ACOPOSinverter P66

User's manual

Version: **1.30 (August 2019)**
Order no.: **MAACPIP66-ENG**

Translation of the original documentation

1 Safety information

Read through these instructions carefully and familiarize yourself with the device before installing, operating or servicing it. The warning messages listed below are included in all documentation and on the device itself in order to highlight potential risks and hazards, or to indicate specific information intended to explain or simplify a particular procedure.

Notes

Danger!

DANGER indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

Warning!

WARNING indicates a potentially hazardous situation that, if not avoided, can result in death, serious injury and/or damage to the equipment.

Caution!

CAUTION indicates a potentially hazardous situation that, if not avoided, can result in injury and/or damage to the equipment.

Advice:

NOTICE, when used without an accompanying hazard symbol, indicates a potentially hazardous situation that, if not avoided, could result in damage to the equipment.

Within the scope of this manual, the term "inverter" refers to the controller unit of the frequency inverter as defined by NEC.
Only qualified personnel are permitted to install, operate, service and repair electrical devices. B&R takes no responsibility for any consequences that may arise from use of this product.

PLEASE NOTE:

Only qualified personnel are permitted to install, operate, control and service electrical devices. B&R is not liable for any damages resulting from use of this equipment.
Qualified personnel are employees who have acquired the necessary skills and knowledge in relation to the design, operation and installation of this electrical device, and who have successfully completed training on how to identify and prevent potential hazards.

Personnel qualifications

Only trained and authorized personnel who are familiar with the content of this manual as well as the overall product documentation are permitted to work with or near this product. In addition, such personnel must have taken part in safety training on the identification and prevention of potential hazards associated with use of this product. They must have received sufficient technical training, acquired relevant knowledge and experience and be capable of anticipating and identifying potential hazards resulting from use of the product, changes to its settings or from the mechanical, electrical and electronic features of the overall system. All personnel working with or near this product must be familiar with all applicable standards, guidelines and accident prevention guidelines.

Intended use

This product is an inverter for three-phase synchronous and induction motors and is intended for industrial applications in line with the specifications and instructions contained in this manual. When using the product, all relevant safety precautions, guidelines, specified requirements and technical data must be observed. The product must be installed outside the ATEX zone. Before using the product, a risk assessment must be performed in relation to the product's planned application. Based on the results of this analysis, suitable safety procedures must be implemented. Since the product is used as a component of an overall system, personal safety must be ensured by selecting an appropriate complete system variant (such as an appropriate machine design, for example). Use of this product in any way other than its expressly permitted use is strictly prohibited and can be potentially dangerous. Only qualified personnel are permitted to install, operate, control and service electrical devices.

Product-related information

Danger!

RISK OF ELECTRIC SHOCK, ARC FLASH OR EXPLOSION

- **Only suitably trained and authorized personnel who are familiar with the content of this manual as well as the overall product documentation are permitted to work with or near this drive system. Such personnel must also have successfully completed safety training on the identification and prevention of the various hazards involved. Installation, setup, repair and service must be performed by qualified personnel.**
- **The system integrator is responsible for ensuring compliance with all relevant local and national electrical engineering requirements as well as with any other applicable regulations in relation to the protective grounding of all devices.**
- **Many product parts, including the printed circuits, are powered via the mains voltage. Do not touch! Use electrically insulated tools only.**
- **Once powered on, do not touch any unshielded components or terminals.**
- **Motors can generate voltage when the shaft rotates. Before working on the drive system, make sure that the motor shaft is not driven by an external source.**
- **If there is a change in voltage, the power supply to unused conductors in the motor cable can become disconnected. Any motor cable conductors that are not used must be insulated at either end.**
- **Do not short-circuit the DC bus terminals, the DC bus capacitors or the braking resistor terminals. Before performing any work on the drive system, proceed as follows:**
    - **Disconnect all power supplies, including the external power supply to the control unit, if applicable.**
    - **Affix a "DO NOT SWITCH ON" sign to all circuit breakers.**
    - **Lock all circuit breakers in the open position.**
    - **Wait 15 minutes to allow the DC bus capacitors to discharge. The DC bus LED does not indicate whether there is voltage still present in the DC bus. This voltage can exceed 800 VDC.**
    - **Measure the voltage on the DC bus between the DC bus terminals (PA/+, PC/-) to ensure that the voltage is less than 42 VDC. You can do this using a voltmeter with the correct rated voltage.**
    - **If the DC bus capacitors do not discharge correctly, contact your local B&R representative. In this case, it is not permitted to repair or start up the product.**
- **Mount and close all covers before switching on the power supply.**

Failure to follow these instructions can result in death or serious injury.

Incorrect settings, invalid data or faulty wiring as well as other types of error can cause unexpected movements.

Warning!

UNINTENDED OPERATION OF THE DEVICE

- **When wiring the device, all EMC requirements must be strictly observed.**
- **It is not permitted to operate the product using unspecified or unsuitable settings or data.**
- **Perform a comprehensive commissioning test.**

Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.

Damaged products and accessories can result in electric shock or the equipment operating in unanticipated ways.

Danger!

RISK OF ELECTRIC SHOCK, ARC FLASH OR EXPLOSION

Use of damaged products or accessories is not permitted.

Failure to follow these instructions can result in death or serious injury.

In the event of damage, contact your local B&R sales representative.

Warning!

CONTROL FAILURE

- **When designing a control plan, possible error states for the control paths must be taken into account and for certain critical control functions, a procedure must be put in place to ensure that the device can return to a safe state after a path has failed. Examples of critical control functions include emergency switch-off, overrun stop, power failure and restart.**
- **Separate or redundant control paths must be provided for critical control functions.**
- **System control paths can include communication connections. The effects of unforeseen transfer delays or connection disruptions must be taken into account.**
- **All applicable accident prevention guidelines and local safety regulations[1)] must be taken into account.**
- **Before commissioning, each individual implementation of the product must be tested carefully to ensure smooth operation.**

Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.

Advice:

IRREPARABLE DAMAGE DUE TO INCORRECT SUPPLY VOLTAGE

- **Before switching on and configuring the product, ensure that it is authorized for use with the existing supply voltage.**

Failure to follow these instructions can result in equipment damage or injury.

When operating, the products described in these instructions can reach temperatures of over 80°C.

Warning!

HOT SURFACES

- **Avoid all contact with hot surfaces.**
- **Keep flammable or heat-sensitive parts away from the immediate vicinity of hot surfaces.**
- **Before handling the product, make sure to check that it has cooled down sufficiently.**
- **Make sure that there is adequate heat dissipation by performing a test run on maximum load.**

Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.

The product is approved for applications in areas outside of danger zones (explosive atmospheres). Only install the device in zones that are not exposed to hazardous environments.

1) For additional information for the US, see NEMA ICS 1.1 (latest edition), "Safety guidelines for the application, installation and maintenance of solid state control" and NEMA ICS 7.1 (latest edition), "Safety standards for construction and guide for selection, installation and operation of adjustable-speed drive systems".

Danger!

POTENTIALLY EXPLOSIVE ENVIRONMENTS

Only use this device in zones that are not exposed to potentially explosive environments.

Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.

Machines, controls and associated equipment are normally integrated into networks. In the event of inadequate access protection for software and networks, unauthorized persons and malicious software (malware) could gain access to the inverter and other devices in the inverter's network/fieldbus and connected networks.

Warning!

UNAUTHORIZED ACCESS TO THE MACHINE VIA SOFTWARE OR NETWORK.

When performing your hazard and risk assessment, take into account all hazards that can result from the device being accessed or used from a network/fieldbus and define a suitable cybersecurity strategy.

Make sure that the hardware and software infrastructure in which the machine is used is fully integrated. Also ensure that all organizational procedures and rules for accessing this infrastructure take into account the results of the hazard and risk assessment and that they are implemented in accordance with best practices and standards for IT security and cybersecurity. For more information about procedures and standards for IT security and cybersecurity, see the following standards (Examples: ISO / IEC 27000 - Series, Common Criteria for Information Technology Security Evaluation, ISO/ IEC 15408, IEC 62351, ISA/IEC 62443, NIST Cybersecurity Framework, Information Security Forum - Standard of Good Practice for Information Security).

Test the effectiveness of your IT and cybersecurity systems using suitable, proven methods.

Failure to follow these instructions can result in serious injury and death or damage to the equipment.

Warning!

LOSS OF CONTROL

Perform a comprehensive commissioning test to ensure that the communication monitoring function is capable of detecting communication interruptions correctly.

Failure to follow these instructions can result in serious injury and death or damage to the equipment.

2 General information

2.1 Device overview

The ACOPOSinverter P66 family of products comprises five inverter sizes (A, B, C, D and E) and is ideally suited for integration in compact, powerful inverter solutions with high-performance requirements.

Five inverter sizes

Size A 8I66S200018.00-000, 8I66S200037.00-000, 8I66S200055.00-000, 8I66S200075.00-000, 8I66T200018.00-000, 8I66T200037.00-000, 8I66T200055.00-000, 8I66T200075.00-000	**Size B** 8I66S200110.00-000, 8I66S200150.00-000, 8I66S200220.00-000, 8I66T200110.00-000, 8I66T200150.00-000, 8I66T200220.00-000, 8I66T400037.00-000, 8I66T400055.00-000, 8I66T400075.00-000, 8I66T400110.00-000, 8I66T400150.00-000, 8I66T600075.00-000, 8I66T600150.00-000
• 240 V 1-phase from 0.18 to 0.75 kW (0.25 to 1 PS) • 240 V 3-phase from 0.18 to 0.75 kW (0.25 to 1 PS) 	• 240 V 1-phase from 1.1 to 2.2 kW (1.5 to 3 PS) • 240 V 3-phase from 1.1 to 2.2 kW (1.5 to 3 PS) • 500 V 3-phase from 0.37 to 1.5 kW (0.5 to 2 PS) • 600 V 3-phase from 0.75 to 1.5 kW (1 to 2 PS) 
Size C 8I66T200300.00-000, 8I66T200400.00-000, 8I66T400220.00-000, 8I66T400300.00-000, 8I66T400400.00-000, 8I66T600220.00-000, 8I66T600400.00-000	**Size D** 8I66T200550.00-000, 8I66T200750.00-000, 8I66T400550.00-000, 8I66T400750.00-000, 8I66T600550.00-000, 8I66T600750.00-000,
• 500 V 3-phase from 2.2 to 4 kW (up to 5 PS) • 600 V 3-phase from 2.2 to 4 kW (up to 5 PS) 	• 240 V 3-phase from 3 to 7.5 kW (4 to 10 PS) • 500 V 3-phase from 5.5 to 7.5 kW (7.5 to 10 PS) • 600 V 3-phase from 5.5 to 7.5 kW (7.5 to 10 PS) 
Size E 8I66T201100.00-000, 8I66T201500.00-000, 8I66T401100.00-000, 8I66T401500.00-000, 8I66T601100.00-000, 8I66T601500.00-000,	
• 240 V 3-phase from 11 to 15 kW (15 to 20 PS) • 500 V 3-phase from 11 to 15 kW (15 to 20 PS) • 600 V 3-phase from 11 to 15 kW (15 to 20 PS) 	

2.2 Model number key

Product area														
8														Motion group
	Product family													
	I													ACOPOSinverter
		Model												
		66												ACOPOSinverter P66
			Number of phases											
			S											1-phase
			T											3-phase
				Voltage range										
				2										200 to 240 V
				4										380 to 500 V
				6										525 to 600 V
					Nominal power									
					0-9									W x 10^5
						0-9								W x 10^4
							0-9							W x 10^3
								0-9						W x 10^2
									0-9					W x 10
											Interface			
										.	0-F			Version
										.	0P			POWERLINK
													Version	
												-	000	Version control
Examples														
8	I	66	S	2	0	0	0	1	8	.	00	-	000	ACOPOSinverter P66, 1 x 200 to 240 V, 0.18 kW, integrated EMC filter and brake chopper, shield plate included in delivery
8	I	66	S	2	0	0	0	1	8	.	0P	-	000	ACOPOSinverter P66, 1 x 200 to 240 V, 0.18 kW, integrated EMC filter and brake chopper, shield plate included in delivery, POWERLINK interface
8	I	66	T	2	0	0	1	5	0	.	00	-	000	ACOPOSinverter P66, 3 x 200 to 240 V, 1.5 kW, integrated EMC filter and brake chopper, shield plate included in delivery
8	I	66	T	2	0	0	1	5	0	.	0P	-	000	ACOPOSinverter P66, 3 x 200 to 240 V, 1.5 kW, integrated EMC filter and brake chopper, shield plate included in delivery, POWERLINK interface
8	I	66	T	4	0	0	3	0	0	.	00	-	000	ACOPOSinverter P66, 3 x 380 to 500 V, 3 kW, integrated EMC filter and brake chopper, shield plate included in delivery
8	I	66	T	4	0	0	3	0	0	.	0P	-	000	ACOPOSinverter P66, 3 x 380 to 500 V, 3 kW, integrated EMC filter and brake chopper, shield plate included in delivery, POWERLINK interface
8	I	66	T	6	0	1	1	0	0	.	00	-	000	ACOPOSinverter P66, 3 x 500 to 600 V, 11 kW, integrated EMC filter and brake chopper, shield plate included in delivery
8	I	66	T	6	0	1	1	0	0	.	0P	-	000	ACOPOSinverter P66, 3 x 500 to 600 V, 11 kW, integrated EMC filter and brake chopper, shield plate included in delivery, POWERLINK interface

2.3 Order data

2.3.1 8I66S200018.00-000, 8I66S200037.00-000, 8I66S200055.00-000, 8I66S200075.00-000

Model number	Short description	Figure
	ACOPOSinverter P66 - 1-phase 200 to 240 V	
8I66S200018.00-000	ACOPOSinverter P66, 1 x 200 to 240 V, 0.18 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66S200037.00-000	ACOPOSinverter P66, 1 x 200 to 240 V, 0.37 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66S200055.00-000	ACOPOSinverter P66, 1 x 200 to 240 V, 0.55 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66S200075.00-000	ACOPOSinverter P66, 1 x 200 to 240 V, 0.75 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
	Optional accessories	
	Cable and adapters	
8I0XC001.003-1	USB adapter cable, USB to Modbus, for ACOPOSinverter.	
8I0XD302.300-1	Installation kit, IP54 protection, for graphic display of the ACOPOSinverter.	
8I0XD303.300-1	Front cover for installation kit, IP65 protection, for graphic display of the ACOPOSinverter.	
8I0XD304.301-1	RJ45 cable, 1 m, for graphic display of the ACOPOSinverter.	
8I0XD304.303-1	RJ45 cable, 3 m, for graphic display of the ACOPOSinverter.	
8I0XD304.305-1	RJ45 cable, 5 m, for graphic display of the ACOPOSinverter.	
8I0XD304.310-1	RJ45 cable, 10 m, for graphic display of the ACOPOSinverter.	
8I0XD305.300-1	Female to female adapter, RJ45, for graphics display of the ACOPOSinverter.	
	Cable and adapters (CANopen)	
8I0CA001.000-1	Y-cable, RJ45, daisy chain connection ≤0.3 m, for integrated CANopen interface of the ACOPOSinverter.	
	Graphic displays	
8I0XD301.300-1	Graphics display for ACOPOSinverter, 240 x 160 pixels, 8 lines, backlight, function keys, navigation key, IP54 protection.	
	Optional EMC filters	
8I0FS009.200-2	9 A EMC filter for ACOPOSinverter P76 and P74new (1-phase 200-240 V, 0.18-0.75 kW).	
	Optional braking resistors	
8I0BR060.000-1	Braking resistor 60 Ω, continuous braking power 0.1 kW, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 2.2 kW and 3x 380 to 500 V, 5.5 to 7.5 kW, for ACOPOSinverter P84 3x 200 to 240 V, 1.5 to 2.2 kW and 3x 380 to 480 V, 5.5 to 7.5 kW.	
8I0BR100.000-1	Braking resistor 100 Ω, continuous braking power 0.05 kW, for ACOPOSinverter P76 and P74new 1x200 to 240 V, 0.18 to 1.5 kW and 3x 380 to 500 V, 0.37 to 4 kW for ACOPOSinverter P84 3x 200 to 240 V, 0.37 to 0.75 kW and 3x 380 to 480 V, 0.75 to 4 kW.	
	Optional line chokes	
8I0CS004.000-1	Mains choke 1-phase 4 A, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 0.18 to 0.37 kW.	
8I0CS007.000-1	Mains choke 1-phase 7 A, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 0.55 to 0.75 kW.	
	X2X Link cable	
X67CA0X99.1000	Cable for custom assembly, 100 m	
X67CA0X99.5000	Cable for custom assembly, 500 m	

Table 1: 8I66S200018.00-000, 8I66S200037.00-000, 8I66S200055.00-000, 8I66S200075.00-000 - Order data

2.3.2 8I66S200110.00-000, 8I66S200150.00-000, 8I66S200220.00-000

Model number	Short description	Figure
	ACOPOSinverter P66 - 1-phase 200 to 240 V	
8I66S200110.00-000	ACOPOSinverter P66, 1 x 200 to 240 V, 1.1 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66S200150.00-000	ACOPOSinverter P66, 1 x 200 to 240 V, 1.5 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66S200220.00-000	ACOPOSinverter P66, 1 x 200 to 240 V, 2.2 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
	Optional accessories	
	Cable and adapters	
8I0XC001.003-1	USB adapter cable, USB to Modbus, for ACOPOSinverter.	
8I0XD302.300-1	Installation kit, IP54 protection, for graphic display of the ACOPOSinverter.	
8I0XD303.300-1	Front cover for installation kit, IP65 protection, for graphic display of the ACOPOSinverter.	
8I0XD304.301-1	RJ45 cable, 1 m, for graphic display of the ACOPOSinverter.	
8I0XD304.303-1	RJ45 cable, 3 m, for graphic display of the ACOPOSinverter.	
8I0XD304.305-1	RJ45 cable, 5 m, for graphic display of the ACOPOSinverter.	
8I0XD304.310-1	RJ45 cable, 10 m, for graphic display of the ACOPOSinverter.	
8I0XD305.300-1	Female to female adapter, RJ45, for graphics display of the ACOPOSinverter.	
	Cable and adapters (CANopen)	
8I0CA001.000-1	Y-cable, RJ45, daisy chain connection ≤0.3 m, for integrated CANopen interface of the ACOPOSinverter.	
	Graphic displays	
8I0XD301.300-1	Graphics display for ACOPOSinverter, 240 x 160 pixels, 8 lines, backlight, function keys, navigation key, IP54 protection.	
	Optional EMC filters	
8I0FS016.200-1	16 A EMC filter for ACOPOSinverter P76 and P74new (1-phase 200-240 V, 1.1-1.5 kW).	
8I0FS022.200-1	22 A EMC filter for ACOPOSinverter P76 and P74new (1-phase 200-240 V, 2.2 kW).	
	Optional braking resistors	
8I0BR028.000-1	Braking resistor 28 Ω continuous braking power 0.2 kW, for ACOPOSinverter P76 and P74new 3x 380 to 500 V, 11 to 15 kW, for ACOPOSinverter P84 3x 200 to 240 V, 3 to 4 kW and 3x 380 to 480 V, 11 to 15 kW.	
8I0BR060.000-1	Braking resistor 60 Ω, continuous braking power 0.1 kW, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 2.2 kW and 3x 380 to 500 V, 5.5 to 7.5 kW, for ACOPOSinverter P84 3x 200 to 240 V, 1.5 to 2.2 kW and 3x 380 to 480 V, 5.5 to 7.5 kW.	
	Optional line chokes	
8I0CS018.000-1	Mains choke 1-phase 18 A, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 1.1 to 2.2 kW.	
	X2X Link cable	
X67CA0X99.1000	Cable for custom assembly, 100 m	
X67CA0X99.5000	Cable for custom assembly, 500 m	

Table 2: 8I66S200110.00-000, 8I66S200150.00-000, 8I66S200220.00-000 - Order data

2.3.3 8I66T200018.00-000, 8I66T200037.00-000, 8I66T200055.00-000, 8I66T200075.00-000

Model number	Short description	Figure
	ACOPOSinverter P66 - 1-phase 200 to 240 V	
8I66T200018.00-000	ACOPOSinverter P66, 3 x 200 to 240 V, 0.18 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T200037.00-000	ACOPOSinverter P66, 3 x 200 to 240 V, 0.37 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T200055.00-000	ACOPOSinverter P66, 3 x 200 to 240 V, 0.55 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T200075.00-000	ACOPOSinverter P66, 3 x 200 to 240 V, 0.75 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
	Optional accessories	
	Cable and adapters	
8I0XC001.003-1	USB adapter cable, USB to Modbus, for ACOPOSinverter.	
8I0XD302.300-1	Installation kit, IP54 protection, for graphic display of the ACOPOSinverter.	
8I0XD303.300-1	Front cover for installation kit, IP65 protection, for graphic display of the ACOPOSinverter.	
8I0XD304.301-1	RJ45 cable, 1 m, for graphic display of the ACOPOSinverter.	
8I0XD304.303-1	RJ45 cable, 3 m, for graphic display of the ACOPOSinverter.	
8I0XD304.305-1	RJ45 cable, 5 m, for graphic display of the ACOPOSinverter.	
8I0XD304.310-1	RJ45 cable, 10 m, for graphic display of the ACOPOSinverter.	
8I0XD305.300-1	Female to female adapter, RJ45, for graphics display of the ACOPOSinverter.	
	Cable and adapters (CANopen)	
8I0CA001.000-1	Y-cable, RJ45, daisy chain connection ≤0.3 m, for integrated CANopen interface of the ACOPOSinverter.	
	Graphic displays	
8I0XD301.300-1	Graphics display for ACOPOSinverter, 240 x 160 pixels, 8 lines, backlight, function keys, navigation key, IP54 protection.	
	Optional EMC filters	
8I0FS016.200-1	16 A EMC filter for ACOPOSinverter P76 and P74new (1-phase 200-240 V, 1.1-1.5 kW).	
	Optional braking resistors	
8I0BR060.000-1	Braking resistor 60 Ω, continuous braking power 0.1 kW, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 2.2 kW and 3x 380 to 500 V, 5.5 to 7.5 kW, for ACOPOSinverter P84 3x 200 to 240 V, 1.5 to 2.2 kW and 3x 380 to 480 V, 5.5 to 7.5 kW.	
	Optional line chokes	
8I0CS018.000-1	Mains choke 1-phase 18 A, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 1.1 to 2.2 kW.	
	X2X Link cable	
X67CA0X99.1000	Cable for custom assembly, 100 m	
X67CA0X99.5000	Cable for custom assembly, 500 m	

Table 3: 8I66T200018.00-000, 8I66T200037.00-000, 8I66T200055.00-000, 8I66T200075.00-000 - Order data

2.3.4 8I66T200110.00-000, 8I66T200150.00-000, 8I66T200220.00-000

Model number	Short description	Figure
	ACOPOSinverter P66 - 1-phase 200 to 240 V	
8I66T200110.00-000	ACOPOSinverter P66, 3 x 200 to 240 V, 1.1 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T200150.00-000	ACOPOSinverter P66, 3 x 200 to 240 V, 1.5 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T200220.00-000	ACOPOSinverter P66, 3 x 200 to 240 V, 2.2 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
	Optional accessories	
	Cable and adapters	
8I0XC001.003-1	USB adapter cable, USB to Modbus, for ACOPOSinverter.	
8I0XD302.300-1	Installation kit, IP54 protection, for graphic display of the ACOPOSinverter.	
8I0XD303.300-1	Front cover for installation kit, IP65 protection, for graphic display of the ACOPOSinverter.	
8I0XD304.301-1	RJ45 cable, 1 m, for graphic display of the ACOPOSinverter.	
8I0XD304.303-1	RJ45 cable, 3 m, for graphic display of the ACOPOSinverter.	
8I0XD304.305-1	RJ45 cable, 5 m, for graphic display of the ACOPOSinverter.	
8I0XD304.310-1	RJ45 cable, 10 m, for graphic display of the ACOPOSinverter.	
8I0XD305.300-1	Female to female adapter, RJ45, for graphics display of the ACOPOSinverter.	
	Cable and adapters (CANopen)	
8I0CA001.000-1	Y-cable, RJ45, daisy chain connection ≤0.3 m, for integrated CANopen interface of the ACOPOSinverter.	
	Graphic displays	
8I0XD301.300-1	Graphics display for ACOPOSinverter, 240 x 160 pixels, 8 lines, backlight, function keys, navigation key, IP54 protection.	
	Optional EMC filters	
8I0FS016.200-1	16 A EMC filter for ACOPOSinverter P76 and P74new (1-phase 200-240 V, 1.1-1.5 kW).	
	Optional braking resistors	
8I0BR060.000-1	Braking resistor 60 Ω, continuous braking power 0.1 kW, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 2.2 kW and 3x 380 to 500 V, 5.5 to 7.5 kW, for ACOPOSinverter P84 3x 200 to 240 V, 1.5 to 2.2 kW and 3x 380 to 480 V, 5.5 to 7.5 kW.	
	Optional line chokes	
8I0CS018.000-1	Mains choke 1-phase 18 A, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 1.1 to 2.2 kW.	
	X2X Link cable	
X67CA0X99.1000	Cable for custom assembly, 100 m	
X67CA0X99.5000	Cable for custom assembly, 500 m	

Table 4: 8I66T200110.00-000, 8I66T200150.00-000, 8I66T200220.00-000 - Order data

2.3.5 8I66T200300.00-000, 8I66T200400.00-000, 8I66T200550.00-000, 8I66T200750.00-000

Model number	Short description	Figure
	ACOPOSinverter P66 - 1-phase 200 to 240 V	
8I66T200300.00-000	ACOPOSinverter P66, 3 x 200 to 240 V, 3 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T200400.00-000	ACOPOSinverter P66, 3 x 200 to 240 V, 4 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T200550.00-000	ACOPOSinverter P66, 3 x 200 to 240 V, 5.5 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T200750.00-000	ACOPOSinverter P66, 3 x 200 to 240 V, 7.5 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
	Optional accessories	
	Cable and adapters	
8I0XC001.003-1	USB adapter cable, USB to Modbus, for ACOPOSinverter.	
8I0XD302.300-1	Installation kit, IP54 protection, for graphic display of the ACOPOSinverter.	
8I0XD303.300-1	Front cover for installation kit, IP65 protection, for graphic display of the ACOPOSinverter.	
8I0XD304.301-1	RJ45 cable, 1 m, for graphic display of the ACOPOSinverter.	
8I0XD304.303-1	RJ45 cable, 3 m, for graphic display of the ACOPOSinverter.	
8I0XD304.305-1	RJ45 cable, 5 m, for graphic display of the ACOPOSinverter.	
8I0XD304.310-1	RJ45 cable, 10 m, for graphic display of the ACOPOSinverter.	
8I0XD305.300-1	Female to female adapter, RJ45, for graphics display of the ACOPOSinverter.	
	Cable and adapters (CANopen)	
8I0CA001.000-1	Y-cable, RJ45, daisy chain connection ≤0.3 m, for integrated CANopen interface of the ACOPOSinverter.	
	Graphic displays	
8I0XD301.300-1	Graphics display for ACOPOSinverter, 240 x 160 pixels, 8 lines, backlight, function keys, navigation key, IP54 protection.	
	Optional EMC filters	
8I0FS016.200-1	16 A EMC filter for ACOPOSinverter P76 and P74new (1-phase 200-240 V, 1.1-1.5 kW).	
	Optional braking resistors	
8I0BR060.000-1	Braking resistor 60 Ω, continuous braking power 0.1 kW, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 2.2 kW and 3x 380 to 500 V, 5.5 to 7.5 kW, for ACOPOSinverter P84 3x 200 to 240 V, 1.5 to 2.2 kW and 3x 380 to 480 V, 5.5 to 7.5 kW.	
	Optional line chokes	
8I0CS018.000-1	Mains choke 1-phase 18 A, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 1.1 to 2.2 kW.	
	X2X Link cable	
X67CA0X99.1000	Cable for custom assembly, 100 m	
X67CA0X99.5000	Cable for custom assembly, 500 m	

Table 5: 8I66T200300.00-000, 8I66T200400.00-000, 8I66T200550.00-000, 8I66T200750.00-000 - Order data

2.3.6 8I66T201100.00-000, 8I66T201500.00-000

Model number	Short description	Figure
	ACOPOSinverter P66 - 1-phase 200 to 240 V	
8I66T201100.00-000	ACOPOSinverter P66, 3 x 200 to 240 V, 11 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T201500.00-000	ACOPOSinverter P66, 3 x 200 to 240 V, 15 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
	Optional accessories	
	Cable and adapters	
8I0XC001.003-1	USB adapter cable, USB to Modbus, for ACOPOSinverter.	
8I0XD302.300-1	Installation kit, IP54 protection, for graphic display of the ACOPOSinverter.	
8I0XD303.300-1	Front cover for installation kit, IP65 protection, for graphic display of the ACOPOSinverter.	
8I0XD304.301-1	RJ45 cable, 1 m, for graphic display of the ACOPOSinverter.	
8I0XD304.303-1	RJ45 cable, 3 m, for graphic display of the ACOPOSinverter.	
8I0XD304.305-1	RJ45 cable, 5 m, for graphic display of the ACOPOSinverter.	
8I0XD304.310-1	RJ45 cable, 10 m, for graphic display of the ACOPOSinverter.	
8I0XD305.300-1	Female to female adapter, RJ45, for graphics display of the ACOPOSinverter.	
	Cable and adapters (CANopen)	
8I0CA001.000-1	Y-cable, RJ45, daisy chain connection ≤0.3 m, for integrated CANopen interface of the ACOPOSinverter.	
	Graphic displays	
8I0XD301.300-1	Graphics display for ACOPOSinverter, 240 x 160 pixels, 8 lines, backlight, function keys, navigation key, IP54 protection.	
	Optional EMC filters	
8I0FS016.200-1	16 A EMC filter for ACOPOSinverter P76 and P74new (1-phase 200-240 V, 1.1-1.5 kW).	
	Optional braking resistors	
8I0BR060.000-1	Braking resistor 60 Ω, continuous braking power 0.1 kW, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 2.2 kW and 3x 380 to 500 V, 5.5 to 7.5 kW, for ACOPOSinverter P84 3x 200 to 240 V, 1.5 to 2.2 kW and 3x 380 to 480 V, 5.5 to 7.5 kW.	
	Optional line chokes	
8I0CS018.000-1	Mains choke 1-phase 18 A, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 1.1 to 2.2 kW.	
	X2X Link cable	
X67CA0X99.1000	Cable for custom assembly, 100 m	
X67CA0X99.5000	Cable for custom assembly, 500 m	

Table 6: 8I66T201100.00-000, 8I66T201500.00-000 - Order data

2.3.7 8I66T400037.00-000, 8I66T400055.00-000, 8I66T400075.00-000, 8I66T400110.00-000

Model number	Short description	Figure
	ACOPOSinverter P66 - 3-phase 380 to 500 V	
8I66T400037.00-000	ACOPOSinverter P66, 3 x 380 to 500 V, 0.37 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T400055.00-000	ACOPOSinverter P66, 3 x 380 to 500 V, 0.55 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T400075.00-000	ACOPOSinverter P66, 3 x 380 to 500 V, 0.75 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T400110.00-000	ACOPOSinverter P66, 3 x 380 to 500 V, 1.1 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
	Optional accessories	
	Cable and adapters	
8I0XC001.003-1	USB adapter cable, USB to Modbus, for ACOPOSinverter.	
8I0XD302.300-1	Installation kit, IP54 protection, for graphic display of the ACOPOSinverter.	
8I0XD303.300-1	Front cover for installation kit, IP65 protection, for graphic display of the ACOPOSinverter.	
8I0XD304.301-1	RJ45 cable, 1 m, for graphic display of the ACOPOSinverter.	
8I0XD304.303-1	RJ45 cable, 3 m, for graphic display of the ACOPOSinverter.	
8I0XD304.305-1	RJ45 cable, 5 m, for graphic display of the ACOPOSinverter.	
8I0XD304.310-1	RJ45 cable, 10 m, for graphic display of the ACOPOSinverter.	
8I0XD305.300-1	Female to female adapter, RJ45, for graphics display of the ACOPOSinverter.	
	Cable and adapters (CANopen)	
8I0CA001.000-1	Y-cable, RJ45, daisy chain connection ≤0.3 m, for integrated CANopen interface of the ACOPOSinverter.	
	Graphic displays	
8I0XD301.300-1	Graphics display for ACOPOSinverter, 240 x 160 pixels, 8 lines, backlight, function keys, navigation key, IP54 protection.	
	Optional EMC filters	
8I0FT015.200-1	15 A EMC filter for ACOPOSinverter P76 and P74new (3-phase 380-500 V, 0.37-1.5 kW).	
	Optional braking resistors	
8I0BR100.000-1	Braking resistor 100 Ω, continuous braking power 0.05 kW, for ACOPOSinverter P76 and P74new 1x200 to 240 V, 0.18 to 1.5 kW and 3x 380 to 500 V, 0.37 to 4 kW for ACOPOSinverter P84 3x 200 to 240 V, 0.37 to 0.75 kW and 3x 380 to 480 V, 0.75 to 4 kW.	
	Optional line chokes	
8I0CT004.000-1	Mains choke 3-phase 4 A, for ACOPOSinverter P74 3x 380 to 500 V, 0.37 to 1.5 kW, for ACOPOSinverter P84 3x 200 to 240 V, 0.37 to 0.75 kW and 3x 380 to 480 V, 0.75 to 1.5 kW.	
	X2X Link cable	
X67CA0X99.1000	Cable for custom assembly, 100 m	
X67CA0X99.5000	Cable for custom assembly, 500 m	

Table 7: 8I66T400037.00-000, 8I66T400055.00-000, 8I66T400075.00-000, 8I66T400110.00-000 - Order data

2.3.8 8I66T400150.00-000, 8I66T400220.00-000, 8I66T400300.00-000, 8I66T400400.00-000

Model number	Short description	Figure
	ACOPOSinverter P66 - 3-phase 380 to 500 V	
8I66T400150.00-000	ACOPOSinverter P66, 3 x 380 to 500 V, 1.5 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T400220.00-000	ACOPOSinverter P66, 3 x 380 to 500 V, 2.2 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T400300.00-000	ACOPOSinverter P66, 3 x 380 to 500 V, 3 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T400400.00-000	ACOPOSinverter P66, 3 x 380 to 500 V, 4 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
	Optional accessories	
	Cable and adapters	
8I0XC001.003-1	USB adapter cable, USB to Modbus, for ACOPOSinverter.	
8I0XD302.300-1	Installation kit, IP54 protection, for graphic display of the ACOPOSinverter.	
8I0XD303.300-1	Front cover for installation kit, IP65 protection, for graphic display of the ACOPOSinverter.	
8I0XD304.301-1	RJ45 cable, 1 m, for graphic display of the ACOPOSinverter.	
8I0XD304.303-1	RJ45 cable, 3 m, for graphic display of the ACOPOSinverter.	
8I0XD304.305-1	RJ45 cable, 5 m, for graphic display of the ACOPOSinverter.	
8I0XD304.310-1	RJ45 cable, 10 m, for graphic display of the ACOPOSinverter.	
8I0XD305.300-1	Female to female adapter, RJ45, for graphics display of the ACOPOSinverter.	
	Cable and adapters (CANopen)	
8I0CA001.000-1	Y-cable, RJ45, daisy chain connection ≤0.3 m, for integrated CANopen interface of the ACOPOSinverter.	
	Graphic displays	
8I0XD301.300-1	Graphics display for ACOPOSinverter, 240 x 160 pixels, 8 lines, backlight, function keys, navigation key, IP54 protection.	
	Optional EMC filters	
8I0FT015.200-1	15 A EMC filter for ACOPOSinverter P76 and P74new (3-phase 380-500 V, 0.37-1.5 kW).	
8I0FT025.200-1	25 A EMC filter for ACOPOSinverter P76 and P74new (3-phase 380-500 V, 2.2-4 kW).	
	Optional braking resistors	
8I0BR060.000-1	Braking resistor 60 Ω, continuous braking power 0.1 kW, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 2.2 kW and 3x 380 to 500 V, 5.5 to 7.5 kW, for ACOPOSinverter P84 3x 200 to 240 V, 1.5 to 2.2 kW and 3x 380 to 480 V, 5.5 to 7.5 kW.	
8I0BR100.000-1	Braking resistor 100 Ω, continuous braking power 0.05 kW, for ACOPOSinverter P76 and P74new 1x200 to 240 V, 0.18 to 1.5 kW and 3x 380 to 500 V, 0.37 to 4 kW for ACOPOSinverter P84 3x 200 to 240 V, 0.37 to 0.75 kW and 3x 380 to 480 V, 0.75 to 4 kW.	
	Optional line chokes	
8I0CT004.000-1	Mains choke 3-phase 4 A, for ACOPOSinverter P74 3x 380 to 500 V, 0.37 to 1.5 kW, for ACOPOSinverter P84 3x 200 to 240 V, 0.37 to 0.75 kW and 3x 380 to 480 V, 0.75 to 1.5 kW.	
8I0CT010.000-1	Mains choke 3-phase 10 A, for ACOPOSinverter P74 3x 380 to 500 V, 2.2 to 4 kW, for ACOPOSinverter P84 3x 200 to 240 V, 1.5 to 2.2 kW and 3x 380 to 480 V, 2.2 to 4 kW.	
	X2X Link cable	
X67CA0X99.1000	Cable for custom assembly, 100 m	
X67CA0X99.5000	Cable for custom assembly, 500 m	

Table 8: 8I66T400150.00-000, 8I66T400220.00-000, 8I66T400300.00-000, 8I66T400400.00-000 - Order data

2.3.9 8I66T400550.00-000, 8I66T400750.00-000, 8I66T401100.00-000, 8I66T401500.00-000

Model number	Short description	Figure
	ACOPOSinverter P66 - 3-phase 380 to 500 V	
8I66T400550.00-000	ACOPOSinverter P66, 3 x 380 to 500 V, 5.5 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T400750.00-000	ACOPOSinverter P66, 3 x 380 to 500 V, 7.5 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T401100.00-000	ACOPOSinverter P66, 3 x 380 to 500 V, 11 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T401500.00-000	ACOPOSinverter P66, 3 x 380 to 500 V, 15 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
	Optional accessories	
	Cable and adapters	
8I0XC001.003-1	USB adapter cable, USB to Modbus, for ACOPOSinverter.	
8I0XD302.300-1	Installation kit, IP54 protection, for graphic display of the ACOPOSinverter.	
8I0XD303.300-1	Front cover for installation kit, IP65 protection, for graphic display of the ACOPOSinverter.	
8I0XD304.301-1	RJ45 cable, 1 m, for graphic display of the ACOPOSinverter.	
8I0XD304.303-1	RJ45 cable, 3 m, for graphic display of the ACOPOSinverter.	
8I0XD304.305-1	RJ45 cable, 5 m, for graphic display of the ACOPOSinverter.	
8I0XD304.310-1	RJ45 cable, 10 m, for graphic display of the ACOPOSinverter.	
8I0XD305.300-1	Female to female adapter, RJ45, for graphics display of the ACOPOSinverter.	
	Cable and adapters (CANopen)	
8I0CA001.000-1	Y-cable, RJ45, daisy chain connection ≤0.3 m, for integrated CANopen interface of the ACOPOSinverter.	
	Graphic displays	
8I0XD301.300-1	Graphics display for ACOPOSinverter, 240 x 160 pixels, 8 lines, backlight, function keys, navigation key, IP54 protection.	
	Optional EMC filters	
8I0FT025.200-1	25 A EMC filter for ACOPOSinverter P76 and P74new (3-phase 380-500 V, 2.2-4 kW).	
	Optional braking resistors	
8I0BR060.000-1	Braking resistor 60 Ω, continuous braking power 0.1 kW, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 2.2 kW and 3x 380 to 500 V, 5.5 to 7.5 kW, for ACOPOSinverter P84 3x 200 to 240 V, 1.5 to 2.2 kW and 3x 380 to 480 V, 5.5 to 7.5 kW.	
	Optional line chokes	
8I0CT010.000-1	Mains choke 3-phase 10 A, for ACOPOSinverter P74 3x 380 to 500 V, 2.2 to 4 kW, for ACOPOSinverter P84 3x 200 to 240 V, 1.5 to 2.2 kW and 3x 380 to 480 V, 2.2 to 4 kW.	
	X2X Link cable	
X67CA0X99.1000	Cable for custom assembly, 100 m	
X67CA0X99.5000	Cable for custom assembly, 500 m	

Table 9: 8I66T400550.00-000, 8I66T400750.00-000, 8I66T401100.00-000, 8I66T401500.00-000 - Order data

2.3.10 8I66T600075.00-000, 8I66T600150.00-000, 8I66T600220.00-000, 8I66T600400.00-000

Model number	Short description	Figure
	ACOPOSinverter P66 - 3-phase 525 to 600 V	
8I66T600075.00-000	ACOPOSinverter P66, 3 x 525 to 600 V, 0.75 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T600150.00-000	ACOPOSinverter P66, 3 x 525 to 600 V, 1.5 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T600220.00-000	ACOPOSinverter P66, 3 x 525 to 600 V, 2.2 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T600400.00-000	ACOPOSinverter P66, 3 x 525 to 600 V, 4 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
	Optional accessories	
	Cable and adapters	
8I0XC001.003-1	USB adapter cable, USB to Modbus, for ACOPOSinverter.	
8I0XD302.300-1	Installation kit, IP54 protection, for graphic display of the ACOPOSinverter.	
8I0XD303.300-1	Front cover for installation kit, IP65 protection, for graphic display of the ACOPOSinverter.	
8I0XD304.301-1	RJ45 cable, 1 m, for graphic display of the ACOPOSinverter.	
8I0XD304.303-1	RJ45 cable, 3 m, for graphic display of the ACOPOSinverter.	
8I0XD304.305-1	RJ45 cable, 5 m, for graphic display of the ACOPOSinverter.	
8I0XD304.310-1	RJ45 cable, 10 m, for graphic display of the ACOPOSinverter.	
8I0XD305.300-1	Female to female adapter, RJ45, for graphics display of the ACOPOSinverter.	
	Cable and adapters (CANopen)	
8I0CA001.000-1	Y-cable, RJ45, daisy chain connection ≤0.3 m, for integrated CANopen interface of the ACOPOSinverter.	
	Graphic displays	
8I0XD301.300-1	Graphics display for ACOPOSinverter, 240 x 160 pixels, 8 lines, backlight, function keys, navigation key, IP54 protection.	
	Optional braking resistors	
8I0BR100.000-1	Braking resistor 100 Ω, continuous braking power 0.05 kW, for ACOPOSinverter P76 and P74new 1x200 to 240 V, 0.18 to 1.5 kW and 3x 380 to 500 V, 0.37 to 4 kW for ACOPOSinverter P84 3x 200 to 240 V, 0.37 to 0.75 kW and 3x 380 to 480 V, 0.75 to 4 kW.	
	Optional line chokes	
8I0CT004.000-1	Mains choke 3-phase 4 A, for ACOPOSinverter P74 3x 380 to 500 V, 0.37 to 1.5 kW, for ACOPOSinverter P84 3x 200 to 240 V, 0.37 to 0.75 kW and 3x 380 to 480 V, 0.75 to 1.5 kW.	
8I0CT010.000-1	Mains choke 3-phase 10 A, for ACOPOSinverter P74 3x 380 to 500 V, 2.2 to 4 kW, for ACOPOSinverter P84 3x 200 to 240 V, 1.5 to 2.2 kW and 3x 380 to 480 V, 2.2 to 4 kW.	
	X2X Link cable	
X67CA0X99.1000	Cable for custom assembly, 100 m	
X67CA0X99.5000	Cable for custom assembly, 500 m	

Table 10: 8I66T600075.00-000, 8I66T600150.00-000, 8I66T600220.00-000, 8I66T600400.00-000 - Order data

2.3.11 8I66T600550.00-000, 8I66T600750.00-000, 8I66T601100.00-000, 8I66T601500.00-000

Model number	Short description	Figure
	ACOPOSinverter P66 - 3-phase 525 to 600 V	
8I66T600550.00-000	ACOPOSinverter P66, 3 x 525 to 600 V, 5.5 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T600750.00-000	ACOPOSinverter P66, 3 x 525 to 600 V, 7.5 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T601100.00-000	ACOPOSinverter P66, 3 x 525 to 600 V, 11 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I66T601500.00-000	ACOPOSinverter P66, 3 x 525 to 600 V, 15 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
	Optional accessories	
	Cable and adapters	
8I0XC001.003-1	USB adapter cable, USB to Modbus, for ACOPOSinverter.	
8I0XD302.300-1	Installation kit, IP54 protection, for graphic display of the ACOPOSinverter.	
8I0XD303.300-1	Front cover for installation kit, IP65 protection, for graphic display of the ACOPOSinverter.	
8I0XD304.301-1	RJ45 cable, 1 m, for graphic display of the ACOPOSinverter.	
8I0XD304.303-1	RJ45 cable, 3 m, for graphic display of the ACOPOSinverter.	
8I0XD304.305-1	RJ45 cable, 5 m, for graphic display of the ACOPOSinverter.	
8I0XD304.310-1	RJ45 cable, 10 m, for graphic display of the ACOPOSinverter.	
8I0XD305.300-1	Female to female adapter, RJ45, for graphics display of the ACOPOSinverter.	
	Cable and adapters (CANopen)	
8I0CA001.000-1	Y-cable, RJ45, daisy chain connection ≤0.3 m, for integrated CANopen interface of the ACOPOSinverter.	
	Graphic displays	
8I0XD301.300-1	Graphics display for ACOPOSinverter, 240 x 160 pixels, 8 lines, backlight, function keys, navigation key, IP54 protection.	
	Optional braking resistors	
8I0BR028.000-1	Braking resistor 28 Ω continuous braking power 0.2 kW, for ACOPOSinverter P76 and P74new 3x 380 to 500 V, 11 to 15 kW, for ACOPOSinverter P84 3x 200 to 240 V, 3 to 4 kW and 3x 380 to 480 V, 11 to 15 kW.	
8I0BR060.000-1	Braking resistor 60 Ω, continuous braking power 0.1 kW, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 2.2 kW and 3x 380 to 500 V, 5.5 to 7.5 kW, for ACOPOSinverter P84 3x 200 to 240 V, 1.5 to 2.2 kW and 3x 380 to 480 V, 5.5 to 7.5 kW.	
	Optional line chokes	
8I0CT016.000-1	Mains choke, 3-phase 17 A, for ACOPOSinverter P74 3x 380 to 500 V, 5.5 to 7.5 kW, for ACOPOSinverter P84 3x 200 to 240 V, 3 kW and 3x 380 to 480 V, 5.5 to 7.5 kW.	
8I0CT030.000-1	Mains choke 3-phase 30 A, for ACOPOSinverter P74 3x 380 to 500 V, 11 to 15 kW, for ACOPOSinverter P84 3x 200 to 240 V, 4 to 5.5 kW and 3x 380 to 480 V, 11 to 15 kW.	
	X2X Link cable	
X67CA0X99.1000	Cable for custom assembly, 100 m	
X67CA0X99.5000	Cable for custom assembly, 500 m	

Table 11: 8I66T600550.00-000, 8I66T600750.00-000, 8I66T601100.00-000, 8I66T601500.00-000 - Order data

2.4 Technical data

2.4.1 8I66S200018.00-000, 8I66S200037.00-000, 8I66S200055.00-000, 8I66S200075.00-000

Model number	8I66S200018.00-000	8I66S200037.00-000	8I66S200055.00-000	8I66S200075.00-000
General information				
Certifications				
CE	Yes			
UL	Yes			
CSA	Yes			
Motor power				
Specified on nameplate	0.18 kW (0.25 HP)	0.37 kW (0.5 HP)	0.55 kW (0.75 HP)	0.75 kW (1 HP)
Mains connection				
Mains input voltage	1x 200 VAC -15% to 240 VAC +10%			
Frequency	50 to 60 Hz ±5%			
Apparent power (at 240 VAC)	0.6 kVA	1 kVA	1.4 kVA	1.8 kVA
Max. assumed short-circuit current (Isc) (short-circuit current at connection point)	1 kA [1]			
Inrush current	Max. 9.6 A [2]			
Mains current				
At 200 VAC	3.1 A [3]	5.2 A [3]	6.8 A [3]	8.8 A [3]
At 240 VAC	2.6 A [3]	4.3 A [3]	5.7 A [3]	7.4 A [3]
Power dissipation at nominal load and nominal clock frequency	22 W	32 W	42 W	48 W
Integrated EMC filter	Yes [4]			
Motor connection				
Nominal output current	1.5 A [5]	3.3 A [5]	3.7 A [5]	4.8 A [5]
Derating of continuous output current depending on ambient temperature				
At nominal clock frequency (4 kHz)	No derating (up to 50°C)			
Other clock frequencies	The derating curves are included in the installation instructions, which can be downloaded from the website (www.br-automation.com).			
Derating of continuous output current depending on installation elevation				
Starting at 1000 m above sea level	1%, per 100 m			
Max. transient current for 60 s	2.3 A	5 A	5.6 A	7.2 A
Output frequency range	0.1 to 599 Hz			
Nominal clock frequency	4 kHz			
Clock frequency				
Min.	2 kHz			
Max.	16 kHz			
Braking torque				
With braking resistor	Up to 170% of the rated motor torque			
Max. motor cable length				
Shielded cable	50 m			
Non-shielded cable	100 m			
Motor control profiles				
Induction motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps Sensorless slip control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for constant torque (6 f-ranges) → Custom profile for special applications 3. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps			
Synchronous motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile			
Main protective functions of inverter	Thermal protection against power stage overheating Protection against short circuits between motor phases, overcurrent between output phases and ground, overvoltages on the DC bus, exceeding the speed limit. Safety function for: Over- and undervoltage of the power supply system, line phase failure with 3-phase supply			
Brake chopper				
Integrated dynamic brake transistors	Yes			
Min. resistance value (external)	40 Ω			
24 VDC power supply				
Input voltage	24 VDC (-15%/+20%)			
Current	Max. 1.1 A			
Available internal power supplies				
Output voltage 24 VDC	24 VDC (-15%/+20%)			
Output voltage 24 VDC				
Max. output current at 24 VDC	100 mA			
Output voltage 10 VDC	10 VDC (-0%/+10%)			
Output voltage 10 VDC				
Max. output current at 10 VDC	10 mA			

Table 12: 8I66S200018.00-000, 8I66S200037.00-000, 8I66S200055.00-000, 8I66S200075.00-000 - Technical data

Model number	8I66S200018.00-000	8I66S200037.00-000	8I66S200055.00-000	8I66S200075.00-000
Interfaces				
POWERLINK				
Type	Type 3 [6)]			
Digital inputs				
Quantity	6 [7)]			
Nominal voltage	24 VDC (max. 30 VDC)			
Input circuit	Source or sink			
Switching threshold	Sink: >19 V (position 0), <13 V (position 1) Source: <5 V (position 0), >11 V (position 1)			
Electrical isolation				
Input - ACOPOSinverter	Yes			
Input - Input	No			
Sampling time	8 ms ±0.7 ms			
Digital input 5				
Max. input frequency	20 kHz			
Safe input - STO (Safe Torque Off)				
Quantity	1			
Nominal voltage	24 VDC (max. 30 VDC)			
Input impedance	1.5 kΩ			
Input impedance				
Current consumption	16 mA			
Electrical isolation				
Input - ACOPOSinverter	Yes			
Input - Input	No			
Analog inputs				
Quantity	3			
Electrical isolation				
Input - Input	No			
Input - ACOPOSinverter	Yes			
Nonlinearity	±0.2%, max. ±0.5%			
Basic accuracy	At 25°C: ±0.5% At -10 to 60°C: ±0.7%			
Input				
Voltage	AI1: 0 to 10 VDC AI2: 0 ±10 VDC, max. 30 VDC			
Current	0 to 20 mA (or 4 to 20 mA)			
Resolution	10-bit			
Sampling time	2 ms			
Input impedance				
Voltage	30 kΩ			
Current	250 Ω			
Digital outputs				
Quantity	1			
Nominal voltage	24 VDC -15%/+20%			
Max. voltage	30 VDC			
Output circuit	Source or sink			
Sampling time	2 ms			
Max. current	100 mA			
Relay outputs				
Quantity	2			
Nominal voltage	30 VDC / 250 VAC			
Switching current range	Min. switching current: 5 mA at 24 VDC Max. switching current: R1 at cos φ = 1: 3 A at 250 VAC / 4 A at 30 VDC R2 at cos φ = 1: 5 A R1 and R2 at cos φ = 0.4: 2 A			
Variant				
Relay 1	1 changeover contact			
Relay 2	1 normally open contact			
Electrical isolation				
Output - ACOPOSinverter	Yes			
Output - Output	No			
Response time (max.)	2 ms			
Analog outputs				
Quantity	1			
Output	0 to 10 V or 0 to 20 mA			
Nonlinearity	±0.3%			
Basic accuracy	At 25°C: ±1% At -10 to 60°C: ±2%			
Electrical isolation				
Output - ACOPOSinverter	Yes			
Output - Output	No			

Table 12: 8I66S200018.00-000, 8I66S200037.00-000, 8I66S200055.00-000, 8I66S200075.00-000 - Technical data

Model number	8I66S200018.00-000	8I66S200037.00-000	8I66S200055.00-000	8I66S200075.00-000
Max. load impedance				
Voltage	470 Ω			
Current	800 Ω			
Update time	2 ms			
Resolution	10-bit			
Operating conditions				
Degree of protection per EN 61800-5-1	IP20			
Relative humidity per IEC 60068-2-3	5 to 95%, non-condensing No dripping water			
Maximum installation elevation	≤1000 m without derating 1000 to 3000 m with Derating [8)]			
Max. pollution degree per IEC/EN 61800-5-1	2 (non-conductive pollution)			
Ambient conditions per IEC 60721-3-3	Class 3C3 and 3S2			
Operating position	Vertical mounting orientation ±10°			
Ambient conditions				
Temperature				
Operation	-10 to 50°C without derating 50 to 60°C with derating			
Storage	-25 to 70°C			
Max. vibration resistance	1 g_n 13 to 200 Hz EN/IEC 60068-2-6 1.5 mm peak to peak 2 to 13 Hz EN/IEC 60068-2-6			
Mechanical properties				
Dimensions				
Width	72 mm			
Height	188 mm			
Height without shield plate	143 mm			
Depth	109 mm	138 mm		
Weight	0.8 kg	1 kg	1.1 kg	

Table 12: 8I66S200018.00-000, 8I66S200037.00-000, 8I66S200055.00-000, 8I66S200075.00-000 - Technical data

1) With mains choke max. Isc 22 kA for 200/240 V.
2) Peak current when switching on for maximum voltage (240 V +10% or 500 V +10% or 600 V +10%)
3) Typical value for 4-pin motor and a max. clock frequency of 4 kHz, without mains choke for the max. assumed short circuit current (Isc).
4) Inverter is provided with an integrated Category C2 EMC filter. This filter can be switched off.
5) These values apply at a nominal clock frequency of 4 kHz during continuous operation. The clock frequency can be set from 2 to 16 kHz. Above 4 kHz, reduce the nominal drive current. The nominal motor current is not permitted to exceed this value.
6) See Automation Help under "Communication / POWERLINK / General information / Hardware - IF/LS" for more information.
7) 1 logic input can be programmed as a 20 kbps pulse input. 1 logic input is configurable as an input for a PTC sensor using a switch (SW2). Trigger resistance 3 kΩ, reset value 1.8 kΩ, short-circuit proof <50 Ω
8) Over 1000 m, load reduced by 1% per 100 m.

2.4.2 8I66S200110.00-000, 8I66S200150.00-000, 8I66S200220.00-000

Model number	8I66S200110.00-000	8I66S200150.00-000	8I66S200220.00-000
General information			
Certifications			
CE	Yes		
UL	Yes		
CSA	Yes		
Motor power			
Specified on nameplate	1.1 kW (1.5 HP)	1.5 kW (2 HP)	2.2 kW (3 HP)
Mains connection			
Mains input voltage	1x 200 VAC -15% to 240 VAC +10%		
Frequency	50 to 60 Hz ±5%		
Apparent power (at 240 VAC)	2.5 kVA	3.2 kVA	4.4 kVA
Max. assumed short-circuit current (Isc) (short-circuit current at connection point)	1 kA [1)]		
Inrush current	Max. 19.1 A [2)]		
Mains current			
At 200 VAC	12.2 A [3)]	16 A [3)]	22.1 A [3)]
At 240 VAC	10.3 A [3)]	13.4 A [3)]	18.5 A [3)]
Power dissipation at nominal load and nominal clock frequency	66 W	82 W	110 W
Integrated EMC filter	Yes [4)]		
Motor connection			
Nominal output current	6.9 A [5)]	8 A [5)]	11 A [5)]
Derating of continuous output current depending on ambient temperature			
At nominal clock frequency (4 kHz)	No derating (up to 50°C)		
Other clock frequencies	The derating curves are included in the installation instructions, which can be downloaded from the website (www.br-automation.com).		
Derating of continuous output current depending on installation elevation			
Starting at 1000 m above sea level	1%, per 100 m		
Max. transient current for 60 s	10.4 A	12 A	16.5 A
Output frequency range	0.1 to 599 Hz		
Nominal clock frequency	4 kHz		
Clock frequency			
Min.	2 kHz		
Max.	16 kHz		
Braking torque			
With braking resistor	Up to 170% of the rated motor torque		
Max. motor cable length			
Shielded cable	50 m		
Non-shielded cable	100 m		
Motor control profiles			
Induction motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps Sensorless slip control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for constant torque (6 f-ranges) → Custom profile for special applications 3. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps		
Synchronous motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile		
Main protective functions of inverter	Thermal protection against power stage overheating Protection against short circuits between motor phases, overcurrent between output phases and ground, overvoltages on the DC bus, exceeding the speed limit. Safety function for: Over- and undervoltage of the power supply system, line phase failure with 3-phase supply		
Brake chopper			
Integrated dynamic brake transistors	Yes		
Min. resistance value (external)	27 Ω		25 Ω
24 VDC power supply			
Input voltage	24 VDC (-15%/+20%)		
Current	Max. 1.1 A		
Available internal power supplies			
Output voltage 24 VDC	24 VDC (-15%/+20%)		
Output voltage 24 VDC			
Max. output current at 24 VDC	100 mA		
Output voltage 10 VDC	10 VDC (-0%/+10%)		
Output voltage 10 VDC			
Max. output current at 10 VDC	10 mA		

Table 13: 8I66S200110.00-000, 8I66S200150.00-000, 8I66S200220.00-000 - Technical data

Model number	8I66S200110.00-000	8I66S200150.00-000	8I66S200220.00-000
Interfaces			
POWERLINK			
Type	Type 3 [6]		
Digital inputs			
Quantity	6 [7]		
Nominal voltage	24 VDC (max. 30 VDC)		
Input circuit	Source or sink		
Switching threshold	Sink: >19 V (position 0), <13 V (position 1) Source: <5 V (position 0), >11 V (position 1)		
Electrical isolation			
Input - ACOPOSinverter	Yes		
Input - Input	No		
Sampling time	8 ms ±0.7 ms		
Digital input 5			
Max. input frequency	20 kHz		
Safe input - STO (Safe Torque Off)			
Quantity	1		
Nominal voltage	24 VDC (max. 30 VDC)		
Input impedance	1.5 kΩ		
Input impedance			
Current consumption	16 mA		
Electrical isolation			
Input - ACOPOSinverter	Yes		
Input - Input	No		
Analog inputs			
Quantity	3		
Electrical isolation			
Input - Input	No		
Input - ACOPOSinverter	Yes		
Nonlinearity	±0.2%, max. ±0.5%		
Basic accuracy	At 25°C: ±0.5% At -10 to 60°C: ±0.7%		
Input			
Voltage	AI1: 0 to 10 VDC AI2: 0 ±10 VDC, max. 30 VDC		
Current	0 to 20 mA (or 4 to 20 mA)		
Resolution	10-bit		
Sampling time	2 ms		
Input impedance			
Voltage	30 kΩ		
Current	250 Ω		
Digital outputs			
Quantity	1		
Nominal voltage	24 VDC -15%/+20%		
Max. voltage	30 VDC		
Output circuit	Source or sink		
Sampling time	2 ms		
Max. current	100 mA		
Relay outputs			
Quantity	2		
Nominal voltage	30 VDC / 250 VAC		
Switching current range	Min. switching current: 5 mA at 24 VDC Max. switching current: R1 at cos φ = 1: 3 A at 250 VAC / 4 A at 30 VDC R2 at cos φ = 1: 5 A R1 and R2 at cos φ = 0.4: 2 A		
Variant			
Relay 1	1 changeover contact		
Relay 2	1 normally open contact		
Electrical isolation			
Output - ACOPOSinverter	Yes		
Output - Output	No		
Response time (max.)	2 ms		
Analog outputs			
Quantity	1		
Output	0 to 10 V or 0 to 20 mA		
Nonlinearity	±0.3%		
Basic accuracy	At 25°C: ±1% At -10 to 60°C: ±2%		
Electrical isolation			
Output - ACOPOSinverter	Yes		
Output - Output	No		

Table 13: 8I66S200110.00-000, 8I66S200150.00-000, 8I66S200220.00-000 - Technical data

Model number	8I66S200110.00-000	8I66S200150.00-000	8I66S200220.00-000
Max. load impedance			
Voltage	470 Ω		
Current	800 Ω		
Update time	2 ms		
Resolution	10-bit		
Operating conditions			
Degree of protection per EN 61800-5-1	IP20		
Relative humidity per IEC 60068-2-3	5 to 95%, non-condensing No dripping water		
Maximum installation elevation	≤1000 m without derating 1000 to 3000 m with Derating 8)		
Max. pollution degree per IEC/EN 61800-5-1	2 (non-conductive pollution)		
Ambient conditions per IEC 60721-3-3	Class 3C3 and 3S2		
Operating position	Vertical mounting orientation ±10°		
Ambient conditions			
Temperature			
Operation	-10 to 50°C without derating 50 to 60°C with derating		
Storage	-25 to 70°C		
Max. vibration resistance	1 g_n 13 to 200 Hz EN/IEC 60068-2-6 1.5 mm peak to peak 2 to 13 Hz EN/IEC 60068-2-6		
Mechanical properties			
Dimensions			
Width	105 mm		
Height	188 mm		
Height without shield plate	142 mm		
Depth	158 mm		
Weight	1.6 kg		

Table 13: 8I66S200110.00-000, 8I66S200150.00-000, 8I66S200220.00-000 - Technical data

1) With mains choke max. Isc 22 kA for 200/240 V.
2) Peak current when switching on for maximum voltage (240 V +10% or 500 V +10% or 600 V +10%)
3) Typical value for 4-pin motor and a max. clock frequency of 4 kHz, without mains choke for the max. assumed short circuit current (Isc).
4) Inverter is provided with an integrated Category C2 EMC filter. This filter can be switched off.
5) These values apply at a nominal clock frequency of 4 kHz during continuous operation. The clock frequency can be set from 2 to 16 kHz. Above 4 kHz, reduce the nominal drive current. The nominal motor current is not permitted to exceed this value.
6) See Automation Help under "Communication / POWERLINK / General information / Hardware - IF/LS" for more information.
7) 1 logic input can be programmed as a 20 kbps pulse input. 1 logic input is configurable as an input for a PTC sensor using a switch (SW2). Trigger resistance 3 kΩ, reset value 1.8 kΩ, short-circuit proof <50 Ω
8) Over 1000 m, load reduced by 1% per 100 m.

2.4.3 8I66T200018.00-000, 8I66T200037.00-000, 8I66T200055.00-000, 8I66T200075.00-000

Model number	8I66T200018.00-000	8I66T200037.00-000	8I66T200055.00-000	8I66T200075.00-000
General information				
Certifications				
CE	Yes			
UL	Yes			
CSA	Yes			
Motor power				
Specified on nameplate	0.18 kW (0.25 HP)	0.37 kW (0.5 HP)	0.55 kW (0.75 HP)	0.75 kW (1 HP)
Mains connection				
Mains input voltage	3x 200 VAC -15% to 240 VAC +10%			
Frequency	50 to 60 Hz ±5%			
Apparent power (at 240 VAC)	0.6 kVA	1.1 kVA	1.5 kVA	2 kVA
Max. assumed short-circuit current (Isc) (short-circuit current at connection point)	5 kA [1]			
Inrush current	Max. 9.6 A [2]			
Mains current				
At 200 VAC	1.8 A [3]	3.1 A [3]	4.3 A [3]	5.6 A [3]
At 240 VAC	1.5 A [3]	2.6 A [3]	3.6 A [3]	4.7 A [3]
Power dissipation at nominal load and nominal clock frequency	21 W	34 W	40 W	49 W
Integrated EMC filter	No			
Motor connection				
Nominal output current	1.5 A [4]	3.3 A [4]	3.7 A [4]	4.8 A [4]
Derating of continuous output current depending on ambient temperature				
At nominal clock frequency (4 kHz)	No derating (up to 50°C)			
Other clock frequencies	The derating curves are included in the installation instructions, which can be downloaded from the website (www.br-automation.com).			
Derating of continuous output current depending on installation elevation				
Starting at 1000 m above sea level	1%, per 100 m			
Max. transient current for 60 s	2.3 A	5 A	5.6 A	7.2 A
Output frequency range	0.1 to 599 Hz			
Nominal clock frequency	4 kHz			
Clock frequency				
Min.	2 kHz			
Max.	16 kHz			
Braking torque				
With braking resistor	Up to 170% of the rated motor torque			
Max. motor cable length				
Shielded cable	50 m			
Non-shielded cable	100 m			
Motor control profiles				
Induction motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps Sensorless slip control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for constant torque (6 f-ranges) → Custom profile for special applications 3. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps			
Synchronous motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile			
Main protective functions of inverter	Thermal protection against power stage overheating Protection against short circuits between motor phases, overcurrent between output phases and ground, overvoltages on the DC bus, exceeding the speed limit. Safety function for: Over- and undervoltage of the power supply system, line phase failure with 3-phase supply			
Brake chopper				
Integrated dynamic brake transistors	Yes			
Min. resistance value (external)	40 Ω			
24 VDC power supply				
Input voltage	24 VDC (-15%/+20%)			
Current	Max. 1.1 A			
Available internal power supplies				
Output voltage 24 VDC	24 VDC (-15%/+20%)			
Output voltage 24 VDC				
Max. output current at 24 VDC	100 mA			
Output voltage 10 VDC	10 VDC (-0%/+10%)			
Output voltage 10 VDC				
Max. output current at 10 VDC	10 mA			
Interfaces				
POWERLINK				
Type	Type 3 [5]			

Table 14: 8I66T200018.00-000, 8I66T200037.00-000, 8I66T200055.00-000, 8I66T200075.00-000 - Technical data

Model number	8I66T200018.00-000	8I66T200037.00-000	8I66T200055.00-000	8I66T200075.00-000
Digital inputs				
Quantity	6 [6)]			
Nominal voltage	24 VDC (max. 30 VDC)			
Input circuit	Source or sink			
Switching threshold	Sink: >19 V (position 0), <13 V (position 1) Source: <5 V (position 0), >11 V (position 1)			
Electrical isolation				
Input - ACOPOSinverter	Yes			
Input - Input	No			
Sampling time	8 ms ±0.7 ms			
Digital input 5				
Max. input frequency	20 kHz			
Safe input - STO (Safe Torque Off)				
Quantity	1			
Nominal voltage	24 VDC (max. 30 VDC)			
Input impedance	1.5 kΩ			
Input impedance				
Current consumption	16 mA			
Electrical isolation				
Input - ACOPOSinverter	Yes			
Input - Input	No			
Analog inputs				
Quantity	3			
Electrical isolation				
Input - Input	No			
Input - ACOPOSinverter	Yes			
Nonlinearity	±0.2%, max. ±0.5%			
Basic accuracy	At 25°C: ±0.5% At -10 to 60°C: ±0.7%			
Input				
Voltage	AI1: 0 to 10 VDC AI2: 0 ±10 VDC, max. 30 VDC			
Current	0 to 20 mA (or 4 to 20 mA)			
Resolution	10-bit			
Sampling time	2 ms			
Input impedance				
Voltage	30 kΩ			
Current	250 Ω			
Digital outputs				
Quantity	1			
Nominal voltage	24 VDC -15%/+20%			
Max. voltage	30 VDC			
Output circuit	Source or sink			
Sampling time	2 ms			
Max. current	100 mA			
Relay outputs				
Quantity	2			
Nominal voltage	30 VDC / 250 VAC			
Switching current range	Min. switching current: 5 mA at 24 VDC Max. switching current: R1 at cos φ = 1: 3 A at 250 VAC / 4 A at 30 VDC R2 at cos φ = 1: 5 A R1 and R2 at cos φ = 0.4: 2 A			
Variant				
Relay 1	1 changeover contact			
Relay 2	1 normally open contact			
Electrical isolation				
Output - ACOPOSinverter	Yes			
Output - Output	No			
Response time (max.)	2 ms			
Analog outputs				
Quantity	1			
Output	0 to 10 V or 0 to 20 mA			
Nonlinearity	±0.3%			
Basic accuracy	At 25°C: ±1% At -10 to 60°C: ±2%			
Electrical isolation				
Output - ACOPOSinverter	Yes			
Output - Output	No			
Max. load impedance				
Voltage	470 Ω			
Current	800 Ω			
Update time	2 ms			
Resolution	10-bit			

Table 14: 8I66T200018.00-000, 8I66T200037.00-000, 8I66T200055.00-000, 8I66T200075.00-000 - Technical data

Model number	8I66T200018.00-000	8I66T200037.00-000	8I66T200055.00-000	8I66T200075.00-000
Operating conditions				
Degree of protection per EN 61800-5-1	IP20			
Relative humidity per IEC 60068-2-3	5 to 95%, non-condensing No dripping water			
Maximum installation elevation	≤1000 m without derating 1000 to 3000 m with Derating 7)			
Max. pollution degree per IEC/EN 61800-5-1	2 (non-conductive pollution)			
Ambient conditions per IEC 60721-3-3	Class 3C3 and 3S2			
Operating position	Vertical mounting orientation ±10°			
Ambient conditions				
Temperature				
Operation	-10 to 50°C without derating 50 to 60°C with derating			
Storage	-25 to 70°C			
Max. vibration resistance	1 g_n 13 to 200 Hz EN/IEC 60068-2-6 1.5 mm peak to peak 2 to 13 Hz EN/IEC 60068-2-6			
Mechanical properties				
Dimensions				
Width	72 mm			
Height	188 mm			
Height without shield plate	143 mm			
Depth	109 mm	128 mm	138 mm	
Weight	0.8 kg	0.9 kg	1 kg	

Table 14: 8I66T200018.00-000, 8I66T200037.00-000, 8I66T200055.00-000, 8I66T200075.00-000 - Technical data

1) With mains choke max. Isc 22 kA for 200/240 V.
2) Peak current when switching on for maximum voltage (240 V +10% or 500 V +10% or 600 V +10%)
3) Typical value for 4-pin motor and a max. clock frequency of 4 kHz, without mains choke for the max. assumed short circuit current (Isc).
4) These values apply at a nominal clock frequency of 4 kHz during continuous operation. The clock frequency can be set from 2 to 16 kHz. Above 4 kHz, reduce the nominal drive current. The nominal motor current is not permitted to exceed this value.
5) See Automation Help under "Communication / POWERLINK / General information / Hardware - IF/LS" for more information.
6) 1 logic input can be programmed as a 20 kbps pulse input. 1 logic input is configurable as an input for a PTC sensor using a switch (SW2). Trigger resistance 3 kΩ, reset value 1.8 kΩ, short-circuit proof <50 Ω
7) Over 1000 m, load reduced by 1% per 100 m.

2.4.4 8I66T200110.00-000, 8I66T200150.00-000, 8I66T200220.00-000

Model number	8I66T200110.00-000	8I66T200150.00-000	8I66T200220.00-000
General information			
Certifications			
CE	Yes		
UL	Yes		
CSA	Yes		
Motor power			
Specified on nameplate	1.1 kW (1.5 HP)	1.5 kW (2 HP)	2.2 kW (3 HP)
Mains connection			
Mains input voltage	3x 200 VAC -15% to 240 VAC +10%		
Frequency	50 to 60 Hz ±5%		
Apparent power (at 240 VAC)	2.7 kVA	3.5 kVA	4.7 kVA
Max. assumed short-circuit current (Isc) (short-circuit current at connection point)	5 kA [1)]		
Inrush current	Max. 9.6 A [2)]		
Mains current			
At 200 VAC	7.6 A [3)]	10 A [3)]	13.7 A [3)]
At 240 VAC	6.4 A [3)]	8.4 A [3)]	11.4 A [3)]
Power dissipation at nominal load and nominal clock frequency	66 W	69 W	92 W
Integrated EMC filter	No		
Motor connection			
Nominal output current	6.9 A [4)]	8 A [4)]	11 A [4)]
Derating of continuous output current depending on ambient temperature			
At nominal clock frequency (4 kHz)	No derating (up to 50°C)		
Other clock frequencies	The derating curves are included in the installation instructions, which can be downloaded from the website (www.br-automation.com).		
Derating of continuous output current depending on installation elevation			
Starting at 1000 m above sea level	1%, per 100 m		
Max. transient current for 60 s	10.4 A	12 A	16.5 A
Output frequency range	0.1 to 599 Hz		
Nominal clock frequency	4 kHz		
Clock frequency			
Min.	2 kHz		
Max.	16 kHz		
Braking torque			
With braking resistor	Up to 170% of the rated motor torque		
Max. motor cable length			
Shielded cable	50 m		
Non-shielded cable	100 m		
Motor control profiles			
Induction motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps Sensorless slip control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for constant torque (6 f-ranges) → Custom profile for special applications 3. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps		
Synchronous motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile		
Main protective functions of inverter	Thermal protection against power stage overheating Protection against short circuits between motor phases, overcurrent between output phases and ground, overvoltages on the DC bus, exceeding the speed limit. Safety function for: Over- and undervoltage of the power supply system, line phase failure with 3-phase supply		
Brake chopper			
Integrated dynamic brake transistors	Yes		
Min. resistance value (external)	27 Ω		25 Ω
24 VDC power supply			
Input voltage	24 VDC (-15%/+20%)		
Current	Max. 1.1 A		
Available internal power supplies			
Output voltage 24 VDC	24 VDC (-15%/+20%)		
Output voltage 24 VDC			
Max. output current at 24 VDC	100 mA		
Output voltage 10 VDC	10 VDC (-0%/+10%)		
Output voltage 10 VDC			
Max. output current at 10 VDC	10 mA		

Table 15: 8I66T200110.00-000, 8I66T200150.00-000, 8I66T200220.00-000 - Technical data

Model number	8I66T200110.00-000	8I66T200150.00-000	8I66T200220.00-000
Interfaces			
POWERLINK			
Type	Type 3 [5]		
Digital inputs			
Quantity	6 [6]		
Nominal voltage	24 VDC (max. 30 VDC)		
Input circuit	Source or sink		
Switching threshold	Sink: >19 V (position 0), <13 V (position 1) Source: <5 V (position 0), >11 V (position 1)		
Electrical isolation			
Input - ACOPOSinverter	Yes		
Input - Input	No		
Sampling time	8 ms ±0.7 ms		
Digital input 5			
Max. input frequency	20 kHz		
Safe input - STO (Safe Torque Off)			
Quantity	1		
Nominal voltage	24 VDC (max. 30 VDC)		
Input impedance	1.5 kΩ		
Input impedance			
Current consumption	16 mA		
Electrical isolation			
Input - ACOPOSinverter	Yes		
Input - Input	No		
Analog inputs			
Quantity	3		
Electrical isolation			
Input - Input	No		
Input - ACOPOSinverter	Yes		
Nonlinearity	±0.2%, max. ±0.5%		
Basic accuracy	At 25°C: ±0.5% At -10 to 60°C: ±0.7%		
Input			
Voltage	AI1: 0 to 10 VDC AI2: 0 ±10 VDC, max. 30 VDC		
Current	0 to 20 mA (or 4 to 20 mA)		
Resolution	10-bit		
Sampling time	2 ms		
Input impedance			
Voltage	30 kΩ		
Current	250 Ω		
Digital outputs			
Quantity	1		
Nominal voltage	24 VDC -15%/+20%		
Max. voltage	30 VDC		
Output circuit	Source or sink		
Sampling time	2 ms		
Max. current	100 mA		
Relay outputs			
Quantity	2		
Nominal voltage	30 VDC / 250 VAC		
Switching current range	Min. switching current: 5 mA at 24 VDC Max. switching current: R1 at cos φ = 1: 3 A at 250 VAC / 4 A at 30 VDC R2 at cos φ = 1: 5 A R1 and R2 at cos φ = 0.4: 2 A		
Variant			
Relay 1	1 changeover contact		
Relay 2	1 normally open contact		
Electrical isolation			
Output - ACOPOSinverter	Yes		
Output - Output	No		
Response time (max.)	2 ms		
Analog outputs			
Quantity	1		
Output	0 to 10 V or 0 to 20 mA		
Nonlinearity	±0.3%		
Basic accuracy	At 25°C: ±1% At -10 to 60°C: ±2%		
Electrical isolation			
Output - ACOPOSinverter	Yes		
Output - Output	No		

Table 15: 8I66T200110.00-000, 8I66T200150.00-000, 8I66T200220.00-000 - Technical data

Model number	8I66T200110.00-000	8I66T200150.00-000	8I66T200220.00-000
Max. load impedance			
Voltage	470 Ω		
Current	800 Ω		
Update time	2 ms		
Resolution	10-bit		
Operating conditions			
Degree of protection per EN 61800-5-1	IP20		
Relative humidity per IEC 60068-2-3	5 to 95%, non-condensing No dripping water		
Maximum installation elevation	≤1000 m without derating 1000 to 3000 m with Derating 7)		
Max. pollution degree per IEC/EN 61800-5-1	2 (non-conductive pollution)		
Ambient conditions per IEC 60721-3-3	Class 3C3 and 3S2		
Operating position	Vertical mounting orientation ±10°		
Ambient conditions			
Temperature			
Operation	-10 to 50°C without derating 50 to 60°C with derating		
Storage	-25 to 70°C		
Max. vibration resistance	1 g_n 13 to 200 Hz EN/IEC 60068-2-6 1.5 mm peak to peak 2 to 13 Hz EN/IEC 60068-2-6		
Mechanical properties			
Dimensions			
Width	105 mm		
Height	190 mm		
Height without shield plate	143 mm		
Depth	138 mm		
Weight	1.4 kg		

Table 15: 8I66T200110.00-000, 8I66T200150.00-000, 8I66T200220.00-000 - Technical data

1) With mains choke max. Isc 22 kA for 200/240 V.
2) Peak current when switching on for maximum voltage (240 V +10% or 500 V +10% or 600 V +10%)
3) Typical value for 4-pin motor and a max. clock frequency of 4 kHz, without mains choke for the max. assumed short circuit current (Isc).
4) These values apply at a nominal clock frequency of 4 kHz during continuous operation. The clock frequency can be set from 2 to 16 kHz. Above 4 kHz, reduce the nominal drive current. The nominal motor current is not permitted to exceed this value.
5) See Automation Help under "Communication / POWERLINK / General information / Hardware - IF/LS" for more information.
6) 1 logic input can be programmed as a 20 kbps pulse input. 1 logic input is configurable as an input for a PTC sensor using a switch (SW2). Trigger resistance 3 kΩ, reset value 1.8 kΩ, short-circuit proof <50 Ω
7) Over 1000 m, load reduced by 1% per 100 m.

2.4.5 8I66T200300.00-000, 8I66T200400.00-000, 8I66T200550.00-000, 8I66T200750.00-000

Model number	8I66T200300.00-000	8I66T200400.00-000	8I66T200550.00-000	8I66T200750.00-000
General information				
Certifications				
CE	Yes			
UL	Yes			
CSA	Yes			
Motor power				
Specified on nameplate	3 kW (4 HP)	4 kW (5 HP)	5.5 kW (7.5 HP)	7.5 kW (10 HP)
Mains connection				
Mains input voltage	3x 200 VAC -15% to 240 VAC +10%			
Frequency	50 to 60 Hz ±5%			
Apparent power (at 240 VAC)	6.1 kVA	7.8 kVA	11.8 kVA	15.3 kVA
Max. assumed short-circuit current (Isc) (short-circuit current at connection point)	5 kA [1]		22 kA [1]	
Inrush current	28.7 A [2]		35.2 A [2]	
Mains current				
At 200 VAC	17.4 A [3]	22.4 A [3]	33.7 A [3]	43.8 A [3]
At 240 VAC	14.6 A [3]	18.8 A [3]	28.4 A [3]	36.9 A [3]
Power dissipation at nominal load and nominal clock frequency	109 W	141 W	261 W	324 W
Integrated EMC filter	No			
Motor connection				
Nominal output current	13.7 A [4]	17.5 A [4]	27.5 A [4]	33 A [4]
Derating of continuous output current depending on ambient temperature				
At nominal clock frequency (4 kHz)	No derating (up to 50°C)			
Other clock frequencies	The derating curves are included in the installation instructions, which can be downloaded from the website (www.br-automation.com).			
Derating of continuous output current depending on installation elevation				
Starting at 1000 m above sea level	1%, per 100 m			
Max. transient current for 60 s	20.6 A	23.6 A	41.3 A	49.5 A
Output frequency range	0.1 to 599 Hz			
Nominal clock frequency	4 kHz			
Clock frequency				
Min.	2 kHz			
Max.	16 kHz			
Braking torque				
With braking resistor	Up to 170% of the rated motor torque			
Max. motor cable length				
Shielded cable	50 m			
Non-shielded cable	100 m			
Motor control profiles				
Induction motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps Sensorless slip control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for constant torque (6 f-ranges) → Custom profile for special applications 3. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps			
Synchronous motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile			
Main protective functions of inverter	Thermal protection against power stage overheating Protection against short circuits between motor phases, overcurrent between output phases and ground, overvoltages on the DC bus, exceeding the speed limit. Safety function for: Over- and undervoltage of the power supply system, line phase failure with 3-phase supply			
Brake chopper				
Integrated dynamic brake transistors	Yes			
Min. resistance value (external)	16 Ω		8 Ω	
24 VDC power supply				
Input voltage	24 VDC (-15%/+20%)			
Current	Max. 1.1 A			
Available internal power supplies				
Output voltage 24 VDC	24 VDC (-15%/+20%)			
Output voltage 24 VDC				
Max. output current at 24 VDC	100 mA			
Output voltage 10 VDC	10 VDC (-0%/+10%)			
Output voltage 10 VDC				
Max. output current at 10 VDC	10 mA			
Interfaces				
POWERLINK				
Type	Type 3 [5]			

Table 16: 8I66T200300.00-000, 8I66T200400.00-000, 8I66T200550.00-000, 8I66T200750.00-000 - Technical data

Model number	8I66T200300.00-000	8I66T200400.00-000	8I66T200550.00-000	8I66T200750.00-000
Digital inputs				
Quantity	6 [6]			
Nominal voltage	24 VDC (max. 30 VDC)			
Input circuit	Source or sink			
Switching threshold	Sink: >19 V (position 0), <13 V (position 1) Source: <5 V (position 0), >11 V (position 1)			
Electrical isolation				
Input - ACOPOSinverter	Yes			
Input - Input	No			
Sampling time	8 ms ±0.7 ms			
Digital input 5				
Max. input frequency	20 kHz			
Safe input - STO (Safe Torque Off)				
Quantity	1			
Nominal voltage	24 VDC (max. 30 VDC)			
Input impedance	1.5 kΩ			
Input impedance				
Current consumption	16 mA			
Electrical isolation				
Input - ACOPOSinverter	Yes			
Input - Input	No			
Analog inputs				
Quantity	3			
Electrical isolation				
Input - Input	No			
Input - ACOPOSinverter	Yes			
Nonlinearity	±0.2%, max. ±0.5%			
Basic accuracy	At 25°C: ±0.5% At -10 to 60°C: ±0.7%			
Input				
Voltage	AI1: 0 to 10 VDC AI2: 0 ±10 VDC, max. 30 VDC			
Current	0 to 20 mA (or 4 to 20 mA)			
Resolution	10-bit			
Sampling time	2 ms			
Input impedance				
Voltage	30 kΩ			
Current	250 Ω			
Digital outputs				
Quantity	1			
Nominal voltage	24 VDC -15%/+20%			
Max. voltage	30 VDC			
Output circuit	Source or sink			
Sampling time	2 ms			
Max. current	100 mA			
Relay outputs				
Quantity	2			
Nominal voltage	30 VDC / 250 VAC			
Switching current range	Min. switching current: 5 mA at 24 VDC Max. switching current: R1 at cos φ = 1: 3 A at 250 VAC / 4 A at 30 VDC R2 at cos φ = 1: 5 A R1 and R2 at cos φ = 0.4: 2 A			
Variant				
Relay 1	1 changeover contact			
Relay 2	1 normally open contact			
Electrical isolation				
Output - ACOPOSinverter	Yes			
Output - Output	No			
Response time (max.)	2 ms			
Analog outputs				
Quantity	1			
Output	0 to 10 V or 0 to 20 mA			
Nonlinearity	±0.3%			
Basic accuracy	At 25°C: ±1% At -10 to 60°C: ±2%			
Electrical isolation				
Output - ACOPOSinverter	Yes			
Output - Output	No			
Max. load impedance				
Voltage	470 Ω			
Current	800 Ω			
Update time	2 ms			
Resolution	10-bit			

Table 16: 8I66T200300.00-000, 8I66T200400.00-000, 8I66T200550.00-000, 8I66T200750.00-000 - Technical data

Model number	8I66T200300.00-000	8I66T200400.00-000	8I66T200550.00-000	8I66T200750.00-000
Operating conditions				
Degree of protection per EN 61800-5-1	IP20			
Relative humidity per IEC 60068-2-3	5 to 95%, non-condensing No dripping water			
Maximum installation elevation	≤1000 m without derating 1000 to 3000 m with Derating [7)]			
Max. pollution degree per IEC/EN 61800-5-1	2 (non-conductive pollution)			
Ambient conditions per IEC 60721-3-3	Class 3C3 and 3S2			
Operating position	Vertical mounting orientation ±10°			
Ambient conditions				
Temperature				
Operation	-10 to 50°C without derating 50 to 60°C with derating			
Storage	-25 to 70°C			
Max. vibration resistance	1 g_n 13 to 200 Hz EN/IEC 60068-2-6 1.5 mm peak to peak 2 to 13 Hz EN/IEC 60068-2-6			
Mechanical properties				
Dimensions				
Width	140 mm		150 mm	
Height	228 mm		308 mm	
Height without shield plate	184 mm		232 mm	
Depth	158 mm		178 mm	
Weight	2.2 kg		3.5 kg	3.6 kg

Table 16: 8I66T200300.00-000, 8I66T200400.00-000, 8I66T200550.00-000, 8I66T200750.00-000 - Technical data

1) With mains choke max. Isc 22 kA for 200/240 V.
2) Peak current when switching on for maximum voltage (240 V +10% or 500 V +10% or 600 V +10%)
3) Typical value for 4-pin motor and a max. clock frequency of 4 kHz, without mains choke for the max. assumed short circuit current (Isc).
4) These values apply at a nominal clock frequency of 4 kHz during continuous operation. The clock frequency can be set from 2 to 16 kHz. Above 4 kHz, reduce the nominal drive current. The nominal motor current is not permitted to exceed this value.
5) See Automation Help under "Communication / POWERLINK / General information / Hardware - IF/LS" for more information.
6) 1 logic input can be programmed as a 20 kbps pulse input. 1 logic input is configurable as an input for a PTC sensor using a switch (SW2). Trigger resistance 3 kΩ, reset value 1.8 kΩ, short-circuit proof <50 Ω
7) Over 1000 m, load reduced by 1% per 100 m.

2.4.6 8I66T201100.00-000, 8I66T201500.00-000

Model number	8I66T201100.00-000	8I66T201500.00-000
General information		
Certifications		
CE	Yes	
UL	Yes	
CSA	Yes	
Motor power		
Specified on nameplate	11 kW (15 HP)	15 kW (20 HP)
Mains connection		
Mains input voltage	3x 200 VAC -15% to 240 VAC +10%	
Frequency	50 to 60 Hz ±5%	
Apparent power (at 240 VAC)	21.1 kVA	27.9 kVA
Max. assumed short-circuit current (Isc) (short-circuit current at connection point)	22 kA 1)	
Inrush current	66.7 A 2)	
Mains current		
At 200 VAC	60.1 A 3)	79.6 A 3)
At 240 VAC	50.7 A 3)	67 A 3)
Power dissipation at nominal load and nominal clock frequency	528 W	545 W
Integrated EMC filter	No	
Motor connection		
Nominal output current	54 A 4)	66 A 4)
Derating of continuous output current depending on ambient temperature		
At nominal clock frequency (4 kHz)	No derating (up to 50°C)	
Other clock frequencies	The derating curves are included in the installation instructions, which can be downloaded from the website (www.br-automation.com).	
Derating of continuous output current depending on installation elevation		
Starting at 1000 m above sea level	1%, per 100 m	
Max. transient current for 60 s	81 A	99 A
Output frequency range	0.1 to 599 Hz	
Nominal clock frequency	4 kHz	
Clock frequency		
Min.	2 kHz	
Max.	16 kHz	
Braking torque		
With braking resistor	Up to 170% of the rated motor torque	
Max. motor cable length		
Shielded cable	50 m	
Non-shielded cable	100 m	
Motor control profiles		
Induction motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps Sensorless slip control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for constant torque (6 f-ranges) → Custom profile for special applications 3. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps	
Synchronous motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile	
Main protective functions of inverter	Thermal protection against power stage overheating Protection against short circuits between motor phases, overcurrent between output phases and ground, overvoltages on the DC bus, exceeding the speed limit. Safety function for: Over- and undervoltage of the power supply system, line phase failure with 3-phase supply	
Brake chopper		
Integrated dynamic brake transistors	Yes	
Min. resistance value (external)	5 Ω	
24 VDC power supply		
Input voltage	24 VDC (-15%/+20%)	
Current	Max. 1.1 A	
Available internal power supplies		
Output voltage 24 VDC	24 VDC (-15%/+20%)	
Output voltage 24 VDC		
Max. output current at 24 VDC	100 mA	
Output voltage 10 VDC	10 VDC (-0%/+10%)	
Output voltage 10 VDC		
Max. output current at 10 VDC	10 mA	

Table 17: 8I66T201100.00-000, 8I66T201500.00-000 - Technical data

Model number	8I66T201100.00-000	8I66T201500.00-000
Interfaces		
POWERLINK		
Type	Type 3 [5)]	
Digital inputs		
Quantity	6 [6)]	
Nominal voltage	24 VDC (max. 30 VDC)	
Input circuit	Source or sink	
Switching threshold	Sink: >19 V (position 0), <13 V (position 1) Source: <5 V (position 0), >11 V (position 1)	
Electrical isolation		
Input - ACOPOSinverter	Yes	
Input - Input	No	
Sampling time	8 ms ±0.7 ms	
Digital input 5		
Max. input frequency	20 kHz	
Safe input - STO (Safe Torque Off)		
Quantity	1	
Nominal voltage	24 VDC (max. 30 VDC)	
Input impedance	1.5 kΩ	
Input impedance		
Current consumption	16 mA	
Electrical isolation		
Input - ACOPOSinverter	Yes	
Input - Input	No	
Analog inputs		
Quantity	3	
Electrical isolation		
Input - Input	No	
Input - ACOPOSinverter	Yes	
Nonlinearity	±0.2%, max. ±0.5%	
Basic accuracy	At 25°C: ±0.5% At -10 to 60°C: ±0.7%	
Input		
Voltage	AI1: 0 to 10 VDC AI2: 0 ±10 VDC, max. 30 VDC	
Current	0 to 20 mA (or 4 to 20 mA)	
Resolution	10-bit	
Sampling time	2 ms	
Input impedance		
Voltage	30 kΩ	
Current	250 Ω	
Digital outputs		
Quantity	1	
Nominal voltage	24 VDC -15%/+20%	
Max. voltage	30 VDC	
Output circuit	Source or sink	
Sampling time	2 ms	
Max. current	100 mA	
Relay outputs		
Quantity	2	
Nominal voltage	30 VDC / 250 VAC	
Switching current range	Min. switching current: 5 mA at 24 VDC Max. switching current: R1 at cos φ = 1: 3 A at 250 VAC / 4 A at 30 VDC R2 at cos φ = 1: 5 A R1 and R2 at cos φ = 0.4: 2 A	
Variant		
Relay 1	1 changeover contact	
Relay 2	1 normally open contact	
Electrical isolation		
Output - ACOPOSinverter	Yes	
Output - Output	No	
Response time (max.)	2 ms	
Analog outputs		
Quantity	1	
Output	0 to 10 V or 0 to 20 mA	
Nonlinearity	±0.3%	
Basic accuracy	At 25°C: ±1% At -10 to 60°C: ±2%	
Electrical isolation		
Output - ACOPOSinverter	Yes	
Output - Output	No	

Table 17: 8I66T201100.00-000, 8I66T201500.00-000 - Technical data

Model number	8I66T201100.00-000	8I66T201500.00-000
Max. load impedance		
Voltage	470 Ω	
Current	800 Ω	
Update time	2 ms	
Resolution	10-bit	
Operating conditions		
Degree of protection per EN 61800-5-1	IP20	
Relative humidity per IEC 60068-2-3	5 to 95%, non-condensing No dripping water	
Maximum installation elevation	≤1000 m without derating 1000 to 3000 m with Derating 7)	
Max. pollution degree per IEC/EN 61800-5-1	2 (non-conductive pollution)	
Ambient conditions per IEC 60721-3-3	Class 3C3 and 3S2	
Operating position	Vertical mounting orientation ±10°	
Ambient conditions		
Temperature		
Operation	-10 to 50°C without derating 50 to 60°C with derating	
Storage	-25 to 70°C	
Max. vibration resistance	1 g_n 13 to 200 Hz EN/IEC 60068-2-6 1.5 mm peak to peak 2 to 13 Hz EN/IEC 60068-2-6	
Mechanical properties		
Dimensions		
Width	180 mm	
Height	405 mm	
Height without shield plate	330 mm	
Depth	198 mm	
Weight	6.8 kg	6.9 kg

Table 17: 8I66T201100.00-000, 8I66T201500.00-000 - Technical data

1) With mains choke max. Isc 22 kA for 200/240 V.
2) Peak current when switching on for maximum voltage (240 V +10% or 500 V +10% or 600 V +10%)
3) Typical value for 4-pin motor and a max. clock frequency of 4 kHz, without mains choke for the max. assumed short circuit current (Isc).
4) These values apply at a nominal clock frequency of 4 kHz during continuous operation. The clock frequency can be set from 2 to 16 kHz. Above 4 kHz, reduce the nominal drive current. The nominal motor current is not permitted to exceed this value.
5) See Automation Help under "Communication / POWERLINK / General information / Hardware - IF/LS" for more information.
6) 1 logic input can be programmed as a 20 kbps pulse input. 1 logic input is configurable as an input for a PTC sensor using a switch (SW2). Trigger resistance 3 kΩ, reset value 1.8 kΩ, short-circuit proof <50 Ω
7) Over 1000 m, load reduced by 1% per 100 m.

2.4.7 8I66T400037.00-000, 8I66T400055.00-000, 8I66T400075.00-000, 8I66T400110.00-000

Model number	8I66T400037.00-000	8I66T400055.00-000	8I66T400075.00-000	8I66T400110.00-000
General information				
Certifications				
CE	Yes			
UL	Yes			
CSA	Yes			
Motor power				
Specified on nameplate	0.37 kW (0.5 HP)	0.55 kW (0.75 HP)	0.75 kW (1 HP)	1.1 kW (1.5 HP)
Mains connection				
Mains input voltage	3x 380 VAC -15% to 500 VAC +10%			
Frequency	50 to 60 Hz ±5%			
Apparent power (at 500 VAC)	1.2 kVA	1.6 kVA	2.1 kVA	2.9 kVA
Max. assumed short-circuit current (Isc) (short-circuit current at connection point)	5 kA [1]			
Inrush current	Max. 10 A [2]			
Mains current				
At 380 VAC	1.8 A [3]	2.4 A [3]	3.2 A [3]	4.4 A [3]
At 500 VAC	1.4 A [3]	1.9 A [3]	2.4 A [3]	3.4 A [3]
Power dissipation at nominal load and nominal clock frequency	28 W	33 W	39 W	47 W
Integrated EMC filter	Yes [4]			
Motor connection				
Nominal output current	1.5 A [5]	1.9 A [5]	2.3 A [5]	3 A [5]
Derating of continuous output current depending on ambient temperature				
At nominal clock frequency (4 kHz)	No derating (up to 50°C)			
Other clock frequencies	The derating curves are included in the installation instructions, which can be downloaded from the website (www.br-automation.com).			
Derating of continuous output current depending on installation elevation				
Starting at 1000 m above sea level	1%, per 100 m			
Max. transient current for 60 s	2.3 A	2.9 A	3.5 A	4.5 A
Output frequency range	0.1 to 599 Hz			
Nominal clock frequency	4 kHz			
Clock frequency				
Min.	2 kHz			
Max.	16 kHz			
Braking torque				
With braking resistor	Up to 170% of the rated motor torque			
Max. motor cable length				
Shielded cable	50 m			
Non-shielded cable	100 m			
Motor control profiles				
Induction motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps Sensorless slip control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for constant torque (6 f-ranges) → Custom profile for special applications 3. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps			
Synchronous motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile			
Main protective functions of inverter	Thermal protection against power stage overheating Protection against short circuits between motor phases, overcurrent between output phases and ground, overvoltages on the DC bus, exceeding the speed limit. Safety function for: Over- and undervoltage of the power supply system, line phase failure with 3-phase supply			
Brake chopper				
Integrated dynamic brake transistors	Yes			
Min. resistance value (external)	80 Ω			54 Ω
24 VDC power supply				
Input voltage	24 VDC (-15%/+20%)			
Current	Max. 1.1 A			
Available internal power supplies				
Output voltage 24 VDC	24 VDC (-15%/+20%)			
Output voltage 24 VDC				
Max. output current at 24 VDC	100 mA			
Output voltage 10 VDC	10 VDC (-0%/+10%)			
Output voltage 10 VDC				
Max. output current at 10 VDC	10 mA			
Interfaces				
POWERLINK				
Type	Type 3 [6]			

Table 18: 8I66T400037.00-000, 8I66T400055.00-000, 8I66T400075.00-000, 8I66T400110.00-000 - Technical data

Model number	8I66T400037.00-000	8I66T400055.00-000	8I66T400075.00-000	8I66T400110.00-000
Digital inputs				
Quantity	6 [7]			
Nominal voltage	24 VDC (max. 30 VDC)			
Input circuit	Source or sink			
Switching threshold	Sink: >19 V (position 0), <13 V (position 1) Source: <5 V (position 0), >11 V (position 1)			
Electrical isolation				
Input - ACOPOSinverter	Yes			
Input - Input	No			
Sampling time	8 ms ±0.7 ms			
Digital input 5				
Max. input frequency	20 kHz			
Safe input - STO (Safe Torque Off)				
Quantity	1			
Nominal voltage	24 VDC (max. 30 VDC)			
Input impedance	1.5 kΩ			
Input impedance				
Current consumption	16 mA			
Electrical isolation				
Input - ACOPOSinverter	Yes			
Input - Input	No			
Analog inputs				
Quantity	3			
Electrical isolation				
Input - Input	No			
Input - ACOPOSinverter	Yes			
Nonlinearity	±0.2%, max. ±0.5%			
Basic accuracy	At 25°C: ±0.5% At -10 to 60°C: ±0.7%			
Input				
Voltage	AI1: 0 to 10 VDC AI2: 0 ±10 VDC, max. 30 VDC			
Current	0 to 20 mA (or 4 to 20 mA)			
Resolution	10-bit			
Sampling time	2 ms			
Input impedance				
Voltage	30 kΩ			
Current	250 Ω			
Digital outputs				
Quantity	1			
Nominal voltage	24 VDC -15%/+20%			
Max. voltage	30 VDC			
Output circuit	Source or sink			
Sampling time	2 ms			
Max. current	100 mA			
Relay outputs				
Quantity	2			
Nominal voltage	30 VDC / 250 VAC			
Switching current range	Min. switching current: 5 mA at 24 VDC Max. switching current: R1 at cos φ = 1: 3 A at 250 VAC / 4 A at 30 VDC R2 at cos φ = 1: 5 A R1 and R2 at cos φ = 0.4: 2 A			
Variant				
Relay 1	1 changeover contact			
Relay 2	1 normally open contact			
Electrical isolation				
Output - ACOPOSinverter	Yes			
Output - Output	No			
Response time (max.)	2 ms			
Analog outputs				
Quantity	1			
Output	0 to 10 V or 0 to 20 mA			
Nonlinearity	±0.3%			
Basic accuracy	At 25°C: ±1% At -10 to 60°C: ±2%			
Electrical isolation				
Output - ACOPOSinverter	Yes			
Output - Output	No			
Max. load impedance				
Voltage	470 Ω			
Current	800 Ω			
Update time	2 ms			
Resolution	10-bit			

Table 18: 8I66T400037.00-000, 8I66T400055.00-000, 8I66T400075.00-000, 8I66T400110.00-000 - Technical data

Model number	8I66T400037.00-000	8I66T400055.00-000	8I66T400075.00-000	8I66T400110.00-000
Operating conditions				
Degree of protection per EN 61800-5-1	IP20			
Relative humidity per IEC 60068-2-3	5 to 95%, non-condensing No dripping water			
Maximum installation elevation	≤1000 m without derating 1000 to 3000 m with Derating [8)]			
Max. pollution degree per IEC/EN 61800-5-1	2 (non-conductive pollution)			
Ambient conditions per IEC 60721-3-3	Class 3C3 and 3S2			
Operating position	Vertical mounting orientation ±10°			
Ambient conditions				
Temperature				
Operation	-10 to 50°C without derating 50 to 60°C with derating			
Storage	-25 to 70°C			
Max. vibration resistance	1 g_n 13 to 200 Hz EN/IEC 60068-2-6 1.5 mm peak to peak 2 to 13 Hz EN/IEC 60068-2-6			
Mechanical properties				
Dimensions				
Width	105 mm			
Height	188 mm			
Height without shield plate	142 mm			
Depth	158 mm			
Weight	1.2 kg			1.3 kg

Table 18: 8I66T400037.00-000, 8I66T400055.00-000, 8I66T400075.00-000, 8I66T400110.00-000 - Technical data

1) With mains choke max. Isc 65 kA for 380/500 V.
2) Peak current when switching on for maximum voltage (240 V +10% or 500 V +10% or 600 V +10%)
3) Typical value for 4-pin motor and a max. clock frequency of 4 kHz, without mains choke for the max. assumed short circuit current (Isc).
4) Inverter is provided with an integrated Category C2 EMC filter. This filter can be switched off.
5) These values apply at a nominal clock frequency of 4 kHz during continuous operation. The clock frequency can be set from 2 to 16 kHz. Above 4 kHz, reduce the nominal drive current. The nominal motor current is not permitted to exceed this value.
6) See Automation Help under "Communication / POWERLINK / General information / Hardware - IF/LS" for more information.
7) 1 logic input can be programmed as a 20 kbps pulse input. 1 logic input is configurable as an input for a PTC sensor using a switch (SW2). Trigger resistance 3 kΩ, reset value 1.8 kΩ, short-circuit proof <50 Ω
8) Over 1000 m, load reduced by 1% per 100 m.

2.4.8 8I66T400150.00-000, 8I66T400220.00-000, 8I66T400300.00-000, 8I66T400400.00-000

Model number	8I66T400150.00-000	8I66T400220.00-000	8I66T400300.00-000	8I66T400400.00-000
General information				
Certifications				
CE	Yes			
UL	Yes			
CSA	Yes			
Motor power				
Specified on nameplate	1.5 kW (2 HP)	2.2 kW (3 HP)	3 kW (4 HP)	4 kW (5 HP)
Mains connection				
Mains input voltage	3x 380 VAC -15% to 500 VAC +10%			
Frequency	50 to 60 Hz ±5%			
Apparent power (at 500 VAC)	3.8 kVA	5.3 kVA	6.8 kVA	8.6 kVA
Max. assumed short-circuit current (Isc) (short-circuit current at connection point)	5 kA [1]			
Inrush current	Max. 10 A [2]			
Mains current				
At 380 VAC	5.8 A [3]	8 A [3]	10.3 A [3]	12.9 A [3]
At 500 VAC	4.4 A [3]	6.1 A [3]	7.8 A [3]	9.9 A [3]
Power dissipation at nominal load and nominal clock frequency	61 W	76 W	94 W	112 W
Integrated EMC filter	Yes [4]			
Motor connection				
Nominal output current	4.1 A [5]	5.5 A [5]	7.1 A [5]	9.5 A [5]
Derating of continuous output current depending on ambient temperature				
At nominal clock frequency (4 kHz)	No derating (up to 50°C)			
Other clock frequencies	The derating curves are included in the installation instructions, which can be downloaded from the website (www.br-automation.com).			
Derating of continuous output current depending on installation elevation				
Starting at 1000 m above sea level	1%, per 100 m			
Max. transient current for 60 s	6.2 A	8.3 A	10.7 A	14.3 A
Output frequency range	0.1 to 599 Hz			
Nominal clock frequency	4 kHz			
Clock frequency				
Min.	2 kHz			
Max.	16 kHz			
Braking torque				
With braking resistor	Up to 170% of the rated motor torque			
Max. motor cable length				
Shielded cable	50 m			
Non-shielded cable	100 m			
Motor control profiles				
Induction motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps Sensorless slip control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for constant torque (6 f-ranges) → Custom profile for special applications 3. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps			
Synchronous motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile			
Main protective functions of inverter	Thermal protection against power stage overheating Protection against short circuits between motor phases, overcurrent between output phases and ground, overvoltages on the DC bus, exceeding the speed limit. Safety function for: Over- and undervoltage of the power supply system, line phase failure with 3-phase supply			
Brake chopper				
Integrated dynamic brake transistors	Yes			
Min. resistance value (external)	54 Ω			36 Ω
24 VDC power supply				
Input voltage	24 VDC (-15%/+20%)			
Current	Max. 1.1 A			
Available internal power supplies				
Output voltage 24 VDC	24 VDC (-15%/+20%)			
Output voltage 24 VDC				
Max. output current at 24 VDC	100 mA			
Output voltage 10 VDC	10 VDC (-0%/+10%)			
Output voltage 10 VDC				
Max. output current at 10 VDC	10 mA			
Interfaces				
POWERLINK				
Type	Type 3 [6]			

Table 19: 8I66T400150.00-000, 8I66T400220.00-000, 8I66T400300.00-000, 8I66T400400.00-000 - Technical data

Model number	8I66T400150.00-000	8I66T400220.00-000	8I66T400300.00-000	8I66T400400.00-000
Digital inputs				
Quantity	6 [7]			
Nominal voltage	24 VDC (max. 30 VDC)			
Input circuit	Source or sink			
Switching threshold	Sink: >19 V (position 0), <13 V (position 1) Source: <5 V (position 0), >11 V (position 1)			
Electrical isolation				
Input - ACOPOSinverter	Yes			
Input - Input	No			
Sampling time	8 ms ±0.7 ms			
Digital input 5				
Max. input frequency	20 kHz			
Safe input - STO (Safe Torque Off)				
Quantity	1			
Nominal voltage	24 VDC (max. 30 VDC)			
Input impedance	1.5 kΩ			
Input impedance				
Current consumption	16 mA			
Electrical isolation				
Input - ACOPOSinverter	Yes			
Input - Input	No			
Analog inputs				
Quantity	3			
Electrical isolation				
Input - Input	No			
Input - ACOPOSinverter	Yes			
Nonlinearity	±0.2%, max. ±0.5%			
Basic accuracy	At 25°C: ±0.5% At -10 to 60°C: ±0.7%			
Input				
Voltage	AI1: 0 to 10 VDC AI2: 0 ±10 VDC, max. 30 VDC			
Current	0 to 20 mA (or 4 to 20 mA)			
Resolution	10-bit			
Sampling time	2 ms			
Input impedance				
Voltage	30 kΩ			
Current	250 Ω			
Digital outputs				
Quantity	1			
Nominal voltage	24 VDC -15%/+20%			
Max. voltage	30 VDC			
Output circuit	Source or sink			
Sampling time	2 ms			
Max. current	100 mA			
Relay outputs				
Quantity	2			
Nominal voltage	30 VDC / 250 VAC			
Switching current range	Min. switching current: 5 mA at 24 VDC Max. switching current: R1 at cos φ = 1: 3 A at 250 VAC / 4 A at 30 VDC R2 at cos φ = 1: 5 A R1 and R2 at cos φ = 0.4: 2 A			
Variant				
Relay 1	1 changeover contact			
Relay 2	1 normally open contact			
Electrical isolation				
Output - ACOPOSinverter	Yes			
Output - Output	No			
Response time (max.)	2 ms			
Analog outputs				
Quantity	1			
Output	0 to 10 V or 0 to 20 mA			
Nonlinearity	±0.3%			
Basic accuracy	At 25°C: ±1% At -10 to 60°C: ±2%			
Electrical isolation				
Output - ACOPOSinverter	Yes			
Output - Output	No			
Max. load impedance				
Voltage	470 Ω			
Current	800 Ω			
Update time	2 ms			
Resolution	10-bit			

Table 19: 8I66T400150.00-000, 8I66T400220.00-000, 8I66T400300.00-000, 8I66T400400.00-000 - Technical data

Model number	8I66T400150.00-000	8I66T400220.00-000	8I66T400300.00-000	8I66T400400.00-000
Operating conditions				
Degree of protection per EN 61800-5-1	IP20			
Relative humidity per IEC 60068-2-3	5 to 95%, non-condensing No dripping water			
Maximum installation elevation	≤1000 m without derating 1000 to 3000 m with Derating 8)			
Max. pollution degree per IEC/EN 61800-5-1	2 (non-conductive pollution)			
Ambient conditions per IEC 60721-3-3	Class 3C3 and 3S2			
Operating position	Vertical mounting orientation ±10°			
Ambient conditions				
Temperature				
Operation	-10 to 50°C without derating 50 to 60°C with derating			
Storage	-25 to 70°C			
Max. vibration resistance	1 g_n 13 to 200 Hz EN/IEC 60068-2-6 1.5 mm peak to peak 2 to 13 Hz EN/IEC 60068-2-6			
Mechanical properties				
Dimensions				
Width	105 mm	140 mm		
Height	188 mm	227.9 mm		
Height without shield plate	142 mm	184 mm		
Depth	158 mm			
Weight	1.3 kg	2.1 kg		2.2 kg

Table 19: 8I66T400150.00-000, 8I66T400220.00-000, 8I66T400300.00-000, 8I66T400400.00-000 - Technical data

1) With mains choke max. Isc 65 kA for 380/500 V.
2) Peak current when switching on for maximum voltage (240 V +10% or 500 V +10% or 600 V +10%)
3) Typical value for 4-pin motor and a max. clock frequency of 4 kHz, without mains choke for the max. assumed short circuit current (Isc).
4) Inverter is provided with an integrated Category C2 EMC filter. This filter can be switched off.
5) These values apply at a nominal clock frequency of 4 kHz during continuous operation. The clock frequency can be set from 2 to 16 kHz. Above 4 kHz, reduce the nominal drive current. The nominal motor current is not permitted to exceed this value.
6) See Automation Help under "Communication / POWERLINK / General information / Hardware - IF/LS" for more information.
7) 1 logic input can be programmed as a 20 kbps pulse input. 1 logic input is configurable as an input for a PTC sensor using a switch (SW2). Trigger resistance 3 kΩ, reset value 1.8 kΩ, short-circuit proof <50 Ω
8) Over 1000 m, load reduced by 1% per 100 m.

2.4.9 8I66T400550.00-000, 8I66T400750.00-000, 8I66T401100.00-000, 8I66T401500.00-000

Model number	8I66T400550.00-000	8I66T400750.00-000	8I66T401100.00-000	8I66T401500.00-000
General information				
Certifications				
CE	Yes			
UL	Yes			
CSA	Yes			
Motor power				
Specified on nameplate	5.5 kW (7.5 HP)	7.5 kW (10 HP)	11 kW (15 HP)	15 kW (20 HP)
Mains connection				
Mains input voltage	3x 380 VAC -15% to 500 VAC +10%			
Frequency	50 to 60 Hz ±5%			
Apparent power (at 500 VAC)	13.2 kVA	17 kVA	23.6 kVA	30.7 kVA
Max. assumed short-circuit current (Isc) (short-circuit current at connection point)	22 kA [1]			
Inrush current	27.6 A [2]		36.7 A [2]	
Mains current				
At 380 VAC	19.8 A [3]	25.5 A [3]	35.4 A [3]	46.5 A [3]
At 500 VAC	15.2 A [3]	19.6 A [3]	27.2 A [3]	35.5 A [3]
Power dissipation at nominal load and nominal clock frequency	232 W	262 W	398 W	475 W
Integrated EMC filter	Yes [4]			
Motor connection				
Nominal output current	14.3 A [5]	17 A [5]	27.7 A [5]	33 A [5]
Derating of continuous output current depending on ambient temperature				
At nominal clock frequency (4 kHz)	No derating (up to 50°C)			
Other clock frequencies	The derating curves are included in the installation instructions, which can be downloaded from the website (www.br-automation.com).			
Derating of continuous output current depending on installation elevation				
Starting at 1000 m above sea level	1%, per 100 m			
Max. transient current for 60 s	21.5 A	25.5 A	41.6 A	49.5 A
Output frequency range	0.1 to 599 Hz			
Nominal clock frequency	4 kHz			
Clock frequency				
Min.	2 kHz			
Max.	16 kHz			
Braking torque				
With braking resistor	Up to 170% of the rated motor torque			
Max. motor cable length				
Shielded cable	50 m			
Non-shielded cable	100 m			
Motor control profiles				
Induction motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps Sensorless slip control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for constant torque (6 f-ranges) → Custom profile for special applications 3. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps			
Synchronous motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile			
Main protective functions of inverter	Thermal protection against power stage overheating Protection against short circuits between motor phases, overcurrent between output phases and ground, overvoltages on the DC bus, exceeding the speed limit. Safety function for: Over- and undervoltage of the power supply system, line phase failure with 3-phase supply			
Brake chopper				
Integrated dynamic brake transistors	Yes			
Min. resistance value (external)	27 Ω		16 Ω	
24 VDC power supply				
Input voltage	24 VDC (-15%/+20%)			
Current	Max. 1.1 A			
Available internal power supplies				
Output voltage 24 VDC	24 VDC (-15%/+20%)			
Output voltage 24 VDC				
Max. output current at 24 VDC	100 mA			
Output voltage 10 VDC	10 VDC (-0%/+10%)			
Output voltage 10 VDC				
Max. output current at 10 VDC	10 mA			
Interfaces				
POWERLINK				
Type	Type 3 [6]			

Table 20: 8I66T400550.00-000, 8I66T400750.00-000, 8I66T401100.00-000, 8I66T401500.00-000 - Technical data

Model number	8I66T400550.00-000	8I66T400750.00-000	8I66T401100.00-000	8I66T401500.00-000
Digital inputs				
Quantity	6 [7]			
Nominal voltage	24 VDC (max. 30 VDC)			
Input circuit	Source or sink			
Switching threshold	Sink: >19 V (position 0), <13 V (position 1) Source: <5 V (position 0), >11 V (position 1)			
Electrical isolation				
Input - ACOPOSinverter	Yes			
Input - Input	No			
Sampling time	8 ms ±0.7 ms			
Digital input 5				
Max. input frequency	20 kHz			
Safe input - STO (Safe Torque Off)				
Quantity	1			
Nominal voltage	24 VDC (max. 30 VDC)			
Input impedance	1.5 kΩ			
Input impedance				
Current consumption	16 mA			
Electrical isolation				
Input - ACOPOSinverter	Yes			
Input - Input	No			
Analog inputs				
Quantity	3			
Electrical isolation				
Input - Input	No			
Input - ACOPOSinverter	Yes			
Nonlinearity	±0.2%, max. ±0.5%			
Basic accuracy	At 25°C: ±0.5% At -10 to 60°C: ±0.7%			
Input				
Voltage	AI1: 0 to 10 VDC AI2: 0 ±10 VDC, max. 30 VDC			
Current	0 to 20 mA (or 4 to 20 mA)			
Resolution	10-bit			
Sampling time	2 ms			
Input impedance				
Voltage	30 kΩ			
Current	250 Ω			
Digital outputs				
Quantity	1			
Nominal voltage	24 VDC -15%/+20%			
Max. voltage	30 VDC			
Output circuit	Source or sink			
Sampling time	2 ms			
Max. current	100 mA			
Relay outputs				
Quantity	2			
Nominal voltage	30 VDC / 250 VAC			
Switching current range	Min. switching current: 5 mA at 24 VDC Max. switching current: R1 at cos φ = 1: 3 A at 250 VAC / 4 A at 30 VDC R2 at cos φ = 1: 5 A R1 and R2 at cos φ = 0.4: 2 A			
Variant				
Relay 1	1 changeover contact			
Relay 2	1 normally open contact			
Electrical isolation				
Output - ACOPOSinverter	Yes			
Output - Output	No			
Response time (max.)	2 ms			
Analog outputs				
Quantity	1			
Output	0 to 10 V or 0 to 20 mA			
Nonlinearity	±0.3%			
Basic accuracy	At 25°C: ±1% At -10 to 60°C: ±2%			
Electrical isolation				
Output - ACOPOSinverter	Yes			
Output - Output	No			
Max. load impedance				
Voltage	470 Ω			
Current	800 Ω			
Update time	2 ms			
Resolution	10-bit			

Table 20: 8I66T400550.00-000, 8I66T400750.00-000, 8I66T401100.00-000, 8I66T401500.00-000 - Technical data

Model number	8I66T400550.00-000	8I66T400750.00-000	8I66T401100.00-000	8I66T401500.00-000
Operating conditions				
Degree of protection per EN 61800-5-1	IP20			
Relative humidity per IEC 60068-2-3	5 to 95%, non-condensing No dripping water			
Maximum installation elevation	≤1000 m without derating 1000 to 3000 m with Derating 8)			
Max. pollution degree per IEC/EN 61800-5-1	2 (non-conductive pollution)			
Ambient conditions per IEC 60721-3-3	Class 3C3 and 3S2			
Operating position	Vertical mounting orientation ±10°			
Ambient conditions				
Temperature				
Operation	-10 to 50°C without derating 50 to 60°C with derating			
Storage	-25 to 70°C			
Max. vibration resistance	1 g_n 13 to 200 Hz EN/IEC 60068-2-6 1.5 mm peak to peak 2 to 13 Hz EN/IEC 60068-2-6			
Mechanical properties				
Dimensions				
Width	150 mm		180 mm	
Height	308 mm		404 mm	
Height without shield plate	232 mm		330 mm	
Depth	178 mm		198 mm	
Weight	3.5 kg	3.6 kg	6.8 kg	6.9 kg

Table 20: 8I66T400550.00-000, 8I66T400750.00-000, 8I66T401100.00-000, 8I66T401500.00-000 - Technical data

1) With mains choke max. Isc 22 kA for 200/240 V.
2) Peak current when switching on for maximum voltage (240 V +10% or 500 V +10% or 600 V +10%)
3) Typical value for 4-pin motor and a max. clock frequency of 4 kHz, without mains choke for the max. assumed short circuit current (Isc).
4) Inverter is provided with an integrated Category C2 EMC filter. This filter can be switched off.
5) These values apply at a nominal clock frequency of 4 kHz during continuous operation. The clock frequency can be set from 2 to 16 kHz. Above 4 kHz, reduce the nominal drive current. The nominal motor current is not permitted to exceed this value.
6) See Automation Help under "Communication / POWERLINK / General information / Hardware - IF/LS" for more information.
7) 1 logic input can be programmed as a 20 kbps pulse input. 1 logic input is configurable as an input for a PTC sensor using a switch (SW2). Trigger resistance 3 kΩ, reset value 1.8 kΩ, short-circuit proof <50 Ω
8) Over 1000 m, load reduced by 1% per 100 m.

2.4.10 8I66T600075.00-000, 8I66T600150.00-000, 8I66T600220.00-000, 8I66T600400.00-000

Model number	8I66T600075.00-000	8I66T600150.00-000	8I66T600220.00-000	8I66T600400.00-000
General information				
Certifications				
CE	Yes			
UL	Yes			
CSA	Yes			
Motor power				
Specified on nameplate	0.75 kW (1 HP)	1.5 kW (2 HP)	2.2 kW (3 HP)	4 kW (5 HP)
Mains connection				
Mains input voltage	3x 525 VAC -15% to 600 VAC +10%			
Frequency	50 to 60 Hz ±5%			
Apparent power (at 600 VAC)	1.2 kVA	2.2 kVA	3 kVA	5.7 kVA
Max. assumed short-circuit current (Isc) (short-circuit current at connection point)	22 kA			
Inrush current	Max. 12 A [1]			
Mains current				
At 525 VAC	1.4 A [2]	2.4 A [2]	3.3 A [2]	6 A [2]
At 600 VAC	1.2 A [2]	2.1 A [2]	2.9 A [2]	5.5 A [2]
Power dissipation at nominal load and nominal clock frequency	31 W	40 W	50 W	72 W
Integrated EMC filter	No			
Motor connection				
Nominal output current	1.7 A [3]	2.7 A [3]	3.9 A [3]	6.1 A [3]
Derating of continuous output current depending on ambient temperature				
At nominal clock frequency (4 kHz)	No derating (up to 50°C)			
Other clock frequencies	The derating curves are included in the installation instructions, which can be downloaded from the website (www.br-automation.com).			
Derating of continuous output current depending on installation elevation				
Starting at 1000 m above sea level	1%, per 100 m			
Max. transient current for 60 s	2.6 A	4.1 A	5.9 A	9.2 A
Output frequency range	0.1 to 599 Hz			
Nominal clock frequency	4 kHz			
Clock frequency				
Min.	2 kHz			
Max.	16 kHz			
Braking torque				
With braking resistor	Up to 170% of the rated motor torque			
Max. motor cable length				
Shielded cable	50 m			
Non-shielded cable	100 m			
Motor control profiles				
Induction motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps Sensorless slip control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for constant torque (6 f-ranges) → Custom profile for special applications 3. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps			
Synchronous motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile			
Main protective functions of inverter	Thermal protection against power stage overheating Protection against short circuits between motor phases, overcurrent between output phases and ground, overvoltages on the DC bus, exceeding the speed limit. Safety function for: Over- and undervoltage of the power supply system, line phase failure with 3-phase supply			
Brake chopper				
Integrated dynamic brake transistors	Yes			
Min. resistance value (external)	96 Ω	64 Ω		44 Ω
24 VDC power supply				
Input voltage	24 VDC (-15%/+20%)			
Current	Max. 1.1 A			
Available internal power supplies				
Output voltage 24 VDC	24 VDC (-15%/+20%)			
Output voltage 24 VDC				
Max. output current at 24 VDC	100 mA			
Output voltage 10 VDC	10 VDC (-0%/+10%)			
Output voltage 10 VDC				
Max. output current at 10 VDC	10 mA			
Interfaces				
POWERLINK				
Type	Type 3 [4]			

Table 21: 8I66T600075.00-000, 8I66T600150.00-000, 8I66T600220.00-000, 8I66T600400.00-000 - Technical data

Model number	8I66T600075.00-000	8I66T600150.00-000	8I66T600220.00-000	8I66T600400.00-000
Digital inputs				
Quantity	6 [5)]			
Nominal voltage	24 VDC (max. 30 VDC)			
Input circuit	Source or sink			
Switching threshold	Sink: >19 V (position 0), <13 V (position 1) Source: <5 V (position 0), >11 V (position 1)			
Electrical isolation				
Input - ACOPOSinverter	Yes			
Input - Input	No			
Sampling time	8 ms ±0.7 ms			
Digital input 5				
Max. input frequency	20 kHz			
Safe input - STO (Safe Torque Off)				
Quantity	1			
Nominal voltage	24 VDC (max. 30 VDC)			
Input impedance	1.5 kΩ			
Input impedance				
Current consumption	16 mA			
Electrical isolation				
Input - ACOPOSinverter	Yes			
Input - Input	No			
Analog inputs				
Quantity	3			
Electrical isolation				
Input - Input	No			
Input - ACOPOSinverter	Yes			
Nonlinearity	±0.2%, max. ±0.5%			
Basic accuracy	At 25°C: ±0.5% At -10 to 60°C: ±0.7%			
Input				
Voltage	AI1: 0 to 10 VDC AI2: 0 ±10 VDC, max. 30 VDC			
Current	0 to 20 mA (or 4 to 20 mA)			
Resolution	10-bit			
Sampling time	2 ms			
Input impedance				
Voltage	30 kΩ			
Current	250 Ω			
Digital outputs				
Quantity	1			
Nominal voltage	24 VDC -15%/+20%			
Max. voltage	30 VDC			
Output circuit	Source or sink			
Sampling time	2 ms			
Max. current	100 mA			
Relay outputs				
Quantity	2			
Nominal voltage	30 VDC / 250 VAC			
Switching current range	Min. switching current: 5 mA at 24 VDC Max. switching current: R1 at cos φ = 1: 3 A at 250 VAC / 4 A at 30 VDC R2 at cos φ = 1: 5 A R1 and R2 at cos φ = 0.4: 2 A			
Variant				
Relay 1	1 changeover contact			
Relay 2	1 normally open contact			
Electrical isolation				
Output - ACOPOSinverter	Yes			
Output - Output	No			
Response time (max.)	2 ms			
Analog outputs				
Quantity	1			
Output	0 to 10 V or 0 to 20 mA			
Nonlinearity	±0.3%			
Basic accuracy	At 25°C: ±1% At -10 to 60°C: ±2%			
Electrical isolation				
Output - ACOPOSinverter	Yes			
Output - Output	No			
Max. load impedance				
Voltage	470 Ω			
Current	800 Ω			
Update time	2 ms			
Resolution	10-bit			

Table 21: 8I66T600075.00-000, 8I66T600150.00-000, 8I66T600220.00-000, 8I66T600400.00-000 - Technical data

Model number	8I66T600075.00-000	8I66T600150.00-000	8I66T600220.00-000	8I66T600400.00-000
Operating conditions				
Degree of protection per EN 61800-5-1	IP20			
Relative humidity per IEC 60068-2-3	5 to 95%, non-condensing No dripping water			
Maximum installation elevation	≤1000 m without derating 1000 to 2000 m with Derating [6]			
Max. pollution degree per IEC/EN 61800-5-1	2 (non-conductive pollution)			
Ambient conditions per IEC 60721-3-3	Class 3C3 and 3S2			
Operating position	Vertical mounting orientation ±10°			
Ambient conditions				
Temperature				
Operation	-10 to 50°C without derating 50 to 60°C with derating			
Storage	-25 to 70°C			
Max. vibration resistance	1 g_n 13 to 200 Hz EN/IEC 60068-2-6 1.5 mm peak to peak 2 to 13 Hz EN/IEC 60068-2-6			
Mechanical properties				
Dimensions				
Width	105 mm		140 mm	
Height	188 mm		227.9 mm	
Height without shield plate	142 mm		184 mm	
Depth	158 mm			
Weight	1.3 kg		2 kg	2.5 kg

Table 21: 8I66T600075.00-000, 8I66T600150.00-000, 8I66T600220.00-000, 8I66T600400.00-000 - Technical data

1) Peak current when switching on for maximum voltage (240 V +10% or 500 V +10% or 600 V +10%)
2) Typical value for 4-pin motor and a max. clock frequency of 4 kHz, without mains choke for the max. assumed short circuit current (Isc).
3) These values apply at a nominal clock frequency of 4 kHz during continuous operation. The clock frequency can be set from 2 to 16 kHz. Above 4 kHz, reduce the nominal drive current. The nominal motor current is not permitted to exceed this value.
4) See Automation Help under "Communication / POWERLINK / General information / Hardware - IF/LS" for more information.
5) 1 logic input can be programmed as a 20 kbps pulse input. 1 logic input is configurable as an input for a PTC sensor using a switch (SW2). Trigger resistance 3 kΩ, reset value 1.8 kΩ, short-circuit proof <50 Ω
6) Over 1000 m, load reduced by 1% per 100 m.

2.4.11 8I66T600550.00-000, 8I66T600750.00-000, 8I66T601100.00-000, 8I66T601500.00-000

Model number	8I66T600550.00-000	8I66T600750.00-000	8I66T601100.00-000	8I66T601500.00-000
General information				
Certifications				
CE	Yes			
UL	Yes			
CSA	Yes			
Motor power				
Specified on nameplate	5.5 kW (7.5 HP)	7.5 kW (10 HP)	11 kW (15 HP)	15 kW (20 HP)
Mains connection				
Mains input voltage	3x 525 VAC -15% to 600 VAC +10%			
Frequency	50 to 60 Hz ±5%			
Apparent power (at 600 VAC)	7.4 kVA	10.6 kVA	14.5 kVA	20.8 kVA
Max. assumed short-circuit current (Isc) (short-circuit current at connection point)	22 kA			
Inrush current	Max. 33.1 A [1]		Max. 44 A [1]	
Mains current				
At 525 VAC	8 A [2]	11.2 A [2]	15.7 A [2]	22.1 A [2]
At 600 VAC	7.1 A [2]	10.2 A [2]	14 A [2]	20 A [2]
Power dissipation at nominal load and nominal clock frequency	114 W	136 W	197 W	228 W
Integrated EMC filter	No			
Motor connection				
Nominal output current	9 A [3]	11 A [3]	17 A [3]	22 A [3]
Derating of continuous output current depending on ambient temperature				
At nominal clock frequency (4 kHz)	No derating (up to 50°C)			
Other clock frequencies	The derating curves are included in the installation instructions, which can be downloaded from the website (www.br-automation.com).			
Derating of continuous output current depending on installation elevation				
Starting at 1000 m above sea level	1%, per 100 m			
Max. transient current for 60 s	13.5 A	16.5 A	25.5 A	33 A
Output frequency range	0.1 to 599 Hz			
Nominal clock frequency	4 kHz			
Clock frequency				
Min.	2 kHz			
Max.	16 kHz			
Braking torque				
With braking resistor	Up to 170% of the rated motor torque			
Max. motor cable length				
Shielded cable	50 m			
Non-shielded cable	100 m			
Motor control profiles				
Induction motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps Sensorless slip control: 1. With V/f characteristic curve for constant torque → Standard profile 2. With V/f characteristic curve for constant torque (6 f-ranges) → Custom profile for special applications 3. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps			
Synchronous motor	Sensorless vector control: 1. With V/f characteristic curve for constant torque → Standard profile			
Main protective functions of inverter	Thermal protection against power stage overheating Protection against short circuits between motor phases, overcurrent between output phases and ground, overvoltages on the DC bus, exceeding the speed limit. Safety function for: Over- and undervoltage of the power supply system, line phase failure with 3-phase supply			
Brake chopper				
Integrated dynamic brake transistors	Yes			
Min. resistance value (external)	34 Ω	23 Ω	24 Ω	
24 VDC power supply				
Input voltage	24 VDC (-15%/+20%)			
Current	Max. 1.1 A			
Available internal power supplies				
Output voltage 24 VDC	24 VDC (-15%/+20%)			
Output voltage 24 VDC				
Max. output current at 24 VDC	100 mA			
Output voltage 10 VDC	10 VDC (-0%/+10%)			
Output voltage 10 VDC				
Max. output current at 10 VDC	10 mA			
Interfaces				
POWERLINK				
Type	Type 3 [4]			

Table 22: 8I66T600550.00-000, 8I66T600750.00-000, 8I66T601100.00-000, 8I66T601500.00-000 - Technical data

Model number	8I66T600550.00-000	8I66T600750.00-000	8I66T601100.00-000	8I66T601500.00-000
Digital inputs				
Quantity	6 [5)]			
Nominal voltage	24 VDC (max. 30 VDC)			
Input circuit	Source or sink			
Switching threshold	Sink: >19 V (position 0), <13 V (position 1) Source: <5 V (position 0), >11 V (position 1)			
Electrical isolation				
Input - ACOPOSinverter	Yes			
Input - Input	No			
Sampling time	8 ms ±0.7 ms			
Digital input 5				
Max. input frequency	20 kHz			
Safe input - STO (Safe Torque Off)				
Quantity	1			
Nominal voltage	24 VDC (max. 30 VDC)			
Input impedance	1.5 kΩ			
Input impedance				
Current consumption	16 mA			
Electrical isolation				
Input - ACOPOSinverter	Yes			
Input - Input	No			
Analog inputs				
Quantity	3			
Electrical isolation				
Input - Input	No			
Input - ACOPOSinverter	Yes			
Nonlinearity	±0.2%, max. ±0.5%			
Basic accuracy	At 25°C: ±0.5% At -10 to 60°C: ±0.7%			
Input				
Voltage	AI1: 0 to 10 VDC AI2: 0 ±10 VDC, max. 30 VDC			
Current	0 to 20 mA (or 4 to 20 mA)			
Resolution	10-bit			
Sampling time	2 ms			
Input impedance				
Voltage	30 kΩ			
Current	250 Ω			
Digital outputs				
Quantity	1			
Nominal voltage	24 VDC -15%/+20%			
Max. voltage	30 VDC			
Output circuit	Source or sink			
Sampling time	2 ms			
Max. current	100 mA			
Relay outputs				
Quantity	2			
Nominal voltage	30 VDC / 250 VAC			
Switching current range	Min. switching current: 5 mA at 24 VDC Max. switching current: R1 at cos φ = 1: 3 A at 250 VAC / 4 A at 30 VDC R2 at cos φ = 1: 5 A R1 and R2 at cos φ = 0.4: 2 A			
Variant				
Relay 1	1 changeover contact			
Relay 2	1 normally open contact			
Electrical isolation				
Output - ACOPOSinverter	Yes			
Output - Output	No			
Response time (max.)	2 ms			
Analog outputs				
Quantity	1			
Output	0 to 10 V or 0 to 20 mA			
Nonlinearity	±0.3%			
Basic accuracy	At 25°C: ±1% At -10 to 60°C: ±2%			
Electrical isolation				
Output - ACOPOSinverter	Yes			
Output - Output	No			
Max. load impedance				
Voltage	470 Ω			
Current	800 Ω			
Update time	2 ms			
Resolution	10-bit			

Table 22: 8I66T600550.00-000, 8I66T600750.00-000, 8I66T601100.00-000, 8I66T601500.00-000 - Technical data

Model number	8I66T600550.00-000	8I66T600750.00-000	8I66T601100.00-000	8I66T601500.00-000
Operating conditions				
Degree of protection per EN 61800-5-1	IP20			
Relative humidity per IEC 60068-2-3	5 to 95%, non-condensing No dripping water			
Maximum installation elevation	≤1000 m without derating 1000 to 2000 m with Derating [6)]			
Max. pollution degree per IEC/EN 61800-5-1	2 (non-conductive pollution)			
Ambient conditions per IEC 60721-3-3	Class 3C3 and 3S2			
Operating position	Vertical mounting orientation ±10°			
Ambient conditions				
Temperature				
Operation	-10 to 50°C without derating 50 to 60°C with derating			
Storage	-25 to 70°C			
Max. vibration resistance	1 g_n 13 to 200 Hz EN/IEC 60068-2-6 1.5 mm peak to peak 2 to 13 Hz EN/IEC 60068-2-6			
Mechanical properties				
Dimensions				
Width	150 mm		180 mm	
Height	308 mm		404 mm	
Height without shield plate	232 mm		330 mm	
Depth	178 mm		198 mm	
Weight	3.5 kg		6.5 kg	

Table 22: 8I66T600550.00-000, 8I66T600750.00-000, 8I66T601100.00-000, 8I66T601500.00-000 - Technical data

1) Peak current when switching on for maximum voltage (240 V +10% or 500 V +10% or 600 V +10%)
2) Typical value for 4-pin motor and a max. clock frequency of 4 kHz, without mains choke for the max. assumed short circuit current (Isc).
3) These values apply at a nominal clock frequency of 4 kHz during continuous operation. The clock frequency can be set from 2 to 16 kHz. Above 4 kHz, reduce the nominal drive current. The nominal motor current is not permitted to exceed this value.
4) See Automation Help under "Communication / POWERLINK / General information / Hardware - IF/LS" for more information.
5) 1 logic input can be programmed as a 20 kbps pulse input. 1 logic input is configurable as an input for a PTC sensor using a switch (SW2). Trigger resistance 3 kΩ, reset value 1.8 kΩ, short-circuit proof <50 Ω
6) Over 1000 m, load reduced by 1% per 100 m.

3 Installation

3.1 Testing for absence of voltage

The voltage level of the DC bus is calculated by measuring the voltage between DC bus terminals PA/+ and PC/-. The mounting orientation of the DC bus terminals is determined by the inverter model. Use the nameplate to determine your inverter's specific model. For more information, see section "Wiring the power unit" on page 91.

Danger!

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

- **Only suitably trained and authorized personnel who are familiar with the content of this manual as well as the overall product documentation are permitted to work with or near this drive system. Such personnel must also have successfully completed safety training on how to identify and prevent the various hazards involved. Installation, setup, repair and servicing must be performed by qualified personnel.**
- **The system integrator is responsible for ensuring compliance with all relevant local and national electrical engineering requirements as well as with any other applicable regulations relating to the protective grounding of all devices.**
- **Many product components, including the printed circuits, are powered via the mains voltage. Do not touch!**
- **Only use electrically insulated tools and ensure that measuring instruments are used with the correct rated voltage.**
- **Once powered on, do not touch any unshielded components or terminals.**
- **Motors can generate voltage when the shaft rotates. Before working on the drive system, make sure that the motor shaft is not driven by an external source.**
- **If there is a change in voltage, the voltage applied to unused conductors in the motor cable may become disconnected. Any motor cable conductors that are not used must be insulated at either end.**
- **Do not short-circuit the DC bus terminals, the DC bus capacitors or the braking resistor terminals.**
- **Before performing any work on the drive system, proceed as follows:**
  - **Disconnect all power supplies, including the external power supply to the control unit, if applicable.**
  - **Affix a "DO NOT SWITCH ON" sign to all circuit breakers connected to the inverter system.**
  - **Lock all circuit breakers in the open position.**
  - **Wait 15 minutes to allow the DC bus capacitors to discharge.**
  - **Follow the instructions included in section "Testing for absence of voltage" of the product installation instructions.**
- **Before switching on the power supply to the inverter system, proceed as follows:**
  - **Make sure that all work is complete and that no hazards have been created as a result of the installation.**
  - **If the mains input terminals and motor output terminals are grounded and short-circuited, remove the grounding and short circuits from the main input terminals and motor output terminals.**
  - **Make sure that the entire device is grounded correctly.**
  - **Make sure that all protective equipment such as covers, doors and grids are installed and closed.**

Failure to follow these instructions will result in death or serious injury.

Procedure

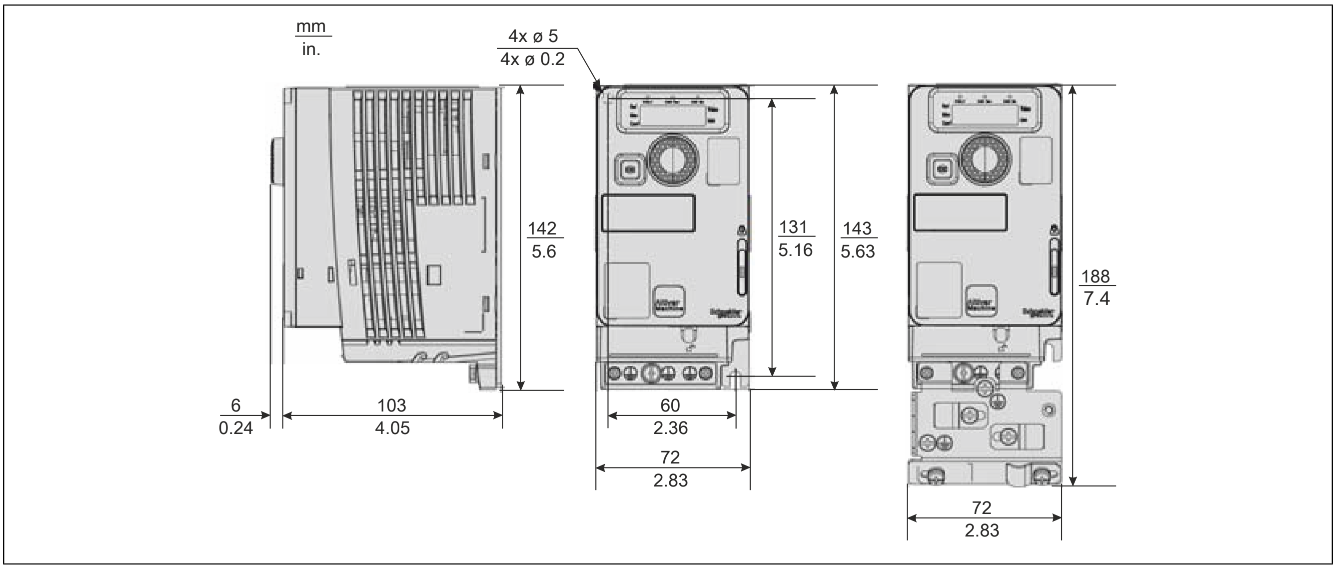
To test for the absence of voltage, proceed as follows:

1) Measure the voltage on the DC bus between the DC bus terminals (PA/+, PC/-) to ensure that the voltage is less than 42 VDC. You can do this using a voltmeter with the correct rated voltage.
2) If the DC bus capacitors do not discharge correctly, contact your local B&R representative. In this case, it is not permitted to repair or start up the product.
3) Make sure that there is no other voltage present in the inverter system.

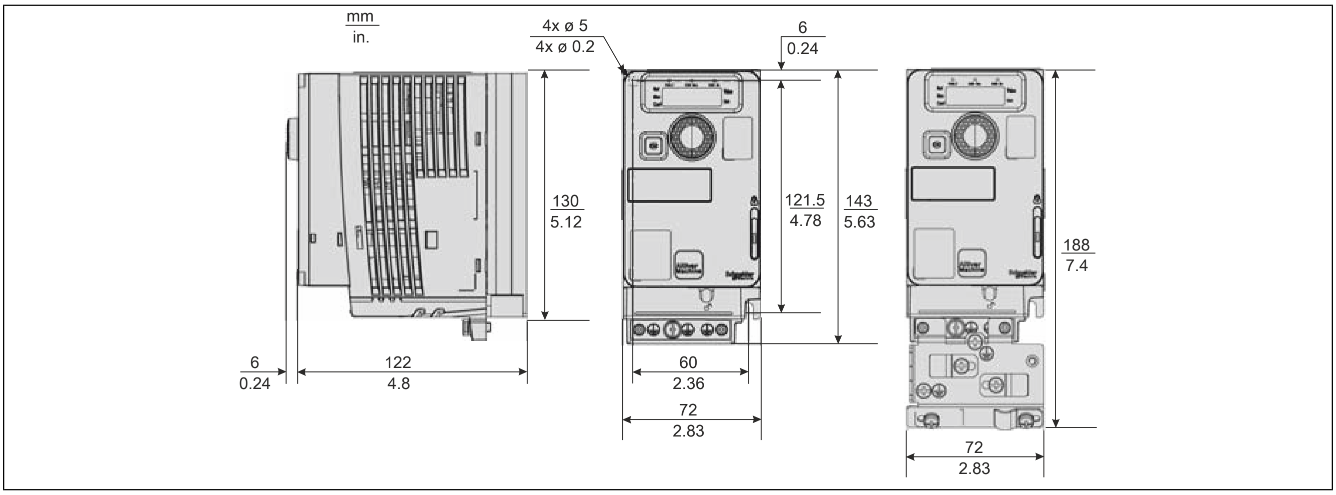
3.2 Mechanical data

Size A - Dimensions and weight

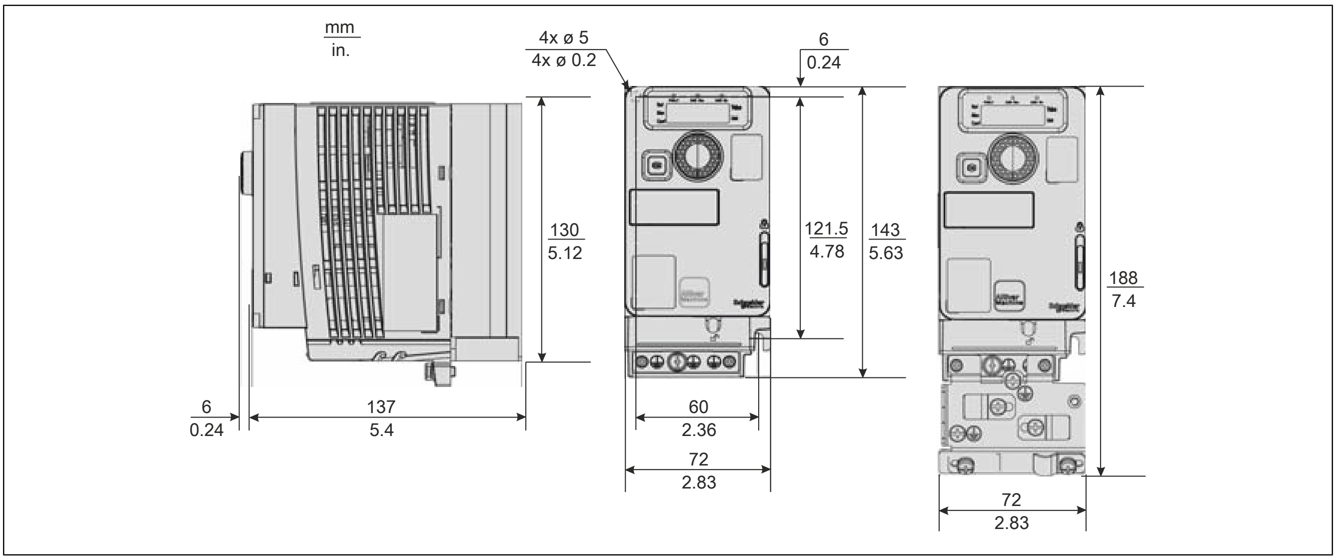
8I66S200018.00-000, 8I66T200018.00-000



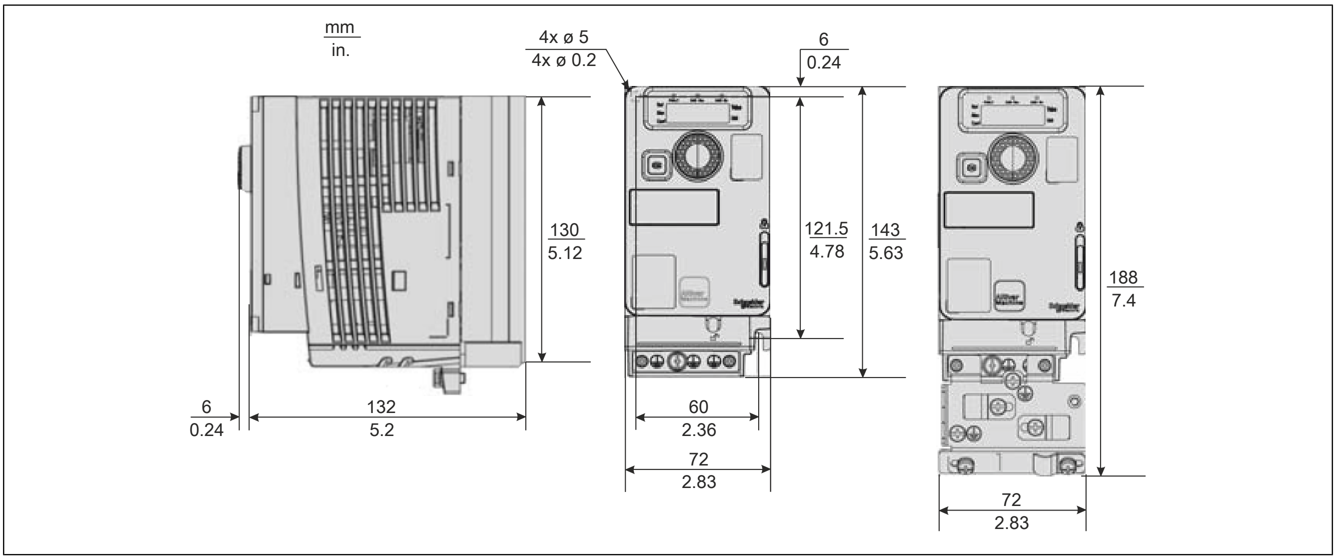
8I66S200037.00-000, 8I66T200037.00-000



8I66S200055.00-000, 8I66S200075.00-000



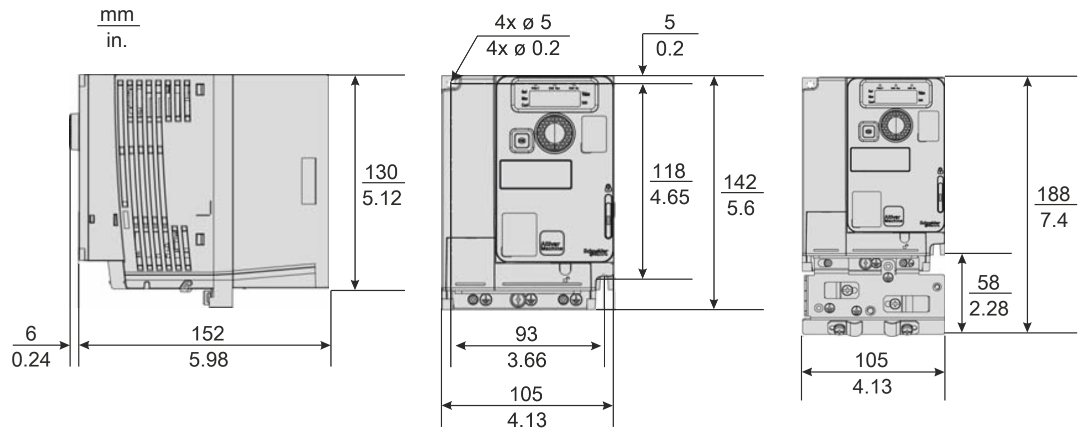
8I66T200055.00-000, 8I66T200075.00-000



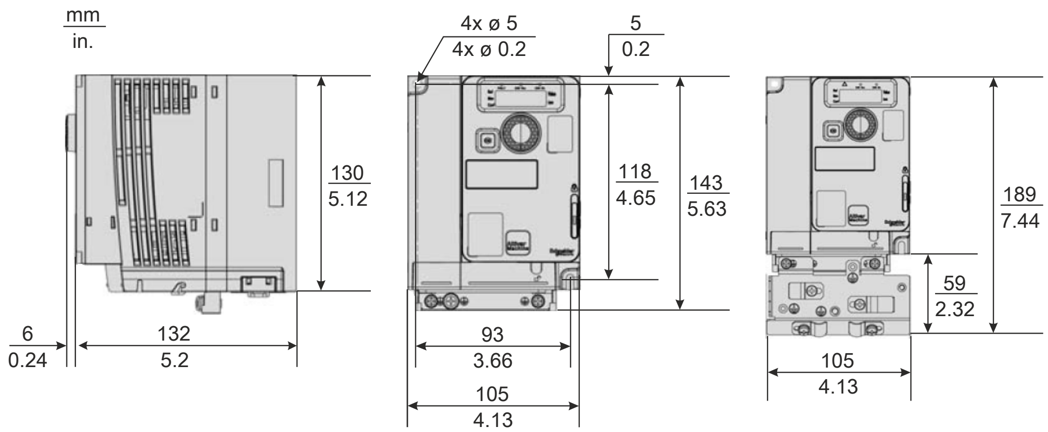
Catalog number	Weight (kg)	Weight (lb)
8I66S200018.00-000, 8I66T200018.00-000	0.8	1.76
8I66T200037.00-000	0.9	1.98
8I66S200037.00-000, 8I66T200055.00-000, 8I66T200075.00-000	1	2.2
8I66S200055.00-000, 8I66S200075.00-000	1.1	2.42

Size B - Dimensions and weight

8I66S200110.00-000, 8I66S200150.00-000, 8I66S200220.00-000, 8I66T400037.00-000, 8I66T400055.00-000, 8I66T400075.00-000, 8I66T400110.00-000, 8I66T400150.00-000, 8I66T600075.00-000, 8I66T600150.00-000

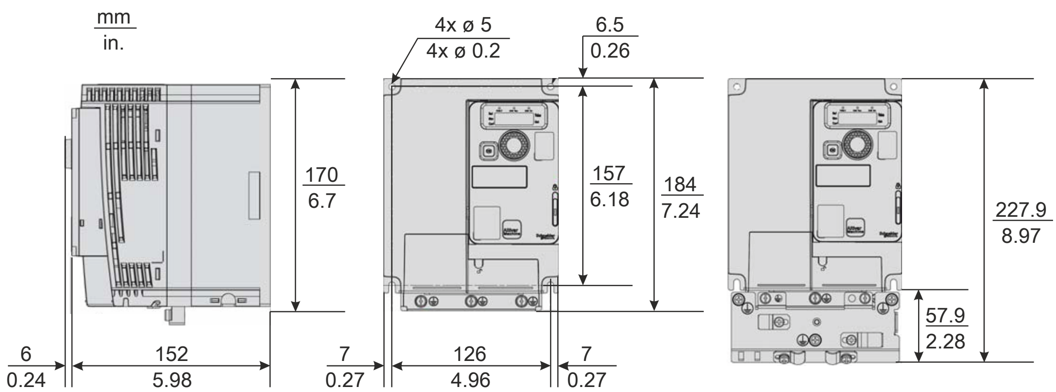


8I66T200110.00-000, 8I66T200150.00-000, 8I66T200220.00-000



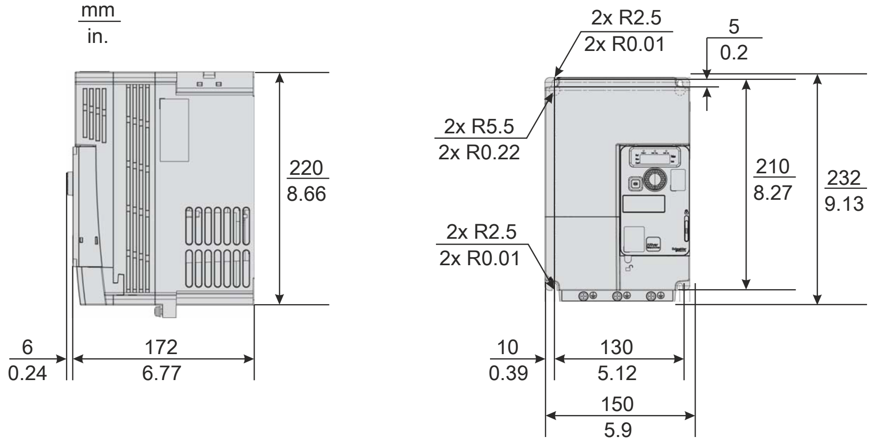
Catalog number	Weight (kg)	Weight (lb)
8I66S200110.00-000, 8I66S200150.00-000, 8I66S200220.00-000	1.60	3.53
8I66T200110.00-000, 8I66T200150.00-000, 8I66T200220.00-000	1.40	3.08
8I66T400037.00-000, 8I66T400055.00-000, 8I66T400075.00-000	1.20	2.65
8I66T400110.00-000, 8I66T400150.00-000, 8I66T600075.00-000, 8I66T600150.00-000	1.30	2.87

Size C - Dimensions and weight

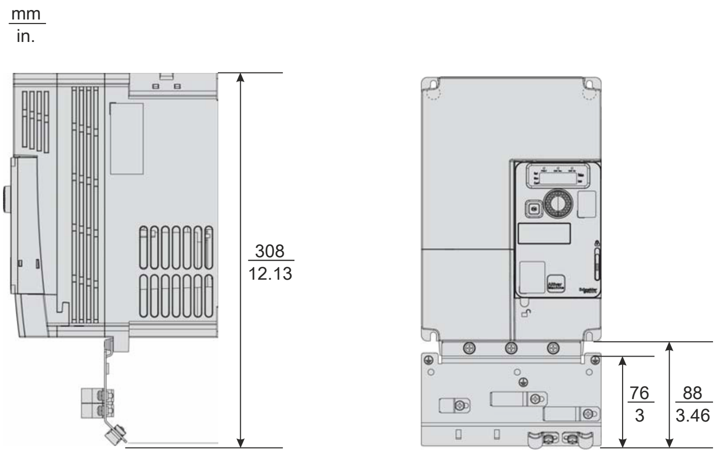


Catalog number	Weight (kg)	Weight (lb)
8I66T200300.00-000, 8I66T200400.00-000, 8I66T400400.00-000	2.20	4.85
8I66T400220.00-000, 8I66T400300.00-000	2.10	4.63
8I66T600220.00-000, 8I66T600400.00-000	2	4.41

Size D - Dimensions and weight

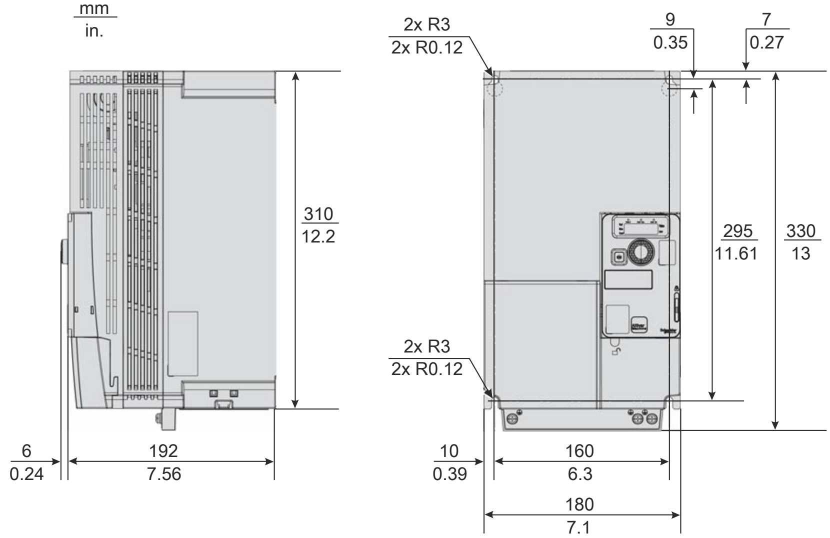


Size D with EMC plate - Dimensions and weight

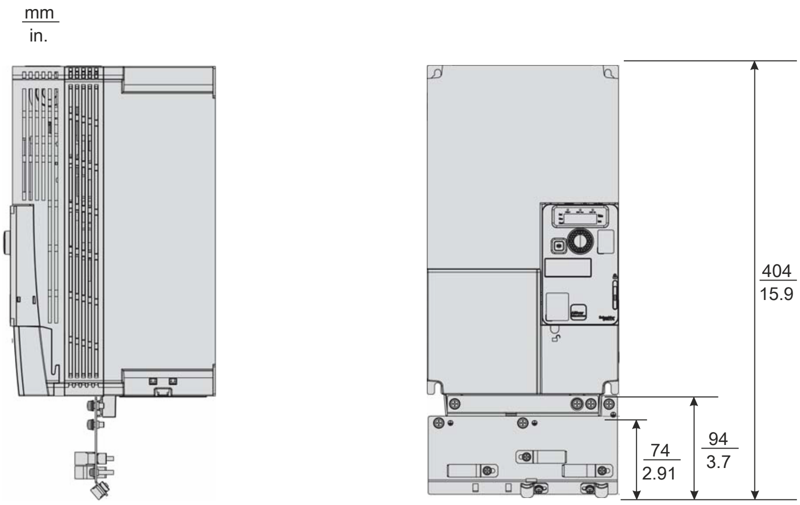


Catalog number	Weight (kg)	Weight (lb)
8I66T200550.00-000, 8I66T400550.00-000, 8I66T600550.00-000, 8I66T600750.00-000	3.5	7.72
8I66T200750.00-000, 8I66T400750.00-000	3.6	7.92

Size E - Dimensions and weight



Size E with EMC plate - Dimensions and weight



Catalog number	Weight (kg)	Weight (lb)
8I66T201100.00-000, 8I66T401100.00-000	6.8	15
8I66T201500.00-000, 8I66T401500.00-000	6.9	15.2
8I66T601100.00-000, 8I66T601500.00-000	6.5	14.3

3.3 Installing the frequency inverter

3.3.1 Procedure for commissioning the inverter

Procedure

1) Take delivery of the inverter and perform an inspection:
    - Make sure that the catalog number indicated on the label matches the model number.
    - Remove the inverter from the packaging and inspect it for damage.
2) Check the mains power supply:
    - Make sure that the mains power supply is compatible with the supply voltage for the inverter power unit.
3) Install the inverter:
    - Install the inverter in accordance with the instructions provided in this document.
    - Mount the inverter(s), and if applicable, all internal and external options.
4) Wire the inverter.
    - Connect the motor and make sure that the connections match the voltage.
    - Make sure that the voltage is switched off, and then connect to the mains power supply.
    - Connect the controller.
5) Programming

Steps 1 to 4 must be carried out with the voltage switched off.

3.3.2 Getting started

Transport and storage

Warning!

HAZARDS DURING TRANSPORTATION

- **The transportation of damaged packaging is not permitted.**
- **The packed product must be transported carefully and the packaging opened carefully.**

Failure to follow these instructions can result in death, serious injury or damage to property.

To protect the device, make sure that it is transported and stored in its own packaging before installation.
Make sure that environmental conditions are suitable.

Inspecting the inverter after delivery

Damaged products and accessories can cause electric shocks or the equipment to operate in unexpected ways.

Danger!

ELECTRIC SHOCK OR UNEXPECTED OPERATION OF THE EQUIPMENT

Use of damaged products or accessories is not permitted.

Failure to follow these instructions will result in death or serious injury.

In the event of damage, contact your local B&R sales representative.

1) Remove the inverter from the packaging and inspect it for damage.
2) Make sure that the catalog number on the nameplate matches the model number.

3.3.3 Forming DC bus capacitors

Electrolytic capacitors are installed in B&R servo drives, inverter modules, stepper motor modules and power supplies. In these cases, the oxide layer that acts as a dielectric can become weakened by electrochemical processes when stored for a lengthy period with the power is switched off. In the worst case, this can cause a short circuit and subsequent destruction of the capacitor and irreparable damage to B&R modules.

When stored for periods over 1 year, the electrolytic capacitors may be destroyed during commissioning if not preconditioned. If preconditioning takes place using a forming process defined for B&R modules, then proper operation can be guaranteed. Forming is performed by applying a defined voltage over a defined period of time. This reforms the oxide layer to ensure the functionality of the electrolytic capacitors.

Caution!

DC bus capacitors can become damaged or destroyed when switching on at the nominal voltage after being stored for periods over 1 year.

Forming B&R modules stored over a long period of time before commissioning avoids damage to the capacitors.

3.3.3.1 Forming specifications for DC bus capacitors

Procedure for modules stored for a long period of time

If modules are not supplied with nominal voltage for a longer period of time, the DC bus capacitors must be formed as follows.

The nominal voltage is the voltage permitted at the mains connections on the respective module.

Power is only supplied to the module; the output stage or controller is NOT permitted to be switched on during this!

Storage time up to 1 year: → No action required

Storage time 1 to 2 years: → Supply the module with nominal voltage 1 hour before commissioning.

Storage time 2 to 3 years: Supply the module with an adjustable power supply and increase the voltage in steps. Observe the following sequence:

1. Supply with 25% of the nominal voltage for 30 minutes.
2. Supply with 50% of the nominal voltage for 30 minutes.
3. Supply with 75% of the nominal voltage for 30 minutes.
4. Supply with 100% of the nominal voltage for 30 minutes.

Total forming time: >2 hours
The module is now ready for operation.

Storage time 3 or more years: Supply the module with an adjustable power supply and increase the voltage in steps. Observe the following sequence:

1. Supply with 25% of the nominal voltage for 2 hours.
2. Supply with 50% of the nominal voltage for 2 hours.
3. Supply with 75% of the nominal voltage for 2 hours.
4. Supply with 100% of the nominal voltage for 2 hours.

Total forming time: >8 hours
The module is now ready for operation.

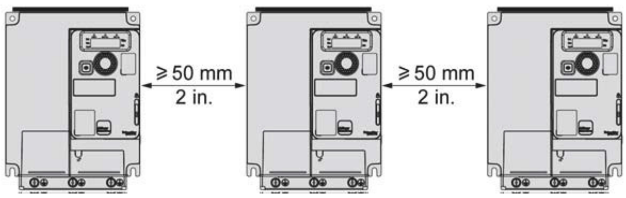
Information:

B&R recommends forming at nominal voltage for 1 hour once a year.

B&R modules that have been stored for more than 5 years without forming should no longer be put into operation.
The storage period is valid from the time of delivery by B&R.

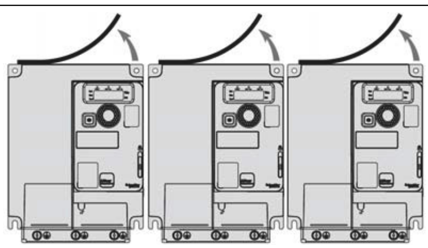
3.3.4 Mounting conditions

Mounting type A



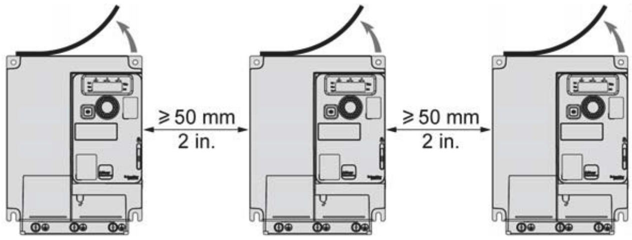
Clearance ≥50 mm (2 in.) on each side with mounted ventilation cover. Mounting type A allows the inverter to operate at ambient temperatures up to 50°C (122°F).

Mounting type B



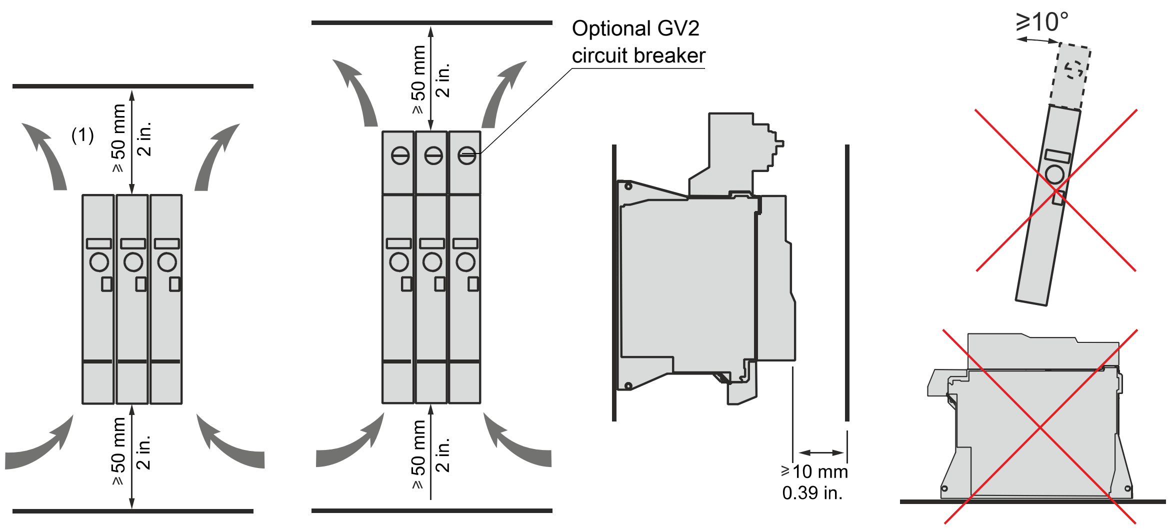
Inverters mounted side by side. The protective cover should be removed. The degree of protection changes to IP20.

Mounting type C



Clearance ≥50 mm (2 in.) on each side. When operating at ambient temperatures above 50°C (122°C), the protective cover should be removed. The degree of protection changes to IP20.

Spacing and mounting position



(1) Minimum value according to the thermal conditions.

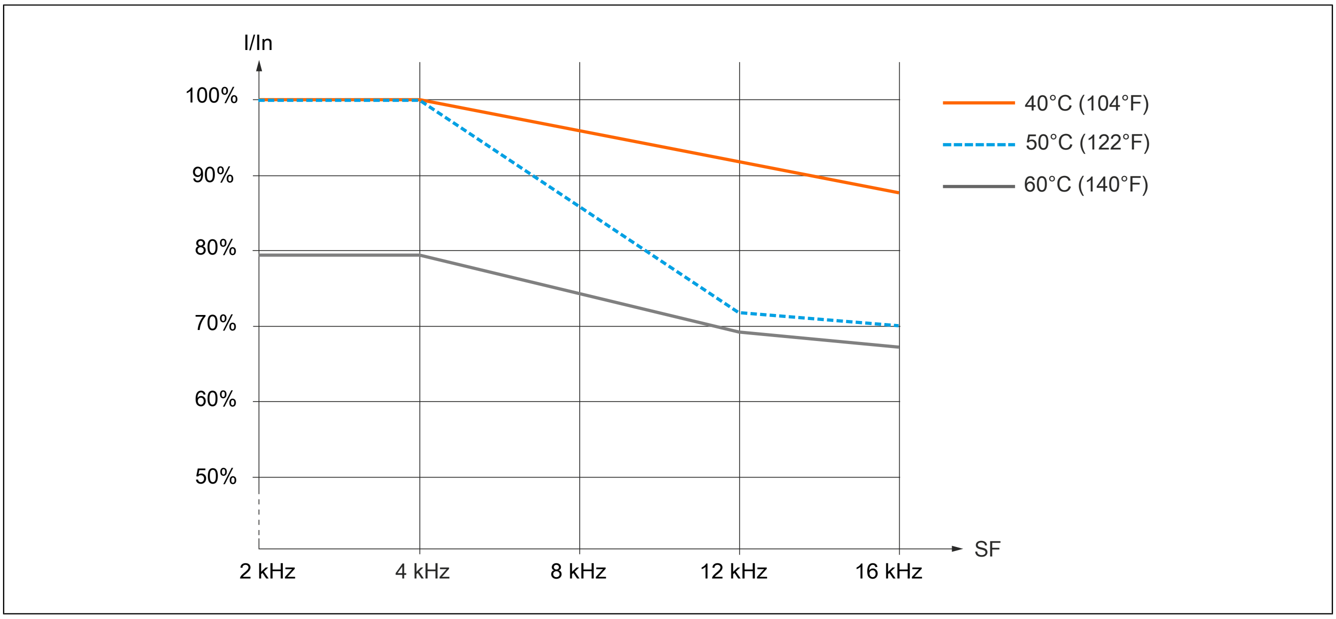
General mounting instructions

- Mount the device in a vertical position of ±10°. This is necessary to facilitate cooling of the device.
- In accordance with the relevant standards, mount the device onto the mounting surface using four screws, as described in the table in section 3.3.6 "Mounting type" on page 77.
- Washers should be used for all mounting screws.
- Tighten the mounting screws.
- Do not install the device near heat sources.
- Avoid environmental influences such as high temperatures and high humidity as well as dust, dirt and aggressive gases.
- Comply with the minimum spacing prescribed for the installation to ensure the required cooling.
- Do not install the device on flammable equipment.
- Install the inverter on a solid, vibration-free floor.
- It is possible for sizes A and B to be installed horizontally without declassification (except if installed directly side by side), provided that the following requirements are met:
  - The air inlets are located on the top of the device.
  - The spacing around the inverter is the same as if installed vertically.

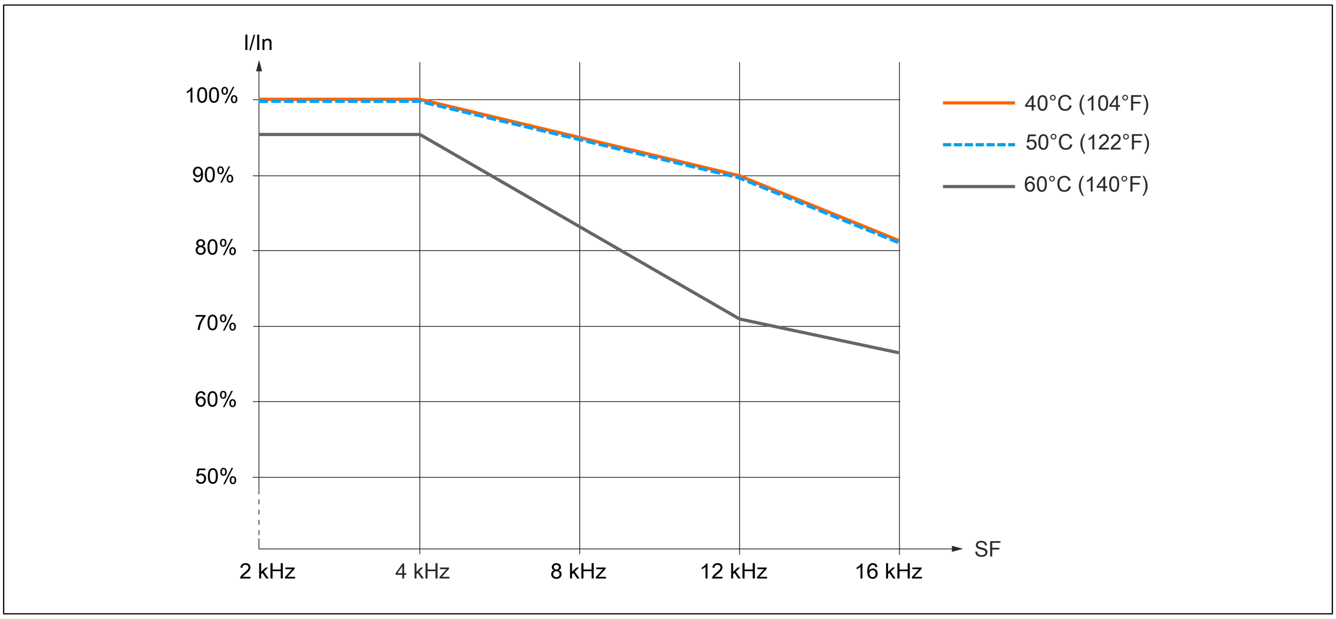
3.3.5 Derating characteristic curve

Characteristic curves for the nominal current of the inverter (In) as a function of the temperature and switching frequency.

8I66S200018.00-000, 8I66S200037.00-000, 8I66S200055.00-000, 8I66S200075.00-000



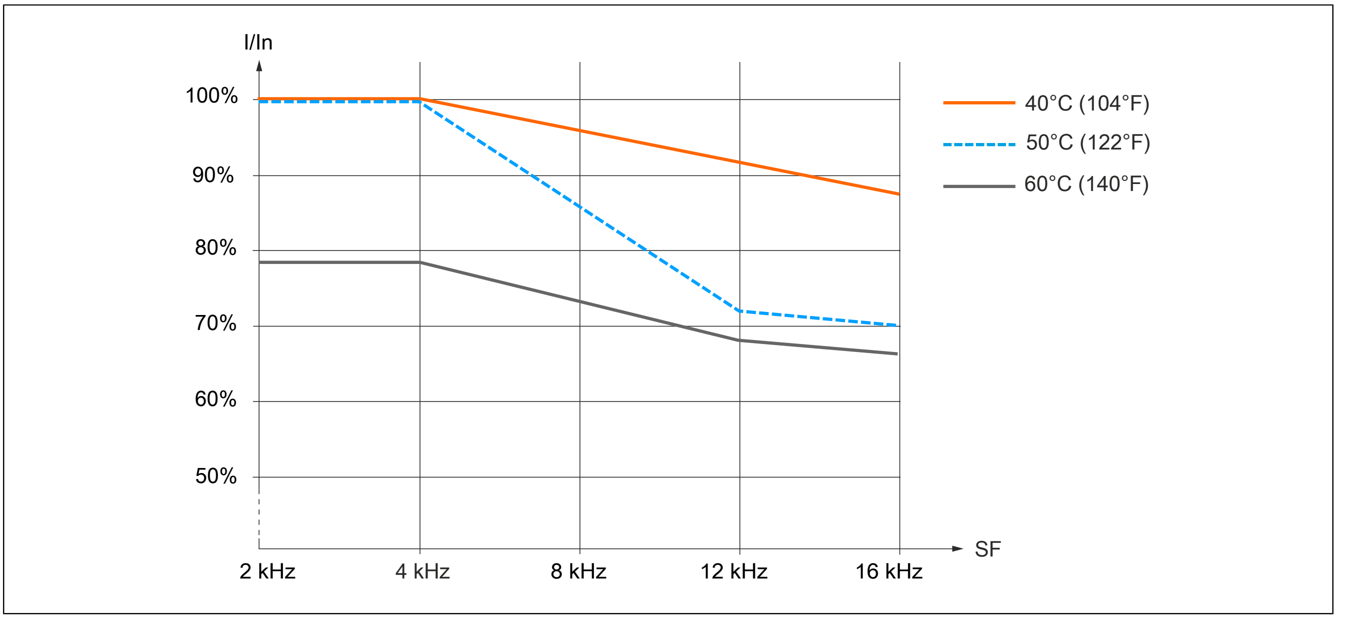
8I66S200110.00-000, 8I66S200150.00-000, 8I66S200220.00-000



8I66T200018.00-000, 8I66T200037.00-000, 8I66T200055.00-000, 8I66T200075.00-000

Mounting type A and B: 40°C

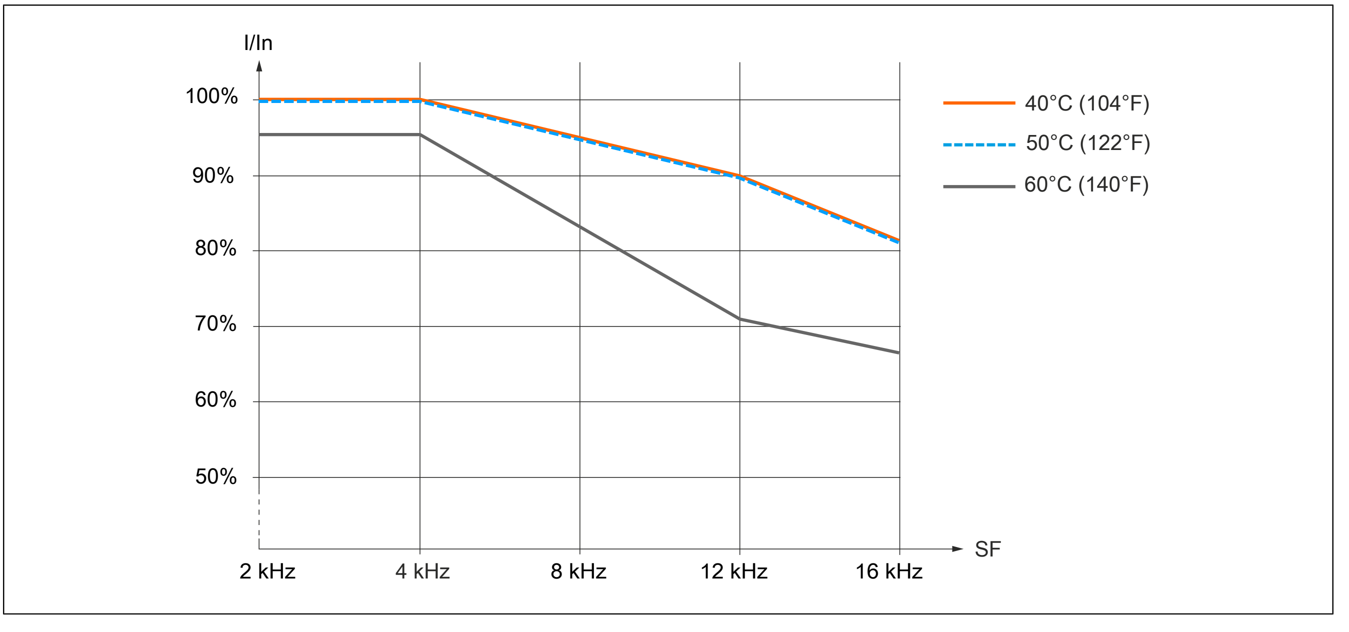
Mounting type C: 40°C, 50°C, 60°C



8I66T200110.00-000, 8I66T200150.00-000, 8I66T200220.00-000

Mounting type A and B: 40°C

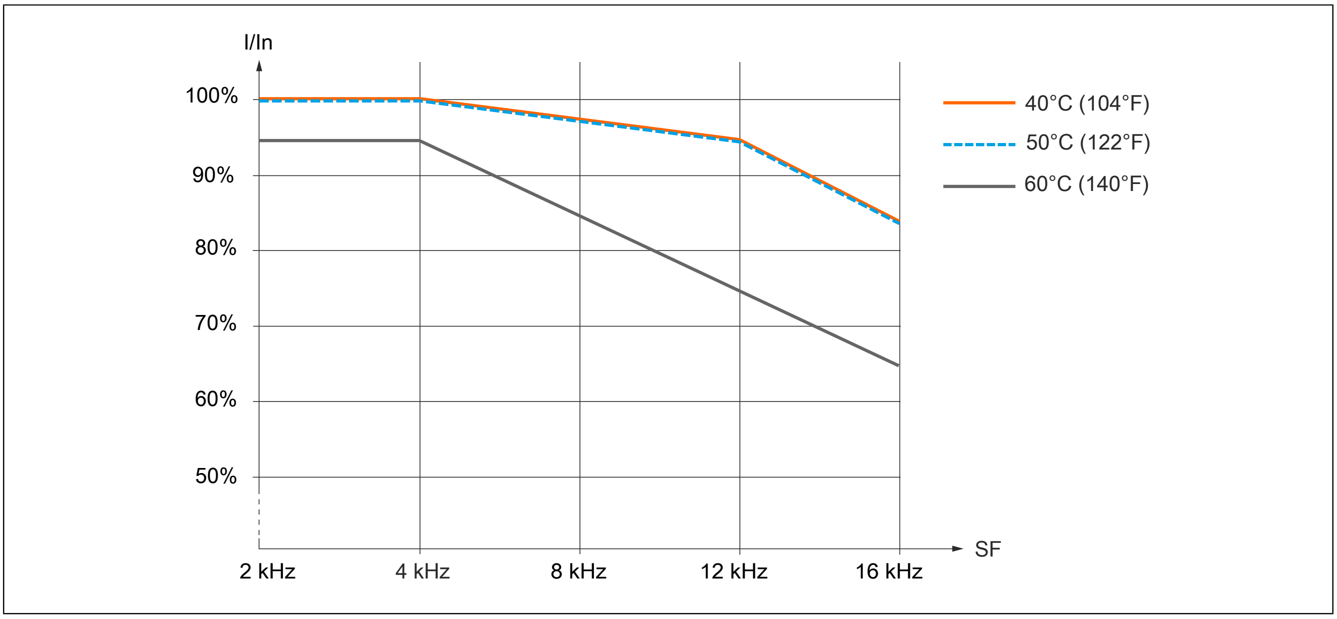
Mounting type C: 40°C, 50°C, 60°C



8I66T200300.00-000, 8I66T200400.00-000

Mounting type A and B: 40°C

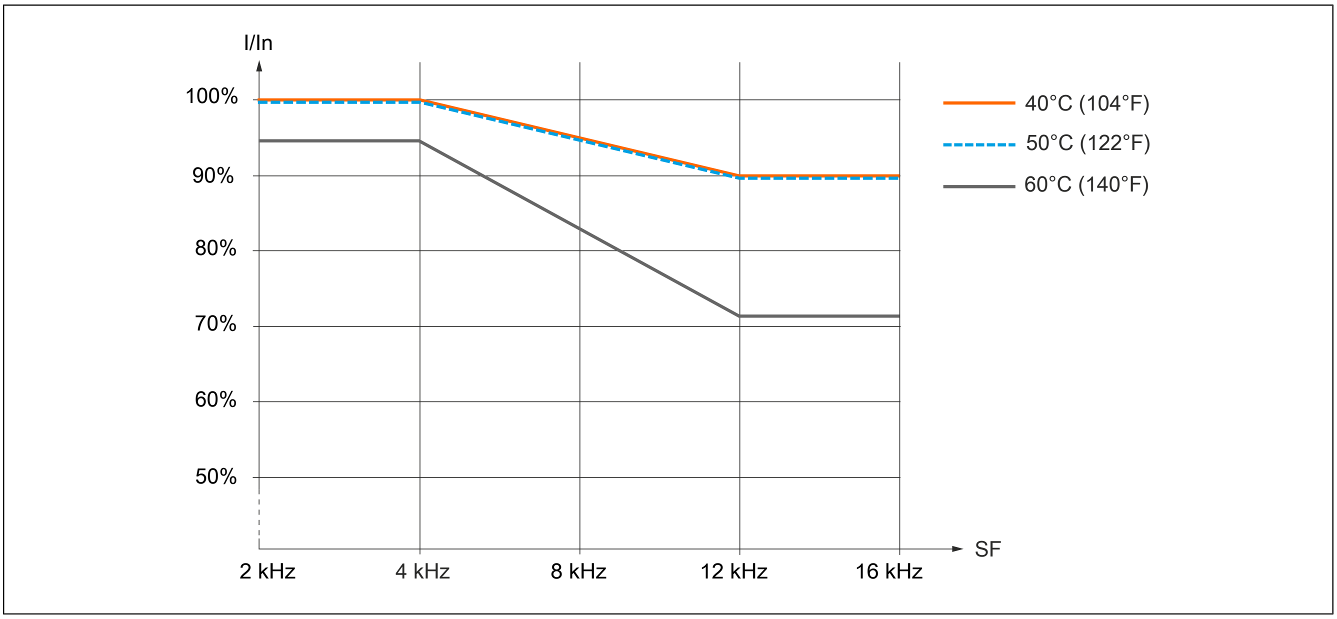
Mounting type C: 40°C, 50°C, 60°C



8I66T200550.00-000, 8I66T200750.00-000

Mounting type A and B: 40°C

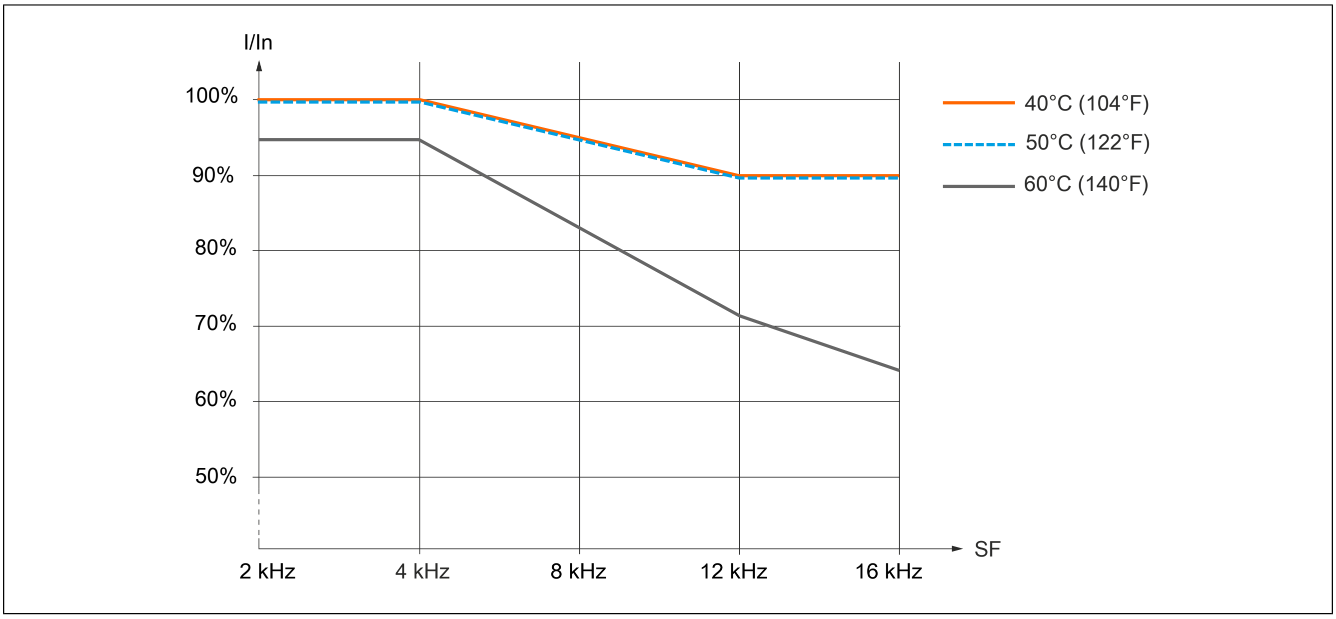
Mounting type C: 40°C, 50°C, 60°C



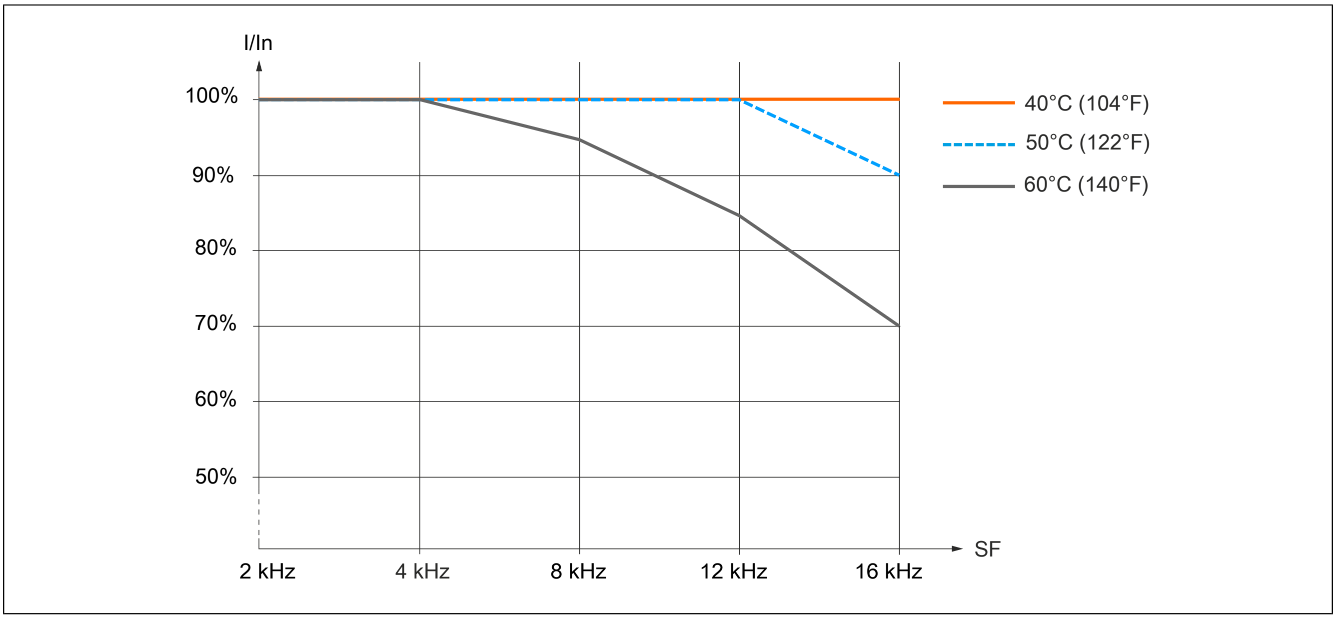
8I66T201100.00-000, 8I66T201500.00-000

Mounting type A and B: 40°C

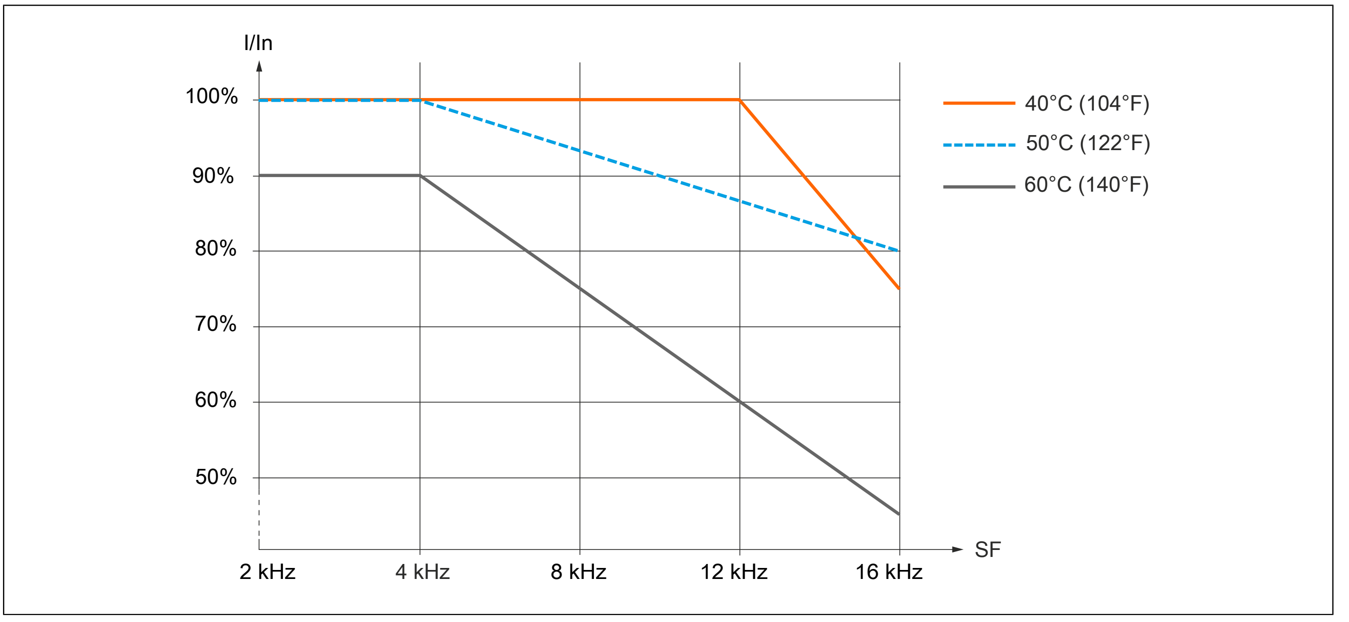
Mounting type C: 40°C, 50°C, 60°C



8I66T400037.00-000, 8I66T400055.00-000, 8I66T400075.00-000, 8I66T400110.00-000, 8I66T400150.00-000

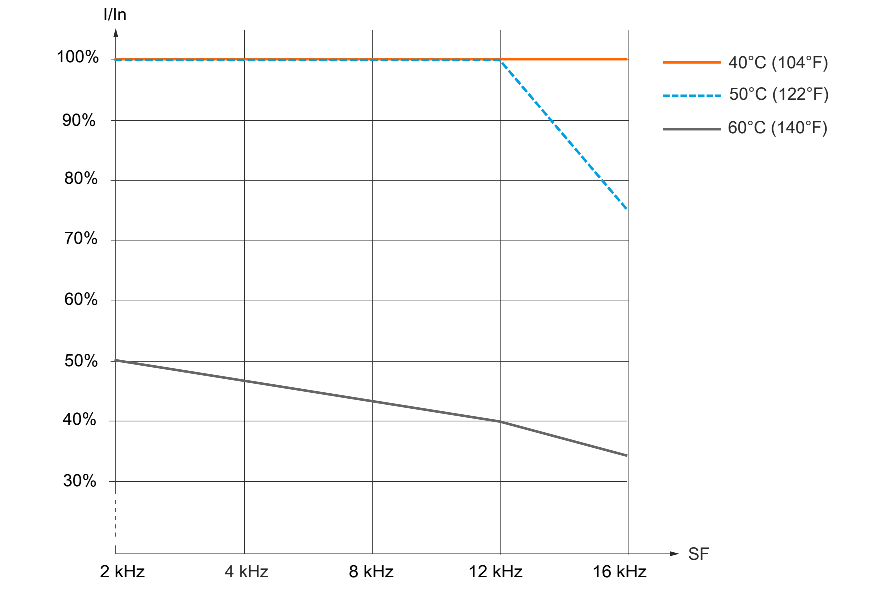


8I66T400220.00-000, 8I66T400300.00-000, 8I66T400400.00-000

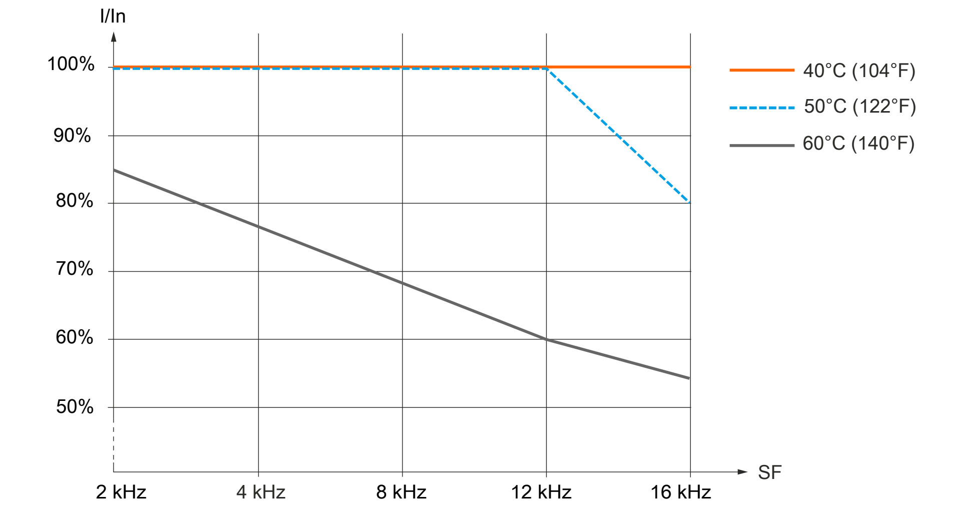


8I66T400550.00-000, 8I66T400750.00-000

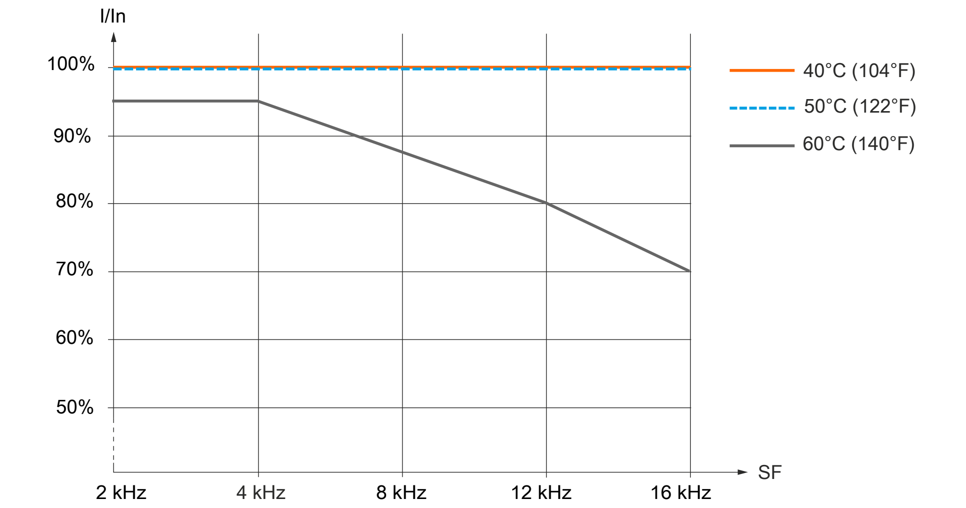
Mounting type A:



Mounting type B:

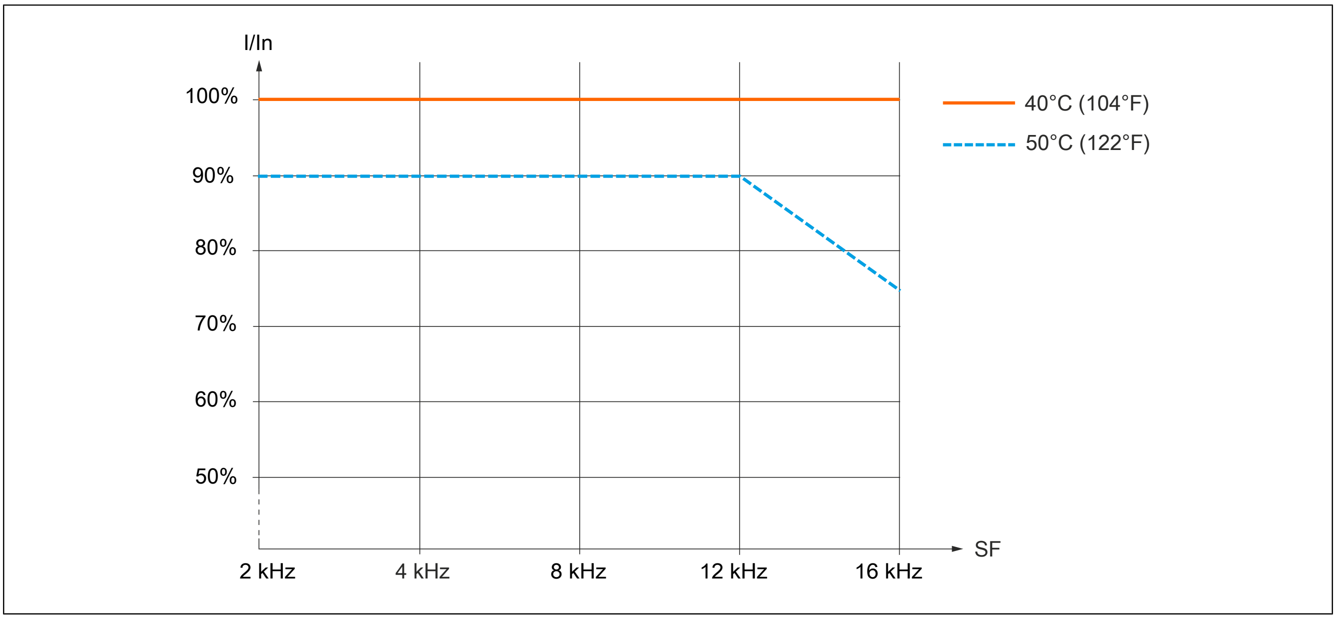


Mounting type C:

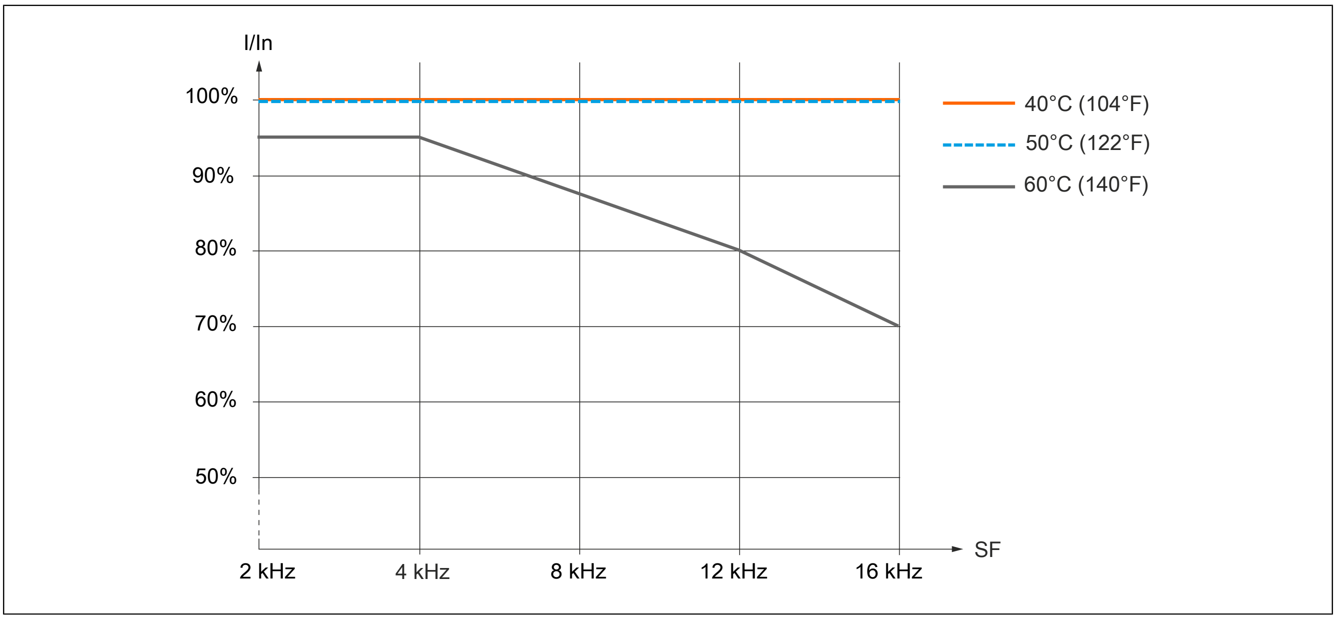


8I66T401100.00-000, 8I66T401500.00-000

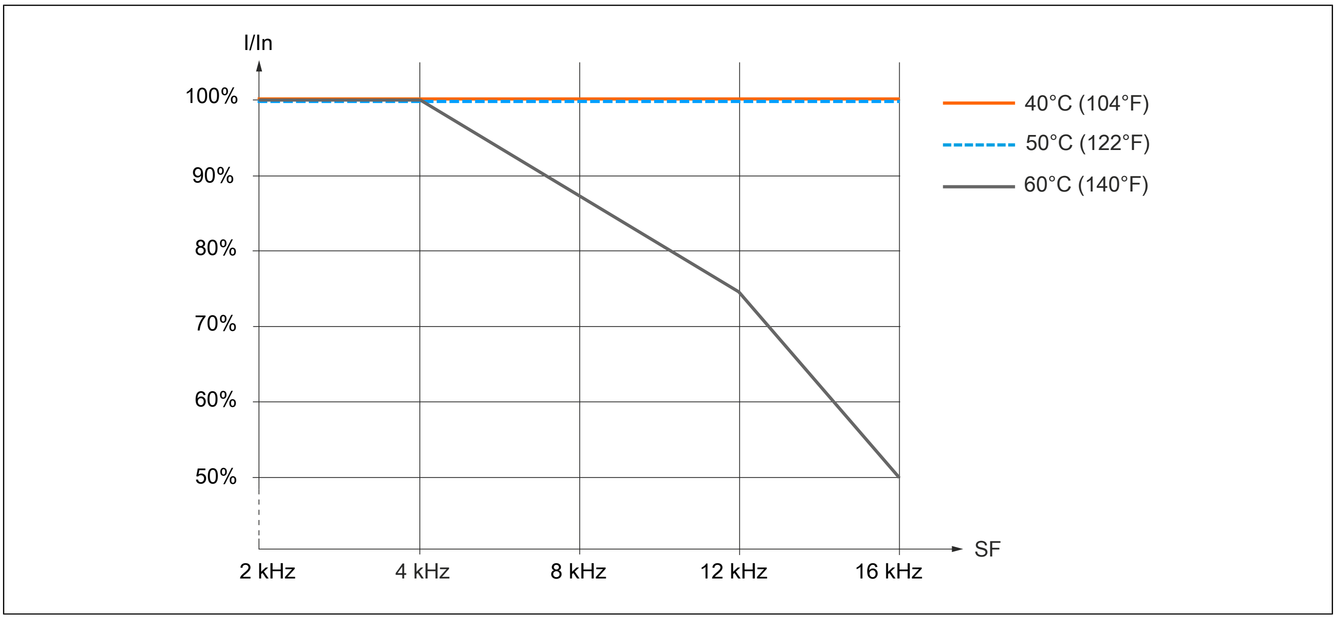
Mounting type A and B:



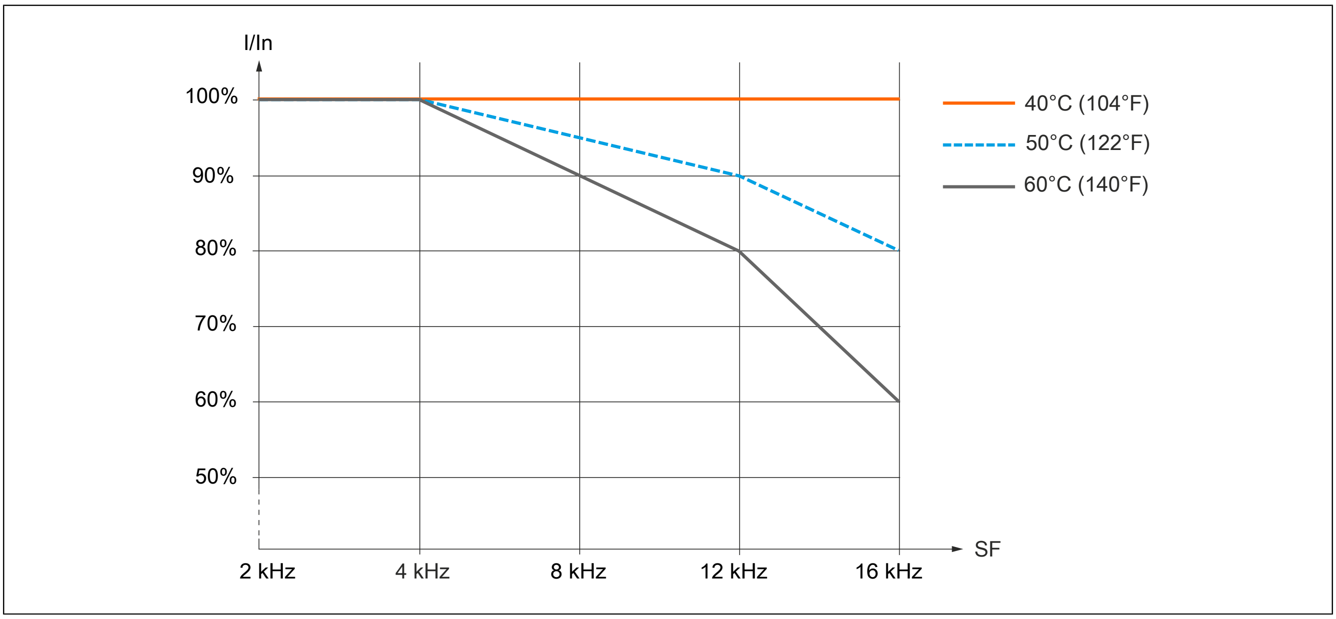
Mounting type C:



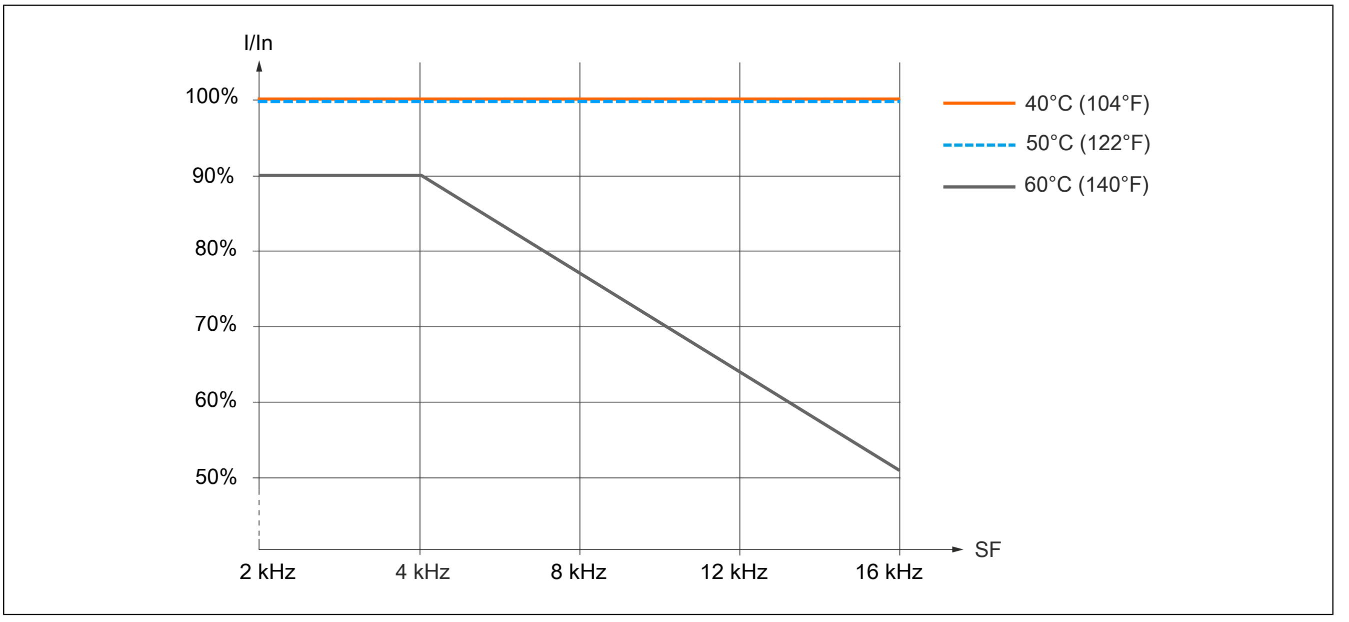
8I66T600075.00-000, 8I66T600150.00-000



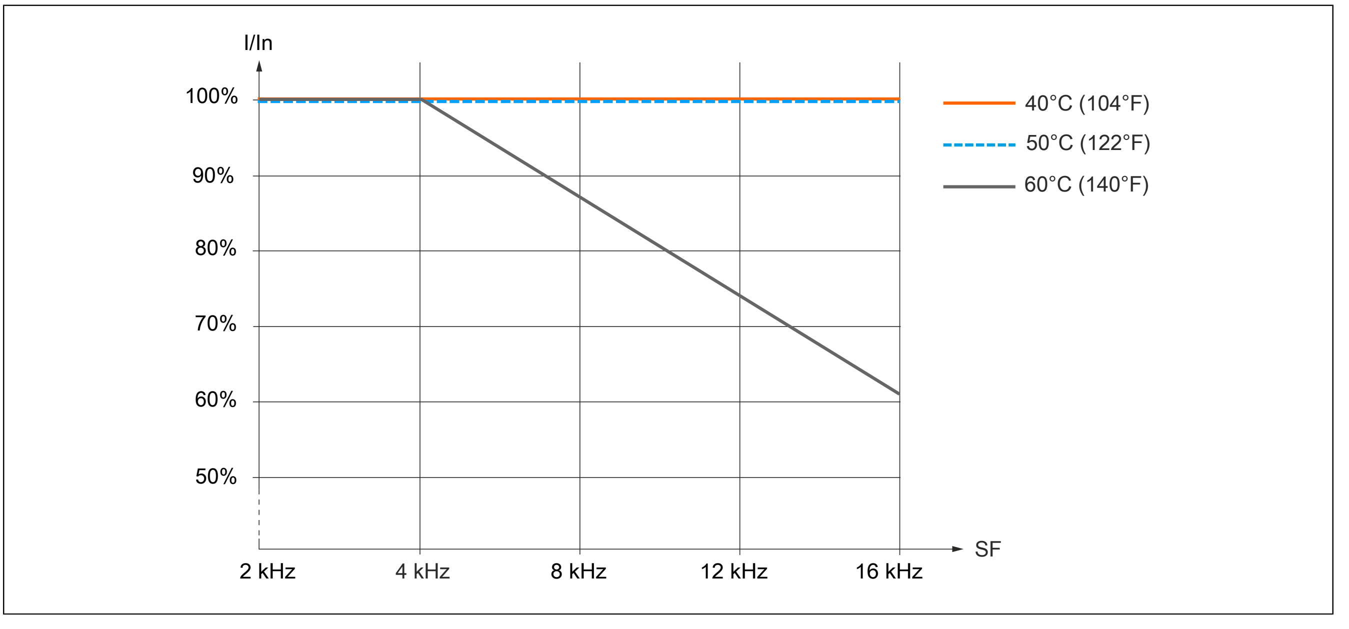
8I66T600220.00-000, 8I66T600400.00-000



8I66T600550.00-000, 8I66T600750.00-000



8I66T601100.00-000, 8I66T601500.00-000

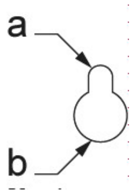


3.3.6 Mounting type

Mounting holes and screws

All inverters of all sizes must be mounted using screws:

- Number of holes: Use all 4 mounting holes.
- Inverter sizes A and B can also be mounted using just 2 mounting holes (top left and bottom right).



Size	Top mounting holes a mm (in)	Top mounting holes b (if applicable) mm (in)	Bottom mounting holes mm (in)	Recommended number of screws
A	5 (0.2)	-	5 (0.2)	M4
B	5 (0.2)	-	5 (0.2)	M4
C	5 (0.2)	-	5 (0.2)	M4
D	5 (0.2)	11 (0.43)	5 (0.2)	M4
E	6 (0.24)	14 (0.55)	6 (0.24)	M5

Advice:

Screws are not included with the delivered product.

3.4 Wiring the drive

3.4.1 Wiring instructions

General instructions

Incorrect settings, invalid data or faulty wiring as well as other types of error can cause unexpected movements.

Warning!

UNEXPECTED OPERATION OF THE EQUIPMENT

- **When wiring the device, all EMC requirements must be strictly observed.**
- **It is not permitted to operate the product using unspecified or unsuitable settings or data.**
- **Perform a comprehensive commissioning test.**

Failure to follow these instructions can result in death, serious injury or damage to property.

Danger!

RISK OF ELECTRIC SHOCK

- **Cable cross-sections and tightening torque must comply with the specifications defined in this document.**
- **For voltage above 25 VAC, cables with multiple conductors must only be used with cable lugs.**

Failure to follow these instructions will result in death or serious injury.

This product has a discharge current of more than 3.5 mA. If there are issues with the protective grounding connection, dangerous touch current can occur when contact is made with the product.

Danger!

ELECTRIC SHOCK CAUSED BY HIGH ELECTRICAL DISCHARGE

- **Make sure that all relevant local and national electrical engineering requirements are complied with, as well as any other applicable regulations in relation to the protective grounding of the entire inverter system.**

Failure to follow these instructions will result in death or serious injury.

Warning!

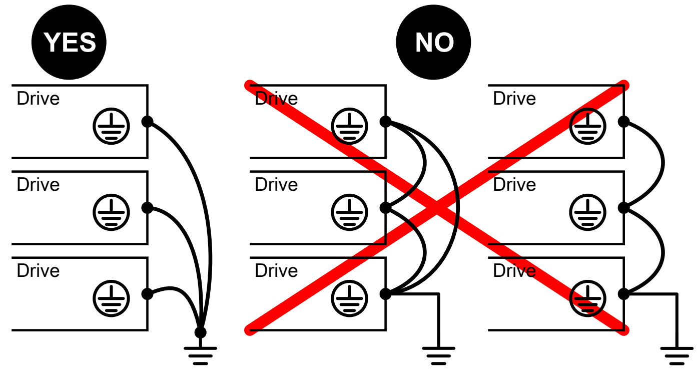
INSUFFICIENT PROTECTION AGAINST OVERCURRENT

- **Overcurrent protective devices with the required power rating must be used.**
- **The fuses listed in the appendix for this inverter must be used.**
- **It is not permitted to connect the product to a mains voltage whose short-circuit current rating (SCCR) exceeds the maximum permitted value specified in the appendix.**

Failure to follow these instructions can result in death, serious injury or damage to property.

- Make sure that the ground resistance value is 1 Ω or less.
- If there are multiple grounded inverters, each inverter must be connected directly, as shown above.

- Do not loop grounding cables or connect them in series.



Cable characteristics

If the cable between the inverter and the motor is longer than 50 m, install an output filter.

Use a shielded cable that complies with category C2 or category C3 requirements in accordance with IEC 61800-3, unless a sine wave filter is used. In this case, it is possible to use an unshielded motor cable.

To limit the current in normal mode, use normal-mode output filters (ferrite) in order to reduce the circulating current in the motor windings.

Standard cables with linear capacity can be used for the ACOPOSinverter. Using cables with reduced linear capacity can result in increased cable length performance.

Function**[Motor surge limit]** (SUL) for limiting overvoltage allows the use of longer cables, and reduces torque performance in the process (see "Programming").

Residual current protective device

Direct current can be introduced into the protective grounding conductor for this inverter If a residual current protective device (RCD/GFCI) or a residual current monitoring device (RCM) is used for additional protection against direct or indirect contact, the following types are to be used.

Warning!

DIRECT CURRENT CAN BE INTRODUCED INTO THE PROTECTIVE GROUNDING CONDUCTOR

- **For one-phase inverters connected to a phase and to the neutral conductor, use a Type A residual current protective device (RCD/GFCI), or a residual current monitoring device (RCM).**
- **For three-phase inverters and one-phase inverters not connected to a phase or to the neutral conductor, use a Type B residual current protective device (RCD/GFCI), or a residual current monitoring device (RCM) that has been approved for use with inverters and is compatible with all types of current.**

Failure to follow these instructions can result in death, serious injury or damage to property.

Additional conditions for using a residual current protective device:

- The drive must have an increased discharge current when the power is switched on. Use a residual current protective device (RCD/GFCI) or a residual current monitoring device (RCM) with a response delay.
- High-frequency currents must be filtered.

Choose a suitable model that incorporates the following functions:

- High frequency current filtering
- A time delay that prevents the upstream device from being triggered due to the load from stray capacitance when switched on. This time delay is not possible for 30 mA devices. In this case, choose devices with immunity against inadvertent triggering.

Due to the high discharge current in standard operation, we recommend choosing at least a 300 mA device.

If the installation requires a residual current protective device of less than 300 mA, it is possible to use a device lower than 300 mA by removing the screws. For more information, see "Operation in an IT system" on page 85.

If the installation comprises several inverters, provide one residual current protective device for each inverter.

Grounding the device

Advice:

IRREPARABLE DAMAGE DUE TO INCORRECT WIRING

- **Before switching on and configuring the product, make sure that it has been wired correctly.**

Failure to follow these instructions can result in damage to property.

Danger!

ELECTRIC SHOCK CAUSED BY INSUFFICIENT GROUNDING

- **Make sure that all relevant local and national electrical engineering requirements are complied with, as well as any other applicable regulations in relation to the protective grounding of the entire inverter system.**
- **Ground the inverter system before applying voltage.**
- **The cross section of the protective grounding conductor must comply with the applicable standards.**
- **Do not use cable ducts as protective grounding conductors; instead, use a protective ground conductor within the cable duct.**
- **It is not permitted to use cable shields as protective grounding conductors.**

Failure to follow these instructions will result in death or serious injury.

Tighten the grounding screws according to the instructions provided in the section on grounding cables (see "Characteristics of the power unit terminals" on page 90).

3.4.2 Instructions in relation to cable length

Consequences of using longer cables

When using inverters with motors, fast-switching transistors combined with lengthy motor cables can cause peaks in voltage of over twice the DC connection voltage. These high-voltage peaks can cause the motor winding insulation to wear prematurely.

The function for limiting overvoltage allows the use of longer cables, reducing torque performance in the process.

Length of the motor cables

The spacing between the power inverter and the motor(s) is limited by the permitted power failure level, the permitted overvoltage on the motor(s), any stray capacitance current generated and the permitted heat loss.

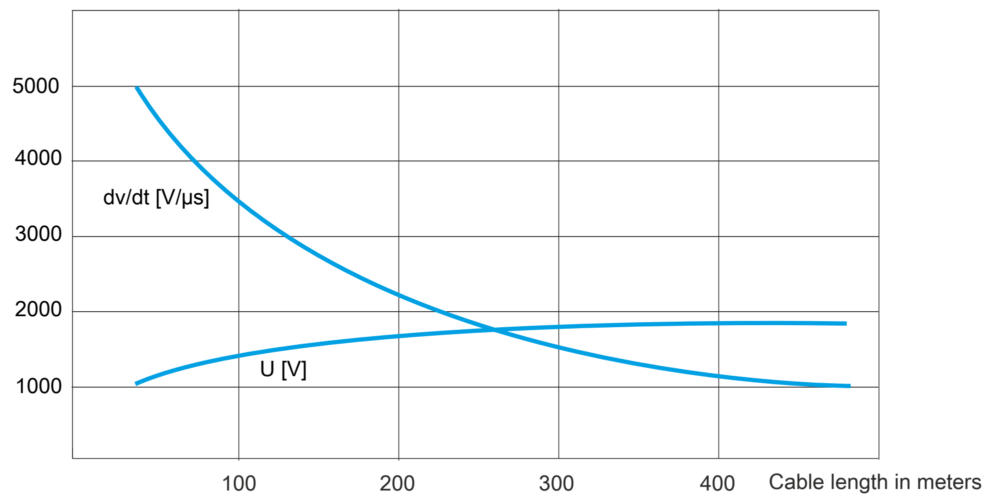
The maximum spacing is largely dependent on the motors used (insulating material), the type of motor cable used (shielded/unshielded), the cable paths (cable channels, underground cabling) as well as the options used.

Dynamic voltage load of the motor

Overvoltages at the motor terminals result from reflection in the motor cable. Once the cable length exceeds 10 m, the motors are exposed to significantly higher voltage peaks. The longer the motor cable, the higher the overvoltage value.

The steep edges of the switching impulses at the output side of the inverter place a further load on the motors. The slew rate of the voltage is typically in excess of 5 kV/µs but decreases according to the length of the motor cable.

Motor load with overvoltage and slew rate when using a standard inverter.



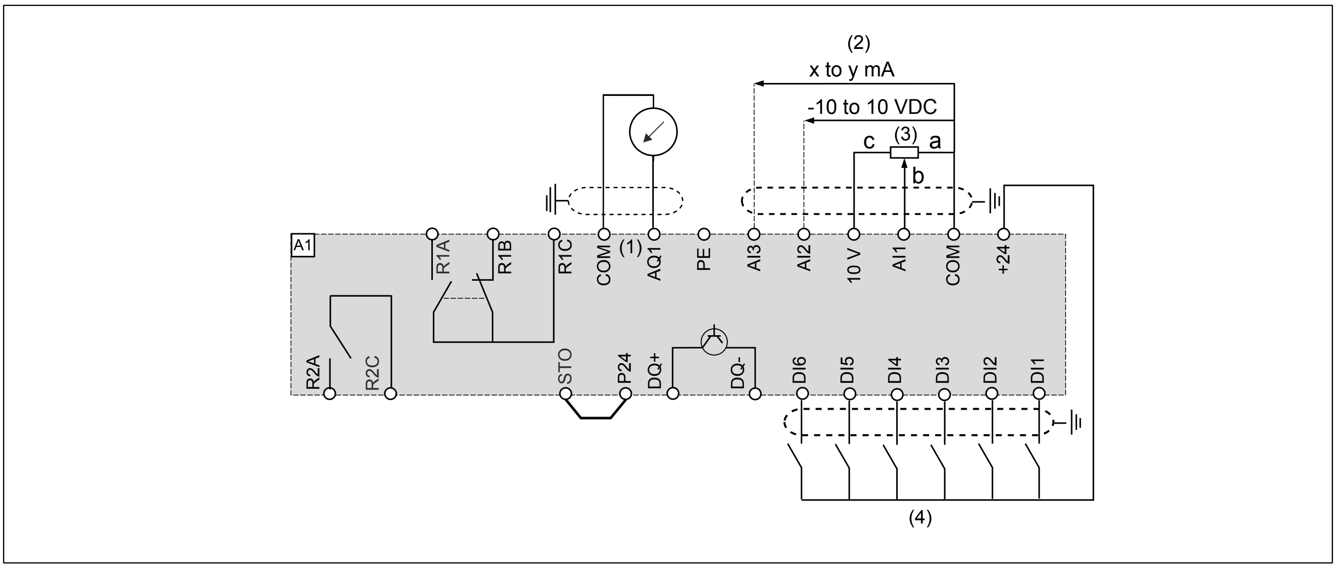
Overview of workaround solutions

A number of simple measures can be taken to extend the service life of the motor:

- Specification of a motor for inverter applications (IEC 60034-25B or NEMA 400 should be observed)
- Reduce the spacing between the motor and the inverter to a minimum
- Use an unshielded cable
- Reducing the inverter switching frequency (A reduction to 2.5 Hz is recommended.)

3.4.3 Connection diagram

Control block connection diagram



(1) Analog outputs

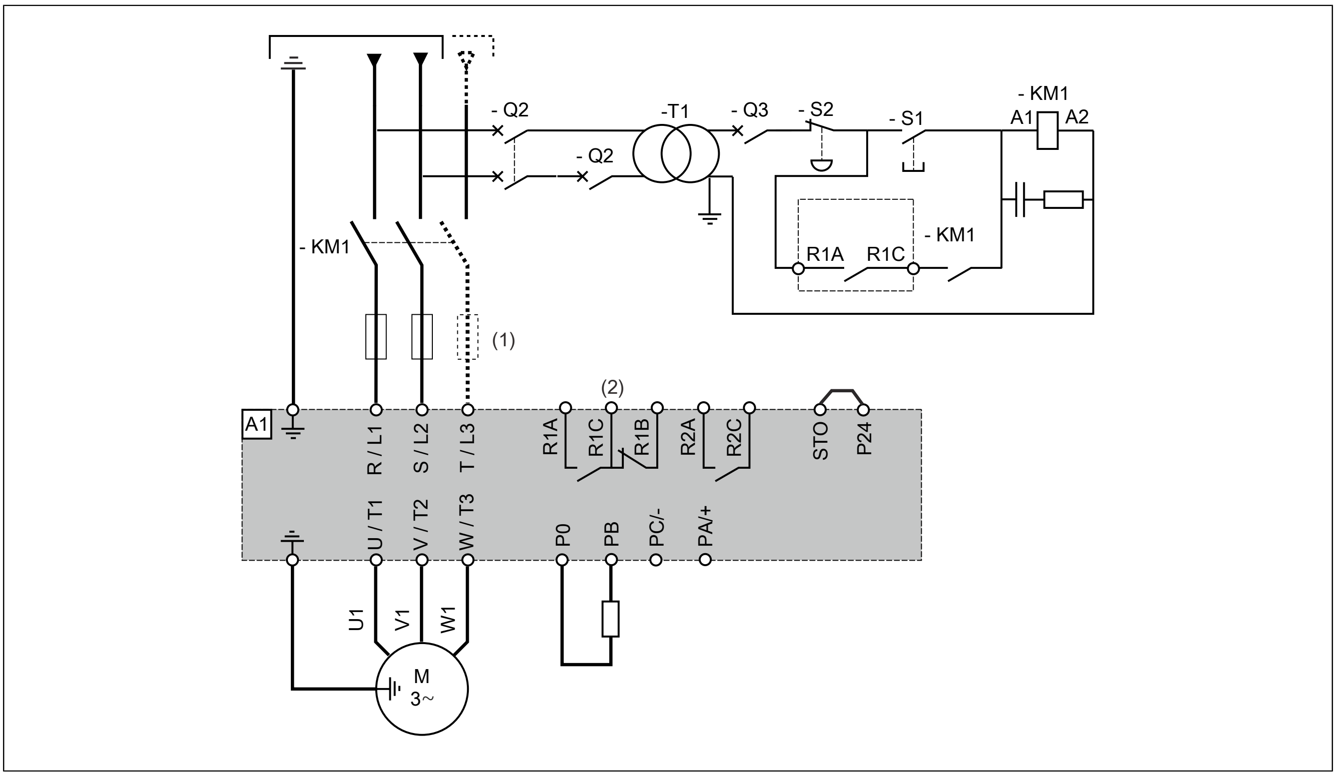
(2) Analog inputs

(3) SZ1RV1202 potentiometer (2.2 kΩ) or similar (max. 10 kΩ)

(4) Digital inputs

One-phase or two-phase power supply - Connection diagram with line contactor

Connection diagrams in accordance with ISO13849 Category 1, ISO 138491 and IEC/EN 61508 Safety Integrity Level SIL 2; Stop Category 0 in accordance with IEC/EN 60204-1.



(1) Line choke (if used)

(2) Use setting "Operating state 'error'" for relay output R1 to switch off the product when an error has been detected.

One-phase or two-phase power supply - Connection diagram with downstream line contactor

If a move command is executed, and the downstream contactor between the inverter and the motor is still open, there may still be residual voltage present at the inverter output. This can result in incorrect estimation of the motor speed when the contacts of the downstream contactor are closed. This incorrect estimation of the motor speed can cause unanticipated operation or damage to the equipment.
In addition, there may be overvoltage present at the output of the inverter if the downstream contactor between the inverter and the motor is open while the power stage is still enabled.

Warning!

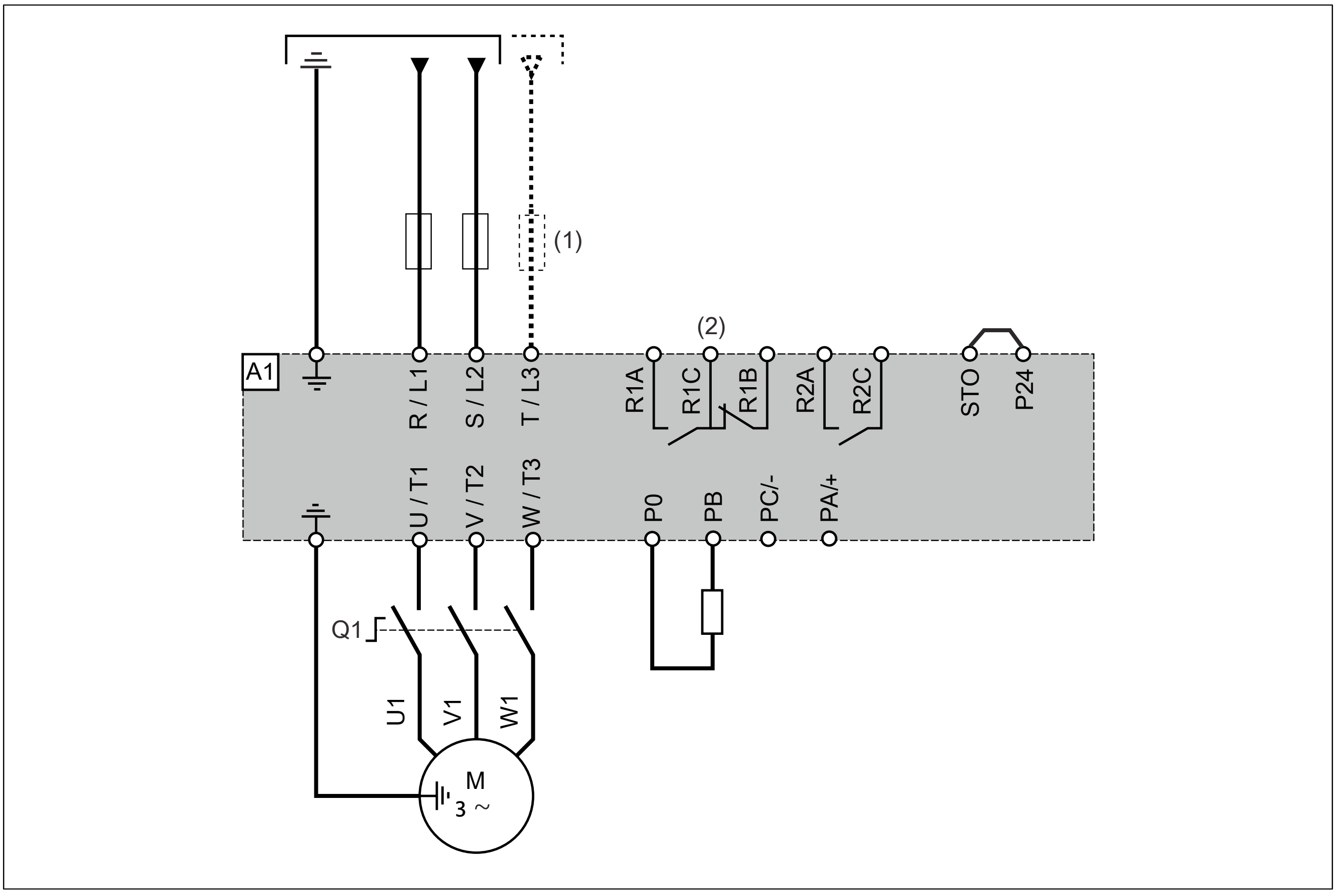
UNANTICIPATED OPERATION OF THE EQUIPMENT OR DAMAGE TO THE EQUIPMENT

If a downstream contactor is used between the inverter and the motor, check the following:

- **The contacts between the motor and the inverter must be closed before a move command is executed.**
- **It is not permitted for the power stage to be enabled when the contacts between the motor and the drive are opened.**

Failure to follow these instructions can result in death, serious injury or damage to property.

Connection diagrams in accordance with EN 954-1 Category 1 and IEC/EN 61508 Safety Integrity Level SIL 1; Stop category 0 in accordance with IEC/EN 60204-1.



(1) Line choke (if used)

(2) Use setting "Operating state 'error'" for relay output R1 to switch off the product when an error has been detected.

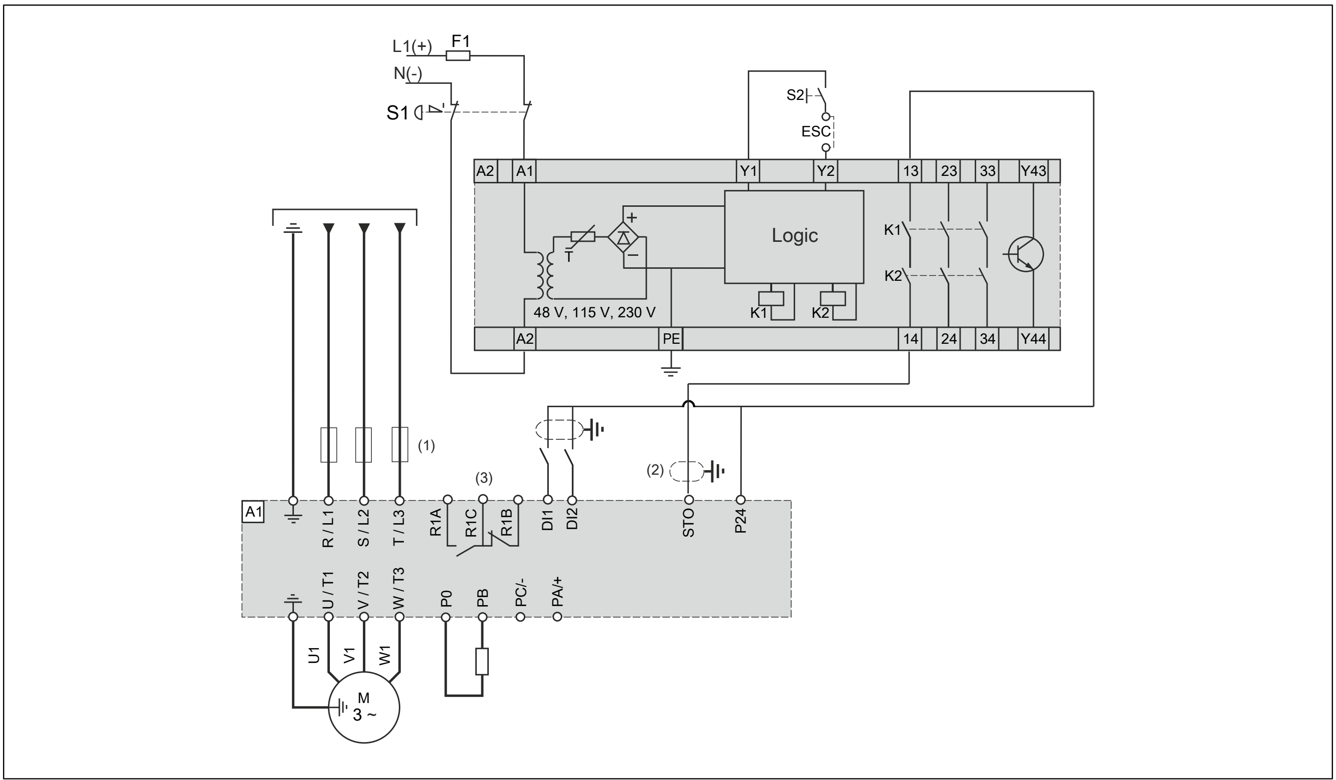
Connection diagram with safety module

Connection diagrams in accordance with EN 954-1 Category 3 and IEC/EN 61508 Safety Integrity Level SIL 2; Stop category 0 in accordance with IEC/EN 60204-1.

The following connection diagram is suitable for machines with a short freewheel stop (machines with low inertia or high resistance torque).

When the emergency switch-off is enabled, the power supply to the inverter is cut immediately and the motor freewheels to a stop in accordance with IEC/EN 60204-1 Category 0.

A contact on the Preventa XPS AC module must be inserted in the brake control circuit to ensure that the module is enabled safely when safety function STO (safe torque off) is activated.



(1) Line choke (if used)

(2) The shielding must be grounded at all times

(3) Error relay contacts for remote signaling of inverter status

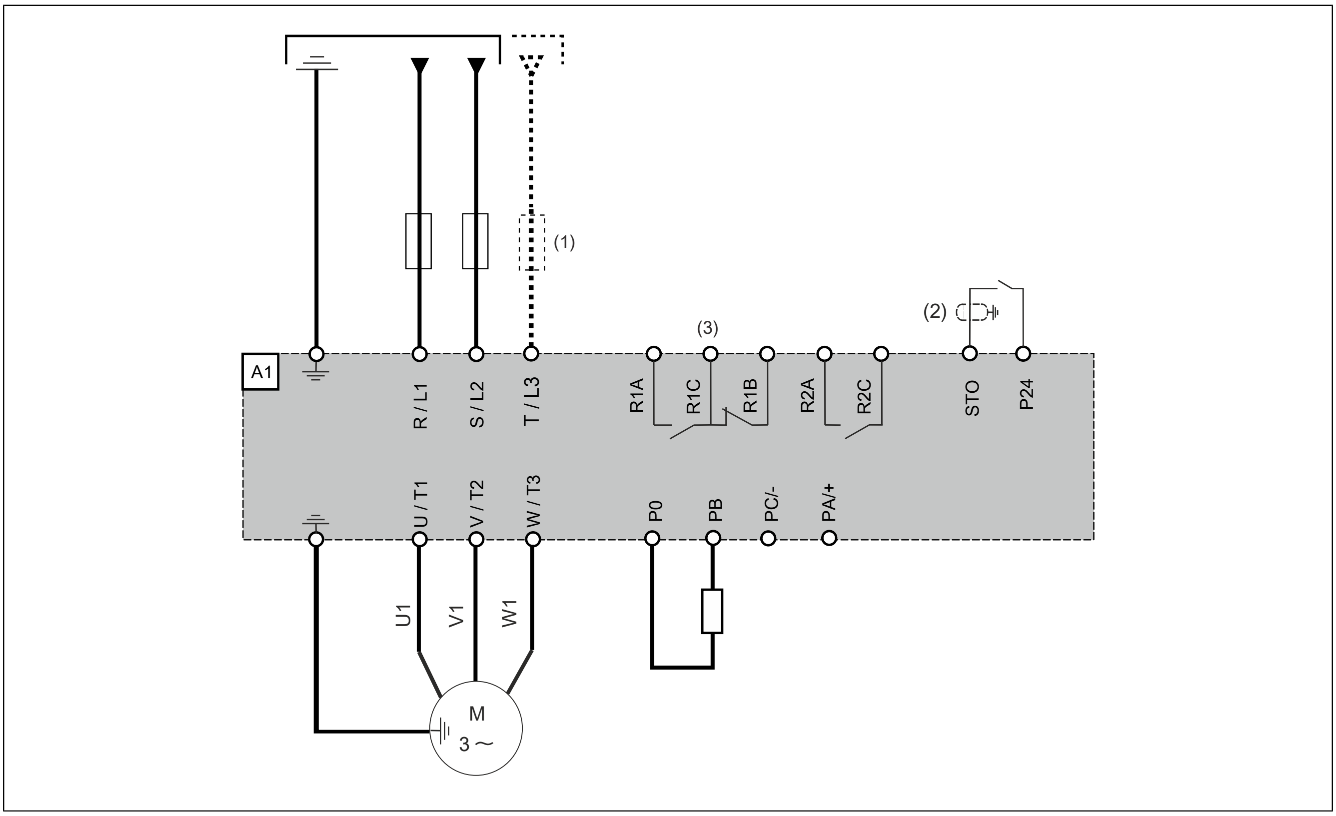
Integrated safety function STO allows implementation of an emergency stop (IEC 60204-1) for category 0 stops. It is also possible to implement category 1 stops using an approved emergency switch-off module.
Resetting function STO: The power unit is disabled and an error message is generated. The motor cannot generate any more torque and begins to freewheel. Before restarting, the error message must be reset via **[FAULT RESET]**.

Connection diagram without a safety module

Connection diagrams in accordance with EN 954-1 Category 2 and IEC/EN 61508 Safety Integrity Level SIL 1; Stop category 0 in accordance with IEC/EN 60204-1.

The following connection diagram is suitable for machines with a short freewheel stop (machines with low inertia or high resistance torque).

When the emergency switch-off is enabled, the power supply to the inverter is cut immediately and the motor freewheels to a stop in accordance with IEC/EN 60204-1 Category 0.



(1) Line choke (if used)

(2) The shielding must be grounded at all times

(3) Error relay contacts for remote signaling of inverter status

Integrated safety function STO allows implementation of an emergency stop (IEC 60204-1) for category 0 stops.

3.4.4 Operation in an IT system

Definition

IT system: Insulated or high-impedance grounded neutral conductor. Use a permanent insulation monitoring function that is compatible with non-linear loads (e.g. XM200 or similar).

Corner-grounded system: System with grounded phase

Operation

Advice:

RISK OF DAMAGE TO FREQUENCY INVERTER

To operate the inverter with an IT system, the integrated EMC filter must be disconnected as described in these instructions.

Failure to follow these instructions can result in damage to property.

3.4.5 Disconnecting the integrated EMC filter

Danger!

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

Before completing any of the procedures described in this section, carefully read through the instructions provided in section "Safety information".

Failure to follow these instructions will result in death or serious injury.

The inverter comes with an integrated EMC filter. This means that ground discharge current is generated. If this leakage current creates compatibility issues for your installation (residual current protective device, etc.), you can reduce the leakage current by disabling the Y capacitors as shown below. In this configuration, the product does not comply with EMC requirements as defined by IEC 61800-3.

3-phase ACOPOSinverter P66 inverters are not equipped with an EMC filter.

Setting

For more information about the IT jumper, see "Leakage current" on page 114.

Inverter type	Rating	Setting
ACOPOSinverter P66	One-phase 200 V to 2.2 kW	IT jumper
	Three-phase 400 V to 4 kW	Screw
	Three-phase 200 V 1)	-
	Three-phase 600 V 1)	-

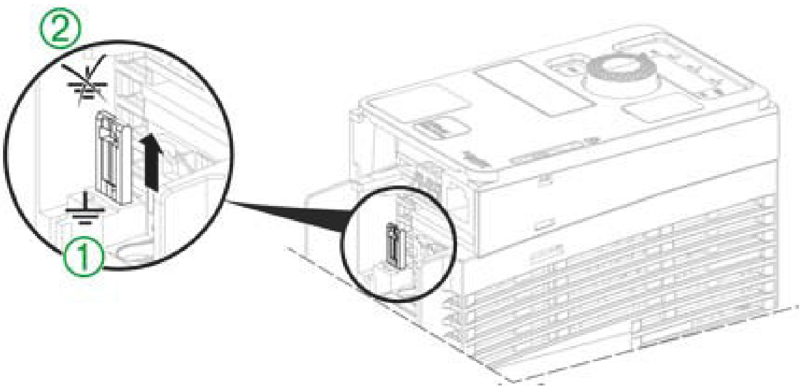
1) These inverters are not equipped with an EMC filter.

Tuning the inverter

8I66S200018.00-000, 8I66S200037.00-000, 8I66S200055.00-000, 8I66S200075.00-000:

To tune the inverter for operation with or without an IT or corner-grounded system, proceed as follows.

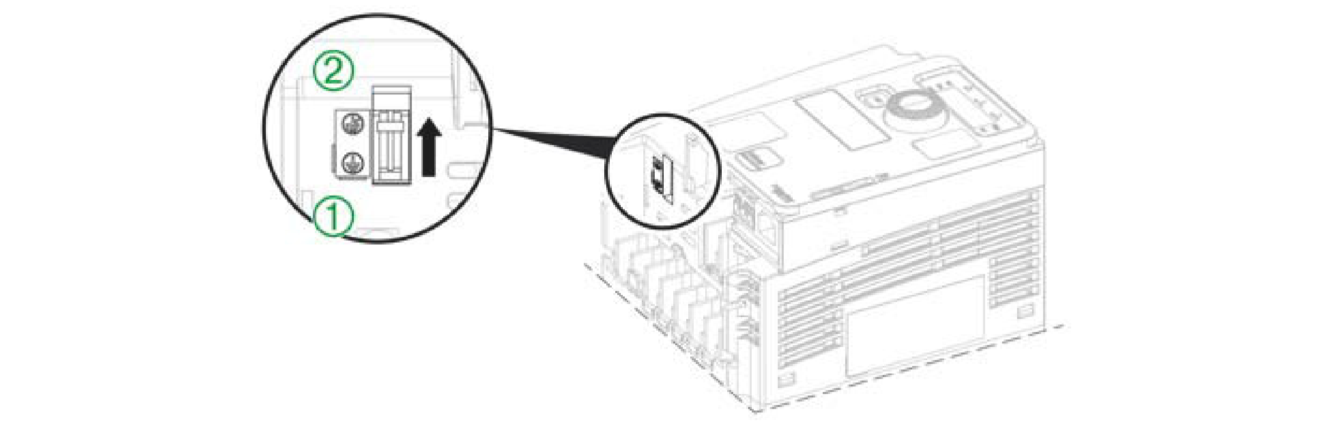
1) Remove the cover from the power terminals.
2) The switch is set to the **preset factory** position ⏚, as shown in the detailed view ①.
3) To disconnect the integrated EMC filter, move the switch to position ② as per the detailed view.
4) Replace the front cover.



8I66S200110.00-000, 8I66S200150.00-000, 8I66S200220.00-000:

To tune the inverter for operation with or without an IT or corner-grounded system, proceed as follows.

1) Remove the cover from the power terminals.
2) The switch is set to the **preset factory** position ⏚, as shown in the detailed view ①.
3) To disconnect the integrated EMC filter, move the switch to position ② as per the detailed view.
4) Replace the front cover.



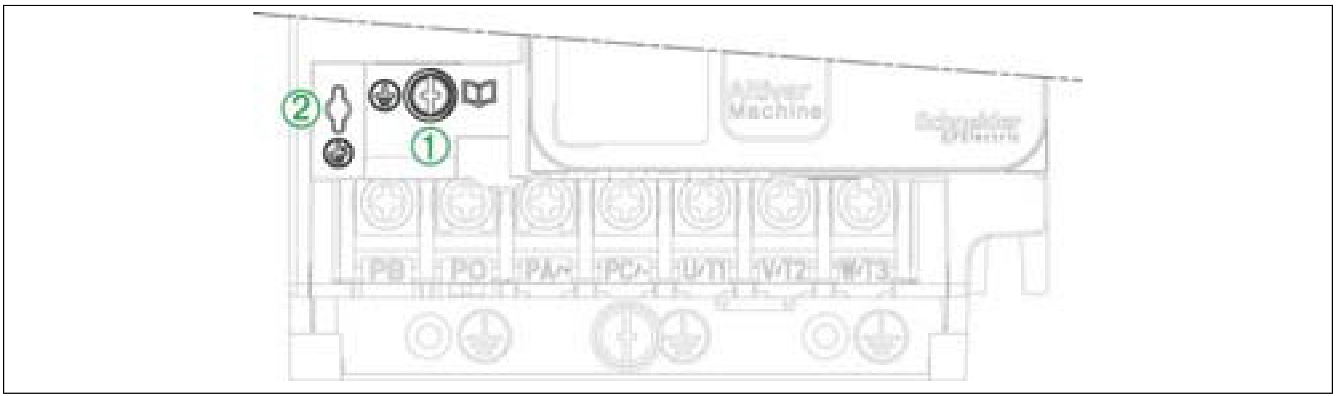
8I66T400037.00-000, 8I66T400055.00-000, 8I66T400075.00-000, 8I66T400110.00-000, 8I66T400150.00-000:

To tune the inverter for operation with or without an IT or corner-grounded system, proceed as follows.

1) Remove the cover from the power terminals.
2) The screw is set to the **preset factory** position ⏚, as shown in the detailed view ①.
3) To separate the integrated EMC filter, remove the screw and move it to the ⏚ position, as shown in the detailed view ②.
4) Replace the front cover.

Advice:

- **Only use the supplied screws.**
- **Do not start up the inverter if the mounting screws have been removed.**



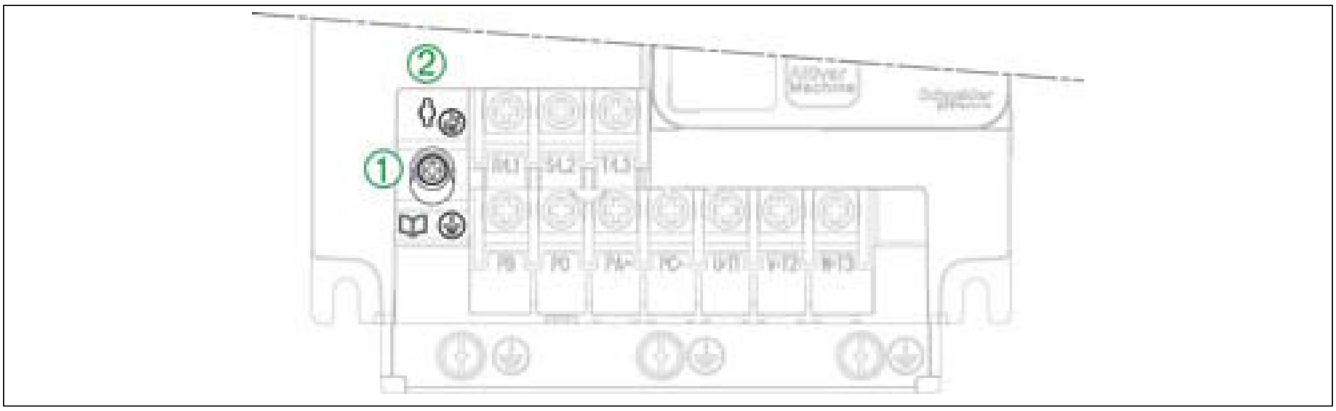
8I66T400220.00-000, 8I66T400300.00-000, 8I66T400400.00-000:

To tune the inverter for operation with or without an IT or corner-grounded system, proceed as follows.

1) Remove the cover from the power terminals.
2) The screw is set to the **preset factory** position ⏚, as shown in the detailed view ①.
3) To separate the integrated EMC filter, remove the screw and move it to the ⏚ position, as shown in the detailed view ②.
4) Replace the front cover.

Advice:

- **Only use the supplied screws.**
- **Do not start up the inverter if the mounting screws have been removed.**



3.4.6 Configuring the inverter as a sink or source (switch)

Contrary to the typical definition of sink and source, the following statements apply to this product:

Sink: The inputs and outputs need a voltage sink, i.e. the current flows out of the inputs and outputs.

Source: The inputs and outputs need a voltage source, i.e. the current flows into the inputs and outputs.

Warning!

UNEXPECTED OPERATION OF THE EQUIPMENT

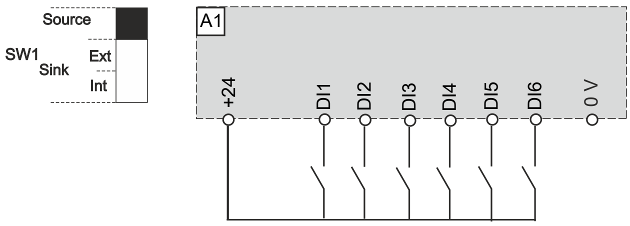
- **If the inverter is set to "Sink Int" or "Sink Ext", do not connect terminal 0 V to grounding or protective grounding.**
- **Make sure that there is no possibility of inadvertent grounding of the digital inputs that have been configured for the sink logic (as a result of damaged signal cables, for example).**
- **To ensure the safe grounding of circuits, all applicable standards and regulations such as NFPA 79 and EN 60204 must be observed.**

Failure to follow these instructions can result in death, serious injury or damage to property.

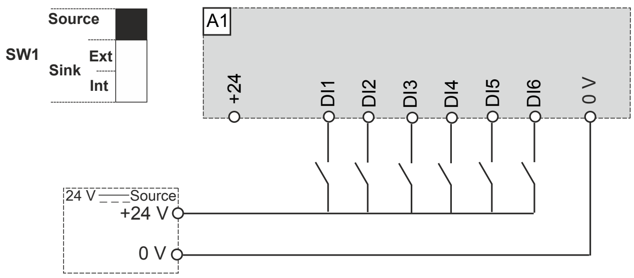
The switch is used to adjust the digital input function to the programmable control output technology. To access the switch, follow the procedure provided for accessing the control terminals. The switch is located under the control terminals.

- Set the switch to "Source" (factory setting), if using PLC outputs with PNP transistors.
- Set the switch to "Ext" if using PLC outputs with NPN transistors.

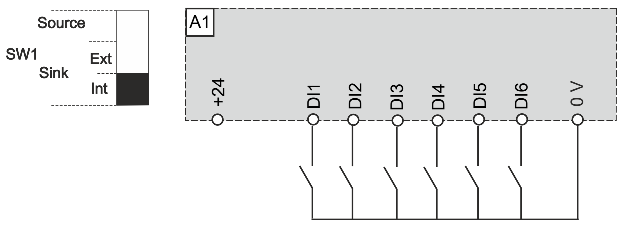
Set the switch to "SRC (Source)" if an output power supply is used for the digital inputs.



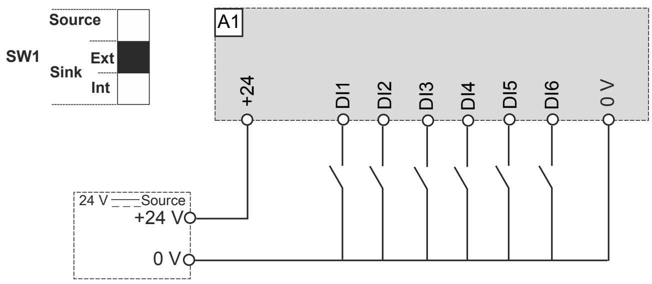
Set the switch to "SRC (Source)" if an external power supply is used for the digital inputs.



Set the switch to "SK (Sink)" if an output power supply is used for the digital inputs.



Set the switch to "EXT" if an external power supply is used for the digital inputs.



Advice:

- **Input STO is also connected to a 24-VDC terminal as standard. When the external power supply is switched off, function STO is triggered.**
- **To prevent function STO from triggering when the product is switched on, the external power supply must be switched on first.**

3.4.7 Characteristics of the power unit terminals

Ground cable

The cross sections of the ground cable at the input and output side correspond to the cross sections of the input and output cable.
The cross section for the protective ground cable must be a minimum of 10 mm² (8 AWG) for copper cables (CU) and 16 mm² (6 AWG) for aluminum cables (AL).
Due to high discharge current, an additional protective ground connection must be wired.

Tightening torque of the screws for the ground terminals

Inverter sizes A and B:

- Main grounding screw (M5): 2.4 N (21.1 lb.in)
- Input/Output grounding screw (M4): 1.4 N (12.4 lb.in)

Inverter sizes C, D and E: 2.4 N (21.1 lb.in)

Size A

Power supply terminals and output terminals

ACOPOSinverter P66	Power supply terminals (L1, L2, L3)			Output terminals (U, V, W)		
	Cable cross section		Tightening torque	Cable cross section		Tightening torque
	Min.	Max.1)	Nominal value	Min.	Max.1)	Nominal value
	mm² (AWG)	mm² (AWG)	Nm (lb.in)	mm² (AWG)	mm² (AWG)	Nm (lb.in)
8I66S200018.00-000, 8I66S200037.00-000, 8I66S200055.00-000, 8I66S200075.00-000	2.5 (14)	4 (12)	1 (8.9)	2.5 (14)	4 (12)	1 (8.9)

1) Maximum permitted terminal cross section

Size B

Power supply terminals and output terminals

ACOPOSinverter P66	Power supply terminals (L1, L2, L3)			Output terminals (U, V, W)		
	Cable cross section		Tightening torque	Cable cross section		Tightening torque
	Min.	Max.1)	Nominal value	Min.	Max.1)	Nominal value
	mm² (AWG)	mm² (AWG)	Nm (lb.in)	mm² (AWG)	mm² (AWG)	Nm (lb.in)
8I66T400037.00-000, 8I66T400055.00-000, 8I66T400075.00-000, 8I66T400110.00-000, 8I66T400150.00-000, 8I66T600075.00-000, 8I66T600150.00-000	2.5 (14)	6 (10)	1.4 (12.4)	2.5 (14)	6 (10)	1.4 (12.4)
8I66S200110.00-000, 8I66S200150.00-000	4 (12)	6 (10)	1.4 (12.4)	4 (12)	6 (10)	1.4 (12.4)
8I66S200220.00-000	6 (10)	6 (10)	1.4 (12.4)	6 (10)	6 (10)	1.4 (12.4)

1) Maximum permitted terminal cross section

Size C

Power supply terminals and output terminals

ACOPOSinverter P66	Power supply terminals (L1, L2, L3)			Output terminals (U, V, W)		
	Cable cross section		Tightening torque	Cable cross section		Tightening torque
	Min.	Max.1)	Nominal value	Min.	Max.1)	Nominal value
	mm² (AWG)	mm² (AWG)	Nm (lb.in)	mm² (AWG)	mm² (AWG)	Nm (lb.in)
8I66T400220.00-000, 8I66T400300.00-000, 8I66T600220.00-000, 8I66T600400.00-000	2.5 (14)	6 (10)	1.4 (12.4)	2.5 (14)	6 (10)	1.4 (12.4)
8I66T400400.00-000	4 (12)	6 (10)	1.4 (12.4)	4 (14)	6 (10)	1.4 (12.4)

1) Maximum permitted terminal cross section

Size D

Power supply terminals and output terminals

ACOPOSinverter P66	Power supply terminals (L1, L2, L3)			Output terminals (U, V, W)		
	Cable cross section		Tighten-ing torque	Cable cross section		Tighten-ing torque
	Min.	Max.[1]	Nominal value	Min.	Max.[1]	Nominal value
	mm² (AWG)	mm² (AWG)	Nm (lb.in)	mm² (AWG)	mm² (AWG)	Nm (lb.in)
8I66T600550.00-000	2.5 (14)	16 (6)	2.4 (20.8)	2.5 (14)	16 (6)	2.4 (20.8)
8I66T600750.00-000	4 (12)	16 (6)	2.4 (20.8)	4 (12)	16 (6)	2.4 (20.8)

1) Maximum permitted terminal cross section

Size E

Power supply terminals and output terminals

ACOPOSinverter P66	Power supply terminals (L1, L2, L3)			Output terminals (U, V, W)		
	Cable cross section		Tighten-ing torque	Cable cross section		Tighten-ing torque
	Min.	Max.[1]	Nominal value	Min.	Max.[1]	Nominal value
	mm² (AWG)	mm² (AWG)	Nm (lb.in)	mm² (AWG)	mm² (AWG)	Nm (lb.in)
8I66T601100.00-000	6 (10)	16 (6)	2.4 (20.8)	6 (10)	16 (6)	2.4 (20.8)
8I66T601500.00-000	6 (10)	16 (6)	2.4 (20.8)	6 (10)	16 (6)	2.4 (20.8)

1) Maximum permitted terminal cross section

3.4.8 Wiring the power unit

Danger!

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

Check that the cable has been installed correctly!

Failure to follow these instructions will result in death or serious injury.

Power terminal functions

Terminal	Function	ACOPOSinverter P66
⏚	Ground terminal	All power ratings and sizes
R/L1 - S/L2/N	Power supply	ACOPOSinverter P66 1-phase
R/L1 - S/L2 - T/L3		ACOPOSinverter P66 3-phase
P0	Output for braking resistor (+ polarity)	All power ratings and sizes
PB	Output to braking resistor	All power ratings and sizes
PA/+	DC bus (+) polarity	All power ratings and sizes
PC/-	DC bus (-) polarity	All power ratings and sizes
U/T1 - V/T2 - W/T3	Motor outlet	All power ratings and sizes

Braking resistors

Braking resistors allow the inverter to operate when braking and decelerating to a stop by dissipating the braking energy. They enable the maximum possible transient braking torque. See the braking resistors in chapter "Accessories".

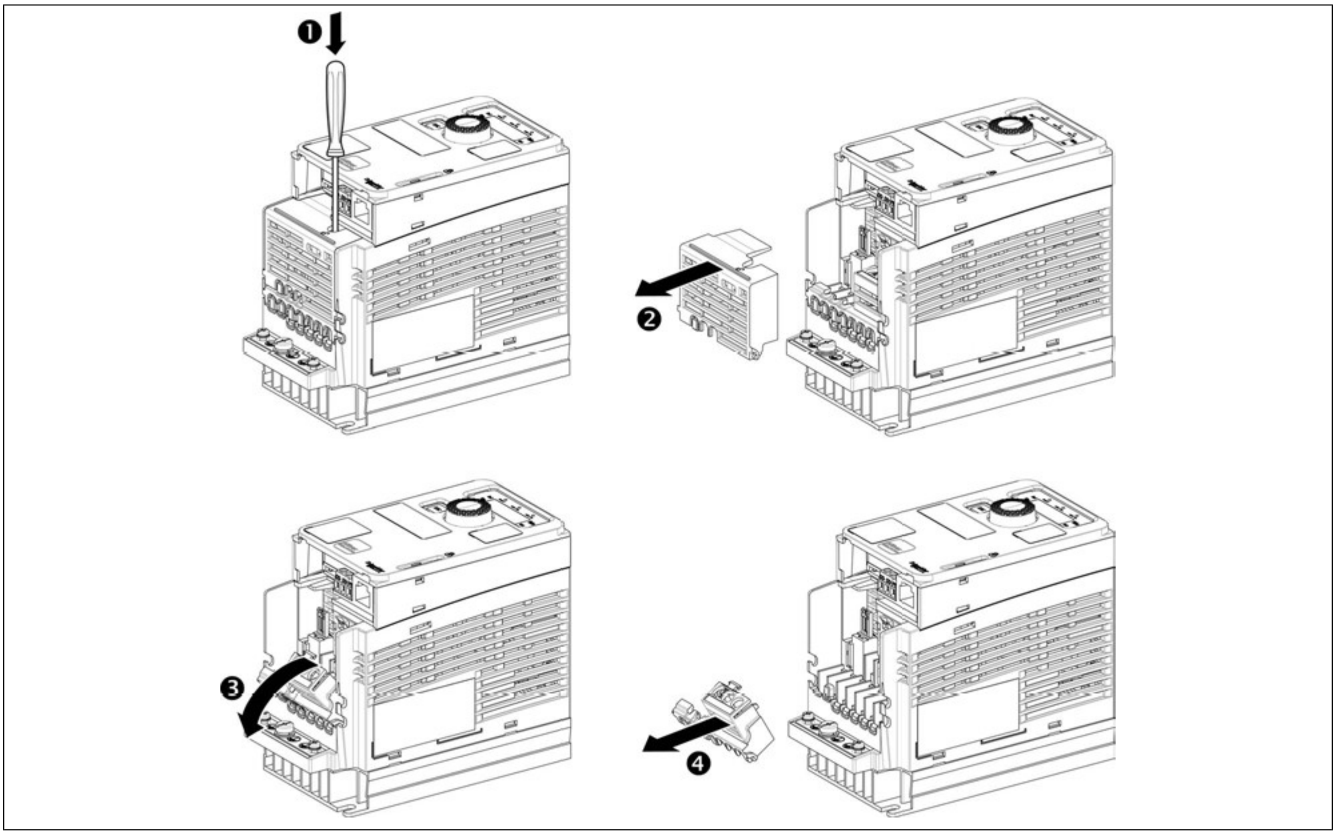
For more information about the minimum values of the resistors to be connected, see the technical data for the relevant inverter.

Accessing the terminals for size A

> ## Danger!
>
> **HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH**
>
> **Before performing the tasks described in this section, read the instructions contained in section "Safety information" carefully.**
>
> **Failure to follow these instructions will result in death or serious injury.**

> ## Danger!
>
> **HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH**
>
> **Once you have wired the power terminals, replace the terminal and wiring covers correctly in order to maintain protection.**
>
> **Failure to follow these instructions will result in death or serious injury.**

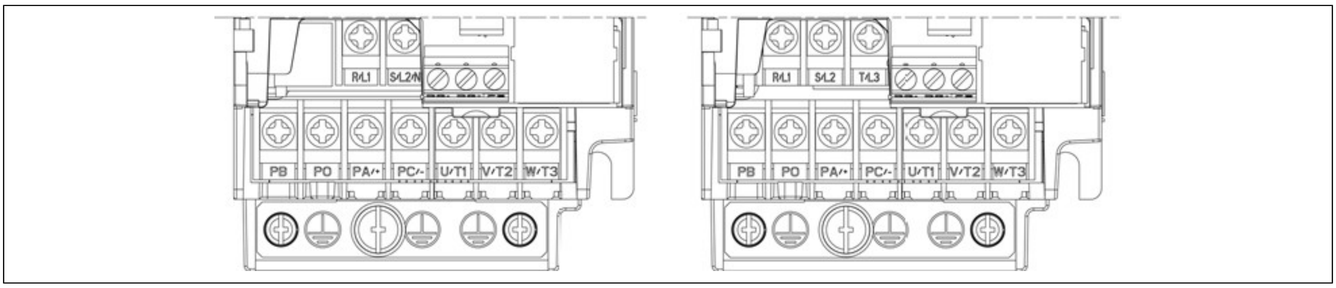
The power, motor and braking resistor terminals are located on the bottom of the inverter.



To access the power terminals for inverter **size A**, follow the instructions below:

1) Break the safety clip using a screwdriver.
2) Remove the wiring cover.
3) Fold down the cover of the terminals.
4) Remove the cover from the terminals.

Arrangement of the power terminals for size



Accessing the terminals for size B

Danger!

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

Before performing the tasks described in this section, read the instructions contained in section "Safety information" carefully.

Failure to follow these instructions will result in death or serious injury.

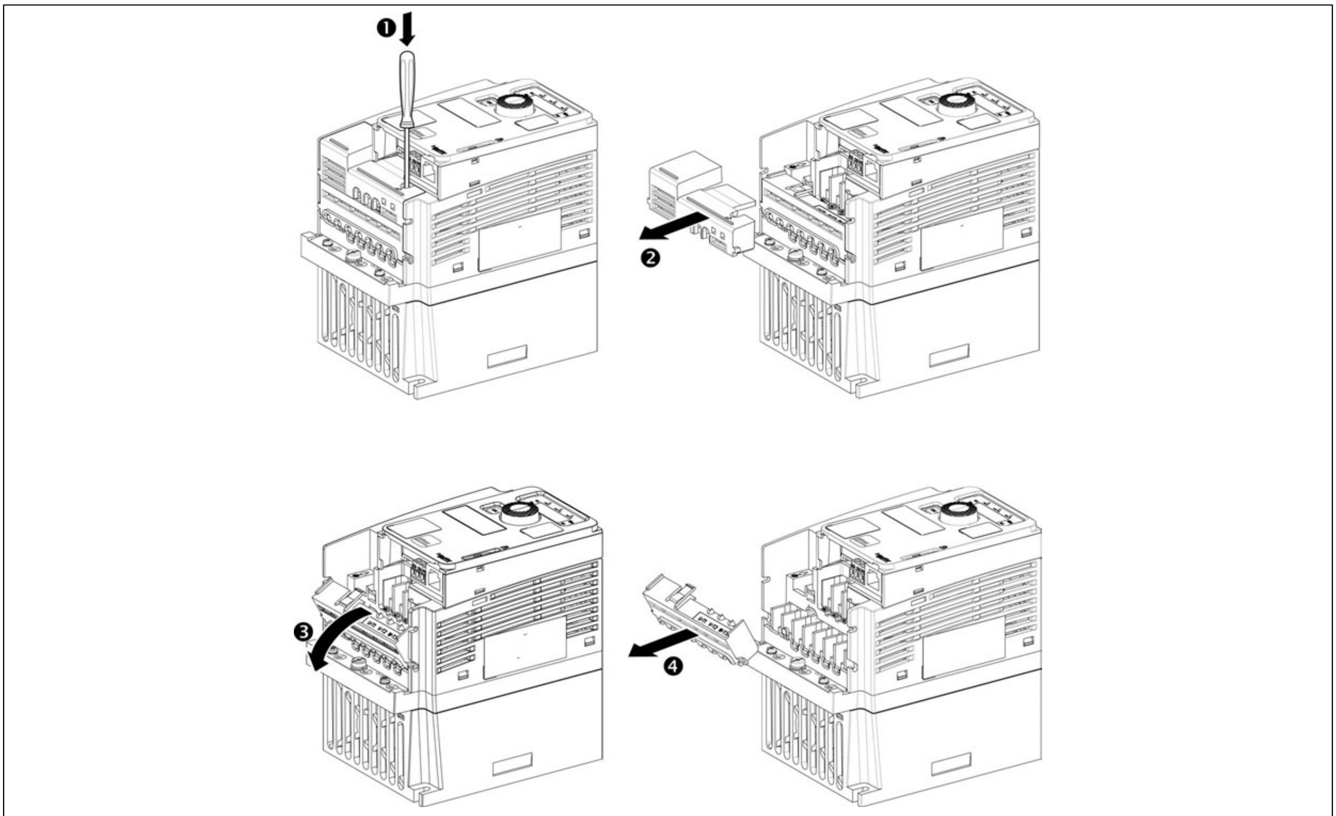
Danger!

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

Once you have wired the power terminals, replace the terminal and wiring covers correctly in order to maintain protection.

Failure to follow these instructions will result in death or serious injury.

The power, motor and braking resistor terminals are located on the bottom of the inverter.

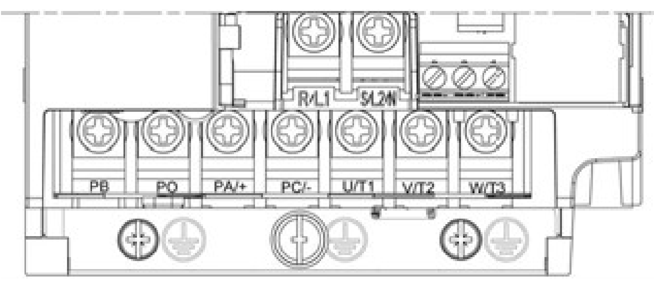


To access the power terminals for inverter **size B**, follow the instructions below:

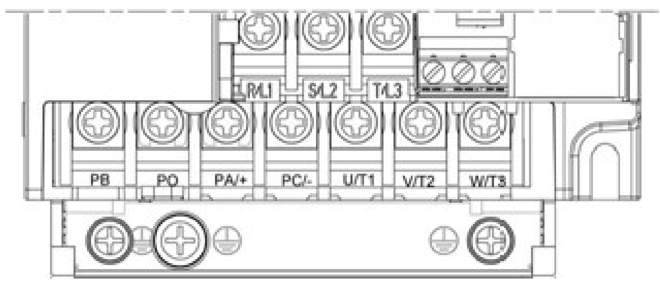
1) Break the safety clip using a screwdriver.
2) Remove the wiring cover.
3) Fold down the cover of the terminals.
4) Remove the cover from the terminals.

Arrangement of the power terminals for size B

1-phase



3-phase



Accessing the terminals for size C

Danger!

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

Before performing the tasks described in this section, read the instructions contained in section "Safety information" carefully.

Failure to follow these instructions will result in death or serious injury.

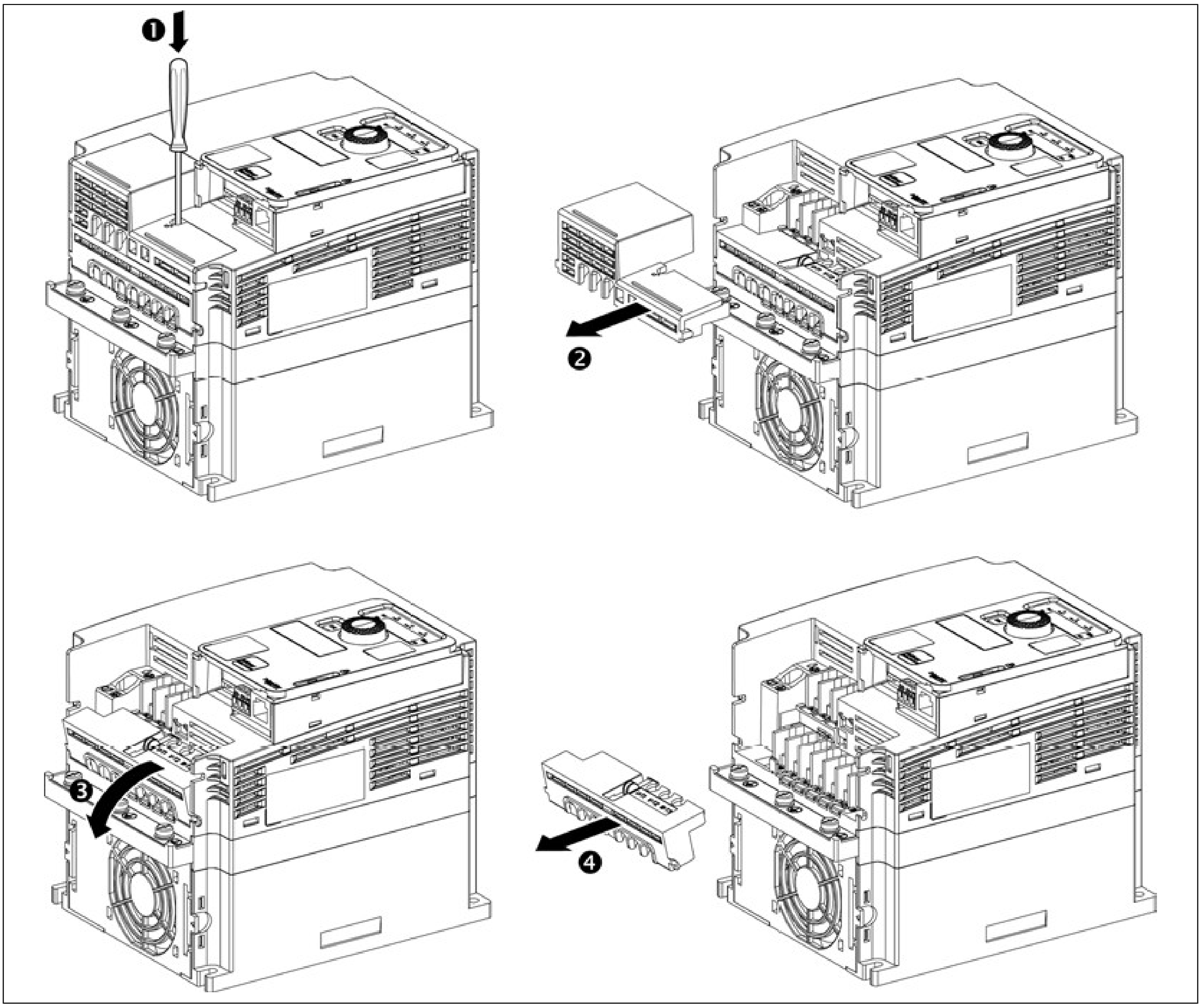
Danger!

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

Once you have wired the power terminals, replace the terminal and wiring covers correctly in order to maintain protection.

Failure to follow these instructions will result in death or serious injury.

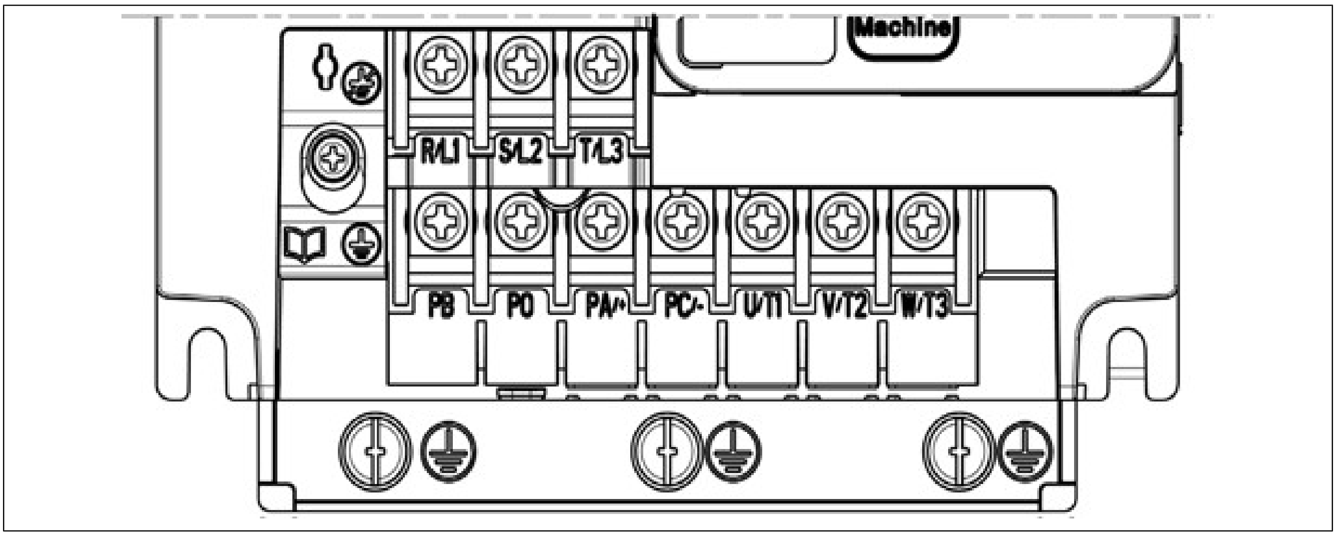
The power, motor and braking resistor terminals are located on the bottom of the inverter.



To access the power terminals for inverter **size C**, follow the instructions below:

1) Break the safety clip using a screwdriver.
2) Remove the wiring cover.
3) Fold down the cover of the terminals.
4) Remove the cover from the terminals.

Arrangement of the power terminals for size C



Accessing the terminals for size D

Danger!

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

Before performing the tasks described in this section, read the instructions contained in section "Safety information" carefully.

Failure to follow these instructions will result in death or serious injury.

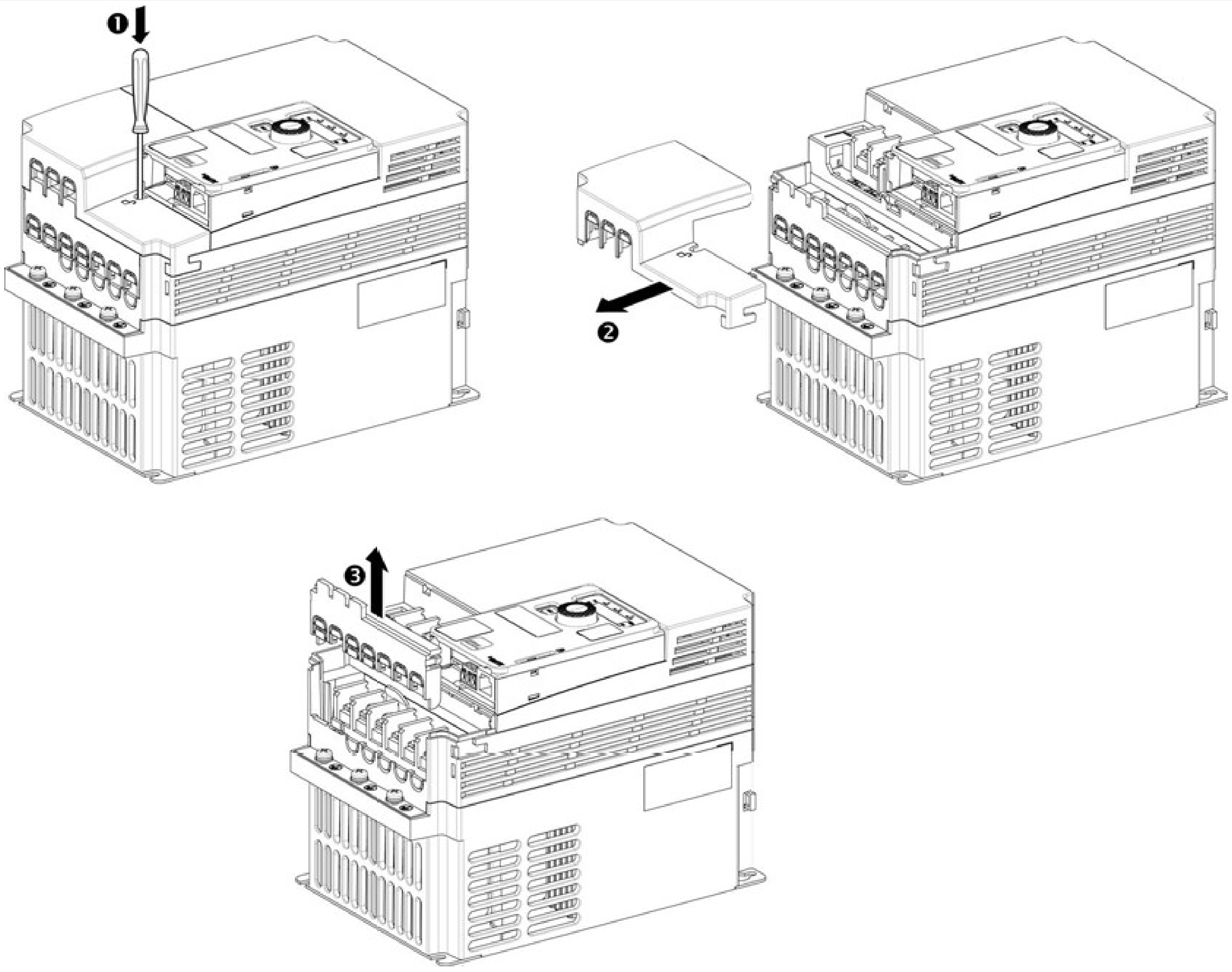
Danger!

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

Once you have wired the power terminals, replace the terminal and wiring covers correctly in order to maintain protection.

Failure to follow these instructions will result in death or serious injury.

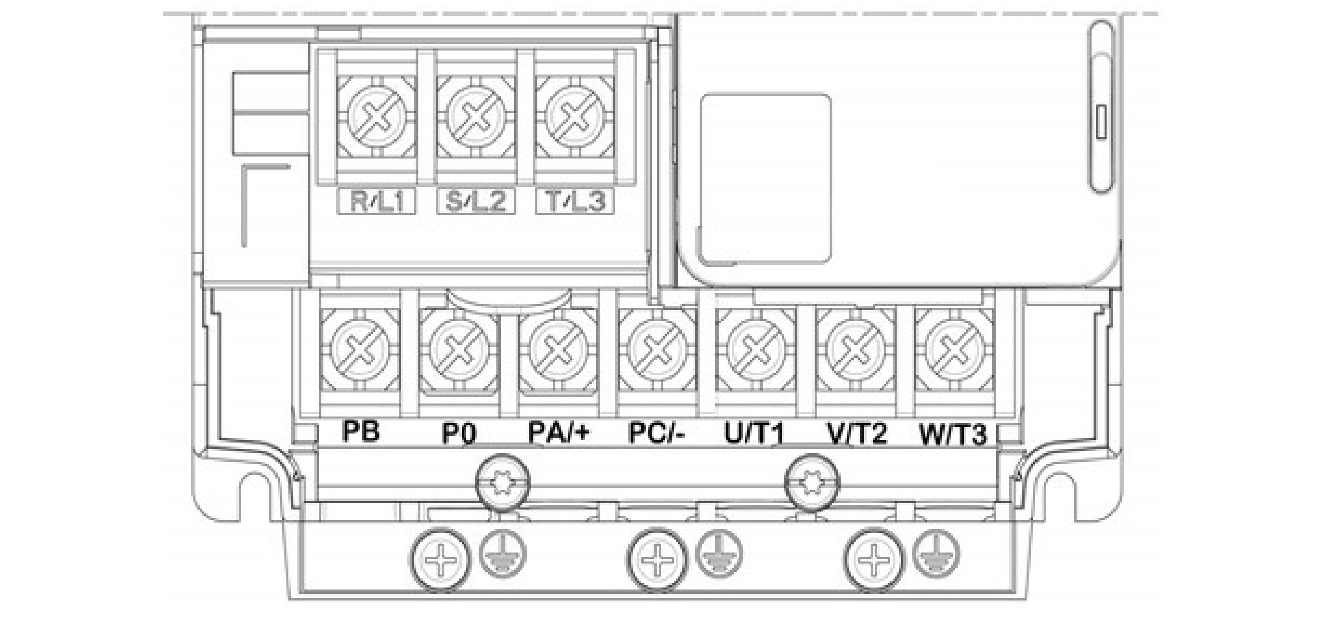
The power, motor and braking resistor terminals are located on the bottom of the inverter.



To access the power terminals for inverter **size D**, follow the instructions below:

1) Break the safety clip using a screwdriver.
2) Remove the wiring cover.
3) Fold down the cover of the terminals.
4) Remove the cover from the terminals.

Arrangement of the power terminals for size D



Accessing the terminals for size E

Danger!

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

Before performing the tasks described in this section, read the instructions contained in section "Safety information" carefully.

Failure to follow these instructions will result in death or serious injury.

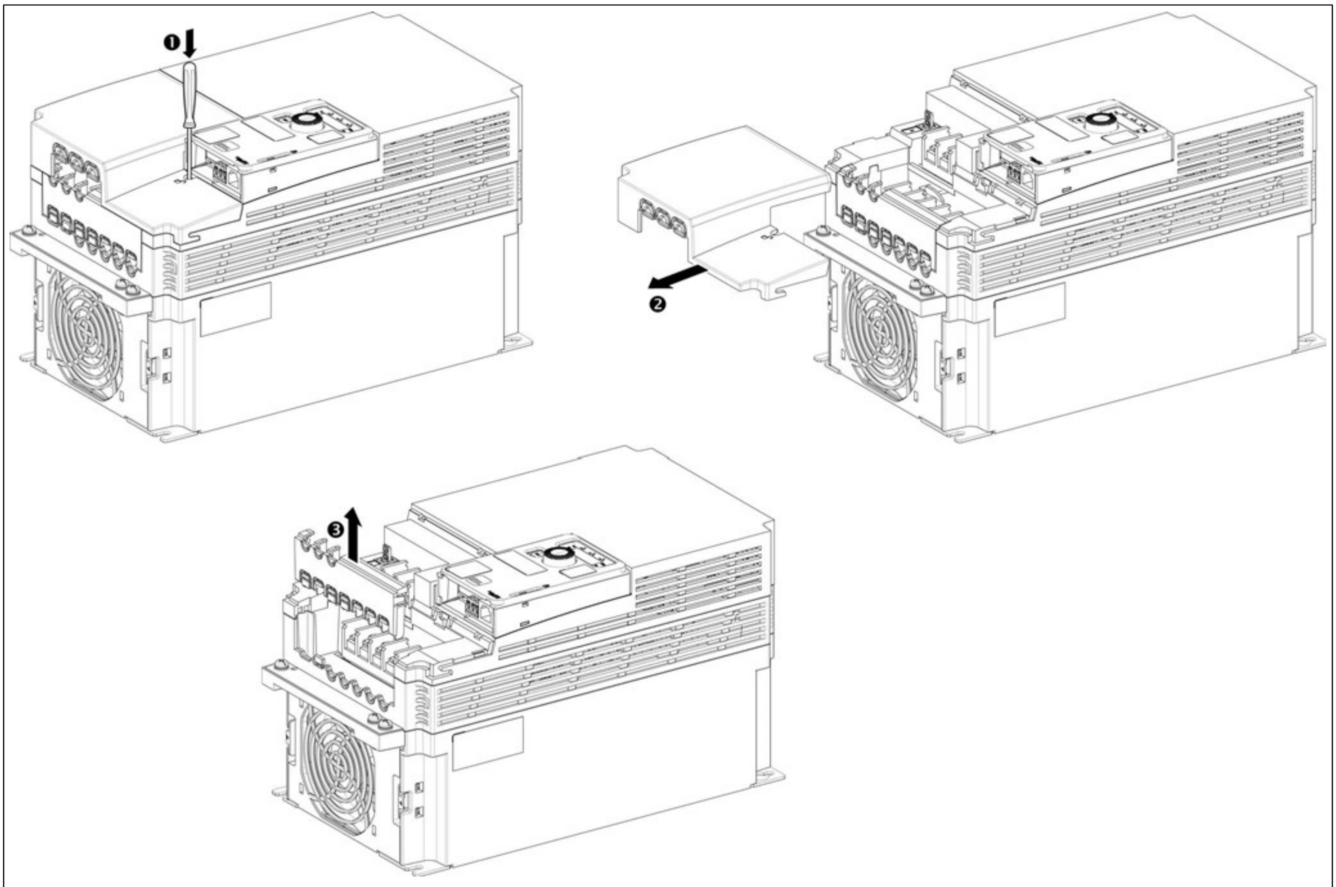
Danger!

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

Once you have wired the power terminals, replace the terminal and wiring covers correctly in order to maintain protection.

Failure to follow these instructions will result in death or serious injury.

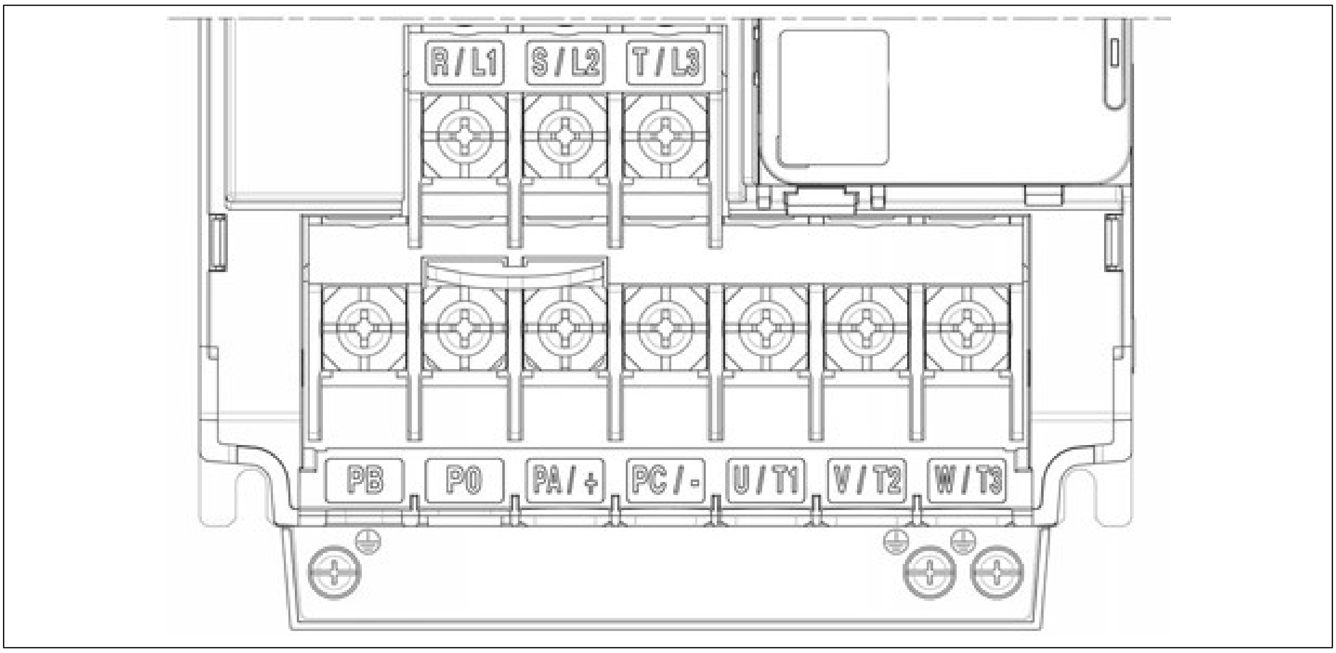
The power, motor and braking resistor terminals are located on the bottom of the inverter.



To access the power terminals for inverter **size E**, follow the instructions below:

1) Break the safety clip using a screwdriver.
2) Remove the wiring cover.
3) Fold down the cover of the terminals.
4) Remove the cover from the terminals.

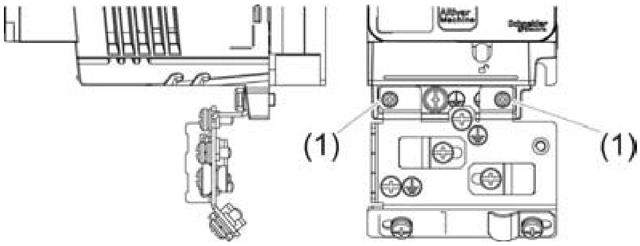
Arrangement of the power terminals for size E



3.4.9 Mounting the EMC plate assembly

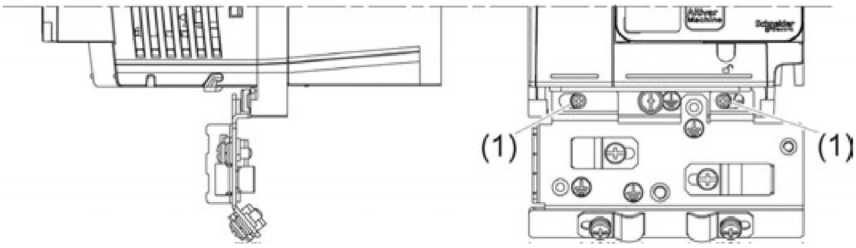
Mounting the EMC plate assembly for size A

Secure the EMC plate with two M5 HS screws (1).



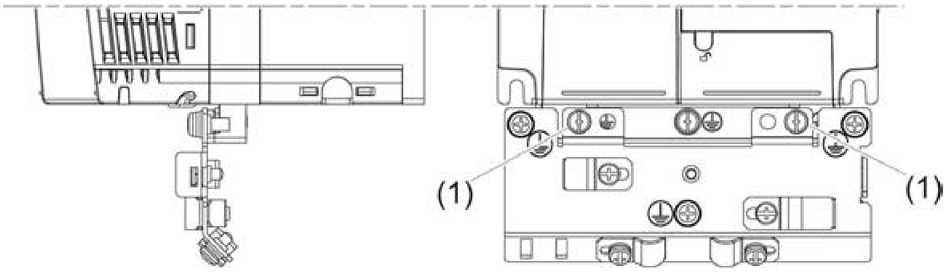
Mounting the EMC plate assembly for size B

Secure the EMC plate with two M5 HS screws (1).



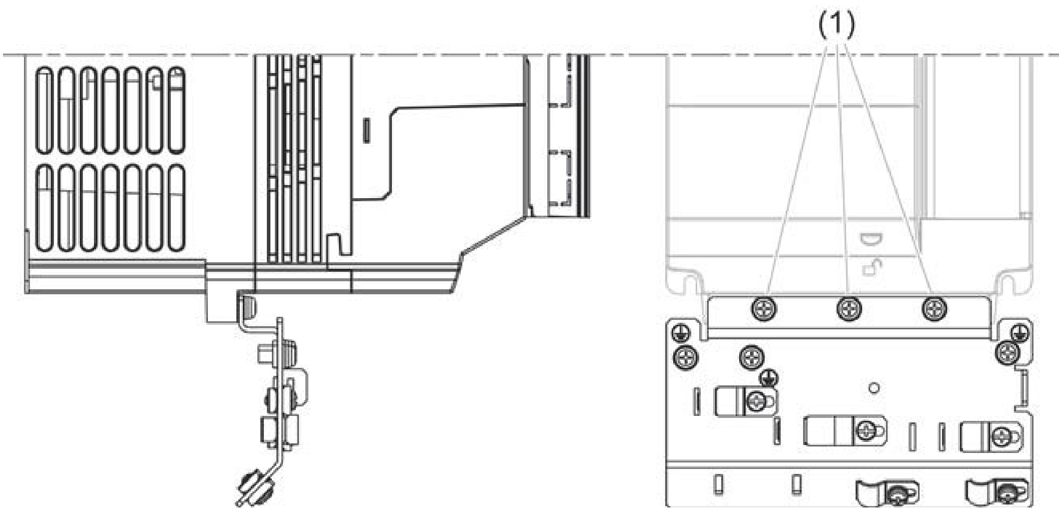
Mounting the EMC plate assembly for size C

Secure the EMC plate with two M5 HS screws (1).



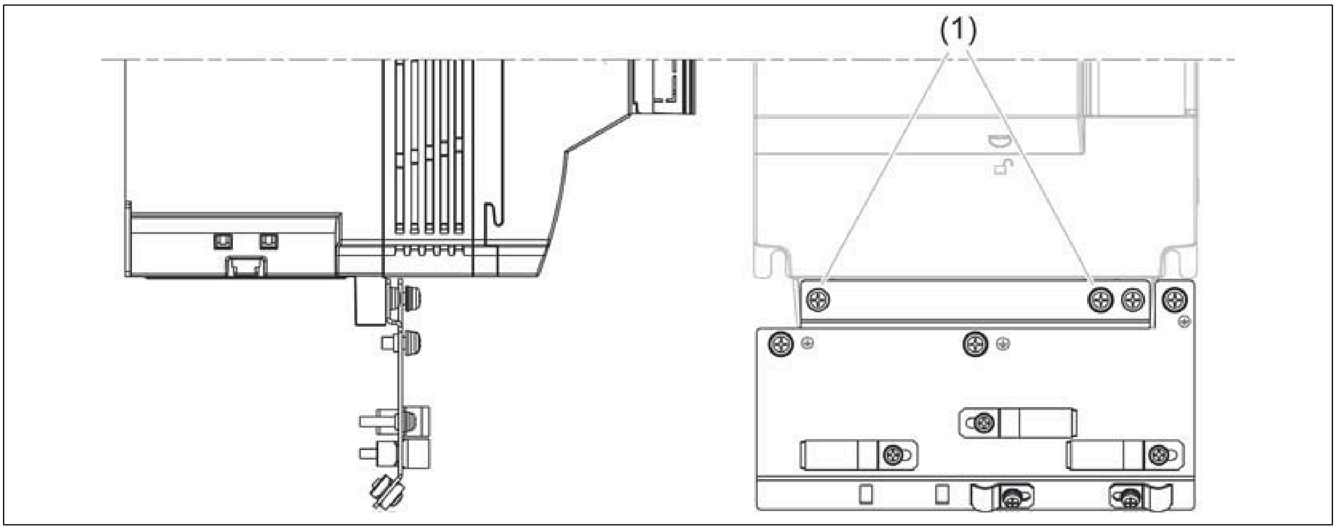
Mounting the EMC plate assembly for size D

Secure the EMC plate with three M5 HS screws (1).

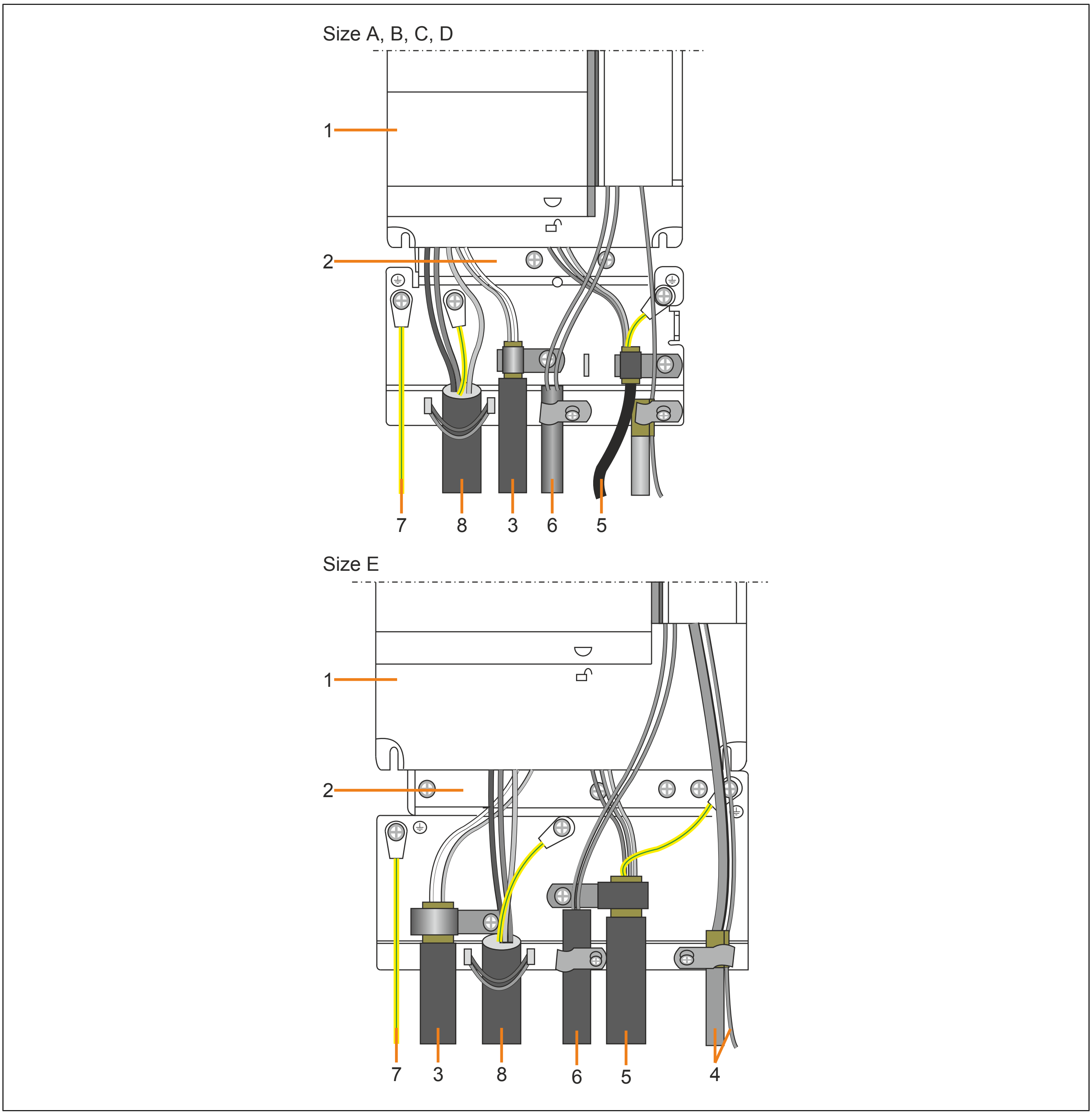


Mounting the EMC plate assembly for size E

Secure the EMC plate with two M5 HS screws (1).



Laying the EMC plate cable



1) ACOPOSinverter P66
2) Grounded, steel-sheet EMC plate
3) Shielded cable for connecting the braking resistor (if used). The shielding must be uninterrupted, and any intermediate connection terminals must be installed on the EMC plate.
4) Shielded control lines and lines to input-side connection of safety function STO.
5) Shielded motor cable, shielding grounded at both ends. This shielding must be uninterrupted, and any intermediate connection terminals must be installed on the EMC plate.
6) Non-shielded cables for relay contact output.
7) Protection ground connection.
8) Unshielded cable for power supply to the inverter.

3.4.10 Electromagnetic compatibility

Signal failures can trigger unanticipated reactions from the inverter, and from other devices in the vicinity of the inverter.

Warning!

SIGNAL AND DEVICE FAILURES

- **When wiring, all EMC requirements described in this document must be strictly observed.**
- **Ensure compliance with the EMC requirements described in this document.**
- **Ensure compliance with all applicable EMC guidelines and requirements for the site where the product is installed.**

Failure to follow these instructions can result in death, serious injury or damage to property.

Limit values

This product complies with the EMC requirements set by IEC 61800-3, provided that the procedures described in this manual are implemented during installation. If the selected configuration (product, line filter, various accessories and measures) does not comply with category C1 requirements, the following applies, as per IEC 61800-3:

Warning!

RADIO INTERFERENCE

In residential areas, this product may trigger radio interference. In this case, additional corrective measures may need to be implemented.

Failure to follow these instructions can result in death, serious injury or damage to property.

EMC requirements for the control cabinet

EMC measures	Objective
Use mounting plates with good conductivity, connect large surfaces of metal parts, remove paint from contact areas	Good conductivity due to large contact surface area
Ground the control cabinet, control cabinet door and the mounting plate using grounding belts or cables. The cable cross section must be at least 10 mm² (8 AWG).	Reduction in emissions
Fit switching contactors such as power contactors, relays or solenoids with interference filters or radio interference suppressors (for example, diodes, varistors, RC circuits)	Reduction in mutual interference.
Install power components and control components separately.	

Shielded cables

EMC measures	Objective
Connect large surfaces of cable shields, use cable terminals and grounding belts.	Reduction in emissions
Use cable terminals to connect large surfaces of the shielding on all shielded cables to the mounting plate at the control cabinet entry.	
Ground the shielding for digital signal cables at both ends. You can do this by connecting the shielding to large surfaces or via conductive connector housing.	Reduction in signal cable interference, reduction in emissions
Ground the shielding for analog signal cables at the device directly (signal input). Insulate the shielding at the other end of the cable, or use a capacitor for grounding (e.g. 10 nF, 100 V or higher).	Reduction in ground loops caused by low-frequency interference.
Only use shielded motor cables with copper braiding and coverage of at least 85%. Ground the shielding at either side of the large surface.	Controlled deflection of interference current and reduction in emissions

Cable installation

EMC measures	Objective
Do not route fieldbus cables and signal cables in a single cable duct together with DC and AC voltage lines of more than 60 V. (Fieldbus cables, signal lines and analog cables can be routed in a single cable duct.) Recommendation: Use separate cable ducts and ensure a minimum distance of 20 cm between each duct.	Reduction in mutual interference.
Keep cables as short as possible. Do not install unnecessary cable loops, and use short cables between the central grounding point in the control cabinet and the external ground connection.	Reduction in capacitive and inductive interference.
Use equipotential bonding conductors in the following cases: Wide-area installations, different voltage supplies and cross-building installations.	Reduction in cable shield interference, and reduction in emissions.
Use fine-stranded wires with potential equalization.	Dispersion of high-frequency interference current.
If the motor and machine are not conductively connected by means of an insulated flange or connection without an interface contact, for example, the motor must be grounded using a grounding belt or cable. The wire cross section must be at least 10 mm² (6 AWG).	Reduction in emissions, increased immunity.
Use twisted-pair wires for the DC supply. For digital and analog inputs, use shielded, twisted cables with a pitch of between 25 mm and 50 mm.	Reduction in signal cable interference, reduction in emissions

Power supply

EMC measures	Objective
Operate the product on a mains network with a grounded neutral conductor.	Ensures effectiveness of line filter.
Use overvoltage protection if there is a risk of overvoltage.	Reduction of the risk of damage due to overvoltage.

Additional measures for improving EMC

Depending on the application, the following measures can improve EMC-dependent values:

EMC measures	Objective
Use mains chokes.	Reduction in mains harmonics and extension of product service life.
Use external mains filters.	Improvement in EMC limit values.
Additional EMC measures, such as mounting in a closed control cabinet with 15 dB shielding attenuation of radiated interference, for example.	

Advice:

If using an additional input filter, it should be mounted as close as possible to the inverter and connected directly to the mains via an unshielded cable.

3.4.11 Electrical data for the control terminals

Characteristics of the terminals

Advice:

- **For a description of the terminal arrangement, see the section on the arrangement and characteristics of the control terminals as well as communication and I/O ports.**
- **For more information about the factory pre-set I/O assignment, see section "Programming".**

Terminal	Description	I/O type	Electrical characteristics
10 V	Power supply for setpoint potentiometer	A	Internal power supply for analog inputs • 10 VDC • Tolerance: 0 to 10% • Current: Max. 10 mA

AI1	Analog voltage input	E	Analog input 0 + 10 VDC
			• Impedance: 30 kΩ
			• Resolution: 10-bit converter
			• Accuracy:
			  ° ±0.5% at 25°C (77°F)
			  ° ±0.7% at a temperature fluctuation of 60°C (108°F)
			• Linearity: ±0.2% (max. ±0.5%) of maximum value
			• Sampling time: 2 ms

COM	Reference wire for analog inputs and outputs	I/O	0 V

AI2	Analog voltage input	E	Bipolar analog input 0 ±10 VDC (max. voltage ±30 VDC). The + or - polarity of the voltage at AI2 influences the setpoint direction, and therefore the rotation direction.
			• Impedance: 30 kΩ
			• Resolution: 10 bits
			• Accuracy:
			  ° ±0.5% at 25°C (77°F)
			  ° ±0.7% at a temperature fluctuation of 60°C (108°F)
			• Linearity: ±0.2% (max. ±0.5%) of maximum value
			• Sampling time: 2 ms

AI3	Analog current input	E	Analog input 0 to 20 mA (or 4 to 20 mA, X to 20 mA, 20 to Y mA). X and Y can be programmed to values between 0 and 20 mA.
			• Impedance: 250 Ω
			• Resolution: 10 bits
			• Accuracy:
			  ° ±0.5% at 25°C (77°F)
			  ° ±0.7% at a temperature fluctuation of 60°C (108°F)
			• Linearity: ±0.2% (max. ±0.5%) of maximum value
			• Sampling time: 2 ms

COM	Reference wire for analog inputs and outputs	I/O	0 V

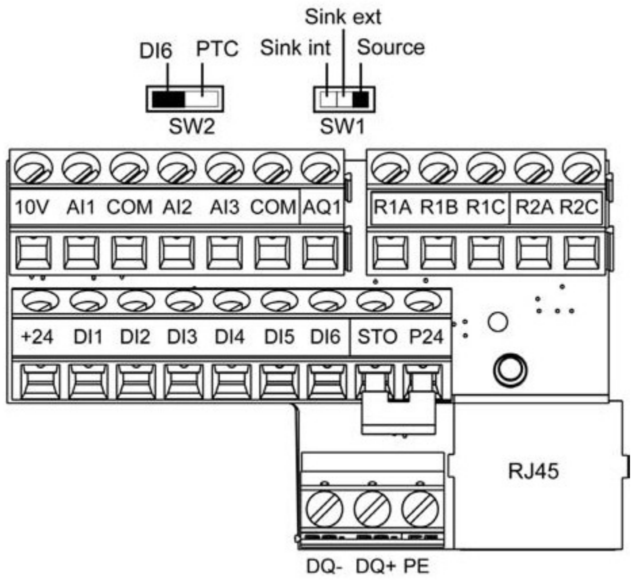
AQ1	Analog output	A	AQ: Analog output configurable via software for voltage or current
			• Analog voltage output: 0 to 10 VDC. Minimum load impedance: 470 Ω
			• Analog current output X-Y mA by programing X and Y to between 0 and 20 mA, maximum load impedance: 800 Ω
			• Sampling time: 2 ms
			• Resolution: 10 bits
			• Accuracy:
			  ° ±1% for 25°C ±10°C (77°F)
			  ° ±2% at a temperature fluctuation of 60°C (108°F)
			• Linearity: ±0.3%

R1A	Normally open (NO) contact for relay R1	A	Output relay 1 • Minimum switching capacity: 5 mA for 24 VDC • Maximum switching current for resistive load: 3 A for 250 VAC (OVC II) 30 VDC • Maximum switching current for inductive load: 2 A for 250 VAC (OVC II) and 30 VDC. The inductive load must be equipped with a device for suppressing voltage peaks in AC or DC operation, the total energy loss of which is greater than the inductive energy stored in the load. • Update time: 2 ms • Service life: 100,000 switching operations at maximum switching power
R1B	Normally closed (NC) contact for relay R1	A	
R1C	Contact reference point for relay R1	A	

Terminal	Description	I/O type	Electrical characteristics
R2A R2C	Normally open (NO) contact for programmable relay R2	A	Output relay 2 • Minimum switching capacity: 5 mA for 24 VDC • Maximum switching current for resistive load: 5 A for 250 VAC (OVC II) and 30 VDC • Maximum switching current for inductive load: 2 A for 250 VAC (OVC II) and 30 VDC. The inductive load must be equipped with a device for suppressing voltage peaks in AC or DC operation, the total energy loss of which is greater than the inductive energy stored in the load. • Update time: 2 ms • Service life: ° 100,000 switching operations at maximum switching capacity ° 1,000,000 switching operations at 1 A
+24	Power supply of digital inputs	I/O	• Input delay 24 VDC • Tolerance: -15 to 20% • Current: 100 mA
DI1 DI2 DI3 DI4	Digital inputs	E	4 programmable digital inputs, configurable as sink or source via switch SW1 • 24 VDC power supply (max. 30 VDC) • State 0 if <5 VDC, state 1 if >11 VDC (in source mode) • State 0 if >16 VDC, state 1 if <10 VDC (in sink mode) • Response time: 8 ms on stop
DI5 DI6	Digital inputs	E	When programming as digital inputs, the characteristics are the same as for DI1 to DI4. • DI5 can be programmed as a pulse input based on 20 kpps (pulses per second). • DI6 can be used as a PTC (Positive Temperature Coefficient) via switch SW2. • Threshold value for resolution: 3 kΩ, threshold value for reset: 1.8 kΩ • Threshold value for short-circuit detection <50 Ω
STO	Input STO (Safe Torque Off)	E	• Input: 24 VDC • Impedance: 1.5 kΩ
P24	Output power supply for digital inputs and STO	A	• 24 VDC • Tolerance: -15 to 20% • Current: Max. 1.1 A
DQ- DQ+	Digital output	A	Output with open collector, configurable as sink or source via switch SW1 • Update time: 2 ms • Maximum voltage: 30 VDC • Maximum current: 100 mA
PE	Protective ground	-	ACOPOSinverter P66 protective ground for high-speed communication.

3.4.12 Arrangement and characteristics of the control block terminals and communication and I/O ports

Connection characteristics



Cable cross sections and tightening torque

Control terminals	Cable cross section for relay output		Cross section for various cables		Tightening torque
	Min.[1]	Max.	Min.[1]	Max.	
	mm² (AWG)	mm² (AWG)	mm² (AWG)	mm² (AWG)	Nm (lb.in)
All terminals	0.75 (18)	1.5 (16)	0.5 (20)	1.5 (16)	0.5 (4.4)

1) The value corresponds to the minimum permitted cross section for the terminal.

Advice:

Electrical data for the control terminals see "Electrical data for the control terminals" on page 105.

RJ45 communication port

Connection options:

- PC with ACPi SafeConfigurator
- External graphic display terminal via Modbus serial cable
- Modbus or CANopen network
- Tool for loading configurations, etc.

Advice:

Before connecting the RJ45 cable to the product, inspect the cable for damage. Connecting a damaged cable may cause the power supply to the controller to fail.

3.4.13 Wiring the control unit

Protective Extra-Low Voltage (PELV) requirements for connected devices

Danger!

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

- **Make sure that the temperature sensors in the motor comply with PELV requirements.**
- **Make sure that the motor encoder complies with PELV requirements.**
- **Make sure that all other devices connected via a signal cable comply with PELV requirements.**

Failure to follow these instructions will result in death or serious injury.

Warning!

UNINTENDED OPERATION OF THE DEVICE

- **Use a shielded cable for all digital and analog I/O and communication signals.**
- **Ground the cable shielding at a single point.**
- **Route communication and I/O cables separately from power cables.**

Failure to follow these instructions can result in death, serious injury or damage to property.

- Keep control circuits and power circuits separate. For digital and analog inputs/outputs, use shielded, twisted cables with a pitch of between 25 mm and 50 mm.
- We recommend using the cable ends described in section "Accessories".

Access to the terminals

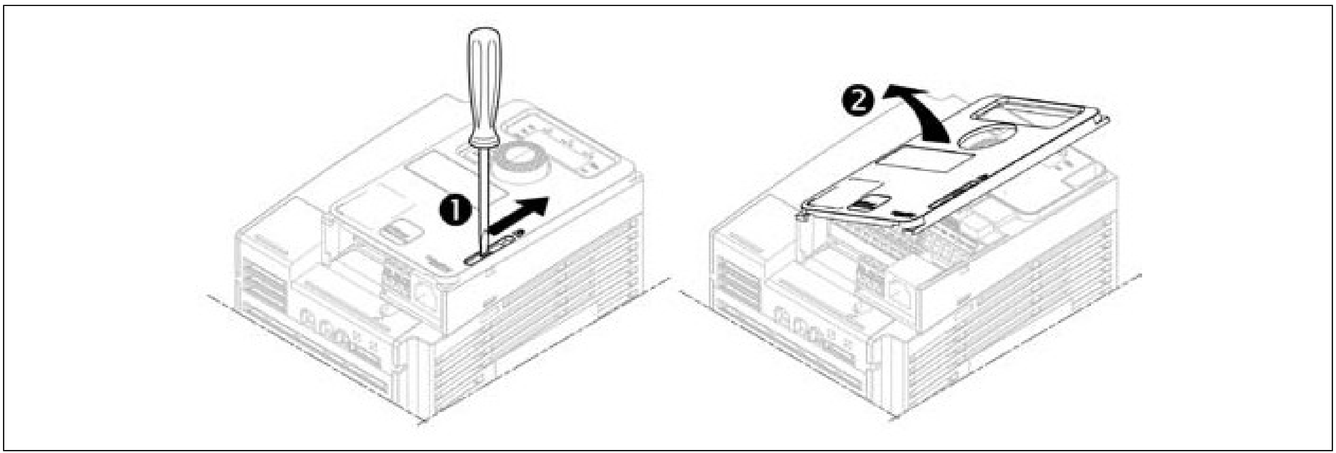
Danger!

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

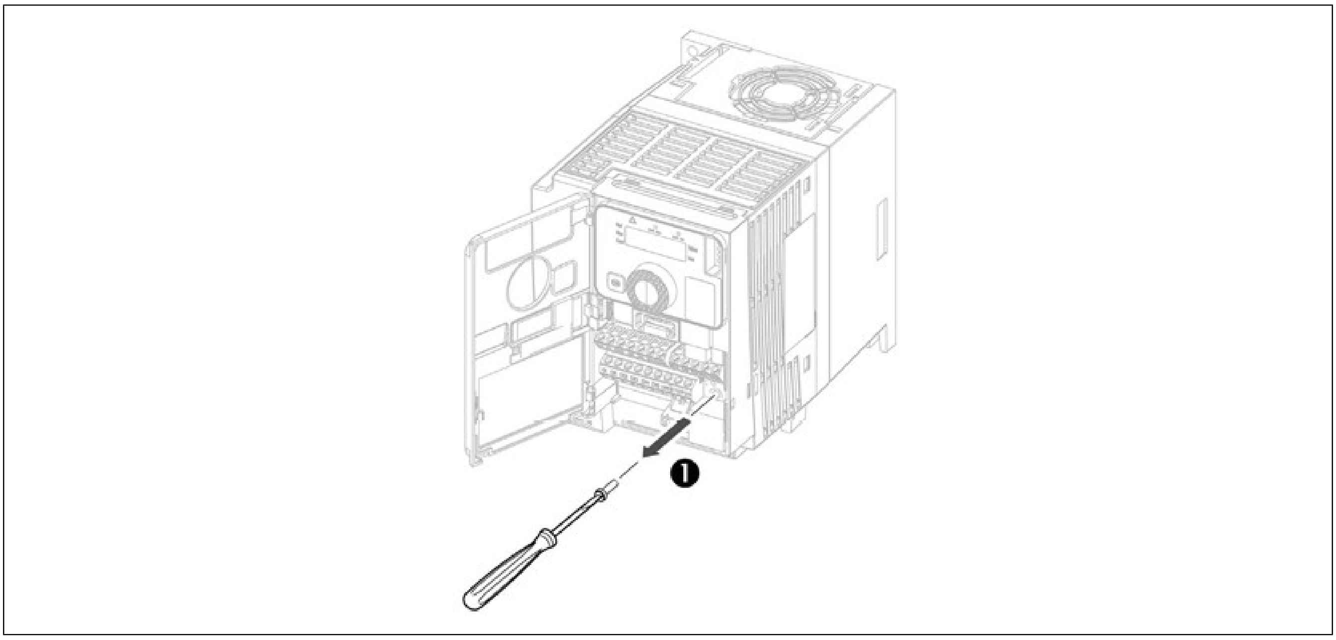
Before completing any of the procedures described in this section, carefully read through the instructions provided in section "Safety information".

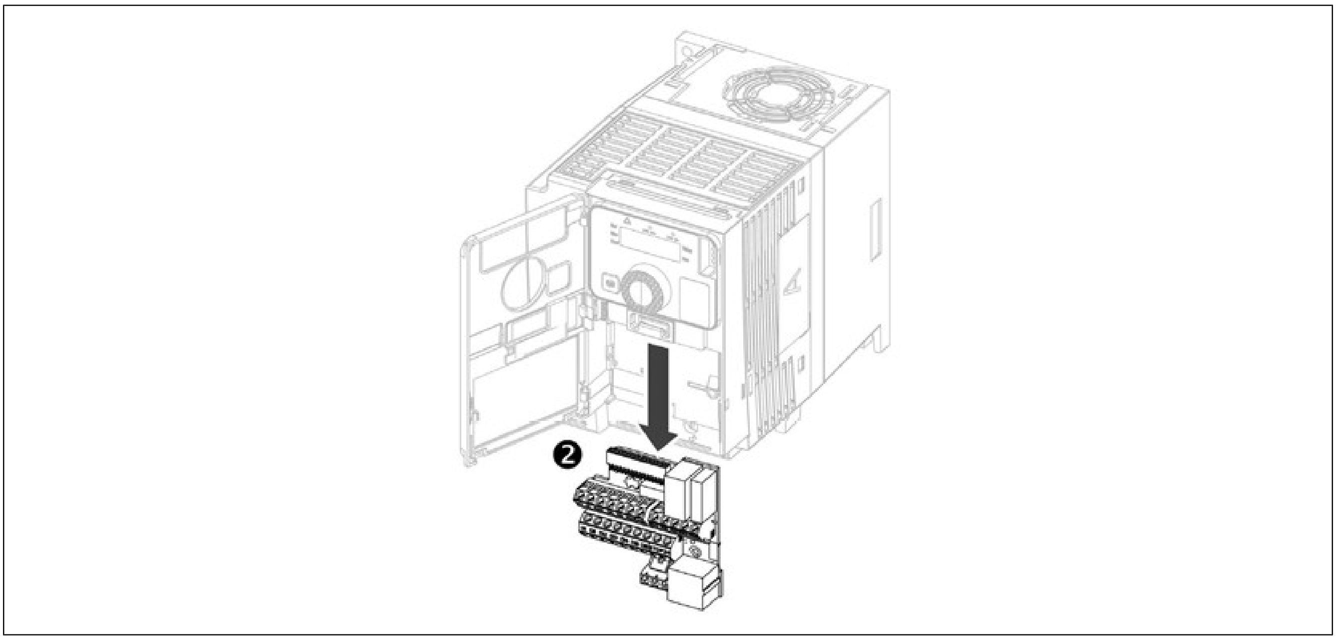
Failure to follow these instructions will result in death or serious injury.

Open the cover to access the terminals, as shown in the examples. All screws are M3 slotted screws of 3.8 mm (0.15 in) in diameter.



The ACOPOSinverter P66 control block can be removed to facilitate wiring.

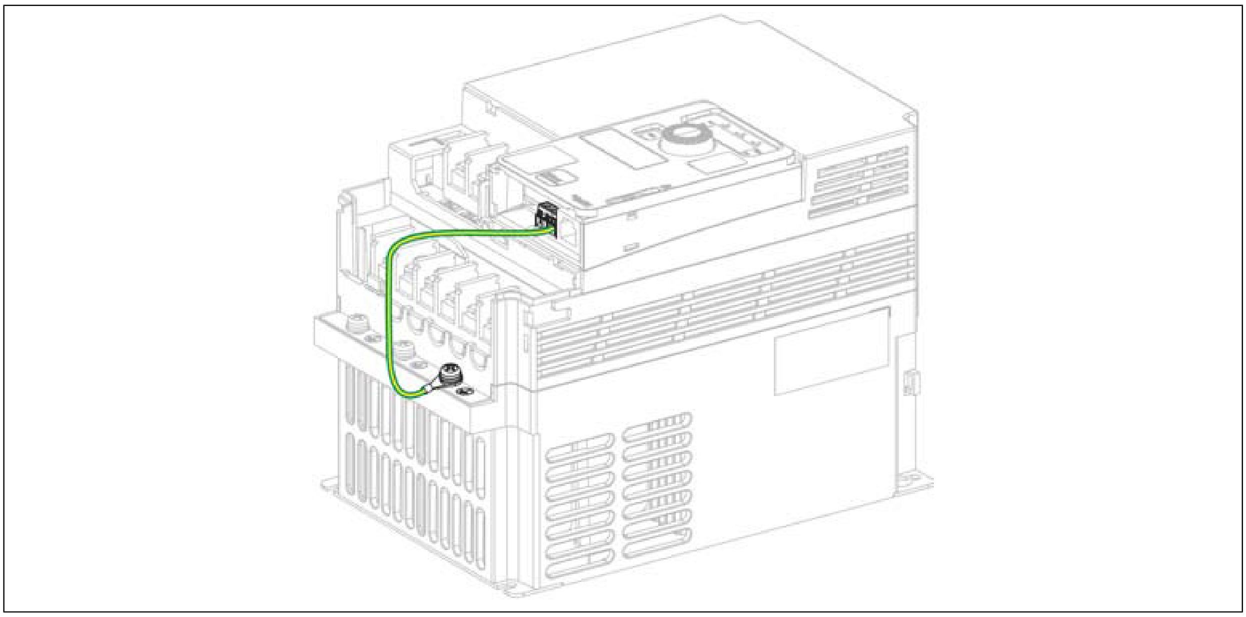

❶


❷

Wiring the control block

Procedure for wiring the control block terminals

1) Wire P24, the STO function, the digital inputs (DI1 to DI6) and terminals +24, DQ-, DQ+ and PE.
2) Wire 10 V, the analog inputs (AI1 to AI3), COM, digital input AQ1 and the COM terminals.
3) Wire the relay outputs.
4) Wire the PE terminal of the ACOPOSinverter P66 as shown below - Example for size C.



3.5 Testing the installation

Before switching on

Safety function STO (Safe Torque Off) does not interrupt the power supply to the DC bus. It only interrupts the power supply to the motor. DC bus voltage and mains voltage are still present in the inverter.

Danger!

RISK OF ELECTRIC SHOCK

- **Use safety function STO for its intended purpose only.**
- **Use a separate switch, outside the circuit for safety function STO, to disconnect the inverter from the mains voltage supply.**

Failure to follow these instructions will result in death or serious injury.

Incorrect settings, invalid data or faulty wiring can cause unexpected movement or signals as well as damage to components and the disabling of monitoring functions.

Warning!

UNEXPECTED OPERATION OF THE EQUIPMENT

- **Do not switch on the system until you have verified that there is no one in the operating area and that it is free from obstacles.**
- **Make sure that everyone involved in the operation has direct access to a fully functioning emergency switch-off button.**
- **Do not operate the inverter system using unknown settings or data.**
- **Make sure that the wiring has been implemented in accordance with the settings.**
- **Never change a parameter unless you are familiar with the function of the parameter and the consequences of a potential change.**
- **When commissioning, make sure to carefully check all operating states, operating conditions and potential error situations.**
- **Take into account the possibility of movement in the wrong direction or motor vibration.**

Failure to follow these instructions can result in death, serious injury or damage to property.

If a power stage is disabled unintentionally, following a power outage, error or functional failure, for example, the brake function in the motor may no longer operate in a controlled way.

Warning!

UNEXPECTED OPERATION OF THE EQUIPMENT

Make sure that unbraked movements do not cause injury or damage to the device.

Failure to follow these instructions can result in death, serious injury or damage to property.

Mechanical installation

Check the mechanical installation of the overall inverter system:

1) Have the specified spacing requirements been observed during installation?
2) Have all mounting screws been tightened using the specified tightening torque?

Electrical installation

Check the electrical connections and wiring:

1) Have all protective ground conductors been connected?
2) Have all fuses and circuit breakers been installed with the correct power values? Have the right types of fuse been used?
3) Have all cable ends been connected or insulated?
4) Have all cables and connections been connected and installed correctly?
5) Have the signal cables been connected correctly?
6) Do the required shield connections comply with the EMC requirements?
7) Have all actions been taken to ensure EMC compliance?

Covers and gaskets

To ensure the required protection, make sure that all devices as well as the doors and covers of the control cabinet have been installed correctly.

3.6 Maintenance

Service

Danger!

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

Before completing any of the procedures described in this section, carefully read through the instructions provided in section "Safety information".

Failure to follow these instructions will result in death or serious injury.

When operating, the products described in these instructions can reach temperatures of over 80°C.

Warning!

HOT SURFACES

- **Avoid all contact with hot surfaces.**
- **Keep flammable or heat-sensitive components away from the immediate vicinity of hot surfaces.**
- **Before handling the product, wait until it has cooled down sufficiently.**
- **Make sure that there is adequate heat dissipation by performing a test run on maximum load.**

Failure to follow these instructions can result in death, serious injury or damage to property.

Advice:

RISK OF DAMAGE TO FREQUENCY INVERTER

Perform the procedures listed below.

Failure to follow these instructions can result in damage to property.

Environment	Affected components:	Action	Frequency [1)]
Impacts to the product	Housing - Control block (LED display, if used)	Perform a visual inspection of the inverter.	At least once a year
Corrosion	Terminals - Male connectors - Screws - EMC plate	Inspect, and clean if necessary	
Dust	Terminals - Fans - Vents - Air inlets and outlets for housing - Cabinet air filters	Inspect, and clean if necessary	
Temperature	In the vicinity of the product	Inspect, and adjust if necessary	
Cooling	Fans	Check that the fans are functioning correctly.	At least once a year
		Replace the fans.	After three to five years depending on operating conditions.
Vibration		Check the tightening torque.	At least once a year

1) Starting from the commissioning date. The actual service intervals required are determined by the specific environmental conditions.

It is possible that the fans may continue to function for a certain period after the inverter has been switched off.

Caution!

OPERATING FANS

Before handling the fans, make sure that they have come to a complete stop.

Failure to follow these instructions can result in injury or damage to the equipment.

Diagnostics and error correction

See "Using the ACOPOSinverter without Automation Studio" on page 115.

Spares and repairs

Serviceable product: Please contact your designated customer service representative.

Replacement of fan: It is possible to order a new fan as part of an ACOPOSinverter servicing agreement.

Lengthy storage periods

If the inverter has not been switched on for a long time, the capacitors must be fully charged before the motor is started.

Advice:

REDUCED CAPACITOR PERFORMANCE

- **If the inverter has not been switched on for any of the time frames listed below, leave the inverter connected to the mains voltage for one hour before switching on the motor.**
  - **12 months when the maximum storage temperature is 50°C**
  - **24 months when the maximum storage temperature is 45°C (113°F)**
  - **36 months when the maximum storage temperature is 40°C (104°F)**
- **Remember that no move commands can be executed until one hour has passed.**
- **When commissioning the inverter for the first time, check the date of manufacture. If the inverter was manufactured more than 12 months ago, perform the specified procedure.**

Failure to follow these instructions can result in damage to property.

If the specified procedure cannot be performed without executing a move command because of the internal mains protection control, perform the procedure during the active power stage. However, the motor must be stopped, in order to prevent noticeable mains current in the capacitors.

3.7 Leakage current

The leakage current values are specified for a power system (TT/TN) at 3% unbalance between phases at maximum voltage and worst case tolerance of internal components.

Leakage currents are sometimes shared in 2 values with different frequencies. Values cannot be strictly added but both act together in Residual Current Device tripping.

<table>
<tr><th rowspan="2">Phases/Voltage</th><th rowspan="2">Material number</th><th colspan="2">IT jumper closed</th><th rowspan="2">IT jumper open</th></tr>
<tr><th>Input frequency (mains frequency) = 50 Hz</th><th>Input frequency (mains frequency) = 60 Hz</th></tr>
<tr><td rowspan="7">1-phase
200 to 240 V</td><td>8I66S200018.00-000</td><td rowspan="4">5.1 mA</td><td rowspan="4">6.1 mA</td><td rowspan="4"><0.5 mA</td></tr>
<tr><td>8I66S200037.00-000</td></tr>
<tr><td>8I66S200055.00-000</td></tr>
<tr><td>8I66S200075.00-000</td></tr>
<tr><td>8I66S200110.00-000</td><td rowspan="3">7.42 mA</td><td rowspan="3">8.9 mA</td><td rowspan="3"><0.5 mA</td></tr>
<tr><td>8I66S200150.00-000</td></tr>
<tr><td>8I66S200220.00-000</td></tr>
<tr><td rowspan="13">3-phase
200 to 240 V</td><td>8I66T200018.00-000</td><td colspan="3" rowspan="13"><0.5 mA</td></tr>
<tr><td>8I66T200037.00-000</td></tr>
<tr><td>8I66T200055.00-000</td></tr>
<tr><td>8I66T200075.00-000</td></tr>
<tr><td>8I66T200110.00-000</td></tr>
<tr><td>8I66T200150.00-000</td></tr>
<tr><td>8I66T200220.00-000</td></tr>
<tr><td>8I66T200300.00-000</td></tr>
<tr><td>8I66T200400.00-000</td></tr>
<tr><td>8I66T200550.00-000</td></tr>
<tr><td>8I66T200750.00-000</td></tr>
<tr><td>8I66T201100.00-000</td></tr>
<tr><td>8I66T201500.00-000</td></tr>
<tr><td rowspan="12">3-phase
380 to 500 V</td><td>8I66T400037.00-000</td><td rowspan="5">4.75 mA</td><td rowspan="5">5.7 mA</td><td rowspan="12"><0.5 mA</td></tr>
<tr><td>8I66T400055.00-000</td></tr>
<tr><td>8I66T400075.00-000</td></tr>
<tr><td>8I66T400110.00-000</td></tr>
<tr><td>8I66T400150.00-000</td></tr>
<tr><td>8I66T400220.00-000</td><td rowspan="3">4.33 mA</td><td rowspan="3">5.2 mA</td></tr>
<tr><td>8I66T400300.00-000</td></tr>
<tr><td>8I66T400400.00-000</td></tr>
<tr><td>8I66T400550.00-000</td><td rowspan="2">8.23 mA</td><td rowspan="2">9.88 mA</td></tr>
<tr><td>8I66T400750.00-000</td></tr>
<tr><td>8I66T401100.00-000</td><td rowspan="2">8.47 mA</td><td rowspan="2">10.16 mA</td></tr>
<tr><td>8I66T401500.00-000</td></tr>
<tr><td rowspan="8">3-phase
525 to 600 V</td><td>8I66T600075.00-000</td><td colspan="3" rowspan="8"><0.5 mA</td></tr>
<tr><td>8I66T600150.00-000</td></tr>
<tr><td>8I66T600220.00-000</td></tr>
<tr><td>8I66T60040.00-000</td></tr>
<tr><td>8I66T600550.00-000</td></tr>
<tr><td>8I66T600750.00-000</td></tr>
<tr><td>8I66T601100.00-000</td></tr>
<tr><td>8I66T601500.00-000</td></tr>
</table>

4 Using the ACOPOSinverter without Automation Studio

4.1 Getting started

Procedure for commissioning the inverter

MOUNTING

1) See "Installation" on page 58.

PROGRAMMING

2) Switch on the power supply to the inverter, but do not issue any move command.
3) Define the following settings:
   - If the frequency is not 50 Hz, set the rated frequency of the motor via **[Standard mot. freq]** (bFr).
   - Only set the motor parameter via menu **[MOTOR CONTROL]** (drC-) if the preset factory configuration defined for the inverter is unsuitable.
   - Only set the application functions via menu **[INPUTS / OUTPUTS CFG]** (I_O-), menu **[COMMAND]** (CtL-) and **[APPLICATION FUNCT.]** (FUn-) if the preset factory configuration defined for the inverter is unsuitable.
4) In menu **[SETTINGS]** (SEt-), set the following parameters:
   - **[Acceleration]** (ACC) and **[Deceleration]** (dEC)
   - **[Low speed]** (LSP) and **[High speed]** (HSP)
   - **[Mot. therm. current]** (ItH)
5) Start the inverter.

Tips:

- Before programming, fill out the tables with user-specific settings.
- Parameter **[Factory settings]** (FCS) allows you to restore the factory settings at any stage.
- You can use the function index to find the description for the individual functions quickly and easily.
- Before configuring a function, read the compatibility table paragraph in section "[APPLICATION FUNCT.] (FUn-)" on page 234.

Advice:

To ensure optimum inverter accuracy and response time, the following steps must be performed:

- **In menu [MOTOR CONTROL] (drC-), specify the values indicated on the motor nameplate.**
- **Use parameter [Auto-tuning] (tUn) to autotune the connected motor in cold state.**

Getting started

If the inverter has not been switched on for a long time, the capacitors must be fully charged before the motor is started.

Advice:

REDUCED CAPACITOR PERFORMANCE

- **If the inverter has not been switched on for any of the time frames listed below, leave the inverter connected to the mains voltage for one hour before switching on the motor.**
  - **12 months when the maximum storage temperature is 50°C**
  - **24 months when the maximum storage temperature is 45°C**
  - **36 months when the maximum storage temperature is 40°C**
- **Remember that no move commands can be executed until one hour has passed.**
- **When commissioning the inverter for the first time, check the date of manufacture. If the inverter was manufactured more than 12 months ago, perform the specified procedure.**

Failure to observe these instructions can result in damage to the equipment.

If, for internal mains protection control reasons, the specified procedure cannot be performed without executing a move command, perform the procedure during the active power stage. However, the motor must be stopped, in order to prevent noticeable mains current in the capacitors.

Before switching on the inverter

Warning!

IRREPARABLE DAMAGE DUE TO INCORRECT SUPPLY VOLTAGE

Before switching on and configuring the product, make sure that it is approved for use with the existing mains voltage.

Failure to follow these instructions can result in serious injury and death or damage to the equipment.

Switching on

Advice:

When the factory settings are enabled, the motor can only be switched on during a normal power-up/ manual reset or after a stop command if commands "Run forward", "Run reverse" and "Stop DC injection" have been reset. If these commands have not been reset, the inverter will display [Freewheel] (nSt) and will not start. If the function has been configured for automatic restart (parameter [Automatic restart] (Atr) in menu [FAULT MANAGEMENT] (FLt-)), these commands are not taken into account and a reset (to Null) is not required.

Inverter locked

If a move command such as "Forward", "Reverse" or "Stop DC injection" is still active during:

- a factory reset,
- an error reset via **[FAULT RESET]** (RsF),
- an error reset performed manually by switching off the product and turning it back on again
- a stop command issued by a channel that does not correspond to the active channel command (e.g. the stop key on the display terminal in 2/3 conductor mode),

  then the inverter will be locked and will display **[Freewheel]** (nSt). Before authorizing a new move command, all active move commands must be disabled first.

Line contactor

Advice:

RISK OF DAMAGE TO FREQUENCY INVERTER

Do not switch on the frequency inverter for cycles shorter than 60 seconds.

Failure to observe these instructions can result in damage to the equipment.

Using a motor with low ratings or dispensing with a motor completely

In the factory settings, output phase monitoring is enabled by default (**[Output Phase Loss]** (OPL) = **[YES]** (YES). To test or service the inverter, without having to access a motor with the same rating as the inverter, you must disable output phase failure monitoring (**[Output Phase Loss]** (OPL) = **[No]** (nO)). This can be especially helpful in cases where you need to test a very large inverter with a small motor. Set **[Motor control type]** (Ctt) to **[Standard]** (Std) via menu **[Motor control]** (drC-).

Advice:

MOTOR OVERHEATING

An external protection system for thermal overload is required in the following situations:

- **If a motor is connected to a nominal current that is less than 20% of the inverter current.**
- **If the motor shutdown function is used.**

Failure to observe these instructions can result in damage to the equipment.

Danger!

RISK OF ELECTRIC SHOCK, ARC FLASH OR EXPLOSION

If output phase monitoring is disabled, then phase loss and any resulting cable disconnection will not be detected.

- **Make sure that the parameter settings do not result in unsafe states.**

Failure to follow these instructions can result in death or serious injury.

4.1.1 Factory configuration

Factory settings

The ACOPOSinverter is factory preset for common operating conditions:

- Display: Inverter ready signal **[Ready]** (rdY), when the motor is ready for operation; and the motor speed when the motor is running.
- Logic inputs LI3 to LI6, analog inputs AI2 and AI3, logic output LO1, analog output AO1 and relay R2 are not assigned.
- Stop mode on error detection: Freewheel stop

Code	Description	Factory settings
bFr	**[Standard mot. freq]**	**[50 Hz IEC]**
tCC	**[2/3 wire control]**	**[2 wire]** (2C): 2-conductor control
Ctt	**[Motor control type]**	**[Standard]** (Std): Standard motor curve
ACC	**[Acceleration]**	3 seconds
dEC	**[Deceleration]**	3 seconds
LSP	**[Low speed]**	0 Hz
HSP	**[High speed]**	50 Hz
ItH	**[Mot. therm. current]**	Motor nominal current (dependent on inverter size value)
SdC1	**[Auto DC inj. level 1]**	0.7 x inverter nominal current for 0.5 seconds
SFr	**[Switching freq.]**	4 kHz
Frd	**[Forward]**	**[LI1]** (LI1): Logic input LI1
rrS	**[Reverse assign.]**	**[LI2]** (LI2): Logic input LI2
Fr1	**[Ref.1 channel]**	**[AI1]** (AI1): Analog input AI1
r1	**[R1 assignment]**	**[No fault]** (FLt): The contact opens when an error is detected or when the inverter is switched off.
brA	**[Dec ramp adapt.]**	**[YES]** (YES): Function active (deceleration ramp adapted automatically)
Atr	**[Automatic restart]**	**[No]** (nO): Function not active
Stt	**[Type of stop]**	**[Ramp stop]** (rMP): One ramp
CFG	**[Macro configuration]**	**[Start/Stop]** (StS)

Advice:

To work with the least possible number of default inverter settings, select macro configuration [Macro configuration] (CFG) = [Start/Stop] (StS), followed by [Factory settings] (FCS) = [Macro-Conf] (InI).

Check that the values specified above are compatible with the relevant application.

4.1.2 Application functions

The tables on the following pages show the function assignments for various applications, in order to guide your selection.

The applications in these tables relate to the following machines in particular:

- Hoisting gear: Cranes, overhead traveling cranes, portal cranes (vertical lifting, gear ratio, rotation), lifting platforms
- Transportation: Pallet loaders/unloaders, conveyor belts, roller tables
- Packaging: Carton packaging machines, labeling machines
- Textiles: Weaving looms, carding frames, washing machines, spinners, drawing frames
- Wood processing: Lathes, sawing, milling
- Process

Each machine has its own special features, and the combinations listed here are neither mandatory nor exhaustive.

Some functions are designed specifically for a particular application. In such cases, a reference to the application is provided in the form of a tab in the margin of the programming section of the corresponding pages.

Motor control functions

Functions	Hoisting	Transport	Packaging	Textiles	Wood processing	Process
V/f characteristic curve		■			■	
Sensorless flux vector control	■	■	■	■	■	■
2-point vector control	■			■		
Synchronous motor in open control loop				■		
Motor speed up to 599 Hz				■	■	
Motor overvoltage limiting				■	■	
DC bus connection (see "Installation" on page 58)				■		■
Motor fluxing using a logic input	■	■	■			
Switching frequency up to 16 kHz				■	■	
Autotuning	■	■	■	■	■	■

Functions of the frequency setpoints

Functions	Hoisting	Transport	Packaging	Textiles	Wood processing	Process
Differential bipolar reference	■	■	■			
Reference delinearization (magnifying glass effect)	■	■				
Frequency control input				■		■
Reference switching			■			
Reference summing			■			
Reference subtraction			■			
Reference multiplication			■			
Ramp with configurable profile	■	■				
Frequency jog		■		■		■
Preset speeds	■	■	■			
± Speed using single-step buttons						■
± Speed using double-step buttons	■					
± Speed around the reference				■		■
Save reference						■

Application-specific functions

Functions	Hoisting	Transport	Packaging	Textiles	Wood processing	Process
Fast stop.					■	
Brake controller	■	■				
Load measurement	■					
High-speed hoisting	■					
Rope slack	■					
PID controllers						■
Motor/generator torque limit		■		■		■
Load distribution	■	■				
Line contactor control	■	■			■	
Motor protection control	■					
Positioning by limit switches or sensors	■	■	■			
Stop-at distance (remote stop) calculated after deceleration limit switch		■	■			
Parameter switching	■	■	■	■	■	■
Motor or configuration switching	■	■	■			
Traverse control				■		
Stop mode		■		■	■	

Safety function / Error management

Functions	Hoisting	Transport	Packaging	Textiles	Wood processing	Process
Safe Torque Off (STO) (see "Safety functions" on page 468)	■	■	■	■	■	■
Deferred stop on thermal alarm	■					■
Alarm management	■	■	■	■	■	■
Error management	■	■	■	■	■	■
IGBT tests	■	■	■	■	■	■
Catch on the fly				■	■	
Motor protection with PTC sensors	■	■	■	■	■	■
Managing undervoltages				■	■	
Loss: 4 to 20 mA	■	■		■	■	■
Uncontrolled output cut (output phase loss)		■				
Automatic restart		■				
Measurement of motor speed via pulse input	■	■				
Load variation detection	■					
Underload detection						■
Overload detection						■

4.1.3 Basic functions

Optional graphic display terminal

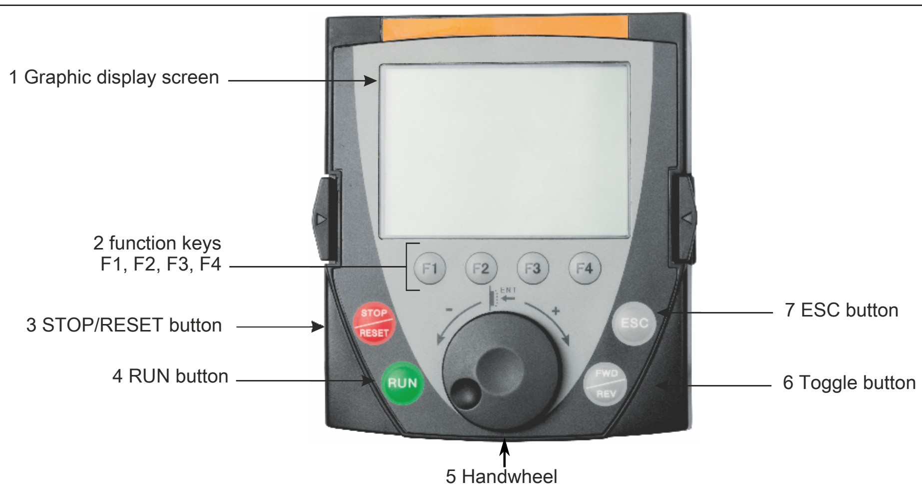
The fan will start automatically once the inverter's thermal state reaches 70% of the maximum value and **[Fan Mode]** (FFM) is set to **[Standard]** (Std).

With the ACOPOSinverter, **[Fan Mode]** (FFM) is set to **[Always]** (run), which means that the fan is always enabled.

4.1.4 Optional graphic display terminal

Description of the graphic display terminal

The graphic display terminal operates with FLASH V1.1 IE26 or higher and displays more detailed information compared to the integrated operator terminal.



5) Handwheel (Jog):

Press (ENT):

- To save the current value
- To launch the selected menu or parameter

Turn +/-:

- To increase or reduce a value
- To go to the next or previous line
- To increase or reduce the setpoint when control via the terminal is enabled

6) Switching button: To switch the direction of rotation of the motor
7) ESC button: To discard a value, parameter or menu and return to the previous selection

Advice:

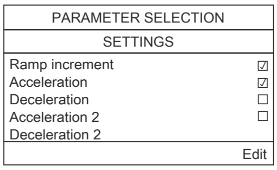
If control via the terminal is enabled, buttons 3, 4, 5 and 6 can be used to control the inverter directly.

To enable the buttons on the external operator terminal, you first need to set **[Ref.1 channel]** (Fr1) to **[HMI]** (LCC).

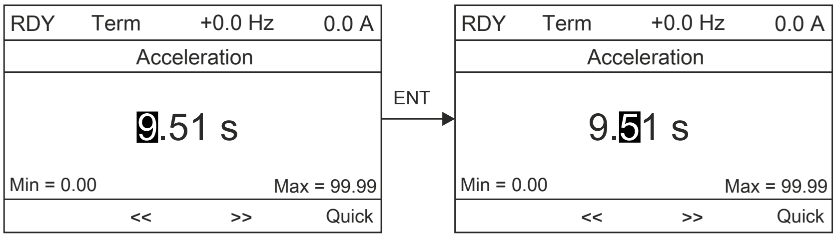
Single selection

The first time you switch on the graphic display terminal, you need to select the required language.
When only one selection is possible, the selected item is indicated by a ✓ symbol.
Example: Only one language can be selected.

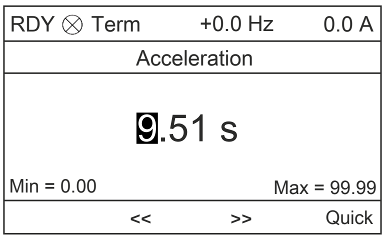
Multiple selection



When multiple selection is possible, the selected items are indicated by a ✓symbol.
Example: To create a **[USER MENU]**, you can select multiple parameters.



The << and >> arrows (F2 and F3) allow you to select the number that you want to change. To increase or reduce this value, turn the handwheel.



OFF display: In stop mode, a valid function block program is running on the ACOPOSinverter.

ON display: In operating mode, a valid function block program is running on the ACOPOSinverter. It is assumed that the inverter is operating. State and configuration parameters cannot be modified.

The first time you switch on the graphic display terminal, you need to select the required language.

LANGUAGE	
English	
Français	✓
Deutsch	
Italiano	
Español	
Chinese	
Русский	
Türkçe	

Screen displayed the first time the graphic display terminal is switched on. Select the language and press ENT.

↓ ENT

8I76
0.75 kW 200 M

Config 0

The sizing data for the inverter is now displayed.

↓ 3 seconds

RDY	Term	0.0 Hz	0.0 A
ACCESS LEVEL			
Basic			
Standard			✓
Advanced			
Expert			

↓ ENT

RDY	Term	0.0 Hz	0.0 A
1 DRIVE MENU			
1.1 SPEED REFERENCE			
1.2 MONITORING			
1.3 CONFIGURATION			
Code	<<	>>	Quick

Example of configuration windows

Single selection

LANGUAGE	
English	
Français	✓
Deutsch	
Italiano	
Español	
Chinese	
Русский	
Türkçe	

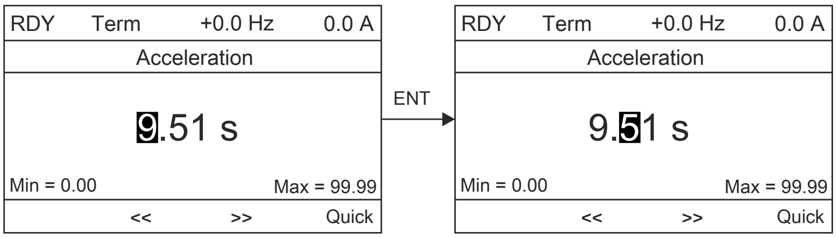
The first time the graphic display terminal is switched on, the desired language must be selected.
If only one selection is possible, the selected item is specified by the ✓ character.
Example: Only one language can be selected.

Multiple selection

PARAMETER SELECTION	
SETTINGS	
Ramp increment	☑
Acceleration	☑
Deceleration	☐
Acceleration 2	☐
Deceleration 2	
	Edit

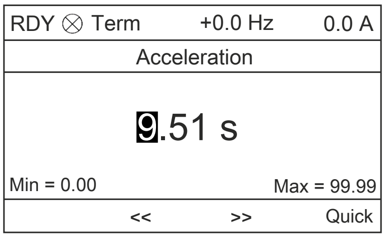
When multiple selection is possible, the selected items are indicated by a ✓symbol.
Example: To create a **[USER MENU]**, multiple parameters can be selected.

Example of a configuration window with one value:



The << and >> arrows (F2 and F3) make it possible to select the number that should be changed. To increase or reduce this value, turn the handwheel.

Example of how to display a function block state



OFF display: In stop mode, a valid function block program is running on the ACOPOSinverter.

ON display: In operating mode, a valid function block program is running on the ACOPOSinverter. It is assumed that the inverter is operating. State and configuration parameters cannot be changed.

Switching on the inverter with the graphic display terminal for the first time

The first time the graphic display terminal is switched on, the desired language must be selected.

LANGUAGE
English
Français ✓
Deutsch
Italiano
Español

Chinese
Русский
Türkçe

Screen displayed the first time the graphic display terminal is switched on. Select the language and press ENT.

↓ ENT

8I66
0.75 kW 200M

Config 0

The sizing data for the inverter is now displayed.

↓ 3 seconds

RDY	Term	0.0 Hz	0.0 A

ACCESS LEVEL
Basic
Standard ✓
Advanced
Expert

↓ ENT

RDY	Term	0.0 Hz	0.0 A

1 DRIVE MENU
1.1 SPEED REFERENCE
1.2 MONITORING
1.3 CONFIGURATION

Code	<<	>>	Quick

4.1.5 Switching on the inverter for the first time

The first time you switch on the inverter with the integrated operator terminal, option **[Standard mot. freq]** (bFr) is called directly from menu (CONF > ALL PARAMETERS > SIM).

8I66 0.75 kW 200M Config 0	Screen displayed the first time the inverter is switched on.
↓ 3 seconds	
RDY Term 0.0 Hz 0.0 A ACCESS LEVEL Basic Standard Advanced Expert	Screen **[ACCESS LEVEL]** is then displayed automatically.
↓ ENT	
RDY Term 0.0 Hz 0.0 A 1 DRIVE MENU 1.1 SPEED REFERENCE 1.2 MONITORING 1.3 CONFIGURATION Code << >> Quick	After three seconds, the screen switches automatically to menu **[1 DRIVE MENU]**. Select the menu and press ENT.
↓ ESC	
MAIN MENU 1 DRIVE MENU 2 IDENTIFICATION 3 INTERFACE 4 OPEN / SAVE AS 5 PASSOWRD	Press ESC to display the main menu on the graphic display terminal.

Subsequent power ups

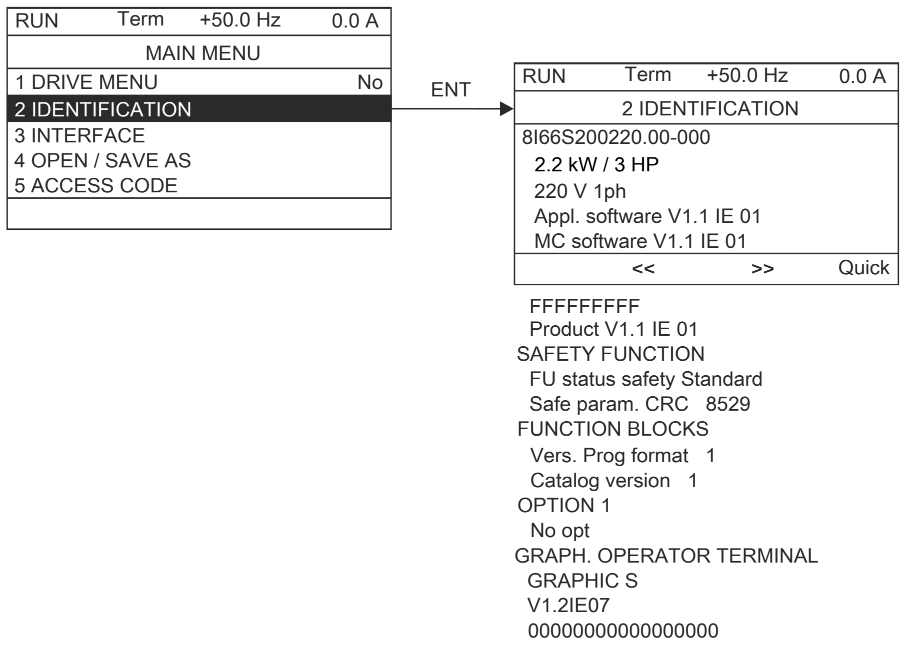
Each time you subsequently switch on the inverter with the integrated operator terminal, the inverter state menu will be called directly (same list as for **[Drive state]** (HS1)). Example: "Invertr ready"(rdY).

8I66 0.75 kW 200M Config 0	Screen displayed after the inverter is switched on.
↓ 3 seconds	
RDY Term 0.0 Hz 0.0 A 1 DRIVE MENU 1.1 SPEED REFERENCE 1.2 MONITORING 1.3 CONFIGURATION Code << >> Quick	After three seconds, the screen switches automatically to menu **[1 DRIVE MENU]**. Select the menu and press ENT.
↓ 10 seconds	
RDY Term +0.0 Hz 0.0 A Frequency ref. +1.3 Hz Min = -599.0 Max = +599.0 Quick	After 10 seconds, the screen automatically changes to the monitoring screen.

Menu IDENTIFICATION

Menu **[IDENTIFICATION]** (OId-) can only be accessed via the graphic display terminal. This is a read-only menu that cannot be configured. The following information can be displayed:

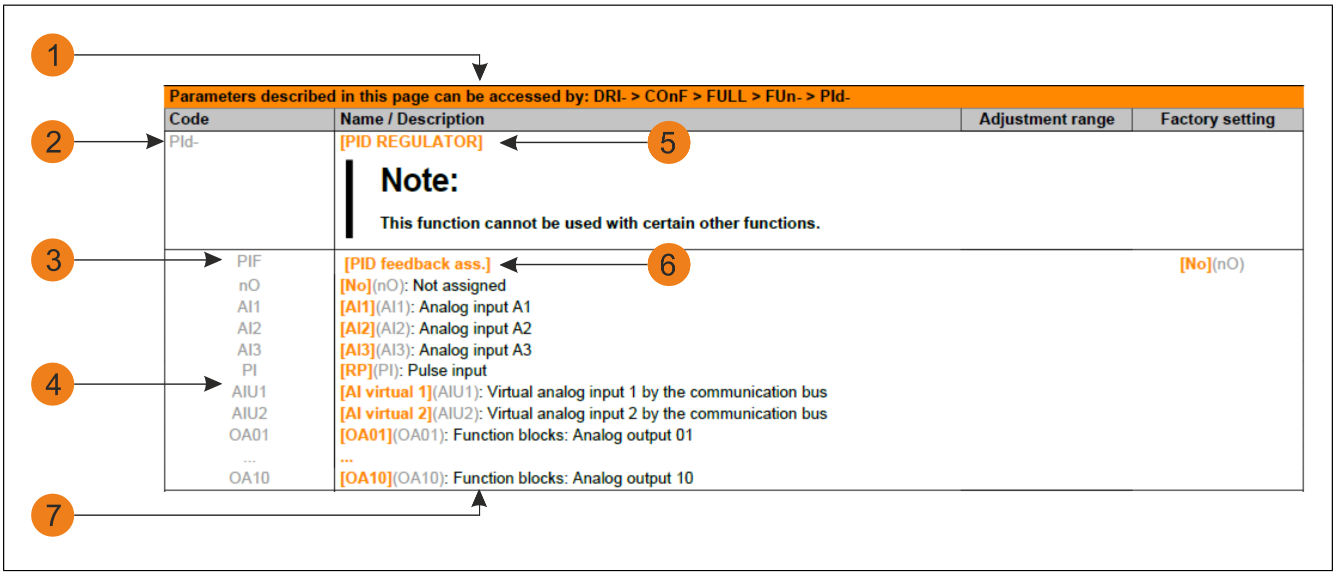
- Inverter setpoint, power rating and voltage
- Inverter software version
- Inverter serial number
- Safety function state and checksum
- Function block program and catalog version
- Option types available, with corresponding software version
- Graphic display terminal type and version



4.1.6 Structure of parameter tables

The parameter tables in the descriptions of the various menus are structured as follows:

Example:



1) Access to the parameters described on this page
2) Submenu code in 4-digit 7-segment display format
3) Parameter code in 4-digit 7-segment display format
4) Parameter value in 4-digit 7-segment display format
5) Name of the submenu on the graphic display terminal
6) Name of the parameter on the graphic display terminal
7) Value of the parameter on the graphic display terminal

Advice:

Text in square brackets [ ] corresponds to the text shown on the graphic display terminal.

Sometimes the menu is followed by the note "(continued)". This helps you to determine your position within the tree structure.

Example:

Parameters described in this page can be accessed by: DRI- > MOn-	
Code	**Name / Description**
MOn-	[1.2 MONITORING]**(continued)**
CnFS	[Config. active] View of the active configuration.

In this case, "continued" indicates that submenu **[APPLICATION FUNCT.]** is located under submenu **[PID REGULATOR]**.

A parameter can also contain pictograms. For each of these pictograms, a legend is provided at the bottom of the table.

Main pictograms:

These parameters only appear if the corresponding function has been selected in another menu. If the parameters can also be accessed and modified from within the configuration menu for the corresponding function, these menus will contain a detailed description of the parameters to make programming easier.

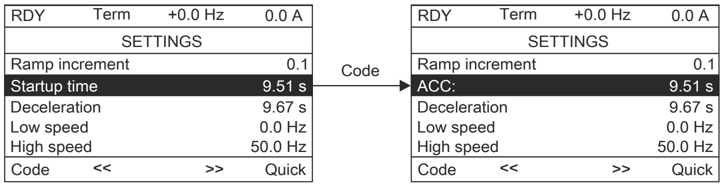
Parameter that can be modified during operation or when stopped.

To modify the assignment of these parameters, press and hold the ENT button for two seconds.

4.1.7 Searching for a parameter in this document

It is now easier to search for parameter descriptions:

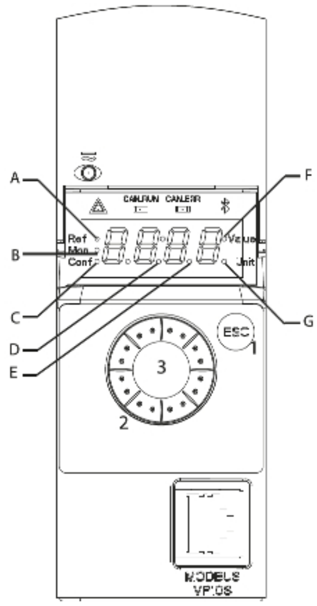
- Using the integrated operator terminal and external operator terminal: Use the parameter code dictionary directly to search the page containing the details for the displayed parameter.
- Using the graphic display terminal: Select the parameters that you want to search for and then press F1: **[Code]**. The parameter code will be displayed instead of the name for as long as you hold the button pressed.
  Example: ACC



4.1.8 Description of the HMI

Functions of the display and keys

1) The ESC button is used for navigating the menus (back) and when setting parameters (cancel).
2) The handwheel is used for navigating the menu (up or down) and for setting parameters (increasing or reducing a value or selecting an element). The handwheel can be used as virtual logic input 1 for the inverter frequency setpoint.
3) The ENT button (on the handwheel) is used for navigating the menu (forward) and when setting parameters (cancel).



A. Mode REF selected (rEF-)

B. Mode MON selected(MOn-)

C. Mode CONF selected (COnF)

D. Point where parameter value is displayed (1/100 unit)

E. Point where parameter value is displayed (1/10 unit)

F. The parameter value is currently displayed

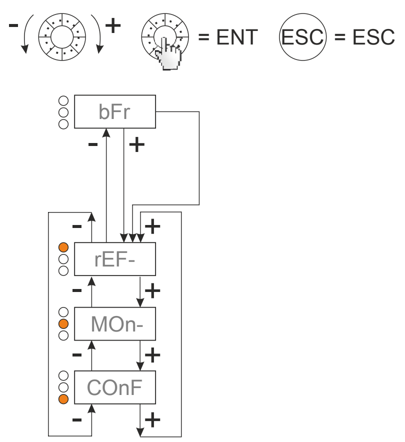
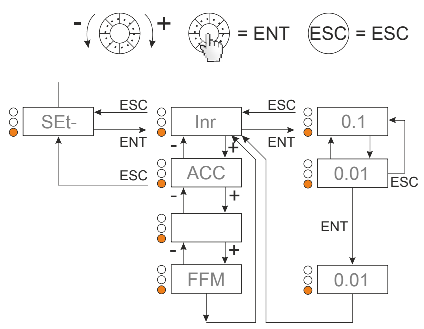
G. The parameter unit is currently displayed

Normal display (no error code and no startup):
Displays the parameter selected from menu **[1.2 MONITORING]** (MOn-) (standard selection: **[Frequency ref.]** (FrH)).

- InIt: Initialization sequence (for external operator terminal only)
- tUN: Self-adjusting
- dCb: DC injection braking
- rdY: Inverter ready for operation
- nSt: Freewheel stop control
- CLI: Current limitation
- FLU: Vector control enabled
- nLP: Controller is switched on but DC bus is not charged
- CtL: Controlled stop
- Obr: Adjusted deceleration.
- SOC: Standby output cut
- USA: Undervoltage alarm
- SS1: Safety function SS1
- SLS: Safety function SLS
- StO: Safety function STO
- SMS: Safety function SMS
- gdL: Safety function GDL
- FSt: Quick stop

An unknown error is indicated by means of a blinking display. If a graphic operator terminal is connected, the name of the known error is displayed.

4.1.9 Structure of the menus

Switching on		Parameter selection
	This parameter is only used when the inverter is switched on for the first time. You can modify it subsequently using menu **[MOTOR CONTROL]** (drC-) for **[Standard mot. freq]** (bFr). **[1.1 SPEED REFERENCE]** (rEF-) **[1.2 MONITORING]** (MOn-) **[1.3 CONFIGURATION]** (COnF)	

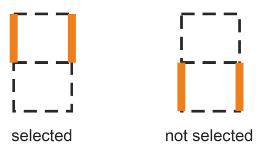
With the 7-segment display format, a dash after a menu and submenu code is used to separate this code from the parameter codes.

Example: Menu **[APPLICATION FUNCT.]** (FUn-), parameter **[Acceleration]** (ACC)

Selection of multiple assignments for one parameter

Example: List of group 1 alarms from menu **[INPUTS/ OUTPUTS CFG]** (I_O-)

Multiple alarms can be selected. They must be "selected" as shown below. The number on the right indicates the following:



The same principle is used for all multiple selections.

4.1.10 Commissioning with ACPi SafeConfigurator

ACPi SafeConfigurator is software that is used independently of Automation Studio. The software can be used to configure drives or to monitor selected parameters.

The software tool is based on a manufacturer-independent concept in which device-specific DTM files are combined and used with the aid of a preferred FDTcontainer.

The following explanations and screenshots were made using the DTM files contained in the software package and the FDTcontainer from the M&M company.

4.1.10.1 Incompatibility and additional functions

ACPi SafeConfigurator is not authorized for the use of the drive with mapp Motion or function model "Motion configuration".

ACPi SafeConfigurator can be used as a supplementary configuration tool to Automation Studio for POWERLINK or X2X Link communication cards. This option is available when using function model "Direct control" and is necessary if safety functions STO, SS1, SLS, SMS or GDL are to be used.

ACPi SafeConfigurator can be used for the complete configuration of an ACOPOSinverter (tab "Parameters"). This option is recommended if the drive is to be used autonomously, i.e. without a PLC. The complete configuration of an ACOPOSinverter via ACPi SafeConfigurator for subsequent use on a PLC requires considerable detailed knowledge about the product and is not included in this description.

4.1.10.2 Additionally required hardware

A USB-to-RS485 converter is required for using ACPi SafeConfigurator. For this purpose, B&R offers accessory ACOPOSinverter USB Modbus universal cable 8I0XC001.003-1.

8I0XC001.003-1 offers a USB connector (type A, USB 2.0) to connect to a PC and an RJ45 connector to connect to the ACOPOSinverter.

Information:

When connecting cable 8I0XC001.003-1 to a PC, make sure that the cable is connected directly to the PC. Using USB hubs (e.g. integrated into a monitor) can lead to impermissible delay times and unstable communication between the PC and ACOPOSinverter.

When connecting cable 8I0XC001.003-1 to the ACOPOSinverter, use the RJ45 female connector for Modbus communication. This is located on the front of the drive or on the terminal block circuit board (ACOPOSinverter P66). RJ45 female connectors arranged in pairs, e.g. for communication in a POWERLINK network, cannot be used for this purpose.

4.1.10.3 Additionally required software

After connecting cable 8I0XC001.003-1 to the PC, a Windows device driver is necessary. This can be located online and installed automatically. If the PC must be operated while disconnected from the Internet, the enclosed installation routine can be used.

Information:

In addition to the device driver, a Windows service called "NetAccess service" is installed and enabled. This Windows service is required during online communication between ACPi SafeConfigurator and the ACOPOSinverter.

To establish an online connection between ACPi SafeConfigurator and the ACOPOSinverter, the following software components are required on the PC:

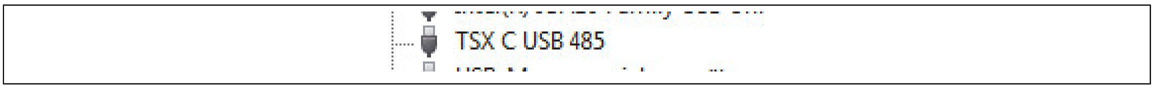
- An FDTcontainer (e.g. M&M FDTcontainer version 4)
- Component "Modbus SL Comm DTM" of ModbusDTMlibrary
- The P66_P76DTMlibrary

4.1.10.4 Establishing connection

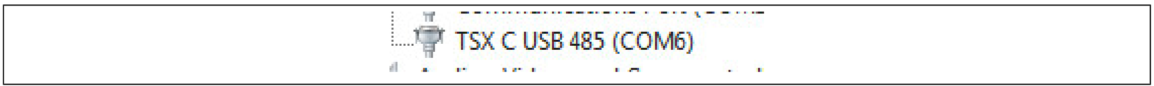
The following steps are necessary for establishing an online connection between ACPi SafeConfigurator and an ACOPOSinverter:

Initial situation:

1) Cable 8I0XC001.003-1 is connected to the PC (without USB hub).
2) The Windows Device Manager displays the following components:
    a) USB controller called "TSX C USB 485"



    b) COM & LPT interface named "TSX C USB 485 (COMx)"



3) Cable 8I0XC001.003-1 is connected to the correct RJ45 female connector of the ACOPOSinverter.
4) An FDTcontainer was successfully installed.
5) The required DTMlibraries were successfully installed:
    a) ModbusDTMlibrary (at least "Modbus SL Comm DTM")
    b) P66_P76DTMlibrary

4.1.10.4.1 Creating a project

To create a project, the FDTcontainer must first be opened and the device catalog updated if necessary. A new/ empty project can be created and saved at the desired location with the desired name.

4.1.10.4.2 Project setup

The FDTcontainer provides a network view and a device catalog. When comparing the elements of the FDTcontainer with those in B&R Automation Studio, the network view can be seen as a kind of hardware tree.

To represent the hardware situation in the FDTcontainer, the DTM files for cable 8I0XC001.003-1 and the connected ACOPOSinverter must be added.

If multiple ACOPOSinverter devices with different configuration information are used, component "ACPi P66_P76" can be defined multiple times in the FDTcontainer network. This allows various hardware combinations to be stored in one project.

Information:

The communication between the ACOPOSinverter and ACPi SafeConfigurator is based on the concept of point-to-point connection; this means that each 8I0XC001.003-1 cable can only communicate with one ACOPOSinverter.

The possibility to add component "ACPi P66_P76" multiple times after component "Modbus serial communication DTM" has no relation to the real hardware arrangement.

4.1.10.4.3 Cable 8I0XC001.003-1

Component "Modbus serial communication DTM" from the device catalog must be added to the network and configured to the COM interface that is displayed in the Windows Device Manager for the "TSX C USB 485 (COMx)". Press "OK" to confirm the change.

4.1.10.4.4 The ACOPOSinverter

After component "ACPi P66_P76" has been selected from the device catalog, it is arranged in the network behind component "Modbus serial communication DTM".

To configure component "ACPi P66_P76", the data required from the drive being used can be entered manually or read directly from the ACOPOSinverter (see "Step 1 - Connect and disconnect" on page 132).

If information will be entered manually, the configuration of component "ACPi P66_P76" must be opened; the type and performance class of the drive and the current software version of the "option board" communication card used must be specified.

4.1.10.4.5 Connect and go online

When using ACPi SafeConfigurator, a distinction must be made between the operating elements of the FDTcontainer and the user interfaces of the device-specific DTMs. A synchronized online connection between PC and ACOPOSinverter is established in two steps.

4.1.10.4.5.1 Step 1 - Connect and disconnect

To establish a connection in the first step, action "Connect and disconnect FDTcontainer" is necessary. These connections are purely virtual and only serve to manage the defined configurations in the network view (enable/disable). The virtual connections between the FDTcontainer and an "ACPi P66_P76" network component are required for a synchronized online communication later on.

> **Information:**
>
> **If component "ACPi P66_P76" is arranged multiple times in the network, multiple virtual connections can also be established.**
>
> **Synchronized online communication is necessary for the actual exchange of data. This is based on the principle of the point-to-point connection.**

Reading the ACOPOSinverter configuration data

The necessary configuration data of component "ACPi P66_P76" can be read directly from a connected ACOPOSinverter. Function "Load from device" is used for this.

> **Information:**
>
> **The required virtual connection is automatically established during this action and is retained after the reading process has been completed.**

To execute this action successfully, the following conditions must be met:

1) Cable 8I0XC001.003-1 must be connected to the PC and the ACOPOSinverter.
2) Component "Modbus serial communication DTM" must be configured to the correct COM interface.
3) Component "ACPi P66_P76" must be added to the network once again. The configuration must be indefinite (i.e. it is not permitted to be changed in advance).

4.1.10.4.5.2 Step 2 - Establish synchronized online communication

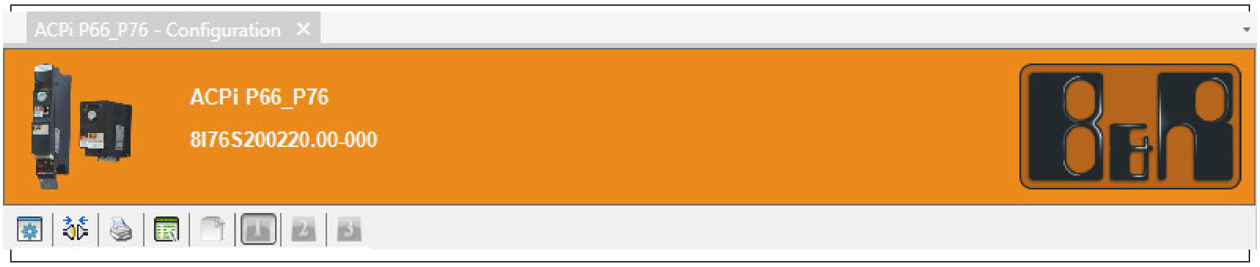
When the configuration of the components in the FDTcontainer network is completed and a virtual connection to the desired component "ACPi P66_P76" exists, a synchronized online communication to the ACOPOSinverter can be established.

In contrast to virtual connections, which are used exclusively for administration on the PC, synchronized online communication involves the exchange of information between the PC and ACOPOSinverter. Note that cable 8I0XC001.003-1 is designed for point-to-point connections, so you cannot connect multiple ACOPOSinverter devices to the PC at the same time.

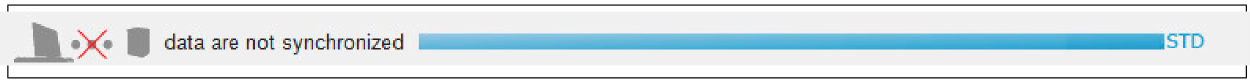
> **Information:**
>
> **To avoid mistakes and simplify work in the FDTcontainer from M&M, B&R recommends hiding the FDTcontainer buttons from this point on. The arrow icon at the top right can be used to hide categories "Device", "Topology" and "View".**

To establish the synchronized online communication, the configuration of component "ACPi P66_P76" must be opened. Regardless of which FDTcontainer is used, the following components should be displayed:

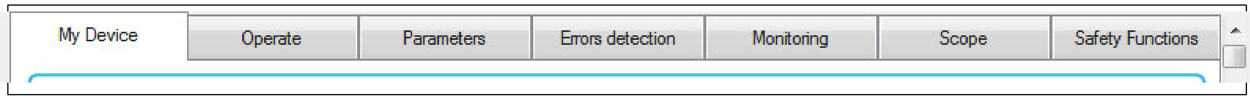
1) Header with device-specific user interfaces



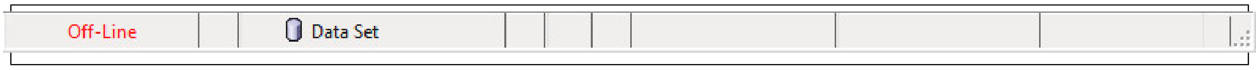
2) Status bar



3) Operating tabs



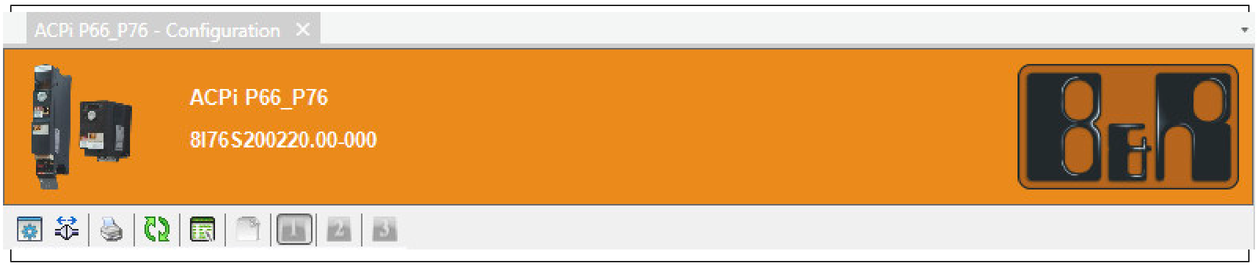
4) Footer



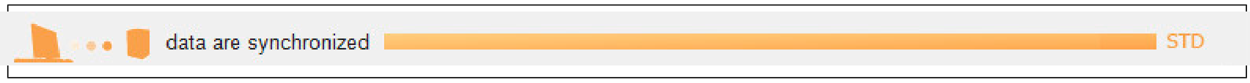
It must be checked whether the information on tab "My Device" matches the hardware arrangement. If the information is incorrect, button "Modify" must be selected. "Device names" can be assigned here, which is strongly recommended for projects with multiple instances of component "ACPi P66_P76".

If all entries are correct in tab "My device", the synchronization symbol in the device-specific user interface can be selected. The view should change as follows:

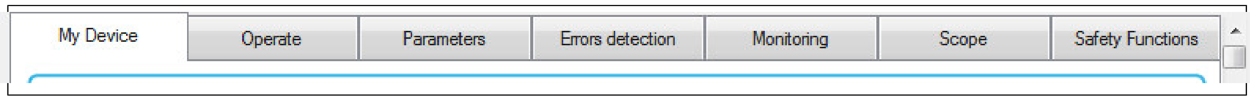
1) Header with device-specific user interfaces



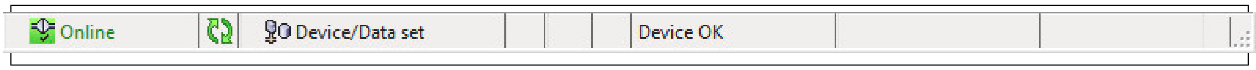
2) Status bar



3) Operating tabs



4) Footer



4.1.10.5 Configuring the ACOPOSinverter using ACPi SafeConfigurator

The ACOPOSinverter can be fully or partially configured using ACPi SafeConfigurator.

In the partial configuration, only safety functions STO, SS1, SLS, SMS or GDL are defined and enabled in Automation Studio in addition to the configuration. The full configuration is intended for autonomous operation of the ACOPOSinverter, i.e. without a PLC.

4.1.10.5.1 Partial configuration

Tab "Safety functions" can be used to configure the safety functions. The configuration of these parameters via ACPi SafeConfigurator is compatible with the configuration options in Automation Studio and can therefore be used as a supplement.

For additional details, see "Safety information" on page 8.

4.1.10.5.2 Full configuration

Tab "Parameters" can be used for the full configuration of the ACOPOSinverter without safety functions. The arrangement of configuration parameters corresponds to the menu navigation on ACOPOSinverter graphic display 8I0XD301.300-1.

For additional details, see "Using the ACOPOSinverter without Automation Studio" on page 115.

Notice!

Adjusting configuration parameters using ACPi SafeConfigurator is intended for autonomous operation of the ACOPOSinverter, i.e. without a PLC. Adjusting configuration parameters using ACPi SafeConfigurator can result in a disturbance in communication with the PLC afterwards.

ACOPOSinverter drives were originally developed for operation without a PLC. Using tab "Parameters" is intended for this use case only.

Information:

Using tab "Parameters" to adjust the configuration and then use it on a PLC requires considerable detailed knowledge of the device and is not part of the descriptions from B&R.

4.1.10.6 Monitoring drive parameters

Tabs "Operate", "Error detections", "Monitoring" and "Scope" offer various ways to monitor or record the current status of a synchronized drive.

4.1.10.6.1 Tab "Operate"

Tab "Operate" displays selected status information and lists basic adjustable configuration parameters.

> **Notice!**
>
> **Adjusting configuration parameters using ACPi SafeConfigurator is intended for autonomous operation of the ACOPOSinverter, i.e. without a PLC.**
> **Adjusting configuration parameters using ACPi SafeConfigurator can result in a disturbance in communication with the PLC afterwards.**

4.1.10.6.2 Tab "Monitoring"

Tab "Monitoring" prepares the status information of tab "Operate" in a different way. The respective parameters can be selected on the left side and placed on the workspace.

In addition, the current status information of the safety functions in tab "Safety functions" can be displayed.

4.1.10.6.3 Tab "Scope"

Tab "Scope" allows the history of selected process parameters to be recorded.

> **Information:**
>
> **Process data recording can be controlled via tab "Scope". This requires a stable online connection between ACOPOSinverter and device-specific DTM since the data is collected directly on the ACOPOSinverter.**
> **B&R strongly recommends saving the project in the FDTcontainer before using tab "Scope".**

In section "Settings", tab "Scope" also offers the possibility to adjust individual configuration parameters.

> **Notice!**
>
> **Adjusting configuration parameters using ACPi SafeConfigurator is intended for autonomous operation of the ACOPOSinverter, i.e. without a PLC.**
>
> **Adjusting configuration parameters using ACPi SafeConfigurator can result in a disturbance in communication with the PLC afterwards.**

4.2 Programming

Incorrect settings, invalid data or faulty wiring can cause unexpected movement, trigger signals, damage components and disable monitoring functions.

Warning!

UNEXPECTED OPERATION OF THE EQUIPMENT

- **Do not operate the inverter system using unknown settings or data.**
- **Never change a parameter if you do not know exactly what its function is or what the impact of your change will be.**
- **When commissioning, carefully check all operating states, operating conditions and potential error situations.**
- **Make sure that everyone responsible for testing is within range of an emergency switch-off button.**
- **Test the functions after the product has been replaced or after changes have been made to the settings or data.**
- **Account for the possibility of movement in the wrong direction or motor vibration.**
- **Do not operate the system until you have verified that there is no one in the operating area and that it is free from obstacles.**

Failure to follow these instructions can result in serious injury and death or damage to the equipment.

If a power stage is unintentionally disabled, as a result of a power outage, error or functional failure, for example, the motor will no longer operate in a controlled way.

Advice:

MOVEMENTS WITHOUT BRAKING EFFECT

Make sure that movements without braking effect do not cause injury or damage to the device.

Failure to follow these instructions can result in serious injury and death or damage to the equipment.

4.2.1 Reference mode (rEF)

4.2.1.1 Introduction

Reference mode is used for monitoring and if the setpoint channel corresponds to analog input 1 (**[Ref.1 channel]** (Fr1) set to **[AI virtual 1]** (AIU1)); it is also used for setting the actual value by modifying the voltage value at the analog input.

If the local controller is enabled (**[Ref.1 channel]** (Fr1) set to **[HMI]** (LCC)), the handwheel or the up/down navigation buttons on the external operator terminal function as a potentiometer that can be used to increase or reduce the setpoint within the tolerances specified by other parameters (**[Low speed]** (LSP) or **[High speed]** (HSP)).

Do not use the ENT button to confirm a setpoint change.

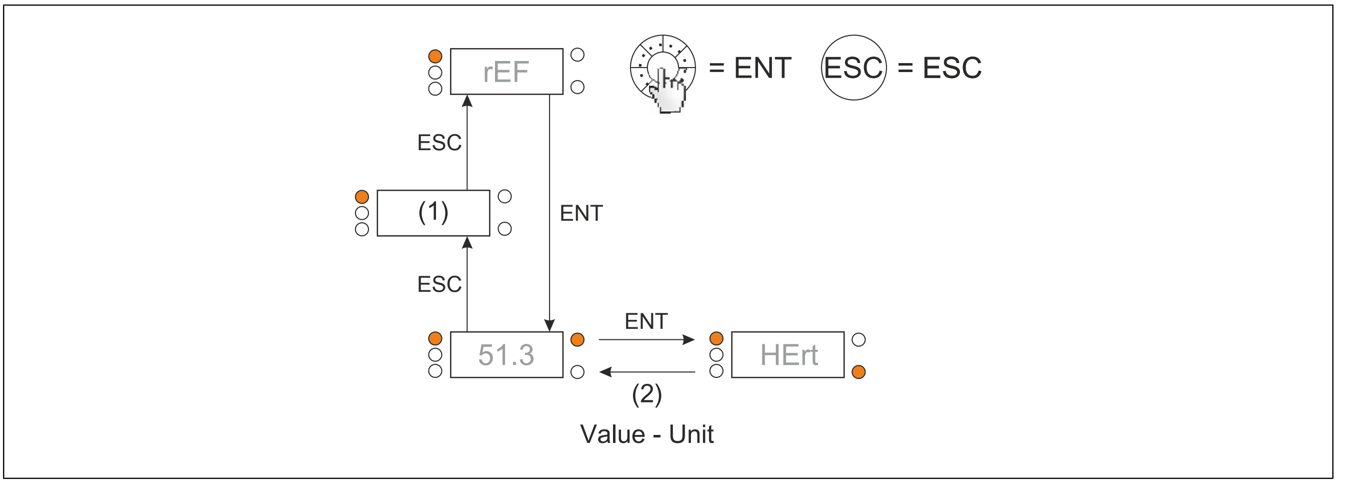
4.2.1.2 Tree structure

(1) Dependent on the actual setpoint channel.

Possible values: (AIU1) (LFr) (MFr) (rPI) (FrH) (rPC)

(2) 2 s or ESC

The parameter value shown on the diagram and the displayed parameter unit serve as examples here.



4.2.1.3 Menu

The parameters described on this page can be accessed by: DRI- > rEF-			
Code	**Name/Description**	**Setting range**	**Factory settings**
rEF-	[1.1 SPEED REFERENCE] The parameters displayed will vary according to the specific inverter settings.		
AIV1 ★ (1)	[Image input AIV1] Value of the first virtual analog input. This parameter allows the frequency setpoint to be changed using the integrated handwheel.	0 to 100% from HSP-LSP	0%
LFr ★ (1)	[HMI Frequency ref.] HMI frequency setpoint (signed value). This parameter allows the frequency setpoint to be changed using the external HMI.	-599 to 599 Hz	0 Hz
MFr ★	[Multiplying coeff.] Multiplication of the frequency variables. Access to this coefficient is possible if [Multiplier ref. -] (MA2,MA3) has been assigned to the graphic display terminal.	0 to 100%	100%
rPI ★ (1)	[Internal PID ref.] PID: Internal setpoint PI. This parameter allows the internal PID setpoint to be changed using the integrated handwheel. The internal PID setpoint is visible if [PID feedback](PIF) is not set to [No](nO).	0 to 32767	150
FrH ★	[Frequency ref.] Frequency setpoint before ramp (signed value). The actual frequency setpoint applied to the motor, regardless of the selected setpoint channel. This parameter is read-only. The frequency setpoint is visible if the command channel is not set to HMI or Virtual AI.	-599 to 599 Hz	-
rPC ★	[PID speed ref.] PID: Setpoint The PID setpoint is visible if [PID feedback](PIF) is not set to [No](nO).	0 to 65535	-

(1) It is not necessary to press the ENT button to confirm the modified setpoint.

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

4.2.2 Monitoring mode (MOn)

4.2.2.1 Introduction

The parameters can be accessed when the inverter is either running or stopped.

Some functions have a large number of parameters. To make programming easier, and to avoid having to scroll through countless parameters, these functions have been structured into submenus. Like menus, submenus are indicated by the inclusion of a hyphen after the code.

When the inverter is running, the value of one of the monitoring parameters is displayed. By default, the displayed value corresponds to the input frequency setpoint (parameter **[Frequency ref.]** (FrH)).

Once the value of the monitoring parameter to be changed is displayed, you can display the units by pressing the handwheel again, or you can confirm and save the new monitoring parameter value by pressing and holding the handwheel (ENT button) for 2 seconds. From now on, this parameter value will be displayed during operation (even after the inverter has been switched off).

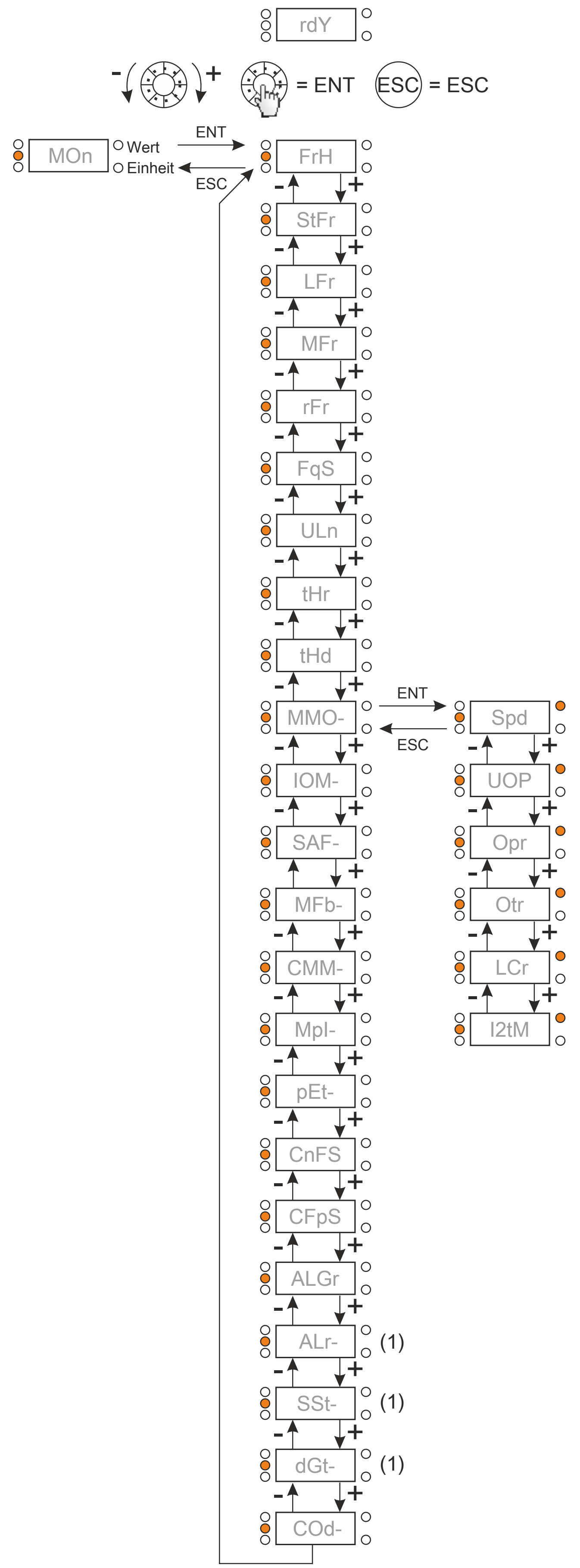
If you do not confirm the new value by pressing and holding the ENT button again, the previous parameter value will be displayed when the inverter is switched back on again.

> ## Advice:
> **After the inverter has been switched off, or after a mains supply failure, the parameters for the inverter state are displayed (Example: [Ready] (rdY)). The selected parameter will then be displayed when a move command is issued.**

4.2.2.2 Tree structure

The parameters shown on the diagram are provided as examples.

(1) Only displayed when the graphic display terminal is used



4.2.2.3 Menu

The parameters described on this page can be accessed by: DRI- > MOn-		
Code	**Name/Description**	**Unit**
MOn-	[1.2 MONITORING]	
AIV1	[Image input AIV1] First virtual AI value. This parameter is read-only. It is used to display the frequency setpoint for the motor.	%
FrH	[Frequency ref.] Frequency setpoint before ramp (signed value). This parameter is read-only. It is used to display the frequency setpoint for the motor, regardless of the selected setpoint channel.	Hz
StFr	[Stator Frequency] Displays the estimated stator frequency in Hz (signed value)	Hz
LFr	[HMI Frequency ref.] HMI frequency setpoint (signed value). This parameter is only displayed if the function has been enabled. It allows the frequency setpoint to be changed using the decentralized controller. It is not necessary to press the ENT button to change the setpoint.	Hz
MFr	[Multiplying coeff.] Multiplication factor. Multiplication coefficient, can be called if [Multiplier ref. -] (MA2,MA3) has been assigned.	%
MMF	[Measured output fr.] Measured motor frequency (signed value). The measured motor speed is displayed if a speed monitoring card is used.	Hz
rFr	[Output frequency] Calculated motor frequency (signed value).	Hz
FqS	[Pulse in. work. freq.] Measured frequency of the pulse input.	Hz
ULn	[Mains voltage] Mains voltage (from DC bus). Mains voltage based on the DC bus measurements, with the motor running or stopped.	V
tHr	[Motor thermal state] Thermal state of the motor. 100% = Rated thermal state, 118% = "OLF threshold value" (motor overload).	%
tHd	[Drv.thermal state] Thermal state of the inverter. 100% = Rated thermal state, 118% = "OLF threshold value" (inverter overload).	%

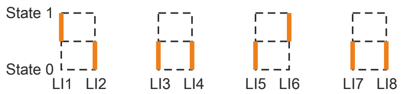
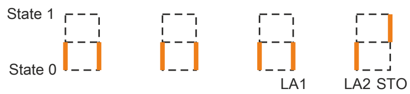
These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

4.2.2.3.1 [MONIT. MOTOR] (MMO-)

The parameters described on this page can be accessed by: DRI- > MOn- > MMO-		
Code	**Name/Description**	**Unit**
MMO-	[MOTOR MONITORING]	
Spd	[Motor speed] Motor speed in rpm (estimated value)	rpm
UOP	[Motor voltage] Motor voltage. (Estimated value)	V
Opr	[Motor power] Monitoring of output power (100% = Rated motor power, estimated value based on current measurement).	%
Otr	[Motor torque] Output torque (100% = Nominal motor torque, estimated value based on current measurement).	%
LCr	[I motor] Calculated motor current. (Measured value)	A
I2tM	[I²t overload level] Monitoring of the I²t overload level This parameter can be accessed if [I²t model activation] (I2tA) = [YES] (YES).	

4.2.2.3.2 [I/O MAP] (IOM-)

The parameters described on this page can be accessed by: DRI- > MOn- > IOM-	
Code	**Name/Description**
IOM-	**[I/O MAP]**
LIA-	**[LOGIC INPUT CONF.]** Logic input functions.
LIA	**[Logic input 1 assignment]** Read-only parameter, not configurable. All of the functions assigned to the logic input are displayed so you can check for multiple assignments. If no functions have been assigned, **[No]** (nO) is displayed. Use the handwheel to scroll through the functions. The time delay is shown on the graphic display terminal: **[LI1 On Delay]** (L1d). Possible values are the same as those shown for the configuration page.
L2A to L6A LA1A LA2A	**[Logic input -- assignment]** All of the logic inputs available on the inverter are processed as shown in the LI1 example above.
LIS1	**[State of logic inputs LI1 to LI6]** Can be used to display the state of logic inputs LI1 to LI6 (segment display: High = 1, low = 0).  Above example: LI1 and LI6 are set to 1; LI2 and LI5 are set to 0.
LIS2	**[LA1, LA2 and STO state]** Can be used to display the state of LA1, LA2 and STO (Safe Torque Off) (segment display: High = 1, low = 0).  Above example: LA1 and LA2 are set to 0; STO (Safe Torque Off) is set to 1.

The parameters described on this page can be accessed by: DRI- > MOn- > IOM- > AIA-		
Code	**Name/Description**	**Unit**
AIA-	**[ANALOG INPUTS IMAGE]** Analog input functions.	
AI1C	**[AI1]** Customized AI1 map: Value of analog input 1.	V
AI1A	**[AI1 assignment]** AI1 function assignment. If no functions have been assigned, **[No]**(nO) is displayed. The following parameters are displayed on the graphic display terminal when you press the ENT button for the parameter.	
nO	**[No]**(nO): Not assigned	
Fr1	**[Ref.1 channel]**(Fr1): Setpoint source 1	
Fr2	**[Ref.2 channel]**(Fr2): Setpoint source 2	
SA2	**[Summing ref. 2]**(SA2): Setpoint total 2	
PIF	**[PID feedback]**(PIF): Actual PI value (PI controller)	
tAA	**[Torque limitation]**(tAA): Torque limiting: Enabled via analog value	
dA2	**[Subtract. ref. 2]**(dA2): Subtraction of setpoint 2	
PIM	**[Manual PID ref.]**(PIM): Manually set frequency setpoint for the PI(D) controller (automatic/manual mode)	
FPI	**[PID speed ref.]**(FPI): Speed setpoint for the PI(D) controller (preset setpoint)	
SA3	**[Summing ref. 3]**(SA3): Setpoint total 3	
Fr1b	**[ch1B active]**(Fr1b): Setpoint source 1B	
dA3	**[SubParam3]**(dA3): Subtraction of setpoint 3	
FLOC	**[Forced local]**(FLOC): Setpoint source "Forced local"	
MA2	**[Multiplier ref. 2]**(MA2): Multiplication factor for setpoint 2	
MA3	**[Ref. 3 multiplier]**(MA3): Multiplication factor for setpoint 3	
PES	**[Weight input]**(PES): External function for measuring weight	
IA01	**[IA01]**(IA01): Function blocks: Analog input 01	
...	**...**	
IA10	**[IA10]**(IA10): Function blocks: Analog input 10	
UIL1	**[AI1 min value]** Minimum voltage value (0%).	V
UIH1	**[AI1 max value]** Maximum voltage value (100%).	V
AI1F	**[AI1 filter]** Filter time of the low-pass filter for filtering interference	s
AI2C	**[AI2]** Customized AI2 map: Value of analog input 2.	V
AI2A	**[AI2 assignment]** AI2 function assignment. If no functions have been assigned, **[No]**(nO) is displayed. The following parameters are displayed on the graphic display terminal when you press the ENT button for the parameter. Identical to **[AI1 assignment]**(AI1A).	

The parameters described on this page can be accessed by: DRI- > MOn- > IOM- > AIA-		
Code	**Name/Description**	**Unit**
UIL2	**[AI2 min value]** Minimum voltage value (0%).	V
UIH2	**[AI2 max value]** Maximum voltage value (100%).	V
AI2F	**[AI2 filter]** Filter time of the low-pass filter for filtering interference	s
AI3C	**[AI3]** Customized AI3 map: Value of analog input 3.	V
AI3A	**[AI3 assignment]** AI3 function assignment. If no functions have been assigned, **[No]**(nO) is displayed. The following parameters are displayed on the graphic display terminal when you press the ENT button for the parameter. Identical to **[AI1 assignment]**(AI1A).	
CrL3	**[Min value]** Minimum current value (0%).	mA
CrH3	**[AI3 max value]** Maximum current value (100%).	mA
AI3F	**[AI3 filter]** Filter time of the low-pass filter for filtering interference	s

The parameters described on this page can be accessed by: DRI- > MOn- > IOM- > AOA-		
Code	**Name/Description**	**Unit**
AOA-	**[STAT ANALOG OUTPUT.]** Analog output functions. The following parameters are displayed on the graphic display terminal when you press the ENT button for the parameter.	
AO1C	**[AO1C]** Customized AO1 map: Value of analog output 1.	
AO1	**[AO1 assignment]** AO1 function assignment. If no functions have been assigned, **[No]**(nO) is displayed. Identical to **[AO1 assignment]**(AOI).	
UOL1 ★	**[AO1 min Output]** Minimum voltage value (0%). Can be accessed if **[Type AO1]**(AO1t) is set to **[Voltage]**(10U).	V
UOH1 ★	**[AO1 max Output]** Maximum voltage value (100%). Can be accessed if **[Type AO1]**(AO1t) is set to **[Voltage]**(10U).	V
AOL1 ★	**[AO1 min Output]** Minimum current value (0%). Can be accessed if **[Type AO1]**(AO1t) is set to **[0-20mA]**(0A).	mA
AOH1 ★	**[AO1 max Output]** Maximum current value (100%). Can be accessed if **[Type AO1]**(AO1t) is set to **[0-20mA]**(0A).	mA
ASL1	**[AO1 min scal]** Minimum scaling value for AO1.	%
ASH1	**[AO1 max scal]** Maximum scaling value for AO1.	%
AO1F	**[AO1 Filter]** Filter time of low-pass filter.	s

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

The parameters described on this page can be accessed by: DRI- > MOn- > IOM- > FSI-		
Code	**Name/Description**	**Unit**
FSI-	**[STATUS FREQ SIGNAL]** Frequency signal state. This menu is only shown on the graphic display terminal.	
PFrC	**[RP input]** Filtered, customized pulse input frequency setpoint. The following parameters are displayed on the graphic display terminal when you press the ENT button for the parameter.	Hz
PIA	**[RP assignment]** Pulse input assignment. If no functions have been assigned, **[No]**(nO) is displayed. Identical to **[AI1 assignment]**(AI1A).	
PIL	**[RP min value]** Minimum RP value. Minimum pulse input (0%).	kHz
PFr	**[RP max value]** Maximum pulse input value on maximum speed (100%).	kHz
PFI	**[RP filter]** Filter time of the low-pass filter for filtering interference (pulse input).	ms

4.2.2.3.3 [MONIT. SAFETY] (SAF-)

The parameters described on this page can be accessed by: DRI- > MOn- > SAF-	
Code	**Name/Description**
SAF-	**[MONIT. SAFETY]** For more information about the integrated safety functions, refer to the dedicated safety manual.
StOS	**[STO status]** State of safety function STO (Safe Torque Off).
IdLE	**[Idle]**(IdLE): STO has not been executed
StO	**[Safe stop]**(StO): STO has been executed
FLt	**[Fault]**(FLt): STO error detected
SLSS	**[SLS status]** SLS (Safe Limit Speed) safety function states.
nO	**[Not configured]**(nO): SLS not configured
IdLE	**[Idle]**(IdLE): SLS has not been executed
Alt	**[TBD]**(Alt): SLS waiting to be enabled
Strt	**[TBD start]**(Strt): SLS in temporary state
SS1	**[Safe ramp]**(SS1): SLS ramp has been executed
SLS	**[Spd limited]**(SLS): SLS torque limiting has been executed.
StO	**[Safe stop]**(StO): SLS "Safe Torque Off" request has been executed
FLt	**[Fault]**(FLt): SLS error detected
SS1S	**[SS1 Status]** State of safety function "Safe stop 1"
nO	**[Not configured]**(nO): SS1 not configured
IdLE	**[Idle]**(IdLE): SS1 has not been executed
SS1	**[Safe ramp]**(SS1): SS1 ramp has been executed
StO	**[Safe stop]**(StO): SS1 "Safe Torque Off" request has been executed
FLt	**[Fault]**(FLt): SS1 error detected
SMSS	**[SMS status]** State of safety function SMS (Safe Maximum Speed).
nO	**[Not configured]**(nO): SMS not configured
AUS	**[Active]**(AUS): SMS active
Ftl	**[Internal Err.]**(Ftl): Internal SMS error
Fto	**[Max Speed]**(Fto): Maximum speed reached
GdLS	**[GDL status]** State of safety function Safety door locking (GDL)
nO	**[Not configured]**(nO): GDL not set
oFF	**[Inactive]**(oFF): GDL not active
Std	**[Short Delay]**(Std): Short delay executed
LGd	**[Long del.]**(LGd): Long delay executed
on	**[Active]**(on): GDL active
LFt	**[Internal Err.]**(LFt): Internal GDL error
SFFE	**[Safety fault reg.]** Safety function error register. Bit 0 = 1: Logic input debounce timeout Bit 1 = Reserved Bit 2 = 1: Motor speed character changed during SS1 stop Bit 3 = 1: Speed has reached SS1 trigger range Bit 4: Reserved Bit 5: Reserved Bit 6 = 1: Motor speed character changed during SLS limitation Bit 7 = 1: Speed has reached SLS trigger range Bit 8: Reserved Bit 9: Reserved Bit 10: Reserved Bit 11: Reserved Bit 12: Reserved Bit 13 = 1: Motor speed cannot be measured Bit 14 = 1: Motor ground short circuit detected Bit 15 = 1: Motor short circuit detected

4.2.2.3.4 [MONIT. FUN. BLOCKS] (MFb-)

The parameters described on this page can be accessed by: DRI- > MOn > MFb-	
Code	**Name/Description**
MFb-	**[MON. FUNC. BLOCKS]**
FbSt	**[FB status]** Status of the function block.
IdLE	**[Idle]** (IdLE): Idle state
CHEC	**[Check prog.]** (CHEC): The program state is being checked.
StOP	**[Stop]** (StOP): STOP state
InIt	**[Init]** (InIt): Initialization state
rUn	**[Run]** (rUn): Execution state
Err	**[Fault]** (Err): Error state
FbFt	**[FB fault]** Function block execution state.
nO	**[No]** (nO): No error detected
Int	**[Intern]** (Int): Internal error detected
bIn	**[Binary file]** (bIn): Binary file detected
InP	**[Int. param.]** (InP): Internal parameter error detected.
PAr	**[Para. RW]** (PAr): Parameter access error detected
CAL	**[Calculation]** (CAL): Calculation error detected
tOAU	**[TO AUX]** (tOAU): AUX task timeout
tOPP	**[TO synch]** (tOPP): PRE/POST task timeout
AdL	**[Bad ADLC]** (AdL): ADLC with invalid parameter
In	**[Input assign.]** (In): Input not configured

The parameters described on this page can be accessed by: DRI- > MOn > MFb- > FbI-	
Code	**Name/Description**
FbI-	**[FB IDENTIFICATION]**
bUEr	**[Program Version]** The program user version. Can be accessed if **[FB state]** (FbSt) is not set to **[Idle]** (IdLE).
bnS	**[Program size]** Size of the program file. Can be accessed if **[FB state]** (FbSt) is not set to **[Idle]** (IdLE).
bnU	**[Prg. format version]** Binary format version of the inverter. Can be accessed if **[FB state]** (FbSt) is not set to **[Idle]** (IdLE).
CtU	**[Catalog version]** Inverter catalog version

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

4.2.2.3.5 [COMMUNICATION MAP] (CMM-)

The parameters described on this page can be accessed by: DRI- > MOn- > CMM-		
Code	**Name/Description**	**Unit**
CMM-	**[COMMUNICATION MAP]** This menu is displayed on the graphic display terminal only; with the exception of menus **[COM. SCANNER INPUT]**(ISA-) and **[COM SCAN OUTPUT MAP]**(OSA-).	
CMdC	**[Command channel]** Active command channel.	
tErM	**[Terminals]** (tErM): Terminals	
HMI	**[HMI]**(HMI): Graphic display terminal or external operator terminal	
Mdb	**[Modbus]**(Mdb): Integrated Modbus	
CAn	**[CANopen com.]**(CAn): Integrated CANopen®	
tUd	**[+/- speed]**(tUd): +/- speed	
nEt	**[Com. card]**(nEt): Communication card (if used)	
P S	**[PC Tool]**(P S): PC software	
CMd	**[CMD value]** Command register. **[Profile]**(CHCF) is not set to **[I/O profile]**(IO). Possible values with Profile DS402, separate or combined mode Bit 0: Command "Switch on" / protection command Bit 1: "Disable voltage"/ mains voltage supply permission Bit 2: "Quick stop" / emergency switch-off Bit 3: "Enable operation" / move command Bit 4 to bit 6: Reserved (set to 0) Bit 7: "Fault reset" / error acknowledgment active for 0 to 1 rising edges Bit 8: Stop as per parameter **[Type of stop]**(Stt) without exiting "operating" state. Bit 9: Reserved (set to 0) Bit 10: Reserved (set to 0) Bits 11 to 15: Can be assigned to a command Possible values in I/O profile Command **[2 wire]**(2C) as controlled by state. Bit 0: Command "Forward" (switch on) • 0: Command "Reverse" • 1: Command "Forward" The assignment of Bit 0 cannot be modified. It corresponds to the terminal block assignment. It is possible for it to be switched. Bit 0 (Cd00) is only active if the channel for this control word is active. Bits 1 to 15: Can be assigned to commands Edge-controlled command **[3 wire]**(3C). Bit 0: Stop (Start permission). • 0: Stop • 1: Run mode only authorized for commands "Forward" and "Reverse" Bit 1: Command "Forward" (if 0 to 1 rising edges) The assignment of Bit 0 and Bit 1 cannot be modified. It corresponds to the terminal block assignment. It is possible for it to be switched. Bit 0 (Cd00) and Bit 1 (Cd01) are only active if the channel for this control word is active. Bits 2 to 15: Can be assigned to commands	
rFCC	**[Channel ref. active]** HMI setpoint channel.	
tErM	**[Terminals]** (tErM): Terminals	
LOC	**[Local]**(LOC): Handwheel	
HMI	**[HMI]**(HMI): Graphic display terminal or operator terminal	
Mdb	**[Modbus]**(Mdb): Integrated Modbus	
CAn	**[CANopen com.]**(CAn): Integrated CANopen®	
tUd	**[+/- Speed]**(tUd): +/- speed	
nEt	**[Com. card]**(nEt): Communication card (if used)	
P S	**[PC Tool]**(P S): PC software	
FrH	**[Frequency ref.]** Frequency setpoint before ramp	Hz

The parameters described on this page can be accessed by: DRI- > MOn- > CMM-		
Code	**Name/Description**	**Unit**
EtA	**[ETA state word]** State word Possible values with profile DS402, separate or combined mode Bit 0: "Ready to be switched on", waiting for mains voltage to be switched on Bit 1: "Switched on", ready Bit 2: "Operation enabled", currently operating Bit 3: "Error" • 0: No error • 1: Error Bit 4: "Voltage enabled", mains voltage present in the power unit • 0: No mains voltage present in the power unit • 1: Mains voltage present in the power unit If the unit is supplied with current through the power unit only, this bit is always preset to 1. Bit 5: Quick stop / emergency switch-off Bit 6: "Switch-on locked", power unit mains voltage is disabled Bit 7: Alarm • 0: No alarm • 1: Alarm Bit 8: Reserved (=0) Bit 9: Remote: Command or setpoint via network • 0: Command or setpoint via the graphic display terminal or external operator terminal • 1: Command or setpoint via the network Bit 10: Target setpoint reached • 0: The setpoint was not reached. • 1: The setpoint was reached. If the inverter is in speed mode, this corresponds to the speed setpoint. Bit 11: "Internal limit active", setpoint outside limits • 0: The setpoint is within the limits. • 1: The setpoint is not within the limits. If the inverter is in speed mode, the limits are defined using parameter **[Low speed]**(LSP) and **[High speed]** (HSP). Bit 12 and Bit 13: Reserved (= 0) Bit 14: "Stop key", STOP via stop key • 0: STOP key not pressed 1: Stop triggered by pressing STOP on the graphic display terminal or the external operator terminal. Bit 15: "Direction", direction of speed • 0: Forward on output • 1: Reverse on output The bit combination 0, 1, 2, 4, 5 and 6 defines the state as per the overview of states in the DSP 402 standard.	

The parameters described on this page can be accessed by: DRI- > MOn- > CMM-		
Code	**Name/Description**	**Unit**
	Possible values in I/O profile **Advice:** **The value is identical in both the DS402 and I/O profiles. In the I/O profile, the description of the values is simplified and does not correspond to the DS402 overview of states.** Bit 0: Reserved (=0 or 1) Bit 1: Ready • 0: Not ready • 1: Ready Bit 2: Operational • 0: The inverter will not start if one of the setpoints is set to zero. • 1: Operational. If one of the setpoints is equal to a value other than zero, the inverter can start. Bit 3: Error • 0: No error • 1: Error Bit 4: Mains voltage present in power unit • 0: No mains voltage present in power unit • 1: Mains voltage present in power unit Bit 5: Reserved (=1) Bit 6: Reserved (=0 or 1) Bit 7: Alarm • 0: No alarm • 1: Alarm Bit 8: Reserved (=0) Bit 9: Command via a network • 0: Command via terminal blocks or graphic display terminal • 1: Command via network Bit 10: Setpoint reached • 0: The setpoint was not reached. • 1: The setpoint was reached. Bit 11: Setpoint outside limits • 0: The setpoint is within the limits. • 1: The setpoint is not within the limits. If the inverter is in speed mode, the limits are defined using parameters LSP and HSP. Bit 12 and Bit 13: Reserved (= 0) Bit 14: Stop via STOP button • 0: STOP button not pressed • 1: Stop triggered by pressing the STOP button on the graphic display terminal or external operator terminal Bit 15: Direction of rotation • 0: Forward on output • 1: Reverse on output	

The parameters described on this page can be accessed by: DRI- > MOn- > CMM- > Mnd-	
Code	**Name/Description**
Mnd-	**[MODBUS NETWORK DIAG]** Modbus network diagnostics.
Mdb1	**[COM LED]** Displays the Modbus communication data.
M1Ct	**[Mb NET frames nb.]** Modbus network frame counter: Number of frames processed.
M1EC	**[Mb NET CRC errors]** Modbus network CRC error counter: Number of CRC errors.

The parameters described on this page can be accessed by: DRI- > MOn- > CMM- > ISA-	
Code	**Name/Description**
ISA-	**[COM. SCANNER INPUT]** Used for CANopen® and Modbus network.
nM1	**[Com Scan In1 val.]** Value of the 1st input word
nM2	**[Com Scan In2 val.]** Value of the input word 2
nM3	**[Com Scan In3 val.]** Value of the input word 3
nM4	**[Com Scan In4 val.]** Value of the input word 4
nM5	**[Com Scan In5 val.]** Value of the input word 5
nM6	**[Com Scan In6 val.]** Value of the input word 6
nM7	**[Com Scan In7 val.]** Value of the input word 7
nM8	**[Com Scan In8 val.]** Value of the input word 8

The parameters described on this page can be accessed by: DRI- > MOn- > CMM- > OSA-

Code	Name/Description
OSA-	[COM. SCAN OUTPUT MAP]
nC1	[Com Scan Out1 val.] Value of the 1st output word
nC2	[Com Scan Out2 val.] Value of the output word 2
nC3	[Com Scan Out3 val.] Value of the output word 3
nC4	[Com Scan Out4 val.] Value of the output word 4
nC5	[Com Scan Out5 val.] Value of the output word 5
nC6	[Com Scan Out6 val.] Value of the output word 6
nC7	[Com Scan Out7 val.] Value of the output word 7
nC8	[Com Scan Out8 val.] Value of the output word 8

The parameters described on this page can be accessed by: DRI- > MOn- > CMM- > C I-

Code	Name/Description
C I-	[CMD. WORD IMAGE] Map command word: Accessible via the graphic display terminal only.
CMd1	[Modbus CMD] Modbus command word map.
CMd2	[CANopen cmd.] CANopen® command word map.
CMd3	[Com. card CMD] Specifies the command word for the communication card.

The parameters described on this page can be accessed by: DRI- > MOn- > CMM- > r I-

Code	Name/Description	Unit
r I-	[FREQ. REF. WORD MAP] Frequency setpoint map: Accessible via the graphic display terminal only.	
LFr1	[Modbus ref.] Modbus frequency setpoint map	Hz
LFr2	[CANopen ref.] CANopen® frequency setpoint map	Hz
LFr3	[Com. card ref.] Specifies the frequency setpoint of the communication card.	Hz

The parameters described on this page can be accessed by: DRI- > MOn- > CMM- > CnM-

Code	Name/Description
CnM-	[CANopen MAP] CANopen® map: Accessible via the graphic display terminal only.
COn	[RUN LED] Displays the CANopen® RUN LED state.
CAnE	[ERR LED] Displays the CANopen® error LED state.

The parameters described on this page can be accessed by: DRI- > MOn- > CMM- > CnM- > PO1-

Code	Name/Description
PO1-	[PDO1 IMAGE] Displays the RPDO1 and TPDO1.
rp11	[Received PDO1-1] First frame of the received PDO1.
rp12	[Received PDO1-2] Second frame of the received PDO1.
rp13	[Received PDO1-3] Third frame of the received PDO1.
rp14	[Received PDO1-4] Fourth frame of the received PDO1.
tp11	[Transmit PDO1-1] First frame of the transmit PDO1.
tp12	[Transmit PDO1-2] Second frame of the transmit PDO1.
tp13	[Transmit PDO1-3] Third frame of the transmit PDO1.
tp14	[Transmit PDO1-4] Fourth frame of the transmit PDO1.

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

The parameters described on this page can be accessed by: DRI- > MOn- > CMM- > CnM- > PO2-	
Code	**Name/Description**
PO2-	**[PDO2 IMAGE]** Displays RPDO2 and TPDO2 using the same structure as for **[PDO1 IMAGE]**(PO1-).
rp21 ★	**[Received PDO2-1]** First frame of the received PDO2.
rp22 ★	**[Received PDO2-2]** Second frame of the received PDO2.
rp23 ★	**[Received PDO2-3]** Third frame of the received PDO2.
rp24 ★	**[Received PDO2-4]** Fourth frame of the received PDO2.
tp21 ★	**[Transmit PDO2-1]** First frame of the transmit PDO2.
tp22 ★	**[Transmit PDO2-2]** Second frame of the transmit PDO2.
tp23 ★	**[Transmit PDO2-3]** Third frame of the transmit PDO2.
tp24 ★	**[Transmit PDO2-4]** Fourth frame of the transmit PDO2.

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

The parameters described on this page can be accessed by: DRI- > MOn- > CMM- > CnM- > PO3-	
Code	**Name/Description**
PO3-	**[PDO3 IMAGE]** Displays RPDO3 and TPDO3 using the same structure as for **[PDO1 IMAGE]**(PO1-).
rp31 ★	**[Received PDO3-1]** First frame of the received PDO3.
rp32 ★	**[Received PDO3-2]** Second frame of the received PDO3.
rp33 ★	**[Received PDO3-3]** Third frame of the received PDO3.
rp34 ★	**[Received PDO3-4]** Fourth frame of the received PDO3.
tp31 ★	**[Transmit PDO3-1]** First frame of the transmit PDO3.
tp32 ★	**[Transmit PDO3-2]** Second frame of the transmit PDO3.
tp33 ★	**[Transmit PDO3-3]** Third frame of the transmit PDO3.
tp34 ★	**[Transmit PDO3-4]** Fourth frame of the transmit PDO3.

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

The parameters described on this page can be accessed by: DRI- > MOn- > CMM- > CnM- > nMtS	
Code	**Name/Description**
nMtS	**[CANopen NMT state]** Inverter NMT state of the CANopen® slave.
bOOt	**[Boot]**(bOOt): Switch on
StOP	**[Stopped]**(StOP): Stopped
OPE	**[Operational]**(OPE): In operation
POPE	**[Pre-op]**(POPE): Ready for operation

The parameters described on this page can be accessed by: DRI- > MOn- > CMM- > CnM- > nMtS	
Code	**Name/Description**
nbtp	**[Number of TX PDO]** Number of transmit PDOs.
nbrp	**[Number of RX PDO]** Number of received PDOs.
ErCO	**[Error code]** CANopen® error register (from 1 to 5).
rEC1	**[RX Error Counter]** Rx controller, error counter (not stored when switched off).
tEC1	**[TX Error Counter]** Tx controller, error counter (not stored when switched off).

4.2.2.3.6 [MONIT. PI] (MpI-)

The parameters described on this page can be accessed by: DRI- > MOn- > MPI-		
Code	**Name/Description**	**Unit**
MPI-	**[MONIT. PI]** PID management. Only visible if **[PID feedback ass.]**(PIF) is not set to**[No]**(nO).	
rPI	**[Internal PID ref.]** Internal PID setpoint: As a process value.	
rpE	**[PID error]** PID error value.	
rpF	**[PID feedback]** PID feedback.	
rpC	**[PID speed ref.]** PID setpoint via graphic display terminal.	
rpO	**[PID Output]** PID output value with limitation.	Hz

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

4.2.2.3.7 [MONIT. POWER TIME] (pEt-)

The parameters described on this page can be accessed by: DRI- > MOn- > pEt-		
Code	**Name/Description**	**Unit**
pEt-	[MONIT. POWER TIME]	
UNT	[Resolution monitoring consumption] This parameter indicates the units of the current values for [Consumption] (ApH), [Elapsed time] (ptH), [Run time] (rtH) and [Operating time motor, internal] (rtHI). This parameter is read only. Bit 0, 1 = 0: ApH in Wh Bit 0, 1 = 1: ApH in kWh Bit 0, 1 = 2: ApH in MWh Bit 2, 3 = 0: PtH in s Bit 2, 3 = 1: PtH in min Bit 2, 3 = 2: PtH in h Bit 4, 5 = 0: RTH in s Bit 4, 5 = 1: RTH in min Bit 4, 5 = 2: RTH in h Bit 6, 7 = 0: RTHI in s Bit 6, 7 = 1: RTHI in min Bit 6, 7 = 2: RTHI in h	0
ApH	[Consumption] Energy consumption in Wh, kWh or MWh (cumulative consumption). The value unit can be determined via parameter[Unit] (UNT): Wh: If (UNT) & 0x03 = 0b00000000 kWh: If (UNT) & 0x03 = 0b00000001 MWh: If (UNT) & 0x03 = 0b0000001?	Wh, kWh or MWh
rtH	[Run time] Displays the operating hours (configurable) in seconds, minutes or hours (time period during which the motor is in operation). The value unit can be determined via parameter[Unit] (UNT): s: If (UNT) & 0x30 = 0b00000000 min: If (UNT) & 0x30 = 0b00010000 h: If (UNT) & 0x30 = 0b001?0000	s, min, h
rtHI	[Operating time motor, internal] Displays the operating hours (configurable) in seconds, minutes or hours (time period during which the motor is in operation). The value unit can be determined via parameter[Unit] (UNT): s: If (UNT) & 0x30 = 0b00000000 min: If (UNT) & 0x30 = 0b01000000 h: If (UNT) & 0x30 = 0b1?000000 Unlike [Run time] (rtH), this parameter is not reset by [Operating t. reset] (rpr).	s, min, h
ptH	[Elapsed time] Displays the operating hours (configurable) in seconds, minutes or hours (time period during which the motor is in operation). The value unit can be determined via parameter[Unit] (UNT): s: If (UNT) & 0x0C = 0b00000000 min: If (UNT) & 0x0C = 0b00000100 h: If (UNT) & 0x0C = 0b00001?00	s, min, h
rpr	[Operating t. reset] Resets the operating data.	
nO	[No](nO): Reset not executed	
APH	[Reset KWh](APH): Clears [Reset KWh](APH)	
rtH	[Rst. runtime](rtH): Clears [Rst. runtime](rtH)	
PtH	[rst. P On t.](PtH): Clears [rst. P On t.](PtH)	

Parameter that can be modified during operation or when stopped.

4.2.2.3.8 [Config. active] (CnFS)

The parameters described on this page can be accessed by: DRI- > MOn-	
Code	**Name/Description**
MOn-	**[1.2 MONITORING]**(continued)
CnFS	**[Config. active]** Displays the current configuration.
nO	**[Active]**(nO): Transition state (configuration is modified)
CnF0	**[CONFIGURATION 0]**(CnF0): Configuration 0 is active
CnF1	**[Config 1]**(CnF1): Configuration 1 is active
CnF2	**[Config 2]**(CnF2): Configuration 2 is active
CFpS	**[Utilised param. set]** Configuration parameter state (accessible if parameter set switching has been enabled).
nO	**[No]**(nO): Not assigned
CFP1	**[Set 1 active]**(CFP1): Parameter set 1 is active
CFP2	**[Set 2 active]**(CFP2): Parameter set 2 is active
CFP3	**[Set 3 active]**(CFP3): Parameter set 3 is active
ALGr	**[Alarm groups]** Currently affected alarm group numbers. Alarm groups can be defined by the user via **[INPUTS/ OUTPUTS CFG]**(I_O-).
---	**[---]**(---): No affected alarm groups
1--	**[1--]**(1--): Alarm group 1
-2-	**[-2-]**(-2-): Alarm group 2
12-	**[12-]**(12-): Alarm groups 1 and 2
--3	**[--3]**(--3): Alarm group 3
1-3	**[1-3]**(1-3): Alarm groups 1 and 3
-23	**[-23]**(-23): Alarm groups 2 and 3
123	**[123]**(123): Alarm groups 1, 2 and 3
SPd1 or SPd2 or ?SPd3	**[Cust. output value]** **[Cust. output value#]**(SPd1), **[Cust. output value#]**(SPd2) or **[Cust. output value#]**(SPd3), depending on parameter **[Scale factor display]**(SdS) (**[Cust. output value#]**(SPd3) in the factory settings)

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

4.2.2.3.9 [ALARMS] (ALr-)

The parameters described on this page can be accessed by: DRI- > MOn- > ALGr-	
Code	**Name/Description**
ALGr-	**[ALARMS]** List of currently configured alarms. If an alarm is enabled, a ✓ will appear on the graphic display terminal.
nOAL	**[No alarm]**(nOAL)
PtCL	**[PTC alarm]**(PtCL)
EtF	**[External fault]**(EtF)
USA	**[UnderV. al.]**(USA)
CtA	**[I attained]**(CtA)
FtA	**[Freq. Th. attained]**(FtA)
F2A	**[Freq. Th. 2 attained]**(F2A)
SrA	**[Freq.ref.att]**(SrA)
tSA	**[Th.mot. att.]**(tSA)
tS2	**[Th. mot2. att.]**(tS2)
tS3	**[Th. mot3. att.]**(tS3)
UPA	**[Undervoltage Pre-alarm]**(UPA)
FLA	**[HSP attain.]**(FLA)
tHA	**[Al. °C drv]**(tHA)
AG1	**[Alarm group 1]**(AG1)
AG2	**[Alarm group 2]**(AG2)
AG3	**[Alarm group 3]**(AG3)
PEE	**[PID error al]**(PEE)
PFA	**[PID fdbk al.]**(PFA)
AP3	**[AI2 Al. 4-20mA]**(AP3)
SSA	**[Torque/current lim att.]**(SSA)
tAd	**[Th.drv.att.]**(tAd)
tJA	**[IGBT al.]**(tJA)
bOA	**[Brake R. al.]**(bOA)
ULA	**[Underload. Proc. Al.]**(ULA)
OLA	**[Overload. Proc. Al.]**(OLA)
rSdA	**[Rope slack alarm]**(rSdA)
ttHA	**[High torque alarm]**(ttHA)
ttLA	**[Low torque alarm]**(ttLA)
dLdA	**[Dynamic load alarm]**(dLdA)
FqLA	**[Fr.met. alar.]**(FqLA)

4.2.2.3.10 [OTHER STATE] (SSt-)

The parameters described on this page can be accessed by: DRI- > MOn- > SSt-	
Code	**Name/Description**
SSt-	**[OTHER STATE]** List of secondary states. This menu is only shown on the graphic display terminal.
FL	**[In motor fluxing]**(FL)
PtCL	**[PTC alarm]**(PtCL)
FSt	**[Fast stop]**(FSt)
CtA	**[I attained]**(CtA)
FtA	**[Freq. Th. attained]**(FtA)
F2A	**[Freq. Th. 2 attain]**(F2A)
SrA	**[Freq.ref.att]**(SrA)
tSA	**[Motor th. state att.]**(tSA)
EtF	**[External fault]**(EtF)
AUtO	**[Auto restart]**(AUtO)
FtL	**[Remote]**(FtL)
tUn	**[Auto-tuning]**(tUn)
USA	**[Undervoltage]**(USA)
CnF1	**[Config. 1 act.]**(CnF1)
CnF2	**[Config 2 active]**(CnF2)
FLA	**[HSP attain.]**(FLA)
CFP1	**[Set 1 active]**(CFP1)
CFP2	**[Set 2 active]**(CFP2)
CFP3	**[Set 3 active]**(CFP3)
brS	**[In braking]**(brS)
dbL	**[DC charged]**(dbL)
ttHA	**[High torque alarm]**(ttHA)
ttLA	**[Low torque alarm]**(ttLA)
MFrd	**[Forward]**(MFrd)
MrrS	**[Reverse assign.]**(MrrS)
FqLA	**[Fr.met. alar.]**(FqLA)

4.2.2.3.11 [DIAGNOSTICS] (dGt-)

The parameters described on this page can be accessed by: DRI- > MOn- > dGt- > pFH-		
Code	**Name/Description**	**Unit**
pFH-	**[FAULT HISTORY]** Displays the last 8 detected errors.	
dP1	**[1st last fault]** Error record 1 (1 comes last).	
nOF	**[No fault]**(nOF): No error stored	
ASF	**[Angle error]**(ASF): Error in magnet wheel setting detected	
bLF	**[Brake control]**(bLF): 3-phase loss in brake motor	
brF	**[Brake feedback]**(brF): Error detected in braking contactor	
CFF	**[Incorrect config.]**(CFF): Invalid configuration when switching on	
CFI2	**[Bad conf.]**(CFI2): Error when transferring configuration	
CnF	**[Com. card]**(CnF): Interruption in network communication	
COF	**[CANopen com.]**(COF): Interruption in CANopen® communication	
CrF	**[Precharge]**(CrF): Charging relay error	
CSF	**[Ch. Sw. fault]**(CSF): Error switching channels	
dLF	**[Dynamic load fault]**(dLF): Dynamic load error	
EEF1	**[Control Eeprom]**(EEF1): EEPROM controller error	
EEF2	**[Power Eeprom]**(EEF2): EEPROM power supply error	
EPF1	**[External fault LI/Bit]**(EPF1): External error at LI or local connector	
EPF2	**[External fault com.]**(EPF2): Interruption in external communication card	
FbE	**[FB fault]**(FbE): Error with function block	
FbES	**[FB stop flt.]**(FbES): Error stopping the function block	
FCF1	**[Out. contact. stuck]**(FCF1): Output contactor closed	
FCF2	**[Out. contact. open.]**(FCF2): Output contactor open	
HCF	**[Cards pairing]**(HCF): Error with hardware configuration	
HdF	**[IGBT desaturation]**(HdF): Hardware error	
ILF	**[Internal com. link]**(ILF): Interruption in internal communication option	
InF1	**[Rating error]**(InF1): Unspecified inverter size	
InF2	**[Incomp./unspec. power card]**(InF2): Unspecified or incompatible power card	
InF3	**[Internal serial link]**(InF3): Interruption in internal serial communication	
InF4	**[Internal-mftg zone]**(InF4): Internal manufacturing error	
InF6	**[Internal - fault option]**(InF6): Unspecified error or incompatible option card	
InF9	**[Internal- I measure]**(InF9): Error measuring current	
InFA	**[Internal-mains circuit]**(InFA): Input phase loss error	
InFb	**[Internal- th. sensor]**(InFb): Temperature sensor error (OC or SC)	
InFE	**[internal- CPU]**(InFE): CPU error (RAM, flash memory, task, etc.)	
LCF	**[Line contactor]**(LCF): Line contactor error	
LFF3	**[AI3 4-20mA loss]**(LFF3): AI3 4 to 20 mA loss	
ObF	**[Overbraking]**(ObF): Overbraking	
OCF	**[Overcurrent]**(OCF): Overcurrent	
OHF	**[Inverter overheat]**(OHF): Inverter overheating	
OLC	**[Proc.Overload Flt]**(OLC): Torque overload	
OLF	**[Motor overload]**(OLF): Motor overload	

The parameters described on this page can be accessed by: DRI- > MOn- > dGt- > pFH-		
Code	**Name/Description**	**Unit**
OPF1	[1 output phase loss](OPF1):Output phase loss - 1	
OPF2	[3out ph loss](OPF2):Output phase loss - 3	
OSF	[Mains overvoltage](OSF): Oversupply error	
OtFL	[PTC fault](OtFL): Motor overheating detected by PTCL: Standard product	
PHF	[Input phase loss](PHF): Input phase loss - 1	
PtFL	[LI6=PTC overheat](PtFL): PtFL error (OC or SC)	
SAFF	[Safety fault](SAFF): Triggers safety function	
SCF1	[Motor short circuit](SCF1): Motor short-circuit (hardware detection)	
SCF3	[Ground short circuit](SCF3): Direct ground short-circuit (hardware detection)	
SCF4	[IGBT short circuit](SCF4): IGBT short-circuit (hardware detection)	
SCF5	[Motor short circuit](SCF5): Load short-circuit during Igon-loading sequence (hardware detection)	
SLF1	[Modbus com.](SLF1): Interruption in local serial Modbus communication	
SLF2	[PC com.](SLF2): Interruption in PC software communication	
SLF3	[HMI com.](SLF3): Interruption in communication with external operator terminal	
SOF	[Overspeed](SOF): Overspeed	
SPF	[Speed fdback loss](SPF): Missing encoder feedback signal	
SSF	[Torque/current lim](SSF): Torque limiting error	
tJF	[IGBT overheat](tJF): IGBT overheating	
tnF	[Auto-tuning](tnF): Autotuning error	
ULF	[Proc. underload Flt](ULF): Speed underload	
USF	[Undervoltage] (USF): Undervoltage	
HS1	[Drive state] HMI state for error record 1.	
tUn	[Auto-tuning](tUn): Autotuning	
dCb	[DC Injection](dCb): DC injection	
rdY	[Ready](rdY): Inverter ready for operation	
nSt	[Freewheel](nSt): Freewheel stop control	
rUn	[Run](rUn): Motor is at steady state, or move command and setpoint are at zero.	
ACC	[Acceleration](ACC): Startup time	
dEC	[Deceleration](dEC): Deceleration time	
CLI	[Current Limit](CLI): Current limit, applied when a synchronous motor is used and the motor fails to start	
FSt	[Fast stop](FSt): Fast stop	
FLU	[Motor fluxing](FLU): Vector control is enabled	
nLP	[no mains V.](nLP): Controller is switched on but DC bus is not charged	
CtL	[control.stop](CtL): Controlled stop	
Obr	[Dec. adapt.](Obr): Deceleration adjusted	
SOC	[Output cut](SOC): Standby output cutoff	
USA	[Undervoltage Alarm](USA): Undervoltage alarm	
tC	[In mfg. test](tC): TC indus mode enabled	
St	[in autotest](St): Self-test executed	
FA	[autotest err](FA): Error detected during self-test	
YES	[Autotest OK](YES): Self-test successful	
EP	[eeprom test](EP): Error detected during EEPROM self-test	
FLt	[No drive flt](FLt): Product detected an error	
SS1	[SS1 active](SS1): Safety function "Safe Stop 1" is active	
SLS	[SLS active](SLS): Safety function "Safely-Limited Speed" is active	
StO	[STO active](StO): Safety function "Safe Torque Off" is active	
GdL	[GdL active](GdL): GDL safety function	
Ep1	[ETA state word] State register for error record 1 (identical to [ETA state word](EtA)).	
IP1	[ETI state word] Advanced state register for error record 1 (see communication parameter file)	
CMP1	[Cmd word] Command register for error record 1 (identical to [Cmd word](CMd)).	
LCP1	[I motor] Motor current calculated for error record 1 (identical to [I motor](LCr)).	A
rFp1	[Output frequency] Output frequency calculated for error record 1 (identical to [Output frequency](rFr)).	Hz
rtp1	[Elapsed time] Operating time for error record 1 (identical to [Elapsed time](rtH)).	h
ULp1	[Mains voltage] Mains voltage for error record 1 (identical to [Mains voltage](ULn)).	V
tHP1	[Motor thermal state] Motor thermal state for error record 1 (identical to [Motor thermal state](tHr)).	%
dCC1	[Command channel] Command channel for error record 1 (identical to [Command channel](CMdC)).	
drC1	[Active channel ref.] Setpoint channel of error record 1 (identical to [Command channel](CMdC)).	
Sr11	[Saf01 Reg n-1] SAF1 register x (1 in last position)	
Sr21	[SAF2 Reg n-1] SAF2 register x (1 in last position)	
SrA1	[SF00 Reg n-1] SF00 register x (1 in last position)	

The parameters described on this page can be accessed by: DRI- > MOn- > dGt- > pFH-		
Code	**Name/Description**	**Unit**
Srb1	**[SF01 Reg n-1]** SF01 register x (1 in last position)	
SrC1	**[SF02 Reg n-1]** SF02 register x (1 in last position)	
Srd1	**[SF03 Reg n-1]** SF03 register x (1 in last position)	
SrE1	**[SF04 Reg n-1]** SF04 register x (1 in last position)	
SrF1	**[SF05 Reg n-1]** SF05 register x (1 in last position)	
SrG1	**[SF06 Reg n-1]** SF06 register x (1 in last position)	
SrH1	**[SF07 Reg n-1]** SF07 register x (1 in last position)	
SrI1	**[SF08 Reg n-1]** SF08 register x (1 in last position)	
SrJ1	**[SF09 Reg n-1]** SF09 register x (1 in last position)	
Sr?1	**[SF10 Reg n-1]** SF10 register x (1 in last position)	
SrL1	**[SF11 Reg n-1]** SF11 register x (1 in last position)	
dP2	**[Past fault 2]** Parameters **[SAF1 Reg n-2]**(Sr12), **[SAF2 Reg n-2]**(Sr22), **[SF00 Reg n-2]**(SrA2), **[SF01 Reg n-2]**(Srb2) and from **[SF02 Reg n-2]**(SrC2) to **[SF11 Reg n-2]**(SrL2) can be displayed using this parameter. Identical to **[Past fault 1]**(dP1).	
dP3	**[Past fault 3]** Parameters **[SAF1 Reg n-3]**(Sr13), **[SAF2 Reg n-3]**(Sr23), **[SF00 Reg n-3]**(SrA3), **[SF01 Reg n-3]**(Srb3) and from **[SF02 Reg n-3]**(SrC3) to **[SF11 Reg n-3]**(SrL3) can be displayed using this parameter. Identical to **[Past fault 1]**(dP1).	
dP4	**[Past fault 4]** Parameters **[SAF1 Reg n-4]**(Sr14), **[SAF2 Reg n-4]**(Sr24), **[SF00 Reg n-4]**(SrA4), **[SF01 Reg n-4]**(Srb4) and from **[SF02 Reg n-4]**(SrC4) to **[SF11 Reg n-4]**(SrL4) can be displayed using this parameter. Identical to **[Past fault 1]**(dP1).	
dP5	**[Past fault 5]** Parameters **[SAF1 Reg n-5]**(Sr15), **[SAF2 Reg n-5]**(Sr25), **[SF00 Reg n-5]**(SrA5), **[SF01 Reg n-5]**(Srb5) and from **[SF02 Reg n-5]**(SrC5) to **[SF11 Reg n-5]**(SrL5) can be displayed using this parameter. Identical to **[Past fault 1]**(dP1).	
dP6	**[Past fault 6]** Parameters **[SAF1 Reg n-6]**(Sr16), **[SAF2 Reg n-6]**(Sr26), **[SF00 Reg n-6]**(SrA6), **[SF01 Reg n-6]**(Srb6) and from **[SF02 Reg n-6]**(SrC6) to **[SF11 Reg n-6]**(SrL6) can be displayed using this parameter. Identical to **[Past fault 1]**(dP1).	
dP7	**[Past fault 7]** Parameters **[SAF1 Reg n-7]**(Sr17), **[SAF2 Reg n-7]**(Sr27), **[SF00 Reg n-7]**(SrA7), **[SF01 Reg n-7]**(Srb7) and from **[SF02 Reg n-7]**(SrC7) to **[SF11 Reg n-7]**(SrL7) can be displayed using this parameter. Identical to **[Past fault 1]**(dP1).	
dP8	**[Past fault 8]** Parameters **[SAF1 Reg n-8]**(Sr18), **[SAF2 Reg n-8]**(Sr28), **[SF00 Reg n-8]**(SrA8), **[SF01 Reg n-8]**(Srb8) and from **[SF02 Reg n-8]**(SrC8) to **[SF11 Reg n-8]**(SrL8) can be displayed using this parameter. Identical to **[Past fault 1]**(dP1).	

The parameters described on this page can be accessed by:DRI- > MOn- > dGt- > pFL-	
Code	**Name/Description**
PFL-	**[CURRENT FAULT LIST]**
nOF	**[No fault]**(nOF): No error stored
ASF	**[Angle error]**(ASF): Error in magnet wheel setting detected
bLF	**[Brake control]**(bLF): 3-phase loss in brake motor
brF	**[Brake feedback]**(brF): Error detected in braking contactor
CFF	**[Incorrect config.]**(CFF): Invalid configuration when switching on
CFI2	**[Bad conf.]**(CFI2): Error when transferring configuration
CnF	**[Com. card]**(CnF): Interruption in network communication
COF	**[CANopen com.]**(COF): Interruption in CANopen® communication
CrF	**[Precharge]**(CrF): Charging relay error
CSF	**[Ch. Sw. fault]**(CSF): Error switching channels
dLF	**[Dynamic load fault]**(dLF): Dynamic load error
EEF1	**[Control Eeprom]**(EEF1): EEPROM controller error
EEF2	**[Power Eeprom]**(EEF2): EEPROM power supply fault
EPF1	**[External fault LI/Bit]**(EPF1): External error at LI or local connector
EPF2	**[External fault com.]**(EPF2): Interruption in external communication card
FbE	**[FB fault]**(FbE): Error with function block
FbES	**[FB stop flt.]**(FbES): Error stopping the function block
FCF1	**[Out. contact. stuck]**(FCF1): Output contactor closed
FCF2	**[Out. contact. open.]**(FCF2): Output contactor open
HCF	**[Cards pairing]**(HCF): Error with hardware configuration
HdF	**[IGBT desaturation]**(HdF): Hardware error
ILF	**[Internal com. link]**(ILF): Interruption in internal communication option
InF1	**[Rating error]**(InF1): Unspecified inverter size
InF2	**[Incomp./unspec. power card]**(InF2): Unspecified or incompatible power card
InF3	**[Internal serial link]**(InF3): Interruption in internal serial communication
InF4	**[Internal-mftg zone]**(InF4): Internal manufacturing error

The parameters described on this page can be accessed by:DRI- > MOn- > dGt- > pFL-	
Code	**Name/Description**
InF6	**[Internal - fault option]**(InF6): Unspecified error or incompatible option card
InF9	**[Internal- I measure]**(InF9): Error measuring current
InFA	**[Internal-mains circuit]**(InFA): Input phase loss error
InFb	**[Internal- th. sensor]**(InFb): Temperature sensor error (OC or SC)
InFE	**[internal- CPU]**(InFE): CPU error (RAM, flash memory, task, etc.)
LCF	**[Line contactor]**(LCF): Line contactor error
LFF3	**[AI3 4-20mA loss]**(LFF3): AI3 4 to 20 mA loss
ObF	**[Overbraking]**(ObF): Overbraking
OCF	**[Overcurrent]**(OCF): Overcurrent
OHF	**[Inverter overheat]**(OHF): Inverter overheating
OLC	**[Proc.Overload Flt]**(OLC): Torque overload
OLF	**[Motor overload]**(OLF): Motor overload
OPF1	**[1 output phase loss]**(OPF1):Output phase loss - 1
OPF2	**[3out ph loss]**(OPF2):Output phase loss - 3
OSF	**[Mains overvoltage]**(OSF): Oversupply error
OtFL	**[PTC fault]**(OtFL): Motor overheating detected by PTCL: Standard product
PHF	**[Input phase loss]**(PHF): Input phase loss - 1
PtFL	**[LI6=PTC overheat]**(PtFL): PtFL error (OC or SC)
SAFF	**[Safety fault]**(SAFF): Triggers safety function
SCF1	**[Motor short circuit]**(SCF1): Motor short circuit (hardware detection)
SCF3	**[Ground short circuit]**(SCF3): Direct ground short-circuit (hardware detection)
SCF4	**[IGBT short circuit]**(SCF4): IGBT short circuit (hardware detection)
SCF5	**[Motor short circuit]**(SCF5): Load short-circuit during Igon-loading sequence (hardware detection)
SLF1	**[Modbus com.]**(SLF1): Interruption in local serial Modbus communication
SLF2	**[PC com.]**(SLF2): Interruption in PC software communication
SLF3	**[HMI com.]**(SLF3): Interruption in communication with external operator terminal
SOF	**[Overspeed]**(SOF): Overspeed
SPF	**[Speed fdback loss]**(SPF): Missing encoder feedback signal
SSF	**[Torque/current lim]**(SSF): Torque limiting error
tJF	**[IGBT overheat]**(tJF): IGBT overheating
tnF	**[Auto-tuning]**(tnF): Autotuning error
ULF	**[Proc. underload Flt]**(ULF): Speed underload
USF	**[Undervoltage]** (USF): Undervoltage

The parameters described on this page can be accessed by: DRI- > MOn- > dGt- > AFI-	
Code	**Name/Description**
AFI-	**[MORE FAULT INFO]** Additional error information
CnF	**[Com. network]** Error code for the communication option card. This parameter is read-only. The error code remains stored in the parameter, even if the cause is resolved. The parameter is reset, after the inverter has been disconnected from and then reconnected to the power supply. The value of this parameter depends on the network card. Read the user manual for the relevant card.
ILF1	**[Internal link fault 1]** Communication between option card 1 and the inverter was interrupted. This parameter is read-only. The error code remains stored in the parameter, even if the cause is resolved. The parameter is reset, after the inverter has been disconnected from and then reconnected to the power supply.
SFFE	**[Safety fault reg.]**(1) The safety function detected an error. Bit 0: 1 - Timeout during logic input debounce Bit 1: Reserved Bit 2: 1 - Motor speed character was changed during SS1 stop Bit 3: 1 - Speed has reached the SS1 trigger range Bit 4 to 5: Reserved Bit 6: 1 - Motor speed character was changed during SLS limitation Bit 7: 1 - Speed has reached the SLS trigger range Bit 8 to bit 12: Reserved Bit 13: 1 - Motor speed cannot be measured Bit 14: 1 - Motor ground short circuit detected Bit 15: 1 - Motor short circuit detected
SAF1	**[Safety fault Reg1]** (1) This error register is used for application control. Bit 0: 1 - PWRM consistency error detected Bit 1: 1 - Error detected in safety function parameters Bit 2: 1 - The automated application test detected an error. Bit 3: 1 - The diagnostics check on the safety function detected an error. Bit 4: 1 - The logic inputs diagnostics function detected an error. Bit 5: 1 - Safety function SMS or GDL errors detected (see register **[SAFF Subcode 4]** (SF04) for more details) Bit 6: 1 - Application watchdog management active Bit 7: 1 - Motor control error detected Bit 8: 1 - Error detected in internal serial connection Bit 9: 1 - Error detected during logic input activation Bit 10: 1 - Function "Safe Torque Off" triggered an error. Bit 11: 1 - The application interface detected a safety function error. Bit 12: 1 - Function "Safe Stop 1" detected a safety function error. Bit 13: 1 - Function "Safely Limited Speed" triggered an error. Bit 14: 1 - Motor data is corrupted. Bit 15: 1 - Error detected in internal serial connection data flow

The parameters described on this page can be accessed by: DRI- > MOn- > dGt- > AFI-	
Code	**Name/Description**
SAF2	**[Safety fault Reg2]** (1) This error register is used for motor control. Bit 0: 1 - The consistency check for stator frequency detected an error. Bit 1: 1 - Error detected in stator frequency calculation Bit 2: 1 - Motor control watchdog management is active Bit 3: 1 - Motor control hardware watchdog is active Bit 4: 1 - The automated motor control test detected an error. Bit 5: 1 - Error detected during chain testing Bit 6: 1 - Error detected in internal serial connection Bit 7: 1 - Error caused by direct short circuit detected Bit 8: 1 - Frequency inverter PWM error detected Bit 9: 1 - Internal GDL error detected Bit 10: Reserved Bit 11: 1 - The application interface detected a safety function error. Bit 12 to bit 13: Reserved Bit 14: 1 - Motor data is corrupted. Bit 15: 1 - Error detected in internal serial connection data flow
SF00	**[SAFF Subcode 0]** (1) This error register is used for automated application tests. Bit 0: Reserved Bit 1: 1 - RAM stack overrun Bit 2: 1 - Error in RAM address integrity detected Bit 3: 1 - Error detected when accessing RAM data Bit 4: 1 - Error detected in flash memory checksum Bit 5 to 8: Reserved Bit 9: 1 - Fast task overrun Bit 10: 1 - Slow task overrun Bit 11: 1 - Application task overrun Bit 12 to bit 13: Reserved Bit 14: 1 - The PWRM line is not enabled during the initialization phase Bit 15: 1 - The application hardware watchdog was not executed after the initialization phase
SF01	**[SAFF Subcode 1]** (1) This diagnostics error register is used for logic inputs. Bit 0: 1 - Management - Error detected in state machine Bit 1: 1 - Data required for test management is corrupted. Bit 2: 1 - Error detected during channel selection Bit 3: 1 - Test - Error detected in state machine Bit 4: 1 - Test request is corrupted. Bit 5: 1 - Pointer to test method is corrupted. Bit 6: 1 - Incorrect test action provided Bit 7: 1 - Error detected during results collection Bit 8: 1 - Error detected at LI3, safety function cannot be activated. Bit 9: 1 - Error detected at LI4, safety function cannot be activated. Bit 10: 1 - Error detected at LI5, safety function cannot be activated. Bit 11: 1 - Error detected at LI6, safety function cannot be activated. Bit 12: 1 - The test sequence was updated while diagnostics was in progress. Bit 13: 1 - Error detected in test type management Bit 14 to 15: Reserved
SF02	**[SAFF Subcode 2]** (1) This register is used for detected errors relating to application watchdog management. Bit 0: 1 - Fast task error detected Bit 1: 1 - Slow task error detected Bit 2: 1 - Application task error detected Bit 3: 1 - Background task error detected Bit 4: 1 - Fast task / Safety function input error detected Bit 5: 1 - Slow task / Safety function input error detected Bit 6: 1 - Application task / Safety function inputs error detected Bit 7: 1 - Application task / Safety function handling error detected Bit 8: 1 - Safety function background task error detected Bit 9 to 15: Reserved
SF03	**[SAFF Subcode 3]** (1) Bit 0: 1 - Debounce timeout Bit 1: 1 - Inconsistent input Bit 2: 1 - Consistency check - Error detected in state machine Bit 3: 1 - Consistency check - Debounce timeout is corrupted Bit 4: 1 - Error detected in response time data Bit 5: 1 - Response time data is corrupted. Bit 6: 1 - Undefined consumer queried Bit 7: 1 - Configuration error detected Bit 8: 1 - The inputs are not in nominal mode Bit 9 to 15: Reserved
SF04	**[SAFF Subcode 4]** (1) This register is used for detected errors relating to function **[Safe stop]** (StO). Bit 0: 1 - No signal configured Bit 1: 1 - State machine error detected Bit 2: 1 - Internal data error detected Bit 3 to 7: Reserved Bit 8: 1 - SMS overspeed error detected Bit 9: 1 - Internal SMS error detected Bit 10: Reserved Bit 11: 1 - Internal GDL error detected 1 Bit 12: 1 - GDL internal error detected 2 Bit 13 to 15: Reserved

The parameters described on this page can be accessed by: DRI- > MOn- > dGt- > AFI-	
Code	**Name/Description**
SF05	**[SAFF Subcode 5]** (1) This register is used for detected errors relating to function **[Safe ramp]** (SS1). Bit 0: 1 - State machine error detected Bit 1: 1 - Motor speed sign changed during stop Bit 2: 1 - Motor speed reached the output frequency threshold value. Bit 3: 1 - Theoretical motor speed data is corrupted. Bit 4: 1 - Unauthorized configuration Bit 5: 1 - Error detected in theoretical motor speed calculation Bit 6: Reserved Bit 7: 1 - Speed sign check: Consistency error detected Bit 8: 1 - Internal SS1 request corrupted Bit 9 to 15: Reserved
SF06	**[SAFF Subcode 6]**(1) This register is used for detected errors relating to function **[Spd limited]** (SLS). Bit 0: 1 - State machine error detected Bit 1: 1 - Motor speed sign was changed during limitation Bit 2: 1 - Motor speed reached the output frequency threshold value. Bit 3: 1 - Data corrupted Bit 4 to 15: Reserved
SF07	**[SAFF Subcode 7]** (1) This register is used for detected errors relating to application watchdog management. Bit 0 to 15: Reserved
SF08	**[SAFF Subcode 8]** (1) This register is used for detected errors relating to application watchdog management. Bit 0: 1 - PWM task error detected Bit 1: 1 - Fixed task error detected Bit 2: 1 - ATMC watchdog error detected Bit 3: 1 - DYNFCT watchdog error detected Bit 4 to 15: Reserved
SF09	**[SAFF Subcode 9]** (1) This register is used for detected errors relating to automated motor control tests. Bit0: Reserved Bit 1: 1 - RAM stack overrun Bit 2: 1 - Error in RAM address integrity detected Bit 3: 1 - Error detected when accessing RAM data Bit 4: 1 - Error in flash memory checksum Bit 5 to 8: Reserved Bit 9: 1 - 1 ms task overrun Bit 10: 1 - PWM task overrun Bit 11: 1 - Fixed task overrun Bit 12 to 13: Reserved Bit 14: 1 - Unintended interruption Bit 15: 1 - Hardware watchdog is not executed after the initialization phase
SF10	**[SAFF Subcode 10]** (1) This register is used for detected errors relating to direct motor control short circuits. Bit 0: 1 - Ground short circuit - Configuration error detected Bit 1: 1 - Short circuit - Configuration error detected Bit 2: 1 - Ground short circuit Bit 3: 1 - Short circuit Bit 4 to 15: Reserved
SF11	**[SAFF Subcode 11]** (1) This register is used for detected errors relating to the motor control dynamic activity check. Bit 0: 1 - Application has requested diagnostics for the direct short circuit. Bit 1: 1 - Application has requested a consistency check for the stator frequency calculation (voltage and current). Bit 2: 1 - Application has requested diagnostics for the speed statistics provided by motor control. Bit 3 to 7: Reserved Bit 8: 1 - Motor control diagnostics for the direct short circuit is enabled. Bit 9: 1 - Motor control consistency check for stator frequency calculation is enabled. Bit 10: 1 - Motor control diagnostics for the speed statistics provided by motor control is enabled. Bit 11 to 15: Reserved

(1) Hexadecimal values are displayed on the graphic display terminal. Example: SFFE = 0x0008 in hexadecimal format, SFFE = Bit 3

The parameters described on this page can be accessed by: DRI- > MOn- > dGt-	
Code	**Name/Description**
dGt-	**[DIAGNOSTICS]** **(continued)**
tAC	**[IGBT alarm counter]** Transistor alarm time counter (time frame in which alarm "IGBT temperature" was active).
tAC2	**[Min. freq time]** Transistor alarm time counter at minimum clock frequency (time frame in which alarm "IGBT temperature" was active after the inverter automatically reduced clock frequency to the minimum value).
ntJ	**[IGBT alarm Nb]** Transistor alarm counter: Numerical value detected during lifecycle Displayed when **[3.1 ACCESS LEVEL]** (LAC) is set to **[Expert]** (Epr).
SEr-	**[SERVICE MESSAGE]**
rFLt	**[Reset past faults]** Reset all resettable errors detected so far.
nO	**[No]** (nO): Reset not active
YES	**[YES]** (YES): Reset executed.

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

4.2.2.3.12 [1.2 MONITORING] (COd-)

The parameters described on this page can be accessed by: DRI- > MOn- > COd-	
Code	**Name/Description**
COd-	**[PASSWORD]** HMI access code. If you have lost your code, please contact B&R.
CSt	**[State]** Inverter state (locked/unlocked) Information parameter, cannot be modified.
LC	**[Locked]** (LC): The inverter is locked and requires a password to unlock.
ULC	**[Unlocked]**(ULC): The inverter is not locked and does not require a password.
COd	**[PIN code 1]** Trusted access code. Enables the configuration to be protected by mean of an access code. If access is protected using a code, only the parameters in menus **[1.2 MONITORING]**(MOn-) and **[1.1 SPEED REFERENCE]**(rEF-) can be accessed. Key MODE can be used to switch between menus. **Advice:** **Make a note of the code before entering it.**
OFF	**[OFF]**(OFF): No access codes. • Enter a code in order to lock access (2 to 9,999). The value on the display can be increased using the handwheel. Then press ENT. **[ON]**(On) will be displayed on the screen, indicating that access is locked.
On	**[ON]**(On): Access is locked by means of a code (2 to 9,999). • To unlock access, enter the code (increase the value on the display using the handwheel) and then press ENT. The code remains on the display and access is unlocked until the next time the inverter is switched off. The next time the inverter is switched on, access is locked again. • If an invalid code is entered, the display changes to **[ON]**(On). Access remains locked. Access is unlocked (the code is shown on the display). • To lock access again using the same code after it has been unlocked, use the handwheel to enter setting **[ON]**(On) and then press ENT. **[ON]**(On) will remain on the display, indicating that access is locked. • To lock access using a new code after it has been unlocked, enter the new code (increase the value shown on the display using the handwheel) and then press ENT. **[ON]**(On) will be displayed on the screen, indicating that access is locked. • To clear the access lock after it has been unlocked, use the handwheel to enter setting **[OFF]**(OFF) and then press ENT. **[OFF]**(OFF) will continue to be displayed. Access is unlocked and will still be unlocked after the next restart.
COd2	**[PIN code 2]** Access code 2. Displayed when **[3.1 ACCESS LEVEL]**(LAC) is set to **[Expert]**(Epr).
OFF	Value **[OFF]** (OFF) indicates that no password has been set for **[Unlocked]**(ULC)
On	Value **[ON]** (On) indicates that the inverter configuration is protected and that an access code must be entered to unlock it. Once the correct code has been entered, it remains on the display and the inverter is unlocked until the next time the power supply is switched off.
8888	PIN code 2 is an unlock code known only to B&R Product Support.
ULr	**[Upload rights]**
ULr0	**[Permitted]**(ULr0): This indicates that ACPi SafeConfigurator or the graphic display terminal can store the entire configuration (password, protective functions, configuration). When editing the configuration, only unprotected parameters can be accessed.
ULr1	**[Not allowed]**(ULr1): This indicates that ACPi SafeConfigurator or the graphic display terminal cannot store the configuration.
dLr	**[Download rights]**
dLr0	**[Locked drv]**(dLr0): Inverter locked: This indicates that the configuration can only be downloaded to a locked inverter if the configuration for that inverter has the same password. If the passwords are different, the download is not permitted.
dLr1	**[Unlock. drv]**(dLr1): Inverter unlocked: This indicates that the configuration can only be downloaded to a inverter that is not protected by an active password.
dLr2	**[Not allowed]**(dLr2): Not permitted: The configuration cannot be downloaded.
dLr3	**[Lock/unlock]**(dLr3): Locked and unlocked: Download is permitted based on case 0 or case 1.

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

4.2.3 Configuration mode (ConF)

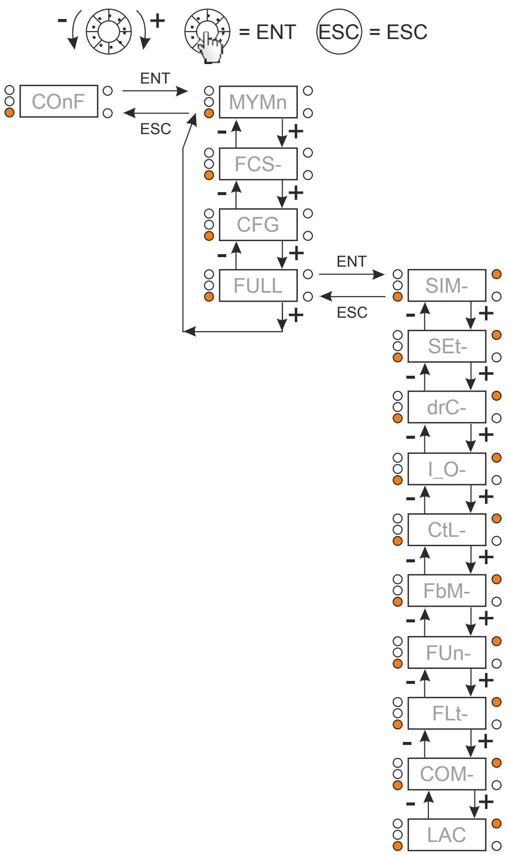
4.2.3.1 Introduction

The configuration mode is structured into 4 sections:

1) Menu "My Menu" contains up to 25 parameters for defining user-specific configurations via the graphic display terminal or ACPi SafeConfigurator.
2) Store/Access configured parameters: These two functions are used to store and access user-specific settings.
3) **[Macro configuration]**(CFG) This parameter enables the loading of preconfigured values for applications.
4) ALL PARAMETERS: This menu enables access to all other parameters. It contains 10 submenus:
    - **[SIMPLY START MENU]**(SIM-)
    - **[SETTINGS]**(SEt-)
    - **[MOTOR CONTROL]**(drC-)
    - **[INPUTS/ OUTPUTS CFG]**(I_O-)
    - **[COMMAND]**(CtL-)
    - **[FUNCTION BLOCK]**(FbM-)
    - **[APPLICATION FUNCT.]**(FUn-)
    - **[FAULT MANAGEMENT]**(FLt-)
    - **[COMMUNICATION]**(COM-)
    - **[ACCESS LEVEL]**(LAC)

4.2.3.2 Tree structure

The parameters displayed here are provided as examples.



4.2.3.3 My Menu

The parameters described on this page can be accessed by: DRI- > COnF > MYMn	
Code	**Name/Description**
MYMn	[MY MENU] This menu contains the parameters selected from menu [3.4 DISPLAY CONFIG.](dCF-).

4.2.3.4 Factory settings

The parameters described on this page can be accessed by: DRI- > COnF > FCS-		
Code	**Name/Description**	**Factory settings**
FCS-	[Factory settings]	
FCSI	[Config. Source] Choice of source configuration. If the function for changing configurations has been set, [Config 1] (CFG1) and [Config 2] (CFG2) can be accessed. **Advice:** **To load the default inverter settings stored previously ([Config 1](Str1) or [Config 2](Str2)), select source configuration [Select configuration](FCSI) = [Config 1](CFG1) or [Config 2](CFG2), followed by factory setting parameter [Goto FACTORY SETTINGS](GFS) = [YES](YES).**	[Macro-Conf](InI)
InI	[Macro-Conf](InI): Factory configuration: Restore selected macro configuration.	
CFG1	[Config 1] (CFG1): Configuration 1	
CFG2	[Config 2] (CFG2): Configuration 2	
FrY-	[PARAMETER GROUP LIST] List of the menus to be loaded. **Advice:** **If the factory configuration is selected and factory settings have been restored, [PARAMETER GROUP LIST] will be empty.**	
ALL	[ALL](ALL): All parameters (The function block program will be deleted also.)	
drM	[Drive configuration](drM): Menu [1 DRIVE MENU](drI-) without [COMMUNICATION](COM-). In menu [2.4 DISPLAY CONFIG.][Return std name](GSP) is reset to [No](nO).	
MOt	[Motor param](MOt): Motor parameters The following selection options are only available if [Config. Source](FCSI) = [Macro configuration](InI).	
COM	[Comm. menu](COM): Menu [COMMUNICATION](COM-) without [Scan. In1 address](nMA1) to [Scan. IN8 address](nMA8) or [Scan. Out1 address](nCA1) to [Scan. Out8 address](nCA8).	
dIS	[Display config](dIS): Menu [3.3 MONITORING CONFIG.](MCF-)	
GFS 2 s	[Goto FACTORY SETTINGS] **Danger!** **UNEXPECTED OPERATION OF THE EQUIPMENT** **Make sure that restoring the factory settings is compatible with the wiring used.** **Failure to follow these instructions can result in death or serious injury.** It is only possible to revert to the factory settings if at least one group of parameters has previously been selected.	
nO	[No](nO): No	
YES	[YES](YES): The parameter changes to [No](nO) automatically when the process is complete.	
SCSI	[Save config] The active configuration to be saved does not appear for selection. If the configuration involves[Cnfg.0 act.](Str0), for example, only [Config 1](Str1) and [Config 2](Str2) are displayed. The parameter reverts back to [No](nO) when the process is complete.	[No](nO)
nO	[No](nO): No	
Str0	[Cnfg.0 act.](Str0): ENT must be pressed and held for two seconds.	
Str1	[Config 1](Str1): ENT must be pressed and held for two seconds.	
Str2	[Config 2](Str2): ENT must be pressed and held for two seconds.	

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

2 s To change the assignment of this parameter, press the ENT key for 2 seconds.

4.2.3.5 Macro configuration

The parameters described on this page can be accessed by: DRI- > COnF > CFG		
Code	**Name/Description**	**Factory setting**
CFG	[Macro configuration]	[Start/Stop](StS)
★ 2 s	**Danger!** **UNEXPECTED OPERATION OF THE EQUIPMENT** **Make sure that the selected macro configuration is compatible with the type of wiring used.** **Failure to follow these instructions can result in death, serious injury or damage to property.**	
StS	[Start/Stop] (StS): Start/Stop	
HdG	[M. handling](HdG): Materials handling	
HSt	[Hoisting](HSt): Hoisting gear	
GEn	[Gen. Use](GEn): General applications	
PId	[PID regul.](PId): PID controllers	
nEt	[Network C.](nEt): Communication bus	

★	These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.
2 s	To change the assignment of this parameter, press the ENT key for 2 seconds.

Example of total return to factory settings

- [Config. Source](FCSI) is set to [Macro configuration](InI)
- [PARAMETER GROUP LIST](FrY-) is set to [ALL](ALL)
- [Goto FACTORY SETTINGS](GFS) is set to [YES](YES)

Assignment of the inputs / outputs

Input/output	[Start/Stop]	[M. handling]	[Gen. Use]	[Hoisting]	[PID regul.]	[Network C.]
[AI1]	[Ref.1 channel]	[Ref.1 channel]	[Ref.1 channel]	[Ref.1 channel]	[Ref.1 channel] (PID setpoint)	[Ref.2 channel] ([Ref.1 channel] = Integrated Modbus) (1)
[AI2]	[No]	[Summing ref. 2]	[Summing ref. 2]	[No]	[PID feedback]	[No]
[AI3]	[No]	[No]	[No]	[No]	[No]	[No]
[AO1]	[No]	[No]	[No]	[No]	[No]	[No]
[R1]	[No fault]	[No fault]	[No fault]	[No fault]	[No fault]	[No fault]
[R2]	[No]	[No]	[No]	[Brk control]	[No]	[No]
[LI1] (2 wire)	[Forward]	[Forward]	[Forward]	[Forward]	[Forward]	[Forward]
[LI2] (2 wire)	[Reverse assign.]	[Reverse assign.]	[Reverse assign.]	[Reverse assign.]	[Reverse assign.]	[Reverse assign.]
[LI3] (2 wire)	[No]	[2 preset speeds]	[Jog]	[FAULT RESET]	[PID integral reset]	[Ref. 2 switching]
[LI4] (2 wire)	[No]	[4 preset speeds]	[FAULT RESET]	[External fault]	[2 preset PID ref.]	[FAULT RESET]
[LI5] (2 wire)	[No]	[8 preset speeds]	[Torque limitation]	[No]	[4 preset PID ref.]	[No]
[LI6] (2 wire)	[No]	[FAULT RESET]	[No]	[No]	[No]	[No]
[LI1] (3 wire)	[Run]	[Run]	[Run]	[Run]	[Run]	[Run]
[LI2] (3 wire)	[Forward]	[Forward]	[Forward]	[Forward]	[Forward]	[Forward]
[LI3] (3 wire)	[Reverse assign.]	[Reverse assign.]	[Reverse assign.]	[Reverse assign.]	[Reverse assign.]	[Reverse assign.]
[LI4] (3 wire)	[No]	[2 preset speeds]	[Jog]	[FAULT RESET]	[PID integral reset]	[Ref. 2 switching]
[LI5] (3 wire)	[No]	[4 preset speeds]	[FAULT RESET]	[External fault]	[2 preset PID ref.]	[FAULT RESET]
[LI6] (3 wire)	[No]	[8 preset speeds]	[Torque limitation]	[No]	[4 preset PID ref.]	[No]
[LO1]	[No]	[No]	[No]	[No]	[No]	[No]
Graphic display terminal keys						
F1 key	[No]	[No]	[No]	[No]	[No]	Control via graphic display terminal
Keys F2, F3, F4	[No]	[No]	[No]	[No]	[No]	[No]

(1) For startup with an integrated Modbus, [Modbus Address](Add) must be configured first.

	In 3-wire control, the assignment of inputs LI1 to LI6 shifts.

Advice:

These pinouts are reinitialized every time the macro configuration changes.

Other configurations and settings

In addition to the I/O pinout, additional parameters are assigned, **however, only in macro configuration "Hoisting".**

Hoisting:

- **[Movement type]**(bSt) = **[Hoisting]**(UEr)
- **[Brake contact]**(bCI) = **[No]**(nO)
- **[Brake impulse]**(bIP) = **[YES]**(YES)
- **[Brake release I FW]**(Ibr) = 0 A
- **[Brake Release time]**(brt) = 0 s
- **[Brake release freq.]**(bIr) = **[Auto]**(AUtO)
- **[Brake engage freq.]**(bEn) = **[Auto]**(AUtO)
- **[Brake engage time]**(bEt) = 0 s
- **[Engage at reversal]** (bEd) = **[No]**(nO)
- **[Jump at reversal]**(JdC) =**[Auto]**(AUtO)
- **[Time to restart]**(ttr) = 0 s
- **[Current ramp time]**(brr) = 0 s
- **[Low speed]**(LSP) = Motor rated slip calculated by inverter
- **[Output Phase Loss]**(OPL) = **[YES]**(YES))
  This parameter can no longer be changed.
- **[Catch on the fly]**(FLr) = **[No]**(nO)
  This parameter can no longer be changed.

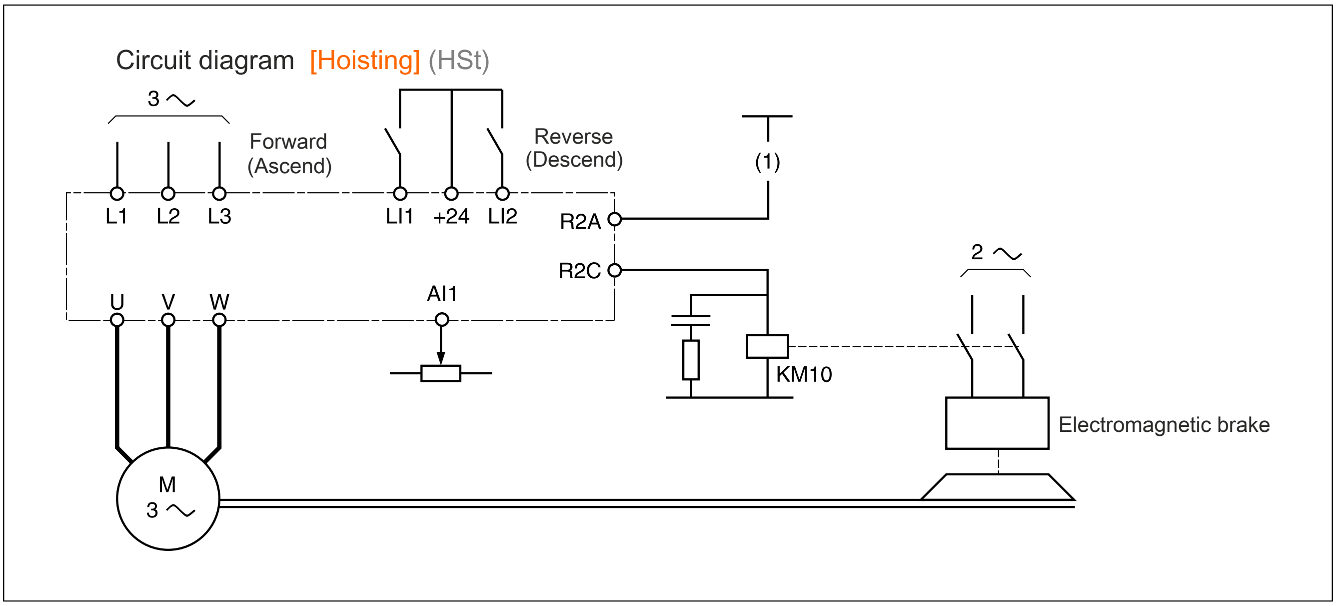
Revert to factory settings:

Using **[Config. Source]**(FCSI) = **[Macro-Conf]**(InI) to revert to factory settings results in reversion to the selected macro configuration. The parameter **[Macro configuration]**(CFG) does not change, however **[Customized macro]**(CCFG) is deleted.

Advice:

The factory settings correspond to [Macro configuration](CFG) = [Start/Stop](StS), that is, the factory defined macro configuration.

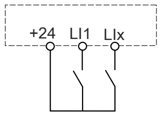
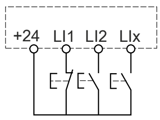
Example diagrams for use with the macro configurations



(1) If there is no existing safety function, a safety module contact must be integrated into the brake circuit, so that the brakes are engaged safely when the safety function "Safe Torque Off" is activated (see "Wiring instructions" on page 78).

4.2.3.6 FuLL

4.2.3.6.1 [SIMPLY START] (SIM-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > SIM-			
Code	**Name/Description**	**Setting range**	**Factory settings**
SIM-	**[SIMPLY START]**		
tCC 2 s	**[2/3 wire control]** **Danger!** **UNEXPECTED OPERATION OF THE EQUIPMENT** **Changing this parameter causes parameters [Reverse assign.](rrS) and [2 wire type](tCt) as well as the digital inputs assignments to revert to factory settings.** **Check that this change is compatible with the wiring used.** **Failure to follow these instructions can result in death, serious injury or damage to property.**		**[2 wire]**(2C)
2C	**[2 wire]**(2C) **2-wire control (level-controlled)**: The input state (0 or 1) or edge (0 to 1 or 1 to 0) controls running or stopping.  LI1: forward LIx: reverse		
3C	**[3 wire]**(3C) **3-wire control (edge-controlled):** A "forward" or "reverse" pulse is sufficient to control motor startup. A "stop" pulse is sufficient to control motor stopping. Source wiring example:  LI1: stop LI2: forward LIx: reverse		
CFG 2 s	**[Macro configuration]** **Danger!** **UNEXPECTED OPERATION OF THE EQUIPMENT** **Make sure that the selected macro configuration is compatible with the type of wiring used.** **Failure to follow these instructions can result in death, serious injury or damage to property.**		**[Start/Stop]**(StS)
StS	**[Start/Stop]** (StS): Start/Stop		
HdG	**[M. handling]**(HdG): Materials handling		
HSt	**[Hoisting]**(HSt): Hoisting gear		
GEn	**[Gen. Use]**(GEn): General applications		
PId	**[PID regul.]**(PId): PID controllers		
nEt	**[Network C.]**(nEt): Communication bus		
CCFG	**[Customized macro]** Read-only parameter, only visible if at least one macro configuration parameter has been modified.		
nO	**[No]**(nO): No		
YES	**[YES]**(YES): Yes		
bFr	**[Standard mot. freq]** This parameter changes the default setting of the following parameters: **[Rated motor volt.]**(UnS), **[High speed]**(HSP), **[Freq. threshold]**(Ftd), **[Rated motor freq.]**(FrS) and **[Max frequency]**(tFr).		**[50 Hz IEC]**(50)
50	**[50Hz IEC]**(50): 50 Hz inverter		
60	**[60Hz NEMA]**(60): 60 Hz inverter		
IPL	**[Input phase loss]** This parameter is available in this menu for 3-phase inverters only. If a phase is lost, the inverter switches to error mode **[Input phase loss]**(PHF). If, on the other hand, two or three phases are lost, the inverter resumes operation until an undervoltage error is triggered (the inverter triggers **[Input phase loss]**(PHF) in the case of a mains phase failure that results in power loss).		Yes or No, depending on the inverter power
nO	**[Ignore]**(nO): Error ignored: To be used when the power to the inverter is supplied via a single-phase supply or by the DC bus.		
YES	**[Freewheel]**(YES): Error when coasting to a stop.		

The parameters described on this page can be accessed by: DRI- > COnF > FULL > SIM-

Code	Name/Description	Setting range	Factory settings
nPr	**[Rated motor power]**	See the following table	See the following table

Rated motor power per the nameplate, in kW, if **[Standard mot. freq]**(bFr) = **[50 Hz IEC]**(50) or in HP, if **[Standard mot. freq]**(bFr) = **[60 Hz NEMA]**(60).

For induction motors with (BFR) = 50 Hz, the following table applies:

ACOPOSinverter P66	Setting range		
	Min. value [10 W]	Max. value [10 W]	Default [10 W]
8I66x200018.00-000	9	55	18
8I66x200037.00-000	9	75	37
8I66x200055.00-000	9	110	55
8I66x200075.00-000	9	150	75
8I66x200110.00-000	9	220	110
8I66x200150.00-000	18	300	150
8I66x200220.00-000	37	400	220
8I66T200300.00-000	55	550	300
8I66T200400.00-000	75	750	400
8I66T200550.00-000	110	1100	550
8I66T200750.00-000	150	1500	750
8I66T201100.00-000	220	1850	1100
8I66T201500.00-000	300	2200	1500
8I66T400037.00-000	9	75	37
8I66T400055.00-000	9	110	55
8I66T400075.00-000	9	150	75
8I66T400110.00-000	9	220	110
8I66T400150.00-000	18	300	150
8I66T400220.00-000	37	400	220
8I66T400300.00-000	55	550	300
8I66T400400.00-000	75	750	400
8I66T400550.00-000	110	1100	550
8I66T400750.00-000	150	1500	750
8I66T401100.00-000	220	1850	1100
8I66T401500.00-000	300	2200	1500
8I66T600075.00-000	9	150	75
8I66T600150.00-000	18	300	150
8I66T600220.00-000	37	400	220
8I66T600400.00-000	75	750	400
8I66T600550.00-000	110	1100	550
8I66T600750.00-000	150	1500	750
8I66T601100.00-000	220	1850	1100
8I66T601500.00-000	300	2200	1500

For induction motors with (BFR) = 60 Hz, the following table applies:

ACOPOSinverter P66	Setting range		
	Min. value [0.1 HP]	Max. value [0.1 HP]	Default [0.1 HP]
8I66x200018.00-000	1	8	3
8I66x200037.00-000	1	10	5
8I66x200055.00-000	1	15	8
8I66x200075.00-000	1	20	10
8I66x200110.00-000	1	30	15
8I66x200150.00-000	3	40	20
8I66x200220.00-000	5	50	30
8I66T200300.00-000	8	70	40
8I66T200400.00-000	10	100	50
8I66T200550.00-000	15	150	70
8I66T200750.00-000	20	200	100
8I66T201100.00-000	30	250	150
8I66T201500.00-000	40	300	200
8I66T400037.00-000	1	10	5
8I66T400055.00-000	1	15	8
8I66T400075.00-000	1	20	10
8I66T400110.00-000	1	30	15
8I66T400150.00-000	3	40	20
8I66T400220.00-000	5	50	30
8I66T400300.00-000	6	70	40
8I66T400400.00-000	8	100	50
8I66T400550.00-000	15	150	70
8I66T400750.00-000	20	200	100
8I66T401100.00-000	30	250	150
8I66T401500.00-000	40	300	200
8I66T600075.00-000	1	20	10
8I66T600150.00-000	3	40	20
8I66T600220.00-000	5	50	30
8I66T600400.00-000	8	100	50
8I66T600550.00-000	10	150	70
8I66T600750.00-000	15	200	100
8I66T601100.00-000	20	250	150
8I66T601500.00-000	30	300	200

Code	Name/Description	Setting range	Factory settings
UnS	**[Rated motor volt.]**	100 to 480 V	According to inverter performance

Rated motor voltage given on the nameplate. 8I66S200xxx.00-000: 100 to 240 V - 8I66T40xxxx.00-000: 200 to 480 V - 8I66T60xxxx.00-000: 525 to 600 V

The parameters described on this page can be accessed by: DRI- > COnF > FULL > SIM-			
Code	**Name/Description**	**Setting range**	**Factory settings**
nCr	**[Rated mot. current]** Rated motor current given on the nameplate.	0.25*INV to 1.5*INV (1)	See the following table

ACOPOSinverter P66	Setting range		
	Min. value [0.1 A]	Max. value [0.1 A]	Default [0.1 A]
8I66x200018.00-000	3	23	11
8I66x200037.00-000	8	50	19
8I66x200055.00-000	9	56	29
8I66x200075.00-000	12	72	35
8I66x200110.00-000	17	104	48
8I66x200150.00-000	20	120	61
8I66x200220.00-000	27	165	88
8I66T200300.00-000	34	206	125
8I66T200400.00-000	43	263	158
8I66T200550.00-000	68	413	206
8I66T200750.00-000	82	495	263
8I66T201100.00-000	135	810	369
8I66T201500.00-000	165	990	495
8I66T400037.00-000	3	23	10
8I66T400055.00-000	4	29	14
8I66T400075.00-000	5	35	20
8I66T400110.00-000	7	45	25
8I66T400150.00-000	10	62	35
8I66T400220.00-000	13	83	51
8I66T400300.00-000	17	107	72
8I66T400400.00-000	23	143	91
8I66T400550.00-000	35	215	119
8I66T400750.00-000	42	255	152
8I66T401100.00-000	69	416	213
8I66T401500.00-000	82	495	286
8I66T600075.00-000	4	26	11
8I66T600150.00-000	6	41	22
8I66T600220.00-000	9	59	30
8I66T600400.00-000	15	92	49
8I66T600550.00-000	22	135	74
8I66T600750.00-000	27	165	95
8I66T601100.00-000	42	255	145
8I66T601500.00-000	55	330	188

Code	Name/Description	Setting range	Factory settings
FrS	**[Rated motor freq.]** Rated motor frequency given on the nameplate. The factory setting is 50 Hz and is replaced by a default setting of 60 Hz if **[Standard mot. freq]**(bFr) is set to 60 Hz. This parameter is not available if **[Motor control type]**(Ctt) = **[Sync. mot.]**(SYn).	10 to 800 Hz	50 Hz

The parameters described on this page can be accessed by: DRI- > COnF > FULL > SIM-

Code	Name/Description	Setting range	Factory settings
nSP	**[Rated motor speed]**	0 to 65,535 rpm	See the following table for induction motors

Rated motor speed given on the nameplate
This parameter is not available if **[Motor control type]**(Ctt) is set to **[Sync. mot.]**(SYn).
0 to 9999 rpm then 10.00 to 60.00 krpm on the integrated display terminal.
If, instead of the nominal speed, the nameplate indicates the synchronous speed and the slip in Hz or as a percentage, calculate the nominal speed as follows:

$$Nominal\ speed = Synchronous\ speed \times \frac{100 - slip\ as\ a\ \%}{100}$$

or

$$Nominal\ speed = Synchronous\ speed \times \frac{50 - slip\ in\ Hz}{50}(50\ Hz\ motors)$$

or

$$Nominal\ speed = Synchronous\ speed \times \frac{60 - slip\ in\ Hz}{60}(60\ Hz\ motors)$$

If (BFR) = 50:

ACOPOSinverter P66	Setting range		
	Min. value [rpm]	Max. value [rpm]	Default [rpm]
8I66x200018.00-000	0	65535	1410
8I66x200037.00-000			1425
8I66x200055.00-000			1400
8I66x200075.00-000			1400
8I66x200110.00-000			1410
8I66x200150.00-000			1420
8I66x200220.00-000			1430
8I66T200300.00-000			1420
8I66T200400.00-000			1425
8I66T200550.00-000			1430
8I66T200750.00-000			1450
8I66T201100.00-000			1450
8I66T201500.00-000			1455
8I66T400037.00-000			1425
8I66T400055.00-000			1400
8I66T400075.00-000			1400
8I66T400110.00-000			1410
8I66T400150.00-000			1420
8I66T400220.00-000			1430
8I66T400300.00-000			1420
8I66T400400.00-000			1425
8I66T400550.00-000			1430
8I66T400750.00-000			1450
8I66T401100.00-000			1450
8I66T401500.00-000			1455
8I66T600075.00-000			1400
8I66T600150.00-000			1420
8I66T600220.00-000			1430
8I66T600400.00-000			1425
8I66T600550.00-000			1430
8I66T600750.00-000			1450
8I66T601100.00-000			1450
8I66T601500.00-000			1455

If (BFR) = 60:

The parameters described on this page can be accessed by: DRI- > COnF > FULL > SIM-

ACOPOSinverter P66	Setting range		
	Min. value [rpm]	Max. value [rpm]	Default [rpm]
8I66x200018.00-000			1680
8I66x200037.00-000			1720
8I66x200055.00-000			1700
8I66x200075.00-000			1700
8I66x200110.00-000			1680
8I66x200150.00-000			1715
8I66x200220.00-000			1715
8I66T200300.00-000			1760
8I66T200400.00-000			1769
8I66T200550.00-000			1780
8I66T200750.00-000			1780
8I66T201100.00-000			1766
8I66T201500.00-000			1771
8I66T400037.00-000			1720
8I66T400055.00-000			1700
8I66T400075.00-000			1700
8I66T400110.00-000	0	65535	1680
8I66T400150.00-000			1715
8I66T400220.00-000			1715
8I66T400300.00-000			1760
8I66T400400.00-000			1769
8I66T400550.00-000			1780
8I66T400750.00-000			1780
8I66T401100.00-000			1766
8I66T401500.00-000			1771
8I66T600075.00-000			1700
8I66T600150.00-000			1715
8I66T600220.00-000			1715
8I66T600400.00-000			1769
8I66T600550.00-000			1780
8I66T600750.00-000			1780
8I66T601100.00-000			1766
8I66T601500.00-000			1771

Code	Name/Description	Setting range	Factory settings
tFr	**[Max frequency]** The factory setting is 60 Hz and is replaced by a default setting of 72 Hz if **[Standard mot. freq]**(bFr) is set to 60 Hz. The maximum value is limited by the following conditions: It must not exceed 10 times the value of **[Rated motor freq.]**(FrS).	10 to 599 Hz or 1*FrS(S)	60 Hz (if (BFR) = 50 Hz) or 72 Hz (if (BFR) = 60 Hz)
tUn	**[Auto-tuning]**		**[No]**(nO)
tUS	**[Auto tuning status]** This parameter is not stored when the inverter is switched off. It shows the autotuning state since the last time the device was commissioned.		**[Not done]**(tAb)
tAb	**[Not done]**(tAb): Autotuning has not been executed.		
PEnd	**[Idle]**(PEnd): Autotuning has been requested but has not been executed yet.		
PrOG	**[Active]**(PrOG): Autotuning has been executed.		
FAIL	**[Failed]**(FAIL): Autotuning has failed.		
dOnE	**[Done]**(dOnE): The stator resistance measured by the autotuning function is used to control the motor.		
StUn	**[Tune selection]**		**[Default]**(tAb)
tAb	**[Default]**(tAb): The default value of the stator resistance is used to control the motor.		
MEAS	**[Measure]**(MEAS): The stator resistance measured by the autotuning function is used to control the motor.		
CUS	**[Customized]**(CUS): The manually configured stator resistance is used to control the motor.		

The parameters described on this page can be accessed by: DRI- > COnF > FULL > SIM-

Code	Name/Description	Setting range	Factory settings
ItH	**[Mot. therm. current]**	0.2*INV to 1.5*INV (1)	See the following table

Motor thermal protection current, to be set to the rated operational current indicated on the nameplate.
If the motor control type for synchronous motors has been enabled: **[Motor control type]**(Ctt) = **[Sync. mot.]**(SYn)

ACOPOSinverter P66	Einstellbereich		
	Min. value [0.1 A]	Max. value [0.1 A]	Default [0.1 A]
8I66x200018.00-000	3	23	6
8I66x200037.00-000	6	50	16
8I66x200055.00-000	7	56	26
8I66x200075.00-000	9	72	28
8I66x200110.00-000	13	104	38
8I66x200150.00-000	16	120	49
8I66x200220.00-000	22	165	53
8I66T200300.00-000	27	206	96
8I66T200400.00-000	35	263	140
8I66T200550.00-000	55	416	175
8I66T200750.00-000	66	495	230
8I66T201100.00-000	108	810	290
8I66T201500.00-000	132	990	420
8I66T400037.00-000	3	23	6
8I66T400055.00-000	3	29	7
8I66T400075.00-000	4	35	15
8I66T400110.00-000	6	45	23
8I66T400150.00-000	8	62	31
8I66T400220.00-000	11	83	32
8I66T400300.00-000	14	107	63
8I66T400400.00-000	19	143	90
8I66T400550.00-000	28	215	102
8I66T400750.00-000	34	255	140
8I66T401100.00-000	55	416	179
8I66T401500.00-000	66	495	185
8I66T600075.00-000	3	26	15
8I66T600150.00-000	5	41	31
8I66T600220.00-000	7	59	32
8I66T600400.00-000	12	92	90
8I66T600550.00-000	18	135	102
8I66T600750.00-000	22	165	140
8I66T601100.00-000	34	255	179
8I66T601500.00-000	44	330	185

If a motor control type for induction motor has been enabled: **[Motor control type]**(Ctt) ≠ **[Sync. mot.]**(SYn)

ACOPOSinverter P66	Einstellbereich		
	Min. value [0.1 A]	Max. value [0.1 A]	Default [0.1 A]
8I66x200018.00-000	3	23	11
8I66x200037.00-000	6	50	19
8I66x200055.00-000	7	56	29
8I66x200075.00-000	9	72	35
8I66x200110.00-000	13	104	48
8I66x200150.00-000	16	120	61
8I66x200220.00-000	22	165	88
8I66T200300.00-000	27	206	125
8I66T200400.00-000	35	263	158
8I66T200550.00-000	55	413	206
8I66T200750.00-000	66	495	263
8I66T201100.00-000	108	810	369
8I66T201500.00-000	132	990	495
8I66T400037.00-000	3	23	10
8I66T400055.00-000	3	29	14
8I66T400075.00-000	4	35	20
8I66T400110.00-000	6	45	25
8I66T400150.00-000	8	62	35
8I66T400220.00-000	11	83	51
8I66T400300.00-000	14	107	72
8I66T400400.00-000	19	143	91
8I66T400550.00-000	28	215	119
8I66T400750.00-000	34	255	152
8I66T401100.00-000	55	416	213
8I66T401500.00-000	66	495	286
8I66T600075.00-000	3	26	11
8I66T600150.00-000	5	41	22
8I66T600220.00-000	7	59	30
8I66T600400.00-000	12	92	49
8I66T600550.00-000	18	135	74
8I66T600750.00-000	22	165	95
8I66T601100.00-000	34	255	145
8I66T601500.00-000	44	330	188

The parameters described on this page can be accessed by: DRI- > COnF > FULL > SIM-			
Code	**Name/Description**	**Setting range**	**Factory settings**
ACC	[Acceleration]	0.00 to 6000 s(2)	3.0 s
	Time taken to accelerate from 0 to [Rated motor freq.](FrS). To ensure ramp repeatability, the value of this parameter must be defined in accordance with what is possible for the application.		
dEC	[Deceleration]	0.00 to 6000 s(2)	3.0 s
	Time taken to decelerate from [Rated motor freq.](FrS) to 0. To ensure ramp repeatability, the value of this parameter must be defined in accordance with what is possible for the application.		
LSP	[Low speed]	0 to 599 Hz or (HSP)	0
	Motor speed with minimum setpoint, setting from 0 to [High speed](HSP).		
HSP	[High speed]	0 to 599 Hz	50 Hz
	Motor speed with maximum setpoint, setting from [Low speed](LSP) to [Max frequency](tFr). The factory setting changes to 60 Hz if [Standard mot. freq](bFr) = [60 Hz NEMA] (60).		

(1) In corresponds to the rated inverter current indicated in the Installation Manual and on the inverter nameplate.
(2) Range between 0.01 and 99.99 s, 0.1 and 999.9 s or 1 and 6,000 s, in accordance with [Ramp increment] (Inr).

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

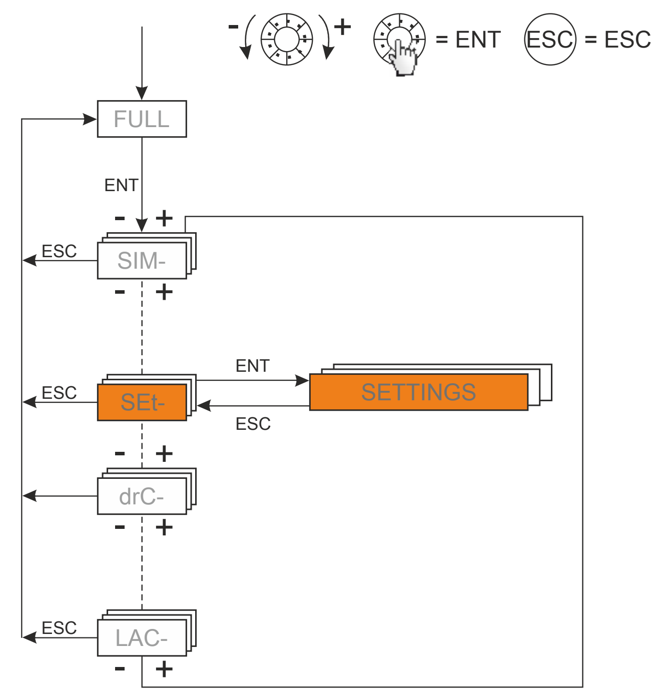
2 s To change the assignment of this parameter, press the ENT key for 2 seconds.

4.2.3.6.2 [SETTINGS] (SEt-)

With integrated display terminal

It is recommended to stop the motor before making any changes to the settings.

Via menu (COnF)



The adjustment parameters can be modified with the inverter running or stopped.

The parameters described on this page are accessed by: DRI- > COnF > FULL > CtL-			
Code	**Name/Description**	**Setting range**	**Factory settings**
SEt-	[SETTINGS]		
Inr	[Ramp increment]		0.1
	This parameter can be used for [Acceleration](ACC), [Deceleration] (dEC), [Acceleration 2](AC2) and [Deceleration 2] (dE2).		
0.01	[0,01]: 99.99-second ramp		
0.1	[0,1]: 999.9-second ramp		
1	[1]: 6,000-second ramp		

The parameters described on this page are accessed by: DRI- > COnF > FULL > CtL-			
Code	Name/Description	Setting range	Factory settings
ACC	**[Acceleration]** Time taken to accelerate from 0 to **[Rated motor freq.]**(FrS). To ensure ramp repeatability, the value of this parameter must be defined in accordance with what is possible for the application.	0.00 to 6000 s[1]	3.0 s
dEC	**[Deceleration]** Time taken to decelerate from **[Rated motor freq.]**(FrS) to 0. Make sure that this value is compatible with the drive's moment of inertia.	0.00 to 6000 s[1]	3.0 s
AC2	**[Acceleration 2]** Time taken to accelerate from 0 to **[Rated motor freq.]**(FrS). To ensure ramp repeatability, the value of this parameter must be defined in accordance with what is possible for the application.	0.00 to 6000 s[1]	5 s
dE2	**[Deceleration 2]** Time taken to decelerate from **[Rated motor freq.]**(FrS) to 0. Make sure that this value is compatible with the drive's moment of inertia.	0.00 to 6000 s[1]	5 s
tA1	**[Begin Acc round]** Rounding of the acceleration ramp start as a % of ramp time **[Acceleration]**(ACC) or **[Acceleration 2]** (AC2). Available if **[Ramp type]**(rPt) = **[Customized]**(CUS).	0 to 100%	10%
tA2	**[End Acc round]** Rounding of the acceleration ramp end as a % of acceleration time **[Acceleration]**(ACC) or **[Acceleration 2]**(AC2). Can be set to between 0% and 100% - **[Begin Acc round]**(tA1). Available if **[Ramp type]**(rPt) = **[Customized]**(CUS).	0 to 100%	10%
tA3	**[Begin Dec round]** Rounding of the deceleration ramp start as a % of ramp time **[Deceleration]**(dEC) or **[Deceleration 2]**(dE2). Available if **[Ramp type]**(rPt) = **[Customized]**(CUS).	0 to 100%	10%
tA4	**[End Dec round]** Rounding of the deceleration ramp end as a % of ramp time **[Deceleration]**(dEC) or **[Deceleration 2]**(dE2). Can be set to between 0% and 100% - **[Begin Dec round]** (tA3). Available if **[Ramp type]**(rPt) = **[Customized]**(CUS).	0 to 100%	10%
LSP	**[Low speed]** Motor speed with minimum setpoint, setting from 0 to **[High speed]**(HSP).	0 to 599 Hz or (HSP)	0 Hz
HSP	**[High speed]** Motor speed with maximum setpoint, setting from **[Low speed]**(LSP) to **[Max frequency]**(tFr). The factory setting changes to 60 Hz if **[Standard mot. freq]**(bFr) = **[60 Hz NEMA]** (60).	0 or (LSP) to 599 Hz or (TFR)	50 Hz (if (BFR) = 50 Hz) or 60 Hz (if (BFR) = 60 Hz)
HSP2	**[High speed 2]** Available if **[2 High speed]**(SH2) is not set to**[No]**(nO).	0 to 599 Hz	50 Hz
HSP3	**[High speed 3]** Available if **[4 High speed]**(SH4) is not set to**[No]**(nO).	0 to 599 Hz	50 Hz
HSP4	**[High speed 4]** Available if **[4 High speed]**(SH4) is not set to**[No]**(nO).	0.0 to 599.0 Hz	50.0 Hz

The parameters described on this page are accessed by: DRI- > COnF > FULL > CtL-

Code	Name/Description	Setting range	Factory settings
ItH	[Mot. therm. current]	0.2*INV to 1.5*INV [2]	See the following table

Motor thermal protection current, to be set to the rated operational current indicated on the nameplate.
If the motor control type for synchronous motors has been enabled: [Motor control type](Ctt) = [Sync. mot.](SYn)

ACOPOSinverter P66	Setting range		
	Min. value [0.1 A]	Max. value [0.1 A]	Default [0.1 A]
8I66x200018.00-000	3	23	11
8I66x200037.00-000	6	50	19
8I66x200055.00-000	7	56	29
8I66x200075.00-000	9	72	35
8I66x200110.00-000	13	104	48
8I66x200150.00-000	16	120	61
8I66x200220.00-000	22	165	88
8I66T200300.00-000	27	206	125
8I66T200400.00-000	35	263	158
8I66T200550.00-000	55	413	206
8I66T200750.00-000	66	495	263
8I66T201100.00-000	108	810	369
8I66T201500.00-000	132	990	495
8I66T400037.00-000	3	23	10
8I66T400055.00-000	3	29	14
8I66T400075.00-000	4	35	20
8I66T400110.00-000	6	45	25
8I66T400150.00-000	8	62	35
8I66T400220.00-000	11	83	51
8I66T400300.00-000	14	107	72
8I66T400400.00-000	19	143	91
8I66T400550.00-000	28	215	119
8I66T400750.00-000	34	255	152
8I66T401100.00-000	55	416	213
8I66T401500.00-000	66	495	286
8I66T600075.00-000	3	26	11
8I66T600150.00-000	5	41	22
8I66T600220.00-000	7	59	30
8I66T600400.00-000	12	92	49
8I66T600550.00-000	18	135	74
8I66T600750.00-000	22	165	95
8I66T601100.00-000	34	255	145
8I66T601500.00-000	44	330	188

If a motor control type for induction motor has been enabled: [Motor control type](Ctt) ≠ [Sync. mot.](SYn)

ACOPOSinverter P66	Setting range		
	Min. value [0.1 A]	Max. value [0.1 A]	Default [0.1 A]
8I66x200018.00-000	3	23	6
8I66x200037.00-000	6	50	16
8I66x200055.00-000	7	56	26
8I66x200075.00-000	9	72	28
8I66x200110.00-000	13	104	38
8I66x200150.00-000	16	120	49
8I66x200220.00-000	22	165	53
8I66T200300.00-000	27	206	96
8I66T200400.00-000	35	263	140
8I66T200550.00-000	55	416	175
8I66T200750.00-000	66	495	230
8I66T201100.00-000	108	810	290
8I66T201500.00-000	132	990	420
8I66T400037.00-000	3	23	6
8I66T400055.00-000	3	29	7
8I66T400075.00-000	4	35	15
8I66T400110.00-000	6	45	23
8I66T400150.00-000	8	62	31
8I66T400220.00-000	11	83	32
8I66T400300.00-000	14	107	63
8I66T400400.00-000	19	143	90
8I66T400550.00-000	28	215	102
8I66T400750.00-000	34	255	140
8I66T401100.00-000	55	416	179
8I66T401500.00-000	66	495	185
8I66T600075.00-000	3	26	15
8I66T600150.00-000	5	41	31
8I66T600220.00-000	7	59	32
8I66T600400.00-000	12	92	90
8I66T600550.00-000	18	135	102
8I66T600750.00-000	22	165	140
8I66T601100.00-000	34	255	179
8I66T601500.00-000	44	330	185

Code	Name/Description	Setting range	Factory settings
UFr	[IR compensation] IR compensation.	0 to 200%	100%
SLP	[Slip compensation] Slip compensation.	0 to 300%	100%

The parameters described on this page are accessed by: DRI- > COnF > FULL > CtL-			
Code	**Name/Description**	**Setting range**	**Factory settings**
SFC	**[K speed loop filter]** Speed filter coefficient.	0 to 100	65
SIt	**[Speed time integral]** Integral time constant for speed control	1 to 65,535 ms	63 ms
VOLT	**[Speed prop. gain]** Proportional gain for speed control	0 to 1,000%	40%
SPGU	**[UF inertia comp.]** Factor of inertia.	0 to 1,000%	40%

(1) Range between 0.01 and 99.99 s, 0.1 and 999.9 s or 1 and 6,000 s, in accordance with **[Ramp increment]** (Inr).
(2) This depends on the nominal inverter current indicated in the installation instructions or on the nameplate.

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

4.2.3.6.2.1 Parameter settings

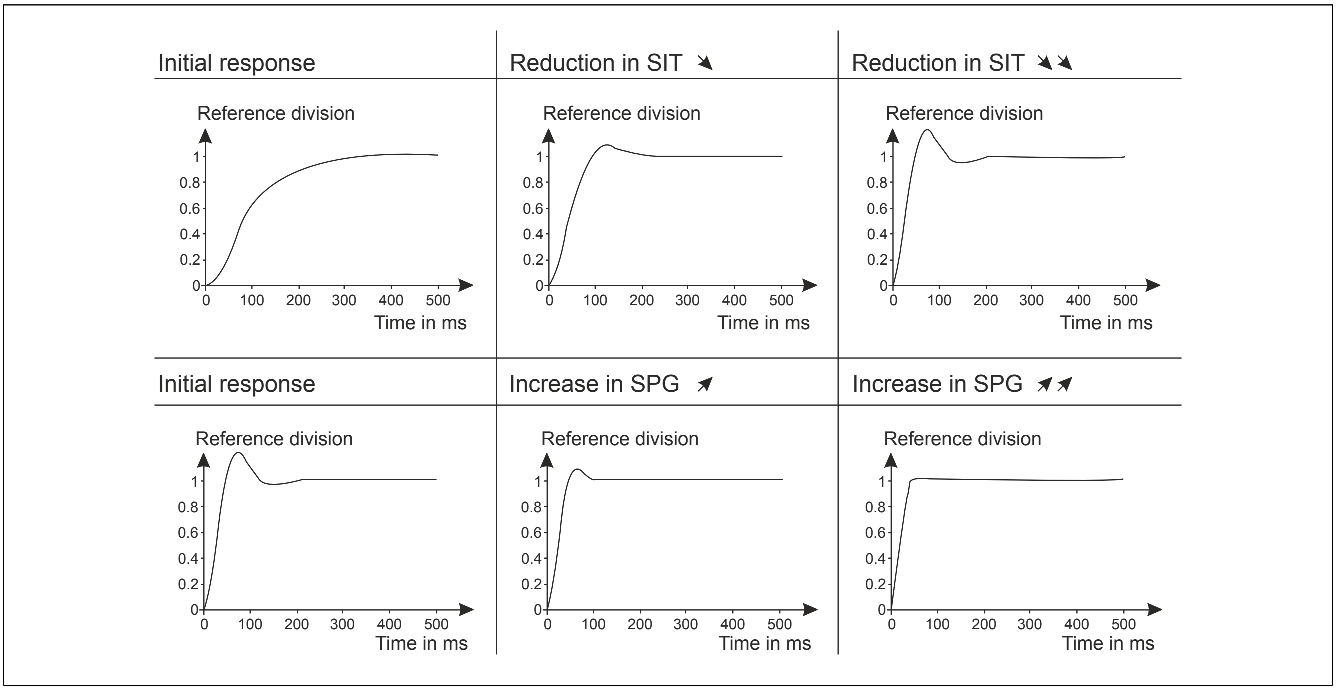
Parameter settings for [K speed loop filter] (SFC), [Speed prop. gain] (SPG) and[Speed time integral] (SIt)

The following parameters cannot be accessed if [Motor control type] (Ctt) is set to [SVC U] (UUC), [Sync. mot.] (SYn) or [Energy Sav.] (nLd).

As a rule: Settings with [K speed loop filter] (SFC) = 0

The controller is an "IP" controller with speed setpoint filtering and is suitable for use in situations that require versatility and stability (for example, hoisting gear or high inertia machines).

- [Speed prop. gain] (SPG) affects speed overshoot.
- [Speed time integral] (SIt) affects bandwidth and response time.



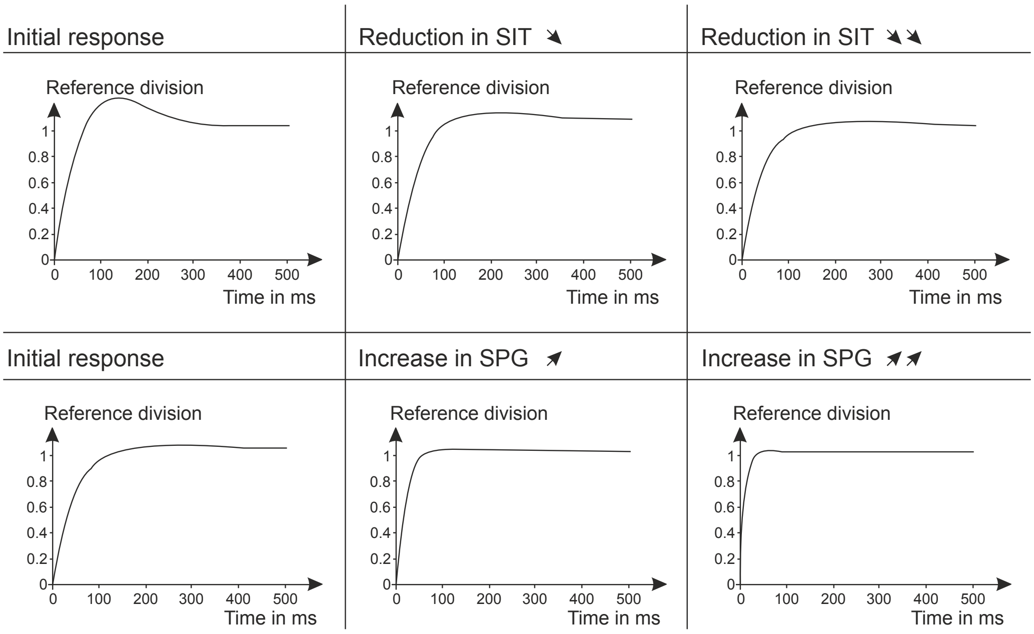
Special case: Parameter [K speed loop filter] (SFC) not equal to 0

This parameter must be reserved for specific applications that require a short response time (for example, position control or distance control).

- When set to 100 as illustrated below, the controller is a "PI" controller without setpoint filtering.
- When set between 0 and 100, the resulting operation is an intermediate frequency between the settings indicated below and those on the previous page.

Example: Setting in which [K speed loop filter] (SFC) = 100

- [Speed prop. gain] (SPG) affects the bandwidth and the response time.
- [Speed time integral] (SIt) affects the speed overshoot.



The parameters described on this page are accessed by: DRI- > COnF > FULL > CtL-			
Code	**Name/Description**	**Setting range**	**Factory settings**
SEt-	**[SETTINGS]**		
dCF	**[Ramp divider]** Reduction in deceleration ramp time.	0 to 10	4
IdC	**[DC inject. level 1]** Level of DC injection braking current activated via logic input or selected as stop mode.	0.1*INV to 1.41*INV (1)	0.64*INV (1)
tdI	**[DC injection time 1]** Maximum duration of current injection **[DC inject. level 1]**(IdC). Once this period has expired, DC current injection will convert to **[DC inject. level 2]**(IdC2).	0.1 to 30 s	0.5 s
IdC2	**[DC inject. level 2]** Current injection that will be enabled via the logic input or selected as stop mode once **[DC injection time 1]**(tdI) has expired.	0.1*INV to IdC (1)	0.5*INV (1)
tdC	**[DC injection time 2]** Maximum duration of injection **[DC inject. level 2]**(IdC2), if the injection is selected as stop mode.	0.1 to 30 s	0.5 s
SdC1	**[Auto DC inj. level 1]** **Advice:** **MOTOR OVERHEATING AND DAMAGE** **In order to prevent damage to the motor due to overheating, make sure the connected motor is sized correctly for DC injection braking with regard to influx rate and duration.** **Failure to observe these instructions can result in damage to the equipment.** Level of standstill DC injection current. **[Auto DC injection]** (AdC) is not set to **[No]**(nO).	0 to 1.2*INV (1)	0.7*INV (1)
tdC1	**[Auto DC inj. time 1]** **Advice:** **MOTOR OVERHEATING AND DAMAGE** **In order to prevent damage to the motor due to overheating, make sure the connected motor is sized correctly for DC injection braking with regard to influx rate and duration.** **Failure to observe these instructions can result in damage to the equipment.** Standstill injection time. The parameter can be called if **[Auto DC injection]**(AdC) is not set to **[No]**(nO). If **[Motor control type]**(Ctt) is set to **[Sync. mot.]**(SYn), this time corresponds to the hold time at speed zero.	0.1 to 30 s	0.5 s

The parameters described on this page are accessed by: DRI- > COnF > FULL > CtL-			
Code	**Name/Description**	**Setting range**	**Factory settings**
SdC2	**[Auto DC inj. level 2]** **Advice:** **MOTOR OVERHEATING AND DAMAGE** **In order to prevent damage to the motor due to overheating, make sure the connected motor is sized correctly for DC injection braking with regard to influx rate and duration.** **Failure to observe these instructions can result in damage to the equipment.** 2. Level of standstill DC injection current. This parameter can be called if **[Auto DC injection]**(AdC) is not set to **[No]**(nO).	0 to 1.2*INV (1)	0.5*INV (1)
tdC2	**[Auto DC inj. time 2]** **Advice:** **MOTOR OVERHEATING AND DAMAGE** **In order to prevent damage to the motor due to overheating, make sure the connected motor is sized correctly for DC injection braking with regard to influx rate and duration.** **Failure to observe these instructions can result in damage to the equipment.** 2. Standstill injection time. This parameter can be activated if **[Auto DC injection]**(AdC) is set to **[YES]**(YES).	0 to 30 s	0 s
SFr	**[Switching freq.]** **Advice:** **MOTOR DAMAGE** **If the EMC filter is separated in an IT power system, make sure that the inverter clock frequency does not exceed 4 kHz.** **Failure to observe these instructions can result in damage to the equipment.** Switching frequency setting. **Configurable range:** The maximum value is limited to 4 kHz if parameter **[Motor surge limit]**(SVL) is configured. **Advice:** **In the event of an excessive temperature increase, the inverter will automatically reduce the clock frequency and then reset it again once the temperature has reverted to within the normal range.**	2 to 16 kHz or 4kHz (if (SVL) is enabled)	4 kHz
CLI	**[CURRENT LIMIT.]** **Advice:** **MOTOR OVERHEATING AND DAMAGE** • **Make sure that the motor has the required power rating for the applied maximum current.** • **In order to calculate the maximum current, take the motor work cycle and all the factors involved in using the motor into account, including declassification requirements.** **Failure to observe these instructions can result in damage to the equipment.** Used to limit the motor current. **Advice:** **If the setting is less than 0.25 in, the inverter can lock in error mode [Output Phase Loss](OPL), if this has been enabled). If this lies below the no-load current of the motor, the motor cannot run.**	0 to 1.5*INV (1)	1.5*INV (1)
CL2	**[I Limit. 2 value]** **Advice:** **MOTOR OVERHEATING AND DAMAGE** • **Make sure that the motor has the required power rating for the applied maximum current.** • **In order to calculate the maximum current, take the motor work cycle and all the factors involved in using the motor into account, including declassification requirements.** **Failure to observe these instructions can result in damage to the equipment.** **Advice:** **If the setting is less than 0.25 in, the inverter can lock in error mode [Output Phase Loss](OPL), if this has been enabled). If this lies below the no-load current of the motor, the motor cannot run.**	0 to 1.5*INV (1)	1.5*INV (1)

The parameters described on this page are accessed by: DRI- > COnF > FULL > CtL-

<table>
<tr><th>Code</th><th>Name/Description</th><th>Setting range</th><th>Factory settings</th></tr>
<tr><td>FLU
2 s</td><td colspan="2">[Motor fluxing]

Danger!
RISK OF ELECTRIC SHOCK, ARC FLASH OR EXPLOSION
If parameter [Motor fluxing](FLU) is set to [continuous](FCt) fluxing will always occur, even when the motor is not running.
Make sure that this setting does not result in unsafe states.
Failure to follow these instructions can result in death or serious injury.

Advice:
MOTOR OVERHEATING AND DAMAGE
To prevent motor overheating and damage, check whether the connected motor has the correct sizing for the magnetizing current.
Failure to observe these instructions can result in damage to the equipment.

The parameter is available if [Motor control type](Ctt) is not set to [Sync. mot.](SYn).
In order to obtain rapid high torque on startup, magnetic flux needs to already have been established in the motor.
In mode [continuous](FCt), the inverter automatically creates the magnetic flux at startup.
In mode [Not cont.](FnC), fluxing occurs when the motor has been started up.
The value of the magnetizing current is greater than [Rated mot. current](nCr) during the creation of the magnetic flux and is then regulated by the value of the magnetizing current of the motor.</td><td>[No](FnO)</td></tr>
<tr><td>FnC
FCt

FnO</td><td colspan="3">[Not cont.](FnC): Non-continuous mode
[continuous](FCt): Continuous mode. This option is not possible if [Auto DC injection] (AdC) is set to [YES](YES) or if [Type of stop] (Stt) has been set to [Freewheel](nSt).
[No](FnO): Function inactive. This option is not possible if [Brake assignment](bLC) is not set to [No](nO).</td></tr>
<tr><td>tLS</td><td>[Low speed time out]

Maximum operating time with [Low speed](LSP). Following operation at LSP for a defined period, a motor stop is requested automatically. The motor restarts when the speed setpoint is greater than LSP and if a move command still exists.

Advice:
A value of 0 indicates an unlimited period of time.

Advice:
If [Low speed time out](tLS) is not equal to 0, parameter [STOP CONFIGURATION](Stt) is forced to [Ramp stop] (rMP) (only if "stop can be configured via ramp).</td><td>0 to 999.9 s</td><td>0 s</td></tr>
<tr><td>JGF</td><td>[Setpoint step mode]

Reference in jog operation</td><td>0 to 10 Hz</td><td>10 Hz</td></tr>
<tr><td>JGt</td><td>[Jog delay]

Debounce delay between two consecutive step modes.</td><td>0 to 2 s</td><td>0.5 s</td></tr>
</table>

(1) Corresponding to the nominal current of the inverter specified on the nameplate.

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

2 s To change the assignment of this parameter, press the ENT key for 2 seconds.

The parameters described on this page are accessed by: DRI- > COnF > FULL > CtL-

Code	Name/Description	Setting range	Factory settings
SEt-	**[SETTINGS] (Continued)**		
SP2	**[Preset speed 2]** Preset speed 2.	0 to 599 Hz	10 Hz
SP3	**[Preset speed 3]** Preset speed 3.	0 to 599 Hz	15 Hz

The parameters described on this page are accessed by: DRI- > COnF > FULL > CtL-			
Code	Name/Description	Setting range	Factory settings
SP4	[Preset speed 4] Preset speed 4.	0 to 599 Hz	20 Hz
SP5	[Preset speed 5] Preset speed 5.	0 to 599 Hz	25 Hz
SP6	[Preset speed 6] Preset speed 6.	0 to 599 Hz	30 Hz
SP7	[Preset speed 7] Preset speed 7.	0 to 599 Hz	35 Hz
SP8	[Preset speed 8] Preset speed 8.	0 to 599 Hz	40 Hz
SP9	[Preset speed 9] Preset speed 9.	0.0 to 599.0 Hz	45 Hz
SP10	[Preset speed 10] Preset speed 10.	0 to 599 Hz	50 Hz
SP11	[Preset speed 11] Preset speed 11.	0 to 599 Hz	55 Hz
SP12	[Preset speed 12] Preset speed 12.	0 to 599 Hz	60 Hz
SP13	[Preset speed 13] Preset speed 13.	0 to 599 Hz	70 Hz
SP14	[Preset speed 14] Preset speed 14.	0 to 599 Hz	80 Hz
SP15	[Preset speed 15] Preset speed 15.	0 to 599 Hz	90 Hz
SP16	[Preset speed 16] Preset speed 16.	0 to 599 Hz	100 Hz
MFr	[Multiplying coeff.] Multiplication factor that is accessible when [Multiplier ref.](MA2, MA3) is assigned to the graphic display terminal.	0 to 100%	100%
SrP	[+/-Speed limitation] Limitation of +/- speed variation.	0 to 50%	10%

The parameters described on this page are accessed by: DRI- > COnF > FULL > CtL-			
Code	**Name/Description**	**Setting range**	**Factory settings**
rPG	**[PID prop. gain]** Proportional gain.	0.01 to 100	1
rIG	**[PID integral gain]** Integral gain.	0.01 to 100	1
rdG	**[PID derivative gain]** D component PID controller.	0.00 to 100	0
PrP	**[PID ramp]** Ramp-up/down ramp of the PID, which is set for a range of **[Min PID reference]**(PIP1) to **[Max PID reference]** (PIP2) or vice versa.	0 to 99.9 s	0 s
POL	**[Min PID output]** Minimum value of regulator output in Hz.	-599 to 599 Hz	0 Hz
POH	**[Max PID output]** Maximum value of regulator output in Hz.	0 to 599 Hz	60 Hz
PAL	**[Min fbk alarm]** Minimum monitoring threshold for regulator feedback.	(2)	100
PAH	**[Max fbk alarm]** Maximum monitoring threshold for regulator feedback.	(2)	1.000
PEr	**[PID error Alarm]** Regulator error monitoring threshold.	0 to 65535 (2)	100
PSr	**[Speed input %]** Multiplying coefficient for predictive speed input.	1 to 100%	100%
rP2	**[Preset ref. PID 2]** Preset PID value.	(2)	300
rP3	**[Preset ref. PID 3]** Preset PID value.	(2)	600
rP4	**[Preset ref. PID 4]** Preset PID value.	(2)	900

(2) If there is no graphic display terminal used, values above 9,999 in four-digit display format are shown with a period as the thousands separator; for example, 15.65 for 15,650.

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

The parameters described on this page are accessed by: DRI- > COnF > FULL > CtL-			
Code	**Name/Description**	**Setting range**	**Factory settings**
SEt-	[SETTINGS](Continued)		
lbr	**[Brake release I FW]** Brake release current threshold for ascending or forward movement.	0 to 1.36*INV (1)	0
Ird	**[Brake release I Rev]** Brake release current threshold for descending or counterclockwise rotation.	0 to 1.36*INV (1)	0
brt	**[Brake Release time]** Brake release time delay.	0 to 5.00 s	0 s
blr	**[Brake release freq.]**	**[Auto]**(AUtO) 0 to 10 Hz	**[Auto]**(AUtO)
AUtO	**[Auto]**(AUtO): Nominal value		
bEn	**[Brake engage freq.]** Threshold of the braking torque frequency.	**[Auto]**(AUtO) 0 to 10 Hz	**[Auto]**(AUtO)
tbE	**[Brake engage delay]** Time delay before request to engage brake.	0 to 5.00 s	0 s
bEt	**[Brake engage time]** Brake engage time (brake response time)	0 to 5.00 s	0 s
JdC	**[Jump at reversal]**	**[Auto]**(AUtO) 0 to 10 Hz	**[Auto]**(AUtO)
AUtO	**[Auto]**(AUtO): Nominal value		
ttr	**[Time to restart]** Time between the end of a brake release sequence and the start of a brake engage sequence.	0.00 to 15.00 s	0.00 s
tLIM	**[Motoring torque lim]** Torque limiting for motor operation in percent or increments of 0.1% of the nominal torque in accordance with parameter **[Torque increment]**(IntP).	0 to 300%	100%
tLIG	**[Gen. torque lim]** Torque limiting for generator operation in percent or increments of 0.1% of nominal torque in accordance with parameter **[Torque increment]**(IntP).	0 to 300%	100%
trH	**[Traverse freq. high]** High traverse frequency.	0 to 10 Hz	4 Hz
trL	**[Traverse freq. low]** Low traverse frequency.	0 to 10 Hz	4 Hz
qSH	**[Quick step High]** High quick step.	0 to **[Traverse freq. high]**(trH)	0 Hz
qSL	**[Quick step Low]** Low quick step.	0 to **[Traverse freq. low]**(trL)	0 Hz

The parameters described on this page are accessed by: DRI- > COnF > FULL > CtL-			
Code	**Name/Description**	**Setting range**	**Factory settings**
Ctd	[Current threshold] Current threshold value of function [I attained](CtA); assigned to a relay or a logic output.	0 to 65535 or 1.5*INV (1)	INV (1)
ttH	[High torque thd.] Higher torque threshold value of function [High torque alarm](ttHA); assigned to a relay or logic output (as a percentage of the nominal torque)	-300% to +300%	100%
ttL	[Low torque thd.] Lower torque threshold value of function [Low torque alarm](ttLA); assigned to a relay or logic output, as a percentage of the nominal torque.	-300% to +300%	50%
FqL	[Pulse warning thd.] Frequency threshold value of function [FREQUENCY METER](FqF-); assigned to a relay or a logic output.	0 Hz to 20,000 kHz	0 Hz
Ftd	[Freq. threshold] Frequency threshold value of function [Freq. Th. attained](FtA); assigned to a relay or a logic output or used by function [PARAM. SET SWITCHING](MLP-).	0.0 to 599 Hz	HSP
F2d	[Freq. threshold 2] Frequency threshold value of function [Freq. Th. 2 attained](F2A); assigned to a relay or a logic output or used by function [PARAM. SET SWITCHING](MLP-).	0.0 to 599 Hz	HSP
FFt	[Freewheel stop Thd.] Speed threshold value under which the motor switches to freewheel stop. This parameter supports switching from a ramp stop or fast stop to a freewheel stop based on a "Low frequency" threshold value. This parameter is accessible if [Type of stop](Stt) is set to [Fast stop](FSt) or [Ramp stop](rMP) and if [Brake assignment](bLC) and [Auto DC injection](AdC) are not configured.	0.2 to 599 Hz	0.2 Hz
ttd	[Motor therm. level] Trip threshold for motor thermal alarm (logic output or relay).	0 to 118%	100%
JPF	[Skip Frequency] Skip frequency. This parameter prevents prolonged operation within an adjustable range around the regulated frequency. This function can be used to prevent a critical speed from being reached, which would cause resonance. Setting the function to 0 disables it.	0 to 599 Hz	0 Hz
JF2	[Skip Frequency 2] 2. Skip frequency. This parameter prevents prolonged operation within an adjustable range around the regulated frequency. This function can be used to prevent a critical speed from being reached, which would cause resonance. Setting the function to 0 disables it.	0 to 599 Hz	0 Hz
JF3	[3rd Skip Frequency] 3. Skip frequency. This parameter prevents prolonged operation within an adjustable range around the regulated frequency. This function can be used to prevent a critical speed from being reached, which would cause resonance. Setting the function to 0 disables it.	0 to 599 Hz	0 Hz
JFH	[Skip Frequency Hyst.] The parameter is visible if at least one of the skip frequencies [Skip Frequency](JPF), [Skip Frequency 2](JF2) or [3rd Skip Frequency](JF3) is not equal to 0. Area for the skip frequency: From (JPF - JFH) to (JPF + JFH), for example. This setting applies to all 3 frequencies (JPF, JF2, JF3) together.	0.1 to 10 Hz	1 Hz
LUn	[Unld. Thr. Nom. Speed.] Threshold value for underload at nominal motor frequency ([Rated motor freq.](FrS)) as a percentage of the nominal torque Only visible if [Unld T. Del. Detect](ULt) is not set to 0.	20 to 100% of [Rated mot. current](nCr)	60%
LUL	[Underload freq.=0] Threshold value for underload for a frequency of zero, as a percentage of nominal torque. Only visible if [Unld T. Del. Detect](ULt) is not set to 0.	0 to [Nom. freq. overload](LUn)	0%
rMUd	[Underl. det. freq. thresh.val] Underload detection frequency threshold value.	0 to 599 Hz	0 Hz
Srb	[Hysteresis Freq.Att.] Maximum difference between frequency setpoint and motor frequency; defines operation in steady state.	0.3 to 599 Hz	0.3 Hz
FtU	[Underload T.B.Rest.] Permissible minimum time frame between underload detection and automatic restart. For an automatic restart to take place, the value for [Max. restart time](tAr) must exceed the value for this parameter for at least one minute.	0 to 6 min	0 min
LOC	[Ovld Detection Thr.] Overload detection threshold value, as a percentage of the motor nominal current [Rated mot. current](nCr). This value must be lower than the limiting current for this function to work. Only visible if [Ovld Time Detect.](tOL) is not set to 0. This parameter is used to detect an "application overload". This is not thermal overload of the motor or inverter.	70% to 150% of [Rated mot. current] (nCr)	110%

The parameters described on this page are accessed by: DRI- > COnF > FULL > CtL-			
Code	**Name/Description**	**Setting range**	**Factory settings**
FtO	**[Overload T.B.Rest.]** Permissible minimum timeframe between overload detection and automatic restart. For an automatic restart to take place, the value for **[Max. restart time]**(tAr) must exceed the value for this parameter for at least one minute.	0 to 6 min	0 min
LbC	**[Load sharing correction]** Nominal compensation in Hz	0 to 599 Hz	0 Hz
FFM	**[Fan mode]** If **[Fan mode]**(FFM) is set to **[Never]**(Stp), the frequency inverter fan is deactivated. This reduces the service life of the electronic part. **Advice:** **INVERTER DAMAGE** **If the fan is deactivated, it is important that the ambient temperature is not higher than 40°C (104°F).** **Failure to observe these instructions can result in damage to the equipment.**		**[Standard]**(Std)
Std	**[Standard]**(Std): The fan is automatically started or stopped in accordance with the inverter's thermal state.		
rUn	**[Always]**(rUn): Fan is always enabled.		
StP	**[Never]**(Stp): Fan is disabled.		
SdS	**[Scale factor display]** Used to display a value in relation to output frequency **[Output frequency]**(rFr): Machine speed, motor speed, etc. The following appears on the display: $[Cust.\ output\ value](SPd3) = \frac{[Scale\ factor\ display](SdS) \times [Output\ frequency](rFr)}{1000}$ *to 2 decimal places* • If **[Scale factor display]**(SdS) ≤ 1, **[Cust. output value]**(SPd1) will display (possible resolution = 0.01) • If 1 < **[Scale factor display]**(SdS) ≤ 10, **[Cust. output value]**(SPd2) will display (possible resolution = 0.1) • If **[Scale factor display]**(SdS) > 10, **[Cust. output value]**(SPd3) will display (possible resolution = 1) • If **[Scale factor display]**(SdS) > 10 and **[Scale factor display]**(SdS) x **[Output frequency]**(rFr) > 9,999: **Example:** For 24.223, 24.22 appears on the display. If for **[Scale factor display]**(SdS) > 10 and **[Scale factor display]**(SdS) x **[Output frequency]**(rFr) > 65.535, the display is locked to 65.54 **Example:** Display motor speed for 4-pin motor, 1,500 rpm at 50 Hz (synchronous speed): **[Scale factor display]**(SdS) = 30 **[Cust. output value]**(SPd3) = 1.500 at**[Output frequency]**(rFr) = 50 Hz	0.1 to 200	30

(1) Corresponding to the nominal current of the inverter specified on the nameplate.

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

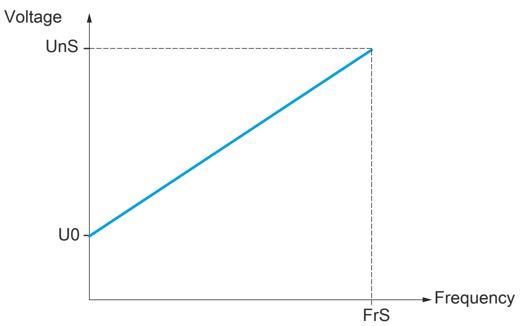
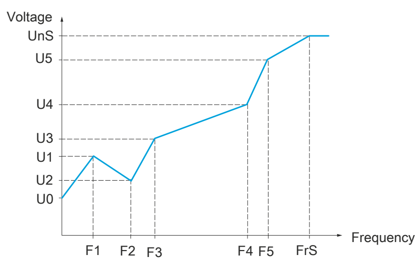
4.2.3.6.3 [MOTOR CONTROL] (drC-)

The parameters in menu **[MOTOR CONTROL]**(drC-) can only be changed if the inverter is stopped and no move command has been given, and in compliance with the following limitations:

- **[Auto-tuning]**(tUn) can cause the motor to start.
- A parameter whose code contains an arrow character can be modified regardless of whether the motor is running or stopped.

Advice:

If one of the following parameters is changed with respect to the factory settings, we recommend autotuning.

The parameters described on this page can be accessed by: DRI- > COnF > FULL > drC-			
Code	**Name/Description**	**Setting range**	**Factory settings**
drC-	**[MOTOR CONTROL]**		
bFr	**[Standard mot. freq]**		**[50 Hz IEC]**(50)
	This parameter is used to change the default setting of the following parameters: **[High speed]**(HSP), **[Freq. threshold]**(Ftd), **[Rated motor volt.]**(UnS), **[Rated motor freq.]**(FrS) and **[Max frequency]**(tFr).		
50	**[50 Hz IEC]**(50): IEC		
60	**[60 Hz NEMA]** (60): NEMA		
tFr	**[Max frequency]**	10 to 599 Hz or 1*FrS(S)	60 Hz (if (BFR) = 50 Hz) or 72 Hz (if (BFR) = 60 Hz)
	The default factory setting is 60 Hz or 72 Hz, if **[Standard mot. freq]**(bFr) is set to 60 Hz. The maximum value is limited by the following conditions: It must not exceed 10 times the value of **[Rated motor freq.]**(FrS).		
Ctt	**[Motor control type]**		**[Standard]**(Std)
	Advice: **Select the characteristic curve before you enter the parameter values.**		
UUC	**[SVC U]**(UUC): Sensorless vector control with internal speed control based on calculation of the actual voltage value. For types of application that require high performance during startup or operation		
Std	**[Standard]**(Std): Standard motor curve For straightforward applications that do not require high performance. Simple motor control curve with a constant voltage/frequency ratio, with possibility of controlling the lower characteristic curve. This characteristic curve is generally used for motors that are connected in parallel. Some specific applications for high-performance motors connected in parallel may require **[SVC U]**(UUC).  **Advice:** **U0 is the result of an internal calculation based on motor parameters and multiplied by UFr (%). U0 can be adjusted by changing the UFr value.**		
UF5	**V/F 5pts**(UF5): 5-segment V/F profile: Functions as a **[Standard]**(Std) profile, but also supports resonance (saturation) prevention.  This profile is defined using parameter values UnS, FrS, U0 to U5 and F1 to F5. S > F5 > F4 > F3 > F2 > F1 **Advice:** **U0 is the result of an internal calculation based on motor parameters and multiplied by UFr (%). U0 can be adjusted by changing the UFr value.**		
SYn	**[Sync. mot.]**(SYn): Only for synchronous motors with a permanent magnet and sinusoidal electromotive force (EMF). The induction motor parameters cannot be accessed using this selection, however it is possible for synchronous motor parameters to be accessed.		
UFq	**[V/F Quad.]**(UFq): Variable torque. Can be used for pump and fan applications.		
nLD	**[Energy Sav.]**(nLd): Energy saving. For straightforward applications without a high-dynamic requirement.		

4.2.3.6.3.1 [ASYNC. MOTOR] (ASY-)

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > drC- > ASY-

Code	Name/Description	Setting range	Factory settings
ASY-	**[ASYNC. MOTOR]** Only visible if **[Motor control type]**(Ctt) is not set to **[Sync. mot.]**(SYn).		
nPr	**[Rated motor power]**	According to inverter performance	See the following table

This parameter cannot be accessed if **[Motor control type]** (Ctt) is set to **[Sync. mot.]** (SYn).
The nominal motor power indicated on the nameplate is displayed in kW if **[Standard mot. freq]**(bFr) = **[50 Hz IEC]**(50), and in HP, if **[Standard mot. freq]**(bFr) = **[60 Hz NEMA]**(60).
For induction motors with (BFR) = 50 Hz, the following table applies:

ACOPOSinverter P66	Setting range		
	Min. value [10 W]	Max. value [10 W]	Default [10 W]
8I66x200018.00-000	9	55	18
8I66x200037.00-000	9	75	37
8I66x200055.00-000	9	110	55
8I66x200075.00-000	9	150	75
8I66x200110.00-000	9	220	110
8I66x200150.00-000	18	300	150
8I66x200220.00-000	37	400	220
8I66T200300.00-000	55	550	300
8I66T200400.00-000	75	750	400
8I66T200550.00-000	110	1100	550
8I66T200750.00-000	150	1500	750
8I66T201100.00-000	220	1850	1100
8I66T201500.00-000	300	2200	1500
8I66T400037.00-000	9	75	37
8I66T400055.00-000	9	110	55
8I66T400075.00-000	9	150	75
8I66T400110.00-000	9	220	110
8I66T400150.00-000	18	300	150
8I66T400220.00-000	37	400	220
8I66T400300.00-000	55	550	300
8I66T400400.00-000	75	750	400
8I66T400550.00-000	110	1100	550
8I66T400750.00-000	150	1500	750
8I66T401100.00-000	220	1850	1100
8I66T401500.00-000	300	2200	1500
8I66T600075.00-000	9	150	75
8I66T600150.00-000	18	300	150
8I66T600220.00-000	37	400	220
8I66T600400.00-000	75	750	400
8I66T600550.00-000	110	1100	550
8I66T600750.00-000	150	1500	750
8I66T601100.00-000	220	1850	1100
8I66T601500.00-000	300	2200	1500

For induction motors with (BFR) = 60 Hz, the following table applies:

ACOPOSinverter P66	Setting range		
	Min value [0.1 PS]	Max value [0.1 PS]	Default [0.1 PS]
8I66x200018.00-000	1	8	3
8I66x200037.00-000	1	10	5
8I66x200055.00-000	1	15	8
8I66x200075.00-000	1	20	10
8I66x200110.00-000	1	30	15
8I66x200150.00-000	3	40	20
8I66x200220.00-000	5	50	30
8I66T200300.00-000	8	70	40
8I66T200400.00-000	10	100	50
8I66T200550.00-000	15	150	70
8I66T200750.00-000	20	200	100
8I66T201100.00-000	30	250	150
8I66T201500.00-000	40	300	200
8I66T400037.00-000	1	10	5
8I66T400055.00-000	1	15	8
8I66T400075.00-000	1	20	10
8I66T400110.00-000	1	30	15
8I66T400150.00-000	3	40	20
8I66T400220.00-000	5	50	30
8I66T400300.00-000	6	70	40
8I66T400400.00-000	8	100	50
8I66T400550.00-000	15	150	70
8I66T400750.00-000	20	200	100
8I66T401100.00-000	30	250	150
8I66T401500.00-000	40	300	200
8I66T600075.00-000	1	20	10
8I66T600150.00-000	3	40	20
8I66T600220.00-000	5	50	30
8I66T600400.00-000	8	100	50
8I66T600550.00-000	10	150	70
8I66T600750.00-000	15	200	100
8I66T601100.00-000	20	250	150
8I66T601500.00-000	30	300	200

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > drC- > ASY-

Code	Name/Description	Setting range	Factory settings
COS	**[Motor 1 Cosinus Phi]**	0.5 to 1	See the following table

The nominal cosine phi of the motor
This parameter can be accessed if **[Motor param choice]**(MPC) = **[Mot Cos]**(COS).

ACOPOSinverter P66	Setting range		
	Min value [0.01]	Max value [0.01]	Default [0.01]
8I66x200018.00-000			75
8I66x200037.00-000			75
8I66x200055.00-000			75
8I66x200075.00-000			77
8I66x200110.00-000			79
8I66x200150.00-000			79
8I66x200220.00-000			81
8I66T200300.00-000			78
8I66T200400.00-000			79
8I66T200550.00-000			82
8I66T200750.00-000			84
8I66T201100.00-000			85
8I66T201500.00-000			85
8I66T400037.00-000			75
8I66T400055.00-000			75
8I66T400075.00-000			77
8I66T400110.00-000	50	100	79
8I66T400150.00-000			79
8I66T400220.00-000			81
8I66T400300.00-000			78
8I66T400400.00-000			79
8I66T400550.00-000			82
8I66T400750.00-000			84
8I66T401100.00-000			85
8I66T401500.00-000			85
8I66T600075.00-000			77
8I66T600150.00-000			79
8I66T600220.00-000			81
8I66T600400.00-000			79
8I66T600550.00-000			82
8I66T600750.00-000			84
8I66T601100.00-000			85
8I66T601500.00-000			85

Code	Name/Description	Setting range	Factory settings
UnS	**[Rated motor volt.]**	100 to 500 V	In accordance with inverter power and **[Standard mot. freq]**(bFr)

This parameter cannot be accessed if **[Motor control type]**(Ctt) is set to **[Sync. mot.]**(SYn).
Rated motor voltage given on the nameplate.

Code	Name/Description	Setting range	Factory settings
nCr	**[Rated mot. current]**	0.25*INV to 1.5*INV (1)	See the following table

This parameter cannot be accessed if **[Motor control type]** (Ctt) is set to **[Sync. mot.]** (SYn).
Rated motor current given on the nameplate.

ACOPOSinverter P66	Setting range		
	Min. value [0.1 A]	Max. value [0.1 A]	Default [0.1 A]
8I66x200018.00-000	3	23	11
8I66x200037.00-000	8	50	19
8I66x200055.00-000	9	56	29
8I66x200075.00-000	12	72	35
8I66x200110.00-000	17	104	48
8I66x200150.00-000	20	120	61
8I66x200220.00-000	27	165	88
8I66T200300.00-000	34	206	125
8I66T200400.00-000	43	263	158
8I66T200550.00-000	68	413	206
8I66T200750.00-000	82	495	263
8I66T201100.00-000	135	810	369
8I66T201500.00-000	165	990	495
8I66T400037.00-000	3	23	10
8I66T400055.00-000	4	29	14
8I66T400075.00-000	5	35	20
8I66T400110.00-000	7	45	25
8I66T400150.00-000	10	62	35
8I66T400220.00-000	13	83	51
8I66T400300.00-000	17	107	72
8I66T400400.00-000	23	143	91
8I66T400550.00-000	35	215	119
8I66T400750.00-000	42	255	152
8I66T401100.00-000	69	416	213
8I66T401500.00-000	82	495	286
8I66T600075.00-000	4	26	11
8I66T600150.00-000	6	41	22
8I66T600220.00-000	9	59	30
8I66T600400.00-000	15	92	49
8I66T600550.00-000	22	135	74
8I66T600750.00-000	27	165	95
8I66T601100.00-000	42	255	145
8I66T601500.00-000	55	330	188

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > drC- > ASY-

Code	Name/Description	Setting range	Factory settings
FrS	**[Rated motor freq.]** This parameter cannot be accessed if **[Motor control type]** (Ctt) is set to **[Sync. mot.]** (SYn). Rated motor frequency given on the nameplate. The default factory setting is 50 Hz or 60 Hz if **[Standard mot. freq]**(bFr) is set to 60 Hz.	10 to 599 Hz	50 Hz
nSP	**[Rated motor speed]** This parameter cannot be accessed if **[Motor control type]** (Ctt) is set to **[Sync. mot.]** (SYn). 0 to 9999 rpm then 10.00 to 65.53 krpm on the integrated display terminal. If, instead of the nominal speed, the nameplate indicates the synchronous speed and the slip in Hz or as a percentage, calculate the nominal speed as follows:	0 to 65,535 rpm	See the following table

$$\text{Nominalspeed} = \text{Synchronousspeed} \times \frac{100 - \text{slip } in\ \%}{100}$$

or

$$\text{Nominalspeed} = \text{Synchronousspeed} \times \frac{50 - \text{slip } in\ Hz}{50}\left(50 - Hz - motors\right)$$

or

$$\text{Nominal speed} = \text{Synchronous speed} \times \frac{60 - \text{Slip in } Hz}{60}\left(60 - Hz \text{ motors}\right)$$

If (BFR) = 50:

ACOPOSinverter P66	Setting range		
	Min. value [rpm]	Max. value [rpm]	Default [rpm]
8I66x200018.00-000			1410
8I66x200037.00-000			1425
8I66x200055.00-000			1400
8I66x200075.00-000			1400
8I66x200110.00-000			1410
8I66x200150.00-000			1420
8I66x200220.00-000			1430
8I66T200300.00-000			1420
8I66T200400.00-000			1425
8I66T200550.00-000			1430
8I66T200750.00-000			1450
8I66T201100.00-000			1450
8I66T201500.00-000			1455
8I66T400037.00-000			1425
8I66T400055.00-000			1400
8I66T400075.00-000			1400
8I66T400110.00-000	0	65535	1410
8I66T400150.00-000			1420
8I66T400220.00-000			1430
8I66T400300.00-000			1420
8I66T400400.00-000			1425
8I66T400550.00-000			1430
8I66T400750.00-000			1450
8I66T401100.00-000			1450
8I66T401500.00-000			1455
8I66T600075.00-000			1400
8I66T600150.00-000			1420
8I66T600220.00-000			1430
8I66T600400.00-000			1425
8I66T600550.00-000			1430
8I66T600750.00-000			1450
8I66T601100.00-000			1450
8I66T601500.00-000			1455

If (BFR) = 60:

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > drC- > ASY-

Code	Name/Description	Setting range	Factory settings

ACOPOSinverter P66	Setting range: Min. value [rpm]	Setting range: Max. value [rpm]	Default [rpm]
8I66x200018.00-000	0	65535	1680
8I66x200037.00-000			1720
8I66x200055.00-000			1700
8I66x200075.00-000			1700
8I66x200110.00-000			1680
8I66x200150.00-000			1715
8I66x200220.00-000			1715
8I66T200300.00-000			1760
8I66T200400.00-000			1769
8I66T200550.00-000			1780
8I66T200750.00-000			1780
8I66T201100.00-000			1766
8I66T201500.00-000			1771
8I66T400037.00-000			1720
8I66T400055.00-000			1700
8I66T400075.00-000			1700
8I66T400110.00-000			1680
8I66T400150.00-000			1715
8I66T400220.00-000			1715
8I66T400300.00-000			1760
8I66T400400.00-000			1769
8I66T400550.00-000			1780
8I66T400750.00-000			1780
8I66T401100.00-000			1766
8I66T401500.00-000			1771
8I66T600075.00-000			1700
8I66T600150.00-000			1715
8I66T600220.00-000			1715
8I66T600400.00-000			1769
8I66T600550.00-000			1780
8I66T600750.00-000			1780
8I66T601100.00-000			1766
8I66T601500.00-000			1771

tUn — **[Auto-tuning]** — Factory setting: **[No]**(nO)

2 s

Warning!

UNEXPECTED MOVEMENT

The motor is moved during autotuning in order to fine-adjust the control loop.

- **Do not switch on the system until you have verified that there is no one in the operating area and that it is free from obstacles.**

Failure to follow these instructions can result in serious injury and death or damage to the equipment.

The motor is executes small movements during autotuning. It is normal for the system to vibrate and produce some noise.

- Autotuning is only performed if no stop command has been activated. If function "Freewheel stop" or "Fast stop" has been assigned to a logic input, this input must be set to 1 (input at 0 active).
- Autotuning has priority over any movement or premagnetization commands. These will not be taken into account until after autotuning.
- If autotuning reports an error, the inverter displays **[No action]**(nO) and, depending on the configuration of **[Autotune fault mgt]**(tnL), it then switches to error mode **[Auto-tuning]**(tnF).
- Autotuning may last for 1 to 2 seconds. Do not interrupt the process. Wait until the display changes to **[No action]**(nO).

Advice:

The thermal state of the motor greatly affects the tuning result. Perform tuning when the motor is stopped and when it is cold.

In order to perform autotuning again, wait until the motor has stopped and cooled down completely. First set **[Auto-tuning]**(tnF) to **[Erase tune]**(CLr), then repeat the autotuning process.
To calculate the thermal state of the motor, autotuning can be performed without enabling **[Erase tune]**(CLr) first.
In all cases, the motor must be stopped before any tuning procedure is performed.
Cable length also affects tuning results. If the cabling is changed, the tuning procedure must be repeated.

nO — **[No action]**(nO): Autotuning not running

YES — **[Do tune]**(YES): Autotuning is performed immediately if possible, at which point the parameter automatically changes to **[No action]**(nO). If the inverter state does not permit immediate tuning, the parameter changes to **[No]**(nO) and the procedure must be repeated.

CLr — **[Erase tune]**(CLr): The motor parameters recorded by autotuning are reset. The standard motor parameter values are used to control the motor. **[Auto tuning status]**(tUS) = **[Not done]**(tAb).

tUS — **[Auto tuning status]** — Factory setting: **[Not done]**(tAb)

(For information only, cannot be modified)
This parameter is not stored when the inverter is switched off. It shows the autotuning state since the last time the device was commissioned.

tAb — **[Not done]**(tAb): Autotuning has not been executed.

PEnd — **[Idle]** (PEnd): Autotuning has been requested but has not been performed yet.

PrOG — **[Active]**(PrOG): Autotuning is being performed.

FAIL — **[Failed]**(FAIL): Autotuning has failed.

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > drC- > ASY-			
Code	**Name/Description**	**Setting range**	**Factory settings**
dOnE	[Done](dOnE): The motor parameters calculated during autotuning are used to control the motor.		
StUn tAb MEAS CUS	[Tune selection] (For information only, cannot be modified) [Default](tAb): The standard motor parameter values are used to control the motor. [Measure](MEAS): The values calculated during autotuning are used to control the motor. [Customized](CUS): The manually set values are used to control the motor. **Advice:** **Autotuning can increase motor performance considerably.**		[Default](tAb)
tUnU nO tM Ct	[Auto tuning usage] This parameter indicates the methods that were used to change the motor parameters in accordance with the calculated thermal state of the motor. [No](nO): Thermal state not calculated. [Therm Mot](tM): Calculation of the stator thermal state, based on the motor's nominal current and current consumption. [Cold tun](Ct): Calculation of the stator thermal state, based on the stator resistance calculated during the initial tuning of the cold motor and the autotuning performed at each startup. **Advice:** **Before [Auto tuning usage] (TUNU) is set to [Cold tun] (CT), autotuning must be performed to obtain reference values for a cold motor.**		[Therm Mot](tM)
AUt 2 s nO YES onE	[Automatic autotune] **Warning!** **UNEXPECTED MOVEMENT** **If this function is enabled, autotuning is performed every time the inverter is switched on.** • **Make sure that enabling this function does not result in unsafe states.** **Failure to follow these instructions can result in death, serious injury or damage to property.** The motor must be switched off when the inverter is switched on. [Automatic autotune](AUt) = [YES](YES) if [Auto tuning usage](tUnU) = [Cold tun](Ct). The motor stator resistance value calculated during the tuning process is used to calculate the motor thermal state when the device is switched on. [No](nO): Function disabled [YES](YES): Tuning is performed automatically on each startup. [One](onE): Tuning is performed on the first move command.		[No](nO)
FLU (1) 2 s FnC FCt	[Motor fluxing] **Danger!** **RISK OF ELECTRIC SHOCK, ARC FLASH OR EXPLOSION** **If parameter [Motor fluxing](FLU) is set to [continuous](FCt) fluxing will always occur, even when the motor is not running.** **Make sure that this setting does not result in unsafe states.** **Failure to follow these instructions can result in death or serious injury.** **Advice:** **MOTOR OVERHEATING AND DAMAGE** **To prevent motor overheating and damage, check whether the connected motor has the correct sizing for the magnetizing current.** **Failure to observe these instructions can result in damage to the equipment.** If [Motor control type](Ctt) = [Sync. mot.](SYn), [Not cont.](FnC) replaces the factory setting. In order to obtain rapid high torque on startup, magnetic flux needs to already have been established in the motor. In mode [continuous](FCt), the inverter automatically establishes the magnetic flux on startup. In mode[Not cont.](FnC), magnetization takes place when the motor has been started. The magnetic flux current is greater than [Rated mot. current](nCr) (configured nominal motor current) if magnetization has been established. After this, the flux current will be adjusted to the motor's magnetizing current. [Not cont.](FnC): Non-continuous mode [continuous](FCt): Continuous mode. This option is not possible if [Auto DC injection](AdC) is set to [YES](YES), or if [Type of stop](Stt) was set to [Freewheel](nSt).		[No](FnO)

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > drC- > ASY-			
Code	**Name/Description**	**Setting range**	**Factory settings**
FnO	[No](FnO): Function inactive. This option is not possible if [Brake assignment](bLC) is not set to [No](nO). If [Motor control type](Ctt) is set to [Sync. mot.](SYn), parameter[Motor fluxing](FLU) triggers rotor assignment and not magnetization assignment. If [Brake assignment](bLC) is not set to [No](nO), parameter [Motor fluxing](FLU) has no effect.		
MPC	[Motor param choice]		[Motor power](nPr)
nPr COS	[Motor power](nPr) [Mot Cos](COS)		

(1) In corresponds to the rated inverter current indicated in the Installation Manual and on the inverter nameplate.

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

2 s To change the assignment of this parameter, press the ENT key for 2 seconds.

4.2.3.6.3.2 [ASYNC. MOTOR] (ASY-) - Expert mode

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > drC- > ASY-			
Code	**Name/Description**	**Setting range**	**Factory settings**
ASY-	[ASYNC. MOTOR]		
rSA (1)	[Cust stator resist.] Cold state stator resistance (per winding), modifiable value. The factory setting is replaced by the autotuning result, if autotuning has been performed.	0 to 65,535 mΩ	0 mΩ
LFA	[Lfw] Stray inductance in cold state, modifiable value. The factory setting is replaced by the autotuning result, if autotuning has been performed.	0 to 655.35 mH	0 mH
IdA	[Idw] Customized adjusted magnetizing current. The factory setting is replaced by the autotuning result, if autotuning has been performed.	0 to 6,553.5 A	0 A
trA	[Cust. rotor t const.] Customized adjusted rotor time constant. The factory setting is replaced by the autotuning result, if autotuning has been performed.	0 to 65,535 ms	0 ms

(1) On the integrated display terminal: 0 to 9999 then 10.00 to 65.53 (10,000 to 65,535).

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

4.2.3.6.3.3 Synchronous motor parameters

These parameters can be accessed if [Motor control type](Ctt) is set to [Sync. mot.] (SYn).

In this case, the induction motor parameters are inaccessible.

After selecting the inverter:

1. Enter the motor nameplate.

2. Perform measurement.

- Perform [Auto-tuning](tUn).
- Check the magnetic reluctance of the synchronous motor.

If [Saliency mot. state](SMOt) displays [Med salient](MLS) or [High salient](HLS):

- Perform the steps under **3. Improve tuning results**

and

- Perform the steps under **4. Adjust PHS**.

Or if [Saliency mot. state](SMOt) corresponds to [Low salient](LLS):

- Perform the steps under **4. Adjust PHS**.

3. Improve tuning results.

Advice:

MOTOR OVERHEATING AND DAMAGE

- **Make sure that the motor has the required power rating for the applied maximum current.**
- **In order to calculate the maximum current, take the motor work cycle and all the factors involved in using the motor into account, including declassification requirements.**

Failure to observe these instructions can result in damage to the equipment.

- Set **[PSI align curr. max]**(MCr) in accordance with the maximum motor current. The maximum value of **[PSI align curr. max]**(MCr) is delimited by **[CURRENT LIMIT.]**(CLI). If you have no data to hand, set **[PSI align curr. max]**(MCr) to **[Auto]**(AUtO).
- Execute a second (tUn) after the change to (MCr).

4. Adjust PHS.

Adjust **[Syn. EMF constant]**(PHS) to achieve optimal behavior.

- Start the motor using the lowest stable frequency possible for the machine (without load).
- Check and make note of the value of **[% error EMF sync]**(rdAE).
    - If the value of **[% error EMF sync]**(rdAE) is less than 0%, **[Syn. EMF constant]**(PHS) can be increased.
    - If the value of **[% error EMF sync]**(rdAE) is greater than 0%, **[Syn. EMF constant]**(PHS) can be decreased.

      The value of **[% error EMF sync]**(rdAE) should be close to 0%.
- Stop the motor to change (PHS) in accordance with the (previously noted) value for (rdAE)

Advice:

The inverter must be selected in such a way that depending on the required behavior, it is supplied with sufficient but not excessive current so that the current can be measured more precisely, especially at high frequency signal injection. See [HF inj. activation] (HFI).

Power values can be increased for motors with high cogging, if high frequency injection is enabled. See [HF inj. activation] (HFI).

4.2.3.6.3.4 [SYNCHRONOUS MOTOR] (SYn-)

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > drC- > SYN-			
Code	**Name/Description**	**Setting range**	**Factory settings**
SYN-	[Sync. mot.]		
nCrS	[Nominal I sync.]	0.25*INV to 1.5*INV (1)	See the following table

Nominal current of the synchronous motor as provided on the nameplate.

ACOPOSinverter P66	Setting range		
	Min. value [0.1 A]	Max. value [0.1 A]	Default [0.1 A]
8I66x200018.00-000	3	23	6
8I66x200037.00-000	8	50	16
8I66x200055.00-000	9	56	26
8I66x200075.00-000	12	72	28
8I66x200110.00-000	17	104	38
8I66x200150.00-000	20	120	49
8I66x200220.00-000	27	165	53
8I66T200300.00-000	34	206	96
8I66T200400.00-000	43	263	140
8I66T200550.00-000	68	413	175
8I66T200750.00-000	82	495	230
8I66T201100.00-000	135	810	290
8I66T201500.00-000	165	990	420
8I66T400037.00-000	3	23	6
8I66T400055.00-000	4	29	7
8I66T400075.00-000	5	35	15
8I66T400110.00-000	7	45	23
8I66T400150.00-000	10	62	31
8I66T400220.00-000	13	83	32
8I66T400300.00-000	17	107	63
8I66T400400.00-000	23	143	90
8I66T400550.00-000	35	215	102
8I66T400750.00-000	42	255	140
8I66T401100.00-000	69	416	179
8I66T401500.00-000	82	495	185
8I66T600075.00-000	4	26	15
8I66T600150.00-000	6	41	31
8I66T600220.00-000	9	59	32
8I66T600400.00-000	15	92	90
8I66T600550.00-000	22	135	102
8I66T600750.00-000	27	165	140
8I66T601100.00-000	42	255	179
8I66T601500.00-000	55	330	185

Code	Name/Description	Setting range	Factory settings
PPnS	[Pole pairs]	1 to 50	See the following table

Number of pole pairs on the synchronous motor

ACOPOSinverter P66	Setting range		
	Min. value	Max. value	Default
8I66x200018.00-000			3
8I66x200037.00-000			3
8I66x200055.00-000			3
8I66x200075.00-000			4
8I66x200110.00-000			4
8I66x200150.00-000			4
8I66x200220.00-000			4
8I66T200300.00-000			5
8I66T200400.00-000			5
8I66T200550.00-000			5
8I66T200750.00-000			5
8I66T201100.00-000			5
8I66T201500.00-000			5
8I66T400037.00-000			3
8I66T400055.00-000			3
8I66T400075.00-000			3
8I66T400110.00-000	1	50	4
8I66T400150.00-000			4
8I66T400220.00-000			4
8I66T400300.00-000			5
8I66T400400.00-000			5
8I66T400550.00-000			5
8I66T400750.00-000			5
8I66T401100.00-000			5
8I66T401500.00-000			5
8I66T600075.00-000			3
8I66T600150.00-000			4
8I66T600220.00-000			4
8I66T600400.00-000			5
8I66T600550.00-000			5
8I66T600750.00-000			5
8I66T601100.00-000			5
8I66T601500.00-000			5

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > drC- > SYN-

Code	Name/Description	Setting range	Factory settings
nSPS	[Nom motor spdsync]	0 to 65535 or $^{8000}/_{6}$*PPNS	See the following table

Rated motor speed given on the nameplate.

ACOPOSinverter P66	Setting range		
	Min. value [rpm]	Max. value [rpm]	Default [rpm]
8I66x200018.00-000			3200
8I66x200037.00-000			2960
8I66x200055.00-000			3120
8I66x200075.00-000			2580
8I66x200110.00-000			1920
8I66x200150.00-000			2100
8I66x200220.00-000			1560
8I66T200300.00-000			1200
8I66T200400.00-000			1160
8I66T200550.00-000			1000
8I66T200750.00-000			1000
8I66T201100.00-000			2000
8I66T201500.00-000			2000
8I66T400037.00-000			3200
8I66T400055.00-000			3360
8I66T400075.00-000			2400
8I66T400110.00-000	0	48000	2000
8I66T400150.00-000			2040
8I66T400220.00-000			1620
8I66T400300.00-000			1200
8I66T400400.00-000			1160
8I66T400550.00-000			1000
8I66T400750.00-000			1000
8I66T401100.00-000			2000
8I66T401500.00-000			2000
8I66T600075.00-000			2400
8I66T600150.00-000			2040
8I66T600220.00-000			1620
8I66T600400.00-000			1160
8I66T600550.00-000			1000
8I66T600750.00-000			1000
8I66T601100.00-000			2000
8I66T601500.00-000			2000

Code	Name/Description	Setting range	Factory settings
tqS	[Motor torque]	0.1 to 6,553.5 Nm	See the following table

Nominal torque of the motor as provided on the nameplate.

ACOPOSinverter P66	Setting range		
	Min. value [0.1 Nm]	Max. value [0.1 Nm]	Default [0.1 Nm]
8I66x200018.00-000			5
8I66x200037.00-000			13
8I66x200055.00-000			19
8I66x200075.00-000			27
8I66x200110.00-000			46
8I66x200150.00-000			57
8I66x200220.00-000			79
8I66T200300.00-000			171
8I66T200400.00-000			263
8I66T200550.00-000			517
8I66T200750.00-000			705
8I66T201100.00-000			450
8I66T201500.00-000			587
8I66T400037.00-000			8
8I66T400055.00-000			11
8I66T400075.00-000			21
8I66T400110.00-000	1	65535	52
8I66T400150.00-000			70
8I66T400220.00-000			95
8I66T400300.00-000			171
8I66T400400.00-000			263
8I66T400550.00-000			517
8I66T400750.00-000			705
8I66T401100.00-000			450
8I66T401500.00-000			587
8I66T600075.00-000			21
8I66T600150.00-000			70
8I66T600220.00-000			95
8I66T600400.00-000			263
8I66T600550.00-000			517
8I66T600750.00-000			705
8I66T601100.00-000			450
8I66T601500.00-000			587

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > drC- > SYN-			
Code	**Name/Description**	**Setting range**	**Factory settings**
tUn 2 s	**[Auto-tuning]** **Warning!** **UNEXPECTED MOVEMENT** **The motor is moved during autotuning in order to fine-adjust the control loop.** • **Do not switch on the system until you have verified that there is no one in the operating area and that it is free from obstacles.** **Failure to follow these instructions can result in serious injury and death or damage to the equipment.** The motor is executes small movements during autotuning. It is normal for the system to vibrate and produce some noise. • Autotuning is only performed if no stop command has been activated. If function "Freewheel stop" or "Fast stop" has been assigned to a logic input, this input must be set to 1 (input at 0 active). • Autotuning has priority over any movement or premagnetization commands. These will not be taken into account until after autotuning. • If autotuning detects an error, the inverter displays[No action](nO) and, depending on the configuration of [Autotune fault mgt](tnL), it switches to error mode [Auto-tuning](tnF). • Autotuning may last for 1 to 2 seconds. Do not interrupt the process. Wait until the display changes to [No action](nO) **Advice:** **The thermal state of the motor greatly affects the tuning result. Perform tuning when the motor is stopped and when it is cold.** **In order to perform autotuning again, wait until the motor has stopped and cooled down completely. First set [Auto-tuning](tnF) to [Erase tune](CLr) and then repeat the autotuning process.** **To calculate the thermal state of the motor, autotuning can be performed without enabling[Erase tune](CLr) first.** **In all cases, the motor must be stopped before any tuning procedure is performed. Cable length also affects tuning results. If the cabling is changed, the tuning procedure must be repeated.**		[No](nO)
nO YES CLr	[No action](nO): Autotuning not running [Do tune](YES): Autotuning is performed immediately if possible, at which point the parameter automatically changes to [No action](nO). If the inverter state does not permit immediate tuning, the parameter changes to [No](nO) and the procedure must be repeated. [Erase tune](CLr): The motor parameters recorded by autotuning are reset. The standard motor parameter values are used to control the motor. [Auto tuning status](tUS) = [Not done](tAb).		
tUS	**[Auto tuning status]** (For information only, cannot be modified) This parameter is not stored when the inverter is switched off. It shows the autotuning state since the last time the device was commissioned.		[Not done](tAb)
tAb PEnd PrOG FAIL dOnE	[Not done](tAb): Autotuning has not been executed. [Idle] (PEnd): Autotuning has been requested but has not been performed yet. [Active](PrOG): Autotuning is being performed. [Failed](FAIL): Autotuning has failed. [Done](dOnE): The motor parameters calculated during autotuning are used to control the motor.		
StUn	**[Tune selection]** (For information only, cannot be modified) **Advice:** **Autotuning can increase motor performance considerably.**		[Default](tAb)
tAb MEAS CUS	[Default](tAb): The standard motor parameter values are used to control the motor. [Measure](MEAS): The values calculated during autotuning are used to control the motor. [Customized](CUS): The manually set values are used to control the motor.		
tUnU	**[Auto tuning usage]** This parameter indicates the methods that were used to change the motor parameters in accordance with the calculated thermal state of the motor.		[Therm Mot](tM)
nO tM Ct	[No](nO): Thermal state not calculated. [Therm Mot](tM): Calculation of the stator thermal state, based on the motor's nominal current and current consumption. [Cold tun](Ct): Calculation of the stator thermal state, based on the stator resistance calculated during the initial tuning of the cold motor and the autotuning performed at each startup. **Advice:** **Before [Auto tuning usage] (TUNU) is set to [Cold tun] (CT), autotuning must be performed to obtain reference values for a cold motor.**		

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > drC- > SYN-

Code	Name/Description	Setting range	Factory settings
AUt 2 s	**[Automatic autotune]** **Warning!** **UNEXPECTED MOVEMENT** **If this function is enabled, autotuning is performed every time the inverter is switched on.** **Make sure that enabling this function does not result in unsafe states.** **Failure to follow these instructions can result in death, serious injury or damage to property.** The motor must be switched off when the inverter is switched on. **[Automatic autotune]** (AUt) = **[YES]** (YES) if **[Auto tuning usage]** (tUnU) = **[Cold tun]** (Ct). The motor stator resistance value calculated during the tuning process is used to calculate the motor thermal state when the device is switched on.		**[No]**(nO)
nO	**[No]**(nO): Function disabled		
YES	**[YES]**(YES): Tuning is performed automatically on each startup.		
onE	**[One]**(onE): Tuning is performed on the first move command.		
SMOt ★	**[Saliency mot. state]** (For information only, cannot be modified) Magnetic reluctance information for synchronous motors. This parameter can be accessed if **[Tune selection]**(StUN) = **[Measure]**(MEAS) **Advice:** **For a motor with lower magnetic reluctance, the standard control process is recommended.**		
nO	**[No]** (nO): Tuning is not performed.		
LLS	**[Low salient]**(LLS): Low magnetic reluctance (recommended configuration: **[Angle setting type]**(ASt) = **[PSI align]**(PSI) or **[PSIO align]**(PSIO) and **[HF inj. activation]**(HFI) = **[No]**(nO)).		
MLS	**[Med salient]**(MLS): Medium magnetic reluctance (**[Angle setting type]**(ASt) = **[SPM align]**(SPMA) is possible. **[HF inj. activation]**(HFI) = **[YES]**(YES) is possible).		
HLS	**[High salient]**(HLS): High magnetic reluctance (**[Angle setting type]**(ASt) = **[IPM align]**(IPMA) is possible. **[HF inj. activation]**(HFI) = **[Yes]**(YES) is possible).		
ASt ★	**[Set angle type]** Mode for measuring phase shift angle. Only visible if **[Motor control type]**(Ctt) = **[Sync. mot.]**(SYn). **[PSI align]**(PSI) and **[PSIO align]**(PSIO) work for all types of synchronous motor. **[SPM align]**(SPMA) and **[Assign IPM]**(IPMA) increase performance, depending on the type of synchronous motor.		**[PSIO align]**(PSIO)
IPMA	**[IPM align]**(IPMA): IPM motor (Interior-buried permanent magnet motor) assignment. Assignment mode for the interior-buried permanent motor (this motor normally has a high magnetic reluctance). It uses a high-frequency application that produces much less noise then standard assignment mode.		
SPMA	**[SPM align]**(SPMA): SPM motor (Surface-mounted permanent magnet motor) assignment. Assignment mode for the surface-mounted permanent motor (this motor normally has medium or low magnetic reluctance). It uses a high-frequency application that produces much less noise then standard assignment mode.		
PSI	**[PSI align]**(PSI): Pulse signal application. Standard assignment mode after pulse signal injection.		
PSIO	**[PSIO align]**(PSIO): Optimized pulse signal application. Optimized standard assignment mode after pulse signal application. The phase shift angle measurement time is reduced after the first move command or measurement procedure, even if the inverter has been switched off.		
nO	**[No action]**(nO): No assignment.		
HFI ★	**[HF inj. activation]** Enabling the high-frequency signal application in RUN. This function allows the motor speed to be calculated in such a way that torque can be achieved at low frequencies without speed feedback. **Advice:** **The higher the cogging, the more efficient function [HF inj. activation](HFI).** To ensure the power values, it may be necessary to adjust the speed control parameters (**[K speed loop filter]**(SFC), **[Speed time integral]**(SIt) and **[Speed prop. gain]**(SPG)) and the phase control loop (Expert parameters **[HF PLL bandwidth]**(SPb) and **[Speed fdback loss]**(SPF)). The high-frequency application is not efficient in motors with low cogging. A 4-Hz PWM frequency is suitable (**[Switching freq.]**(SFr)). In cases of instability without load, it is recommended to reduce **[Speed prop. gain]**(SPG) and **[HF PLL bandwidth]**(SPb). For low frequencies, adjust the speed control loop parameters for dynamic behavior and the PLL gain for accurate speed calculation. In the case of instability with load, it can be helpful to increase parameter **[Angle error Comp.]**(PEC) (especially for SPM motors).		**[No]**(nO)
nO	**[No]**(nO): Function disabled.		
YES	**[YES]**(YES): High-frequency injection is used to calculate speed.		

(1) On the integrated display terminal: 0 to 9999 then 10.00 to 65.53 (10,000 to 65,536).

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

2 s To change the assignment of this parameter, press the ENT key for 2 seconds.

4.2.3.6.3.5 [SYNCHRONOUS MOTOR] (SYn-) Expert mode

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > drC- > SYN-			
Code	**Name/Description**	**Setting range**	**Factory settings**
SYN-	**[Sync. mot.]**		
rSAS (1)	**[Cust. stator R syn]** Cold-state stator resistance (per winding). The factory setting is replaced by the autotuning result, if autotuning has been performed. This value can be entered by the user, if known.	0 to 65,535 mΩ	0 mΩ
LdS	**[Autotune L d-axis]** "d" axis stator inductance in mH (per phase). For motors with smooth poles: **[Autotune L d-axis]**(LdS) = **[Autotune L q-axis]**(LqS) = Stator inductance L. The factory setting is replaced by the autotuning result, if autotuning has been performed.	0 to 655.35 mH	0 mH
LqS	**[Autotune L q-axis]** Stator inductance axis "q" in mH (per phase). For motors with smooth poles: **[Autotune L d-axis]**(LdS) = **[Autotune L q-axis]**(LqS) = Stator inductance L. The factory setting is replaced by the autotuning result, if autotuning has been performed.	0 to 655.35 mH	0 mH
PHS (1)	**[Syn. EMF constant]** Synchronous motor EMF constant in mV per rpm (peak voltage per phase). During operation without load, PHS assignment is used to reduce the current.	0 to 6553.5 mV/rpm	0 mV/rpm
FrSS	**[Nominal freq sync.]** Rated motor frequency for synchronous motors in Hz. Automatically updated in accordance with data from **[Nom motor spdsync]**(nSPS) and **[Pole pairs]**(PPnS).	10 to 800 Hz	**[Nom motor spdsync]**(nSPS)* **[Pole pairs]**(PP-nS) / 60
SPb	**[HF PLL bandwidth]** Bandwidth of PLL stator frequency.	0 to 100 Hz	25 Hz
SPF	**[Speed fdback loss]** Red. factor of PLL stator frequency.	0 to 200%	100%
PEC	**[Angle error Comp.]** Angular position error compensation in high frequency mode. This increases performance at low frequencies in generator and motor mode, especially for SPM motors.	0 to 500%	0%
AUtO	**[Auto]**(AUtO): The inverter accepts a value that corresponds to the motor nominal slip calculated on the basis of the drive parameters.		
FrI	**[High-frequency injection frequency]** Frequency of the high-frequency injection signal. This affects the noise level during angle offset measurement and the accuracy of speed calculation.	250 to 1,000 Hz	500 Hz
HIr	**[HF current level]** Current level value for the high-frequency injection signal. This affects the noise level during angle offset measurement and the accuracy of speed calculation.	0 to 200%	25%
MCr	**[PSI align curr. max]** Current level as a % of **[Nominal I sync.]**(nCrS) for angle offset measurement modes **[PSI align]**(PSI) and **[PSIO align.]**(PSIO). This parameter affects inductance measurement. [PSI align curr. max](MCr) is used for measurement. This current must be greater than or equal to the maximum current level for this application. Otherwise, instability may occur. If **[PSI align curr. max]**(MCr) = **[Auto]**(AUtO), **[PSI align curr. max]**(MCr) = 150% of **[Nominal I sync.]**(nCrS) during measurement and 100% of **[Nominal I sync.]**(nCrS) during angle offset measurement with standard assignment (**[PSI align]**(PSI) or **[PSIO align.]**(PSIO)).	**[Auto]**(AUtO) to 300%	**[Auto]**(AUtO)
ILr	**[Injection level align]** Current level as a % of **[Nominal I sync.]**(nCrS) for IPMA measurement of the high-frequency phase-shift angle.	0 to 200%	50%
SIr	**[Boost level align.]** Current level as a % of **[Nominal I sync.]**(nCrS) for SPMA measurement of the high-frequency phase-shift angle.	0 to 200%	100%
rdAE	**[% error EMF sync]** Power ratio D-axis Use rdAE to adjust **[Syn. EMF constant]**(PHS), where rdAE must be close to 0. If the value of **[% error EMF sync]**(rdAE) is less than 0%, **[Syn. EMF constant]**(PHS) can be increased. If the value of **[% error EMF sync]**(rdAE) is greater than 0%, **[Syn. EMF constant]**(PHS) can be decreased.	-3276.7 to 3275.8	-

(1) On the integrated display terminal: 0 to 9999 then 10.00 to 65.53 (10,000 to 65,536).

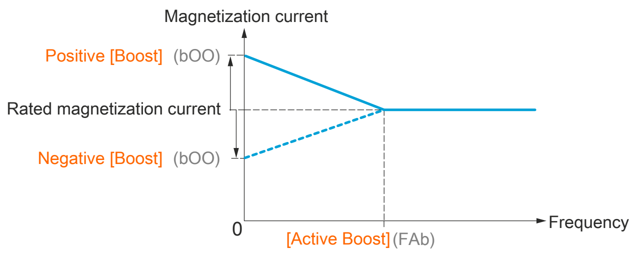
These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

4.2.3.6.3.6 [MOTOR CONTROL] (drC-) (continued)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > drC-			
Code	**Name/Description**	**Setting range**	**Factory settings**
drC-	[MOTOR CONTROL]		
VOLT	[Speed prop. gain] Speed control proportional gain Visible if [Motor control type](Ctt) is not set to [Standard](Std), [V/F 5pts](UFS) or [V/F Quad.](UFq).	0 to 1,000%	40%
SPGU	[UF inertia comp.] Factor of inertia for the following motor control curves: Visible if [Motor control type](Ctt) = [Standard](Std), [V/F 5pts](UFS) or [V/F Quad.](UFq).	0 to 1,000%	40%
SIt	[Speed time integral] Integral time constant for speed control Visible if [Motor control type](Ctt) is not set to [Standard](Std), [V/F 5pts](UFS) or [V/F Quad.](UFq).	1 to 65,535 ms	63 ms
SFC	[K speed loop filter] Speed filter coefficient (0 (IP) to 100 (PI)).	0 to 100	65
FFH	[Spd est. filter time] Only available in Expert mode. Frequency used to filter the calculated speed	0 to 100 ms	6.4 ms
CrtF	[Cur. ref. filter time] Only available in Expert mode. Filter time for the current setpoint filter [of the control curve (if [No](nO): Stator natural frequency)].	0 to 100 ms	3.2 ms
UFr	[IR compensation] Used to optimize torque at very low speed or for adjustment in special cases (Example: To reduce [IR compensation](UFr) for motors connected in parallel. If torque is not sufficient at low speed, increase [IR compensation](UFr). If the value is too high, this can prevent the motor from starting (locking mechanism) or result in a change of current limiting mode.	0 to 200%	100%
SLP	[Slip compensation] This parameter cannot be accessed if [Motor control type](Ctt) = [Sync. mot.](SYn). This parameter is set to 0% if [Motor control type](Ctt) = [V/F Quad.](UFq). Adjust the slip compensation to the value set by nominal motor speed. The speeds given on motor nameplates are not necessarily exact. If the slip setting is lower than the actual slip, it means that the motor is not rotating at the correct speed in steady state; it is rotating at a speed lower than the setpoint. If the slip setting is higher than the actual slip, it means that the motor is overcompensated and the speed is unstable.	0 to 300%	100%
U1	[U1] V/f profile setting This parameter can be accessed if [Motor control type](Ctt) = [V/F 5pts](UF5).	0 to 800 V depending on size	0 V
F1	[F1] V/f profile setting This parameter can be accessed if [Motor control type](Ctt) = [V/F 5pts](UF5).	0 to 599 Hz	0 Hz
U2	[U2] V/f profile setting This parameter can be accessed if [Motor control type](Ctt) = [V/F 5pts](UF5).	0 to 800 V depending on size	0 V
F2	[F2] V/f profile setting This parameter can be accessed if [Motor control type](Ctt) = [V/F 5pts](UF5).	0 to 599 Hz	0 Hz
U3	[U3] V/f profile setting This parameter can be accessed if [Motor control type](Ctt) = [V/F 5pts](UF5).	0 to 800 V depending on size	0 V
F3	[F3] V/f profile setting This parameter can be accessed if [Motor control type](Ctt) = [V/F 5pts](UF5).	0 to 599 Hz	0 Hz
U4	[U4] V/f profile setting This parameter can be accessed if [Motor control type](Ctt) = [V/F 5pts](UF5).	0 to 800 V depending on size	0 V
F4	[F4] V/f profile setting This parameter can be accessed if [Motor control type](Ctt) = [V/F 5pts](UF5).	0 to 599 Hz	0 Hz
U5	[U5] V/f profile setting This parameter can be accessed if [Motor control type](Ctt) = [V/F 5pts](UF5).	0 to 800 V depending on size	0 V
F5	[F5] V/f profile setting This parameter can be accessed if [Motor control type](Ctt) = [V/F 5pts](UF5).	0 to 599 Hz	0 Hz

The parameters described on this page can be accessed by: DRI- > COnF > FULL > drC-

Code	Name/Description	Setting range	Factory settings
CLI	**[CURRENT LIMIT.]**	0 to 1.5*INV	1.5*INV
	Caution! **MOTOR OVERHEATING AND DAMAGE** • **Make sure that the motor has the required power rating for the applied maximum current.** • **In order to calculate the maximum current, take the motor work cycle and all the factors involved in using the motor into account, including declassification requirements.** **Failure to observe these instructions can result in damage to the equipment.** First current limitation. **Advice:** **If the setting is less than 0.25 in, the inverter can lock in error mode [Output Phase Loss](OPL), if this has been enabled). If it is less than the motor no-load current, the motor cannot run.**		
SFt	**[Switch. freq type]** The motor clock frequency is always changed (reduced) if the inverter's internal temperature is too high.		**[SFR type 1]**(HF1)
HF1	**[SFR type 1]**(HF1): Optimized for heating Used by the system to adjust the clock frequency to the motor frequency.		
HF2	**[SFR type 2]**(HF2): Motor noise optimization (for high clock frequency) Allows the system to maintain a selected clock frequency **[Switching freq.]**(SFr), independently of the motor frequency **[Output frequency]**(rFr). In the case of overheating, the inverter automatically reduces the clock frequency. When the temperature returns to normal value, the frequency is also increased back to its original value.		
SFr	**[Switching freq.]**	2 to 16 kHz or 4 kH (if (SVL) enabled)	4 kHz
	Caution! **MOTOR DAMAGE** **If the EMC filter is separated in an IT power system, make sure that the inverter clock frequency does not exceed 4 kHz.** **Failure to observe these instructions can result in damage to the equipment.** Switching frequency setting. Setting range: The maximum value is limited to 4 kHz if parameter **[Motor surge limit]**(SVL) has been configured. **Advice:** **In the event of an excessive temperature increase, the inverter will automatically reduce the clock frequency and then reset it again once the temperature has reverted to within the normal range.** At high motor speeds, it is advisable to increase PWM frequency **[Switching freq.]**(SFr) to 8, 12 or 16 kHz.		
nrd	**[Noise reduction]** Random frequency modulation prevents any resonance that may occur at a fixed frequency.		**[No]**(nO)
nO	**[No]**(nO): Fixed frequency		
YES	**[YES]**(YES): Frequency with random modulation		
bOA	**[Boost activation]**		**[Dynamic]**(dYnA)
nO	**[Inactive]** (nO): No boost		
dYnA	**[Dynamic]**(dYnA): Dynamic boost		
StAt	**[Static]**(StAt): Static boost		
bOO	**[Boost]**	-100 to 100%	0%
	This parameter can be accessed if **[Boost activation]**(bOA) is not set to **[No]**(nO). Adjustment of motor magnetizing current at low speeds as a percentage of nominal magnetizing current. This parameter is used to increase or decrease the time required to build up torque. It allows gradual adjustment up to the frequency, which is defined via **[Action Boost]**(FAb). For motors with conical rotors, negative values are particularly common.  		
FAb	**[Action Boost]**	0 to 599 Hz	0 Hz
	This parameter can be accessed if **[Boost activation]**(bOA) is not set to **[No]**(nO). A frequency that is no longer affected by **[Boost]**(bOO) once it exceeds the magnetizing current.		

The parameters described on this page can be accessed by: DRI- > COnF > FULL > drC-			
Code	**Name/Description**	**Setting range**	**Factory settings**
SVL	**[Motor surge limit.]** This function limits motor overvoltage and can be used for the following types of application: • NEMA motors • Japanese motors • Spindle motors • Rewound motors This parameter can be left set to **[No]**(nO) for 230/400 V motors operated at 230 V and for cases where the cable between the inverter and the motor does not exceed the following lengths: • 4 m for unshielded cables • 10 m for shielded cables **Advice:** **If [Motor surge limit](SVL) = [YES](YES), the maximum clock frequency[Switching freq.](SFr) is changed.**		**[No]**(nO)
nO	**[No]**(nO): Function not active		
YES	**[YES]**(YES): Function active		
SOP	**[Volt surge limit. opt]** Optimization parameter for transient overvoltages at the motor terminals. This parameter can be accessed if **[Motor surge limit]**(SVL) = **[YES]**(YES). Set to 6, 8 or 10 µs, as per the following table.		10 µs
6	**[6 µs]**(6)		
8	**[8 µs]**(8)		
10	**[10 µs]**(10) **Advice:** **This parameter can be used for 8I66T40xxxx.00-000 inverters.**		

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

The value for parameter **[Volt surge limit. opt]**(SOP) corresponds to the damping time for the cable used. It is used to prevent the superimposition of voltage wave reflections resulting from long cable lengths. It limits overvoltages to twice the DC-bus nominal voltage.

The following table shows examples of the correlation between parameter **[Volt surge limit. opt]**(SOP) and the length of the cable between the inverter and the motor. For longer cable lengths, a filter or dV/dt protective filter must be used.

For motors in parallel, the sum of all the cable lengths must be taken into consideration. Compare the length provided in the table row that corresponds to the power for one motor to the length that corresponds to total power, and select the shorter length.

Example: Two 7.5 kW motors (10 HP)

Take the lengths from the 15 kW (20 HP) column that are shorter than those in the 7.5 kW (10 HP) column. Divide the corresponding length by the number of motors to obtain the length per motor (for an unshielded "GORSE" cable where SOP = 6, the result is 40 m / 2 motors = 20 m per motor. This is the maximum for each 7.5 kW (10 HP) motor).

In special cases (for example, different types of cable, motors of different power connected in parallel, different parallel connections with different cable lengths, etc.), we recommend using an oscilloscope to check the overvoltage values obtained at the motor terminals.

To retain the overall inverter performance, the SOP value is not permitted to be increased unnecessarily.

Overview of the correlation between the SOP parameter and the cable length for a 400 V power supply

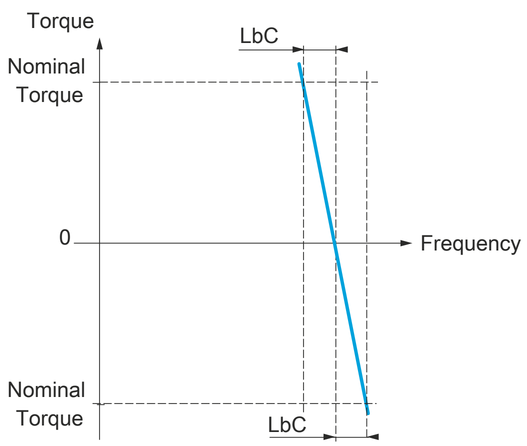
P66	Motor		Cable cross section (min)		Maximum cable length in meters								
Setpoint	Power				Unshielded "GORSE" H07 RN-F 4Gxx cable			Shielded "GORSE" GVCSTV-LS/LH cable			Shielded "BELDEN" 2950x cable		
	kW	HP	In mm^2	AWG	SOP = 10	SOP = 8	SOP = 6	SOP = 10	SOP = 8	SOP = 6	SOP = 10	SOP = 8	SOP = 6
8I66T400037.00-000	0.37	0.50	1.5	14	100 m	70 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
8I66T400055.00-000	0.55	0.75	1.5	14	100 m	70 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
8I66T400075.00-000	0.75	1	1.5	14	100 m	70 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
8I66T400110.00-000	1.1	1.5	1.5	14	100 m	70 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m

P66	Motor		Cable cross section (min)		Maximum cable length in meters								
Setpoint	Power				Unshielded "GORSE" H07 RN-F 4Gxx cable			Shielded "GORSE" GVCSTV-LS/LH cable			Shielded "BELDEN" 2950x cable		
	kW	HP	In mm²	AWG	SOP = 10	SOP = 8	SOP = 6	SOP = 10	SOP = 8	SOP = 6	SOP = 10	SOP = 8	SOP = 6
8I66T400150.00-000	1.5	2	1.5	14	100 m	70 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
8I66T400220.00-000	2.2	3	1.5	14	110 m	65 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
8I66T400300.00-000	3	-	1.5	14	110 m	65 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
8I66T400400.00-000	4	5	2.5	12	110 m	65 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m

In the case of 230/400 V motors operated at 230 V, parameter **[Motor surge limit]** (SVL) is still equal to **[No]** (nO).

The parameters described on this page can be accessed by: DRI- > COnF > FULL > drC-

Code	Name/Description	Setting range	Factory settings
drC-	**[MOTOR CONTROL]** **(continued)**		
Vbr	**[Braking level]** Braking transistor power-on voltage.	335 to 820 V	In accordance with nominal inverter voltage
LbA	**[Load sharing]** When two motors are connected mechanically and are therefore at the same speed, and each motor is controlled by an inverter, this function can be used to improve torque distribution between the two motors. To do this, it varies the speed based on the torque. These parameters can only be accessed if **[Motor control type]**(Ctt) = **[SVC U]**(UUC).		**[No]**(nO)
nO	**[No]**(nO): Function not active		
YES	**[YES]**(YES): Function active		
LbC	**[Load sharing correction]** Nominal compensation in Hz This parameter can be accessed if **[Load sharing]**(LbA) = **[YES]**(YES).	0 to 599 Hz	0 Hz



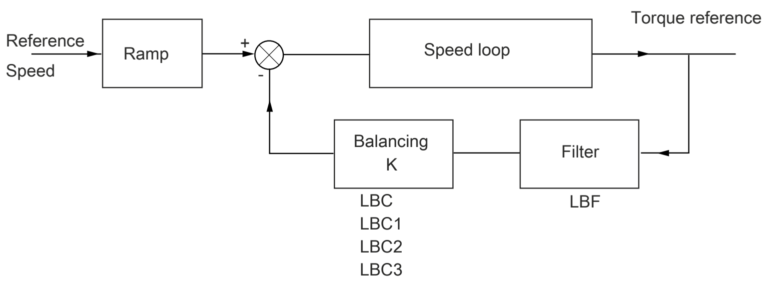
These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

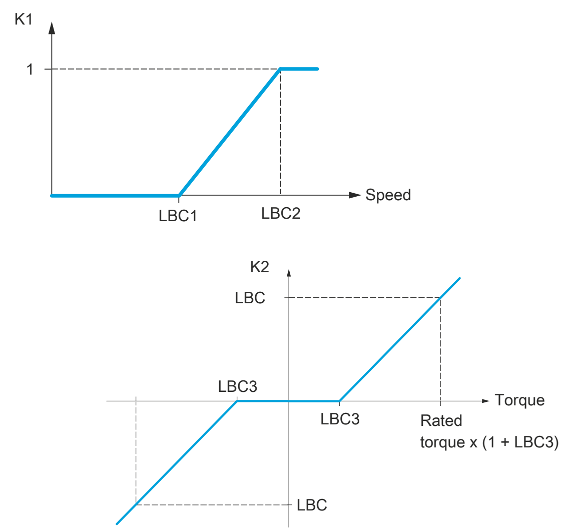
4.2.3.6.3.7 [MOTOR CONTROL] (drC-) Load balancing parameters

Load balancing parameters can be accessed at Expert level.

Principle:



Load sharing factor K is determined by the torque and speed, with two factors K1 and K2 (K = K1 x K2).



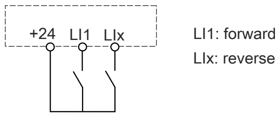
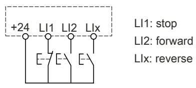
The parameters described on this page can be accessed by: DRI- > COnF > FULL > drC-			
Code	**Name/Description**	**Setting range**	**Factory settings**
drC-	[MOTOR CONTROL]		
LbC1	[Correction min spd] This parameter can be accessed if [Load sharing](LbA) = [YES](YES) is configured. Minimum speed for load distribution correction in Hz. Below this threshold, no corrections are made. Used to cancel correction at very low speed, as this correction would hamper motor rotation.	0 to 598.9 Hz	0 Hz
LbC2	[Correction max spd] This parameter can be accessed if [Load sharing](LbA) is set to [YES](YES). Speed threshold in Hz above which maximum load correction is applied.	[Correction min spd](LbC1) + 0.1 at 599 Hz	0.1 Hz
LbC3	[Torque offset] This parameter can be accessed if [Load sharing](LbA) = [YES](YES) is configured. Minimum torque for load correction as a % of the rated torque. Below this limit value, no corrections are made. Used to avoid torque instability when torque direction is not constant.	0 to 300%	0%
LbF	[Sharing filter] This parameter can be accessed if [Load sharing](LbA) = [YES](YES) is configured. The (filter) time constant for the correction in ms. Used with flexible mechanical couplings to prevent instability.	0 to 20 s	100 ms

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

4.2.3.6.4 [INPUTS/OUTPUTS](I_O-)

The parameters in menu **[INPUTS/OUTPUTS]**(I-O-) can only be changed if the inverter has been stopped and no move command has been given.

The parameters described on this page can be accessed by: DRI- > COnF > FULL > I_O-		
Code	**Name/Description**	**Factory settings**
I_O-	**[INPUTS/ OUTPUTS]**	
tCC 2 s	**[2/3 wire control]** **Warning!** **UNEXPECTED OPERATION OF THE EQUIPMENT** **Changing this parameter causes parameters [Reverse assign.](rrS) and [2 wire type](tCt) as well as the digital inputs assignments to revert to factory settings.** **Check that this change is compatible with the wiring used.** **Failure to follow these instructions can result in death, serious injury or damage to property.**	**[2 wire]**(2C)
2C	**[2 wire]**(2C) **2-wire control (level-controlled):** This is the input state (0 or 1) or edge (0 to 1 or 1 to 0) that controls operation or stopping. Source wiring example: 	
3C	**[3 wire]**(3C) **3-wire control (edge-controlled):** Impulse "Forward" or "Reverse" is sufficient to control motor startup. Impulse "Stop" is sufficient to control motor stopping. Source wiring example: 	
tCt ★ 2 s	**[2 wire type]** **Warning!** **UNEXPECTED OPERATION OF THE EQUIPMENT** **Make sure that this parameter setting is compatible with the type of wiring used.** **Failure to follow these instructions can result in death, serious injury or damage to property.**	**[Transition]**(trn)
LEL trn PFO	**[Level]**(LEL): State 0 or 1 determines whether operation (1) or a stop (0) takes place. **[Transition]**(trn): A state change (edge or transition) is required to initiate operation and to prevent an inadvertent restart after power failure. **[Fwd priority]**(PFO): State 0 or 1 is taken into account for operation or stopping, but input signal "Forward" takes priority over input signal "Reverse".	
rUn ★ LI1 Cd00 OL01 ... OL10	**[Run]** Stop command assignment Only visible if **[2/3 wire control]**(tCC) is set to **[3 wire]**(3C). **[LI1]**(LI1): Logic input LI1, if not in **[I/O profile]**(IO) **[Cd00]**(Cd00): In **[I/O profile]**(IO), logic input switchover is possible **[OL01]**(OL01): Function blocks: Logic output 01 **...** **[OL10]**(OL10): Function blocks: Logic output 10	**[No]**(nO)
Frd LI1 Cd00 OL01 ... OL10	**[Forward]** Forward command assignment. **[LI1]**(LI1): Logic input LI1, if not in **[I/O profile]**(IO) **[Cd00]**(Cd00): In **[I/O profile]**(IO), logic input switchover is possible **[OL01]**(OL01): Function blocks: Logic output 01 **...** **[OL10]**(OL10): Function blocks: Logic output 10	**[LI1]**(LI1)
rrS nO LI1 ...	**[Reverse assign.]** Assignment of the reverse direction command. **[No]**(nO): Not assigned **[LI1]**(LI1): Logic input LI1 **[...]**(...) If **[Profile]** (CHCF) is set to **[Not separ.]** (SIM) or **[Separate]** (SEP), then parameters **[CD11]** (Cd11) to **[CD15]** (Cd15), **[C111]** (C111) to **[C115]** (C115), **[C211]** (C211) to **[C215]** (C215) as well as **[C311]** (C311) to **[C315]** (C315) will not be available.	**[LI2]**(LI2)

★	These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.
2 s	To change the assignment of this parameter, press the ENT key for 2 seconds.

4.2.3.6.4.1 [LI1 CONFIGURATION] (L1-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > I_O- > L1-			
Code	**Name/Description**	**Setting range**	**Factory settings**
L1-	[LI1 CONFIGURATION]		
L1A	[Logic input 1 assignment] Read-only parameter, cannot be configured. It displays all the functions that are assigned to input LI1 in order to check for multiple assignments.		
nO	[No](nO): Not assigned		
rUn	[Run](rUn): Enabled to start		
Frd	[Forward](Frd): Operation in forward direction		
rrS	[Reverse assign.](rrS): Operation in reverse direction		
rPS	[Ramp type](rPS): Switch ramp		
JOG	[Frequency Jog](JOG): Step mode		
USP	[+speed around ref.](USP): Increase speed		
dSP	[-speed around ref.](dSP): Decrease speed		
PS2	[2 preset speeds](PS2): 2 preset speeds		
PS4	[4 preset speeds](PS4): 4 preset speeds		
PS8	[8 preset speeds](PS8): 8 preset speeds		
rFC	[Ref. 2 switching](rFC): Setpoint switching		
nSt	[Freewheel](nSt): Freewheel stop		
dCI	[DC Injection](dCI): Stop via DC injection braking		
FSt	[Fast stop](FSt): Fast stop		
FLO	[Forced local](FLO): Mode "Forced local"		
rSF	[Fault reset](rSF): Error reset		
tUL	[Auto-tuning](tUL): Autotuning		
SPM	[Save setpoint](SPM): Setpoint storage		
FLI	[Pre Fluxing](FLI): Motor magnetization		
PAU	[Auto / manual](PAU): Auto / manual PI(D)		
PIS	[PID integral reset](PIS): PI(D) integral shunt		
Pr2	[2 preset PID ref.](Pr2): 2 PI(D) preset setpoints		
Pr4	[4 preset PID ref.](Pr4): 4 PI(D) preset setpoints		
tLA	[Torque limitation](tLA): Permanent torque limitation		
EtF	[External fault](EtF): External error		
rCA	Output contact. fdbk](rCA): Downstream contactor feedback		
CnF1	[2 config. switching](CnF1): Configuration switchover 1		
CnF2	[3 config. switching](CnF2): Configuration switchover 2		
CHA1	[2 parameter sets](CHA1): Parameter switchover 1		
CHA2	[3 parameter sets](CHA2): Parameter switchover 2		
tLC	[Analog limit. act.](tLC): Torque limiting: Enabled (analog input) via logic input		
CCS	[Cmd switching](CCS): Command channel switchover		
InH	[Fault inhibition](InH): Error inhibition		
PS16	[16 preset speeds](PS16): 16 preset speeds		
LC2	[Current limit 2](LC2): Current-limiting switchover		
rCb	[Ref 1B switching](rCb): Setpoint channel switchover (1 after 1B)		
trC	[Traverse control](trC): Traverse control		
bCI	[Brake feedback](bCI): Logic input brake feedback		
SAF	[Stop FW limit sw.](SAF): Forward stop switch		
SAr	[Stop RV limit sw.](SAr): Reverse stop switch		
dAF	[Slowdown forward](dAF): Forward deceleration achieved		
dAr	[Slowdown reverse](dAr): Reverse deceleration achieved		
CLS	[Disable limit sw.](CLS): Clear limit switch		
LES	[Drive lock](LES): Emergency switch-off		
rtr	[Init. traverse ctrl.](rtr): Reload traverse control		
SnC	[Counter wobble] (SnC): Counter wobble synchronization		
rPA	[Prod. reset](rPA): Reset product		
SH2	[2 HSP](SH2): High speed 2		
SH4	[4 HSP](SH4): High speed 4		
FPS1	[Preset spd2](FPS1): Preset speed 1 function key assignment		
FPS2	[Preset spd3](FPS2): Preset speed 2 function key assignment		
FPr1	[PID ref. 2](FPr1): Preset PI 1 function key assignment		
FPr2	[PID ref. 3](FPr2): Preset PI 2 function key assignment		
FUSP	[+speed around ref.](FUSP): Speed increase function key		
FdSP	[-speed around ref.](FdSP): Speed decrease function key		
Ft	[T/K](Ft): Bumpless function key assignment		
USI	[+speed around ref.](USI): Increase speed around setpoint		
dSI	[-speed around ref.](dSI): Decrease speed around setpoint		
IL01	[IL01](IL01): Function blocks: Logic input 1		
...	...		
IL10	[IL10](IL10): Function blocks: Logic input 10		
FbrM	[FB start](FbrM): Function block: Operational start		
SLS1	[SLS ch.1](SLS1): Safety function SLS channel 1		
SLS2	[SLS ch.2](SLS2): Safety function SLS channel 2		
SS11	[SS1 ch.1](SS11): Safety function SS1 channel 1		
SS12	[SS1 ch.2](SS12): Safety function SS1 channel 2		
StO1	[STO ch.1](St01): Safety function STO channel 1		

The parameters described on this page can be accessed by: DRI- > COnF > FULL > I_O- > L1-			
Code	**Name/Description**	**Setting range**	**Factory settings**
StO2 SMS1 SMS2	[STO ch.2](St02): Safety function STO channel 2 [SMS ch.1](SMS1): Safety function SMS channel 1 [SMS ch.2](SMS2): Safety function SMS channel 2		
L1d	[LI1 On Delay] This parameter is used to enable delayed consideration of the logic input's transition to state 1. This delay can be set to a value from 0 to 200 ms, and it serves to filter possible interference. The transition to state 0 is taken into account without delay.	0 to 200 ms	0 ms

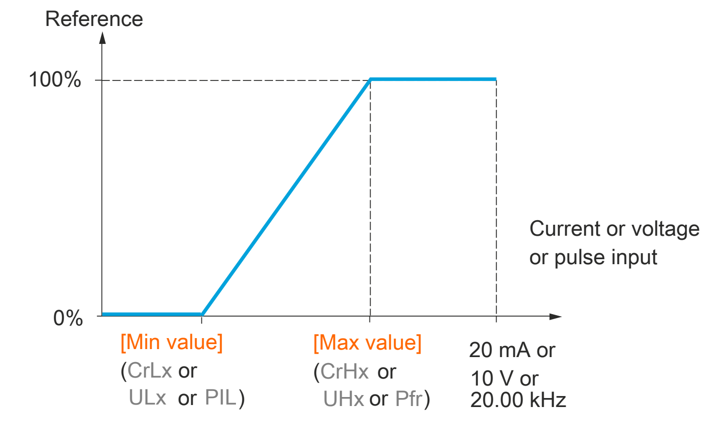
The parameters described on this page can be accessed by: DRI- > COnF > FULL > I_O-			
Code	**Name/Description**	**Setting range**	**Factory settings**
I_O-	[INPUTS/OUTPUTS](continued)		
L2- to L6-	[LIx CONFIGURATION] All available logic inputs of the inverter are processed as shown in example LI1 above (up to LI6).		
L5-	[LI5 CONFIGURATION] The parameters determined for LI5 are used as an pulse input.		
PIA	[RP assignment] Read-only parameter, cannot be configured. This parameter displays all the functions assigned to the pulse input. This allows compatibility problems to be checked, for example. Identical to [AI1 assignment](AI1A).		
PIL	[RP min value] Scaling parameters for pulse input 0% in Hz * 10 unit.	0 to 20.00 kHz	0 kHz
PFr	[RP max value] Scaling parameters for pulse input 100% in Hz * 10 unit.	0 to 20.00 kHz	20.00 kHz
PFI	[RP filter] I/O for external pulse input low-pass filter cutoff time.	0 to 1000 ms	0 ms
LA1- LA2-	[LIx CONFIGURATION] The inverter's two analog inputs, AI1 and AI2, can be used as logic inputs and are processed in the same way as LI1 in the example above.		

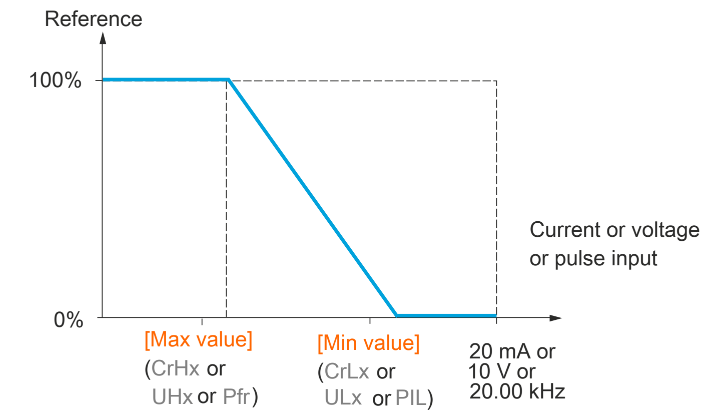
Analog inputs and pulse input configuration

The minimum and maximum values for the inputs (in V, mA, etc.) are converted to a percentage in order to adapt the setpoints to the type of application.

Minimum and maximum input values:

The minimum value corresponds to a 0% setpoint and the maximum value to a 100% setpoint. The minimum value can be greater than the maximum value:

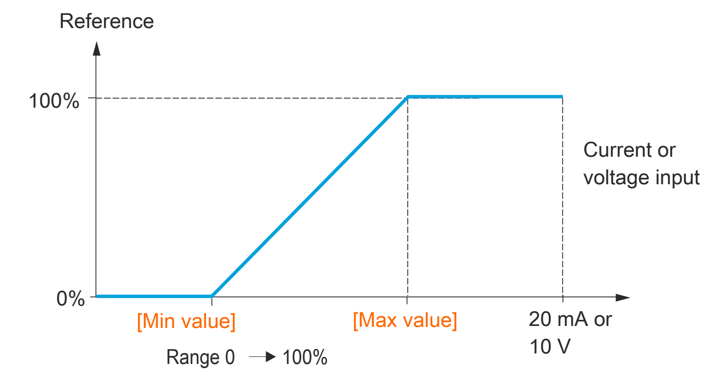


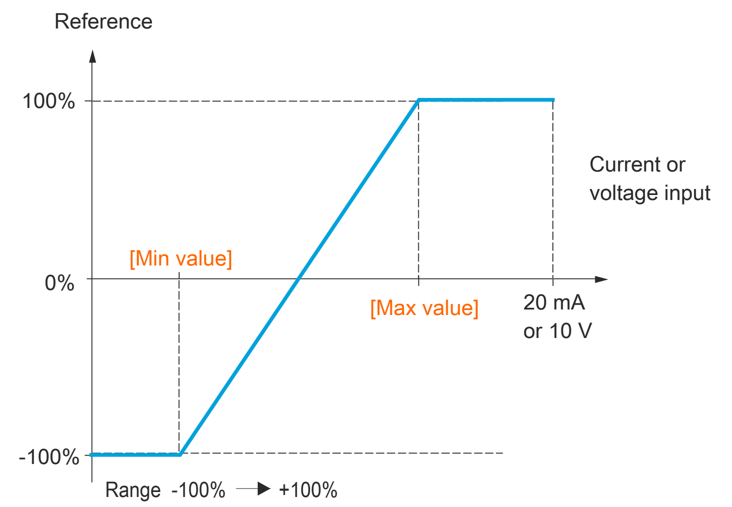


For bidirectional inputs (±), the minimum and maximum values are relative to the absolute value, for example, ± 2 related to 8 V.

Area (output values): Only for analog inputs:

With this parameter, the reference range is set to [0% → 100%] or [-100% → +100%]. This will result in bidirectional output from unidirectional input.

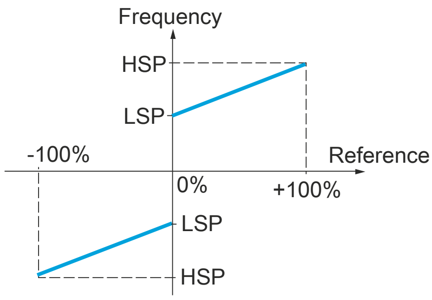




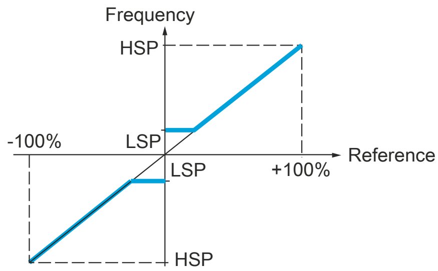
The parameters described on this page can be accessed by: DRI- > COnF > FULL > I_O- > bSP

Code	Name/Description		Setting range	Factory settings
bSP	**[Reference template]**			**[Standard]** (bSd)
bSd	**[Standard]** (bSd)	When setpoint = 0, frequency = LSP		
bLS	**[Pedestal]**(bLS)	When setpoint = 0 to LSP, frequency = LSP		
bnS	**[LSP inhibition]**(bnS)	When setpoint = 0 to LSP, frequency = 0		
bnS0	**[Deadband 0]**(bnS0)	This process is identical to **[Standard]**(bSd), but in the following cases the frequency at setpoint = 0 is also = 0: The signal is below **[Min value]**, which in turn is greater than 0 (example: 1 V on a 2-10-V input) The signal is lower than **[Min value]**, which in turn is greater than **[Max value]** (Example: 11 V on a 10-0-V input) If "bidirectional" was defined for the input range, the procedure is identical to **[Standard]**(bSd). This parameter defines how the frequency setpoint is taken into account (for analog inputs and pulse input only). In the case of the PID controller, this is the PID output setpoint. The limit values are defined by parameters **[Low speed]**(LSP) and **[High speed]**(HSP).		

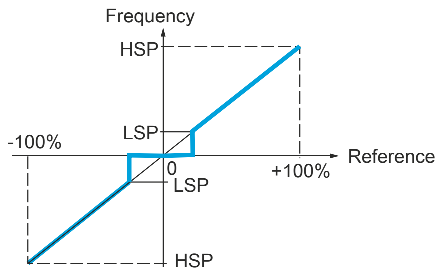
[Standard] (bSd):



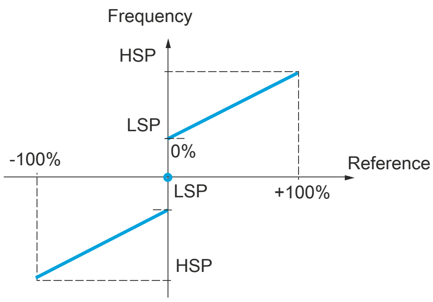
[Pedestal] (bLS):



[LSP inhibition] (bnS):



[Deadband 0] (bnS0):

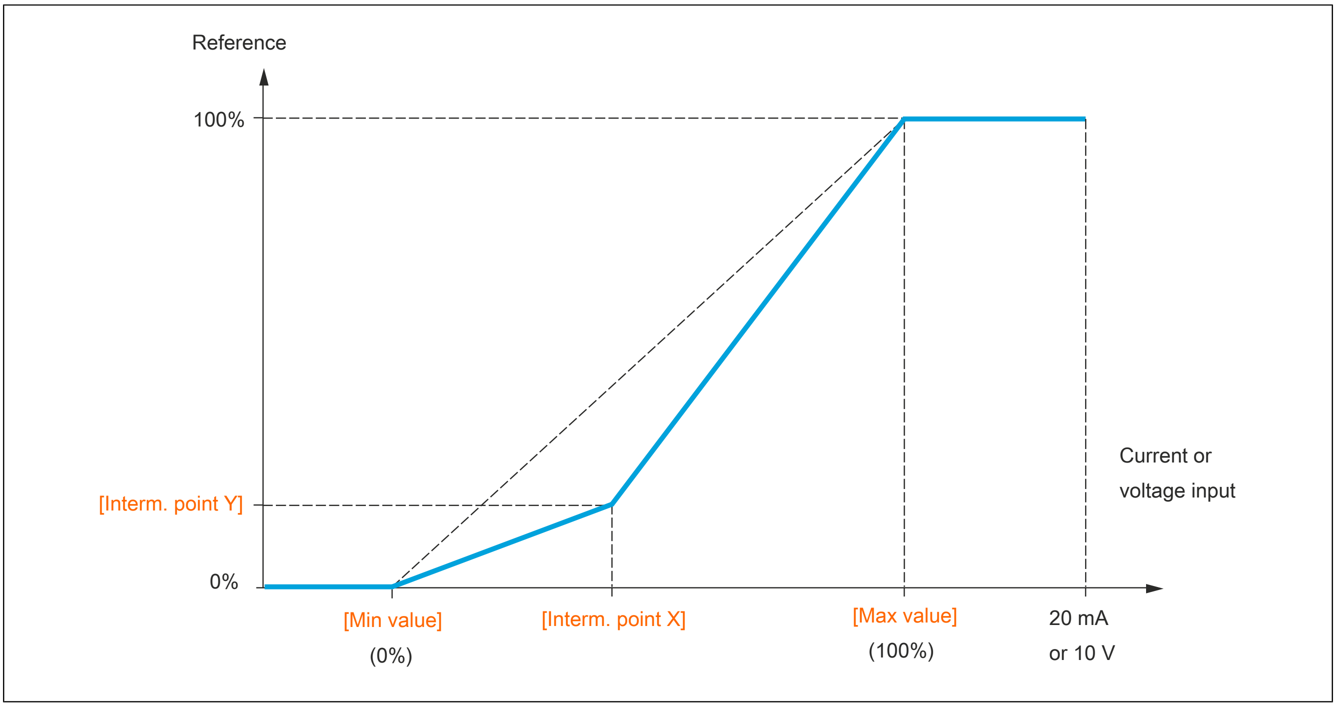


Parameter that can be modified during operation or when stopped.

Delinearization: Only for analog inputs:

To delinearize the input, determine an intermediate point on the input/output curve of this input:

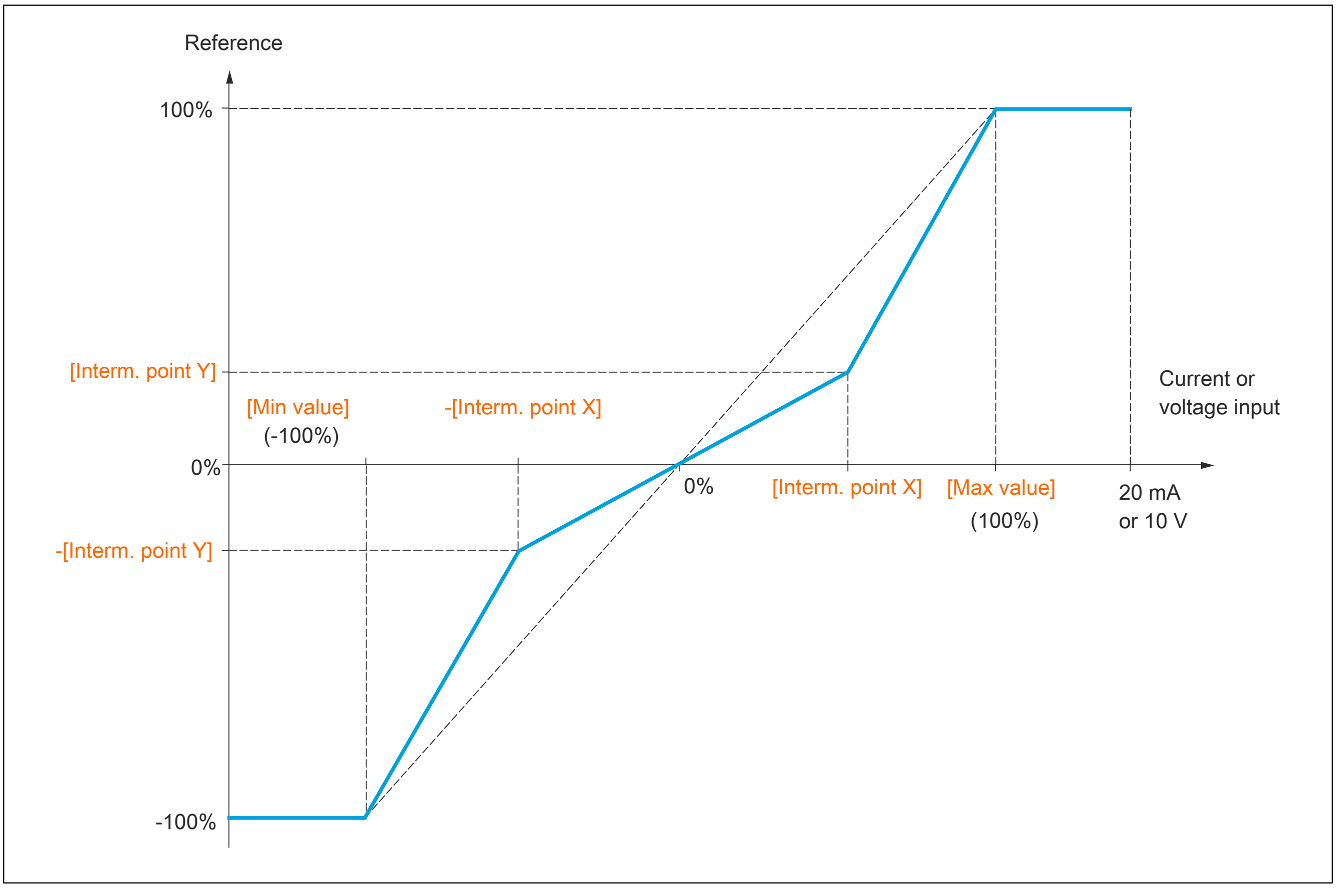
Range 0 → 100%



Advice:

For [AI1 Interm. point] 0% corresponds to the [Min value] and 100% to the [Max value].

Range -100% → 100%



4.2.3.6.4.2 [AI1 CONFIGURATION] (AI1-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > I_O- > AI1-			
Code	**Name/Description**	**Setting range**	**Factory settings**
AI1-	[AI1 CONFIGURATION]		
AI1A	[AI1 assignment] Read-only parameter, cannot be configured. This parameter displays all functions assigned to the AI1 input. This allows compatibility problems to be checked, for example.		
nO	[No](nO): Not assigned		
AO1	[AO1 assignment](AO1): Analog output AO1		
Fr1	[Ref.1 channel](Fr1): Setpoint source 1		
Fr2	[Ref.2 channel](Fr2): Setpoint source 2		
SA2	[Summing ref. 2](SA2): Setpoint total 2		
PIF	[PID feedback](PIF): PI actual value (PI control)		
tAA	[Torque limitation](tAA): Torque limiting: Enabled via analog value		
dA2	[Subtract. ref. 2](dA2): Subtraction setpoint 2		
PIM	[Manual PID ref.](PIM): Manual setpoint frequency for the PI(D) controller (auto-man)		
FPI	[PID speed ref.](FPI): Speed setpoint for the PI(D) controller (predictive setpoint)		
SA3	[Summing ref. 3](SA3): Setpoint total 3		
Fr1b	[ch1B active](Fr1b): Setpoint source 1B		
dA3	[SubParam3](dA3): Subtraction setpoint 3		
FLOC	[Forced local](FLOC): Setpoint source "Forced local"		
MA2	[Multiplier ref. 2](MA2): Multiplication setpoint 2		
MA3	[Multiplication ref 3](MA3): Multiplication setpoint 3		
PES	[Weight input](PES): Hoisting: External weight measurement function		
IA01	[IA01](IA01): Function blocks: Analog input 01		
...	...		
IA10	[IA10](IA10): Function blocks: Analog input 10		
AI1t	[Type AI1]		[Voltage](10U)
10U	[Voltage](10U): Positive voltage input 0 to 10 V (negative values are interpreted as zero:		
UIL1	[AI1 min value] Parameter value for voltage scaling AI1 = 0%	0 to 10.0 V	0 V
UIH1	[AI1 max value] Parameter value for voltage scaling AI1 = 100%	0 to 10.0 V	10.0 V
AI1F	[AI1 filter] Interference filtering.	0 to 10.00 s	0 s
AI1L	[AI1 range]		[0 - 100%](POS)
POS	[0 - 100%](POS): Positive logic		
nEG	[+/- 100%](nEG): Positive and negative logic		
AI1E	[AI1 Interm. point X] Input delinearization point coordinate. Signal at physical input as a percentage. 0% corresponds to [AI1 min value](UIL1). 100% corresponds to [AI1 max value](UIH1).	0 to 100%	0%
AI1S	[AI1 Interm. point Y] Output delinearization point coordinate (frequency reference). Percentage of internal frequency setpoint that corresponds to percentage [AI1 Interm. point X](AI1E) of the signal at the physical input.	0 to 100%	0%

The parameters described on this page can be accessed by: DRI- > COnF > FULL > I_O- > AI2-			
Code	**Name/Description**	**Setting range**	**Factory settings**
AI2-	[AI2 CONFIGURATION]		
AI2A	[AI2 assignment] Identical to [AI1 assignment](AI1A)		
AI2t	[Type AI2]		[Voltage +/-](n10U)
10U	[Voltage](10U): Positive voltage input 0-10 V (negative values are interpreted as zero: the input is unidirectional)		
n10U	[Voltage +/-](n10U): Positive and negative voltage input +/- 10 V (input is bidirectional).		
UIL2	[AI2 min value] Parameter value for voltage scaling AI2 = 0%	0 to 10.0 V	0 V
UIH2	[AI2 max value] Parameter value for voltage scaling AI2 = 100%	0 to 10.0 V	10.0 V
AI2F	[AI2 filter] Disturbance filtering.	0 to 10.00 s	0 s
AI2L	[AI2 range] This parameter can be accessed if [Type AI2](AI2t) = [Voltage +/-](n10U).		[0 - 100%](POS)
POS	[0 - 100%](POS): Positive logic		
nEG	[+/- 100%](nEG): Positive and negative logic		
AI2E	[AI2 Interm. point X] Input delinearization point coordinate. Signal at physical input as a percentage. 0% corresponds to [Min value] if the range = 0 → 100%. 0% corresponds to $\frac{[Max\ value] + [Min\ value]}{2}$ if the range = -100% → + 100%. 100% corresponds to [Max value].	0 to 100%	0%
AI2S	[AI2 Interm. point Y] Output delinearization point coordinate (frequency reference). Percentage of the internal frequency setpoint that corresponds to percentage [AI2 Interm. point X](A12E) of the signal at the physical input.	0 to 100%	0%

The parameters described on this page can be accessed by: DRI- > COnF > FULL > I_O- > AI3-

Code	Name/Description	Setting range	Factory settings
AI3-	[AI3 CONFIGURATION]		
AI3A	[AI3 assignment] Identical to [AI1 assignment](AI1A).		
AI3t 0 A	[AI3 Type] [0-20mA](0A): Current input 0 to 20 mA		[0-20mA](0A)
CrL3	[Min value] Parameter value for current scaling AI3 = 0%	0 to 20.0 mA	0 mA
CrH3	[AI3 max value] Parameter value for current scaling AI3 = 100%	0 to 20.0 mA	20.0 mA
AI3F	[AI3 filter] Disturbance filtering.	0 to 10.00 s	0 s
AI3L POS nEG	[Range AI3] [0 - 100%] (POS): Unidirectional input [+/- 100%](nEG): Bidirectional input Example: At an input of 4-20 mA 4 mA corresponds to a -100% setpoint. 12 mA corresponds to a 0% setpoint. 20 mA corresponds to a +100% setpoint. Since, from a physical perspective, AI3 involves a bidirectional input, configuration[+/- 100%](nEG) is only permitted to be used if the applied signal involves a unidirectional signal. A bidirectional signal is not compatible with a bidirectional configuration.		[0 - 100%](POS)
AI3E	[AI3 Interm. point X] Input delinearization point coordinate. Signal at physical input as a percentage. 0% corresponds to [Min value](CrL3) if the range = 0 → 100%. 0% corresponds to $\frac{[AI3\ max.\ value]\ (CrH3)\ -\ [AI3\ min.\ value]}{(CrL3)}$ if the range = -100% → +100%. 100% corresponds to [AI3 max value](CrH3).	0 to 100%	0%
AI3S	[AI3 Interm. point Y] Output delinearization point coordinate (frequency reference). Percentage of the internal frequency setpoint that corresponds to percentage [AI3 Interm. point X](A13E) of the signal at the physical input.	0 to 100%	0%

4.2.3.6.4.3 [Virtual AI1](AU1-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > I_O- > AU1-

Code	Name/Description
AU1-	[VIRTUAL AI1]
AU1A	[AIV1 assignment] Virtual analog input 1 using the handwheel on the front of the product. Identical to [AI1 assignment](AI1A).

The parameters described on this page can be accessed by: DRI- > COnF > FULL > I_O- > AU2-

Code	Name/Description	Factory settings
AU2-	[VIRTUAL AI2]	
AU2A	[AIV2 assign.] Possible assignment for [AI virtual 2](AIU2): Virtual analog input 2 via the communication channel, configured via [AI2 net. channel](AIC2). Identical to [AIV1 assignment](AU1A).	
AIC2	[AI2 net. channel] [VIRTUAL AI2](AU2A) Source channel. This parameter is also accessible via submenu [PID REGULATOR](PId-). Scale: The value 8192 transmitted by this input corresponds to 10 V on a 10-V input.	[No](nO)
nO Mdb CAn nEt	[No](nO): Not assigned [Modbus](Mdb): Integrated Modbus [CANopen com.](CAn): Integrated CANopen® [Com. card](nEt): Communication card (if used)	

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

4.2.3.6.4.4 [R1 CONFIGURATION] (r1-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > I_O- > r1- > r1		
Code	**Name/Description**	**Factory settings**
r1-	**[R1 CONFIGURATION]**	
r1	**[R1 assignment]**	**[No fault]**(FLt)
nO	**[No]**(nO): Not assigned	
FLt	**[No fault]**(FLt): Inverter error detection state (relay is normally enabled and will be disabled in the event of an error).	
rUn	**[Run]**(rUn): Inverter in operation	
FtA	**[Freq. Th. attained]**(FtA): Frequency threshold value reached (**[Freq. Th. attained]**(Ftd))	
FLA	**[HSP attain.]** (FLA): High speed reached	
CtA	**[I attained]** (CtA): Current threshold value reached (**[Current threshold]** (Ctd))	
SrA	**[Freq.ref.att]**(SrA): Frequency setpoint reached	
tSA	**[Th.mot. att.]**(tSA): Motor thermal state 1 reached	
PEE	**[PID error al]**(PEE): PID controller error alarm	
PFA	**[PID fdbk al.]**(PFA): PID controller error alarm	
F2A	**[Freq. Th. 2 attained]**(F2A): Frequency threshold value 2 reached (**[Freq. threshold 2]**(F2d))	
tAd	**[Th. drv. att.]**(tAd): Inverter thermal state reached	
ULA	**[Underload. Proc. Al.]**(ULA): Underload alarm	
OLA	**[Overload alarm]**(OLA): Overload alarm	
rSdA	**[Rope slack]**(rSdA): Slack rope (see parameter **[Rope slack config.]**(rSd)).	
ttHA	**[High torque alarm]**(ttHA): Motor torque exceeds upper threshold value **[High torque thd.]**(ttH).	
ttLA	**[Low torque alarm]**(ttLA): Motor torque below lower threshold value**[Low torque thd.]**(ttL).	
MFrd	**[Forward]**(MFrd): Motor rotating to the right	
MrrS	**[Reverse assign.]**(MrrS): Motor rotating to the left	
tS2	**[Th. mot2. att.]**(tS2): Motor thermal threshold value 2 (TTD2) reached	
tS3	**[Th. mot3. att.]**(tS3): Motor thermal threshold value 3 (TTD3) reached	
AtS	**[Neg Torque]**(AtS): Negative torque (brakes)	
CnF0	**[Cnfg.0 act.]**(CnF0): Configuration 0 is active	
CnF1	**[Config 1]**(CnF1): Configuration 1 is active	
CnF2	**[CONFIGURATION 2 state]**(CnF2): 2 config. switching is active	
CFP1	**[Set 1 active]**(CFP1): Parameter set 1 is active	
CFP2	**[Set 2 active]**(CFP2): Parameter set 2 is active	
CFP3	**[Set 3 active]**(CFP3): Parameter set 3 is active	
dbL	**[DC bus load]**(dbL): DC bus load	
brS	**[In braking]**(brS): Inverter is braking	
PrM	**[P. removed]**(PrM): Drive locked by input "Safe Torque Off"	
FqLA	**[Fr.met. alar.]**(FqLA): Measured speed setpoint reaches **[Pulse warning thd.]**(FqL)	
MCP	**[I present]**(MCP): Motor current present	
LSA	**[Limit sw. att]**(LSA): Limit switch reached	
dLdA	**[Dynamic load alarm]**(dLdA): Load variation detection	
AG1	**[Alarm group 1]**(AGl): Alarm group 1	
AG2	**[Alarm group 2]**(AG2): Alarm group 2	
AG3	**[Alarm group 3]**(AG3): Alarm group 3	
PMC	**[LI6=PTC al.]**(PLA): LI6 = PtCL alarm	
EFA	**[Ext. fault al.]**(EFA): Alarm external error	
USA	**[Undervoltage Alarm]**(USA): Undervoltage alarm	
UPA	**[Undervoltage Pre-alarm]**(UPA): Undervoltage threshold value	
tHA	**[Fl °C alarm]**(tHA): Inverter overheating	
SSA	**[Torque/current lim att.]**(SSA): Torque limiting alarm	
tJA	**[IGBT al.]**(tJA): Thermal transition alarm	
AP3	**[AI3 Al. 4-20]**(AP3): 4-20 mA AI3 failure alarm	
rdY	**[Brake R. al.]**(rdY): Ready for operation	
ol01	**[OL01]** (oL01): Function block: Logic output 01	
...	**...**	
OL10	**[OL10]** (oL10): Function block: Logic output 10	

The parameters described on this page can be accessed by: DRI- > COnF > FULL > I_O- > r1-			
Code	**Name/Description**	**Setting range**	**Factory settings**
r1-	**[R1 CONFIGURATION]** (continued)		
r1d (1)	**[R1 Delay time]** The status change takes place after the configured time period, if the information becomes true. In assignment **[No fault]**(FLt),, the deceleration cannot be defined and therefore remains at 0.	0 to 60,000 ms	0 ms
r1S POS nEG	**[R1 Active at]** Operating logic configuration: **[1]**(POS): State 1 if the information is true. **[0]**(nEG): State 0 if the information is true. Configuration **[1]**(POS) cannot be changed at assignment**[No fault]**(FLt).		**[1]**(POS)
r1H	**[R1 holding time]** The status change takes place after the configured time period, if the information becomes false. For assignment **[No fault]**(FLt),, switch-off delay cannot be defined and therefore remains at 0.	Up to 9,999 ms	0 ms
r1F nO YES	**[Fallback R1 activation]** This parameter can be accessed if **[R1 configuration]**(r1) = **[No]**(nO). **[No]** (nO): Relay controlled via OL1R. Relay is disconnected if the inverter is in operating state "Error" **[YES]**(YES): Relay controlled via OL1R.		**[No]**(nO)

(1) 0 to 9,999 ms, then 10.00 to 60.00 s on the integrated display terminal.

The parameters described on this page can be accessed by: DRI- > COnF > FULL > I_O- > r2-			
Code	**Name/Description**	**Setting range**	**Factory settings**
r2-	**[R2 CONFIGURATION]**		
r2 bLC LLC OCC EbO tSY dCO OL01 ... OL10	**[R2 assignment]** Identical to **[R1 assignment]**(r1) with the following addition: **[Brk control]**(bLC): Braking contactor control **[Line contactor]**(LLC): Line contactor control **[Out. contact.]**(OCC): Motor contactor control **[End reel]** (EbO): End of winding (function "Traverse control") **[Sync. wobble]**(tSY): Counter wobble synchronization **[DC charging]**(dCO): DC-bus pre-charge contactor control **[OL01]**(OL01): Function blocks: Logic output 01 **...** **[OL10]**(OL10): Function blocks: Logic output 10		**[No]**(nO)
r2d (1)	**[R2 Delay time]** For assignments **[No fault]**(FLt),**[Brk control]**(bLC), **[Out. contact.]**(OCC) and **[Line contactor]**(LLC), the delay cannot be defined and therefore remains at 0. The status change takes place after the configured time period, if the information becomes true.	0 to 60,000 ms	0 ms
r2S POS nEG	**[R2 Active at]** Operating logic configuration: **[1]**(POS): State 1 if the information is true **[0]** (nEG): State 0 if the information is true For configuration **[1]**(POS), assignments **[No fault]**(FLt), **[Brk control]** (bLC), **[DC charging]** (dCo) and **[Line contactor]** (LLC) cannot be changed.		**[1]**(POS)
r2H	**[R2 Holding time]** For assignments **[Brk control]**(FLt),**[Brk control]**(bLC), and **[Line contactor]**(LLC) the switch-off delay cannot be defined and therefore remains at 0. The status change takes place after the configured time period, if the information becomes false.	0 to 9,999 ms	0 ms
r2F nO YES	**[Enable Relay2 fallback]** This parameter can be accessed if **[R2 assignment]**(r2) = **[No]**(nO). **[No]** (nO): Relay controlled via OL1R. Relay is disconnected if the inverter is in operating state "Error" **[YES]**(YES): Relay controlled via OL1R.		**[No]**(nO)

(1) 0 to 9,999 ms, then 10.00 to 60.00 s on the integrated display terminal.

4.2.3.6.4.5 [LO1 configuration] (LO1-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > I_O- > LO1-			
Code	**Name/Description**	**Setting range**	**Factory settings**
LO1-	**[LO1 CONFIGURATION]**		
LO1	**[LO1 assignment]**		**[No]**(nO)
	Identical to **[R1 assignment]**(r1) with the following addition (display only for information purposes, as this selection can only be configured from menu **[APPLICATION FUNCT.]**(FUn-)):		
bLC	**[Brk control]**(bLC): Braking contactor control		
LLC	**[Line contactor]**(LLC): Line contactor control		
OCC	**[Out. contact.]**(OCC): Motor contactor control		
EbO	**[End reel]** (EbO): End of winding (function "Traverse control")		
tSY	**[Sync. wobble]**(tSY): Counter wobble synchronization		
dCO	**[DC charging]**(dCO): DC-bus pre-charge contactor control		
OL01	**[OL01]**(OL01): Function blocks: Logic output 01		
...	**...**		
OL10	**[OL10]**(OL10): Function blocks: Logic output 10		
GdL	**[GDL]**(GdL): Safety function GDL		
LO1d	**[LO1 Delay time]**	0 to 60,000 ms (1)	0 ms
	For assignments **[No fault]**(FLt),**[Brk control]**(bLC), **[Out. contact.]**(OCC) and **[Line contactor]**(LLC) the delay cannot be defined and therefore remains at 0. The status change takes place after the configured time period, if the information becomes true.		
LO1S	**[LO1 active at]**		**[1]**(POS)
	Operating logic configuration:		
POS	**[1]**(POS): State 1 if the information is true.		
nEG	**[0]**(nEG): State 0 if the information is true. Configuration **[1]**(POS) cannot be changed for assignments **[No fault]**(FLt), **[Brk control]**(bLC) and **[Line contactor]**(LLC).		
LO1H	**[LO1 holding time]**	0 to 9,999 ms	0
	For assignments **[No fault]**(FLt),**[Brk control]**(bLC) and **[Line contactor]**(LLC), the switch-off delay cannot be defined and therefore remains at 0. The status change takes place after the configured time period, if the information becomes false.		
LO1F	**[Fallback LO1 activation]**		**[No]**(nO)
	Available if **[LO1 assignment]** (LO1) is set to **[No]**(nO).		
YES	**[YES]** (YES): Logic output, controlled via (OL1R). The logic output is disconnected from the power source if the inverter is in operating state "Error"		
nO	**[No]**(nO): Logic output, controlled via (OL1R).		

(1) 0 to 9,999 ms, then 10.00 to 60.00 s on the integrated display terminal.

Analog output AO1 can be used as a logic output by assigning DO1. In this case, this output corresponds to the minimum value of AO1 (0 V or 0 mA, for example) when set to 0. When set to 1, it corresponds to the maximum value of AO1 (10 V or 20 mA, for example).

The electrical characteristics of this analog input remain unchanged. As these characteristics are different from the characteristics of a logic output, it is necessary to check that they are compatible with the intended type of application.

4.2.3.6.4.6 [DO1 configuration] (dO1-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > I_O- > dO1-			
Code	**Name/Description**	**Setting range**	**Factory settings**
dO1-	[DO1 CONFIGURATION]		
dO1	[D01 assignment]		[No](nO)
	Identical to [R1 assignment](r1) with the following addition (display only for information purposes, as this selection can only be configured from menu [APPLICATION FUNCT.](FUn-)):		
bLC	[Brk control](bLC): Braking contactor control		
LLC	[Line contactor](LLC): Line contactor control		
OCC	[Out. contact.](OCC): Motor contactor control		
EbO	[End reel] (EbO): End of winding (function "Traverse control")		
tSY	[Sync. wobble](tSY): Counter wobble synchronization		
dCO	[DC charging](dCO): DC-bus pre-charge contactor control		
OL01	[OL01](OL01): Function blocks: Logic output 01		
...	...		
OL10	[OL10](OL10): Function blocks: Logic output 10		
dO1d	[DO1 delay time]	0 to 60,000 ms (1)	0 ms
	For assignments [No fault](FLt),[Brk control](bLC), [Out. contact.](OCC) and [Line contactor](LLC), the delay cannot be defined and therefore remains at 0. The status change takes place after the configured time period, if the information becomes true.		
dO1S	[DO1 active at]		[1](POS)
	Operating logic configuration:		
POS	[1](POS): State 1 if the information is true		
nEG	[0] (nEG): State 0 if the information is true Configuration [1](POS) cannot be changed for assignments [No fault](FLt), [Brk control](bLC) and [Line contactor](LLC).		
dO1H	[DO1 holding time]	0 to 9,999 ms	0 ms
	For assignments [No fault](FLt),[Brk control](bLC) and [Line contactor](LLC), the switch-off delay cannot be defined and therefore remains at 0. The status change takes place after the configured time period, if the information becomes false.		

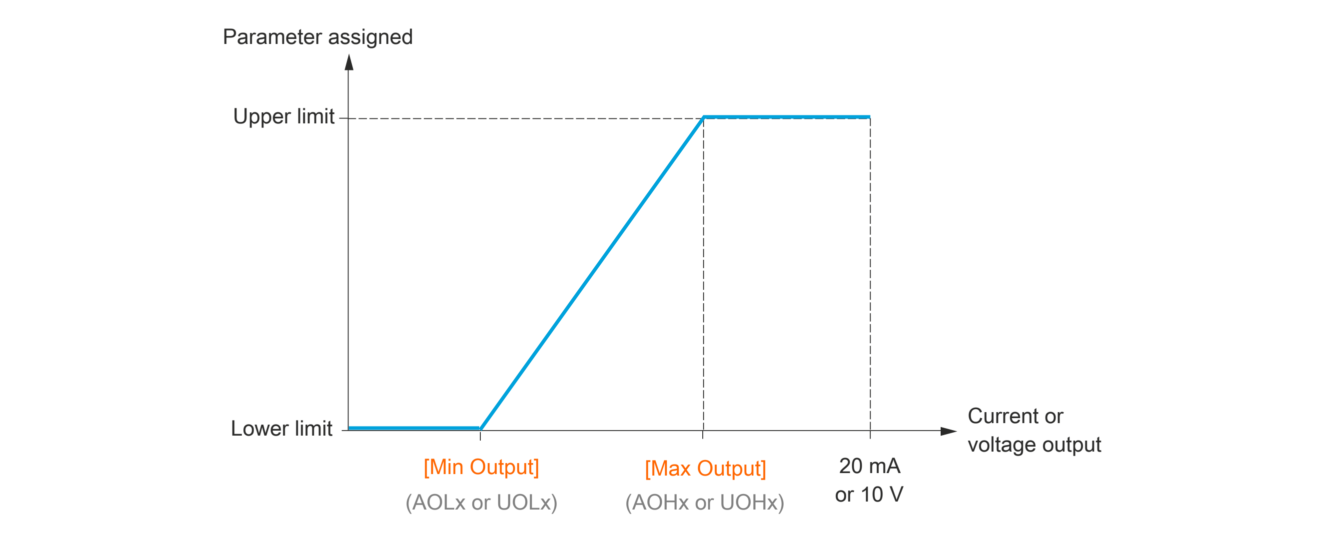
(1) 0 to 9,999 ms, then 10.00 to 60.00 s on the integrated display terminal.

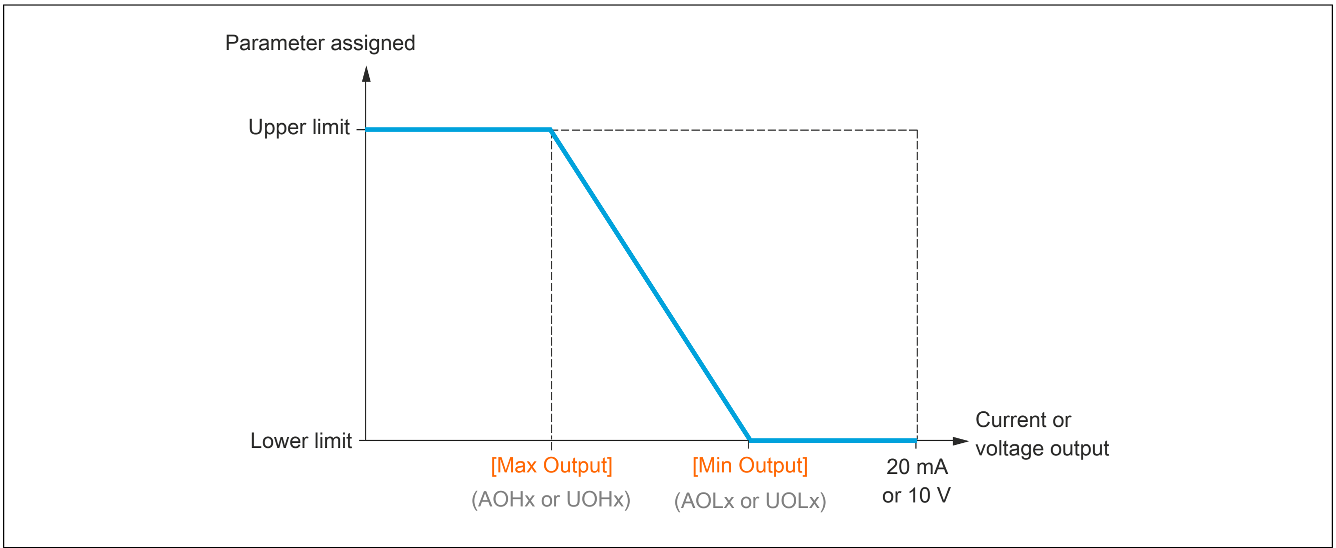
4.2.3.6.4.7 [AO1 configuration] (AO1-)

Analog output configuration

Minimum and maximum values (output values):

The minimum output value, in volts, corresponds to the lower limit value of the assigned parameter, and the maximum value corresponds to its upper limit value. The minimum value may be greater than the maximum value.





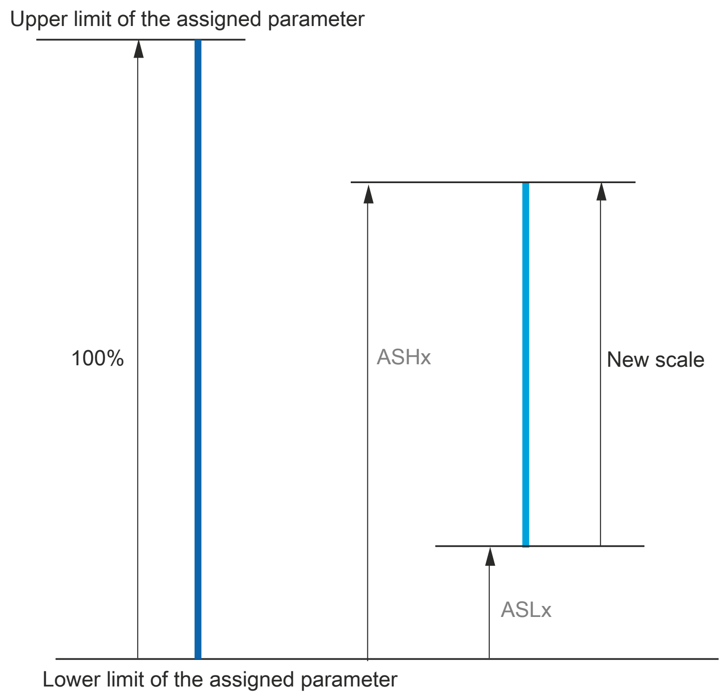
Scaling of the assigned parameter

The assigned parameter's scale can be adapted according to requirements. In order to do so, the upper and lower limit values of each analog input are changed via the corresponding parameter.

The parameter values are given as percentages. 100% corresponds to the total variation range of the configured parameter. Accordingly, the following applies: 100% = Upper limit value - Lower limit value.

For example, for parameter **[Sign torque +/-]**(Stq) (varies between -3 and +3 times the rated torque), the setting is 100% of 6 times the rated torque.

- Parameter **[Scaling AOx min]**(ASLx) changes the lower limit value: New value = Lower limit value + (range x ASLx). The factory preset value, 0%, does not change the lower limit value.
- Parameter **[Scaling AOx max]**(ASHx) changes the upper limit value: New value = Lower limit value + (range x ASLx). The factory preset value, 100%, does not change the upper limit value.
- The value of parameter **[Scaling AOx min]**(ASLx) must always be less than the value of parameter **[Scaling AOx max]**(ASHx).



Application example 2

The motor current value at output AO1 should be transferred with 0-20 mA (range: 2 In motor). In this case, In motor is equivalent to 0.8 times the value of In inverter.

Parameter **[I motor]**(OCr) varies between 0 and 2 times the rated inverter current or in the range of 2.5 times the inverter rated current.

Parameter **[AO1 max scal]**(ASL1) does not change the lower limit value. Consequently, this value remains at the factory setting of 0%.

Parameter **[AO1 min scal]**(ASH1) changes the upper limit value by 0.5 times the nominal motor torque, i.e. 100 - 100/5 = 80% (New value = Lower limit value + (range x ASH1)).

The parameters described on this page can be accessed by: DRI- > COnF > FULL > I_O- > AO1-			
Code	**Name/Description**	**Setting range**	**Factory settings**
AO1-	[AO1 CONFIGURATION]		
AO1 nO OCr OFr OFS OrP trq Stq OrS OPS OPF OPE OPI OPr UOP tHr tHr2 tHr3 tHd tqL d01 tqMS OA01 ... OA10	[AO1 assignment] [No](nO): Not assigned. [I motor](OCr): Current in the motor, between 0 and 2 In (In = rated current of inverter indicated on the inverter nameplate). [Motor freq](OFr): Frequency output from 0 to [Max frequency](tFr). [Output ramp](OFS): Signed motor frequency between -[Max frequency](tFr) and +[Max frequency](tFr). [Motor torq.](OrP): From 0 to[Max frequency](tFr). [Sign torque](trq): Motor torque, between 0 and 3 times the nominal motor torque. [Sign torque +/-](Stq): Signed motor torque, between -3 and +3 times the motor torque. The + sign corresponds to motor operation and the - sign corresponds to generator operation (brakes). [Ramp +/-](OrS): Signed ramp output, between -[Max frequency](tFr) and +[Max frequency](tFr). [PID ref.](OPS): PID controller setpoint, between [Min PID reference](PIP1) and[Max PID reference](PIP2). [PID feedback](OPF): PID controller feedback, between [Min PID feedback](PIF1) and [Max PID feedback](PIF2). [PID error](OPE): PID controller error, between -5% and +5% of ([Max PID feedback](PIF2) - [Min PID feedback](PIF1)). [PID Output](OPI): PID controller output, between [Low speed](LSP) and [High speed](HSP). [Motor power](OPr): Motor power, between 0 and 2.5 times the [Rated motor power](nPr). [Motor voltage](UOP): Voltage applied to motor, between 0 and [Rated motor volt.](UnS). [Mot thermal](tHr): Thermal motor state, between 0 and 200% of the thermal rated state. [Mot therm2](tHr2): Thermal motor state 2, between 0 and 200% of the thermal rated state. [Mot therm3](tHr3): Thermal motor state 3, between 0 and 200% of the thermal rated state. [Drv thermal](tHd): Thermal inverter state, between 0 and 200% of the thermal rated state. [Torque lim.](tqL): Torque limiting, between 0 and 3 times the nominal motor torque. [DO1](dO1): Assignment to a logic output. This assignment can only occur if [D01 assignment](dO1) has been assigned. This is the only possible selection in this case. It is displayed for information purposes only. [Torque 4Q](tqMS): Signed motor torque, between -3 and +3 times the motor torque. The + and - signs correspond to physical torque direction, independently of the operating mode (motor or generator). [OA01](OA01): Function blocks: Analog output 01 ... [OA10](OA10): Function blocks: Analog output 10		[No](nO)
AO1t 10U 0 A	[Type AO1] [Voltage](10U): Voltage output [0-20mA](0A): Current output		[0-20mA](0A)
AOL1 ★	[AO1 min Output] To access this parameter, [Type AO1](AO1t) must be set to [0-20mA](0A).	0 to 20.0 mA	0 mA
AOH1 ★	[AO1 max Output] To access this parameter, [Type AO1](AO1t) must be set to [0-20mA](0A).	0 to 20.0 mA	20.0 mA
UOL1 ★	[AO1 min Output] To access this parameter, [Type AO1](AO1t) must be set to [Voltage](10U).	0 to 10.0 V	0 V
UOH1 ★	[AO1 max Output] To access this parameter, [Type AO1](AO1t) must be set to [Voltage](10U).	0 to 10.0 V	10.0 V
ASL1	[AO1 max scal] Scaling for the lower limit value of the assigned parameter, as a % of the maximum variation possible.	0 to 100.0%	0%
ASH1	[AO1 min scal] Scaling for the upper limit value of the assigned parameter, as a % of the maximum possible variation.	0 to 100.0%	100.0%
AO1F	[AO1 Filter] Interference filtering. This parameter is forced to 0 if [AO1 assignment](AO1) is set to [DO1](dO1).	0 to 10.00 s	0 s
AOF1 YES nO	[Enable Relay1 fallback] Available if [AO1 assignment] (AO1) is set to [No](nO). [YES](YES): (AO1) is used as a logic output and controlled by (AO1C). The logic output is disconnected from the power source if the inverter is in operating state "Error" [No](nO): (AO1) is used as a logic output and controlled by (AO1C).		[No](nO)

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

4.2.3.6.4.8 [ALARM GRP1 DEFINITION] (A1C-)

In the following submenus, alarms are arranged into between one and three groups. The individual groups can be assigned to the remote signaling of a relay or a logic output. These groups can also be displayed on the graphic display terminal (see menu **[3.3 MONITORING CONFIG.]**(MCF-)) and via menu **[1.2 MONITORING]**(MOn-).

If there are selected alarms in a group, the corresponding alarm group is enabled.

The parameters described on this page can be accessed by: DRI- > COnF > FULL > I_O- > A01-	
Code	**Name/Description**
A1C-	**[ALARM GRP1 DEFINITION]** Selections must be made on the basis of the following list:
PMC	**[LI6=PTC al.]**(PLA): LI6 = PtCL alarm
EFA	**[Ext. fault al.]**(EFA): Alarm external error
USA	**[Undervoltage Alarm]**(USA): Undervoltage alarm
CtA	**[I attained]** (CtA): Current threshold value reached (**[Current threshold]** (Ctd))
FtA	**[Freq. Th. attained]**(FtA): Frequency threshold value reached (**[Freq. threshold]**(Ftd))
F2A	**[Freq. Th. 2 attained]**(F2A): Frequency threshold value 2 reached (**[Freq. Th. 2 attain]**(F2d))
SrA	**[Freq.ref.att]**(SrA): Frequency setpoint reached
tSA	**[Th.mot. att.]**(tSA): Motor thermal state 1 reached
tS2	**[Th. mot2. att.]**(tS2): Motor thermal state 2 reached
tS3	**[Th. mot3. att.]**(tS3): Motor thermal state 3 reached
UPA	**[Undervoltage Pre-alarm]**(UPA): Undervoltage threshold value
FLA	**[HSP attain.]** (FLA): High speed reached
tHA	**[Fl °C alarm]**(tHA): Inverter overheating
PEE	**[PID error al]**(PEE): PID controller error alarm
PFA	**[PID fdbk al]**(PFA): PID feedback alarm
AP3	**[AI3 Al. 4-20]**(AP3): Alarm for the display of a missing 4-20-mA signal at input AI3
SSA	**[Torque/current lim att.]**(SSA): Torque limiting alarm
tAd	**[Th. drv. att.]**(tAd): Inverter thermal state reached
tJA	**[IGBT al.]**(tJA): IGBT alarm
ULA	**[Underload. Proc. Al.]**(ULA): Underload alarm
OLA	**[Overload process alarm]**(OLA): Overload alarm
rSdA	**[Rope slack alarm]**(rSdA): Slack rope (see parameter **[Rope slack config.]**(rSd)).
ttHA	**[High torque alarm]**(ttHA): Motor torque exceeds upper threshold value **[High torque thd.]**(ttH)
ttLA	**[Low torque alarm]**(ttLA): Motor torque below lower threshold value **[Low torque thd.]**(ttL).
FqLA	**[Fr.met. alar.]**(FqLA): Measured speed setpoint reached: **[Pulse warning thd.]**(FqL).
dLdA	**[Dynamic load alarm]**(dLdA): Load variation detection (see **[DYNAMIC LOAD DETECT.]**(dLd-)).
A2C-	**[ALARM GRP2 DEFINITION]** Identical to **[ALARM GRP1 DEFINITION]**(A1C-)
A3C-	**[ALARM GRP3 DEFINITION]** Identical to **[ALARM GRP1 DEFINITION]**(A1C-)

4.2.3.6.5 [COMMAND] (CtL-)

The parameters in menu **[COMMAND]** (CtL-) can only be changed if the inverter has been stopped and no move command has been given.

Command and reference channels

Move commands (forward, reverse, stop, etc.) and setpoints can be transferred using the following channels:

Command	Setpoint
Terminals: Logic inputs LI or analog inputs LA, used as logic inputs Function blocks External operator terminal Graphic display terminal Integrated Modbus Integrated CANopen® Communication card	Terminals: Analog inputs AI, pulse input Function blocks External operator terminal Graphic display terminal Integrated Modbus Integrated CANopen® Communication card +/- speed via the terminals +/- speed via the graphic display terminal

Danger!

UNINTENDED OPERATION OF DEVICES

If analog inputs [AI1] (A11) and[AI2] (A12) are used as logic inputs in a configuration ([LAI1] (LAI1) or [LAI2] (LAI2)), their behavior in analog input mode remains active (Example: [Ref.1 channel] (Fr1) is still set to [AI1] (A11)).

- **Delete the configuration of [AI1] (A11) or [AI2] (A12) in analog input mode**
- **Check that this behavior does not present a risk to personnel or equipment.**

Failure to follow these instructions can result in death or serious injury.

Warning!

UNEXPECTED OPERATION OF THE EQUIPMENT

If analog input [AI1] (A11) or [AI2] (A12) is used as logic input ([LAI1] (LAI1) or [LAI2] (LAI2)), its behavior in analog input mode remains active (Example: [Ref.1 channel] (Fr1) is still set to [AI1] (A11)).

Failure to follow these instructions can result in death, serious injury or damage to property.

Advice:

[LAI1] (LAI1) and [LAI2] (LAI2) can only be used as logic inputs in source mode.

- **24 V power supply (max. 30 V)**
- **State 0 if <7.5 V, state 1 if >8.5 V**

Advice:

The stop buttons on the graphic display terminal or the external operator terminal can be programmed as lower-priority buttons. A stop button only has priority if parameter [Stop Key priority] (PSt) in menu [COMMAND] (CtL-) is set to [YES] (YES):

The ACOPOSinverter's behavior can be adjusted to requirements:

- **[Not separ.]** (SIM): Command and setpoint are transferred via the same channel.
- **[Separate]** (SEP): Command and setpoint can be transferred via different channels.

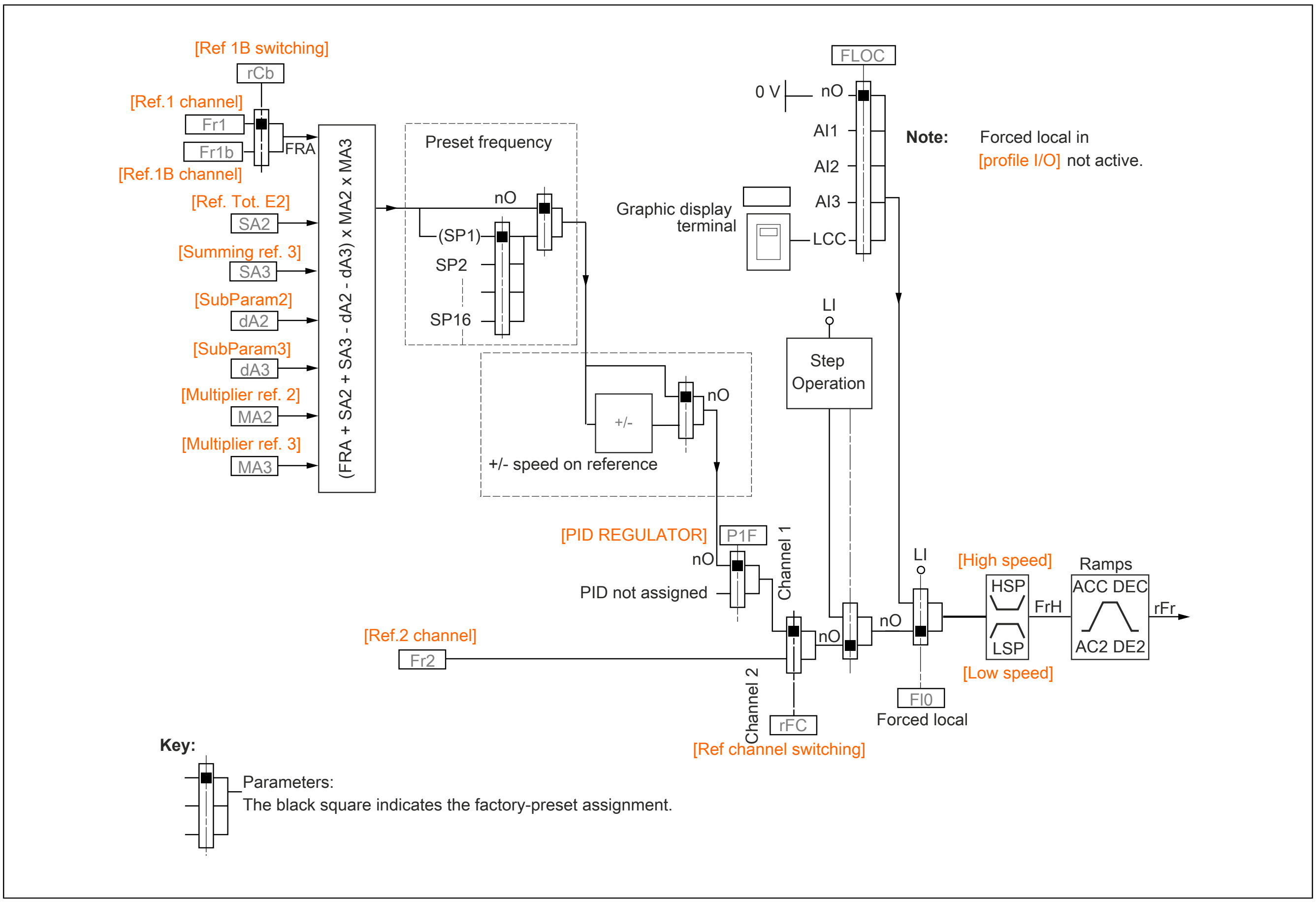
In these configurations, control is via the communication bus in accordance with the standard (only 5 freely assignable bits). It is not possible to access the application functions via the communication interface.

- **[I/O profile]** (IO): Command and setpoint can originate from different channels. This configuration both simplifies and extends communication interface use. Commands can be transferred via the logic inputs on the terminals or via the communication bus. When transmitting via the bus, the commands are available as a word that functions as a virtual terminal with only logic inputs. Application functions can be assigned to the bits in this word. More than one function can be assigned to the same bit.

Advice:

Stop commands sent via the graphic display terminal or the external operator terminal remain active, even if the terminals no longer constitute the active command channel.

Setpoint channels for configurations [Not separ.] (SIM), [Separate] (SEP) and [I/O profile] (IO), PID not configured



Fr1, SA2, SA3, dA2, dA3, MA2, MA3:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen®, communication card

Fr1b for SEP and IO:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen®, communication card

Fr1b for SIM:

- Terminals, only available if Fr1 = Terminals

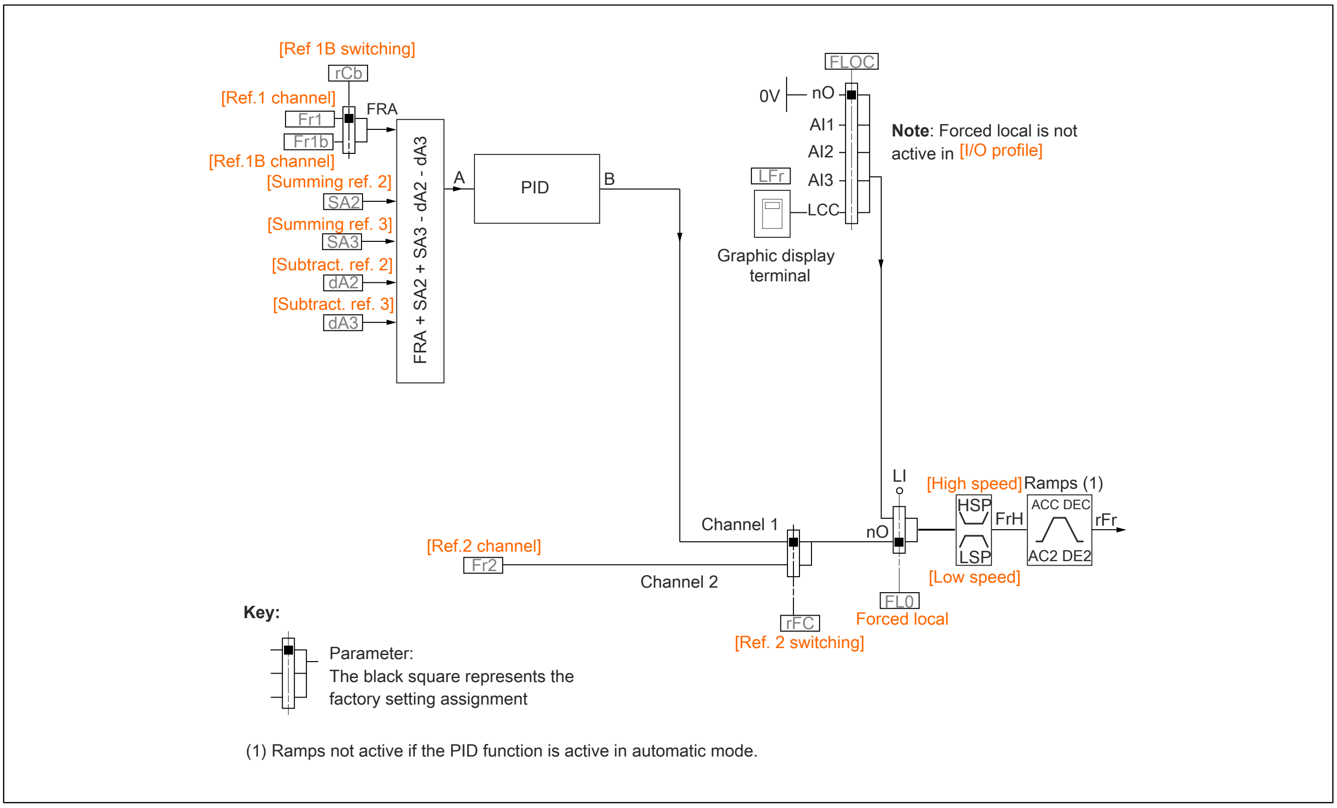
Fr2:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen®, communication card and +/- speed

Advice:

[Ref.1B channel] (Fr1b) and [Ref 1B switching] (rCb) must be configured in menu [APPLICATION FUNCT.] (Fun-).

Not separar. for configurations [Not separ.] (SIM), [Separate] (SEP) and [I/O profile] (IO), PID configured with PID setpoints at the terminals



Fr1:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen®, communication card

Fr1b for SEP and IO:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen® and POWERLINK communication card

Fr1b for SIM:

- Terminals, only available if Fr1 = Terminals

SA2, SA3, dA2, dA3:

- Terminals only

Fr2:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen®, communication card **and +/- speed**

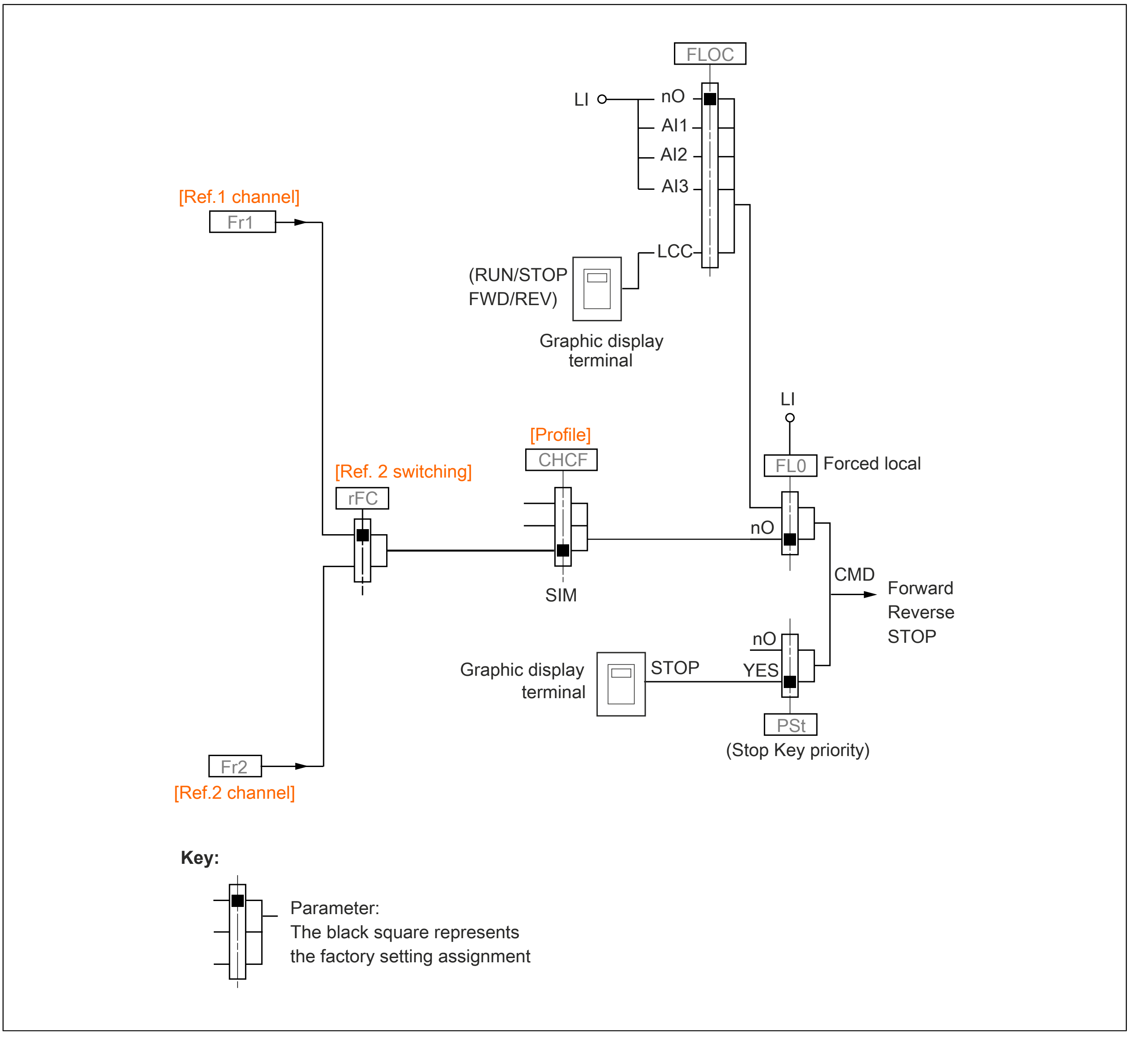
> ## Advice:
>
> **[Ref.1B channel] (Fr1b) and [Ref 1B switching] (rCb) must be configured in menu [APPLICATION FUNCT.] (Fun-).**

Command channel for configuration [Together] (SIM)

Setpoint and command, together

The command channel is determined by the reference channel. Parameters Fr1, Fr2, rFC, FLO and FLOC are valid for setpoint and command.

Example: If setpoint setting Fr1 = AI1 (analog input at the terminals), control is executed via LI (logic input at the terminals).



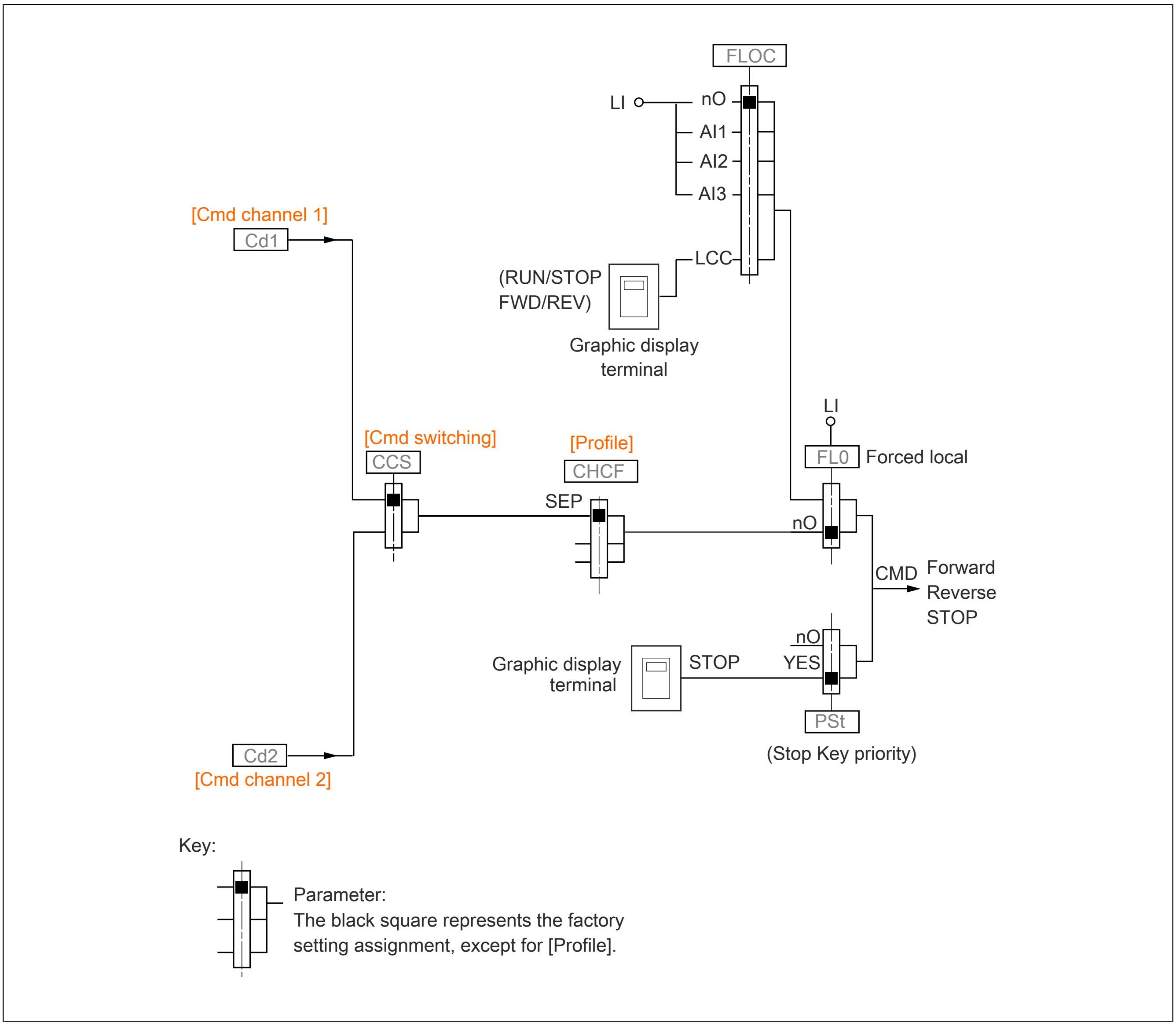
Command channel for the configuration [separated] (SEP)

Separate reference and command

Parameters FLO and FLOC apply for setpoint and command.

Example: For a setpoint in mode "Forced local" via AI1 (analog input at the terminals), the command is executed in mode "Forced local" via LI (logic input at the terminals)

The command channels Cd1 and Cd2 are independent of the reference channels Fr1, Fr1b and Fr2.



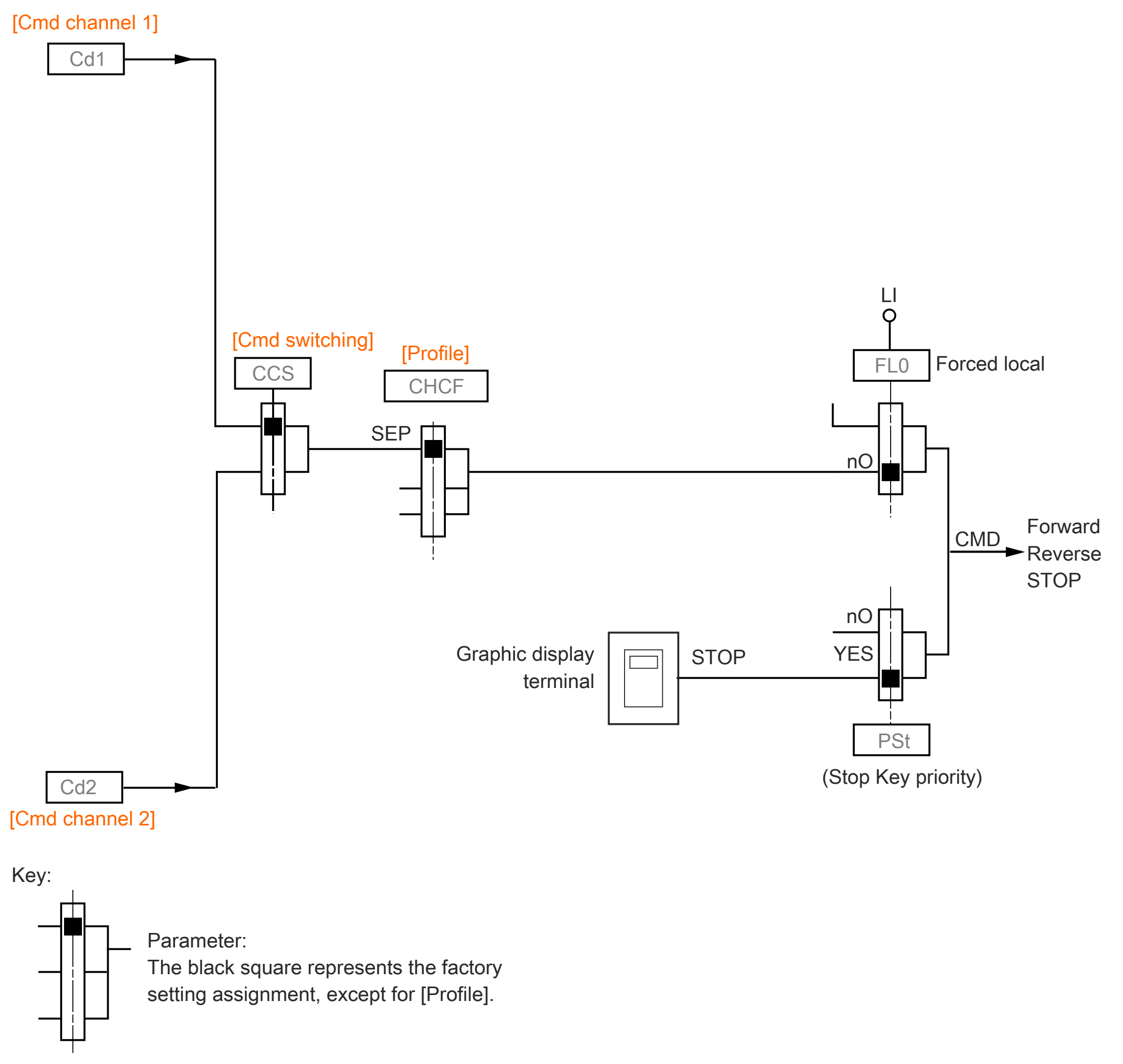
Cd1, Cd2:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen®, communication card

Command channel for configuration [I/O profile] (IO)

Setpoint and command separate, as in configuration **[Separate]** (SEP).

The command channels Cd1 and Cd2 are independent of the reference channels Fr1, Fr1b and Fr2.



Cd1, Cd2:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen®, communication card

A command or an action can be assigned to the following elements:

- Static channel by selecting input LI or a Cxxx bit:
  - For example, if you select LI3, this action is triggered by LI3, regardless of the switched command channel.
  - For example, if you select C214, this action is triggered by the integrated CANopen® with bit 14, regardless of the switched command channel.
- Switchable channel by selecting a CDxx bit:
  - For example, if you select Cd11, this action is triggered by the following elements:
    LI12, if the terminal channel is active
    C111, if the channel for the integrated Modbus is active
    C211, if the channel for the integrated Modbus is active
    C311, if the communication card channel is active

If the active channel is the graphic display terminal, the functions and commands assigned to internal switchable CDxx bits are inactive.

Advice:

Cd06 to Cd13 can only be used to switch between two networks. There are no equivalent logic inputs.

Terminals	Integrated Modbus	Integrated CANopen®	Communication card	Internal bit, switchable
				CD00
LI2 (1)	C101 (1)	C201 (1)	C301 (1)	CD01
LI3	C102	C202	C302	CD02
LI4	C103	C203	C303	CD03
LI5	C104	C204	C304	CD04
LI6	C105	C205	C305	CD05
-	C106	C206	C306	CD06
-	C107	C207	C307	CD07
-	C108	C208	C308	CD08
-	C109	C209	C309	CD09
-	C110	C210	C310	CD10
-	C111	C211	C311	CD11
-	C112	C212	C312	CD12
LAI1	C113	C213	C313	CD13
LAI2	C114	C214	C314	CD14
-	C115	C215	C315	CD15
OL01 to OL10				

(1) If [2/3 wire control](tCC) is set to [3 wire](3C), access to LI2, C101, C201 and C301 is not possible.

Assignment conditions for logic inputs and control bits

The following elements are available for every command or function that can be assigned to a logic input or a control bit:

[LI1](LI1) to **[LI6]**(LI6)	Drive with or without option
[LAI1](LAI1) to **[LAI2]**(LAI2)	Logic inputs
[C101](C101) to **[C110]**(C110)	With integrated Modbus, in configuration **[I/O profile]**(IO)
[C111](C111) to **[C115]**(C115)	With integrated Modbus, regardless of configuration
[C201](C201) to **[C210]**(C210)	With integrated CANopen®, in configuration **[I/O profile]**(IO)
[C211](C211) to **[C215]**(C215)	With integrated CANopen®, regardless of configuration
[C301](C301) to **[C310]**(C310)	With a communication card, in configuration **[I/O profile]**(IO)
[C311](C311) to **[C315]**(C315)	With a communication card, regardless of configuration
[CD00](Cd00) to **[CD10]**(Cd10)	In configuration **[I/O profile]**(IO)
[CD11](Cd11) to **[CD15]**(Cd15)	Regardless of configuration
[OL01](OL01) to **[OL10]**(OL10)	Regardless of configuration

Advice:

In configuration [I/O profile](IO), access to LI1 is not possible if [2/3 wire control](tCC) is set to [3 wire](3C). Access to LI2, C101, C201 and C301 is not possible either.

Warning!

LOSS OF CONTROL

Inactive command channels are not monitored (no error detection due to communication interruption).

Make sure that the commands and functions assigned to bits C101 to C315 do not result in unsafe states in the event of a communication interruption.

Failure to follow these instructions can result in serious injury and death or damage to the equipment.

The parameters described on this page are accessed by: DRI- > COnF > FULL > CtL-		
Code	**Name/Description**	**Factory settings**
CtL-	**[COMMAND]**	
Fr1	**[Ref.1 channel]**	**[AI1]**(AI1)
AI1	**[AI1]**(AI1): Analog input A1	
AI2	**[AI2]**(AI2): Analog input A2	
AI3	**[AI3]**(AI3): Analog input A3	
LCC	**[HMI]**(LCC): Graphic display terminal or external operator terminal source	
Mdb	**[Modbus]**(Mdb): Integrated Modbus	
CAn	**[CANopen com.]**(CAn): Integrated CANopen®	
nEt	**[Com. card]**(nEt): Communication card (if used)	
PI	**[RP]**(PI): Pulse input	
AIU1	**[Virtual AI 1]**(AIU1): Virtual analog input 1 with handwheel (only available if **[Profile]**(CHCF) is not set to **[Not separ.]**(SIM)).	
0A01	**[OA01]**(OA01): Function blocks: Analog output 01	
...	**...**	
OA10	**[OA10]**(OA10): Function blocks: Analog output 10	
rIn	**[RV Inhibition]** Suppression of movement in left direction of rotation; does not apply to direction queries transmitted by logic inputs. Requests from logic inputs for reverse rotation will be taken into account. Requests from the graphic display terminal for reverse rotation will not be taken into account. Requests from the fieldbus for reverse rotation will not be taken into account. Any speed setpoint for reverse rotation originating from the PID, summation input, etc. will be interpreted as null frequency (0Hz).	**[No]**(nO)
nO	**[No]**(nO)	
YES	**[YES]**(YES)	
PSt 2 s	**[Stop Key priority]** **Warning!** **LOSS OF CONTROL** **This function disables the stop buttons of the external operator terminal if parameter [Command channel](CMdC) is not set to [HMI](HMI).** **Only set this parameter to [No](nO) if suitable alternative stop functions are available.** **Failure to follow these instructions can result in death, serious injury or damage to property.** This is a freewheel stop. If the active command channel is the graphic display terminal, then this stop is done in accordance with **[Type of stop]** (Stt) regardless of the configuration for **[Stop Key priority]**(PSt).	**[YES]**(YES)
nO	**[No]**(nO)	
YES	**[YES]**(YES): Gives priority to STOP on the graphic display terminal when the graphic display terminal is not enabled as the command channel.	
CHCF 2 s	**[Profile]** **Warning!** **UNEXPECTED OPERATION OF THE EQUIPMENT** **Disabling [I/O profile](IO) restores the frequency inverter to factory settings.** **It is important that the factory setting restoration is compatible with the wiring used.** **Failure to follow these instructions can result in death, serious injury or damage to property.**	**[Together]**(SIM)
SIM	**[Not separ.]**(SIM): Setpoint and command not separate.	
SEP	**[Separate]**(SEP): Setpoint and command separate. The access to this assignment is not possible in the **[I/O profile]**(IO).	
I/O	**[I/O profile]**(IO): I/O profile	
CCS	**[Cmd switching]** To access this parameter, **[Profile]**(CHCF) must be set to **[Separate]**(SEP) or **[I/O profile]**(IO). In state 0 of the assigned input or bit, channel **[Cmd channel 1]**(Cd1) is configured. Channel 1. In state 1 of the assigned input or bit, channel **[Cmd channel 2]**(Cd2) is configured. Channel 1. If **[Profile]**(CHCF) is set to **[Not separ.]**(SIM), the parameter can only be configured on **[ch1 active]**(Cd1).	**[ch1 active]**(Cd1)
Cd1	**[ch1 active]**(Cd1): **[Cmd channel 1]**(Cd1) active (no switchover)	
Cd2	**[Channel 2 active]**(Cd2): **[Cmd channel 1]**(Cd2) active (no switchover)	
LI1	**[LI1]**(LI1): Logic input LI1	
...	**[...]**(...): See the assignment conditions (not Cd00 to Cd15).	
Cd1	**[Cmd channel 1]** To access this parameter, **[Profile]**(CHCF) must be set to **[Separate]**(SEP) or **[I/O profile]**(IO).	**[Terminals]**(tEr)
tEr	**[Terminals]**(tEr): Terminals	
LCC	**[HMI]**(LCC): Graphic display terminal or external operator terminal	
Mdb	**[Modbus]**(Mdb): Integrated Modbus	
CAn	**[CANopen com.]**(CAn): Integrated CANopen®	
nEt	**[Com. card]**(nEt): Communication card (if used)	
Cd2	**[Cmd channel 2]** To access this parameter, **[Profile]**(CHCF) must be set to **[Separate]**(SEP) or **[I/O profile]**(IO).	**[Modbus]**(Mdb)
tEr	**[Terminals]**(tEr): Terminals	
LCC	**[HMI]**(LCC): Graphic display terminal or external operator terminal	
Mdb	**[Modbus]**(Mdb): Integrated Modbus	

The parameters described on this page are accessed by: DRI- > COnF > FULL > CtL-		
Code	**Name/Description**	**Factory settings**
CAn	[CANopen com.](CAn): Integrated CANopen®	
nEt	[Com. card](nEt): Communication card (if used)	
rFC	**[Ref. 2 switching]**	[Ref.1 channel](Fr1)
	In state 0 of the assigned input or bit, channel [Cmd channel 1](Cd1) is active. In state 1 of the assigned input or bit, channel [Cmd channel 2](Cd2) is active.	
Fr1	[Ref.1 channel](Fr1): [Cmd channel 1](Cd1) active (no switchover)	
Fr2	[Ref.2 channel](Fr2): [Cmd channel 2](Cd2) active (no switchover)	
LI1	[LI1](LI1): Logic input LI1	
...	[...](...): See the assignment conditions (not Cd00 to Cd15).	
Fr2	**[Ref.2 channel]**	[No](nO)
nO	[No](nO): Not assigned. If [Profile](CHCF) is set to[Together](SIM), the command via the terminals has the setpoint zero. If [Profile](CHCF) is set to [Separate](SEP) or [I/O profile](IO) is set, the setpoint is zero.	
AI1	[AI1](AI1): Analog input A1	
AI2	[AI2](AI2): Analog input A2	
AI3	[AI3](AI3): Analog input A3	
Updt	[+/- speed](Updt): Command +/- speed	
LCC	[HMI](LCC): Graphic display terminal or external operator terminal	
Mdb	[Modbus](Mdb): Integrated Modbus	
CAn	[CANopen com.](CAn): Integrated CANopen®	
nEt	[Com. card](nEt): Communication card (if used)	
PI	[RP](PI): Pulse input	
AIU1	[AI virtual 1](AIU1): Virtual analog input 1 with handwheel	
0A01	[OA01](OA01): Function blocks: Analog output 01	
...	...	
OA10	[OA10](OA10): Function blocks: Analog output 10	
COP	**[Copy channel 1 <> 2]**	[No](nO)
2 s	**Danger!** **UNEXPECTED OPERATION OF THE EQUIPMENT** **This parameter may cause unexpected movements such as change in direction of rotation of the motor, sudden acceleration or stopping.** • **It is important that the setting for this parameter does not lead to unexpected movements.** • **It is important that the setting for this parameter does not lead to unstable states.** **Failure to follow these instructions can result in death, serious injury or damage to property.**	
	Enables the copying of the setpoint and/or the current command by switchover, for example to avoid fluctuations in speed. If [Profile](CHCF) is set to [Not separ.](SIM) or [Separate](SEP), only copying from channel 1 to channel 2 is possible. If [Profile](CHCF) is set to [I/O profile](IO), copying in both directions is possible. A reference or a command cannot be copied to a channel on the terminals. The copied setpoint is [Frequency ref.](FrH) (before ramp), except if the setpoint of the target channel is given via the +/- speed. In this case, setpoint [Output frequency](rFr) (after ramp) will be copied.	
nO	[No](nO): No copy	
SP	[Reference](SP): Copy of the setpoint	
Cd	[Command](Cd): Copy of the command	
ALL	[Cmd and ref](ALL): Copy of the command and reference	

★	These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.
2 s	To change the assignment of this parameter, press the ENT key for 2 seconds.

As the graphic display terminal may be selected as the command and/or reference channel, its action modes can be configured.

The parameters on this page can only be accessed on the graphic display terminal, and not on the integrated display terminal.

Comments:

- The command and/or setpoint of the operator terminal is only active when the command and/or setpoint channels are also active via the terminal, with the exception of **[T/K]**(Ft) (command via the operator terminal), which has priority on these channels. By pressing **[T/K]**(Ft) again (command via the operator terminal), the control is transferred back to the selected channel.
- Command and reference via the display terminal are impossible if the latter is connected to more than one inverter.
- The functions JOG, preset frequencies and +/- speed are only accessible if **[Profile]**(CHCF) is set to **[Together]**(SIM).
- The functions for the predefined PID setpoint are only accessible if **[Profile]**(CHCF) is set to **[Together]**(SIM) or **[Separate]**(SEP).
- Function **[T/K]**(Ft) (command via the operator terminal) is accessible, regardless of the setting in **[Profile]**(CHCF).

The parameters described on this page are accessed by: DRI- > COnF > FULL > CtL-		
Code	**Name/Description**	**Factory settings**
CtL-	**[COMMAND]**	
Fn1	**[F1 key assignment]**	**[No]**(nO)
nO	**[No]**(nO): Not assigned	
FJOG	**[Jog]**(FJOG): JOG step mode	
FPS1	**[Preset spd2]**(FPS1): Via keystroke, the inverter is preset with second speed **[Preset speed 2]**(SP2). Press STOP to stop the frequency inverter.	
FPS2	**[Preset spd3]**(FPS2): Via keystroke, the inverter is preset with third speed **[Preset speed 3]**(SP3). Press STOP to stop the frequency inverter.	
FPr1	**[PID ref. 2]**(FPr1): Defines a PID setpoint that is equal to second preselected PID setpoint **[Preset ref. PID 2]**(rP2). A move command will not be sent. Only executable if **[Ref.1 channel]**(Fr1) is set to **[HMI]**(LCC). Not compatible with function **[T/K]**(Ft).	
FPr2	**[PID ref. 3]**(FPr2): Defines a PID setpoint that is equal to the third preselected PID setpoint **[Preset ref. PID 3]**(rP3). A move command will not be sent. Only executable if **[Ref.1 channel]**(Fr1) is set to **[HMI]**(LCC). Not compatible with function **[T/K]**(Ft).	
FUSP	**[+speed around ref.]**(FUSP): + speed; only executable if **[Ref.2 channel]**(Fr2) is set to **[HMI]**(LCC). Press the key to control the inverter and increase the speed. Press STOP to stop the frequency inverter.	
FdSP	**[-speed around ref.]**(FdSP): - speed; only executable if **[Ref.2 channel]** (Fr2) is set to **[HMI]** (LCC) and if **[+speed around ref.]** (FUSP) is assigned to another key. Press a key to control the inverter and decrease the speed. Press STOP to stop the frequency inverter.	
Ft	**[T/K]**(Ft): Command via the operator terminal; takes priority over **[Cmd switching]**(CCS) and **[Ref. 2 switching]**(rFC).	
Fn2	**[F2 key assignment]** Identical to **[F1 key assignment]**(Fn1).	**[No]**(nO)
Fn3	**[F3 key assignment]** Identical to **[F1 key assignment]**(Fn1).	**[No]**(nO)
Fn4	**[F4 key assignment]** Identical to **[F1 key assignment]**(Fn1).	**[No]**(nO)
bMp ★	**[HMI cmd.]** If function **[T/K]**(Ft) is assigned to a key and is active, this parameter defines behavior for the point in time at which the graphic display terminal or the external operator terminal takes back control.	**[Stop]**(StOP)
StOP	**[Stop]**(StOP): Stops inverter; controlled direction of operation and setpoint of the previous channel are copied (to be taken into account on the next move command).	
bUMF	**[Bumpless]**(bUMF): Does not stop the inverter; the controlled direction of operation and the setpoint of the previous channel are copied.	

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

4.2.3.6.6 [FUNCTION BLOCKS] (FbM-)

The parameters described on this page can be accessed by: DRI- > ConF > FuLL- > FbM-	
Code	**Name/Description**
FbM-	**[FUNCTION BLOCKS]**
MFb-	**[FB MONITORING]** **Advice:** **This section only describes the possible inverter functions of the local and external operator terminal.**
FbSt	**[FB status]**
IdLE	**[Idle]** (IdLE): No binary file in target; function block waiting for download.
CHEC	**[Check prog.]** (CHEC): The downloaded program is checked.
StOP	**[Stop]** (StOP): The function block application is stopped.
InIt	**[Init]** (InIt): Coherency check performed on the ACOPOSLogic program and function block parameters.
rUn	**[Run]** (rUn): The function block application is running.
Err	**[Fault]** (Err): An internal error was detected. The function block application is in an error state.
FbFt	**[FB fault]**
nO	**[No]** (nO): No error detected
Int	**[Intern]** (Int): Internal error detected
bIn	**[Binary file]** (bIn): Binary file is corrupted
InP	**[Int. param.]** (InP): Internal parameter error detected.
PAr	**[Para. RW]** (PAr): Parameter access error detected
CAL	**[Calculation]** (CAL): Calculation error detected
tOAU	**[TO AUX]** (tOAU): AUX task timeout
tOPP	**[TO synch]** (tOPP): PRE/POST task timeout
AdL	**[Bad ADLC]** (AdL): ADLC with invalid parameter
In	**[Input assign.]** (In): Input not configured

The parameters described on this page can be accessed by: DRI- > ConF > FuLL- > FbM-			
Code	**Name/Description**	**Setting range**	**Factory settings**
FbI-	**[FB IDENTIFICATION]**		
bUEr ★	**[Program Version]** User's program version.	0 to 255	-
bnS ★	**[Program size]** Size of the program file.	0 to 65,535	-
bnU	**[Prg. format version]** Binary format version of the inverter.	0 to 255	-
CtU	**[Catalog version]** Inverter catalog version	0 to 255	-

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

The parameters described on this page can be accessed by: DRI- > ConF > FuLL- > FbM-		
Code	**Name/Description**	**Factory settings**
FbCd	**[FB Command]** Used to manually start and stop function blocks. **[FB Command]** (FbCd) is forced to **[Stop]** (StOP) if there is no valid function block application saved in the inverter memory. **[FB Command]** (FbCd) is set to **[Start]**(Strt) if the function block application switches to execution mode in accordance with configuration **[FB start mode]**(FbrM) **Advice:** **As soon as the function blocks are executed, the inverter can be assumed to be operating. In this case, it no longer possible to change the configuration parameters.**	
StOP	**[Stop]** (StOP): Stop command for the function block application.	
Strt	**[Start]** (Strt): Move command for the function block application.	
FbrM 2 s	**[FB start mode]** **Warning!** **UNINTENDED OPERATION OF DEVICES** **Depending on the setting defined for this parameter, function blocks may execute suddenly.** **Make sure that this setting does not result in unsafe states.** **Failure to follow these instructions can result in death, serious injury or damage to property.** Used to select various start options for the function block application. **Advice:** **Changes made to this parameter are not taken into account while the function block application is running.**	**[No]** (nO)
nO	**[No]** (nO): Parameter **[FB Command]** (FbCd) controls the function block application.	
YES	**[YES]** (YES): The function block application automatically switches to execution mode when the inverter is switched on.	
LI1	**[LI1]** (LI1): The function block application changes to execution mode on a rising edge of the logic input. On a falling edge of the logic input, the application switches to a stop.	
...	**[...]** (...): See Assignment conditions (excluding **[OL01]** (OL01) to **[OL10]** (OL10)).	
FbSM	**[Stop FB Stop motor]** **Warning!** **LOSS OF CONTROL** **If [Stop FB Stop motor](FbSM) is set to [No] (nO), the motor keeps running when the program is stopped.** **Only set this parameter to [No] (nO) if suitable alternative stop functions are available.** **Failure to follow these instructions can result in death, serious injury or damage to property.** Used to set up operating options with the inverter when the function blocks are stopped.	**[Freewheel]** (YES)
nO	**[Fault ignored]** (nO): The frequency inverter does not stop.	
YES	**[Freewheel]** (YES): The motor is coasting to a stop.	
rMP	**[Ramp stop]** (rMP): Ramp stop	
FSt	**[Fast stop]** (FSt): Fast stop	
dCI	**[DC Injection]** (dCI): DC injection braking	
FbdF	**[FB on drive fault]** Behavior of the function blocks in the event of inverter errors.	**[Stop]** (StOP)
StOP	**[Stop]** (StOP): The function blocks stop in the event of an inverter error; the outputs are enabled.	
IGn	**[Fault ignored]** (IGn): The function blocks continue to execute in the event of an inverter error (exception: CFF and INFE).	

Parameter that can be modified during operation or when stopped.

2 s To change the assignment of this parameter, press the ENT key for 2 seconds.

The parameters described on this page can be accessed by: DRI- > ConF > FuLL- > FbM-		
Code	**Name/Description**	**Factory settings**
FbA-	**[FB INPUT ASSIGN.]**	
IL01	**[Logic input 1 assignment]** Possible assignment of the function block logic input.	**[No]** (nO)
nO	**[No]** (nO): Not assigned	
FLt	**[No fault]** (FLt): State of the inverter error detection (relay is normally enabled and will be disabled in the event of an error).	
FtA	**[Freq. Th. attained]**(FtA): Frequency threshold value reached (**[Freq. threshold]**)	
F2A	**[Freq. Th. 2 attained]**(F2A): Frequency threshold value 2 reached (**[Freq. threshold 2]**)	
Fr1	**[Ref.1 channel]**(Fr1): Setpoint source 1	
Fr2	**[Ref.2 channel]**(Fr2): Setpoint source 2	
Cd1	**[ch1 active]**(Cd1): Command channel = Channel 1 (for **[Cmd switching]** (CCS))	
Cd2	**[Channel 2 active]**(Cd2): Command channel = Channel 2 (for **[Cmd switching]**(CCS))	
Fr1b	**[Ref.1B channel]**(Fr1b): Setpoint channel = Channel 1b (for **[Ref. 2 switching]**(rFC))	
YES	**[YES]**(YES): Yes	
LI1	**[LI1]**(LI1): Logic input LI1	
...	**[...]** (...): See the assignment conditions	
IL--	**[Logic input x assignment]** All available function block logic inputs for the inverter are processed as per the examples provided above for **[Logic input 1 assignment]** (IL01) (to **[Logic input 10 assignment]** (IL10)).	**[No]** (nO)
IA01	**[Analog input 1 assignment]**	**[No]** (nO)
nO	**[No]** (nO): Not assigned	
A11	**[AI1]** (A11): Analog input A1	
A12	**[AI2]** (A12): Analog input A2	
A13	**[AI3]** (A13): Analog input A3	
OCr	**[I motor]** (OCr): Motor current	
OFr	**[Motor freq]** (OFr): Motor speed	
OrP	**[Motor torq.]** (OrP): Ramp output	
trq	**[Sign torque]** (trq): Motor torque	
Stq	**[Sign torque]** (Stq): Signed motor torque	
OrS	**[Ramp +/-]** (OrS): Signed ramp output	
OPS	**[PID ref.]** (OPS): PI(D) setpoint	
OPF	**[PID feedback]** (OPF): PI(D) actual value	
OPE	**[PID error]** (OPE): PI(D) error	
OPI	**[PID Output]** (OPI): PI(D) integral	
OPr	**[Motor power]** (OPr): Motor power	
tHr	**[Mot thermal]** (tHr): Thermal state of the motor	
tHd	**[Drv thermal]** (tHd): Thermal state of the inverter	
tqMS	**[Torque 4Q]** (tqMS): Signed motor torque	
UPdt	**[+/- speed]** (UPdt): Assignment of up/down function via Lix	
UPdH	**[Ref +/- HMI]** (UPdH): Assignment of up/down function via the graphic display terminal or external operator terminal	
LCC	**[HMI]** (LCC): Graphic display terminal or external operator terminal source	
Mdb	**[Modbus]** (Mdb): Integrated Modbus	
CAn	**[CANopen com.]** (CAn): Integrated CANopen®	
nEt	**[Com. card]** (nEt): Optional communication card source	
OFS	**[Output ramp]** (OFS): Signed motor frequency	
tHr2	**[Mot therm2]** (tHr2): Thermal motor state 2	
tHr3	**[Mot therm3]** (tHr3): Thermal motor state 3	
tqL	**[Torque lim.]** (tqL): Torque limiting	
UOP	**[Motor voltage]** (UOP): Motor voltage	
PI	**[RP]** (PI): Pulse input	
AIU1	**[AI virtual 1]** (AIU1): Virtual analog input 1 with handwheel	
dO1	**[DO1]** (dO1): Analog / logic output DO1	
AIU2	**[AI virtual 2]** (AIU2): Virtual analog input 2 via communication bus	
OA01	**[OA01]** (OA01): Function blocks: Analog output 01	
...	**[...]** (...)	
OA10	**[OA10]** (OA10): Function blocks: Analog output 10	
IA--	**[Analog input x assignment]** All available function block analog inputs for the inverter are processed as per the examples provided above for **[IA01]** (IA01) (to **[IA01]** (IA10)).	**[No]** (nO)

The parameters described on this page can be accessed by: DRI- > ConF > FuLL- > FbM-			
Code	**Name/Description**	**Setting range**	**Factory settings**
FbM-	[FUNCTION BLOCKS]		
FAd-	[FLAG WORDS] ADL containers include logical Modbus addresses for internal inverter parameters. If the selected address is valid, the corresponding parameter is displayed instead of the address.		
LA01	Flag word 01	3,015 to 64,299	0
LA02	Flag word 02	3,015 to 64,299	0
LA03	Flag word 03	3,015 to 64,299	0
LA04	Flag word 04	3,015 to 64,299	0
LA05	Flag word 05	3,015 to 64,299	0
LA06	Flag word 06	3,015 to 64,299	0
LA07	Flag word 07	3,015 to 64,299	0
LA08	Flag word 08	3,015 to 64,299	0

The parameters described on this page can be accessed by: DRI- > ConF > FuLL- > FbM-			
Code	**Name/Description**	**Setting range**	**Factory settings**
FbM-	[FUNCTION BLOCKS]		
FbP-	[FB PARAMETERS] Internal parameters available for the user program.		
M001 1)	[] Parameter M001 saved in EEPROM.	0 to 65,535	0
M002 1)	[] Parameter M002 saved in EEPROM.	0 to 65,535	0
M003 1)	[] Parameter M003 saved in EEPROM.	0 to 65,535	0
M004 1)	[] Parameter M004 saved in EEPROM.	0 to 65,535	0
M005 1)	[] Parameter M005 written in RAM.	0 to 65,535	0
M006 1)	[] Parameter M006 written in RAM.	0 to 65,535	0
M007 1)	[] Parameter M007 written in RAM.	0 to 65,535	0
M008 1)	[] Parameter M008 written in RAM.	0 to 65,535	0

1) If there is no graphic display terminal used, values above 9,999 in four-digit display format are shown with a period as the thousands separator; for example, 15.65 for 15,650.

Parameter that can be modified during operation or when stopped.

4.2.3.6.7 [APPLICATION FUNCT.] (FUn-)

Summary of the functions:

Code	Name
(rEF-)	[REFERENCE SWITCH.]
(OAI-)	[REF. OPERATIONS]
(rPt-)	[RAMP]
(Stt-)	[STOP CONFIGURATION]
(AdC-)	[Auto DC injection]
(JOG-)	[JOG]
(PSS-)	[PRESET SPEEDS]
(UPd)	[+/- speed]
(SrE-)	[+- SPEED AROUND REF]
(SPM-)	[MEMO REFERENCE]
(FLI-)	[FLUXING BY LI]
(bLC-)	[BRAKE LOGIC CONTROL]
(ELM-)	[EXTERNAL LOAD MEAS.]
(HSH-)	[HIGH SPEED HOISTING]
(PId-)	[PID REGULATOR]
(Pr1-)	[PRESET PID REF]
(tOL-)	[TORQUE LIMITATION]
(CLI-)	[CURRENT LIMIT.]
(I2t-)	[DYN CURRENT LIMIT]
(LLC-)	[LINE CONTACTOR COMMAND]
(OCC-)	[OUTPUT CONTACTOR CMD]
(LPO-)	[POSITIONING BY SENSORS]
(MLP-)	[PARAM. SET SWITCHING]
(MMC-)	[MULTIMOTORS/CONFIG.]
(tnL-)	[AUTO-TUNING BY LI]
(trO-)	[TRAVERSE CONTROL]
(CHS-)	[HSP SWITCHING]
(dCC-)	[DC BUS]

The parameters in menu **[APPLICATION FUNCT.]**(Fun-) can only be changed if the inverter has been stopped and no move command has been given. Parameters with an arrow symbol in the "Code" column are exceptions to this rule. These parameters can be modified with the inverter running or stopped.

Advice:

Compatibility of functions

The choice of application functions may be limited by the number of inputs and outputs and by the incompatibility of some functions with one another. Functions not listed in the table below are do not have these types of limitations.

If functions are not compatible with one another, the first configured function will block the configuration of the other functions.

Each of the functions on the following pages can be assigned to one of the inputs or outputs.

Danger!

UNINTENDED OPERATION OF DEVICES

Several functions can be assigned to the same input and simultaneously enabled by this input.

Make sure that the assignment of several functions to a single input does not result in unsafe states.

Failure to follow these instructions can result in death, serious injury or damage to property.

The assignment of an input to several functions is only possible on levels **[Advanced]**(AdU) and **[Expert]**(EPr).

Before assigning a command, setpoint or function to an input or output, make sure that this input or output has not already been assigned and that no incompatible functions have been assigned to any other input or output.

The factory settings or the macro configurations of the inverter automatically configure the functions, **which in turn can prohibit the assignment of other functions**.

It may be necessary to remove one or more functions from the configuration in order to be able to enable another function. Check the compatibility table below.

Stop functions have priority over move commands.

Frequency references via logic commands have priority over analog references.

Advice:

This compatibility table does not affect the control commands that can be assigned to the keys of the graphic display terminal.

	Reference operations	+/- speed	Preset speeds	PID regulator	Traverse control	JOG operation	Reference switching	Skip frequency	Brake logic control	Auto DC injection	Catch on the fly	Output contactor command	DC injection stop	Fast stop	Freewheel stop	+/- speed around a reference	High speed hoisting	Load sharing	Positioning by sensors
Reference configurations			↑	• (2)		↑	↑	↑											
+/- speed					•	•	↑	↑											
Preset frequencies	←					↑	↑	↑											
PID controllers	• (2)				•	•	↑	↑	•							•	•	•	•
Traverse control		•		•		•	↑	↑								•	•		
JOG operation	←	•	←	•	•			↑	•	←						•	•		
Reference switching	←	←	←	←	←			↑								↑			
Skip frequency	←	←	←	←	←	←	←									←			
Brake logic				•		•					•	•	•						
Auto DC injection						↑							↑		↑				
Catch on the fly									•										
Motor protection command									•										
DC injection braking									•	←				• (1)	↑				
Fast stop													• (1)		↑				
Freewheel stop										←			←	←					
+/- speed around the setpoint				•	•	•	←	↑											
High-speed hoisting				•	•	•													
Load distribution				•															
Positioning via limit switch				•															

(1) Priority is given to the first of these two stop modes to be activated.
(2) Only the multiplier reference is incompatible with the PID regulator.

• Incompatible functions

Compatible functions

Not applicable

Priority functions (functions, which cannot be active at the same time):

← ↑ The function indicated by an arrow has priority over the other function.

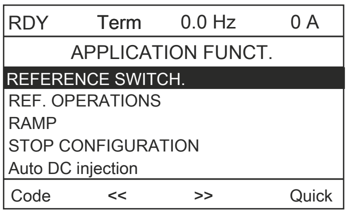
Incompatible functions

The following function cannot be accessed or is disabled after an automatic restart:

This function is only possible for the following types of control: **[2/3 wire control]**(tCC) = **[2 wire]**(2C) and **[2 wire type]**(tCt) = **[Level]** (LEL) or **[Fwd priority]**(PFO).

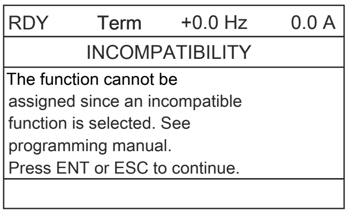
Via the monitoring menu **[1.2 MONITORING]**(MOn-) the functions assigned to each input can be displayed in order to check compatibility.

When a function is assigned, a ✓ appears on the graphic display terminal, as illustrated in the example below:



If a function should be assigned that is incompatible with another function that has already been assigned, an alarm message will appear:

- With the graphic display terminal:



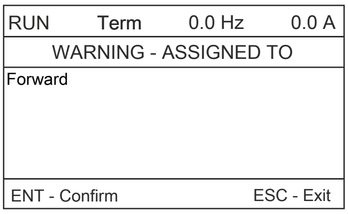
- With the integrated operator terminal and external operator terminal:

COMP flashes until ENT or ESC is pressed.

If a logic input, analog input, setpoint channel or bit is assigned to a function, pressing the HELP button will display the functions that may already have been activated by this input, bit or channel.

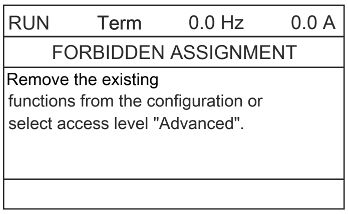
When a logic input, an analog input, a setpoint channel or a bit that has already been assigned is assigned to another function, the following screens appear:

- With the graphic display terminal:



If the access level permits this new assignment, pressing ENT confirms the assignment.

If the access level does not permit this new assignment, pressing ENT results in the following display:



- With the integrated operator terminal:

The code for the first function, which is already assigned, is displayed blinking.

If the access level permits this new assignment, pressing ENT confirms the assignment.

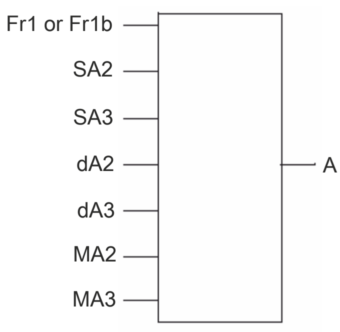
If the access level does not permit this new assignment, pressing ENT has no effect and the message continues to flash. It is only possible to exit by pressing ESC.

4.2.3.6.7.1 [REFERENCE SWITCH.] (rEF-)

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > rEF-		
Code	**Name/Description**	**Factory settings**
rEF-	[REFERENCE SWITCH.]	
rCb	[Ref 1B switching] In state 0 of the assigned input or bit, [Ref.1 channel](Fr1) is active. In state 1 of the assigned input or bit, [Ref.1B channel](Fr1b) is active. [Ref 1B switching](rCb) is forced to [ch1 active](Fr1) if [Profile](CHCF) is set to [Not separ.](SIM) and [Ref.1 channel](Fr1) is assigned via the terminals (analog inputs, pulse input).	[ch1 active](Fr1)
Fr1	[ch1 active](Fr1): No switchover, [Ref.1 channel](Fr1) active.	
Fr1b	[ch1B active](Fr1b): No switchover, [Ref.1B channel](Fr1b) active.	
LI1	[LI1](LI1): Logic input LI1	
...	[...](...): See the assignment conditions (excluding [Cd00](Cd00) to [Cd15](Cd15)).	
Fr1b	[Ref.1B channel]	[No](nO)
nO	[No](nO): Not assigned	
AI1	[AI1](AI1): Analog input A1	
AI2	[AI2](AI2): Analog input A2	
AI3	[AI3](AI3): Analog input A3	
LCC	[HMI](LCC): Graphic display terminal or external operator terminal source	
Mdb	[Modbus](Mdb): Integrated Modbus	
CAn	[CANopen com.](CAn): Integrated CANopen®	
nEt	[Com. card](nEt): Optional communication card source	
PI	[RP](PI): Pulse input	
AIU1	[AI virtual 1](AIU1): Virtual analog input 1 with handwheel (only available if [Profile](CHCF) is not set to [Not separ.](SIM)).	
OA01	[OA01](OA01): Function blocks: Analog output 01	
...	...	
OA10	[OA10](OA10): Function blocks: Analog output 10	

4.2.3.6.7.2 [REF. OPERATIONS] (OAI-)

Input addition/ Input subtraction / Multiplier

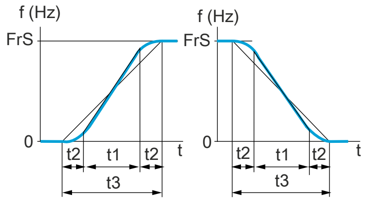
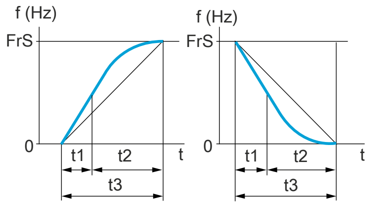
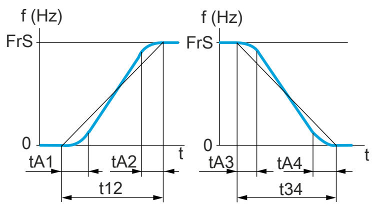


A = (Fr1 or Fr1b + SA2 + SA3 - dA2 - dA3) x MA2 x MA3

- If SA2, SA3, dA2 and dA3 are not assigned, they are set to 0.
- If MA2 and MA3 are not assigned, they are set to 1.
- A is limited by parameters "Low speed" LSP and "High speed" HSP.
- During multiplication, the signal at MA2 or MA3 is captured in %. 100% corresponds to the maximum value of the corresponding input. If MA2 or MA3 are sent by the communication bus or the graphic display terminal, a multiplication variable MFr must be sent via the bus or the graphic display terminal.
- The inversion of the direction of rotation in case of a negative result can be locked ([RV Inhibition](SIn)).

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > OAI-		
Code	**Name/Description**	**Factory settings**
OAI-	**[REF. OPERATIONS]** Reference = (Fr1 or Fr1b + SA2 + SA3 - dA2 - dA3) x MA2 x MA3. **Advice:** **This function cannot be used with certain other functions.**	
SA2	**[Summing ref. 2]** Selection of a setpoint to be added to **[Ref.1 channel]**(Fr1) or **[Ref.1B channel]**(Fr1b).	**[No]**(nO)
nO	**[No]**(nO): Not assigned	
AI1	**[AI1]**(AI1): Analog input A1	
AI2	**[AI2]**(AI2): Analog input A2	
AI3	**[AI3]**(AI3): Analog input A3	
LCC	**[HMI]**(LCC): Graphic display terminal or external operator terminal source	
Mdb	**[Modbus]**(Mdb): Integrated Modbus	
CAn	**[CANopen com.]**(CAn): Integrated CANopen®	
nEt	**[Com. card]**(nEt): Optional communication card source	
PI	**[RP]**(PI): Pulse input	
AIU1	**[AI virtual 1]**(AIU1): Virtual analog input 1 with handwheel	
AIU2	**[AI virtual 2]**(AIU2): Virtual analog input 2 via communication bus	
OA01	**[OA01]**(OA01): Function blocks: Analog output 01	
...	**...**	
OA10	**[OA10]**(OA10): Function blocks: Analog output 10	
SA3	**[Summing ref. 3]** Selection of a setpoint to be added to **[Ref.1 channel]**(Fr1) or **[Ref.1B channel]**(Fr1b). Identical to **[Summing ref. 2]**(SA2).	**[No]**(nO)
dA2	**[Subtract. ref. 2]** Selection of a setpoint to be subtracted from **[Ref.1 channel]**(Fr1) or **[Ref.1B channel]**(Fr1b). Identical to **[Summing ref. 2]**(SA2).	**[No]**(nO)
dA3	**[SubParam3]** Selection of a setpoint to be subtracted from **[Ref.1 channel]**(Fr1) or **[Ref.1B channel]**(Fr1b). Identical to **[Summing ref. 2]**(SA2).	**[No]**(nO)
MA2	**[Multiplier ref. 2]** Selection of a setpoint to be multiplied by **[Ref.1 channel]**(Fr1) or **[Ref.1B channel]**(Fr1b). Identical to **[Summing ref. 2]**(SA2). This parameter is incompatible with the PID controller. **[No]** (nO) is the only value that can be set.	**[No]**(nO)
MA3	**[Multiplier ref. 3]** Selection of a setpoint to be multiplied by **[Ref.1 channel]**(Fr1) or **[Ref.1B channel]**(Fr1b). Identical to **[Summing ref. 2]**(SA2). This parameter is incompatible with the PID controller. **[No]** (nO) is the only value that can be set.	**[No]**(nO)

4.2.3.6.7.3 [RAMP] (rPt-)

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > rPt-			
Code	**Name/Description**	**Setting range**	**Factory settings**
rPt-	[RAMP]		
rPt LIn S U CUS	[Ramp type] [Linear](LIn) [S ramp](S) [U ramp](U) [Customized](CUS) S-shaped ramps  The rounding coefficient cannot be changed: t1 = 0.6 times the configured ramp time (linear) t2 = 0.4 times the configured ramp time (round) t3 = 1.4 times the configured ramp time U-shaped ramps  The rounding coefficient cannot be changed: t1 = 0.5 times the configured ramp time (linear) t2 = 1.0 times the configured ramp time (round) t3 = 1.5 times the configured ramp time Customized ramps  tA1: Can be set between 0 and 100% tA2: Can be set between 0 and (100%- tA1) tA3: Can be set between 0 and 100% tA4: Can be set between 0 and (100%- tA3) t12 = ACC * (tA1(%) / 100 + tA2(%) / 100 + 1) t34 = DEC * (tA3(%) / 100 + tA4(%) / 100 + 1)		[Linear](LIn)
Inr (1) 0.01 0.1 1	[Ramp increment] This parameter is used for [Acceleration](ACC), [Deceleration](dEC), [Acceleration 2](AC2) and [Deceleration 2](dE2). [0,01]: 99.99-second ramp [0,1]: 999.9-second ramp [1]: 6,000-second ramp		[0.1](0.1)
ACC (1)	[Acceleration] Time taken to accelerate from 0 to [Rated motor freq.](FrS). To ensure ramp repeatability, the value of this parameter must be defined in accordance with what is possible for the application.	0.00 to 6000 s(2)	3.0 s
dEC (1)	[Deceleration] Time taken to decelerate from [Rated motor freq.](FrS) to 0. To ensure ramp repeatability, the value of this parameter must be defined in accordance with what is possible for the application.	0.00 to 6000 s(2)	3.0 s
tA1 (1)	[Begin Acc round] Rounding of the acceleration ramp start as a % of ramp time [Acceleration](ACC) or [Acceleration 2] (AC2). Can be set between 0 and 100%. The parameter is accessible if [Ramp type](rPt) is of type [Customized](CUS).	0 to 100%	10%
tA2 (1)	[End Acc round] Rounding of the acceleration ramp end as a % of acceleration time [Acceleration](ACC) or [Acceleration 2](AC2). Can be set from 0 to (100% - [Begin Acc round](tA1)). The parameter is accessible if [Ramp type](rPt) is of type [Customized](CUS).	0 to 100%	10%

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > rPt-

Code	Name/Description	Setting range	Factory settings
tA3 (1)	**[Begin Dec round]** Rounding of the deceleration ramp start as a % of ramp time **[Deceleration]**(dEC) or **[Deceleration 2]**(dE2). Can be set between 0 and 100% The parameter is accessible if **[Ramp type]**(rPt) is of type **[Customized]**(CUS).	0 to 100%	10%
tA4 (1)	**[End Dec round]** Rounding of the deceleration ramp end as a % of ramp time **[Deceleration]**(dEC) or **[Deceleration 2]**(dE2). Can be set from 0 to (100% - **[Begin Dec round]**(tA3)). The parameter is accessible if **[Ramp type]**(rPt) is of type **[Customized]**(CUS).	0 to 100%	10%
Frt	**[Ramp 2 threshold]** Ramp switching threshold. Switching the 2nd Ramp if **[Ramp 2 threshold]**(Frt) is not equal to 0 (the value 0 disables the function) and motor frequency exceeds **[Ramp 2 threshold]**(Frt). The switchover of the ramp using the threshold value and switchover **[Ramp switching]**(rPS) can be used together as follows:	0 to 599 Hz, depending on size	0 Hz

LI or bit	Frequency	Ramp
0	<Frt	ACC, dEC
0	>Frt	AC2, dE2
1	<Frt	AC2, dE2
1	>Frt	AC2, dE2

Code	Name/Description	Setting range	Factory settings
rPS	**[Ramp switching]** Identical to **[Ref.1B channel]**(Fr1b).		**[No]**(nO)
AC2 (1)	**[Acceleration 2]** Time taken to accelerate from 0 to **[Rated motor freq.]**(FrS). In order to ensure ramp repeatability, the value of this parameter must be defined in accordance with the relevant application options. The parameter is accessible if **[Ramp 2 threshold]**(Frt) is greater than 0 or if **[Ramp switching]**(rPS) is assigned.	0.00 to 6000 s(2)	5.0 s
dE2 (1)	**[Deceleration 2]** Time taken to decelerate from **[Rated motor freq.]**(FrS) to 0. In order to ensure ramp repeatability, the value of this parameter must be defined in accordance with the relevant application options. The parameter is accessible if **[Ramp 2 threshold]**(Frt) is greater than 0 or if **[Ramp switching]**(rPS) is assigned.	0.00 to 6000 s(2)	5.0 s
brA	**[Dec ramp adapt.]**		**[YES]**(YES)

Advice:

MOTOR DAMAGE

This parameter is only permitted to be set to [YES](YES) or [No](nO) if the connected motor is a synchronous motor with a permanent magnet.

Other settings demagnetize synchronous motors with a permanent magnet.

Failure to observe these instructions can result in damage to the equipment.

Activating this function automatically adapts the deceleration ramp if it has been set at too low a value with respect to the inertia of the load, which can cause an overvoltage error.
[Dec ramp adapt.](brA) is forced to **[No]**(nO) if brake logic control **[Brake assignment]**(bLC) has been assigned.
The function is incompatible with applications requiring:

- Positioning on a ramp
- Use of a braking resistor (this would not preserve its function)

Code	Description
nO	**[No]**(nO): Function not active
YES	**[YES]**(YES): Function active, for applications that do not require high deceleration time. Depending on the size of the inverter and **[Motor control type]**(Ctt), the following parameters are displayed.A higher deceleration time can be achieved with these parameters than with parameter **[YES]**(YES). Use comparative testing to determine your selection.
dYnA	**[High torq. A]**(dYnA): Addition of a constant current flow component. If **[Dec ramp adapt.]**(brA) is configured to **[High torq. x]**(dYnx), the dynamic power supplies for brakes are improved by adding a current flow component. The aim is to increase the iron loss and magnetic energy stored in the motor.

(1) The parameter can also be accessed via menu **[SETTINGS]**(SEt-).
(2) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to 6000 s in accordance with **[Ramp increment]**(Inr).

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

4.2.3.6.7.4 [STOP CONFIGURATION] (Stt-)

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > Stt-

Code	Name/Description	Setting range	Factory settings
Stt-	[STOP CONFIGURATION] **Advice:** **Some types of stop cannot be used with all other functions.**		
Stt	[Type of stop] Stop mode when the move command disappears or when a stop command is issued. **Advice:** **If function "Brake logic" is released or if [Low speed time out](tLS) is not equal to 0, only "Stop via ramp" can be configured.**		[Ramp stop](rMP)
rMP FSt nSt dCI	[Ramp stop](rMP): Stopping via ramp [Fast stop](FSt): Fast stop [Freewheel](nSt): Freewheel stop [DC Injection](dCI): Stop via DC injection braking. Only available if [Motor control type](Ctt) is not set to [Sync. mot.](SYn).		
FFt (1)	[Freewheel stop Thd.] Speed threshold value below which the motor switches into freewheel stop. This parameter supports switching from a ramp stop or fast stop to a freewheel stop based on a "Low frequency" threshold value. This parameter is accessible if [Type of stop](Stt) is set to [Fast stop](FSt) or [Ramp stop](rMP) and if [Brake assignment](bLC) or [Auto DC injection](AdC) is configured.	0.2 to 599 Hz	0.2 Hz
nSt	[Freewheel] This stop is activated when the input or bit change to 0. If the input switches back to state 1 and the move command is still active, the motor starts running again only if [2/3 wire control](tCC) = [2 wire](2C) and [2 wire type](tCt) = [Level](LEL) or [Fwd priority](PFO). Otherwise, a new move command is required.		[No](nO)
nO LI1 ...	[No](nO): Not assigned [LI1](LI1): Logic input LI1 [...](...): See the assignment conditions.		
FSt	[Fast stop assignment] The stop is activated if the input is set to 0 or the bit changes to 1 (state 0 of the bit in [I/O profile](IO)). If the input switches back to state 1 and the move command is still active, the motor starts running again only if [2/3 wire control](tCC) = [2 wire](2C) and [2 wire type](tCt) = [Level](LEL) or [Fwd priority](PFO). Otherwise, a new move command is required. **Advice:** **This function cannot be used with certain other functions.**		[No](nO)
nO LI1 ...	[No](nO): Not assigned [LI1](LI1): Logic input LI1 [...](...): See the assignment conditions.		
dCF (1)	[Ramp divider] This parameter is accessible if [Type of stop](Stt) = [Fast stop](FSt) and [Fast stop assign.](FSt) is not equal to [No](nO) and [Stop type](PAS) is not equal to [Fast stop](FSt). The enabled ramp ([Deceleration](dEC) or [Deceleration 2](dE2)) is subsequently divided by this coefficient during the stop commands. Value 0 corresponds to a minimum ramp time.	0 to 10	4
dCI	[DC injection assign.] **Warning!** **UNINTENTIONAL MOVEMENT** • **Do not use DC injection braking in order to generate a holding torque if the motor is not running.** • **Instead, use a holding brake in order to hold the motor in a standstill position.** **Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.** DC injection braking is initiated when the assigned input or bit changes to state 1. If the input switches back to state 1 and the move command is still active, the motor starts running again only if [2/3 wire control](tCC) = [2 wire](2C) and [2 wire type](tCt) = [Level](LEL) or [Fwd priority](PFO). Otherwise, a new move command is required. **Advice:** **This function cannot be used with certain other functions.**		[No](nO)
nO LI1 ...	[No](nO): Not assigned [LI1](LI1): Logic input LI1 [...](...): See the assignment conditions.		

<table>
<tr><th colspan="4">The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > Stt-</th></tr>
<tr><th>Code</th><th>Name/Description</th><th>Setting range</th><th>Factory settings</th></tr>
<tr><td>IdC
(1)(3)</td><td>[DC inject. level 1]
<h2>Advice:</h2>MOTOR OVERHEATING AND DAMAGE
In order to prevent damage to the motor due to overheating, make sure the connected motor is sized correctly for DC injection braking with regard to influx rate and duration.
Failure to observe these instructions can result in damage to the equipment.
Level of DC injection braking current activated via logic input or selected as stop mode.
This parameter is accessible if [Type of stop](Stt) = [DC Injection](dCI) or if [DC injection assign.](dCI) is not equal to [No](nO).</td><td>0.1*INV to 1.41*INV (2)</td><td>0.64*INV (2)</td></tr>
<tr><td>tdI
(1)(3)</td><td>[DC injection time 1]
<h2>Advice:</h2>MOTOR OVERHEATING AND DAMAGE
In order to prevent damage to the motor due to overheating, make sure the connected motor is sized correctly for DC injection braking with regard to influx rate and duration.
Failure to observe these instructions can result in damage to the equipment.
Maximum duration of current injection [DC inject. level 1](IdC). After this time has expired, the braking current changes to level [DC inject. level 2](IdC2).
This parameter is accessible if [Type of stop](Stt) = [DC Injection](dCI) or if [DC injection assign.](dCI) is not equal to [No](nO).</td><td>0.1 to 30 s</td><td>0.5 s</td></tr>
<tr><td>IdC2
(1)(3)</td><td>[DC inject. level 2]
<h2>Advice:</h2>MOTOR OVERHEATING AND DAMAGE
In order to prevent damage to the motor due to overheating, make sure the connected motor is sized correctly for DC injection braking with regard to influx rate and duration.
Failure to observe these instructions can result in damage to the equipment.
The braking current is activated by the logic input or selected as a stop mode once time span [DC injection time 1](tdI) has expired.
This parameter is accessible if [Type of stop](Stt) = [DC Injection](dCI) or if [DC injection assign.](dCI) is not equal to [No](nO).</td><td>0.1*INV to IdC(2)</td><td>0.5*INV (2)</td></tr>
<tr><td>tdC
(1)(3)</td><td>[DC injection time 2]
<h2>Caution!</h2>MOTOR OVERHEATING AND DAMAGE
In order to prevent damage to the motor due to overheating, make sure the connected motor is sized correctly for DC injection braking with regard to influx rate and duration.
Failure to observe these instructions can result in damage to the equipment.
Maximum braking time [DC inject. level 2](IdC2) for the DC injection braking, only selected as stop configuration.
This parameter is accessible if [Stop type](Stt) is set to [DC Injection](dCI).</td><td>0.1 to 30 s</td><td>0.5 s</td></tr>
<tr><td>dOtd

nSt
rMp</td><td>[Disable Output Trigger Definition]
Disabling stop configuration.

[Freewheel](nSt): Disabling inverter function
[Ramp stop](rMp): Stops ramp, then disables inverter function.</td><td></td><td>[Ramp stop](rMp)</td></tr>
</table>

(1) The parameter can also be accessed via menu **[SETTINGS]**(SEt-).
(2) Corresponding to the nominal current of the inverter specified on the nameplate.
(3) These settings are independent of function **[Auto DC injection]**(AdC-).

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

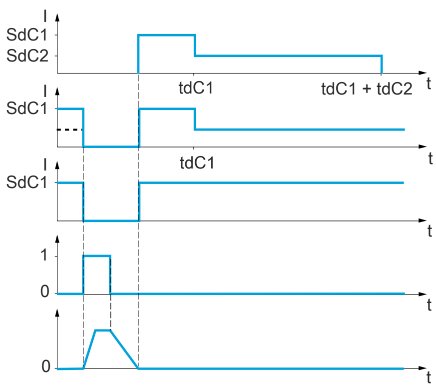
Parameter that can be modified during operation or when stopped.

4.2.3.6.7.5 [Auto DC injection] (AdC-)

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > AdC-			
Code	**Name/Description**	**Setting range**	**Factory settings**
AdC-	[Auto DC injection]		
AdC 2 s	[Auto DC injection] **Danger!** **RISK OF ELECTRIC SHOCK, ARC FLASH OR EXPLOSION** **If parameter [Auto DC injection](AdC) is set to [continuous](Ct), the DC brake is always active, even if the motor is not running.** **Make sure that this setting does not result in unsafe states.** **Failure to follow these instructions can result in death or serious injury.** **Warning!** **UNINTENTIONAL MOVEMENT** • **Do not use DC injection braking in order to generate a holding torque if the motor is not running.** • **Instead, use a holding brake in order to hold the motor in a standstill position.** **Failure to follow these directives can result in death, serious injury or damage to property.** Automatic current injection on stopping (at the end of the ramp) **Advice:** **This function blocks the function [Motor fluxing](FLu). If [Motor fluxing](FLu) is set to [continuous](FCt), [Auto DC injection](AdC) must be set to [No](nO).** **Advice:** **[Auto DC injection](AdC) is set to [No](nO) if [Motor control type](Ctt) is set to [Sync. mot.](SYn).** **[Auto DC injection](AdC) is forced to [No](nO) if [Brake assignment](bLC) is not set to [No](nO).** **This parameter gives rise to the injection of current even if a run command has not been sent. It can be accessed with the frequency inverter running.**		[YES](YES)
nO	[No](nO): No supply		
YES	[YES](YES): Supply with adjustable duration		
Ct	[continuous](Ct): Continuous supply at standstill		

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > AdC-			
Code	**Name/Description**	**Setting range**	**Factory settings**
SdC1 (1)	**[Auto DC inj. level 1]** **Caution!** **MOTOR OVERHEATING AND DAMAGE** **In order to prevent damage to the motor due to overheating, make sure the connected motor is sized correctly for DC injection braking with regard to influx rate and duration.** **Failure to observe these instructions can result in damage to the equipment.** Level of standstill DC injection current. **[Auto DC injection]**(AdC) is not set to **[No]**(nO).	0 to 1.2*INV (2)	0.7*INV (2)
tdC1 (1)	**[Auto DC inj. time 1]** **Advice:** **MOTOR OVERHEATING AND DAMAGE** **In order to prevent damage to the motor due to overheating, make sure the connected motor is sized correctly for DC injection braking with regard to influx rate and duration.** **Failure to observe these instructions can result in damage to the equipment.** Standstill injection time. The parameter can be activated if **[Auto DC injection]**(AdC) is not set to **[No]**(nO). If **[Motor control type]**(Ctt) is set to **[Sync. mot.]**(SYn), this time corresponds to the hold time at speed zero.	0.1 to 30 s	0.5 s
SdC2 (1)	**[Auto DC inj. level 2]** **Advice:** **MOTOR OVERHEATING AND DAMAGE** **In order to prevent damage to the motor due to overheating, make sure the connected motor is sized correctly for DC injection braking with regard to influx rate and duration.** **Failure to observe these instructions can result in damage to the equipment.** 2. Level of standstill DC injection current. This parameter can be activated if **[Auto DC injection]**(AdC) is not set to **[No]**(nO).	0 to 1.2*INV (2)	0.5*INV (2)
tdC2 (1)	**[Auto DC inj. time 2]** **Caution!** **MOTOR OVERHEATING AND DAMAGE** **In order to prevent damage to the motor due to overheating, make sure the connected motor is sized correctly for DC injection braking with regard to influx rate and duration.** **Failure to observe these instructions can result in damage to the equipment.** 2. Standstill injection time. This parameter can be accessed if **[Auto DC injection]**(AdC) is set to **[YES]**(YES).	0 to 30 s	0 s

AdC	SdC2
YES	x
Ct	≠ 0
Ct	= 0
Movement command	
Speed	



(1) The parameter can also be accessed via menu **[SETTINGS]**(SEt-).
(2) Corresponding to the nominal current of the inverter specified on the nameplate.

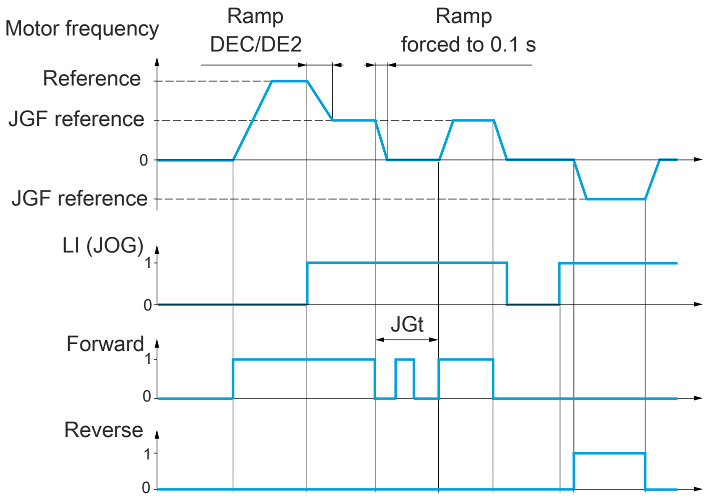
These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

2 s To change the assignment of this parameter, press the ENT key for 2 seconds.

4.2.3.6.7.6 [JOG] (JOG-)

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > JOG-			
Code	**Name/Description**	**Setting range**	**Factory settings**
JOG-	**[JOG]** **Advice:** **This function cannot be used with certain other functions.**		
JOG	**[JOG]** Pulse operation. The JOG function is only active if the command channel and the reference channels are on the terminals. The function is active if the assigned input or bit is at 1. Example: Operation via 2-wire control (tCC = 2C).		**[LI3]**(LI3)



Code	Name/Description	Setting range	Factory settings
nO LI1 ...	**[No]**(nO): Not assigned **[LI1]**(LI1): Logic input LI1 **[...]**(...): See the assignment conditions (excluding **[Cd00]**(Cd00) to **[Cd15]**(Cd15)) If **[Profile]** (CHCF) is set to **[Not separ.]**(SIM) or **[Separate]** (SEP), parameters **[CD11]** (Cd11) to **[CD15]** (Cd15), **[C111]** (C111) to **[C115]** (C115), **[C211]** (C211) to **[C215]** (C215) and **[C311]** (C311) to **[C315]** (C315) are not available.		
JGF (1)	**[Setpoint step mode]** Reference in jog operation This parameter can be accessed if **[JOG]**(JOG) is not set to **[No]**(nO).	0 to 10 Hz	10 Hz
JGt (1)	**[Jog delay]** Anti-repeat delay between 2 consecutive jog operations. This parameter can be accessed if **[JOG]**(JOG) is not set to **[No]**(nO).	0 to 2.0 s	0.5 s

(1) This parameter can also be accessed via menu **[SETTINGS]**(SEt-).

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

4.2.3.6.7.7 [PRESET SPEEDS] (PSS-)

2, 4, 8 or 16 frequencies can be preset, in which case 1, 2, 3 or 4 logic inputs will be required.

Advice:

2 and 4 frequencies must be configured in order to obtain 4 frequencies.

2, 4 and 8 frequencies must be configured in order to obtain 8 frequencies .

2, 4, 8 and 16 frequencies must be configured in order to obtain 16 frequencies.

Combination table for preset speed inputs.

16 frequencies LI (PS16)	8 frequencies LI (PS8)	4 frequencies LI (PS4)	2 frequencies LI (PS2)	Frequency reference
0	0	0	0	Setpoint (1)
0	0	0	1	SP2
0	0	1	0	SP3
0	0	1	1	SP4
0	1	0	0	SP5
0	1	0	1	SP6
0	1	1	0	SP7
0	1	1	1	SP8
1	0	0	0	SP9
1	0	0	1	SP10
1	0	1	0	SP11
1	0	1	1	SP12
1	1	0	0	SP13
1	1	0	1	SP14
1	1	1	0	SP15
1	1	1	1	SP16

(1) Setpoint 1 = (SP1).

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > PSS-

Code	Name/Description	Setting range	Factory settings
PSS-	**[PRESET SPEEDS]** **Advice:** **This function cannot be used with certain other functions.**		
PS2 nO LI1 ...	**[2 preset speeds]** **[No]**(nO): Not assigned **[LI1]**(LI1): Logic input LI1 **[...]**(...): See the assignment conditions.		**[No]**(nO)
PS4	**[4 preset speeds]** Identical to **[2 preset speeds]**(PS2). In order to obtain 4 speeds, 2 speeds must also be configured.		**[No]**(nO)
PS8	**[8 preset speeds]** Identical to **[2 preset speeds]**(PS2). In order to obtain 8 speeds, 2 and 4 speeds must also be configured.		**[No]**(nO)
PS16	**[16 preset speeds]** Identical to **[2 preset speeds]**(PS2). In order to obtain 16 speeds, 2, 4 and 8 speeds must also be configured.		**[No]**(nO)
SP2 (1)	**[Preset speed 2]** 2nd preset speed	0 to 599 Hz	10 Hz
SP3 (1)	**[Preset speed 3]** 3rd preset speed	0 to 599 Hz	15 Hz
SP4 (1)	**[Preset speed 4]** 4th preset speed	0 to 599 Hz	20 Hz
SP5 (1)	**[Preset speed 5]** 5th preset speed.	0 to 599 Hz	25 Hz
SP6 (1)	**[Preset speed 6]** 6th preset speed	0 to 599 Hz	30 Hz
SP7 (1)	**[Preset speed 7]** 7th preset speed.	0 to 599 Hz	35 Hz
SP8 (1)	**[Preset speed 8]** 8th preset speed.	0 to 599 Hz	40 Hz
SP9 (1)	**[Preset speed 9]** 9th preset speed	0 to 599 Hz	45 Hz
SP10 (1)	**[Preset speed 10]** 10th preset speed	0 to 599 Hz	50 Hz

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > PSS-			
Code	**Name/Description**	**Setting range**	**Factory settings**
SP11 (1)	**[Preset speed 11]** 11th preset speed	0 to 599 Hz	55 Hz
SP12 (1)	**[Preset speed 12]** 12th preset speed	0 to 599 Hz	60 Hz
SP13 (1)	**[Preset speed 13]** 13th preset speed	0 to 599 Hz	70 Hz
SP14 (1)	**[Preset speed 14]** 14th preset speed	0 to 599 Hz	80 Hz
SP15 (1)	**[Preset speed 15]** 15th preset speed.	0 to 599 Hz	90 Hz
SP16 (1)	**[Preset speed 16]** 16th preset speed The display of parameter **[Preset speed x]**(SPx) is based on the number of configured speeds. See combination table for preset PID references.	0 to 599 Hz	100 Hz
JPF	**[Skip Frequency]** Skip frequency. This parameter prevents operation within an adjustable range around the regulated frequency. This function is used to prevent a critical speed, which would generate resonance. Setting the function to 0 renders it inactive.	0 to 599 Hz	0 Hz
JF2	**[Skip Frequency 2]** 2nd skip frequency. This parameter prevents operation within an adjustable range around the regulated frequency. This function is used to prevent a critical speed, which would generate resonance. Setting the function to 0 renders it inactive.	0 to 599 Hz	0 Hz
JF3	**[3rd Skip Frequency]** 3rd skip frequency. This parameter prevents operation within an adjustable range around the regulated frequency. This function is used to prevent a critical speed, which would generate resonance. Setting the function to 0 renders it inactive.	0 to 599 Hz	0 Hz
JFH	**[Skip Frequency Hyst.]** This parameter is visible if at least one skip frequency **[Skip Frequency]**(JPF), **[Skip Frequency 2]**(JF2) or **[3rd Skip Frequency]**(JF3) is not equal to 0. Range for the skip frequency: From (JPF - JFH) to (JPF + JFH), for example. This setting applies to all three frequencies (JPF, JF2, JF3).	0.1 to 10 Hz	1 Hz

(1) This parameter can also be accessed via menu **[SETTINGS]**(SEt-).

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

4.2.3.6.7.8 [+/- speed] (UPd-)

Two types of operation are available:

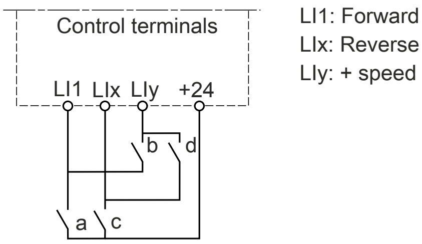
- **Use of single-step buttons:** Two logic inputs are required in addition to rotational direction(s). If the input is set to "+ speed", the speed increases. If the input is set to "- speed", the speed reduces.
- **Use of double-step buttons:** Only one logic input assigned to "+ speed" is required.

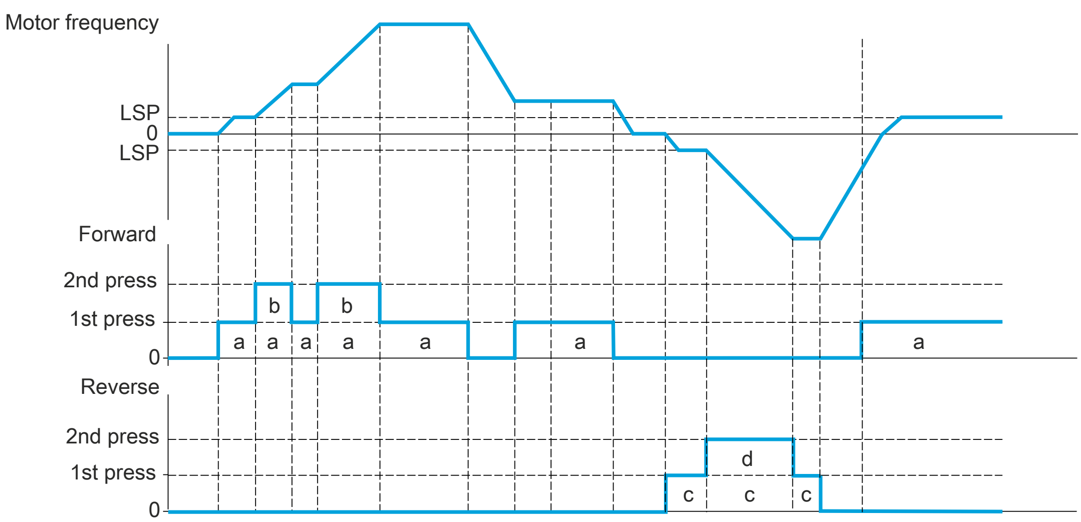
+/- speed with double-press buttons:

Description: 1 button that can be pressed twice (2 steps) for each direction of rotation. A contact closes each time the button is pressed.

	Released (-speed)	1. Push (Speed maintained)	2. Push (+ speed)
Forward button	-	a	a and b
Reverse button	-	c	c and d

Connection example:





Do not use this "+/-speed" type with 3-wire control.

In both cases, the maximum speed is specified by [High speed](HSP).

Advice:

In the event of a setpoint switchover by [Ref. 2 switching](rFC) from any setpoint channel to a different setpoint channel with "+/- speed", the value of setpoint [Output frequency](rFr) (after ramp) can be copied over at the same time in accordance with parameter [Copy channel 1 --> 2](COP).

In the event of a setpoint switchover by [Ref. 2 switching](rFC) from one setpoint channel to another with "+/- speed", the value of setpoint [Output frequency](rFr) (after ramp) is copied over at the same time.

In this way, the speed can be prevented from incorrectly being reset to zero when switching takes place.

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > UPd-

Code	Name/Description	Factory settings
UPd-	**[+/- speed]** This function is accessible if the reference channel **[Ref.2 channel]**(Fr2) is set to **[+/- speed]**(UPdt). **Advice:** **This function cannot be used with certain other functions.**	
USP	**[Assign. + SPEED]** Function active if the assigned input or bit is at 1.	**[No]**(nO)
nO LI1 ...	**[No]**(nO): Not assigned **[LI1]**(LI1): Logic input LI1 **[...]**(...): See the assignment conditions. If **[Profile]** (CHCF) is set to **[Not separ.]**(SIM) or **[Separate]** (SEP), parameters **[CD11]** (Cd11) to **[CD15]** (Cd15), **[C111]** (C111) to **[C115]** (C115), **[C211]** (C211) to **[C215]** (C215) and **[C311]** (C311) to **[C315]** (C315) are not available.	
dSP	**[-Speed assignment]** The assignment is identical to **[+ speed assignment]** (USP) Function active if the assigned input or bit is at 1.	**[No]**(nO)
Str ★	**[Reference saved]** This parameter, which is assigned to function "+/- speed", can be used to save the setpoint in the following cases: • If the move commands disappear (saved to RAM). • If the mains supply is severed or the move commands disappear (saved to EEPROM). As a consequence, the next time the frequency inverter starts up, the speed setpoint is the last setpoint saved.	**[No]**(nO)
nO rAM EEP	**[No]**(nO): No saving (at the next start-up, the speed setpoint is **[Low speed]**(LSP)) **[RAM]**(rAM): Saving to RAM **[EEPROM]**(EEP): Saving to EEPROM	

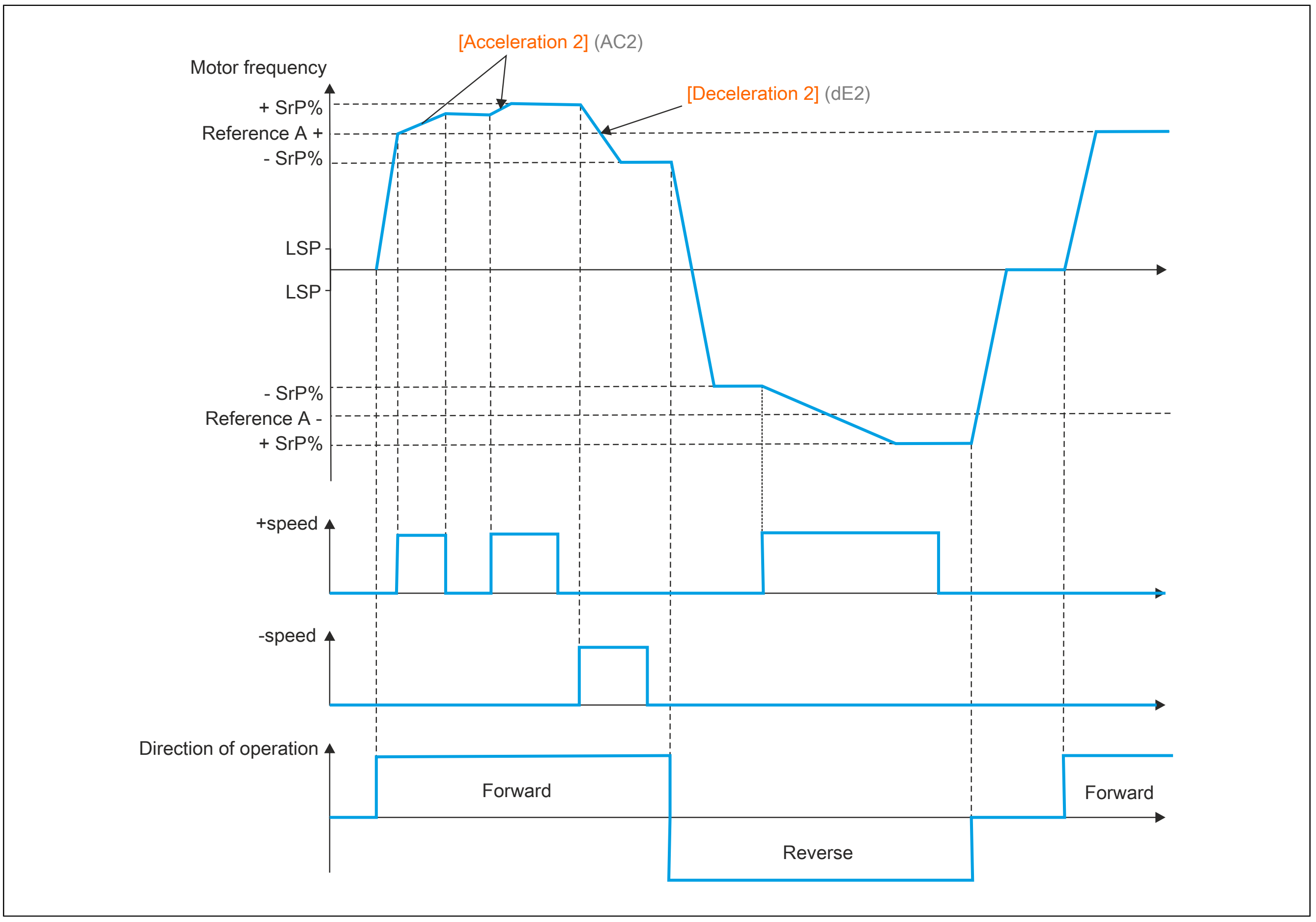
★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

4.2.3.6.7.9 [+- SPEED AROUND REF] (SrE-)

The setpoint is returned by **[Ref.1 channel]**(Fr1) or **[Ref.1B channel]**(Fr1b); if necessary with functions "Addition"/"Subtraction"/"Multiplication" and the preset speeds. For the sake of simplicity, this will hereinafter be called Reference A. The action of the + speed and - speed keys can be set to a percentage of Setpoint A. On stopping, the setpoint (A ± speed) is not stored. The inverter then runs with only one reference A+.

The maximum total setpoint is limited by **[High speed]**(HSP) and the minimum setpoint by **[Low speed]**(LSP).

Example of 2-wire control:



The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > SrE-			
Code	**Name/Description**	**Setting range**	**Factory settings**
SrE-	**[+- SPEED AROUND REF]** This function is accessible for setpoint channel **[Ref.1 channel]**(Fr1). **Advice:** **This function cannot be used with certain other functions.**		
USI nO LI1 ...	**[Assign. + SPEED]** **[No]**(nO): Not assigned **[LI1]**(LI1): Logic input LI1 **[...]**(...): See the assignment conditions.		**[No]**(nO)
dSI	**[-Speed assignment]** Function active if the assigned input or bit is at 1.		**[No]**(nO)
SrP	**[+/-Speed limitation]** This parameter limits the variation range with +/- speed and is expressed as a % of the setpoint. The ramps used with this function are **[Acceleration 2]**(AC2) and **[Deceleration 2]**(dE2). This parameter is accessible if "± speed" is assigned.	0 to 50%	10%
AC2 (1)	**[Acceleration 2]** Time taken to accelerate from 0 to **[Rated motor freq.]**(FrS). In order to ensure ramp repeatability, the value of this parameter must be defined in accordance with the relevant application options. This parameter is accessible if **[+/- speed]**(tUd) is assigned.	0.00 to 6000 s(2)	5.00 s
dE2 (1)	**[Deceleration 2]** Time taken to decelerate from **[Rated motor freq.]**(FrS) to 0. In order to ensure ramp repeatability, the value of this parameter must be defined in accordance with the relevant application options. This parameter is accessible if **[+/- speed]**(tUd) is assigned.	0.00 to 6000 s(2)	5.00 s

(1) This parameter can also be accessed via menu **[SETTINGS]**(SEt-).
(2) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to 6000 s according to **[Ramp increment]**(Inr).

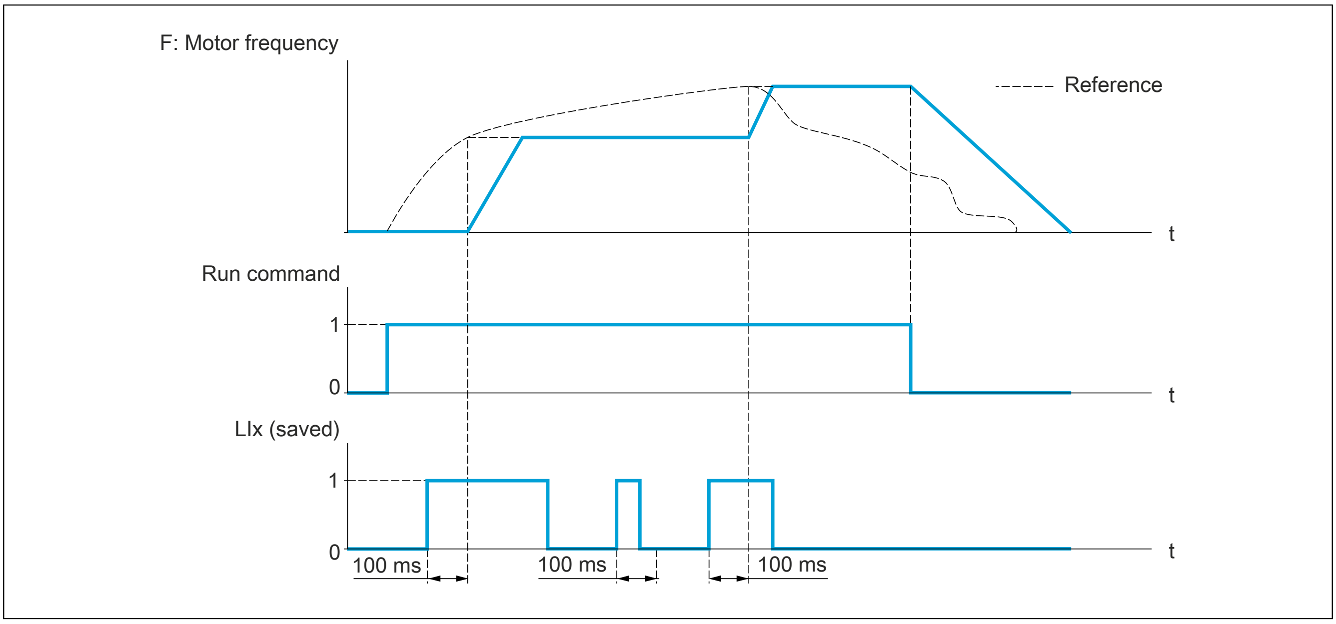
These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

4.2.3.6.7.10 [MEMO REFERENCE] (SPM-)

Storing of a speed setpoint level using a logic input command that lasts longer than 0.1 s.

- This function is used to control the speed of several inverters alternately via one analog setpoint and one logic input for each inverter.
- It is also used to confirm a line setpoint (communication bus or network) on several inverters via a logic input. This allows movements to be synchronized by preventing variations when the setpoint is sent.
- The setpoint is recorded 100 ms after the rising edge of the recording request. A new reference is subsequently recorded only if a new request is made.



The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > SPM-		
Code	**Name/Description**	**Factory settings**
SPM-	[MEMO REFERENCE]	
SPM	[Ref. memo ass.] Assignment to a logic input The function is active if the assigned input is active.	[No](nO)
nO	[No](nO): Not assigned	
LI1	[LI1](LI1): Logic input LI1	
...	[...](...): See the assignment conditions.	
LI6	[LI6](LI1): Logic input LI6	
LAI1	[LA1](LA1): Logic input LA1	
LAI2	[LA2](LA2): Logic input LA2	
OL01	[OL01](OL01): Function block: Logic output 01	
...	...	
OL10	[OL10](OL10): Function block: Logic output 10	

4.2.3.6.7.11 [FLUXING BY LI] (FLI-)

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > FLI-		
Code	**Name/Description**	**Factory settings**
FLI-	[FLUXING BY LI]	
FLU 2 s (1)	[Motor fluxing] **Danger!** **RISK OF ELECTRIC SHOCK, ARC FLASH OR EXPLOSION** **If parameter [Motor fluxing](FLU) is set to [continuous](FCt) fluxing will always occur, even when the motor is not running. Make sure that this setting does not result in unsafe states.** **Failure to follow these instructions can result in death or serious injury.** **Advice:** **MOTOR OVERHEATING AND DAMAGE** **In order to prevent damage to the motor due to overheating, make sure the connected motor is sized correctly for DC injection braking with regard to influx rate and duration.** **Failure to observe these instructions can result in damage to property.**	[No](FnO)
FnC	[Not cont.](FnC): Non-continuous mode	

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > FLI-		
Code	**Name/Description**	**Factory settings**
FCt	[continuous](FCt): Permanent mode This option is not possible if [Auto DC injection](AdC) is set to [YES](YES) or if [Type of stop](Stt) has been set to [Freewheel](nSt).	
FnO	[No](FnO): Function inactive In order to obtain rapid high torque on startup, magnetic flux needs to already have been established in the motor. In mode [continuous](FCt), the inverter automatically creates the fluxing when starting up. In mode [Not cont.](FnC), fluxing occurs when the motor has been started up. The magnetic flux current is greater than [Rated mot. current](nCr) (configured nominal motor current) if magnetization has been established. After this, the flux current will be adjusted to the motor's magnetizing current. If [Motor control type](Ctt) is set to [Sync. mot.](SYn), parameter[Motor fluxing](FLU) results in the assignment of the rotor and not of the magnetization. If [Brake assignment](bLC) is not [No](nO), parameter [Motor fluxing](FLU) has no effect.	
FLI ★	[Fluxing assignment] **Caution!** **MOTOR OVERHEATING AND DAMAGE** **To prevent motor overheating and damage, check whether the connected motor has the correct sizing for the magnetizing current.** **Failure to observe these instructions can result in damage to the equipment.** The assignment is only possible if [Motor fluxing](FLU) = [Not cont.](FnC). If an LI or a bit is assigned to the motor fluxing command, flux is built up when the assigned input or bit is at 1. If an LI or a bit has not been assigned, or if the assigned LI or bit is at 0 when a move command is sent, fluxing occurs when the motor starts.	[No](nO)
nO	[No](nO): Not assigned	
LI1	[LI1](LI1): Logic input LI1	
...	[...](...): See the assignment conditions.	
ASt ★	[Angle setting type] Mode for measuring phase shift angle. Only visible if [Motor control type](Ctt) is set to [Sync. mot.](SYn). [PSI align](PSI) and [PSIO align](PSIO) work for all types of synchronous motor. [SPM align](SPMA) and [Assign IPM](IPMA) increase performance, depending on the type of synchronous motor.	[PSIO align](PSIO)
IPMA	[IPM align](IPMA): IPM motor (Interior-buried permanent magnet motor) assignment. Assignment mode for the interior-buried permanent motor (this motor normally has a high magnetic reluctance). It uses a high-frequency application that produces much less noise then standard assignment mode.	
SPMA	[SPM align](SPMA): SPM motor (Surface-mounted permanent magnet motor) assignment. Assignment mode for the surface-mounted permanent motor (this motor normally has medium or low magnetic reluctance). It uses a high-frequency application that produces much less noise then standard assignment mode.	
PSI	[PSI align](PSI): Pulse signal applied. Standard assignment mode after pulse signal applied.	
PSIO	[PSIO align](PSIO): Optimized pulse signal application. Optimized standard assignment mode after pulse signal applied. The phase shift angle measurement time is reduced after the first move command or measurement procedure, even if the inverter has been switched off.	
nO	[No action](nO): No assignment.	

(1) This parameter can also be accessed via menu [SETTINGS](SEt-).

★	These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.
	Parameter that can be modified during operation or when stopped.
2 s	To change the assignment of this parameter, press the ENT key for 2 seconds.

4.2.3.6.7.12 [BRAKE LOGIC CONTROL] (bLC-)

This function is used to control an electromagnetic brake via the inverter during horizontal and vertical hoisting applications and when machines are unbalanced.

Principle:

- Vertical hoisting movement:
  Maintain the motor torque in the driving load holding direction during brake release and engage, in order to hold the load, start smoothly when the brake is engaged and stop smoothly when the brake is released.
- Horizontal hoisting movement:
  To prevent jolting, synchronize brake release with torque build-up during startup and application of brakes at zero speed on stopping.

Recommended settings for brake logic control for a vertical hoisting application:

Warning!

UNEXPECTED OPERATION OF THE EQUIPMENT

Check that the selected settings will not result in a loss of control over the load being lifted.

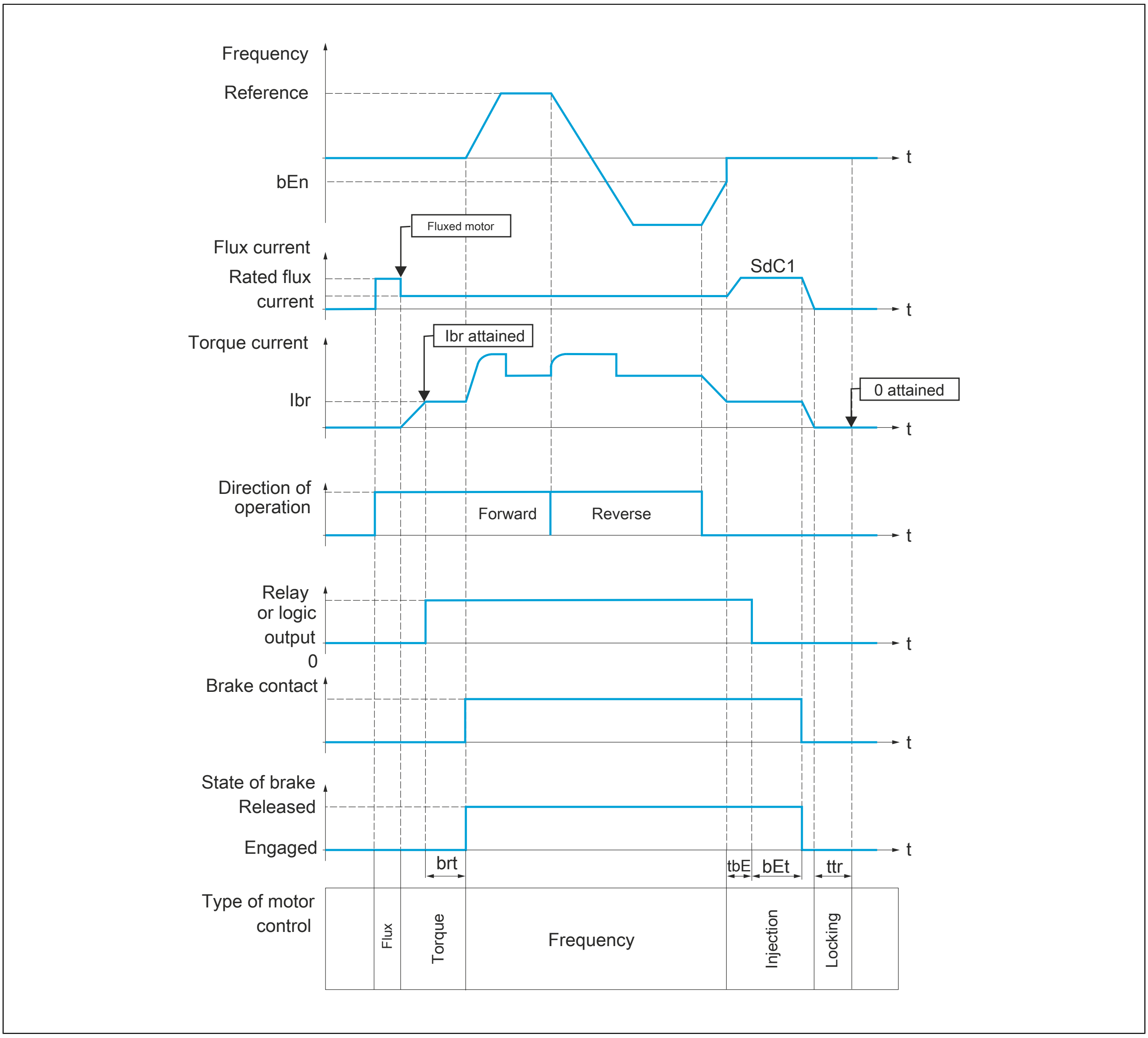
Failure to follow these instructions can result in serious injury and death or damage to the equipment.

- **[Brake impulse]**(bIP): **[YES]**(YES). Make sure that the forward direction of operation corresponds to hoisting the load.
  For applications in which the lowered load differs very much from the raised load, set bIP = 2 Ibr (Example: Always lift with a load and lower when load is empty).
- Brake release current (**[Brake release I FW]**(Ibr) and **[Brake release I Rev]**(Ird) if **[Brake impulse]**(bIP) = 2 Ibr): Set the brake release current to the rated current according to the motor nameplate.
  When testing, adjust the brake release current to achieve slip-free holding of the load.
- Acceleration time: For hoisting applications it is advisable to set the acceleration ramps to at least 0.5 seconds. Check that the inverter does not go into current limit mode.
  The same recommendation also applies to deceleration.
  Please note: For a hoisting movement, a braking resistor must be used.
- **[Brake Release time]**(brt): To be set according to the brake type. This is the time required for the mechanical brake to release.
- **[Brake release freq.]**(bIr), only in open control loop: Leave in mode **[Auto]**(AUtO) and synchronize if necessary.
- **[Brake engage freq.]**(bEn): Leave in mode **[Auto]**(AUtO) and synchronize if necessary.
- **[Brake engage time]**(bEt): To be set according to the brake type. It is the time required for the mechanical brake to engage.

Recommended settings for brake logic control for a horizontal hoisting application:

- **[Brake impulse]**(bIP): No
- **[Brake release current]**(Ibr): Set to 0.
- **[Brake Release time]**(brt): To be set according to the brake type. This is the time required for the mechanical brake to release.
- **[Brake release freq.]**(bEn), only in open control loop: Leave in mode **[Auto]**(AUtO) and synchronize if necessary.
- **[Brake engage time]**(bEt): To be set according to the brake type. It is the time required for the mechanical brake to engage.

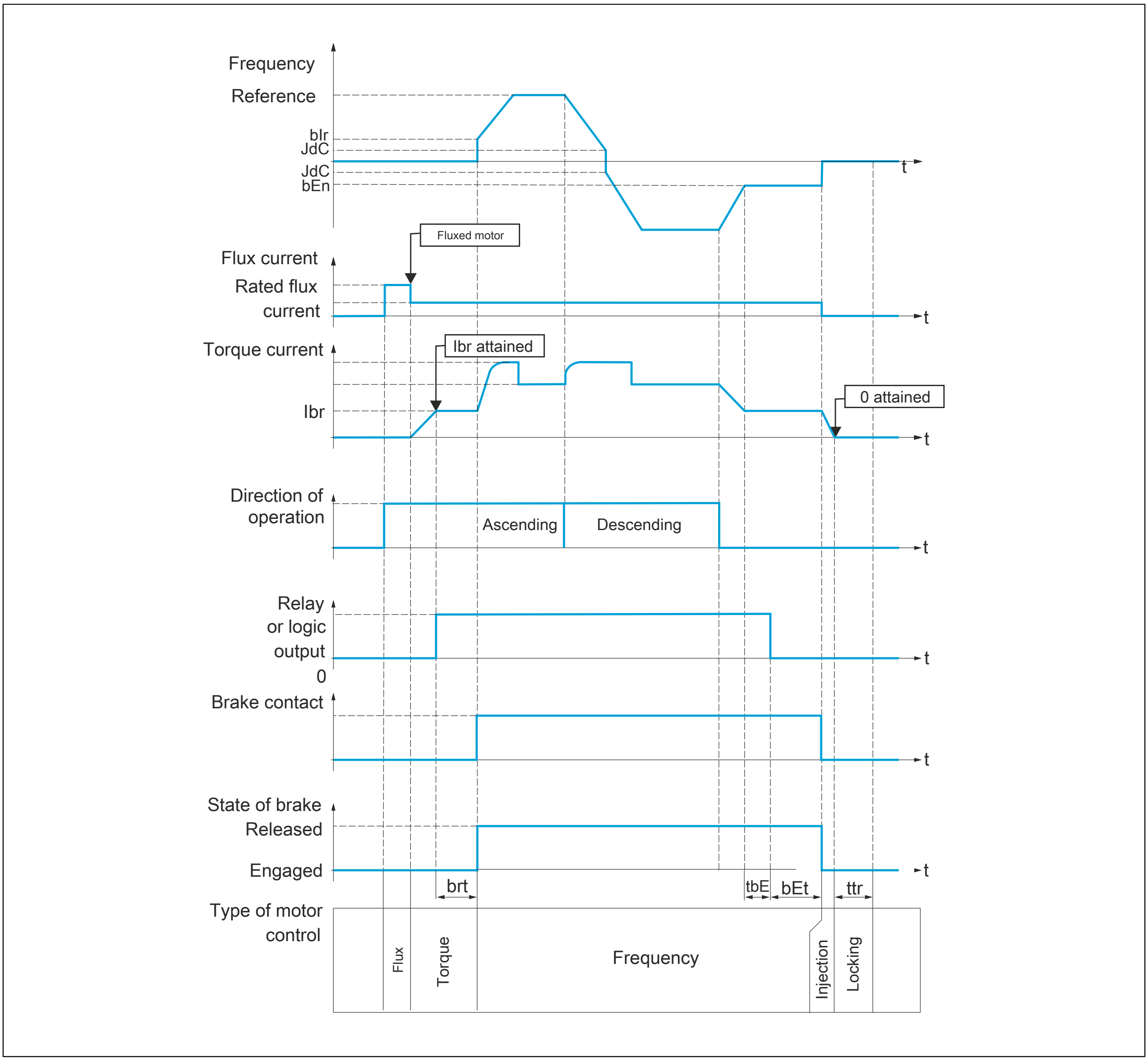
Brake logic control, horizontal movement in open control loop



Legend:

- (bEn): **[Brake engage freq.]**
- (bEt): **[Brake engage time]**
- (brt): **[Brake Release time]**
- (Ibr): **[Brake release I FW]**
- (SdC1): **[Auto DC inj. level 1]**
- (tbE):**[Brake engage delay]**
- (ttr): **[Time to restart]**

Brake logic control, vertical movement in open control loop



Legend:

- (bEn): **[Brake engage freq.]**
- (bEt): **[Brake engage time]**
- (bIr): **[Brake release freq.]**
- (brt): **[Brake Release time]**
- (Ibr): **[Brake release I FW]**
- (JdC): **[Jump at reversal]**
- (tbE):**[Brake engage delay]**
- (ttr): **[Time to restart]**

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > bLC-

Code	Name/Description	Setting range	Factory settings
bLC-	[BRAKE LOGIC CONTROL] **Advice:** **This function cannot be used with certain other functions.**		
bLC	[Brake assignment] Logic output or control relay. **Advice:** **If the brake is assigned, only a ramp stop is possible. Check parameter [Type of stop](Stt).** The brake logic control can only be assigned if [Motor control type](Ctt) is not equal to [Standard](Std), [V/F 5pts](UF5), [V/F Quad.](UFq) or [Sync. mot.](SYn).		[No](nO)
nO	[No](nO): Function not assigned (in this case, none of the functions can be accessed).		
r2	[R2](r2): Relay		
LO1	[LO1](LO1): Logic output		
dO1	[DO1](dO1): Analog output AO, which can be used as a logic output. Selection is possible if [AO1 assignment](AO1) is set to [No](nO).		
bSt	[Movement type]		[Hoisting](UEr)
HOr	[Traveling](HOr): Resistive-load movement (translational motion of overhead traveling cranes, for example). **Advice:** **If [Motor control type](Ctt) is set to [Standard](Std) or [V/F 5pts](UF5), [Movement type](bSt) is forced to [Traveling](HOr).**		
UEr	[Hoisting](UEr): Driving-load movement (hoisting winch, for example) **Advice:** **If [Weight sensor ass.](PES) is not equal [No](nO), [Movement type](bSt) is forced to [Hoisting](UEr).**		
bCI	[Brake contact] If the brake has a monitoring contact (closed for released brake).		[No](nO)
nO	[No](nO): Not assigned		
LI1	[LI1](LI1): Logic input LI1		
...	[...](...): See the assignment conditions.		
bIP	[Brake impulse] Brake start pulse. This parameter can be accessed if [Weight sensor ass.](PES) is set to [No](nO). The parameter is set to [Yes](YES) if [Movement type](bSt) is set to [Hoisting](UEr).		[YES](YES)
nO	[No](nO): The motor torque is specified in the required direction using [Brake release I FW](Ibr).		
YES	[Yes](YES): The motor torque direction is "forward" (make sure that this direction of rotation corresponds to the lifting operation), using [Brake release I FW](Ibr)		
2Ibr	[2 IBR](2Ibr):The torque has the required direction of rotation, with current [Brake release I FW](Ibr) for forward and [Brake release I Rev](Ird) for reverse; for certain specific applications.		
Ibr (1)	[Brake release I FW] Brake release current threshold for ascending or forward movement. This parameter is accessible if [Weight sensor ass.](PES) is set to [No](nO).	0 to 1.36*INV (2)	0
Ird	[Brake release I Rev] Brake release current threshold for descending or counterclockwise rotation. This parameter is accessible if [Brake impulse](bIP) is set to [2 IBR](2Ibr).	0 to 1.36*INV (2)	0
brt (1)	[Brake Release time] Brake release time delay.	0 to 5.00 s	0 s
bIr (1)	[Brake release freq.] Brake release frequency threshold (initialization of acceleration ramp). This parameter is accessible if [Movement type](bSt) is set to [Hoisting](UEr).	[Auto](AUtO) to 10 Hz	[Auto](AUtO)
AUtO	[Auto](AUtO): The inverter is assigned a value that is equal to the motor nominal slip and calculated using the drive parameters. 0 to 10 Hz: Manual adjustment		

<table>
<tr><th colspan="4">The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > bLC-</th></tr>
<tr><th>Code</th><th>Name/Description</th><th>Setting range</th><th>Factory settings</th></tr>
<tr><td>bEn
★
(1)</td><td>[Brake engage freq.]

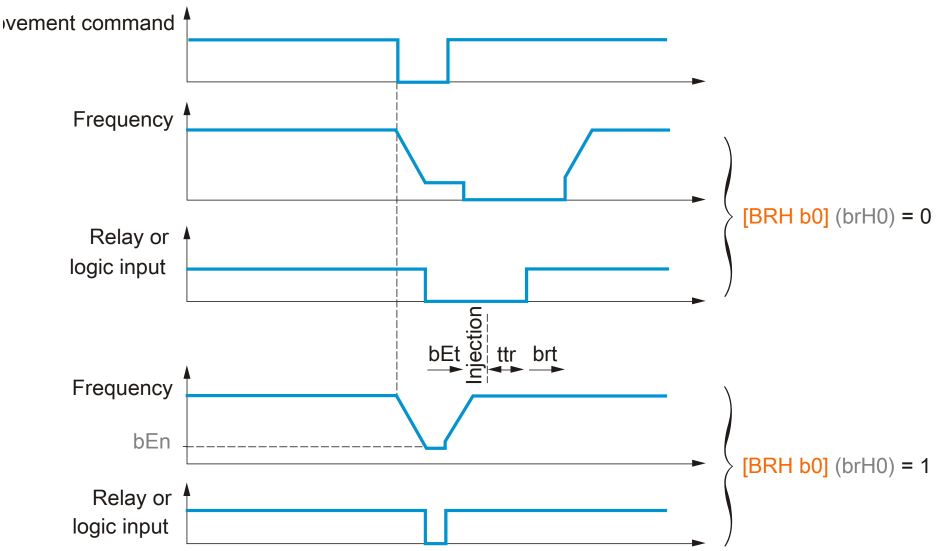
Threshold of the braking torque frequency.
Advice:
[Brake engage freq.](bEn) cannot be greater than [Low speed](LSP).</td><td>[Auto](AUtO)
0 to 10 Hz</td><td>[Auto](AUtO)</td></tr>
<tr><td>AUtO</td><td colspan="3">[Auto](AUtO): The inverter is assigned a value that is equal to the motor nominal slip and calculated using the drive parameters.
0 to 10 Hz: Manual adjustment</td></tr>
<tr><td>tbE
★
(1)</td><td>[Brake engage delay]
Time delay before request to engage brake.</td><td>0 to 5.00 s</td><td>0 s</td></tr>
<tr><td>bEt
★
(1)</td><td>[Brake engage time]
Brake engage time (brake response time).</td><td>0 to 5.00 s</td><td>0 s</td></tr>
<tr><td>SdC1
★
(1)</td><td>[Auto DC inj. level 1]
Advice:
MOTOR OVERHEATING AND DAMAGE
In order to prevent damage to the motor due to overheating, make sure the connected motor is sized correctly for DC injection braking with regard to influx rate and duration.
Failure to observe these instructions can result in damage to the equipment.
Level of standstill DC injection current.
Advice:
This parameter is accessible if [Movement type](bSt) is set to [Traveling](HOr).</td><td>0 to 1.2*INV (2)</td><td>0.7*INV (2)</td></tr>
<tr><td>bEd
★</td><td>[Engage at reversal]
This parameter can be used to select whether or not the brake engages on transition to zero speed when the operating direction is reversed.</td><td></td><td>[No](nO)</td></tr>
<tr><td>nO
YES</td><td colspan="3">[No](nO): The brake does not release.
[YES](YES): The brake releases.</td></tr>
<tr><td>JdC
★
(1)</td><td>[Jump at reversal]
This parameter is accessible if [Movement type](bSt) is set to [Hoisting](UEr).</td><td>[Auto](AUtO) to 10 Hz</td><td>[Auto](AUtO)</td></tr>
<tr><td>AUtO
-</td><td colspan="3">[Auto](AUtO): The inverter is assigned a value that is equal to the motor nominal slip and calculated using the drive parameters.
0 to 10 Hz: Manual adjustment
When the reference direction is reversed, this parameter can be used to avoid loss of torque (and consequential release of load) on transition to zero speed. The parameter is irrelevant if [Engage at reversal](bEd) = [Yes](YES).</td></tr>
<tr><td>ttr
★
(1)</td><td>[Time to restart]
Time between the end of a brake release sequence and the start of a brake engage sequence.</td><td>0.00 to 15.00 s</td><td>0 s</td></tr>
</table>

(1) This parameter can also be accessed via menu [SETTINGS](SEt-).
(2) Corresponding to the nominal current of the inverter specified on the nameplate.

★	These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.
	Parameter that can be modified during operation or when stopped.

Brake control logic expert parameters

The following brake logic sequence parameters are accessible in Expert mode only.

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > bLC-			
Code	**Name/Description**	**Setting range**	**Factory settings**
bLC-	**[BRAKE LOGIC CONTROL]** **Advice:** **This function cannot be used with certain other functions.**		
brH0 ★ 0 1	**[BRH b0]** Selection of the brake restart sequence if a run command is repeated while the brake is engaging. **[0]**(0): The release/engage sequence has been fully executed. **[1]**(1): The brake is immediately reopened. A run command may be requested during the brake release phase. The **[BRH b0]**(brH0) setting determines whether or the sequence for re-releasing the brake is executed.  **Advice:** **If a move command is requested during phase "ttr", the full brake controller sequence is initialized.**		0
brH1 ★ 0 1	**[BRH b1]** Deactivation of the brake contact fault in steady state. **[0]**(0): Error "Brake feedback" in steady state is active (error state if the contact is open during operation). Error **[Brake feedback]**(brF) is monitored during all operating phases. **[1]**(1): Error "Brake feedback" in steady state is not active. Error **[Brake feedback]**(brF) is only monitored during brake release and brake engage phases.		0

<table>
<tr><th colspan="4">The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > bLC-</th></tr>
<tr><th>Code</th><th>Name/Description</th><th>Setting range</th><th>Factory settings</th></tr>
<tr><td>brH2

0
1</td><td>

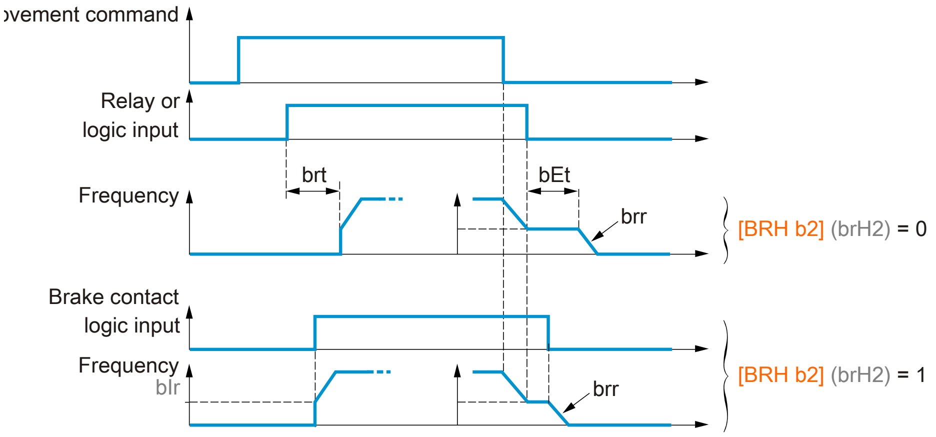
[BRH b2]

Taking into account brake feedback for the brake controller sequence.

[0](0): Brake feedback is not taken into account.
[1](1): Brake feedback is taken into account.

If a logic input is assigned to the brake feedback, the following applies:

- **[BRH b2]**(brH2) = 0: During the brake release sequence, the setpoint is enabled after **[Brake Release time]**(brt) has elapsed. During the brake release sequence, the current switches to 0 in accordance with ramp **[Current ramp time]**(brr) after **[Brake engage time]**(bEt) has elapsed.
- **[BRH b2]**(brH2)= 1: When the brakes are released, the setpoint is enabled when the logic input changes to 1. When the brakes are engaged, in accordance with **[Current ramp time]**(brr), the current switches to 0 if the logic input changes to 0.



</td><td></td><td>0</td></tr>
<tr><td>brr</td><td>

[Current ramp time]

Time of the ramp for the torque current (increase and decrease) for a current change that corresponds to the value**[Brake release I FW]**(Ibr).

</td><td>0 to 5.00 s</td><td>0 s</td></tr>
</table>

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

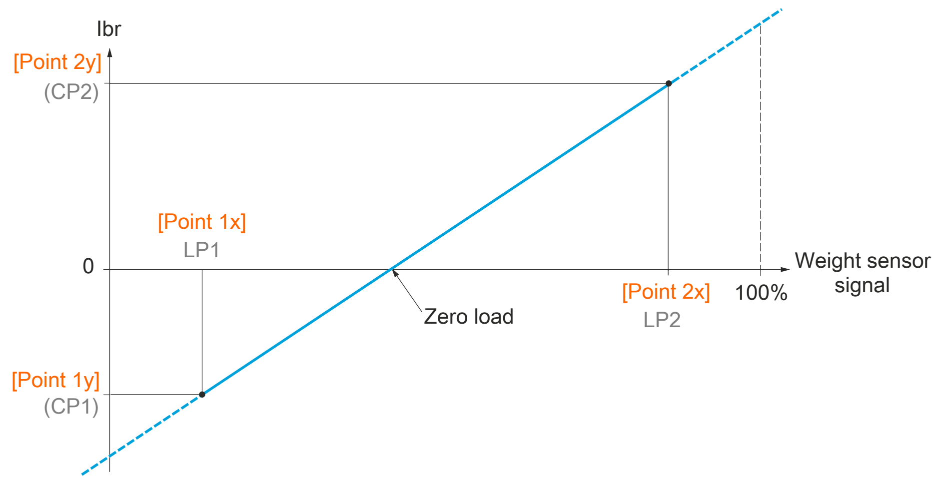
4.2.3.6.7.13 [EXTERNAL LOAD MEAS.] (ELM-)

Load measurement

Based on the information provided by a load sensor, this function adapts current [Brake release I FW](Ibr) to function [BRAKE LOGIC CONTROL](bLC-). The signal from the load sensor can be assigned to an analog input (usually a 4-20 mA signal) or the pulse input, depending on the type of load sensor.

Example: Measuring the total weight of a hoisting winch and its load.

Current [Brake release I FW] (Ibr) is adjusted according to the following characteristic curve:



The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > ELM-			
Code	**Name/Description**	**Setting range**	**Factory settings**
ELM-	**[EXTERNAL LOAD MEAS.]**		
PES	**[Weight sensor ass.]** **Warning!** **LOSS OF CONTROL** **To prevent loss of control of the load being lifted, make sure that [Point 1x](LP1), [Point 2x](LP2), [Point 1Y](CP1) and [Point 2Y](CP2) have been configured correctly.** **Perform a comprehensive commissioning check in order to confirm the values assigned to parameters [Point 1x](LP1), [Point 2x](LP2), [Point 1Y](CP1) and [Point 2Y](CP2).** **Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.** This parameter can be configured if [BRAKE LOGIC CONTROL](bLC-) is not set to [No](nO).		[No](nO)
nO AI1 AI2 AI3 PI AIU1 AIU2 OA01 ... OA10	[No](nO): Not assigned [AI1](AI1): Analog input A1 [AI2](AI2): Analog input A2 [AI3](AI3): Analog input A3 [RP](PI): Pulse input [AI virtual 1](AIU1): Virtual analog input 1 with handwheel [AI virtual 2](AIU2): Virtual analog input 2 via communication bus [OA01](OA01): Function blocks: Analog output 01 ... [OA10](OA10): Function blocks: Analog output 10		
LP1 ★	**[Load measure. Pt 1X]** 0 to 99.99% of signal on assigned input. [Point 1x](LP1) must be less than [Point 2x](LP2). This parameter is accessible if [Weight sensor ass.](PES) is assigned.	0 to LP2-0.01%	0%

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > ELM-			
Code	**Name/Description**	**Setting range**	**Factory settings**
CP1 ★	**[Point 1Y]** Current corresponding to load **[Point 1x]**(LP1); in A. This parameter is accessible if **[Weight sensor ass.]**(PES) is assigned.	-32767 or -1.36*INV to 32767 or 1.36*INV (1)	-INV (1)
LP2 ★	**[Point 2x]** 0.01 to 100% of signal on assigned input. **[Point 2x]**(LP2) must be greater than **[Point 1x]**(LP1). This parameter is accessible if **[Weight sensor ass.]**(PES) is assigned.	1 or LP1+0.01% to 100%	50%
CP2 ★	**[Load sensor point 2Y]** Current corresponding to load **[Point 2x]**(LP2); in A. This parameter is accessible if **[Weight sensor ass.]**(PES) is assigned.	-32767 or -1.36*INV to 32767 or 1.36*INV (1)	0
IbrA ★	**[Ibr 4-20 mA loss]** Brake release current in the event of the loss of the load sensor information. This parameter can be accessed if the load sensor is assigned to an analog current input and the 4-20 mA loss error is disabled. Recommended setting: Rated motor current for a hoisting application.	0 to 1.36*INV (1)	0

(1) Corresponding to the nominal current of the inverter specified on the nameplate.

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

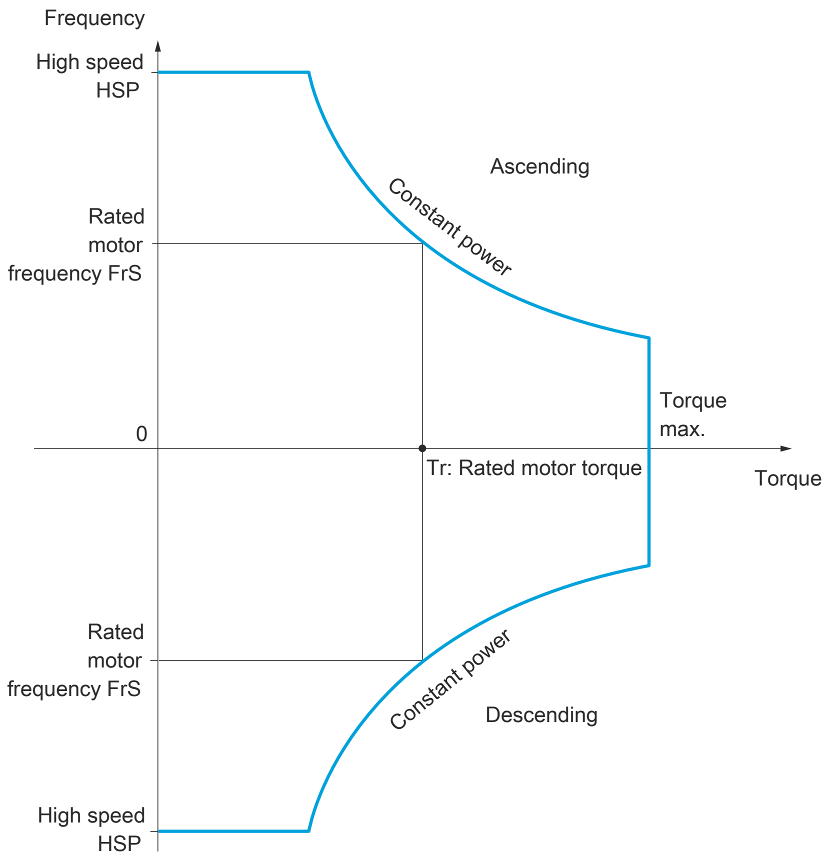
4.2.3.6.7.14 [HIGH SPEED HOISTING] (HSH-)

This function can be used to optimize the cycle times for hoisting movements for zero or lightweight loads. It authorizes operation at "constant power" in order to reach a speed greater than the rated speed without exceeding the rated motor current.

The speed is limited by parameter **[High speed]**(HSP).

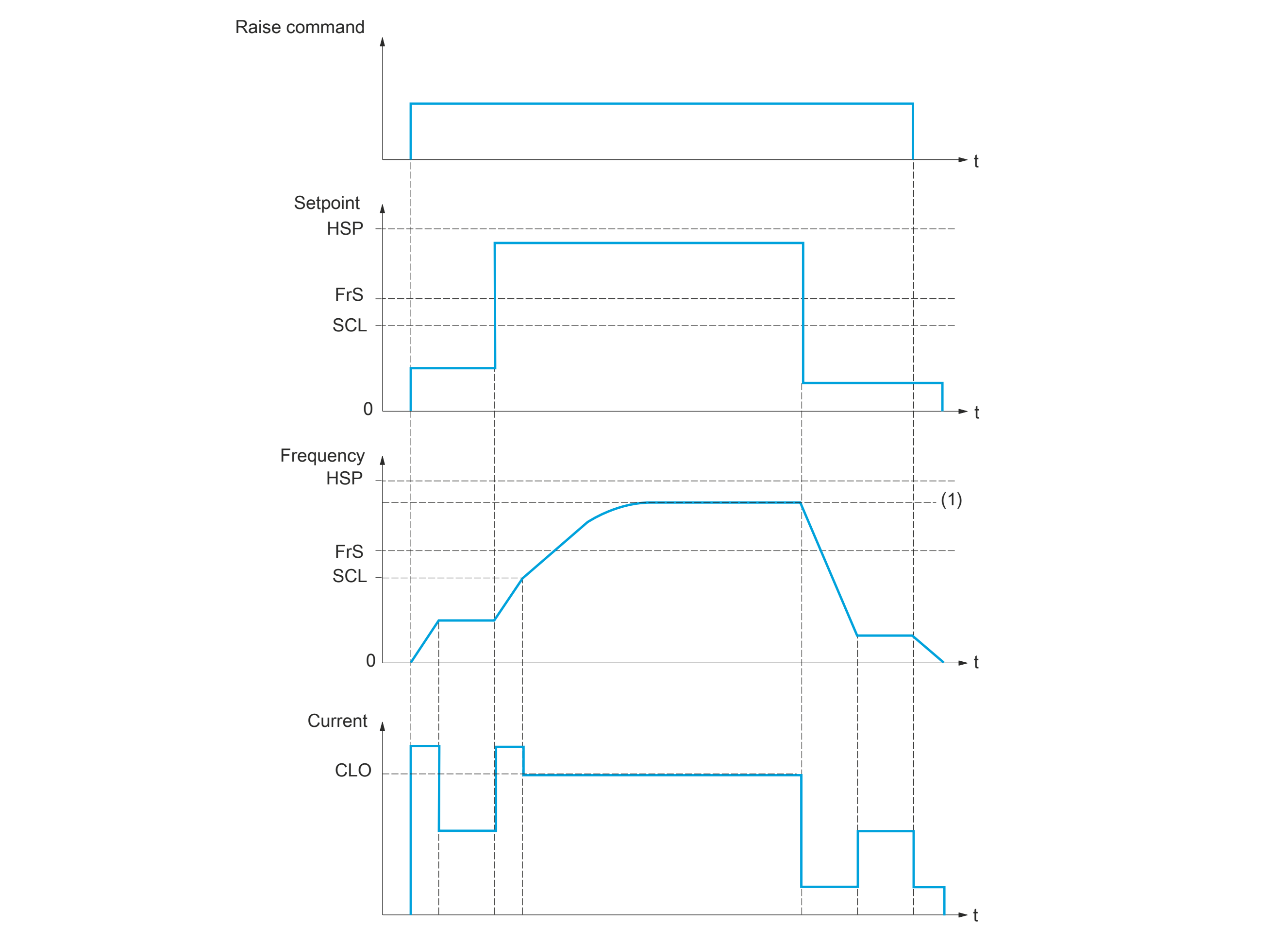
The function acts on the speed reference limitation and not on the reference itself.

Principle:



There are 2 possible operating modes:

- "Speed reference" mode: The maximum permissible speed is calculated by the inverter during a speed step that is set so that the inverter can measure the load.
- "Current limiting" mode: The maximum permissible speed is the speed that supports current limiting in motor mode, in the "hoisting" direction only. For the "Lowering" direction, operation is always in "Speed reference" mode.



(1) Based on the limit value required by the current limit

SCL: Adjustable frequency threshold, above which current limiting is active.

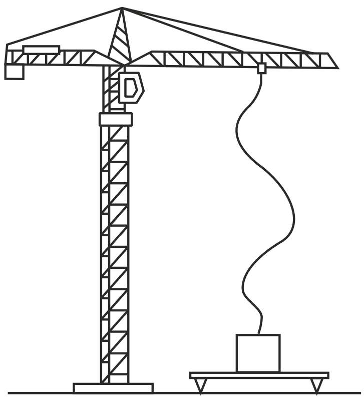
CLO: Current limiting for HSP function, large frequency.

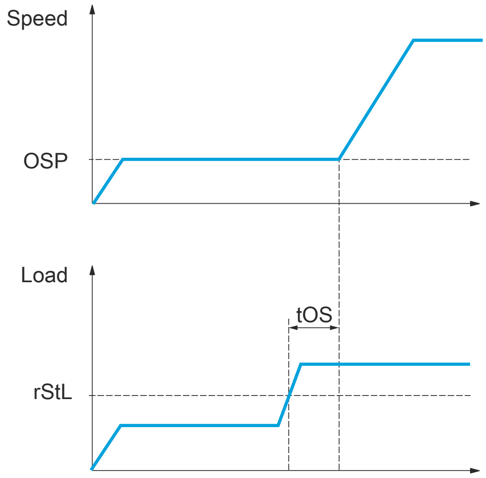
Advice:

The speed reached for a specific current will be lower in case of network undervoltage in comparison with nominal network voltage.

Rope slack

The "rope slack" function can be used to prevent starting up at high speed when a load has been set down ready for lifting but the cable is still slack (as in figure below).

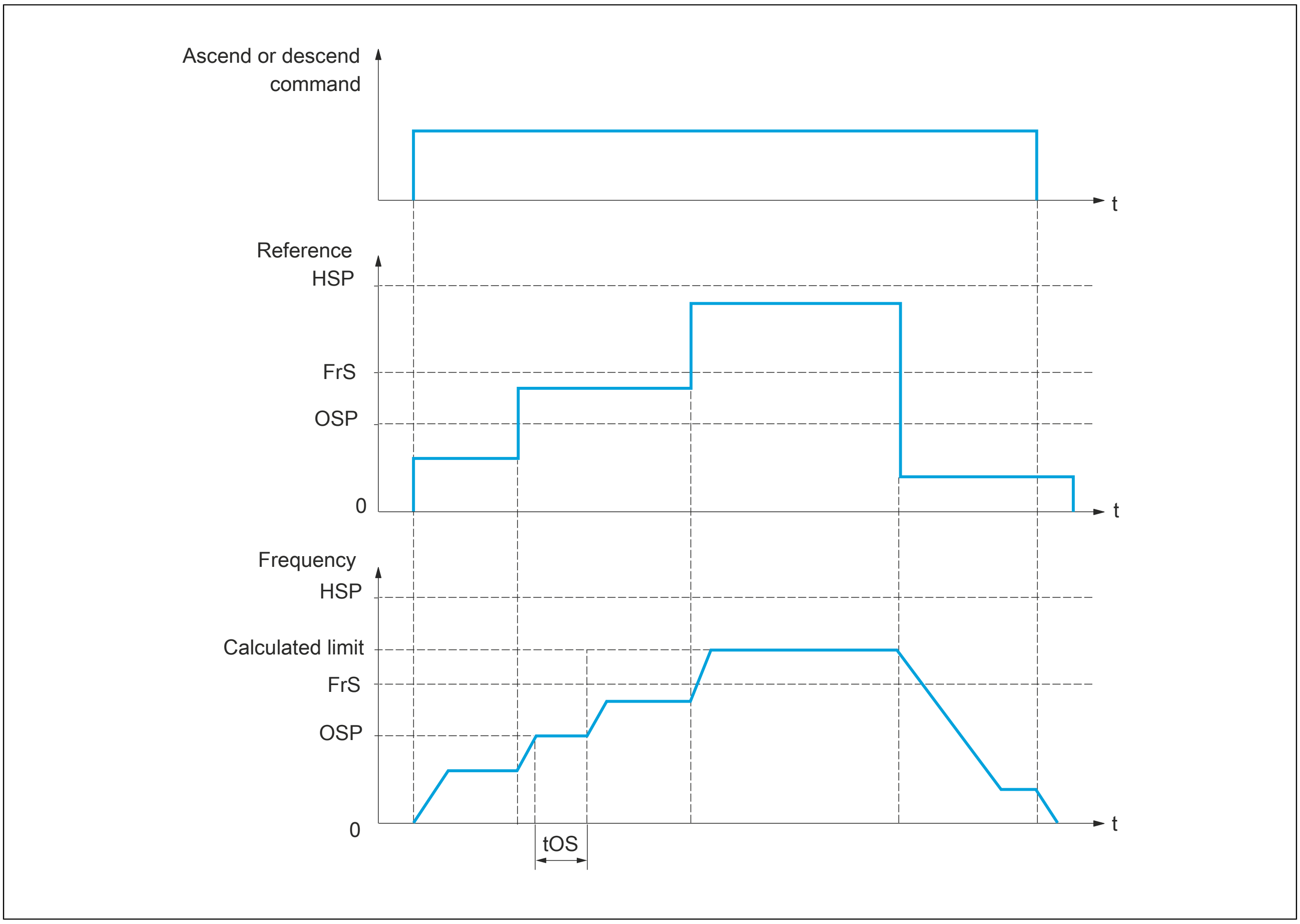




The frequency level (parameter OSP) is used for measuring the load. As long as the frequency level has not reached adjustable threshold value **[Rope slack trq level]**(rStL), which corresponds to the weight of the load hook, the effective measuring cycle will not be triggered.

Menu **[INPUTS / OUTPUTS CFG]**(I_O-) can be used to assign a logic output or relay to the displayed state "Slack rope".

"Speed reference" mode:



OSP: Adjustable frequency step for load measurement

tOS: Load measuring time

Two parameters are used to reduce the frequency calculated by the inverter for the ascending and descending direction.

"Current limiting" mode:

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > HSH-			
Code	**Name/Description**	**Setting range**	**Factory settings**
HSH-	**[HIGH SPEED HOISTING]** **Advice:** **This function cannot be used with certain other functions.**		
HSO nO SSO CSO	**[High speed hoisting optim]** **[No]**(nO): Function not active **[Speed ref]**(SSO): Mode "Frequency reference" **[Current Limit]**(CSO): Mode "Current limiting"		**[No]**(nO)
COF	**[Motor speed coeff.]** Speed reduction coefficient calculated by the inverter for the lifting direction. The parameter can be accessed if **[High speed hoisting optim]**(HSO) is set to **[Speed ref]**(SSO).	0 to 100%	100%
COr	**[Gen. speed coeff]** Speed reduction coefficient calculated by the inverter for Descending direction. This parameter is accessible if **[High speed hoisting optim]**(HSO) is not set to **[No]**(nO).	0 to 100%	50%
tOS	**[Load measuring tm.]** Duration of speed step for measurement. This parameter is accessible if **[High speed hoisting optim]**(HSO) is not set to **[No]**(nO).	0.1 s to 65 s	0.5 s
OSP	**[Measurement spd]** Speed stabilized for measurement. This parameter is accessible if **[High speed hoisting optim]**(HSO) is not set to **[No]**(nO).	0 to **[Rated motor freq.]**(FrS)	40 Hz
CLO	**[High speed I Limit]** HSP limitation current. The parameter can be accessed if **[High speed hoisting optim]**(HSO) is set to **[Current Limit]**(CSO). **Advice:** **If the setting is less than 0.25 in, the inverter can lock in error mode [Output Phase Loss](OPL), if this has been enabled).**	0 to 1.5*INV (1)	See the following table

ACOPOSinverter P66	Setting range		
	Min. value [0.1 A]	Max. value [0.1 A]	Default [0.1 A]
8I66x200018.00-000	0	23	15
8I66x200037.00-000	0	50	33
8I66x200055.00-000	0	56	37
8I66x200075.00-000	0	72	48
8I66x200110.00-000	0	104	69
8I66x200150.00-000	0	120	80
8I66x200220.00-000	0	165	110
8I66T200300.00-000	0	206	137
8I66T200400.00-000	0	263	175
8I66T200550.00-000	0	413	275
8I66T200750.00-000	0	495	330
8I66T201100.00-000	0	810	540
8I66T201500.00-000	0	990	660
8I66T400037.00-000	0	23	15
8I66T400055.00-000	0	29	19
8I66T400075.00-000	0	35	23
8I66T400110.00-000	0	45	30
8I66T400150.00-000	0	62	41
8I66T400220.00-000	0	83	55
8I66T400300.00-000	0	107	71
8I66T400400.00-000	0	143	95
8I66T600075.00-000	0	26	17
8I66T600150.00-000	0	41	27
8I66T600220.00-000	0	59	39
8I66T600400.00-000	0	92	61
8I66T600550.00-000	0	135	90
8I66T600750.00-000	0	165	110
8I66T601100.00-000	0	255	170
8I66T601500.00-000	0	330	220

Code	Name/Description	Setting range	Factory settings
SCL	**[I Limit. frequency]** Frequency threshold, above which the high-speed limitation current is active. The parameter can be accessed if **[High speed hoisting optim]**(HSO) is set to **[Current Limit]**(CSO).	0 to 599 Hz, depending on size	40 Hz
rSd	**[Rope slack config.]** Function "Rope slack". This parameter is accessible if **[High speed hoisting optim]**(HSO) is not set to **[No]**(nO).		**[No]**(nO)

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > HSH-			
Code	**Name/Description**	**Setting range**	**Factory settings**
nO drI PES	**[No]**(nO): Function not active **[Drive estim.]**(drI): Load measurement by estimating the inverter torque. **[Ext. Sensor]**(PES): Load measurement via sensor; assignment only possible if **[Weight sensor ass.]**(PES) is not set to **[No]**(nO).		
rStL	**[Rope slack trq level]** Adjustment threshold corresponding to a load weighing slightly less than the hook when off-load, as a % of the rated load. This parameter is accessible if **[Rope slack trq level]**(rSd) has been assigned.	0 to 100%	0%

(1) In corresponds to the rated inverter current indicated in the Installation Manual and on the inverter nameplate.

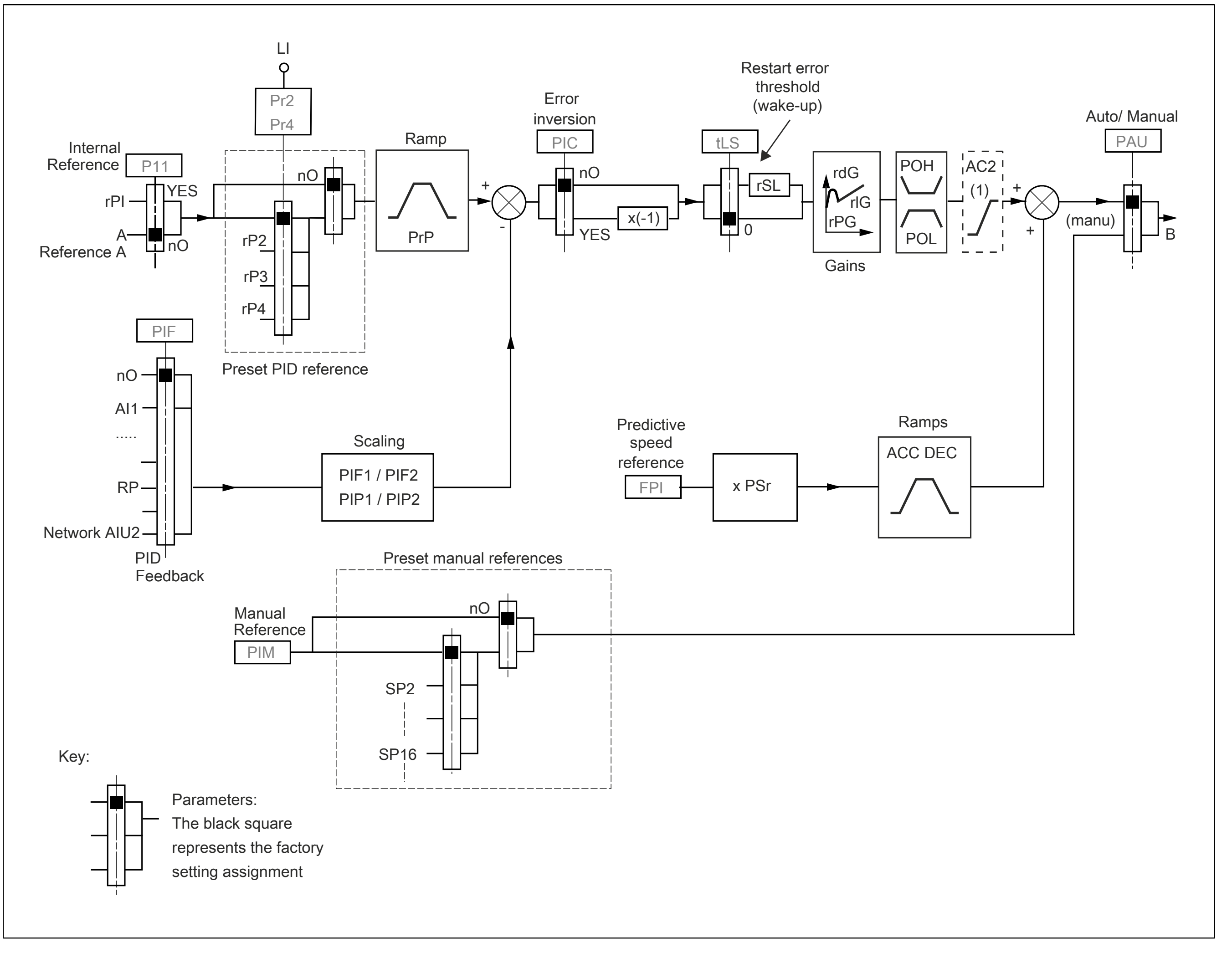
These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

4.2.3.6.7.15 [PID REGULATOR] (PId-)

Overview

The function is enabled if the PID actual value (measured value) is assigned to an analog input.



(1) Ramp AC2 is only active when function "PID" starts up and during PID wake-up.

PID- feedback:

The actual PID value must be assigned to one of the analog inputs AI1 to AI3 based on the expansion cards existing at the pulse input.

PID reference:

The PID setpoint must be assigned to the following parameters: Preset setpoints via logic inputs (rP2, rP3, rP4).

As per the configuration of **[Act. internal PID ref.]**(PII):

Internal setpoint ((rPI)) or

Setpoint A (**[Ref.1 channel]**(Fr1) or **[Ref.1B channel]**(Fr1b)).

Combination table for preset PID setpoints:

LI (Pr4)	LI (Pr2)	Pr2 = nO	Reference
			rPI or A
0	0		rPI or A
0	1		rP2
1	0		rP3
1	1		rP4

A predictive speed reference can be used to initialize the speed on restarting the process.

Scaling of feedback and references:

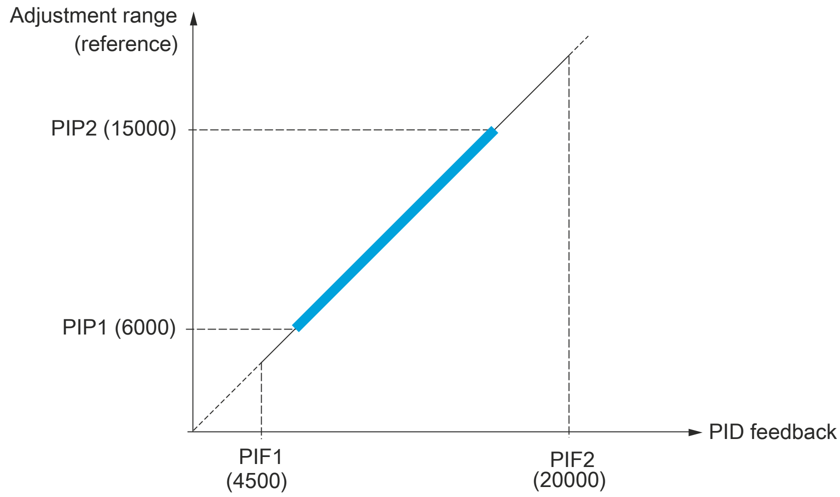
- Parameters **[Min PID feedback]**(PIF1) and **[Max PID feedback]**(PIF2) can be used to scale the PID actual value (encoder range). **This scaling absolutely must be retained for all further parameters.**
- Parameters **[Min PID reference]**(PIP1) and **[Max PID reference]**(PIP2) to scale the control range, i.e. the setpoint. **The control range must be within the sensor range.**

The maximum scaling parameter value is 32767. To simplify the start-up process, it is recommended that you use values as close to this maximum value as possible, while still staying within a power of 10 of the real values.

Example (see characteristic curve below): Adjustment of the volume in a tank, between 6 m^3 and 15 m^3.

- Used 4-20-mA encoder, 4.5 m^3 for 4 mA, 20 m^3 for 20 mA, where PIF1 = 4500 and PIF2 = 20000.
- Control range 6 to 15 m^3, where PIP1 = 6000 (min. setpoint) and PIP2 = 15000 (max. setpoint).
- Example references:
  - rP1 (internal setpoint) = 9500
  - rP2 (preset setpoint) = 6500
  - rP3 (preset setpoint) = 8000
  - rP4

Menu **[DISPLAY CONFIG. 3.4]** is used to adapt the name of the displayed unit and its format to the specific user.



Additional parameters:

- **[PID wake up thresh.]**(rSL): This parameter can be used to define the threshold value of the PID deviation from which the PID controller can be re-enabled (wake-up) after it has stopped as a result of having exceeded low-frequency time threshold **[Low speed time out]**(tLS).
- Inverted correction direction **[PID correct. reverse]**(PIC): If **[PID correct. reverse]**(PIC) is set to **[No]**(nO), the motor speed increases if the deviation is positive. Example: Pressure control via compressor. If **[PID correct. reverse]**(PIC) is set to **[Yes]**(YES), the motor speed decreases if the deviation is positive. Example: Temperature control via cooling fan.
- The integral gain may be short-circuited by a logic input.
- An alarm on the PID feedback may be configured and indicated by a logic output.
- An alarm on the PID error may be configured and indicated by a logic output.

"Manual - Automatic" operation with PID

This function combines the PID regulator, the preset speeds and a manual reference. Depending on the state of the logic input, the frequency setpoint is given by the preset speeds or by a manual setpoint input via function "PID".

Manual setpoint [Manual reference](PIM):

- Analog inputs AI1 to AI3
- Pulse input

Specification speed setpoint [Speed ref. assign.](FPI):

- **[AI1]**(AI1): Analog input
- **[AI2]**(AI2): Analog input
- **[AI3]**(AI3): Analog input
- **[RP]**(PI): Pulse input
- **[HMI]**(LCC): Graphic display terminal or external operator terminal
- **[Modbus]**(Mdb): Integrated Modbus
- **[CANopen com.]**(CAn): Integrated CANopen®
- **[Com. card]**(nEt): Communication card (if used)

Setting up the PID regulator

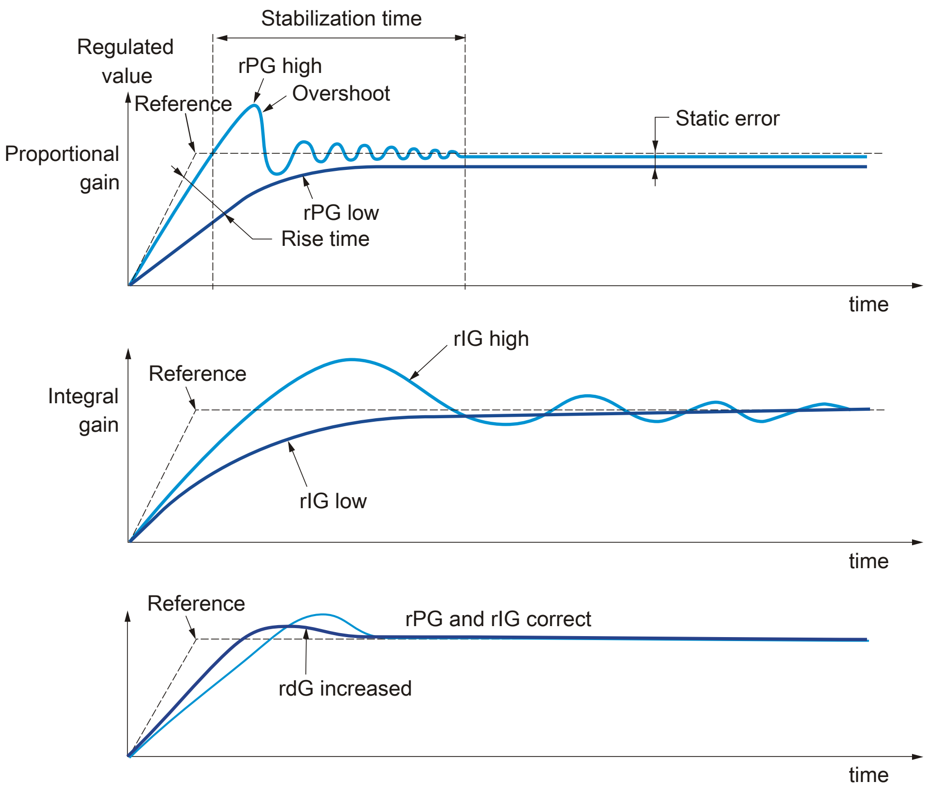
1. Configuration in mode PID

2. Start testing the factory settings.

For optimization of the inverter, synchronize **[PID prop. gain]**(rPG) or **[PID integral gain]**(rIG) step-by-step and independently of each other and monitor the effect on the PID actual value in relation to the setpoint.

3. If the factory settings are unstable or the setpoint is not met

- Test the frequency range of the system under load with a reference value under manual operation (without PID controls):
  - Speed must remain stable in steady state and correspond to the setpoint; the PID actual value must remain stable.
  - In temporary operation, the speed must follow the ramp and stabilize quickly; the PID actual value must track with the speed. Otherwise, perform tests to check the inverter settings and/or encoder signals and wiring.
- Switch to PID mode and set
- Set **[Dec ramp adapt.]**(brA) to **[No]**(nO) (no self-alignment of the ramp).
- Set **[PID ramp]**(PrP) to the permissible minimum value for the machine, without triggering overbraking **[Overbraking]**(ObF).
- Set integral component **[PID integral gain]**(rIG) to the minimum value.
- Leave D component **[PID derivative gain]**(rdG) at 0.
- Observe the PID feedback and the reference.
- Switch the frequency inverter ON/OFF a number of times or vary the load or reference rapidly a number of times.
- Set P component **[PID prop. gain]**(rPG) to a value that allows for the best compromise between response time and stability during temporary phases (slight overshoot and 1 to 2 vibrations prior to stability).
- If the setpoint is not complied with in steady state, increase I component **[PID integral gain]**(rIG) progressively and in the case of instability (oscillation), reduce P component **[PID prop. gain]**(rPG). Achieve a compromise between response time and precision (see diagram).
- Lastly, the derivative gain may permit the overshoot to be reduced and the response time to be improved, although this will make it more difficult to obtain a compromise in terms of stability, as it depends on 3 gains.
- Test the entire setpoint range.



The oscillation frequency depends on the system kinematics.

Parameter	Rise time	Overshoot	Stabilization time	Static error
rPG ↗	↘ ↘	↗	=	↘
rIG ↗	↘	↗ ↗	↗	↘ ↘
rdG ↗	=	↘	↘	=

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > PId-			
Code	**Name/Description**	**Setting range**	**Factory settings**
PId-	**[PID REGULATOR]** **Advice:** **This function cannot be used with certain other functions.**		
PIF nO AI1 AI2 AI3 PI AIU1 AIU2 OA01 ... OA10	**[PID feedback ass.]** **[No]**(nO): Not assigned **[AI1]**(AI1): Analog input A1 **[AI2]**(AI2): Analog input A2 **[AI3]**(AI3): Analog input A3 **[RP]**(PI): Pulse input **[AI virtual 1]**(AIU1): Virtual analog input 1 via communication bus **[AI virtual 2]**(AIU2): Virtual analog input 2 via communication bus **[OA01]**(OA01): Function blocks: Analog output 01 **...** **[OA10]**(OA10): Function blocks: Analog output 10		**[No]**(nO)
AIC2 ★ nO Mdb CAn nEt	**[AI2 net. channel]** This parameter is accessible if **[PID feedback ass.]**(PIF) is set to **[AI virtual 2]**(AIU2). The parameter can also be accessed via menu **[INPUTS/OUTPUTS]**(I_O-). **[No]**(nO): Not assigned **[Modbus]**(Mdb): Integrated Modbus **[CANopen com.]**(CAn): Integrated CANopen® **[Com. card]**(nEt): Communication card (if used)		**[No]**(nO)
PIF1 ★ (1)	**[Min PID feedback]** Value for minimum feedback.	0 to **[Max PID feedback]**(PIF2)(2)	100
PIF2 ★ (1)	**[Max PID feedback]** Value for maximum feedback.	**[Min PID feedback]**(PIF1) to 32767(2)	1.000
PIP1 ★ (1)	**[Min PID reference]** Minimum process value.	**[Min PID feedback]**(PIF1) to **[Max PID reference]**(PIP2)(2)	150
PIP2 ★ (1)	**[Max PID reference]** Maximum process value.	**[Min PID reference]**(PIP1) to **[Max PID feedback]**(PIF2)(2)	900
PII ★ nO YES	**[Act. internal PID ref.]** Internal PID regulator reference **[No]**(nO): The setpoint of the PID controller is returned by **[Ref.1 channel]**(Fr1) or **[Ref.1B channel]**(Fr1b), if necessary with functions "Addition"/"Subtraction"/"Multiplication" and the preset speeds. **[YES]**(YES): The setpoint of the PID controller is defined as an internal setpoint by parameter **[Internal PID ref.]**(rPI).		**[No]**(nO)
rPI ★	**[Internal PID ref.]** Internal PID regulator reference The parameter can also be accessed via menu **[1.2 MONITORING]**(MOn-).	**[Min PID reference]**(PIP1) to **[Max PID reference]**(PIP2)	150
rPG ★	**[PID prop. gain]** Proportional gain.	0.01 to 100	1
rIG ★	**[PID integral gain]** Integral gain.	0.01 to 100	1
rdG ★	**[PID derivative gain]** Derivative gain.	0.00 to 100	0

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > PId-			
Code	**Name/Description**	**Setting range**	**Factory settings**
PrP (1)	**[PID ramp]** Acceleration/deceleration ramp of the PID, which is defined for a range of **[Min PID reference]**(PIP1) to **[Max PID reference]**(PIP2) or vice versa.	0 to 99.9 s	0 s
PIC	**[PID correct. reverse]** Inverted correction direction **[PID correct. reverse]**(PIC): If **[PID correct. reverse]**(PIC) is set to **[No]**(nO), motor speed increases if the deviation is positive. Example: Pressure control via compressor. If **[PID correct. reverse]**(PIC) is set to **[Yes]**(YES), the motor speed decreases if the deviation is positive. Example: Temperature control via cooling fan.		**[No]**(nO)
nO	**[No]**(nO): No		
YES	**[YES]**(YES): Yes		
POL (1)	**[Min PID output]** Minimum value of regulator output in Hz.	- 599 to 599 Hz	0 Hz
POH (1)	**[Max PID output]** Maximum value of regulator output in Hz.	0 to 599 Hz	60 Hz
PAL (1)	**[Min fbk alarm]** Minimum monitoring threshold for regulator feedback.	**[Min PID feedback]**(PIF1) to **[Max PID feedback]**(PIF2)(2)	100
PAH (1)	**[Max fbk alarm]** Maximum monitoring threshold for regulator feedback.	**[Min PID feedback]**(PIF1) to **[Max PID feedback]**(PIF2)(2)	1.000
PEr (1)	**[PID error Alarm]** Regulator error monitoring threshold.	0 to 65535 (2)	100
PIS	**[PID integral reset]** If the assigned input or bit is at 0, the function is inactive (I component of the PID is valid). If the assigned input or bit is at 1, the function is active (I component of the PID is locked).		**[No]**(nO)
nO	**[No]**(nO): Not assigned		
LI1	**[LI1]**(LI1): Logic input LI1		
...	**[...]**(...): See the assignment conditions.		
FPI	**[Speed ref. assign.]** PID controller specified speed input		**[No]**(nO)
nO	**[No]**(nO): Not assigned		
AI1	**[AI1]**(AI1): Analog input A1		
AI2	**[AI2]**(AI2): Analog input A2		
AI3	**[AI3]**(AI3): Analog input A3		
LCC	**[HMI]**(LCC): Graphic display terminal or external operator terminal source		
Mdb	**[Modbus]**(Mdb): Integrated Modbus		
CAn	**[CANopen com.]**(CAn): Integrated CANopen®		
nEt	**[Com. card]**(nEt): Optional communication card source		
PI	**[RP]**(PI): Pulse input		
AIU1	**[AI virtual 1]**(AIU1): Virtual analog input 1 with handwheel		
OA01	**[OA01]**(OA01): Function blocks: Analog output 01		
...	**...**		
OA10	**[OA10]**(OA10): Function blocks: Analog output 10		
PSr (1)	**[Speed input %]** Multiplying coefficient for predictive speed input. This parameter is not accessible if **[Speed ref. assign.]**(FPI) is set to **[No]**(nO).	0 to 100%	100%

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > PId-

Code	Name/Description	Setting range	Factory settings
PAU	**[Auto/Manual assign]**		**[No]**(nO)
	If the assigned input or bit is at 0, the PID controller is active. If the assigned input or bit is at state 1, manual operation is active.		
nO LI1 ...	**[No]**(nO): Not assigned **[LI1]**(LI1): Logic input LI1 **[...]**(...): See the assignment conditions.		
AC2 (1)	**[Acceleration 2]**	0.00 to 6000 s[3]	5 s
	Time taken to accelerate from 0 to **[Rated motor freq.]**(FrS). In order to ensure ramp repeatability, the value of this parameter must be defined in accordance with the relevant application options. Ramp AC2 is only active when function PID starts up and during PID wake-ups.		
PIM	**[Manual reference]**		**[No]**(nO)
	Frequency input in manual operation. This parameter can be accessed if **[Auto/Manual assign]**(PAU) is not equal to **[No]**(nO). The preset speeds are active on the manual reference if they have been configured.		
nO AI1 AI2 AI3 PI AIU1 OA01 ... OA10	**[No]**(nO): Not assigned **[AI1]**(AI1): Analog input A1 **[AI2]**(AI2): Analog input A2 **[AI3]**(AI3): Analog input A3 **[RP]**(PI): Pulse input **[AI virtual 1]**(AIU1): Virtual analog input 1 with handwheel **[OA01]**(OA01): Function blocks: Analog output 01 **...** **[OA10]**(OA10): Function blocks: Analog output 10		
tLS (1)	**[Low speed time out]**	0 to 999.9 s	0 s
	Maximum operating time with **[Low speed]**(LSP) Following an operation with **[Low speed]**(LSP) for a defined period, a motor stop is requested automatically. The motor restarts when the frequency setpoint is greater than **[Low speed]**(LSP) and if a move command is still present. **Advice:** **A value of 0 indicates an unlimited period of time.** If **[Low speed time out]**(tLS) is not equal to 0, parameter **[Type of stop]**(Stt) is forced to **[Ramp stop]**(rMP) (only if "Stop via ramp" can be configured).		
rSL 2 s	**[PID wake up thresh.]**	0.0 to 100.0	0
	Danger! **UNEXPECTED OPERATION OF THE EQUIPMENT** **Make sure that enabling this function does not result in unsafe states.** **Failure to follow these instructions can result in death or serious injury.** If functions "PID" and "Duration of operation at low speed" **[Low speed time out]**(tLS) are configured at the same time, the PID controller may attempt to set a lower speed than **[Low speed]**(LSP). This results in unsatisfactory operation, such as startup, rotation at low frequency, standstill, etc. With parameter **[PID wake up thresh.]**(rSL) (threshold value of the deviation when restarting), a PID deviation minimum threshold can be set for the restart after a standstill in the event of lengthy operation with low speed **[Low speed]**(LSP). **[PID wake up thresh.]**(rSL) is a percentage of the PID deviation (the value depends on parameters **[Min PID feedback]**(PIF1) and **[Max PID feedback]**(PIF2)). The function is inactive if **[Low speed time out]**(tLS) = 0 or if **[PID wake up thresh.]**(rSL) = 0.		

(1) The parameter can also be accessed via menu **[SETTINGS]**(SEt-).
(2) If no graphic display terminal is being used, the values over 9,999 on the four-digit display are shown with a period as thousands separator, for example, 15.65 for 15,650.
(3) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to 6000 s according to **[Ramp increment]**(Inr).

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

2 s To change the assignment of this parameter, press the ENT key for 2 seconds.

PID management

Description of the problem

A position reference is sent to the inverter (PISP parameter).

An analog potentiometer that is read in AI1 (PIF is set to AI1) is used as a feedback value.

If the stop command (CMDD bit 8) is now triggered, the PISP parameter changes and the stop command is released. In this case the control does not compensate for the full difference between the position reference and the actual position.

The movement only occurs for a certain distance, resulting in a difference between the position reference and the actual value.

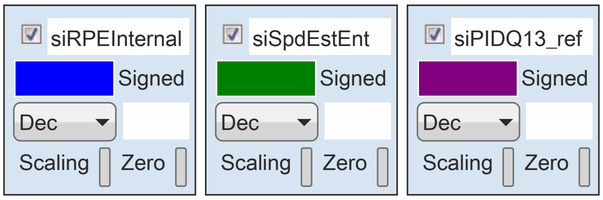
If the stop command is now triggered again and then removed, the delay fault is compensated and the motor moves into the correct position (it is really only the stop command that is triggered and reset - there is no other control - and the PID of the inverter compensates for the difference between the reference and the actual position).

Test case 1: The PID response corresponds to the response time of the PID feedback.

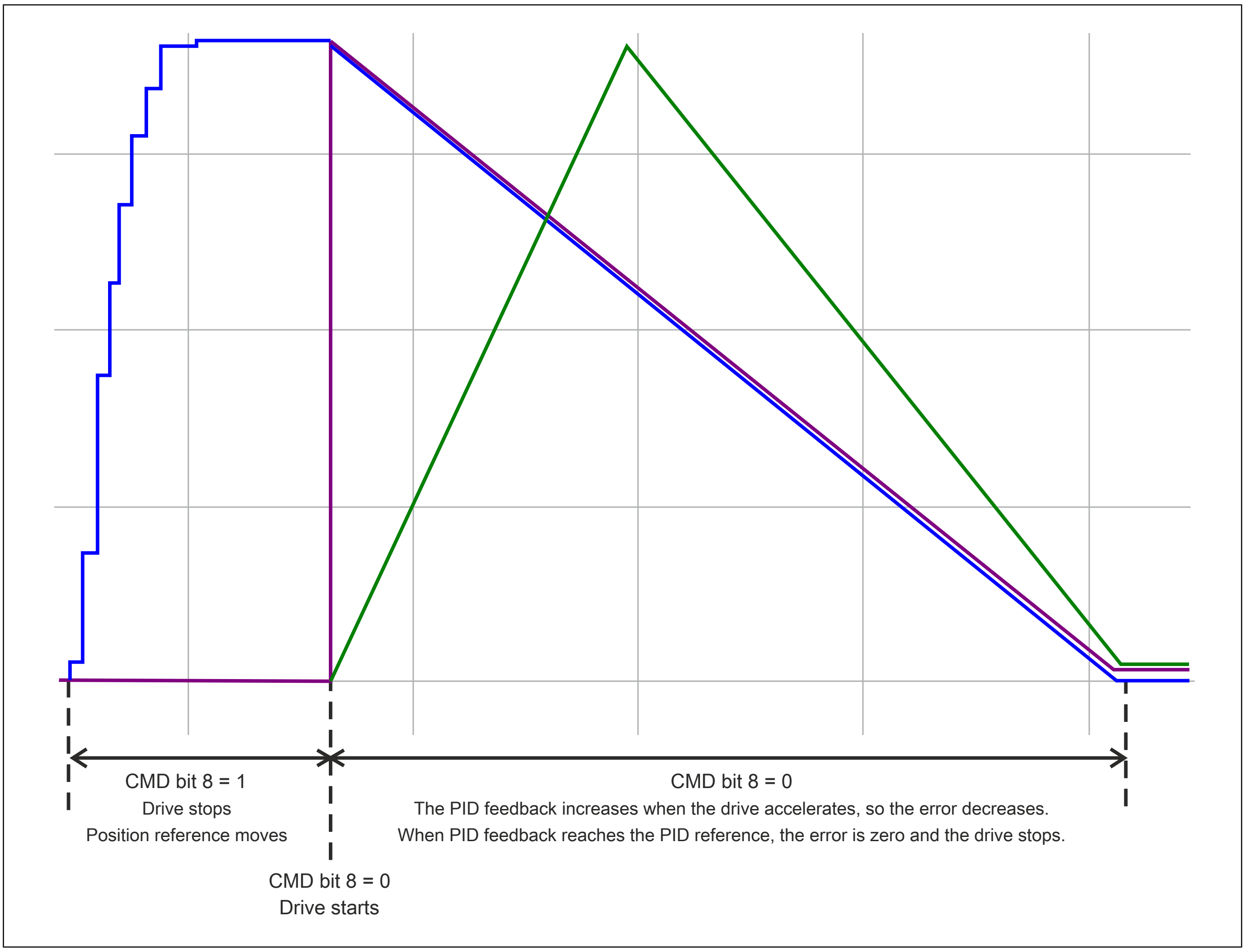
ACOPOSinverter PID configuration:

ACC:	1			PIF1:	0	RPG:	1.00	POL:	-500
DEC:	1	PIF:	AIV1	PIF2:	8192	RIG:	0.01	POH:	500
HSP:	50.0 Hz	AIC1:	CAN	PIP1:	0	RDG:	0.00	AC2:	30
LSP:	0.0 Hz	AIV1:	0	PIP2:	8192	PRP:	0.0 s	DE2:	30

Test results:



siRPEInternal = PID fault
siSpdEstEnt = Motor speed
siPIDQ13_ref = PID output



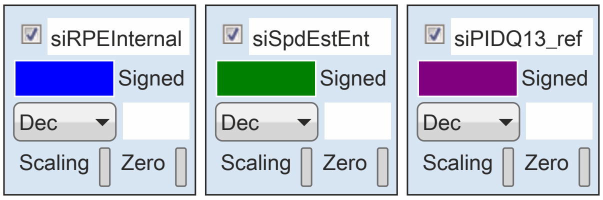
This is the expected behavior. The fault remains positive, the inverter accelerates. As a result, the PID feedback increases (the fault decreases), so the PID reference size is reached. The motor is in the run mode, but with a speed of 0.

Test case 2: The PID response is faster than the response time of the PID feedback.

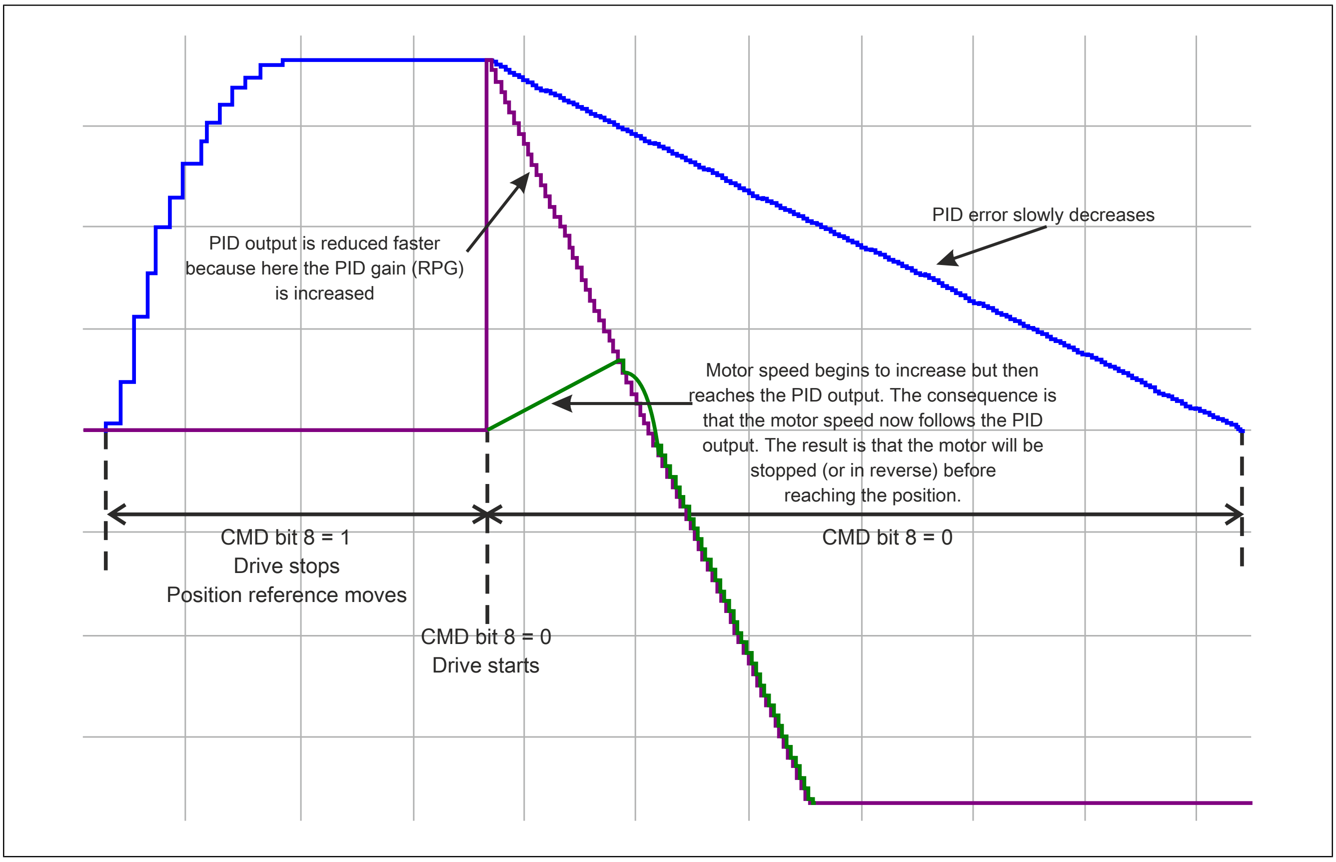
ACOPOSinverter PID configuration:

ACC:	1			PIF1:	0	RPG:	7.00	POL:	-500
DEC:	1	PIF:	AIV1	PIF2:	8192	RIG:	0.01	POH:	500
HSP:	50.0 Hz	AIC1:	CAN	PIP1:	0	RDG:	0.00	AC2:	30
LSP:	0.0 Hz	AIV1:	0	PIP2:	8192	PRP:	0.0 s	DE2:	30

Test results:



siRPEInternal = PID fault
siSpdEstEnt = Motor speed
siPIDQ13_ref = PID output



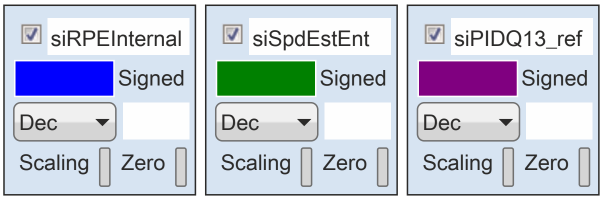
In this case the PID gain (RPG) is set to a higher value to obtain a higher PID responsiveness. With this setting the PID output reacts faster in comparison to the motor speed and the PID feedback. The motor speed is therefore reaches the PID output, which has already reduced before reaching the position. This results in a positioning fault.

Test case 3: PID response to STOP with stop bit.

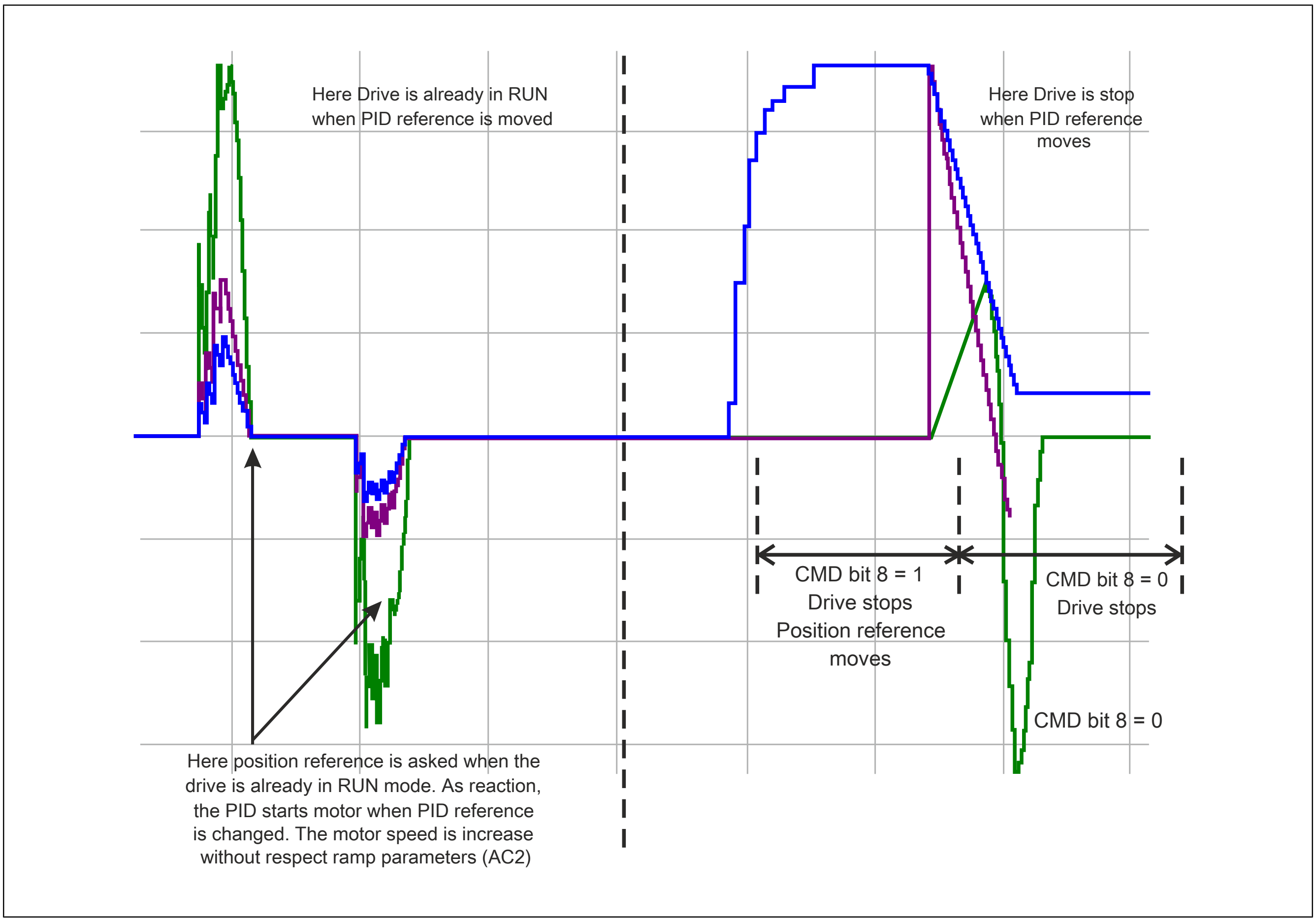
ACOPOSinverter PID configuration:

ACC:	1			PIF1:	0	RPG:	7.00	POL:	-500
DEC:	1	PIF:	AIV1	PIF2:	8192	RIG:	0.01	POH:	500
HSP:	50.0 Hz	AIC1:	CAN	PIP1:	0	RDG:	0.00	AC2:	30
LSP:	0.0 Hz	AIV1:	0	PIP2:	8192	PRP:	0.0 s	DE2:	30

Test results:



siRPEInternal = PID fault
siSpdEstEnt = Motor speed
siPIDQ13_ref = PID output



If the inverter is already in the RUN mode if the PID reference variable is changed, the motor responds without subsequent gain. The response is immediate.

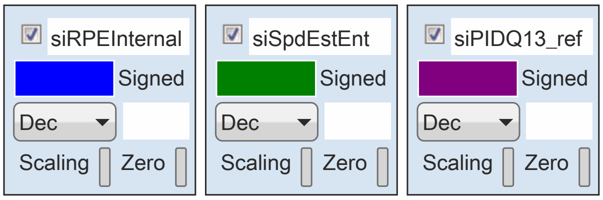
If the inverter stops (e.g. by CMD-bit 8), the motor responds, but accelerates on the basis of the AC2 parameter. The result would be that the motor physically reaches the PID output via the tracking of the AC2 ramp and loses time during this. This results in a positioning error compared to the start without AC2 tracking.

Test case 4: Reset time

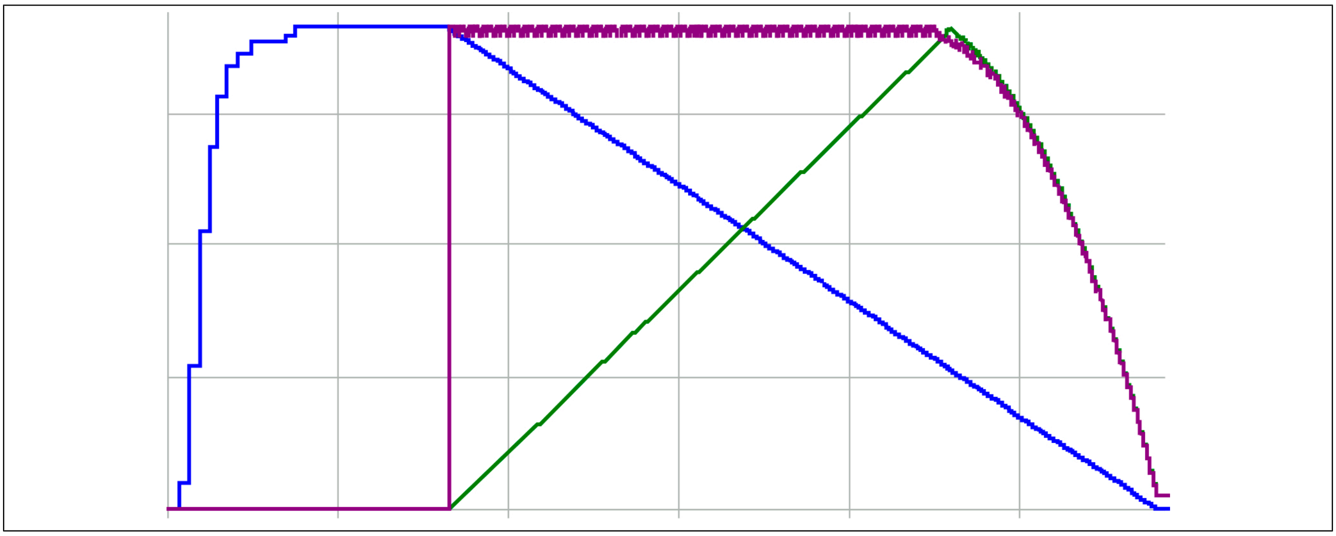
ACOPOSinverter PID configuration:

ACC:	1			PIF1:	0	RPG:	7.00	POL:	-500
DEC:	1	PIF:	AIV1	PIF2:	8192	RIG:	5.00	POH:	500
HSP:	50.0 Hz	AIC1:	CAN	PIP1:	0	RDG:	0.00	AC2:	30
LSP:	0.0 Hz	AIV1:	0	PIP2:	8192	PRP:	0.0 s	DE2:	30

Test results:



siRPEInternal = PID fault
siSpdEstEnt = Motor speed
siPIDQ13_ref = PID output



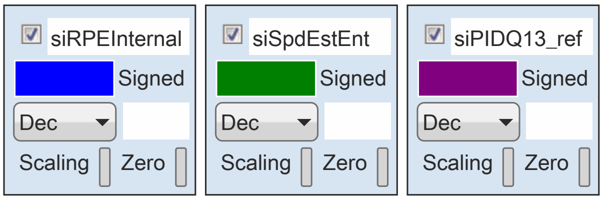
If the PID reference variable has been moved, the inverter is stopped (CMD bit 8 = 1). The AC2 parameter has the same effect as previously when starting in this example. For this reason, the motor speed will be adapted according to the ramp so that the PID output is achieved. This integral intervention allows the generation of the average value for the PID fault and then adds it to the PID output. This produces a PID output that does not only follow a linear ramp.

Test case 5: Reset time + AC2 ramp reduction

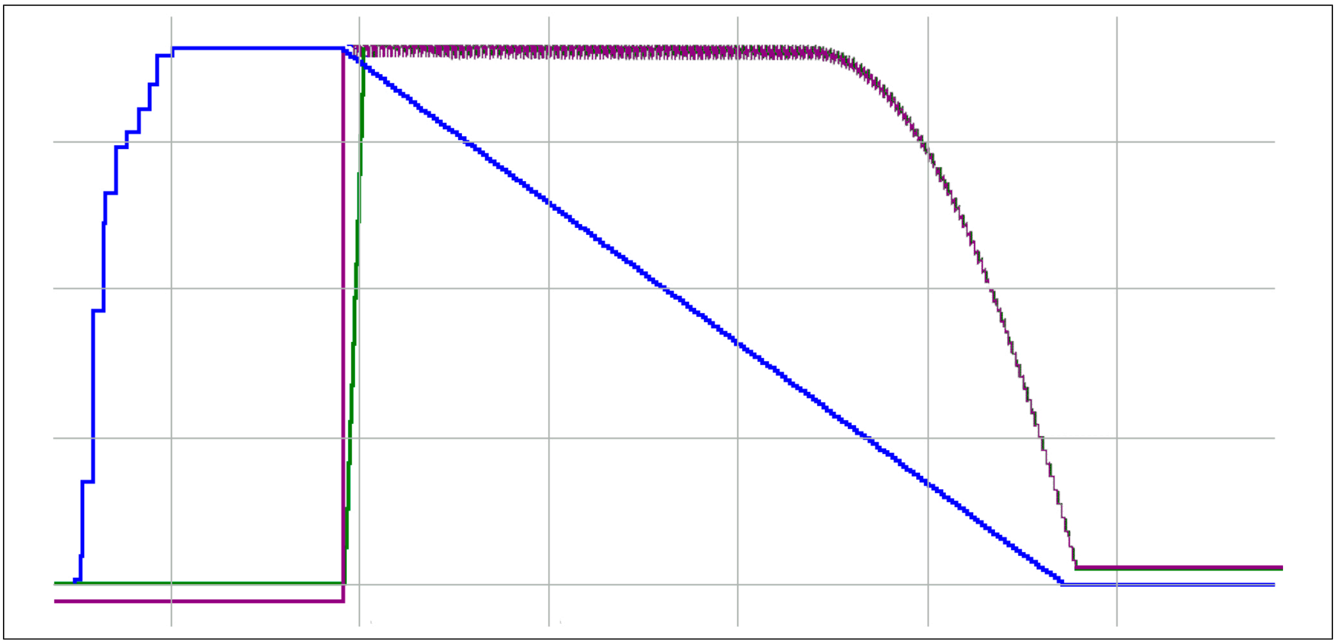
ACOPOSinverter PID configuration:

ACC:	1			PIF1:	0	RPG:	7.00	POL:	-500
DEC:	1	PIF:	AIV1	PIF2:	8192	RIG:	5.00	POH:	500
HSP:	50.0 Hz	AIC1:	CAN	PIP1:	0	RDG:	0.00	AC2:	1
LSP:	0.0 Hz	AIV1:	0	PIP2:	8192	PRP:	0.0 s	DE2:	30

Test results:



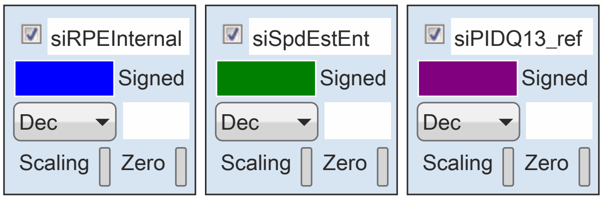
siRPEInternal = PID fault
siSpdEstEnt = Motor speed
siPIDQ13_ref = PID output



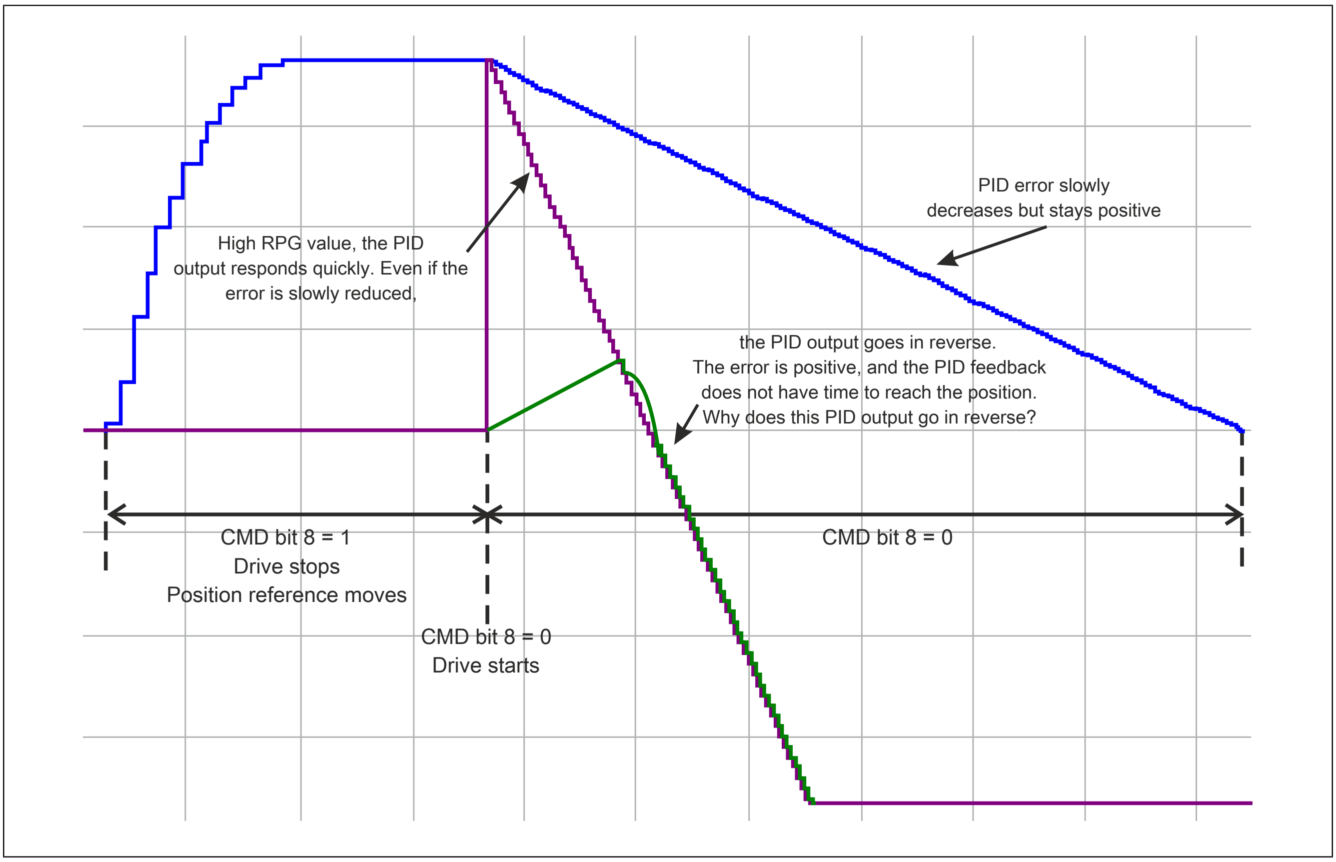
If the PID reference variable has been moved, the inverter is stopped (CMD bit 8 = 1). The AC2 parameter has the same effect as previously when starting in this example. With AC2 = 0.1 s, the PID output is reached more quickly. This reset time allows the generation of the average value for the PID fault and then adds it to the PID output. This produces a PID output that does not only follow a linear ramp.

What results in a falling ramp (with reversing direction) with proportional gain and a continually positive error?

This must be studied.



siRPEInternal = PID fault
siSpdEstEnt = Motor speed
siPIDQ13_ref = PID output



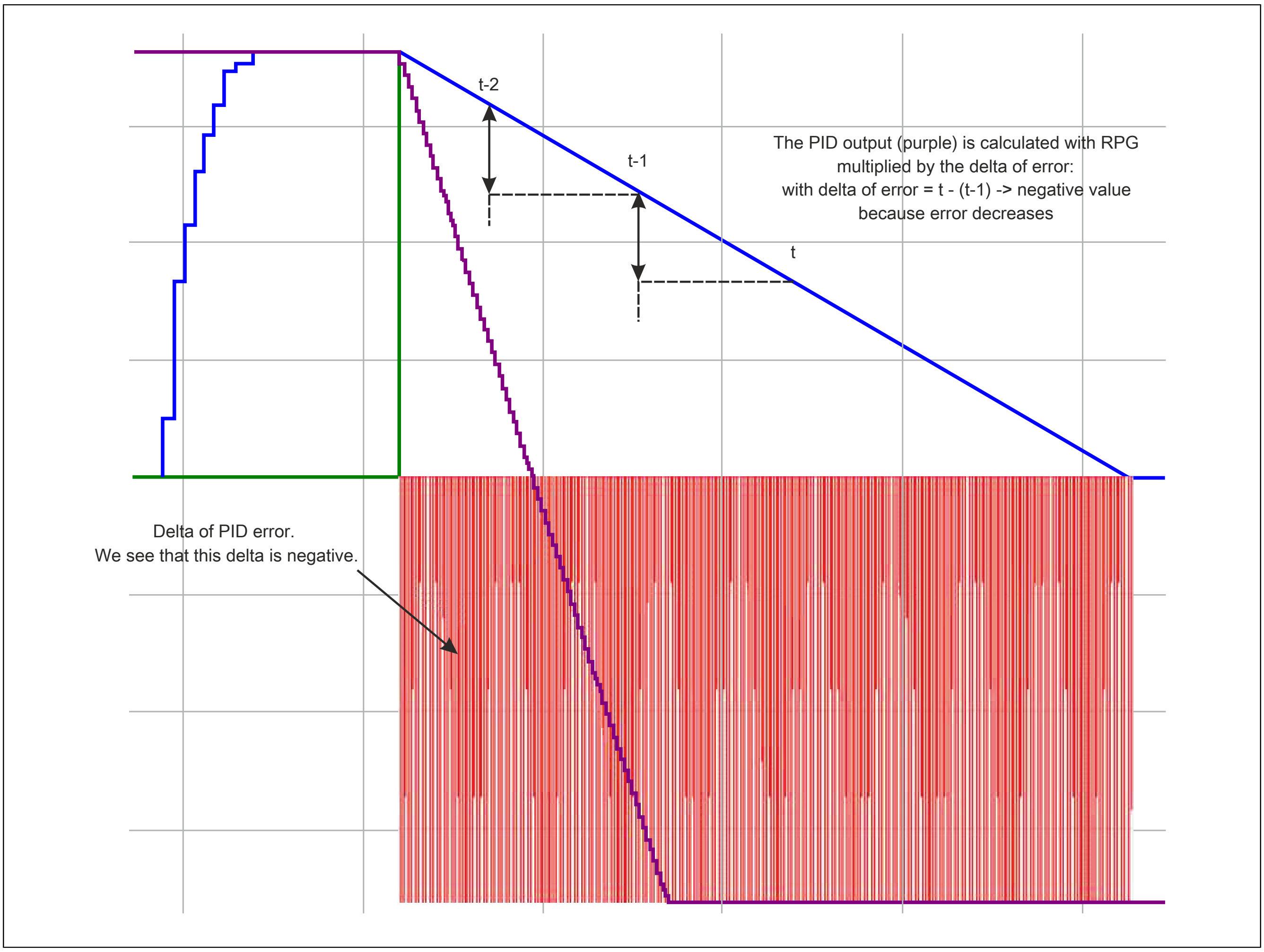
In the case of a high RPG-value the PID output responds more rapidly. This PID output is even reversed in the case of a positive fault. The PID Feedback does not have enough time to reach the PID reference variable, but the inverter turns round. In practical use, this means that this position is never reached.

The behavior is also similar to when the inverter is in RUN mode and the PID reference variable changes.

Explanation:

Taking into account the inverter settings.

ACC:	1			PIF1:	0	RPG:	7.00	POL:	-500
DEC:	1	PIF:	AIV1	PIF2:	8192	RIG:	0.01	POH:	500
HSP:	50.0 Hz	AIC1:	CAN	PIP1:	0	RDG:	0.00	AC2:	1
LSP:	0.0 Hz	AIV1:	0	PIP2:	8192	PRP:	0.0 s	DE2:	30

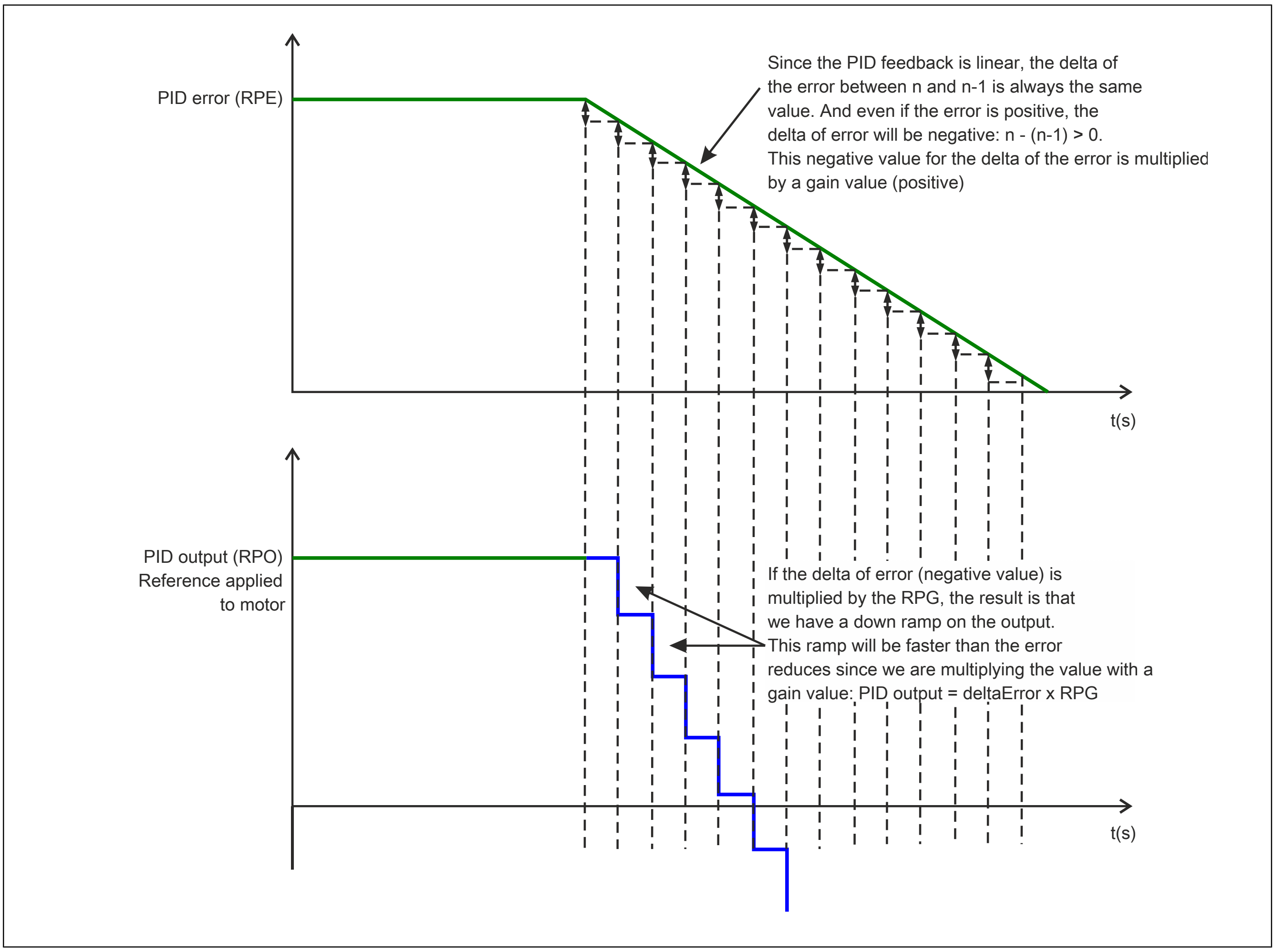


In our inverters PID output is calculated by multiplying the RPG-value (gain) with the delta of the error. Since the PID feedback is linear, the delta value for the fault between t and t-1 will always be the same value. And even in the case of a positive error, the delta value of the error is negative: t-(t-1) < 0. This negative delta value of the error is multiplied by a gain (positive) value.

The result: The error is positive, but the delta value of the error is negative. Multiplied by the gain, the PID output decreases.

If POL = 0, the PID output is limited to 0. If POL permits a negative value, the PID output is negative and the motor can be run in reverse.

Diagram



Conclusion and recommendation

- In our inverters PID output is calculated by multiplying the RPG-value (gain) with the delta value of the error. Even in the case of a positive error, the delta value of the error is negative if this error reduces. The delta value of the error is multiplied by the RPG-value. For this reason with a high RPG-value the PID output is a falling ramp up to 0 (or reversal operation at POL < 0).
- If the motor has also been stopped in the event of a change of the PID reference, the motor starts, but follows the AC2 parameters. This is not the case if the inverter is in RUN mode and the PID reference variable is moved.
- For correct behavior, the PID must be adjusted. Proportional gain cannot be used alone. The same applies for the integral gain - it cannot be completely suppressed. You can have a minimum value of 0.01 for it, but it is always present.

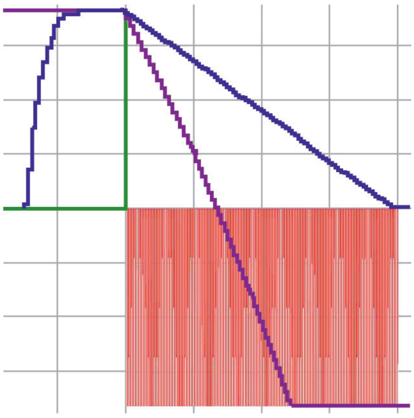
The points 1 and/or 2 may be the result of a poor positioning at the customer site.

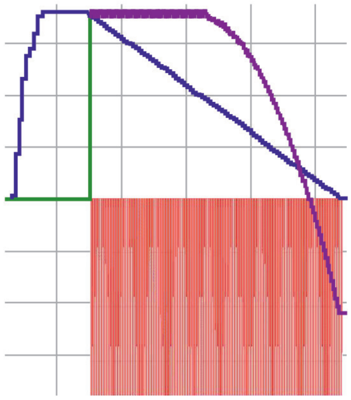
Our recommendation:

- **In the first step, the AC2 value should be reduced to a minimum.** This reduces the difference in behavior when starting of the motor when the inverter is already in the RUN mode and the motor is started at the stopping of the inverter.
- **Adjust the PID values RPG and RIG in the second step** (and, if possible, also RDG). The objective is to find the best compromise of dynamics and precision at the stop.

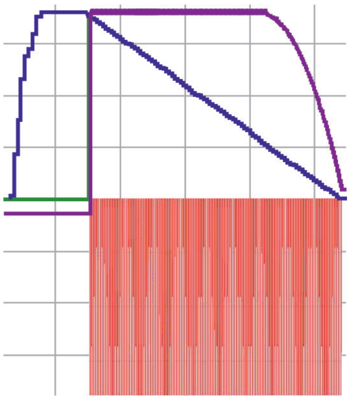
RPG:	7.00
RIG:	1.00
RDG:	0.00
PRP:	0.0 s

RPG:	7.00
RIG:	3.00
RDG:	0.00
PRP:	0.0 s





RPG:	7.00
RIG:	5.00
RDG:	0.00
PRP:	0.0 s



- The specified reference must be used in the third step. Using the specified reference, a reference speed can be sent directly to the output of the PID controller.

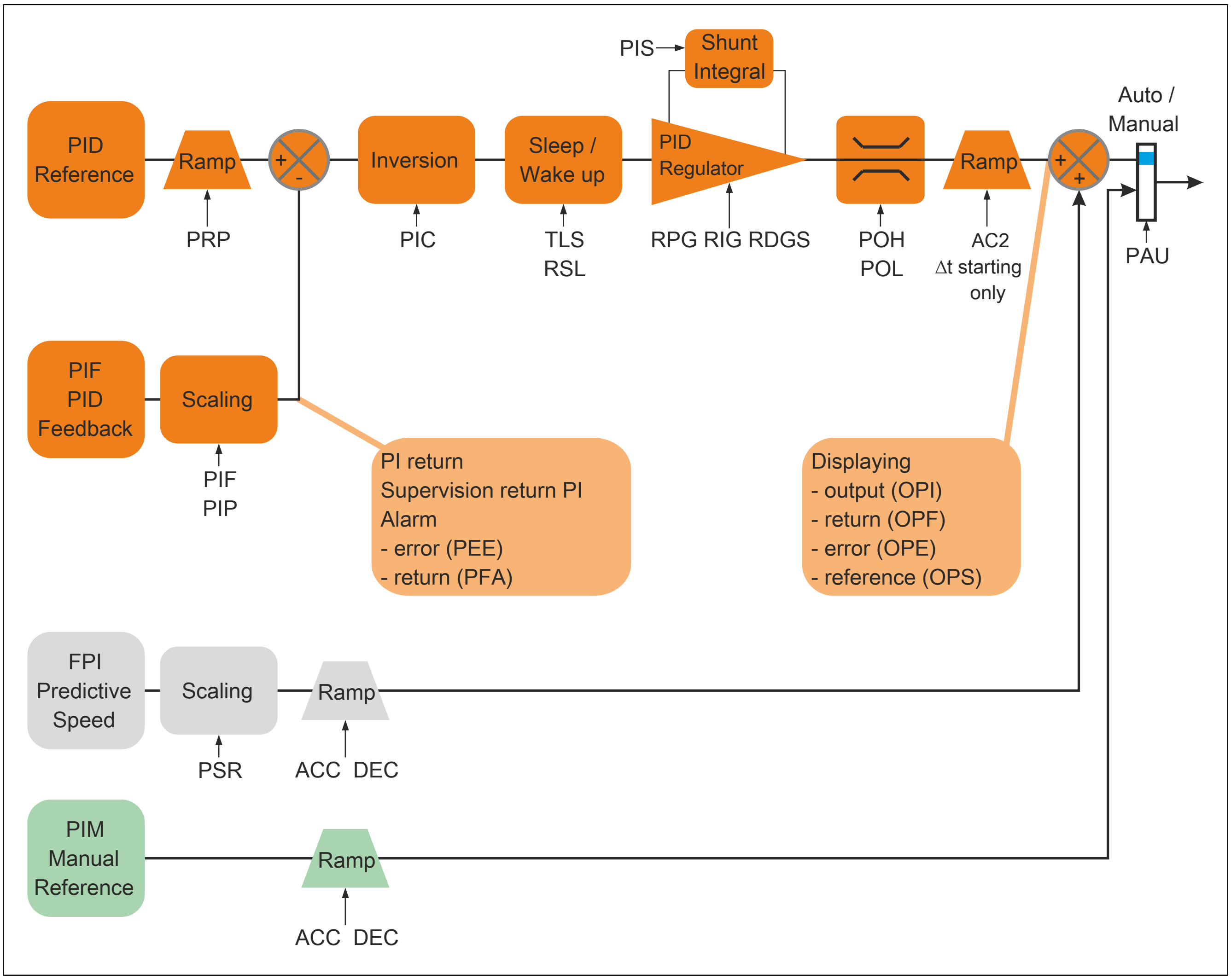
The parameters described below are accessed as follows: DRI- > COnF > FULL > FUn- > PId-			
Code	**Description**	**Setting range**	**Factory settings**
PId-	[PID REGULATOR]		
FPI	[Speed ref. assign.] Specified frequency input of the PID controller.		
nO	Not assigned (function not active)		
AI1	Analog input		
AI2	Analog input		
AI3	Analog input		
AI4	Analog input		
LCC	Graphic display terminal		
Mdb	Integrated Modbus		
CAn	Integrated CANopen		
nEt	POWERLINK communication card (if used)		
APP	Integrated control card (if used)		
PI	Frequency input		
PSr	[Speed input %] Multiplication factor for the specified frequency input. The parameter is not accessible when [Speed ref. assign.] (FPI) = [No] (nO).	1 to 100%	100%

Parameter that can be modified during operation or when stopped.

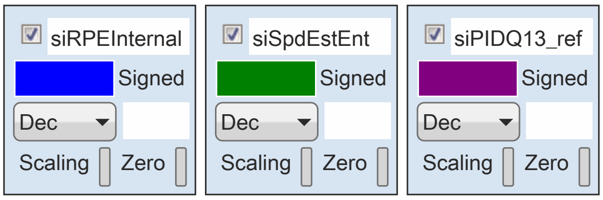
In order to use the FPI, this must be configured on the reference channel and the PSR value defined.

Send the target speed for the speed specification via the configured channel.

With the reference for the speed specification, you can add a frequency reference to this PID output.



Below you will find a configuration example for the given reference.

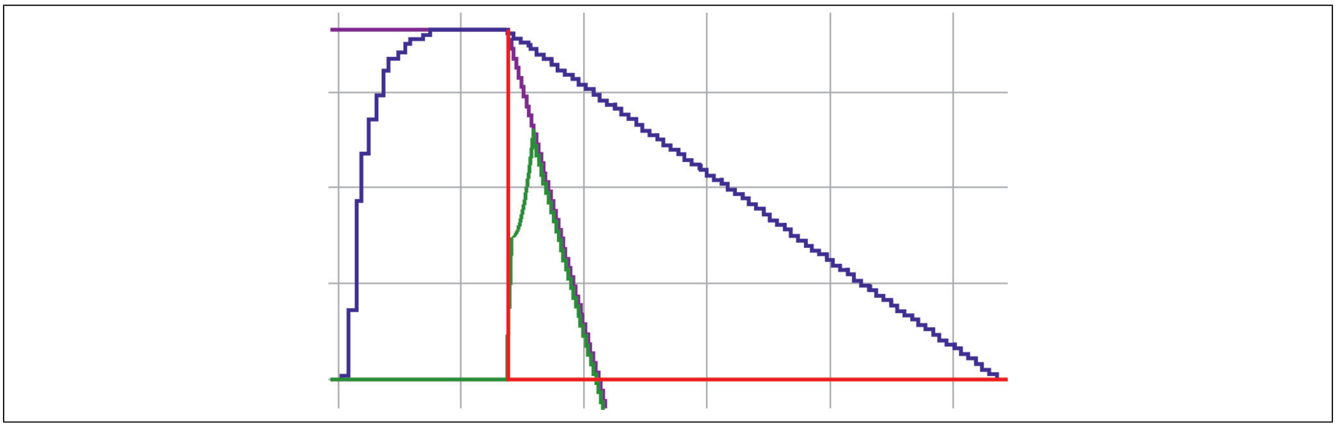


siRPEInternal = PID fault
siSpdEstEnt = Motor speed
siPIDQ13_ref = PID output

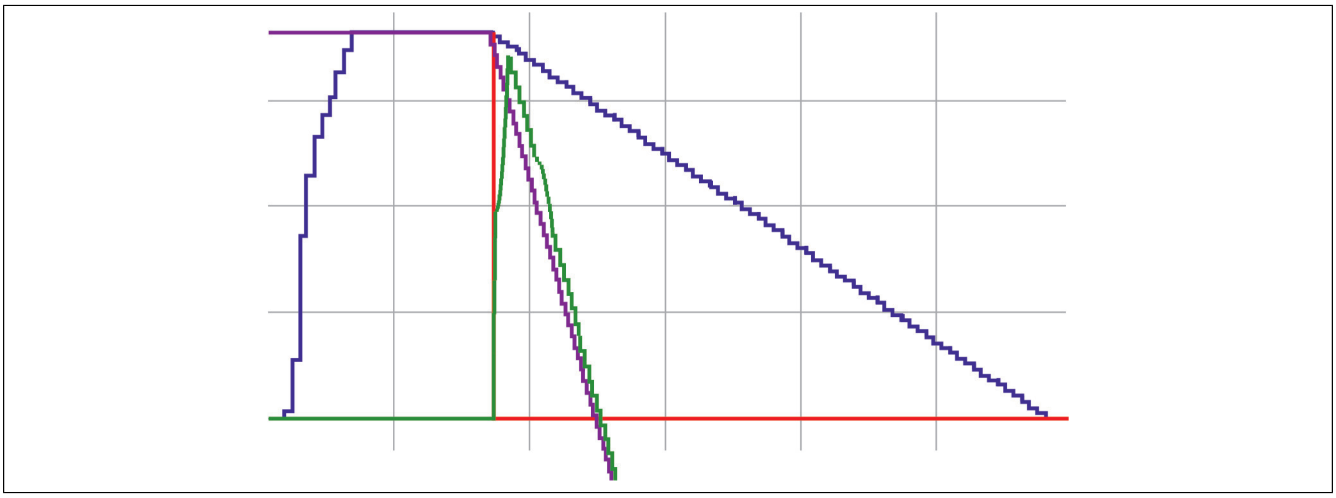
Drive configuration

ACC:	1			PIF1:	0	RPG:	7.00	POL:	-500
DEC:	1	PIF:	AIV1	PIF2:	8192	RIG:	0.01	POH:	500
HSP:	50.0 Hz	AIC1:	CAN	PIP1:	0	RDG:	0.00	AC2:	1
LSP:	0.0 Hz	AIV1:	0	PIP2:	8192	PRP:	0.0 s	DE2:	30

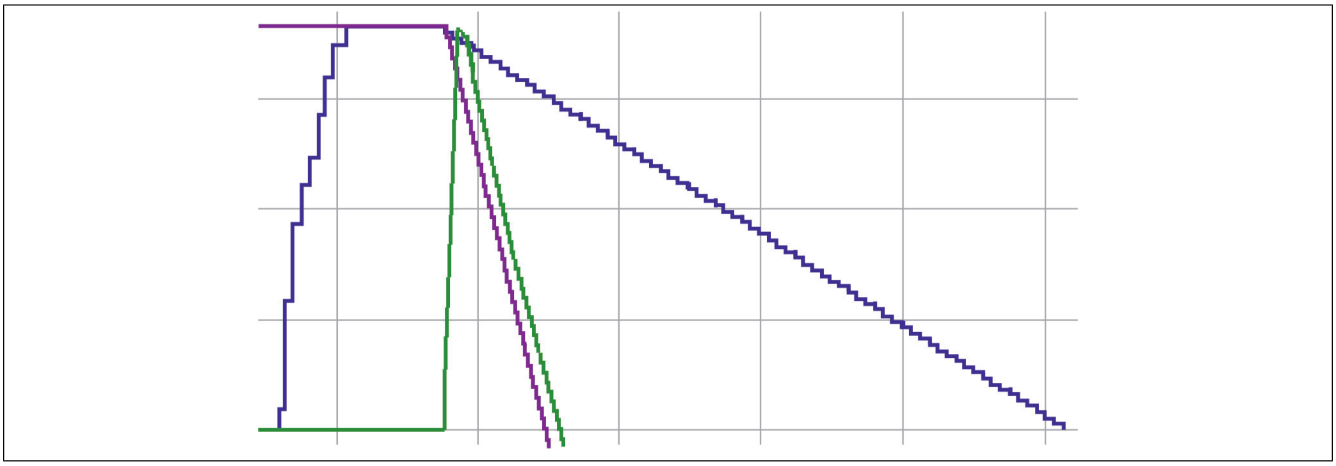
PSR = 1% - Target speed 0 rpm



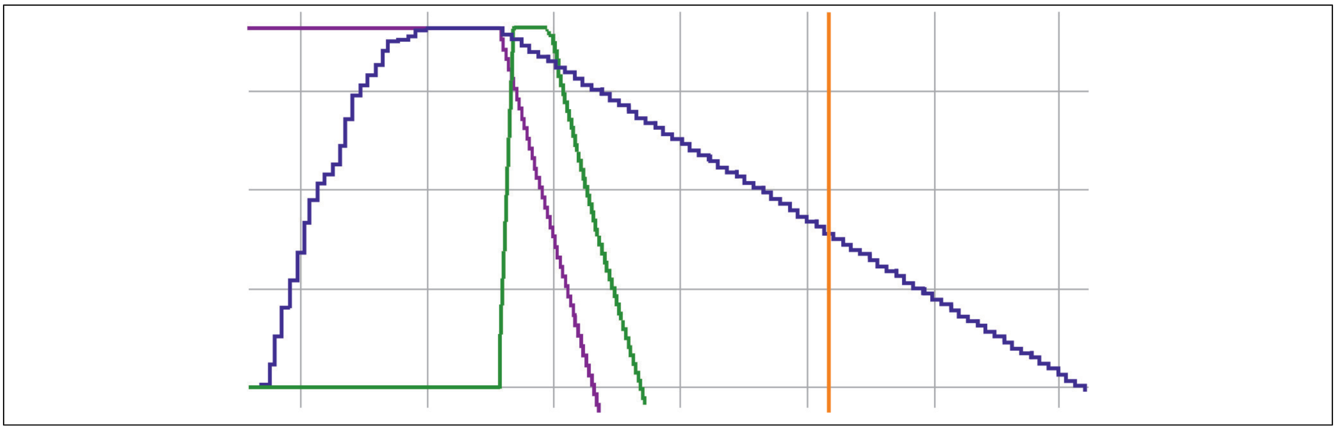
PSR = 1% - Target speed 1500 rpm



PSR = 10% - Target speed 1500 rpm



PSR = 50% - Target speed 1500 rpm



4.2.3.6.7.16 [PRESET PID REF] (PrI-)

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > PrI-			
Code	**Name/Description**	**Setting range**	**Factory settings**
PrI-	[PRESET PID REF] The function is accessible if [PID feedback ass.](PIF) is assigned.		
Pr2 nO LI1 ...	[2 preset PID ref.] If the assigned input or bit is at state 0, the function is inactive. If the assigned input or bit is at state 1, the function is active. [No](nO): Not assigned [LI1](LI1): Logic input LI1 [...](...): See the assignment conditions.		[No](nO)
Pr4	[4 preset PID ref.] Make sure that [2 preset PID ref.](Pr2) has been assigned before you assign this function. Identical to [2 preset PID ref.](Pr2). If the assigned input or bit is at state 0, the function is inactive. If the assigned input or bit is at state 1, the function is active.		[No](nO)
rP2 (1)	[Preset ref. PID 2] This parameter is accessible if [2 preset PID ref.](Pr2) is assigned.	[Min PID reference](PIP1) to [Max PID reference](PIP2)(2)	300
rP3 (1)	[Preset ref. PID 3] This parameter is accessible if [3 preset PID ref.](Pr3) is assigned.	[Min PID reference](PIP1) to [Max PID reference](PIP2)(2)	600
rP4 (1)	[Preset ref. PID 4] This parameter is accessible if [4 preset PID ref.](Pr4) is assigned.	[Min PID reference](PIP1) to [Max PID reference](PIP2)(2)	900

(1) The parameter can also be accessed via menu [SETTINGS](SEt-).
(2) If no graphic display terminal is being used, the values over 9,999 on the four-digit display are shown with a period as thousands separator, for example, 15.65 for 15,650.

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

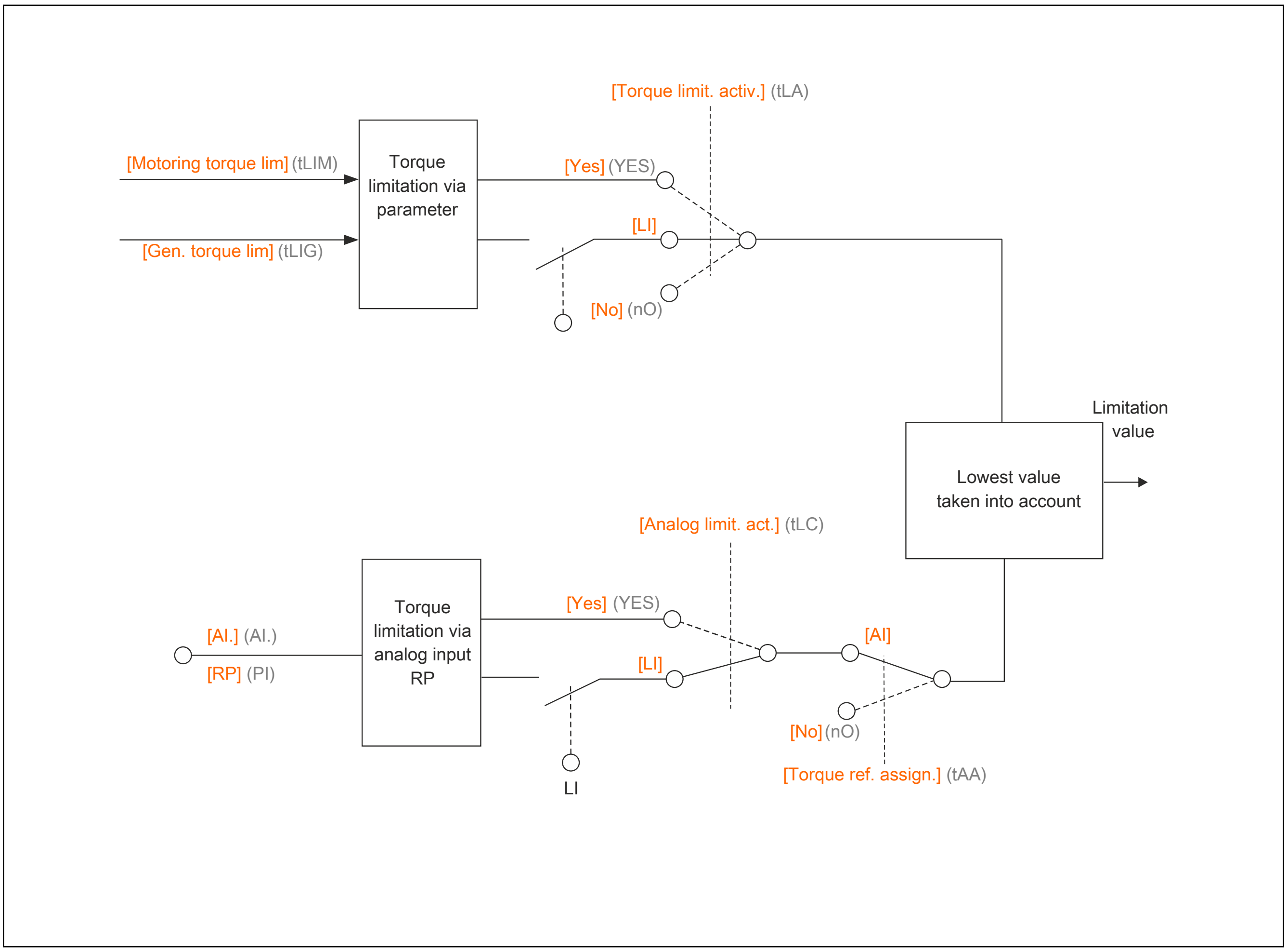
Parameter that can be modified during operation or when stopped.

4.2.3.6.7.17 [TORQUE LIMITATION] (tOL-)

There are two types of torque limitation:

- With a value that is fixed by a parameter
- With a value specified by an analog input (AI or pulse input)

If both types are enabled, the lowest value is taken into account. The two types of limitation can be configured or switched remotely using a logic input or via the communication bus.



The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > tOL-			
Code	**Name/Description**	**Setting range**	**Factory settings**
tOL-	**[TORQUE LIMITATION]**		
tLA	**[Torque limit. activ.]** If the assigned input or bit is at state 0, the function is inactive. If the assigned input or bit is at state 1, the function is active.		**[No]**(nO)
nO YES LI1 ...	**[No]**(nO): Function not active **[YES]**(YES): Function always active **[LI1]**(LI1): Logic input LI1 **[...]**(...): See the assignment conditions.		
IntP ★	**[Torque increment]** This parameter is accessible if **[Torque limit. activ.]**(tLA) is set to **[No]**(nO). Selection of the unit of parameters **[Motoring torque lim]**(tLIM) and **[Gen. torque lim]**(tLIG).		**[1%]**(1)
0.1 1	**[0.1%]**(0.1): Unit 0.1% **[1%]**(1): Unit 1%		
tLIM ★ (1)	**[Motoring torque lim]** This parameter is accessible if **[Torque limit. activ.]**(tLA) is set to **[No]**(nO). Torque limiting for motor operation in percent or 0.1% of the nominal torque in accordance with parameter **[Torque increment]**(IntP).	0 to 300%	100%

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > tOL-			
Code	**Name/Description**	**Setting range**	**Factory settings**
tLIG ★ (1)	**[Gen. torque lim]** This parameter is accessible if **[Torque limit. activ.]**(tLA) is set to **[No]**(nO). Torque limiting for generator operation in percent or 0.1% of the nominal torque in accordance with parameter **[Torque increment]**(IntP).	0 to 300%	100%
tAA	**[Torque ref. assign.]** If the function has been assigned, limitation varies between 0% and 300% of the nominal torque on the basis of signal 0% to 100%, which is used for the assigned input. Examples: 12 mA on a 4-20 mA input results in limitation to 150% of the nominal torque. 2.5 V on a 10 V input results in 75% of the rated torque.		**[No]**(nO)
nO	**[No]**(nO): Not assigned (function not active)		
AI1	**[AI1]**(AI1): Analog input		
AI2	**[AI2]**(AI2): Analog input		
AI3	**[AI3]**(AI3): Analog input		
PI	**[RP]**(PI): Pulse input		
AIU1	**[AI virtual 1]**(AIU1): Virtual analog input 1 with handwheel		
AIU2	**[AI virtual 2]**(AIU2): Virtual input via communication bus, which is configured via **[AI2 net. channel]**(AIC2).		
OA01	**[OA01]**(OA01): Function blocks: Analog output 01		
...	**...**		
OA10	**[OA10]**(OA10): Function blocks: Analog output 10		
tLC ★	**[Analog limit. act.]** This parameter is accessible if **[Torque limit. activ.]**(tLA) is set to **[No]**(nO). Identical to **[Torque limit. activ.]**(tLA). Assigned input or bit changes to state 0: The limit is provided by parameters**[Motoring torque lim]**(tLIM) and **[Gen. torque lim]**(tLIG) if **[Torque limit. activ.]**(tLA) is not equal to **[No]**(nO). No limit if **[Torque limit. activ.]**(tLA) is set to **[No]**(nO). Assigned input or bit changes to state 1: The limit depends on the input assigned to **[Torque ref. assign.]**(tAA). **Advice:** **If [Torque limitation](tLA) and [Torque ref. assign.](tAA) are enabled at the same time, the lowest value is taken into account.**		**[YES]**(YES)

(1) This parameter can also be accessed via menu **[SETTINGS]**(SEt-).

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

4.2.3.6.7.18 [CURRENT LIMIT] (CLI-)

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > CLI-			
Code	**Name/Description**	**Setting range**	**Factory settings**
CLI-	**[CURRENT LIMIT.]**		
LC2	**[Current limit 2]** If the assigned input or bit is at state 0, the first current limiting is active. If the assigned input or bit is at state 1, the second current limiting is active.		**[No]**(nO)
nO LI1 ...	**[No]**(nO): Function not active **[LI1]**(LI1): Logic input LI1 **[...]**(...): See the assignment conditions.		
CL2	**[I Limit. 2 value]** **Advice:** **MOTOR OVERHEATING AND DAMAGE** • **Make sure that the motor has the required power rating for the applied maximum current.** • **In order to calculate the maximum current, take the motor work cycle and all the factors involved in using the motor into account, including declassification requirements.** **Failure to observe these instructions can result in damage to the equipment.** Second current limitation This parameter is accessible if **[Current limit 2]**(LC2) is not equal to **[No]**(nO). The configuration mode is limited to 1.5 In. **Advice:** **If the setting is less than 0.25 in, the inverter can lock in error mode [Output Phase Loss](OPL), if this has been enabled). If it is less than the motor no-load current, the motor cannot run.**	0 to 1.5*INV (1)	1.5*INV (1)
CLI	**[CURRENT LIMIT.]** **Caution!** **MOTOR OVERHEATING AND DAMAGE** • **Make sure that the motor has the required power rating for the applied maximum current.** • **In order to calculate the maximum current, take the motor work cycle and all the factors involved in using the motor into account, including declassification requirements.** **Failure to observe these instructions can result in damage to the equipment.** First current limitation. This parameter is accessible if **[Current limit 2]**(LC2) is not equal to **[No]**(nO). The configuration mode is limited to 1.5 In. **Advice:** **If the setting is less than 0.25 in, the inverter can lock in error mode [Output Phase Loss](OPL), if this has been enabled). If it is less than the motor no-load current, the motor cannot run.**	0 to 1.5*INV (1)	1.5*INV (1)

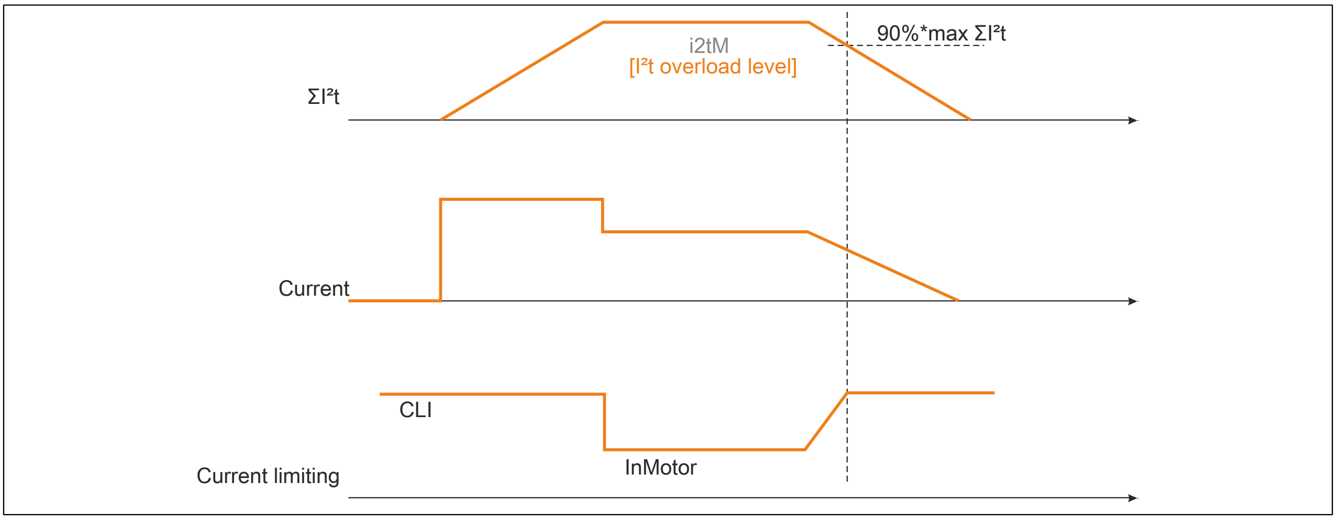
(1) Corresponding to the nominal current of the inverter specified on the nameplate.

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

4.2.3.6.7.19 [DYN CURRENT LIMIT] (I2t-)

The ACOPOSinverter is available for setting the BMP motors with ACPi SafeConfigurator. The field device tool (FDT) files can be downloaded and installed to install the ACOPOSinverter.



The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > I2T-			
Code	**Name/Description**	**Setting range**	**Factory settings**
I2t-	[DYN CURRENT LIMIT]		
I2tA ★ nO YES	[I²t model activation] I²t model activation for current limiting [No](nO): Function not active [YES](...): Function always active If i²t ≥ Max.Σi²t, [I²t overload level] (I2tM) = 100 and current limiting = InMotor. If i²t ≤ Max.Σi²t*90%, [I²t overload level](I2tM) ≤ 90 and current limiting = CLI. This parameter can be accessed if [max time of I²tl] (I2tt) does not equal [0.00] (0.00).		[No](nO)
I2tl	[max current of I²tl] Maximum current of I²t model		1.5 In +1 (1)

ACOPOSinverter P66	Setting range		
	Min. value [0.1 A]	Max. value [0.1 A]	Default [0.1 A]
8I66x200018.00-000	The I2tl value must be at least 1 greater than the specified nominal value for the motor current, i.e. I2tl > nCr (for induction motors) or I2tl > nCrS (for synchronous motors)	65535	24
8I66x200037.00-000			51
8I66x200055.00-000			57
8I66x200075.00-000			73
8I66x200110.00-000			105
8I66x200150.00-000			121
8I66x200220.00-000			166
8I66T200300.00-000			207
8I66T200400.00-000			264
8I66T200550.00-000			414
8I66T200750.00-000			496
8I66T201100.00-000			811
8I66T201500.00-000			991
8I66T400037.00-000			24
8I66T400055.00-000			30
8I66T400075.00-000			36
8I66T400110.00-000			46
8I66T400150.00-000			63
8I66T400220.00-000			84
8I66T400300.00-000			108
8I66T400400.00-000			144
8I66T400550.00-000			216
8I66T400750.00-000			256
8I66T401100.00-000			417
8I66T401500.00-000			496
8I66T600075.00-000			27
8I66T600150.00-000			42
8I66T600220.00-000			60
8I66T600400.00-000			93
8I66T600550.00-000			136
8I66T600750.00-000			166
8I66T601100.00-000			256
8I66T601500.00-000			331

Code	Name/Description	Setting range	Factory settings
I2tt	[max time of I²tl] Maximum time of I²t model	0.00 to 655.35	[0.00] (0.00)

(1) Corresponding to the nominal current of the inverter specified in the installation manual and on the nameplate.

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

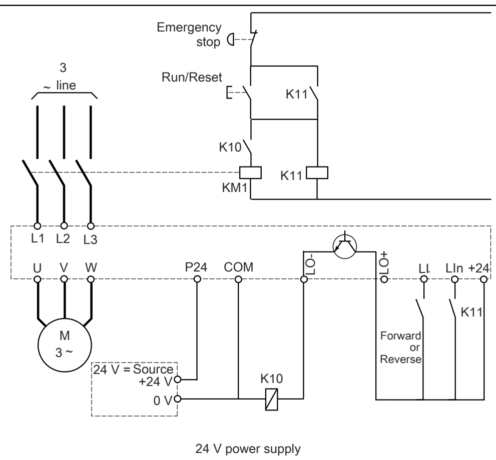
4.2.3.6.7.20 [INPUT CONTACTOR CONTROL] (LLC-)

The line contactor closes every time a run command (forward or reverse) is sent and opens after every stop, as soon as the inverter is locked. For example, if the stop mode is stop on ramp, the contactor will open when the motor reaches zero speed.

Advice:

The inverter control must be supplied by an external 24 V power source.

Cabling example:



Advice:

After enabling "Emergency switch-off", it is necessary to enable "Run/reset".

LIx = Move command **[Forward]**(Frd) or **[Reverse assign.]**(rrS)

LO-/LO+ = **[Input contactor assign]**(LLC)

LIn = **[Drive lock]**(LES)

Advice:

INVERTER DAMAGE

Do not use the function for cycles shorter than 60 seconds.

Failure to observe these instructions can result in damage to the equipment.

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > LLC-			
Code	**Name/Description**	**Setting range**	**Factory settings**
LLC-	**[INPUT CONTACTOR CONTROL]**		
LLC	**[Input contactor assign]** Logic output or control relay		**[No]**(nO)
nO LO1 r2 dO1	**[No]**(nO): Function not assigned (in this case, none of the functions can be accessed). **[LO1]**(LO1): Logic output LO1 **[R2]**(r2): Relay R2 **[D01]**(dO1): Analog output AO, which can be used as a logic output. Selection is possible if **[AO1 assignment]**(AO1) is set to **[No]**(nO).		
LES ★	**[Drive lock]** This parameter can be accessed if **[Input contactor assign]**(LLC) is not equal to **[No]**(nO). The inverter is locked when the assigned input or bit changes to state 0.		**[No]**(nO)
nO LI1 ...	**[No]**(nO): Function not active **[LI1]**(LI1): Logic input LI1 **[...]**(...): See the assignment conditions.		
LCt ★	**[Mains V. time out]** Monitoring time for closing of line contactor. If after this time there is no voltage present in the power circuit of the inverter, it will be locked with error **[Line contactor]**(LCF).	5 to 999 s	5 s

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

4.2.3.6.7.21 [OUTPUT CONTACTOR CONTROL] (OCC-)

This allows the inverter to control a contactor located between the inverter and the motor. The request for the contactor to close is made when a move command is sent. The request for the contactor to open is made when there is no longer any current in the motor.

Advice:

If braking with direct current supply is used, the output contactor will not close as long as braking with direct current supply is active.

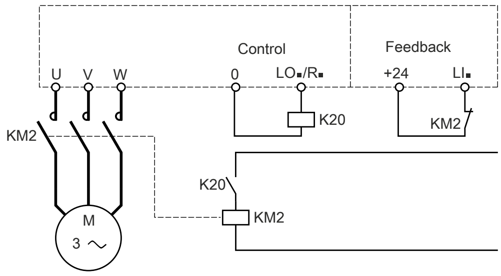
The corresponding logic input must be at 1 if there is no move command and at 0 during operation.

In the event of an inconsistency, the inverter triggers error FCF2 if the output contactor does not close (LIx at 1) and error FCF1 if it is stuck (LIx at 0).

With parameter **[Delay start out. contact.]**(dbS), triggering the error can be delayed in case of a move command and parameter **[Delay to open cont.]**(dAS) delays the error in the event of a stop command.

Advice:

Error FCF2 (the contactor does not close) can be switched on again by changing the move command from 1 to 0 (0 → 1 → 0 with a 3-wire control).



Functions **[Out. contactor ass.]**(OCC) and **[Output contact. fdbk]**(rCA) can be used individually or at the same time.

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > OCC-			
Code	**Name/Description**	**Setting range**	**Factory settings**
OCC-	**[OUTPUT CONTACTOR CONTROL]**		
OCC	**[Out. contactor ass.]** Logic output or control relay		**[No]**(nO)
nO	**[No]**(nO): Function not assigned (in this case, none of the functions can be accessed).		
LO1	**[LO1]**(LO1): Logic output LO1		
r2	**[R2]**(r2): Relay R2		
dO1	**[DO1]**(dO1): Analog output AO, which can be used as a logic output. Selection is possible if **[AO1 assignment]**(AO1) is set to **[No]**(nO).		
rCA	**[Output contact. fdbk]** The motor starts up when the assigned input or bit changes to 0.		**[No]**(nO)
nO	**[No]**(nO): Function not active		
LI1	**[LI1]**(LI1): Logic input LI1		
...	**[...]**(...): See the assignment conditions.		
dbS ★ ↻	**[Delay start out. contact.]** Time delay for: Motor control following the sending of a run command Output contactor fault monitoring, if the feedback is assigned. If the contactor fails to close at the end of the set time, the frequency inverter will lock in error mode FCF2. This parameter is accessible if **[Out. contactor ass.]**(OCC) or **[Output contact. fdbk]**(rCA) are assigned. The time delay must be greater than the closing time of the output contactor.	0.05 to 60 s	0.15 s
dAS ★ ↻	**[Delay to open cont.]** Time delay for monitoring motor contactor opening after the motor has stopped. This parameter is accessible if **[Output contact. fdbk]**(rCA) is assigned. The time delay must be greater than the opening time of the output contactor. If it is set to 0, the fault will not be monitored. If the contactor does not open after the set time, this will cause locking via error FCF1.	0 to 5.00 s	0.10 s

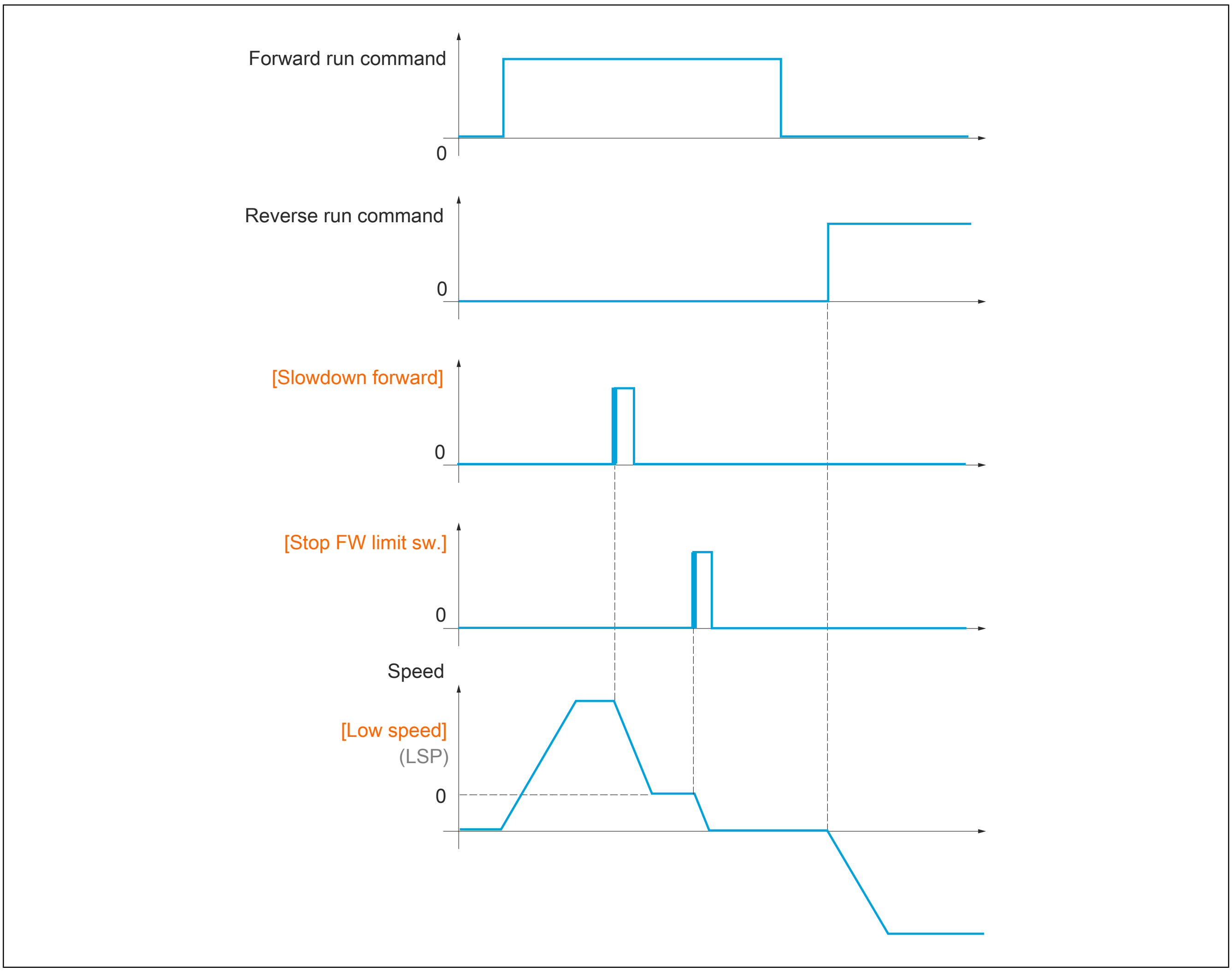
★	These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.
↻	Parameter that can be modified during operation or when stopped.

4.2.3.6.7.22 [POSITIONING BY SENSORS] (LPO-)

This function is used for managing positioning using position sensors or limit switches linked to logic inputs or using control word bits:

- Braking
- Stop

The action logic for the inputs and bits can be configured on a rising edge (change from 0 to 1) or a falling edge (change from 1 to 0). The example below has been configured on a rising edge:



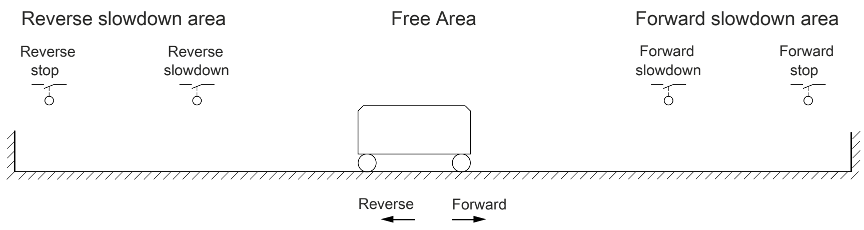
The slowdown mode and stop mode can be configured.

The operation is identical for both directions of operation. Slowdown and stopping operate according to the same logic, specified below.

Example: Forward slowdown on rising edge

- Forward slowdown takes place on a rising edge (change from 0 to 1) of the input or bit assigned to forward slowdown if this rising edge occurs in forward operation. The slowdown command is then memorized, even in the event of a power outage. Operation in the opposite direction is authorized at high frequency. The slowdown command is deleted on a falling edge (change from 1 to 0) of the input or bit assigned to forward slowdown if this falling edge occurs in reverse operation.
- A bit or a logic input can be assigned to disable this function.
- Although forward slowdown is disabled while the disable input or bit is at 1, sensor changes continue to be monitored and saved.

Example: Positioning of limit switch on rising edge



Warning!

LOSS OF CONTROL

- **Make sure to connect the limit switches correctly.**
- **Make sure to install the limit switches correctly. The limit switches must be installed at a sufficient distance from the mechanical end stop in order to ensure an appropriate stop distance.**
- **In order for them to be operational, the limit switches must be reset.**
- **Make sure the limit switches function correctly.**

Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.

Operation with short cams:

Warning!

LOSS OF CONTROL

Before commissioning the motor for the first time or after having reset the configuration to factory settings, the motor must always be started up outside of the slowdown and stop ranges.

Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.

Warning!

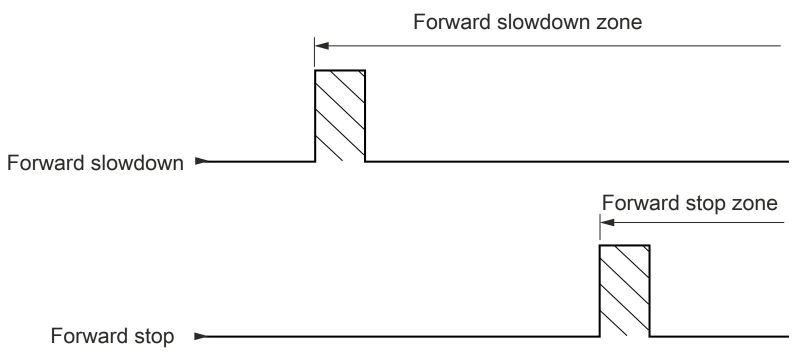
LOSS OF CONTROL

If the inverter is switched off, the current range will be stored.

If the system has been moved manually while the inverter was switched off, you need to restore the original position before switching the inverter back on.

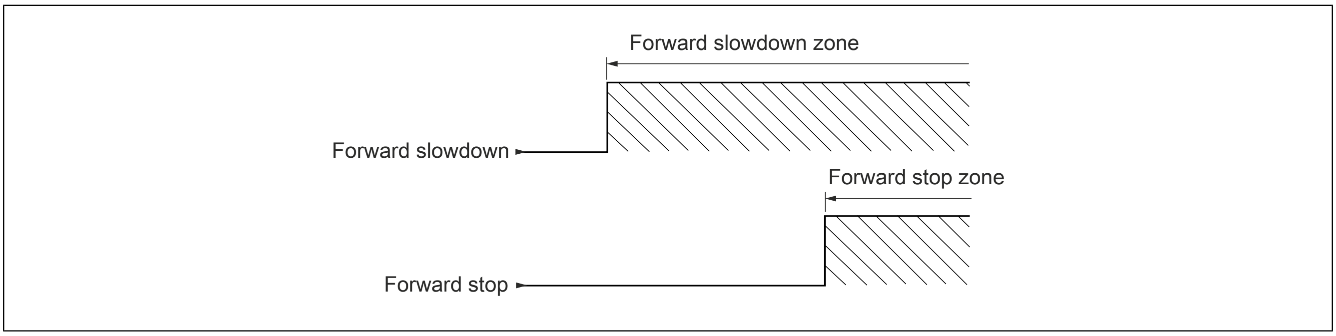
Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.

In this instance, when operating for the first time or after restoring the factory settings, the inverter must initially be started outside the slowdown and stop zones in order to initialize the function.



Operation with long cams:

In this instance, there is no limitation, which means the function can be initialized across the entire system to be controlled.



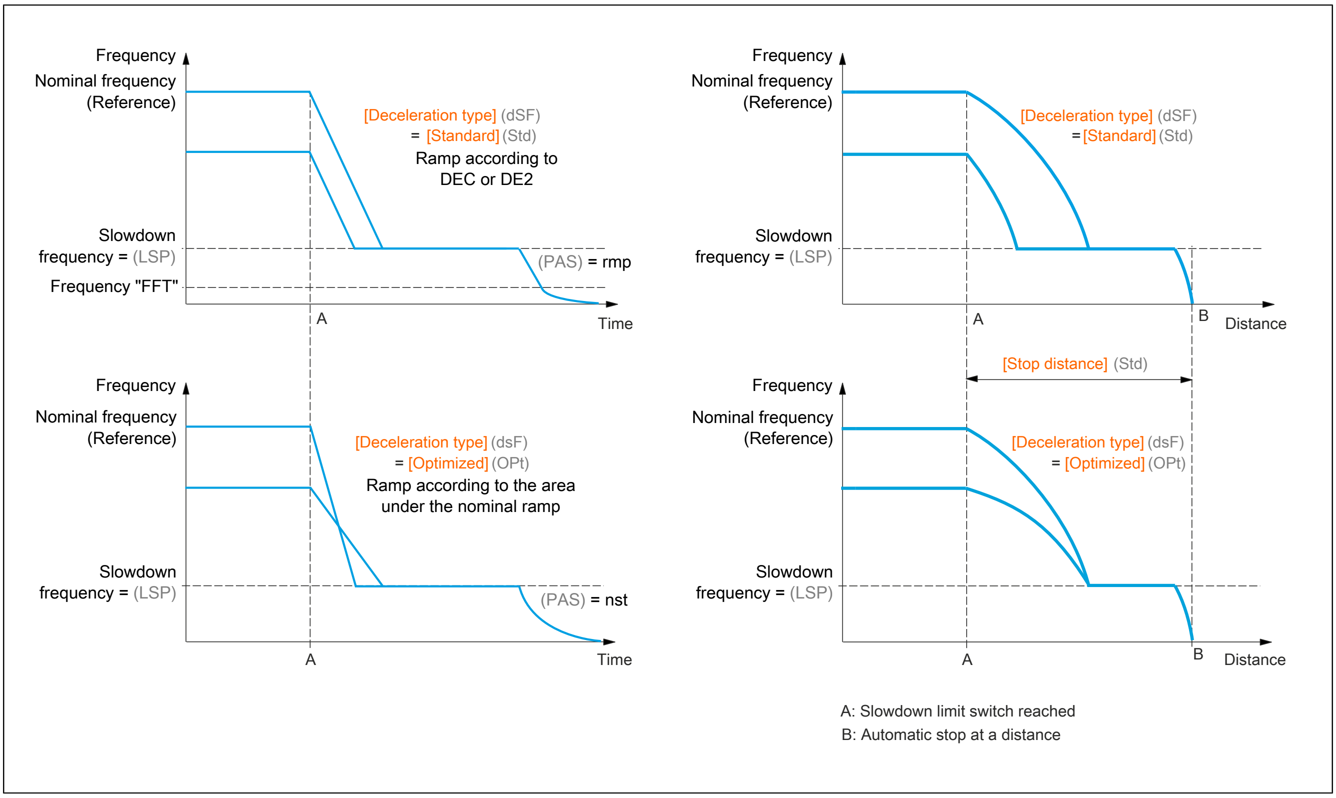
Calculated stopping distance (remote stop) after deceleration limit switch

This function can be used to control the stopping of the moving part automatically once a preset distance has been traveled after the slowdown limit switch.

On the basis of the rated linear speed and the speed estimated by the inverter when the slowdown limit switch is tripped, the inverter will induce the stop at the configured distance.

This function is useful in applications where one shared limit switch (for violations) with manual restart is shared for both directions. It will then only respond to ensure safety if the distance is exceeded. The stop limit switch retains priority in respect of the function.

Depending on parameter **[Deceleration type]** (dSF), one of the following four modes of operation is achieved:



Advice:

- **If the deceleration ramp is modified while stopping at a distance is in progress, this distance will not be observed.**
- **If the direction is modified while stopping at a distance is in progress, this distance will not be observed.**

Warning!

LOSS OF CONTROL

Make sure that the configured distance is actually possible.

This function does not replace the limit switch.

Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > LPO-			
Code	**Name/Description**	**Setting range**	**Factory settings**
LPO-	**[POSITIONING BY SENSORS]** **Advice:** **This function cannot be used with certain other functions.**		
SAF nO LI1 ...	**[Stop FW limit sw.]** Forward stop switch. **[No]**(nO): Not assigned **[LI1]**(LI1): Logic input LI1 **[...]**(...): See the assignment conditions. If **[Profile]** (CHCF) is set to **[Not separ.]**(SIM) or **[Separate]** (SEP), parameters **[CD11]** (Cd11) to **[CD15]** (Cd15), **[C111]** (C111) to **[C115]** (C115), **[C211]** (C211) to **[C215]** (C215) and **[C311]** (C311) to **[C315]** (C315) are not available.		**[No]**(nO)
SAr	**[Stop RV limit sw.]** Reverse stop switch. Identical to **[Stop FW limit sw.]**(SAF).		**[No]**(nO)
SAL ★ LO HIG	**[Stop limit config.]** **Warning!** **LOSS OF CONTROL** **If [Stop limit config.](SAL) is set to [Active high](HIG), the stop command is active while the signal is active and is not applied if the connection is interrupted.** **Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.** Actuation level stop switch. This parameter can be accessed if at least one limit switch or one stop sensor has been assigned. It is used to define the positive or negative logic of the bits or inputs assigned to the stop. **[Active low]**(LO): Stop command on a falling edge (change from 1 to 0) of the bits or the assigned inputs. **[Active high]**(HIG): Stop command on a rising edge (change from 0 to 1) of the bits or the assigned inputs.		**[Active low]**(LO)
dAF	**[Slowdown forward]** Slowdown achieved on forward movement. Identical to **[Stop FW limit sw.]**(SAF).		**[No]**(nO)
dAr	**[Slowdown reverse]** Slowdown achieved on reverse movement. Identical to **[Stop FW limit sw.]**(SAF).		**[No]**(nO)
dAL ★ LO HIG	**[Slowdown limit cfg.]** **Warning!** **DANGER OF DAMAGE TO THE DEVICE** **If [Slowdown limit cfg.](dAL) is set to [Active high](HIG), the slowdown command is enabled while the signal is active (the slowdown command is not output if, for any reason, there is no signal).** **Make sure that this setting will not result in unsafe states.** **Failure to observe these instructions can result in damage to the equipment.** This parameter can be accessed if at least one limit switch or one slowdown sensor has been assigned. It is used to define the positive or negative logic of the bits or inputs assigned to the slowdown. **[Active low]**(LO): Slowdown command on a falling edge (change from 1 to 0) of the bits or assigned inputs. **[Active high]**(HIG): Slowdown command on a rising edge (change from 0 to 1) of the bits or assigned inputs.		**[Active low]**(LO)

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > LPO-			
Code	**Name/Description**	**Setting range**	**Factory settings**
CLS ★	[Disable limit sw.] **Warning!** **LOSS OF CONTROL** **If [Disable limit sw.](CLS) is set to an input and is enabled, the limit switch control is locked.** **Make sure that enabling this function does not result in unsafe states.** **Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.** This parameter can be accessed if at least one limit switch or one sensor has been assigned. When the assigned bit or input is in state 1, the action of the limit switch is deactivated. If the inverter was presently being slowed down or stopped by the limit switch, it will now continue running until it attains its reference speed.		[No](nO)
nO	[No](nO): Function not active		
LI1	[LI1](LI1): Logic input LI1		
...	[...](...): See the assignment conditions.		
PAS ★	[Stop type] This parameter can be accessed if at least one limit switch or one sensor has been assigned.		[Ramp stop](rMP)
rMP	[Ramp stop](rMP): Via ramp		
FSt	[Fast stop](FSt): Fast stop (ramp reduced by [Ramp divider](dCF)).		
nSt	[Freewheel](nSt): Freewheel stop		
dSF ★	[Deceleration type] This parameter can be accessed if at least one limit switch or one sensor has been assigned.		[Standard](Std)
Std	[Standard](Std): Uses the valid ramp [Deceleration](dEC) or [Deceleration 2](dE2).		
OPt	[Optimized](OPt): The ramp time is calculated on the basis of the actual speed when the slowdown contact switches, in order to limit the operating time at low speed (optimization of the cycle time: The braking time is constant, regardless of the output speed).		
Std ★	[Stop distance] This parameter can be accessed if at least one limit switch or one sensor has been assigned. Enabling and adjusting function "Stop at distance calculated after the slowdown limit switch".		[No](nO)
nO	[No](nO): Function not active (as a consequence, the next two parameters will be inaccessible).		
-	0.01 to 10.00: Setting the stopping distance in meters.		
nLS ★	[Rated linear speed] The parameter can be accessed if at least one limit switch or one sensor has been assigned and [Stop distance](Std) is not set to [No](nO). Rated linear speed in meters/second.	0.20 to 5.00 m/s	1.00 m/s
SFd ★	[Stop corrector] The parameter can be accessed if at least one limit switch or one sensor has been assigned and [Stop distance](Std) is not set to [No](nO). Scaling factor applied to the stop distance to compensate, for example, a nonlinear ramp.	50 to 200%	100%
MStP ★	[Memo Stop] This parameter can be accessed if a limit switch or sensor has been assigned to function "POSITIONING ABOVE ENCODER OR LIMIT SWITCH". With or without storing the system position.		[No](nO)
nO	[No](nO): Without system position storing		
YES	[YES](YES): With system position storing		
PrSt ★	[Priority restart] This parameter can be accessed if at least one limit switch or one encoder has been assigned. The startup has priority, even if the stop switch is enabled.		[No](nO)
nO	[No](nO): No priority for restart if stop switch has been enabled		
YES	[YES](YES): Priority for restart even if stop switch has been enabled This parameter is forced to be set to [No](nO) if [Memo Stop](MStP) = [YES](YES).		

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

4.2.3.6.7.23 [PARAM. SET SWITCHING] (MLP-)

It is possible to select a set of 1 to 15 parameters via menu **[SETTINGS]**(SEt-). After that, 2 or 3 different values can be assigned to these parameters. The 2 or 3 value groups can be switched by 1 or 2 logic inputs or control word bits. This switching can be performed during operation (motor running).

This switching can also be controlled by one or two frequency threshold values. Every threshold value functions like a logic input (0 = Threshold value not reached; 1 = Threshold value reached).

	Values 1	Values 2	Values 3
Parameter 1 Parameter 2 Parameter 3 Parameter 4 Parameter 5 Parameter 6 Parameter 7 Parameter 8 Parameter 9 Parameter 10 Parameter 11 Parameter 12 Parameter 13 Parameter 14 Parameter 15	Parameter 1 Parameter 2 Parameter 3 Parameter 4 Parameter 5 Parameter 6 Parameter 7 Parameter 8 Parameter 9 Parameter 10 Parameter 11 Parameter 12 Parameter 13 Parameter 14 Parameter 15	Parameter 1 Parameter 2 Parameter 3 Parameter 4 Parameter 5 Parameter 6 Parameter 7 Parameter 8 Parameter 9 Parameter 10 Parameter 11 Parameter 12 Parameter 13 Parameter 14 Parameter 15	Parameter 1 Parameter 2 Parameter 3 Parameter 4 Parameter 5 Parameter 6 Parameter 7 Parameter 8 Parameter 9 Parameter 10 Parameter 11 Parameter 12 Parameter 13 Parameter 14 Parameter 15
Values for input LI or bit or frequency threshold value 2	0	1	0 or 1
Values for input LI or bit or frequency threshold value 3	0	0	1

Advice:

Do not change these parameters in menu [SETTINGS](SEt-), as any change made in this menu ([SETTINGS](SEt-)) is lost at the next power-on. During operation, the parameters can be set via menu [PARAM. SET SWITCHING](MLP-) in the active configuration.

Advice:

Parameter set switching cannot be configured from the integrated display terminal.

The parameters can only be adjusted on the integrated display terminal if the function was previously configured via the graphic display terminal, PC software or via the bus or communication network. If the function has not been configured, menu **[PARAM. SET SWITCHING]**(MLP-) and submenus **[Set N°1]**(PS1-), **[Set N°2]**(PS2-) and **[Set N°3]**(PS3-) are not displayed.

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > MLP-		
Code	**Name/Description**	**Factory settings**
MLP-	**[PARAM. SET SWITCHING]**	
CHA1	**[2 parameter sets]** Switching 2 parameter sets.	**[No]**(nO)
nO	**[No]**(nO): Not assigned	
FtA	**[Freq. Th. attained]**(FtA): Switching via **[Freq. threshold]**(Ftd)	
F2A	**[Freq. Th. 2 attained]**(F2A): Switching via **[Freq. threshold 2]**(F2d)	
LI1	**[LI1]**(LI1): Logic input LI1	
...	**[...]**(...): See the assignment conditions.	
CHA2	**[3 parameter sets]** Identical to **[2 parameter sets]**(CHA1). Switching 3 parameter sets. **Advice:** **To obtain 3 parameter sets, [2 parameter sets](CHA1) must also be configured.**	**[No]**(nO)

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > MLP-		
Code	**Name/Description**	**Factory settings**
SPS	**[PARAMETER SELECTION]** This parameter is only accessible on the graphic display terminal if **[2 parameter sets]**(CHA1) is not set to **[No]**(nO). Making an entry in this parameter opens a window containing all the adjustment parameters that can be accessed. Select 1 to 15 parameters using ENT (a check mark ✓ appears by your selections) or cancel the parameter selection using ENT. Example: PARAMETER SELECTION SETTINGS Ramp increment ☑ --------- ☐ --------- ☐ --------- ☑	
PS1- ★ ⟲ S101 ... S115	**[Set N°1]** Parameter is accessible if at least 1 parameter in **[PARAMETER SELECTION]** has been selected. Making an entry in this parameter opens a settings window containing the selected parameters in the order in which they were selected. With the graphic display terminal: RDY Term +0.0 Hz 0.0 A Set N°1 Acceleration: 9.51 s Deceleration: 9.67 s Acceleration 2: 12.58 s Deceleration 2: 13.45 s Begin Acc round: 2.3 s Code Quick ENT → RDY Term +0.0 Hz 0.0 A Startup time 9.51 s Min = 0.1 Max = 999.9 << >> Quick With the integrated operator terminal: Proceed as in the Settings menu using the parameters that appear.	
PS2- ★ ⟲ S201 ... S215	**[Set N°2]** Parameter is accessible if at least 1 parameter in **[PARAMETER SELECTION]** has been selected. Identical to **[Set N°1]**(PS1-).	
PS3- ★ ⟲ S301 ... S315	**[Set N°3]** This parameter is accessible if **[3 parameter sets]**(CHA2) is not equal to **[No]**(nO) and if at least 1 parameter has been selected in **[PARAMETER SELECTION]**. Identical to **[Set N°1]**(PS1-).	

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

⟲ Parameter that can be modified during operation or when stopped.

Advice:

It is recommended that an attempt be made to switch parameters in the stopped state and a check is made to ensure that it has been performed correctly.

Some parameters are interdependent and in this case may be restricted at the time of switching.

The mutual dependency of parameters must be taken into account, **even between different sets**.

Example: The highest **[Low speed]** (LSP) must be lower than the lowest **[High speed]** (HSP).

4.2.3.6.7.24 [MULTIMOTORS/CONFIG.] (MMC-)

Switching of the motors or configuration [MULTIMOTORS/CONFIG.](MMC-)

The inverter can contain up to 3 configurations, which can be stored via menu **[Factory settings]**(FCS-).

Each of these configurations can be activated remotely, enabling adaptation to:

- 2 or 3 different motors or mechanisms (multimotor mode)
- 2 or 3 different configurations for a single motor (multiconfiguration mode)

The two switching modes cannot be combined.

Advice:

The following conditions MUST be observed:

- **Switching may only take place when stopped (inverter locked). If a switching request is sent during operation, it will not be executed until the next stop.**
- **In the event of motor switching, the following additional conditions apply:**
  - **When the motors are switched, the power and control terminals concerned must also be switched as appropriate.**
  - **The maximum power of the inverter must not be exceeded by any of the motors.**
- **All the configurations to be switched must be set and saved in advance in the same hardware configuration, this being the definitive configuration (option and communication cards). In the event of non-compliance with this provision, there is the danger that the inverter will be locked with error [Incorrect config.](CFF).**

Menu and parameters that can be switched in mode "Multimotor"

- **[SETTINGS]**(SEt-)
- **[MOTOR CONTROL]**(drC-)
- **[INPUTS/ OUTPUTS CFG]**(I_O-)
- **[COMMAND]**(CtL-)
- **[APPLICATION FUNCT.]**(Fun-), with the exception of function **[MULTIMOTORS/CONFIG.]** (only configure once)
- **[FAULT MANAGEMENT]**(FLt)
- **[MY MENU]**
- **[USER CONFIG.]**: The name of the configuration specified by the user in menu **[Factory settings]**(FCS-)

Menu and parameters that can be switched in mode "Multiconfiguration"

As in multimotor mode, except for the motor parameters that are common to the three configurations:

- Nominal current
- Thermal current
- Nominal voltage
- Rated frequency
- Nominal speed
- Nominal power
- IR compensation
- Slip compensation
- Synchronous motor parameters
- Type of thermal protection
- Thermal state
- The autotuning parameters and motor parameters that can be accessed in expert mode
- Type of motor control

Advice:

No other menus or parameters can be switched.

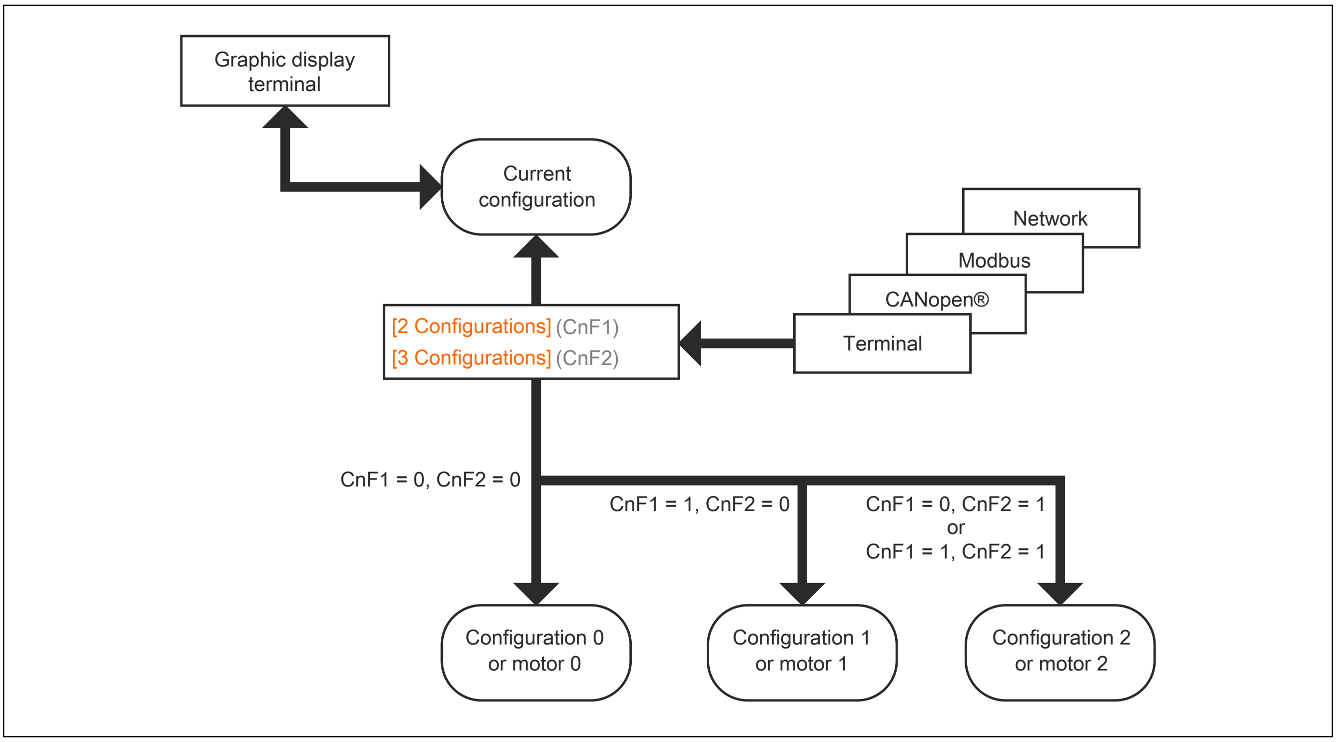
Transferring configurations to other inverters with the graphic display terminal when using function [MULTIMOTORS/CONFIG.](MMC-)

Example: A is the source, B is the target. In this example, configuration switching occurs via the logic input.

1) Connect graphic display terminal to inverter A.
2) Set LI ([2 Configurations](CnF1)) and LI ([3 Configurations](CnF2)) to 0.
3) Download configuration 0 as a file on the graphic display terminal (Example: File 1 of the graphic display terminal).
4) Set LI ([2 Configurations](CnF1)) to 1 and leave LI (3 Configurations](CnF2)) at 0.
5) Download configuration 1 as a file on the graphic display terminal (Example: File 2 of the graphic display terminal).
6) Set LI ([3 Configurations](CnF2)) to 1 and leave LI ([2 Configurations](CnF1)) at 1.
7) Download configuration 2 as a file on the graphic display terminal (Example: File 3 of the graphic display terminal).
8) Connect graphic display terminal to inverter B.
9) Set LI ([2 Configurations](CnF1)) and LI ([3 Configurations](CnF2)) to 0.
10) Configure inverter B to factory settings.
11) Upload the configuration file 0 onto the inverter (file 1 on the graphic display terminal in this example).
12) Set LI ([2 Configurations](CnF1)) to 1 and leave LI (3 Configurations](CnF2)) at 0.
13) Upload the configuration file 1 onto the inverter (file 2 on the graphic display terminal in this example).
14) Set LI ([3 Configurations](CnF2)) to 1 and leave LI ([2 Configurations](CnF1)) at 1.
15) Upload the configuration file 2 onto the inverter (file 3 on the graphic display terminal in this example).

Advice:

Steps 6, 7, 14 and 15 are only required if function [MULTIMOTORS/CONFIG.](MMC-) is used with 3 configurations or 3 motors.



Switching command

Depending on the number of motors or selected configuration (2 or 3), the switching command is sent using one or two logic inputs. The table below lists the possible combinations.

LI 2 motors or configurations	LI 3 motors or configurations	Number of configurations or active motors
0	0	0
1	0	1
0	1	2
1	1	2

Schematic diagram for mode "Multimotor"

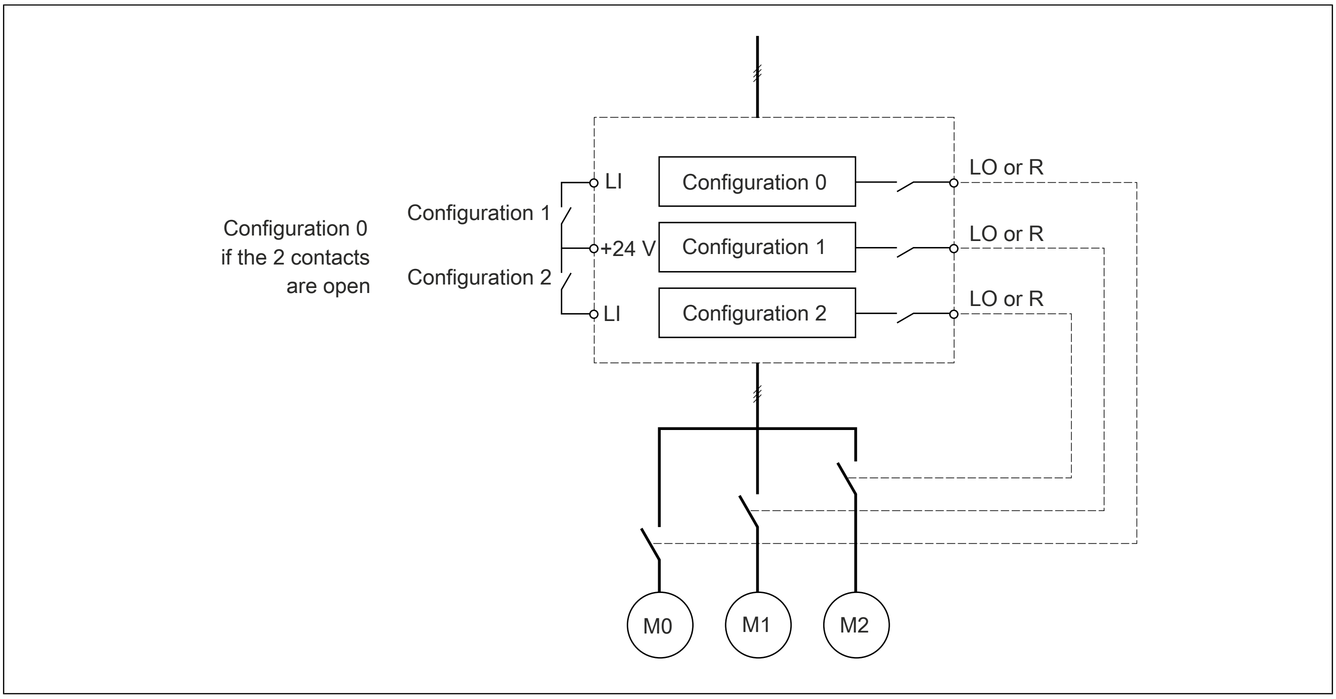
Advice:

MOTOR OVERHEATING

The individual motor thermal states are not stored when the inverter is switched off. When the inverter is switched back on, it does not know the thermal state of the connected motors.

In order to ensure correct temperature monitoring of the motors, an external temperature sensor must be installed for each motor.

Failure to observe these instructions can result in damage to the equipment.



Autotuning in mode "Multimotor"

This autotuning can be performed:

- Manually using a logic input when the motor changes
- Automatically on each first activation of the motor after the inverter is switched on if parameter **[Automatic autotune]** (AUt) is set to **[YES]** (YES).

Motor thermal states in mode "Multimotor":

The inverter protects each of the three motors separately, with each thermal state observing all stop times including the switch-off time of the inverter itself.

Configuration information output

Via menu [INPUTS/OUTPUTS](I-O-) any configuration or any motor (2 or 3) can be assigned to a logic output in order to transfer information locally.

Advice:

Due to the changeover of menu [INPUTS/OUTPUTS](I-O-), these outputs must be assigned in all configurations if the information is necessary.

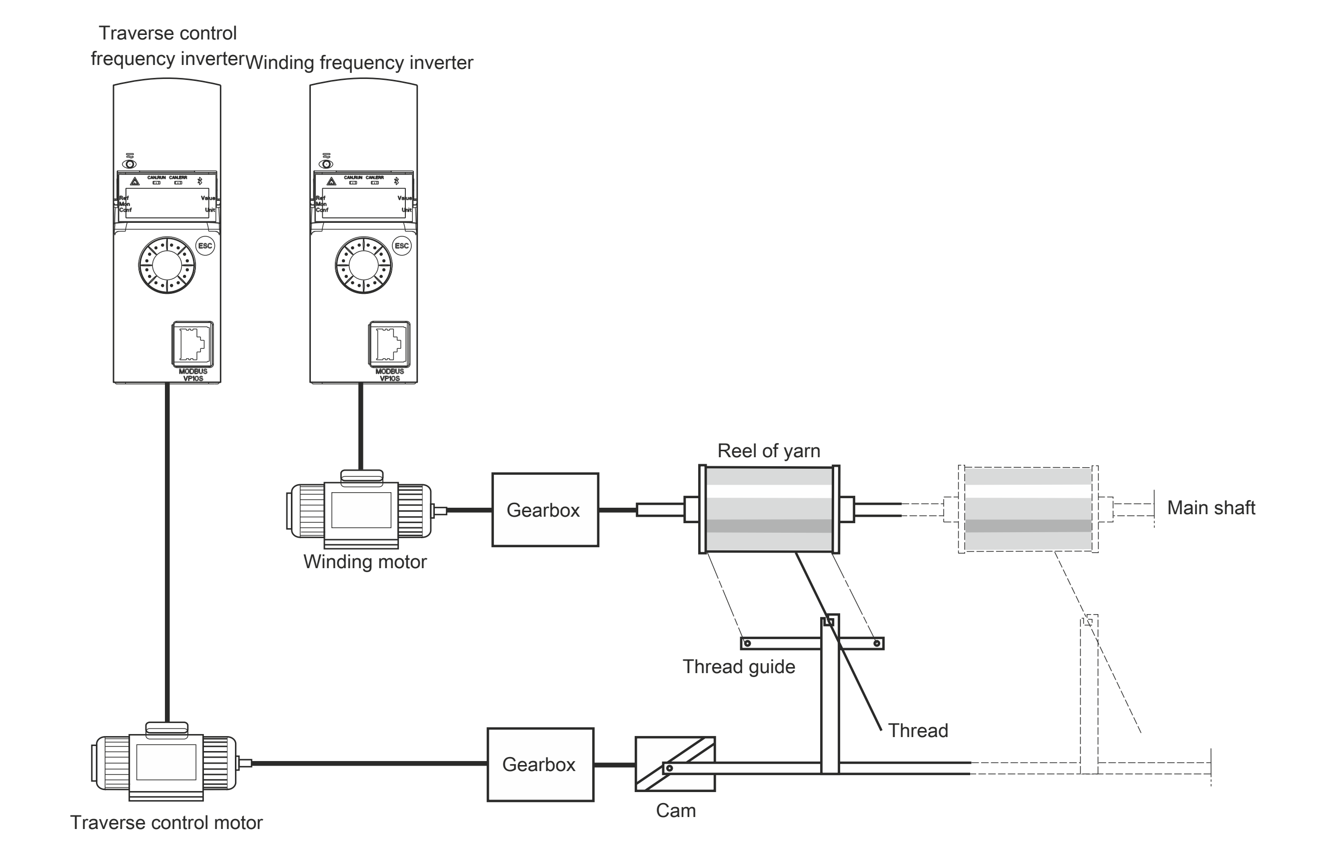
The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > MMC-		
Code	**Name/Description**	**Factory settings**
MMC-	[MULTIMOTORS/CONFIG.]	
CHM	[Multimotors] **Advice:** **MOTOR OVERHEATING** **If the inverter is switched off, the thermal states of the connected motors are not stored.** **When the inverter is switched back on, the inverter does not know the thermal state of the connected motors.** • **In order to ensure that the temperature of each connected motor is monitored correctly, separate temperature sensors must be used.** **Failure to observe these instructions can result in damage to the equipment.**	[No](nO)
nO	[No](nO): Several possible configurations	
YES	[YES](YES): Several possible motors	
CnF1	[2 Configurations] Switching two motors or two configurations.	[No](nO)
nO	[No](nO): No switchover	
LI1	[LI1](LI1): Logic input LI1	
...	[...](...): See the assignment conditions. If [Profile] (CHCF) is set to [Not separ.](SIM) or [Separate] (SEP), parameters [CD11] (Cd11) to [CD15] (Cd15), [C111] (C111) to [C115] (C115), [C211] (C211) to [C215] (C215) and [C311] (C311) to [C315] (C315) are not available.	
CnF2	[Configuration 3] Switching of 3 motors or 3 configurations Identical to [2 Configurations](CnF1). **Advice:** **To obtain 3 motors or 3 configurations, [2 Configurations](CnF1) must also be configured.**	[No](nO)

4.2.3.6.7.25 [AUTO-TUNING BY LI] (tnL-)

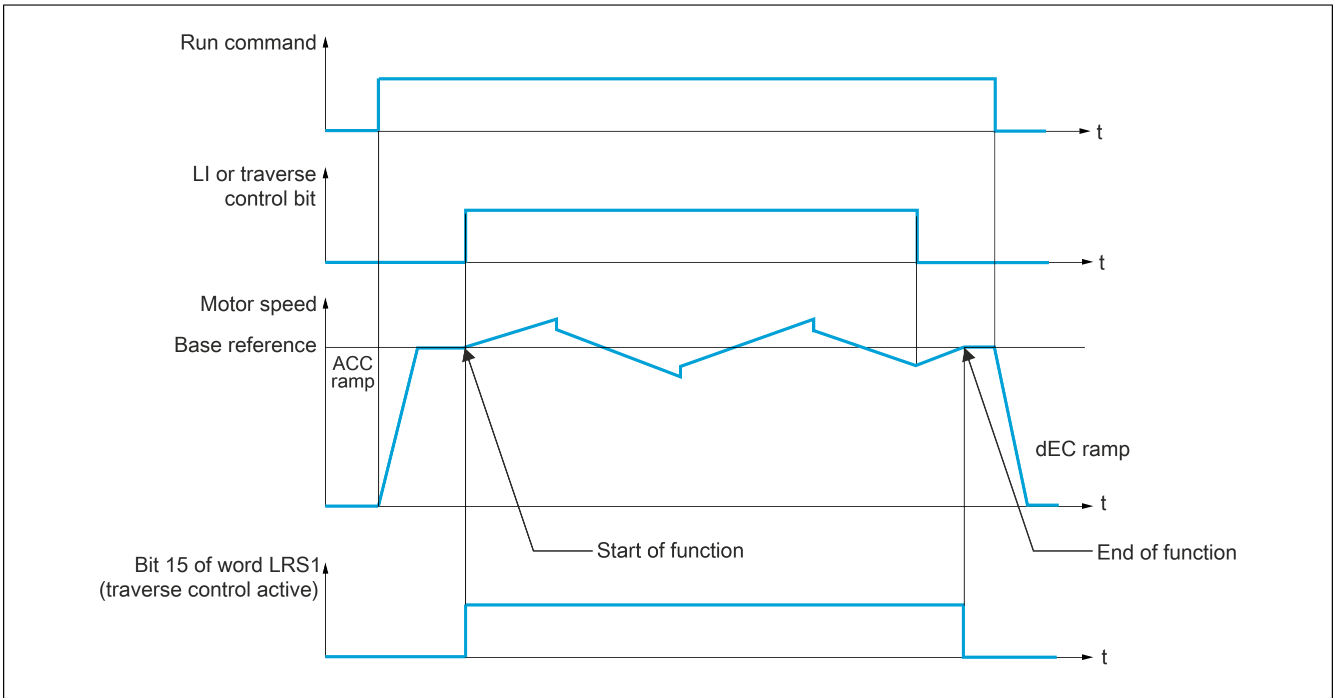
The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > tnL-		
Code	**Name/Description**	**Factory settings**
tnL-	[AUTO-TUNING VIA LI]	
tUL	[Auto-tune assign.] Autotuning is performed when the assigned input or bit changes to 1. **Advice:** **The motor is placed under voltage by the autotuning.**	[No](nO)
nO	[No](nO): Not assigned	
LI1	[LI1](LI1): Logic input LI1	
...	[...](...): See the assignment conditions.	

4.2.3.6.7.26 [TRAVERSE CONTROL] (tr0-)

Winding reels of yarn (in textile applications)



The speed of rotation of the cam must follow a precise profile to ensure that the reel is steady, compact and linear.



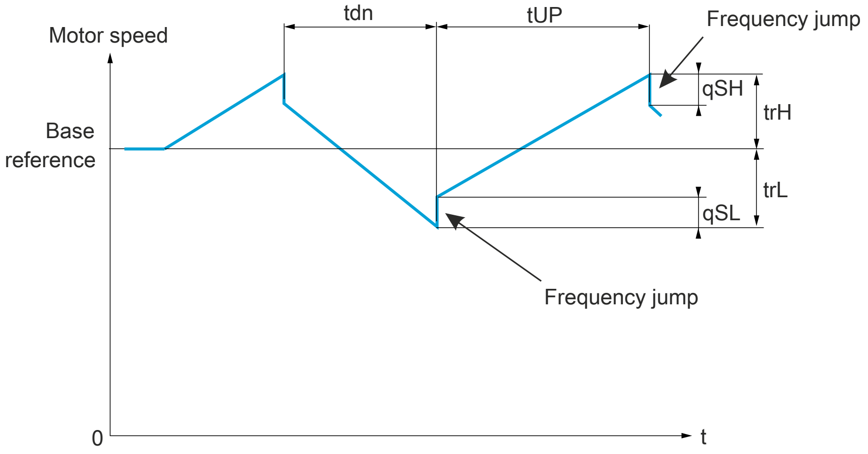
The function starts if the inverter has reached its base setpoint and command "Traverse control" has been enabled.

When command "Traverse control" is disabled, the inverter returns to its base setpoint, following the ramp determined by function "Traverse control". The function then stops, as soon as it has returned to this reference.

Bit 15 of word LRS1 is at 1 while the function is active.

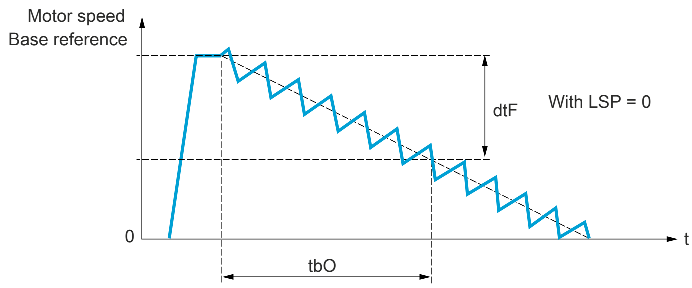
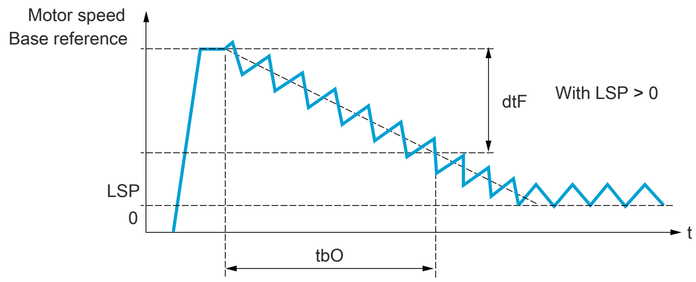
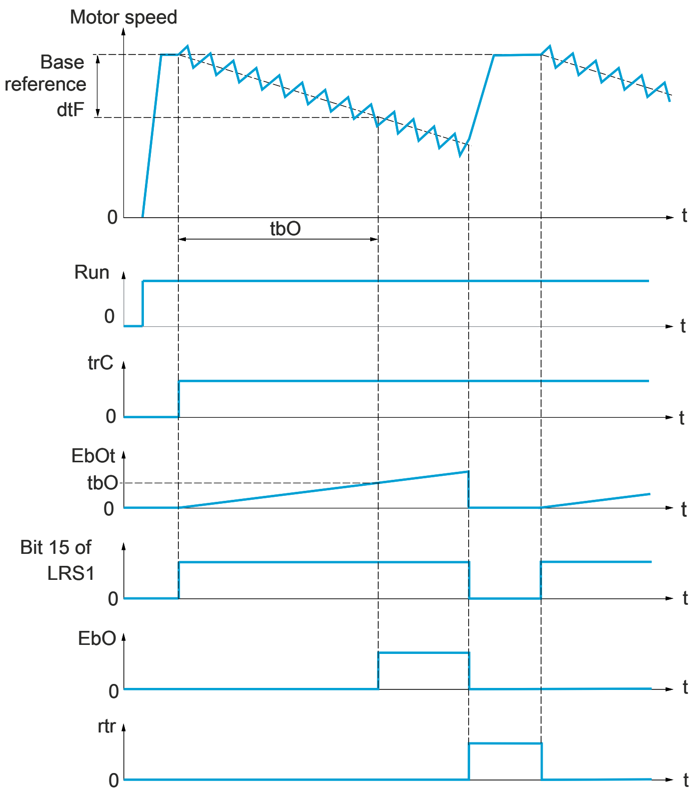
Function parameters

These define the cycle of frequency variations around the base reference, as shown in the figure below:

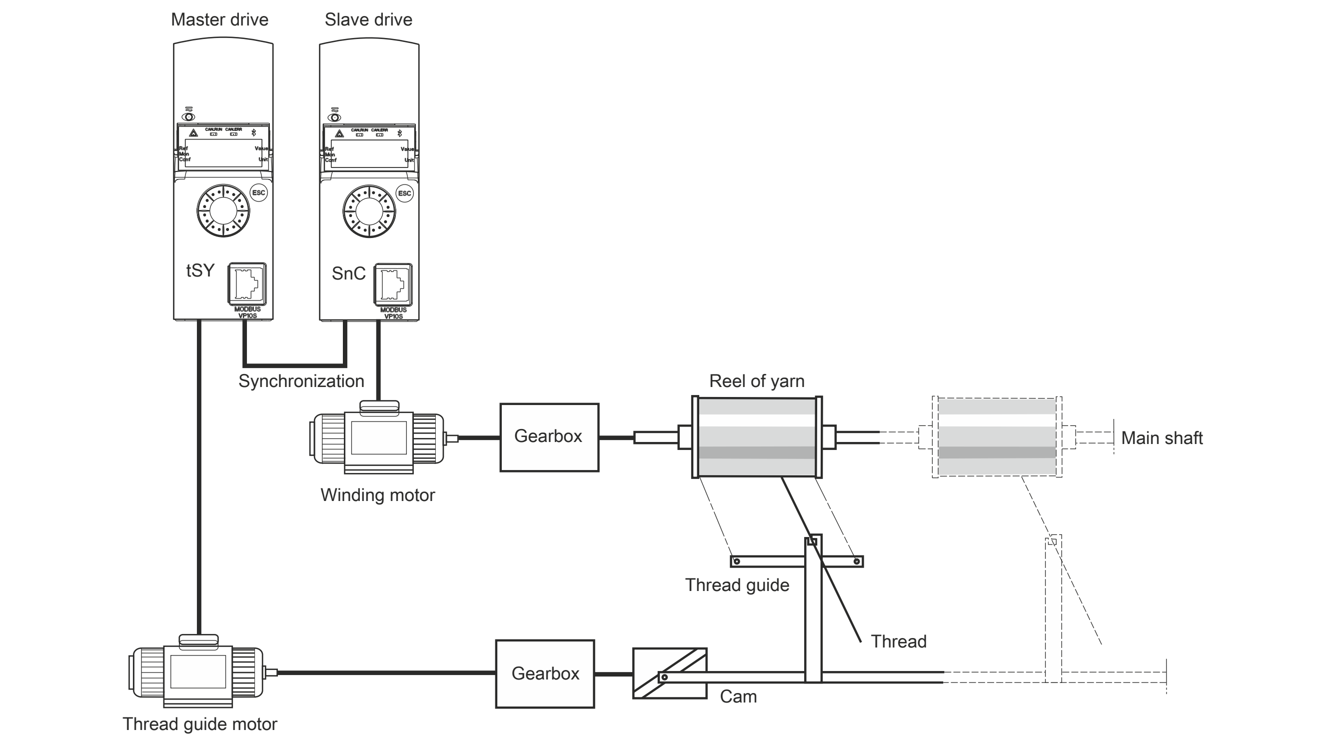


trC	**[Yarn control]**(trC): Assignment of command "Traverse control" to a logic input or to a communication bus control word bit.
trH	**[Traverse freq. high]**(trH): In hertz
trL	**[Traverse freq. low]**(trL): In hertz
qSH	**[Quick step High]**(qSH): In hertz
qSL	**[Quick step Low]**(qSL): In hertz
tUP	**[Traverse ctrl. accel.]**(tUP): In seconds
tdn	**[Traverse ctrl. decel]**(tdn): In seconds

Reel parameters:

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > tr0-	
Code	**Name/Description**
tr0-	**[TRAVERSE CONTROL]**
tbO	**[Reel time]**(tbO): Time to rewind a reel in minutes. This parameter displays the end of the rewinding. If the operating time in mode "Traverse control" via control command **[Yarn control]**(trC) reaches the value of **[Reel time]**(tbO), the logic output or one of the relays changes to state 1 if the corresponding function has been assigned to **[End reel]**(EbO). Operating time EbOt in mode "Traverse control" can be monitored online via a communication bus.
dtF	**[Decrease ref. speed]**(dtF): Reduction of the basic setpoint. In certain cases, the base reference must be reduced as the reel increases in size. Value **[Decrease ref. speed]**(dtF) corresponds to time **[Reel time]**(tbO). Once this time has elapsed, the reference continues to fall, following the same ramp. If low speed **[Low speed]**(LSP) is set to 0 and the frequency of 0 Hz has been reached, the inverter will stop and must be switched on again via a new move command. If low speed **[Low speed]**(LSP) is not equal to 0, function "Traverse control" continues to execute at above **[Low speed]**(LSP).  
rtr	**[Init. traverse ctrl]**: Reinitialization of "Traverse control". This control command can be assigned to a logic input or to a bit of a communication bus's control word. It sets the alarm EbO and the operating time EbOt back to zero and initializes the reference again with the basic reference. As long as rtr remains set to1, function "Traverse control" will be locked and the frequency will remain the same as the base setpoint. This control command is used especially when changing reels. 

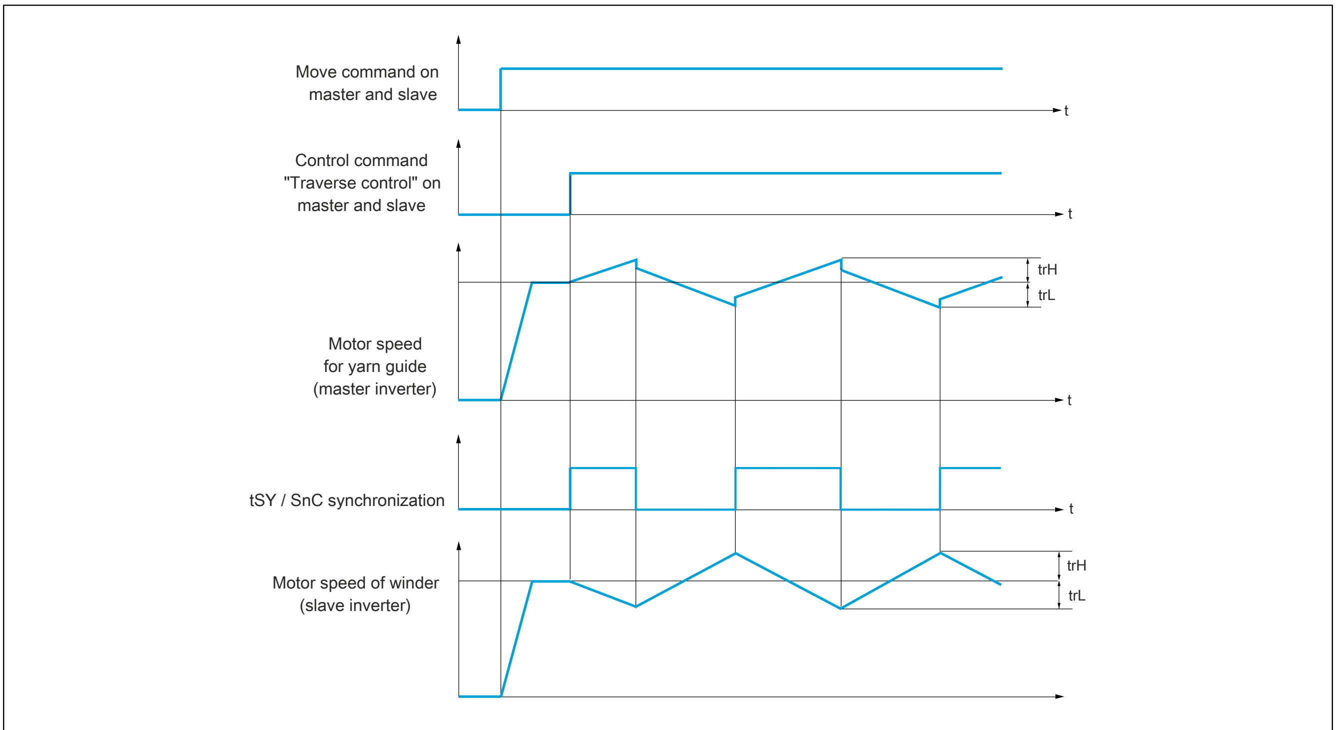
Counter wobble



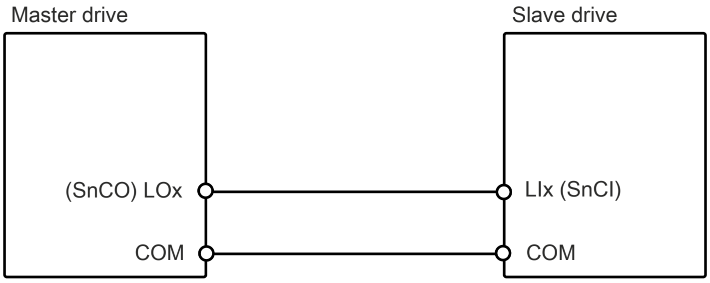
Function "Counter wobble" is used in some applications to attain a constant voltage of the yarn since function "Traverse control" causes strong frequency fluctuations in the motor of the thread guide (**[Traverse freq. high]**(trH) and **[Traverse freq. low]**(trL).).

Two motors must be used (one master and one slave).

The master controls the speed of the yarn guide; the slave controls the winding speed. The function returns a speed profile to the slave in the opposite direction to the master. This means that synchronization is then required using one of the master's logic outputs and one of the slave's logic inputs.



Connection of synchronization inputs/outputs



The starting conditions for the function are:

- Base frequencies reached on both inverters
- Input **[Yarn control]**(trC) is enabled
- Synchronization signal present

Advice:

Parameters [Quick step High](qSH) and [Quick step Low](qSL) should generally be left set to zero.

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > tr0-			
Code	**Name/Description**	**Setting range**	**Factory settings**
tr0-	**[TRAVERSE CONTROL]** **Advice:** **This function cannot be used with certain other functions.**		
trC nO LI1 ...	**[Yarn control]** The "traverse control" cycle starts in state 1 of the assigned input or bit and stops in state 0. **[No]**(nO): Function not active. The other parameters are then not accessible. **[LI1]**(LI1): Logic input LI1 **[...]**(...): See the assignment conditions.		**[No]**(nO)
trH (1)	**[Traverse freq. high]** Traverse frequency high.	0 to 10 Hz	4 Hz
trL (1)	**[Traverse freq. low]** Traverse frequency low.	0 to 10 Hz	4 Hz
qSH (1)	**[Quick step High]** High quick step.	0 to **[Traverse freq. high]**(trH)	0 Hz
qSL (1)	**[Quick step Low]** Low quick step.	0 to **[Traverse freq. low]**(trL)	0 Hz
tUP	**[Traverse ctrl. accel.]** Traverse control startup time.	0.1 to 999.9 s	4 s

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > tr0-			
Code	**Name/Description**	**Setting range**	**Factory settings**
tdn ★ (1)	**[Traverse ctrl. decel]** Traverse control deceleration.	0.1 to 999.9 s	4 s
tbO ★ (1)	**[Reel time]** Time needed to process a reel.	0 to 9,999 min	0 min
EbO ★	**[End reel]** The assigned output or relay changes to state 1 if the operating time in mode "Traverse control" has reached **[Reel time]**(tbO).		**[No]**(nO)
nO	**[No]**(nO): Not assigned		
LO1	**[LO1]**(LO1): Logic output LO1		
r2	**[R2]**(r2): Relay R2		
dO1	**[DO1]**(dO1): Analog output AO, which can be used as a logic output. Selection is possible if **[AO1 assignment]**(AO1) is set to **[No]**(nO).		
SnC ★	**[Counter wobble]** Synchronization input. Only to be configured on the inverter for the winder (slave).		**[No]**(nO)
nO	**[No]**(nO): Function not active. The other parameters are then not accessible.		
LI1	**[LI1]**(LI1): Logic input LI1		
...	**[...]**(...): See the assignment conditions.		
tSY ★	**[Sync. wobble]** Synchronization output. To be configured on the yarn guide inverter (master) only.		**[No]**(nO)
nO	**[No]**(nO): Function not assigned		
LO1	**[LO1]**(LO1)		
r2	**[R2]**(r2)		
dO1	**[DO1]**(dO1): Analog output AO, which can be used as a logic output. Selection is possible if **[AO1 assignment]**(AO1) is set to **[No]**(nO).		
dtF ★ (1)	**[Decrease ref. speed]** Decrease in the base reference during the traverse control cycle.	0 to 599 Hz	0 Hz
rtr ★	**[Init. traverse ctrl]** If the state of the assigned input or bit changes to 1, the operating time in mode "Traverse control" as well as **[Decrease ref. speed]**(dtF) are both set to zero.		**[No]**(nO)
nO	**[No]**(nO): Function not assigned		
LI1	**[LI1]**(LI1): Logic input LI1		
...	**[...]**(...): See the assignment conditions.		

(1) This parameter can also be accessed via menu **[SETTINGS]**(SEt-).

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

(1) Parameter that can be modified during operation or when stopped.

4.2.3.6.7.27 [HSP SWITCHING] (CHS-)

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > CHS-			
Code	**Name/Description**	**Setting range**	**Factory settings**
CHS-	[HSP SWITCHING]		
SH2 nO FtA F2A LI1 ...	[2 High speed] HSP switchover. [No](nO): Function not assigned [Freq. Th. attained](FtA): Frequency threshold reached [Freq. Th. 2 attain](F2A): Frequency threshold 2 reached [LI1](LI1): Logic input LI1 [...](...): See the assignment conditions.		[No](nO)
SH4	[4 High speed] HSP switchover. **Advice:** **In order to obtain 4 HSP values, [2 High speed](SH2) must also be configured.** Identical to [2 High speed](SH2).		[No](nO)
HSP	[High speed] Motor speed with maximum setpoint, setting from [Low speed](LSP) to [Max frequency](tFr). The factory setting changes to 60 Hz if [[Standard mot. freq](bFr) is set to [60 Hz NEMA](60).	0 or (LSP) to 599 Hz or (TFR)	50 Hz (if (BFR) = 50 Hz) or 60 Hz (if (BFR) = 60 Hz)
HSP2	[High speed 2] Available if [2 High speed](SH2) has not been set to[No](nO). Identical to[High speed](HSP).	0 to 599 Hz	50 Hz
HSP3	[High speed 3] Available if [4 High speed](SH4) has not been set to[No](nO). Identical to[High speed](HSP).	0 to 599 Hz	50 Hz
HSP4	[High speed 4] Available if [4 High speed](SH4) has not been set to[No](nO). Identical to[High speed](HSP).	0 to 599 Hz	50 Hz

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

4.2.3.6.7.28 [DC BUS] (dCC-)

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > dCC-			
Code	**Name/Description**	**Setting range**	**Factory settings**
dCC-	[DC BUS]		
dCCM nO MAIn bUS	[DC bus coupling] DC bus chaining configuration [No](nO): Not assigned [Bus & Main](MAIn): The inverter is supplied by the DC bus and via the mains. [Only Bus](bUS): The inverter is supplied by the Only Bus. Mains supply not wired. **Danger!** **MONITORING OF GROUND SHORT CIRCUIT DISABLED, NO ERROR DETECTION** **If setting [Bus & Main](MAIn) is selected for this parameter, ground short-circuit monitoring will be disabled.** • **Do not use this parameter unless you have performed a detailed risk assessment in line with all applicable regulations and standards for the device and the application.** • **Implement alternative functions for monitoring ground short-circuit errors that do not result in the triggering of an automated error response from the inverter. Instead ensure an appropriate equivalent response of a different type in accordance with all applicable regulations and standards including risk assessment considerations.** • **The system must be started up and tested with ground short-circuit monitoring enabled.** • **When commissioning, perform tests and simulations in a controlled environment under controlled conditions to test whether the inverter and the system are functioning as expected.** **Failure to follow these instructions will result in death or serious injury.**		[No](nO)
dCCC	[DC-Bus compat.] Not applicable.		Inverter

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > dCC-			
Code	**Name/Description**	**Setting range**	**Factory settings**
IPL ★	**[Input phase loss]** Inverter behavior when an input phase failure error is detected. This parameter is not available for inverter sizes 8I66S200xxx.00-000. Visible if **[3.1 ACCESS LEVEL]**(LAC) is set to **[Expert]**(Epr) and **[DC bus coupling]**(dCCM) (see above) is set to **[No]**(nO).		According to inverter performance
nO	**[Fault ignored]**(nO): Detected error is ignored		
YES	**[Freewheel]**(YES): Detected error with freewheel stop **[Input phase loss]**(IPL) is forced to **[Fault ignored]**(nO) if **[DC-Bus chaining]**(dCCM) is set to **[Only Bus]**(bUS). See **[Input phase loss]**(IPL) in section "Programming" (DRI- > CONF > FULL > FLT- > IPL-).		
SCL3	**[Ground short-circuit error]** Behavior in the event of a direct ground short-circuit being detected. Access for inverter sizes D and E (8I66T600550.00-000 to 8I66T601500.00-000). Visible if **[3.1 ACCESS LEVEL]**(LAC) is set to **[Expert]**(Epr) and **[DC bus coupling]**(dCCM) (see above) is set to **[No]**(nO).		**[Freewheel]**(YES)
nO	**[Fault ignored]**(nO): Detected error is ignored		
YES ★	**[Freewheel]**(YES): Detected error with freewheel stop **[Ground short circuit]**(SCL3) is forced to **[Ignore]**(nO) if **[DC BUS]**(dCCM) (see above) is set to **[Bus & Main]**(MAIn). **Danger!** **MONITORING OF GROUND SHORT CIRCUIT DISABLED, NO ERROR DETECTION** **If setting [Fault ignored](No) is set to [No](No) for this parameter, ground short-circuit monitoring is disabled.** • **Do not use this parameter unless you have performed a detailed risk assessment in line with all applicable regulations and standards for the device and the application.** • **Implement alternative functions for monitoring ground short-circuit errors that do not result in the triggering of an automated error response from the inverter. Instead ensure an appropriate equivalent response of a different type in accordance with all applicable regulations and standards including risk assessment considerations.** • **The system must be started up and tested with ground short-circuit monitoring enabled.** • **When commissioning, perform tests and simulations in a controlled environment under controlled conditions to test whether the inverter and the system are functioning as expected.** **Failure to follow these instructions can result in death or serious injury.**		

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > dCC-

Code	Name/Description	Setting range	Factory settings
UrES	[Mains voltage]	In accordance with the nominal inverter voltage	In accordance with the nominal inverter voltage

Visible if [3.1 ACCESS LEVEL](LAC) is set to [Expert](Epr) and [DC bus coupling](dCCM) (see above) is set to [No](nO). Rated voltage of the line supply in V.

For 8I66S200xxx.00-000:

200 [200Vac](200): 200 volts AC
220 [220Vac](220): 220 volts AC
230 [230Vac](230): 230 volts AC
240 [240Vac](240): 240 volts AC (factory setting)

For 8I66T400xxx.00-000:

380 [380Vac](380): 380 volts AC
400 [400Vac](400): 400 volts AC
440 [440Vac](440): 440 volts AC
460 [460Vac](460): 460 volts AC
500 [500Vac](500): 500 volts AC (factory setting)

For 8I66T600xxx.00-000:

525 [525Vac](525): 525 volts AC
600 [600Vac](600): 600 volts AC (factory setting)

Code	Name/Description	Setting range	Factory settings
USL	[Undervoltage level]	100 to 276 V	According to inverter performance

Setting the trigger level for the undervoltage error in V. Displayed when [3.1 ACCESS LEVEL](LAC) is set to [Expert](Epr).
If DC chaining has been enabled: [DC-Bus chaining](dCCM) = [Bus & Main] (MAIn) or [Only Bus] (bUS)

ACOPOSinverter P66	Setting range		
	Min. value	Max. value/default	Default
8I66S2xxxxx.00-000	100 Vdc	141 Vdc	141 Vdc
8I66T4xxxxx.00-000	190 Vdc	276 Vdc	276 Vdc
8I66T6xxxxx.00-000	266 Vdc	304 Vdc	304 Vdc

If DC chaining has not been enabled: [DC bus coupling](dCCM) = [No] (nO)

ACOPOSinverter P66	[Mains voltage] (UrES)	Setting range		
		Min. value	Max. value	Default
8I66S2xxxxx.00-000	[200Vac] (200)	100 Vdc	141 Vdc	141 Vdc
	[220Vac] (220)	120 Vdc		
	[230Vac] (230)	131 Vdc		
	[240Vac] (240)	141 Vdc		
8I66T4xxxxx.00-000	[380Vac] (380)	190 Vdc	276 Vdc	276 Vdc
	[400Vac] (400)	204 Vdc		
	[440Vac] (440)	233 Vdc		
	[460Vac] (460)	247 Vdc		
	[500Vac] (500)	276 Vdc		
8I66T6xxxxx.00-000	[525Vac] (525)	266 Vdc	304 Vdc	304 Vdc
	[600Vac] (600)	304 Vdc		

This parameter is also visible in (DRI > CONF > FULL > FLT- > USB-).

Code	Name/Description	Setting range	Factory settings
Vbr	[Braking level]	335 to 820 Vdc	According to inverter performance

Braking transistor command level. Visible if [3.1 ACCESS LEVEL](LAC) is set to [Expert](Epr).
If DC chaining has been enabled: [DC-Bus chaining](dCCM) = [Bus & Main] (MAIn) or [Only Bus] (bUS):

ACOPOSinverter P66	Setting range		
	Min. value	Max. value	Default
8I66S2xxxxx.00-000	395 Vdc	395 Vdc	395 Vdc
8I66T4xxxxx.00-000	820 Vdc	820 Vdc	820 Vdc
8I66T6xxxxx.00-000	995 Vdc	995 Vdc	995 Vdc

If DC chaining has not been enabled: [DC bus coupling](dCCM) = [No] (nO):

ACOPOSinverter P66	[Mains voltage] (UrES)	Setting range		
		Min. value	Max. value	Default
8I66S2xxxxx.00-000	[200Vac] (200)	335 Vdc	395 Vdc	395 Vdc
	[220Vac] (220)	365 Vdc		
	[230Vac] (230)	380 Vdc		
	[240Vac] (240)	395 Vdc		
8I66T4xxxxx.00-000	[380Vac] (380)	698 Vdc	820 Vdc	820 Vdc
	[400Vac] (400)	718 Vdc		
	[440Vac] (440)	759 Vdc		
	[460Vac] (460)	779 Vdc		
	[500Vac] (500)	820 Vdc		
8I66T6xxxxx.00-000	[525Vac] (525)	941 Vdc	995 Vdc	995 Vdc
	[600Vac] (600)	995 Vdc		

This parameter is also visible in (DRI- > CONF > FULL > DRC-).

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

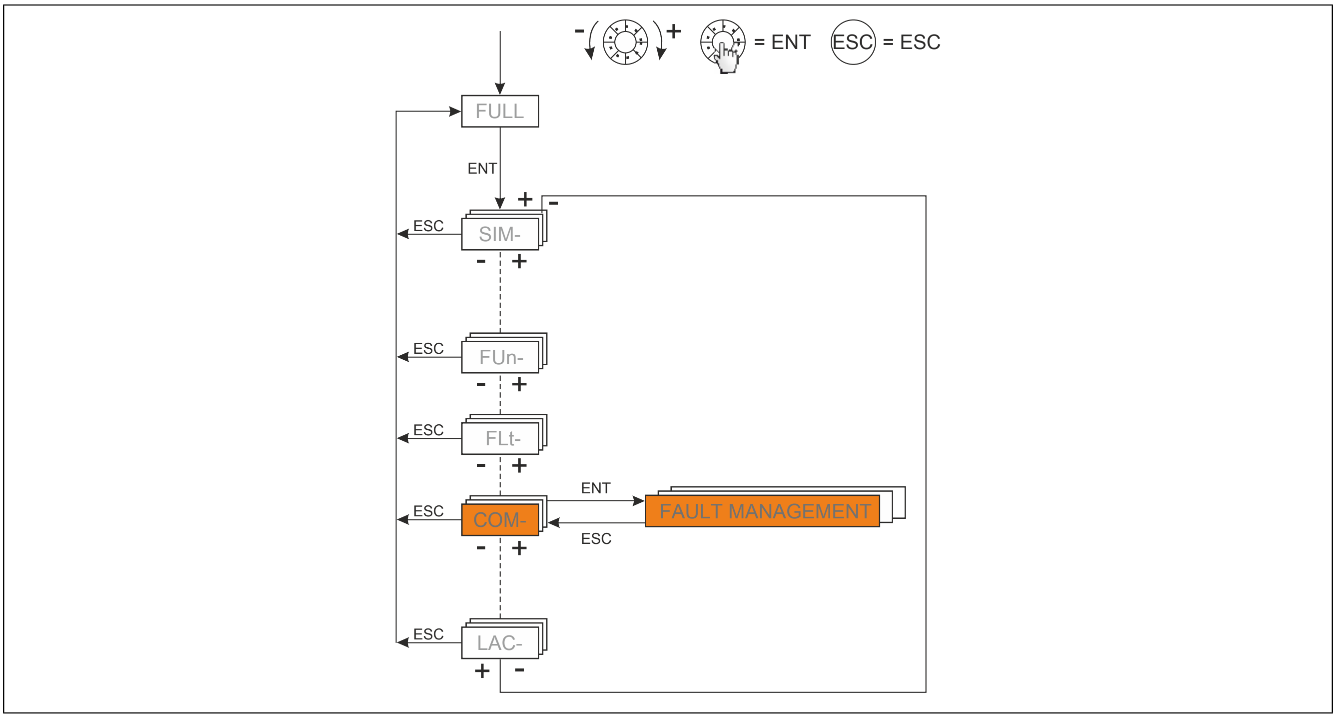
4.2.3.6.8 [FAULT MANAGEMENT] FLt-

With integrated display terminal:

Overview of functions:

Code	Name
PtC	[PTC MANAGEMENT]
rSt	[FAULT RESET]
Atr	[AUTOMATIC RESTART]
AIS	[AUTOMATIC RESTART]
FLr	[CATCH ON THE FLY]
tHt	[MOTOR THERMAL PROT.]
OPL	[Output Phase Loss]
IPL	[Input phase loss]
OHL	[DRIVE OVERHEAT]
SAt	[THERMAL ALARM STOP]
EtF	[EXTERNAL FAULT]
USb	[UNDERVOLTAGE MGT]
tIt	[IGBT test]
LFL	[4-20 mA LOSS]
InH	[FAULT INHIBITION]
CLL	[COM. FAULT MANAGEMENT]
Sdd	[ENCODER FAULT]
tId	[TORQUE/CURRENT LIM .]
FqF	[FREQUENCY METER]
dLd	[DYNAMIC LOAD DETECT.]
tnF	[AUTO TUNING FAULT]
PPI	[CARDS PAIRING]
ULd	[PROCESS UNDERLOAD]
OLd	[PROCESS OVERLOAD]
LFF	[FALLBACK SPEED]
FSt	[FAST STOP]
dCI	[DC Injection]

From menu (ConF)



The parameters of menu [FAULT MANAGEMENT](FLt-) can only be changed during standstill and without a move command. The parameters with an arrow symbol in the "Code" column are exceptions to this rule. These parameters can be changed during operation and in stop mode.

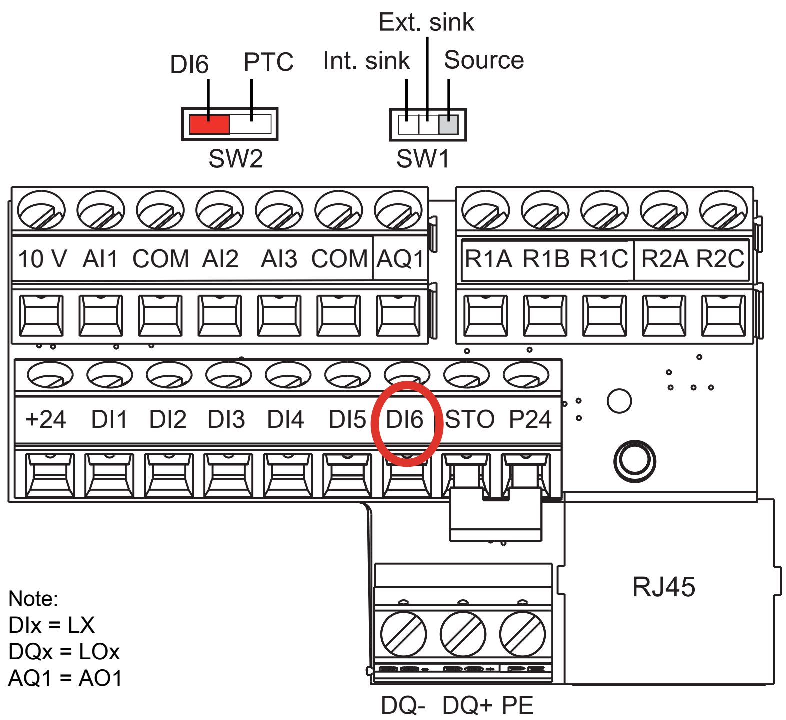
4.2.3.6.8.1 [PTC MANAGEMENT] (PtC-)

The inverter can process a set of PTC sensors for motor protection. One PTC sensor at logic input LI6. It is enabled via switch "SW2" on the control card.

The PTC sensor is monitored continuously for the following errors:

- Overtemperature on the motor
- Sensor break fault
- Sensor short-circuit fault

Protection via PTC probes does not disable protection via I²t calculation performed by the inverter. The two types of protection can be combined.



Contrary to the typical definition of sink and source, the following statements apply to this product:

Sink: The inputs and outputs need a voltage sink, i.e. the current flows out of the inputs and outputs.

Source: The inputs and outputs need a voltage source, i.e. the current flows into the inputs and outputs.

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > PtC-		
Code	**Name/Description**	**Factory settings**
PtC-	[PTC MANAGEMENT]	
PtCL	[LI6 = PTC probe] Access is possible if control card switch SW2 is set to PTC.	[No](nO)
nO	[No](nO): Not used	
AS	[Always](AS): The PTC sensors are monitored permanently, even if the power unit is not connected; provided the controller unit remains connected to the power supply.	
rdS	[Boot](rdS): The PTC sensors are monitored while the inverter power unit is connected.	
rS	[Motor on](rS): The PTC sensors are monitored while the motor is switched on.	

4.2.3.6.8.2 [FAULT RESET] (rSt-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > rSt-

Code	Name/Description	Factory settings
rSt-	[FAULT RESET]	
rSF	[FAULT RESET] The error is reset if the assigned input or bit changes to 1, provided the cause of the error has been resolved. The STOP/RESET button on the graphic display terminal performs the same function. The following detected errors can be deleted manually: ASF, brF, bLF, CnF, COF, dLF, EPF1, EPF2, FbES, FCF2, InF9, InFA, InFb, LCF, LFF3, ObF, OHF, OLC, OLF, OPF1, OPF2, OSF, OtFL, PHF, PtFL, SCF4, SCF5, SLF1, SLF2, SLF3, SOF, SPF, SSF, tJF, tnF and ULF **Advice:** **If [Extended Fault reset](HrFC) is set to [Yes](YES), the following detected errors can also be acknowledged manually: OCF, SCF1 and SCF3.** If [Profile] (CHCF) is set to [Not separ.](SIM) or [Separate] (SEP), parameters [CD11] (Cd11) to [CD15] (Cd15), [C111] (C111) to [C115] (C115), [C211] (C211) to [C215] (C215) and [C311] (C311) to [C315] (C315) are not available.	[No](nO)
nO	[No](nO): Function not active	
LI1	[LI1](LI1): Logic input LI1	
...	[...](...): See Assignment conditions.	
rPA	[Product reset assig.] The restart function performs an error reset and then restarts the inverter. During this restart, the inverter runs through the same steps as if it were switched off and then switched on again. Depending on the wiring and configuration of the inverter, this can result in sudden, unexpected operation. The restart function can be assigned to a digital input. **Danger!** **UNEXPECTED OPERATION OF THE EQUIPMENT** **The restart function executes an error reset and restarts the inverter.** **Make sure that enabling this function does not result in unsafe states.** **Failure to follow these instructions can result in death or serious injury.** This parameter can only be changed if [3.1 ACCESS LEVEL](LAC) is set to [Expert](EPr). Inverter reinitialization via logic input. Can be used to reset all faults without having to disconnect the inverter from the power supply. The frequency inverter is reinitialized on a rising edge (change from 0 to 1) of the assigned input. The inverter can only be reinitialized when locked. To assign the reinitialization, press and hold the ENT key for 2 seconds.	[No](nO)
nO	[No](nO): Function not active	
LI1	[LI1](LI1): Logic input LI1	
...	...	
LI6	[LI6](LI6): Logic input LI6	
LAI1	[LAI1](LAI1): Logic input AI1	
LAI2	[LAI2](LAI2): Logic input AI2	
OL01	[OL01](OL01): Function blocks: Logic output 01	
...	...	
OL10	[OL10](OL10): Function blocks: Logic output 10	
rP	[Product reset] The restart function performs an error reset and then restarts the inverter. During this restart, the inverter runs through the same steps as if it were switched off and then switched on again. Depending on the wiring and configuration of the inverter, this can result in sudden, unexpected operation. **Danger!** **UNEXPECTED OPERATION OF THE EQUIPMENT** **The restart function executes an error reset and restarts the inverter.** **Make sure that enabling this function does not result in unsafe states.** **Failure to follow these instructions can result in death or serious injury.** This parameter is only accessible if [3.1 ACCESS LEVEL](LAC) is set to [Expert](EPr). Inverter reinitialization. Can be used to reset all faults without having to disconnect the inverter from the power supply.	[No](nO)
nO	[No](nO): Function not active	

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > rSt-		
Code	**Name/Description**	**Factory settings**
YES	[YES](YES): Reinitialization. The ENT button must be pressed for two seconds. The parameter changes automatically to [No](nO) as soon as the process is complete. The inverter can only be reinitialized when locked.	
HrFC ★	**[Extended Fault reset]**	[No](nO)
	This parameter is only accessible if [3.1 ACCESS LEVEL](LAC) is set to [Expert](EPr).	
	Can be used in order to select access level [Fault reset](rSF). It allows detected errors to be reset without switching off the inverter.	
nO	[No](nO): Function not active	
YES	[YES](YES): Function active	
	Advice: **If [Extended Fault reset](HrFC) is set to [Yes](YES), the following detected errors can also be acknowledged manually: OCF, SCF1 and SCF3.**	

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

4.2.3.6.8.3 [AUTOMATIC RESTART] (Atr-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > Atr-

Code	Name/Description	Factory settings
Atr-	**[AUTOMATIC RESTART]**	
Atr 2 s	**[Automatic restart]**	**[No]**(nO)
	If the cause of the error that triggered the transition to error state is resolved while this function is active, the inverter reverts to normal operation. For the duration that automatic error reset attempts are performed, output signal "Operating state fault" will not be available. If these error reset attempts are unsuccessful, the inverter remains in operating state "Fault" and output signal "Fault" is enabled. **Danger!** **UNEXPECTED OPERATION OF THE EQUIPMENT** • **Make sure that enabling this function does not result in unsafe states.** • **Check whether a safety risk is posed by the fact that the response to errors in operating state is not available when this function is enabled.** **Failure to follow these instructions can result in death or serious injury.** The inverter's failure notification relay remains enabled for as long as the function is active. The frequency reference and the direction of operation must be maintained. Use 2 wire control (**[2/3 wire control]**(tCC) = **[2 wire]**(2C) and **[2 wire type]**(tCt) = **[Level]**(LEL)). If the inverter still does not restart after configurable time interval tAr has elapsed, the process is ended and the inverter remains locked until it is switched off and then switched back on again.	
nO	**[No]**(nO): Function not active	
YES	**[YES]**(YES): Automatic restart after locking due to a fault in case this fault has been resolved and the other operating conditions are conducive to the inverter restarting. The inverter is restarted by means of a series of automatic attempts in increasing intervals of time: 1 s, 5 s, 10 s, after that,1 minute for all subsequent attempts.	
tAr	**[Max. restart time]**	**[5 min]**(5)
	This parameter is accessible if **[Automatic restart]**(Atr) is set to **[Yes]**(YES). This parameter can be used to limit the number of successive restarts in the event of a recurring error.	
5	**[5 min]**(5): 5 minutes	
10	**[10 min]**(10): 10 minutes	
30	**[30 min]**(30): 30 minutes	
1h	**[1 hour]**(1h): 1 hour	
2h	**[2 hours]**(2h): 2 hours	
3h	**[3 hours]**(3h): 3 hours	
Ct	**[continuous]**(Ct): Continuous	

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

2 s To change the assignment of this parameter, press the ENT key for 2 seconds.

4.2.3.6.8.4 [AUTOMATIC RESTART] (ALS-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > ALS-

Code	Name/Description	Setting range	Factory settings
ALS-	**[AUTOMATIC RESTART]**		
Ctd (1)	**[Current threshold]** Threshold value of the motor current.	0 to 65535 or 1.5*INV (1)	INV
Ftd	**[Freq. threshold]** Threshold value of the output frequency.	0 to 599 Hz	50 Hz
F2d	**[Freq. threshold 2]** Threshold value of the output frequency.	0 to 599 Hz	50 Hz
ttH	**[High torque thd.]** Frequency threshold value for high torque.	-300 to 300%	100%
ttL	**[Low torque thd.]** Frequency threshold value for low torque.	-300 to 300%	50%
FqL	**[Pulse warning thd.]** Frequency level. Available if **[Frequency meter]**(FqF) is not equal to **[No]**(nO).	0 to 20,000 Hz	0 Hz

(1) Corresponding to the nominal current of the inverter specified on the nameplate.

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

4.2.3.6.8.5 [CATCH ON THE FLY] (FLr-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > FLr-		
Code	Name/Description	Factory settings
FLr-	[CATCH ON THE FLY] **Advice:** **This function cannot be used with certain other functions.**	
FLr	[Catch on the fly] Used to enable a smooth restart if the run command is maintained after the following events: • Mains supply failure or disconnection. • Reset of current fault or automatic restart • Freewheel stop The frequency preset by the inverter is applied again, starting at the estimated speed of the motor at the time of the restart, and then increasing until the frequency setpoint has been reached. This function requires 2-wire level control. When the function is active, it intervenes each time a move command is executed, resulting in a slight current delay (0.5 s max.). [Catch on the fly](FLr) is forced to [No](nO) if brake logic control [Brake assignment](bLC) is assigned, or if [Auto DC injection](AdC) is set to [continuous](Ct).	[No](nO)
nO YES	[No](nO): Function not active [YES](YES): Function active	

4.2.3.6.8.6 [MOTOR THERMAL PROT.] (tHt-)

Functionality

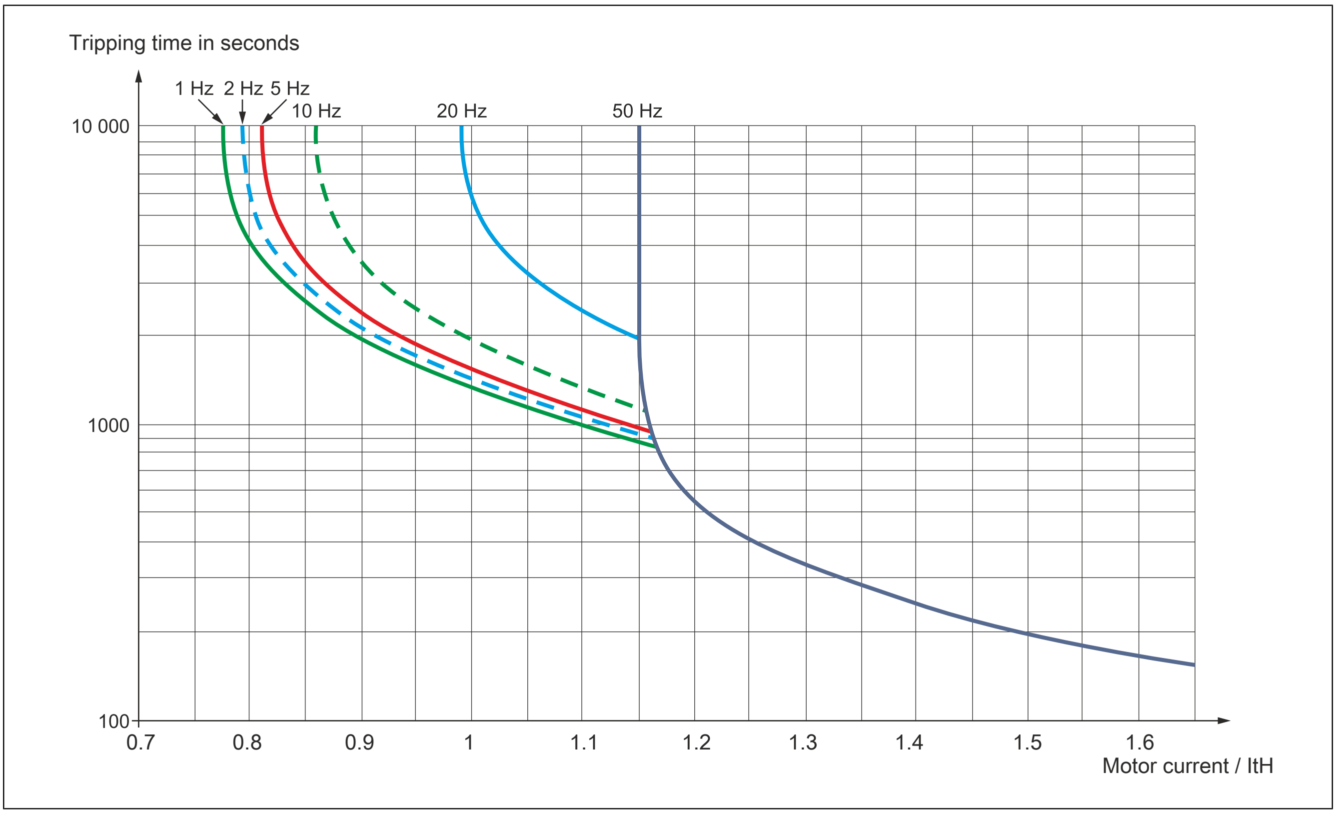
Thermal motor protection based on I²t calculation.

Advice:

The motor thermal state is not saved when the inverter is switched off.

- Self-cooling motors: The tripping curves depend on the motor frequency.
- Force-cooled motors: Regardless of the motor frequency, only the 50 Hz tripping curve must be observed.

The following characteristic curves show the tripping time in seconds.



Caution!

RISK OF DAMAGE TO THE MOTOR

External overload protection is required in the following situations:

- **When the product is switched back on (since the thermal motor state is not saved in any memory)**
- **If power is supplied to multiple motors**
- **If power is supplied to motors with a sizing of less than 0.2 times the nominal current of the inverter**
- **Motor shutdown**

Failure to observe these instructions can result in damage to the equipment.

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > tHt-			
Code	**Name/Description**	**Setting range**	**Factory settings**
tHt-	[MOTOR THERMAL PROT.]		
tHt	[Motor protect. type] **Advice:** **A fault trip will occur when the thermal state reaches 118% of the rated state and reactivation will occur when the state falls back below 100%.**		[Self cooled](ACL)
nO ACL FCL	[No](nO): No protection [Self cooled] (ACL): For self-cooling motors [Force-cool](FCL): For forced-cooled motors		
ttd (1)	[Motor therm. level] Trip threshold for motor thermal alarm (logic output or relay)	0 to 118%	100%
ttd2	[Motor2 therm. level] Trip threshold for motor 2 thermal alarm (logic output or relay)	0 to 118%	100%
ttd3	[Motor3 therm. level] Trip threshold for motor 3 thermal alarm (logic output or relay)	0 to 118%	100%
OLL	[Overload fault mgt] **Caution!** **MOTOR OVERHEATING AND DAMAGE** **Depending on the setting defined for this parameter, the error word is disabled or switching to error operating state is prevented whenever an error is detected.** • **Make sure that the setting defined for this parameter does not result in damage to the device.** • **Implement alternative solutions for the disabled monitoring functions.** **Failure to observe these instructions can result in damage to the equipment.** Type of stop in the event of a motor thermal fault.		[Freewheel](YES)
nO YES Stt LFF rLS rMP FSt dCI	[Ignore](nO): The detected error is ignored. [Freewheel](YES): Freewheel [Type of stop](Stt): Stop in accordance with configuration of [Type of stop](Stt) without triggering an error. In this case, the alarm relay does not open and after the fault disappears, the inverter is ready for operation in accordance with the restart conditions of the active command channel (for example, according to [2/3 wire control](tCC) and [2 wire type](tCt), if control is on the terminal side). Configuring an alarm for this fault is recommended (assigned to a logic output, for example) in order to indicate the cause of the stop. [fallback spd](LFF): Change to fallback speed, which is maintained for as long as the fault persists and the move command has not been canceled. (2) [Spd maint.](rLS): The inverter maintains the speed that was applied when the fault occurred, for as long as the fault persists and the move command has not been canceled. (2) [Ramp stop](rMP): Stopping via ramp [Fast stop](FSt): Fast stop [DC Injection](dCI): Stop via DC injection braking. This function type cannot be used in combination with certain other functions.		
MtM	[Mot THR memo] The thermal motor state is stored.		[No](nO)
nO YES	[No](nO): On switch-off, the thermal motor state is not stored. [YES](YES): On switch-off, the thermal motor state is stored.		

(1) This parameter can also be accessed via menu [SETTINGS](SEt-).
(2) Since the detected fault does not trip a stop in this case, the display of this fault must be assigned to a relay or a logic output.

Parameter that can be modified during operation or when stopped.

4.2.3.6.8.7 [OUTPUT PHASE LOSS] (OPL-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > OPL-			
Code	**Name/Description**	**Setting range**	**Factory settings**
OPL-	[Output Phase Loss]		
OPL 2 s	[Output Phase Loss] **Danger!** **RISK OF ELECTRIC SHOCK, ARC FLASH OR EXPLOSION** **If output phase monitoring is disabled, phase loss and therefore the inadvertent disconnection of cables will not be detected.** **Make sure that the parameter settings do not result in unsafe states.** **Failure to follow these instructions can result in death or serious injury.** **Advice:** **[Output Phase Loss](OPL) is set to [No](nO) if [Motor control type](Ctt) is set to [Sync. mot.](SYn). For other configuration of parameter [Motor control type](Ctt), [Output Phase Loss](OPL) is forced to [Yes](YES), if the brake logic is configured.**		[YES](YES)
nO	[No](nO): Function not active		
YES	[Yes](YES): Triggered if [Output Phase Loss](OPL) with freewheel stop		
OAC	[Output cut](OAC): No fault triggered, but output voltage controlled to prevent overcurrent when the connection with the motor is re-established, catch-on-the-fly function executed too (even if this function has not been configured). The inverter switches to state [Output cut](SOC) once the time set by [OutPh time detect](Odt) has elapsed. The catch-on-the-fly function can be executed as soon as the inverter state switches to [Output cut](SOC).		
Odt	[OutPh time detect] Delay in taking into account the recorded fault [Output Phase Loss](OPL).	0.5 to 10 s	0.5 s

Parameter that can be modified during operation or when stopped.

2 s To change the assignment of this parameter, press the ENT key for 2 seconds.

4.2.3.6.8.8 [Input phase loss] (IPL-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > IPL-		
Code	**Name/Description**	**Factory settings**
IPL-	[Input phase loss]	
IPL ★ 2 s	[Input phase loss] This parameter is not available for inverter sizes 8Ix6S200xxx.00-000. In this case, there are no factory-preset values available. Factory setting: [Freewheel](YES) for 3-phase inverters 380 to 500 V. In the event of a phase loss, a power derating occurs and the inverter switches to error state [Input phase loss](PHF). If two or three phases are lost, the inverter triggers error [Input phase loss](PHF).	According to inverter performance
nO	[Fault ignored](nO): Detected error is ignored	
YES	[Freewheel](YES): Error with freewheel stop.	

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

2 s To change the assignment of this parameter, press the ENT key for 2 seconds.

4.2.3.6.8.9 [OUTPUT PHASE LOSS] (OPL-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > OPL-			
Code	**Name/Description**	**Setting range**	**Factory settings**
OPL-	[Output Phase Loss]		
OPL 2 s	[Output Phase Loss] **Danger!** **RISK OF ELECTRIC SHOCK, ARC FLASH OR EXPLOSION** **If output phase monitoring is disabled, phase loss and therefore the inadvertent disconnection of cables will not be detected.** **Make sure that the parameter settings do not result in unsafe states.** **Failure to follow these instructions can result in death or serious injury.** **Advice:** **[Output Phase Loss](OPL) is set to [No](nO) if [Motor control type](Ctt) is set to [Sync. mot.](SYn). For other configuration of parameter [Motor control type](Ctt), [Output Phase Loss](OPL) is forced to [Yes](YES), if the brake logic is configured.**		[YES](YES)
nO YES OAC	[No](nO): Function not active [Yes](YES): Triggered if [Output Phase Loss](OPL) with freewheel stop [Output cut](OAC): No fault triggered, but output voltage controlled to prevent overcurrent when the connection with the motor is re-established, catch-on-the-fly function executed too (even if this function has not been configured). The inverter switches to state [Output cut](SOC) once the time set by [OutPh time detect](Odt) has elapsed. The catch-on-the-fly function can be executed as soon as the inverter state switches to [Output cut](SOC).		
Odt	[OutPh time detect] Delay in taking into account the recorded fault [Output Phase Loss](OPL).	0.5 to 10 s	0.5 s

Parameter that can be modified during operation or when stopped.

2 s — To change the assignment of this parameter, press the ENT key for 2 seconds.

4.2.3.6.8.10 [THERMAL ALARM STOP] (SAt-)

Deferred stop on thermal alarm

This function prevents the inverter from stopping between two process steps if the inverter or motor overheats by authorizing operation until the next stop. At the next stop, the inverter is locked until the thermal state falls back to a value, which undershoots the set threshold by 20%. Example: A trip threshold set to 80% enables reactivation at 60%.

One thermal state threshold must be defined for the inverter, and one thermal state threshold for the motor(s), which will trip the deferred stop.

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > SAt-			
Code	**Name/Description**	**Setting range**	**Factory settings**
SAt-	[THERMAL ALARM STOP]		
SAt	[Thermal alarm stop] This function can be used to set a user-specific alarm level for the thermal inverter or motor state. Once this level is reached, the inverter freewheels to a stop.		[No](nO)
nO YES	[No](nO): Function inactive (in this case, subsequent parameters cannot be accessed) [YES](YES): Freewheel stop when inverter or motor thermal alarm triggered		
tHA	[Drv therm. state al] Thermal state threshold of the inverter tripping a deferred stop.	0 to 118%	100%
ttd	[Motor therm. level] Thermal state threshold of the motor tripping a deferred stop.	0 to 118%	100%
ttd2	[Motor2 therm. level] Threshold value of the thermal state of motor 2 for which a delayed stop has been triggered.	0 to 118%	100%
ttd3	[Motor3 therm. level] Threshold value of the thermal state of motor 3 for which a delayed stop has been triggered.	0 to 118%	100%

Parameter that can be modified during operation or when stopped.

4.2.3.6.8.11 [EXTERNAL FAULT] (EtF-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > EtF-		
Code	**Name/Description**	**Factory settings**
EtF-	**[EXTERNAL FAULT]**	
EtF	**[External fault ass.]** If the assigned bit is at 0, there is no external fault. If the assigned bit is at 1, there is an external fault. The logic is configurable via **[External fault config]**(LEt) if a logic input is assigned.	**[No]**(nO)
nO	**[No]**(nO): Function not active	
LI1	**[LI1]**(LI1): Logic input LI1	
...	**[...]**(...): See the assignment conditions.	
LEt ★	**[External fault config]** Parameter can be accessed if the external fault has been assigned to a logic input. It defines the positive or negative logic of the input assigned to the fault.	**[Active high]**(HIG)
LO	**[Active low]**(LO): Fault on falling edge (change from 1 to 0) of the assigned input.	
HIG	**[Active high]**(HIG): Fault on rising edge (change from 0 to 1) of the assigned input.	
EPL	**[External fault mgt]** Type of stop in the event of an external fault.	**[Freewheel]**(YES)
nO	**[Fault ignored]**(nO): External error ignored	
YES	**[Freewheel]**(YES): Freewheel	
Stt	**[In accordance with STT]**(Stt): Stop in accordance with configuration of **[Type of stop]**(Stt) without triggering an error. In this case, the alarm relay does not open and once the fault disappears, the inverter is ready for operation in accordance with the restart conditions of the active command channel (for example, according to **[2/3 wire control]**(tCC) and **[2 wire type]**(tCt), if control is on the terminal side). Configuring an alarm for this fault is recommended (assigned to a logic output, for example) in order to indicate the cause of the stop.	
LFF	**[fallback spd]**(LFF): Change to fallback speed, which is maintained for as long as the fault persists and the move command has not been canceled. (1)	
rLS	**[Spd maint.]**(rLS): The inverter maintains the speed that was applied when the fault occurred, for as long as the fault persists and the move command has not been canceled. (1)	
rMP	**[Ramp stop]**(rMP): Stopping via ramp	
FSt	**[Fast stop]**(FSt): Fast stop	
dCI	**[DC Injection]**(dCI): Stop via DC injection. This function type cannot be used in combination with certain other functions.	

(1) Since the detected fault does not trip a stop in this case, the display of this fault must be assigned to a relay or a logic output.

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

4.2.3.6.8.12 [UNDERVOLTAGE MGT] (USb-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > USb-

Code	Name/Description	Setting range	Factory settings
USb-	[UNDERVOLTAGE MGT]		
USb	[UnderV. fault mgt] Behavior of the inverter in the event of an undervoltage		[Flt&R1 open](0)
0	[Flt&R1 open](0): The inverter triggers an error and the external error signal is triggered (the error relay assigned to [No fault](FLt) is opened).		
1	[Flt&R1close](1): The inverter triggers an error, but the external error signal is not triggered (the error relay assigned to [No fault](FLt) remains closed).		
2	[Alarm](2): Alarm and error relay remain closed. The alarm can be assigned to a logic output or a relay.		
UrES	[Mains voltage] Rated voltage of the line supply in V. For 8I66S200xxx.00-000:	According to nominal voltage	According to nominal voltage
200	[200Vac](200): 200 volts AC		
220	[220Vac](220): 220 volts AC		
230	[230Vac](230): 230 volts AC		
240	[240Vac](240): 240 volts AC		
	For 8I66T40xxxx.00-000:		
380	[380Vac](380): 380 volts AC		
400	[400Vac](400): 400 volts AC		
440	[440Vac](440): 440 volts AC		
460	[460Vac](460): 460 volts AC		
500	[500Vac](500): 500 volts AC (factory setting)		
	For 8I66T60xxxx.00-000:		
525	[525Vac](525): 525 volts AC		
600	[600Vac](460): 600 volts AC (factory setting)		
USL	[Undervoltage level] Setting the trigger level for the undervoltage error in V. Displayed when [3.1 ACCESS LEVEL](LAC) is set to [Expert](Epr). The setting range is defined in the following table: If DC chaining has been enabled: [DC-Bus chaining](dCCM) = [Bus & Main] (MAIn) or [Only Bus] (bUS)	100 to 276 V	According to inverter performance

ACOPOSinverter P66	Setting range		
	Min. value	Max. value/default	Default
8I66S2xxxxx.00-000	100 Vdc	141 Vdc	141 Vdc
8I66T4xxxxx.00-000	190 Vdc	276 Vdc	276 Vdc
8I66T6xxxxx.00-000	266 Vdc	304 Vdc	304 Vdc

If DC chaining has not been enabled: [DC bus coupling](dCCM) = [No] (nO)

ACOPOSinverter P66	[Mains voltage] (UrES)	Setting range		
		Min. value	Max. value	Default
8I66S2xxxxx.00-000	[200Vac] (200)	100 Vdc	141 Vdc	141 Vdc
	[220Vac] (220)	120 Vdc		
	[230Vac] (230)	131 Vdc		
	[240Vac] (240)	141 Vdc		
8I66T4xxxxx.00-000	[380Vac] (380)	190 Vdc	276 Vdc	276 Vdc
	[400Vac] (400)	204 Vdc		
	[440Vac] (440)	233 Vdc		
	[460Vac] (460)	247 Vdc		
	[500Vac] (500)	276 Vdc		
8I66T6xxxxx.00-000	[525Vac] (525)	266 Vdc	304 Vdc	304 Vdc
	[600Vac] (600)	304 Vdc		

This parameter is also visible in (DRI > CONF > FULL > FLT- > USB-).

Code	Name/Description	Setting range	Factory settings
USt	[Undervolt. time out] Time delay for taking undervoltage fault into consideration	0.2 s to 999.9 s	0.2 s
StP	[UnderV. prevention] Behavior when the undervoltage prevention level is reached.		[No](nO)
nO	[No](nO): No action		
MMS	[DC Maintain](MMS): This stop mode uses the inertia to maintain the DC bus voltage as long as possible.		
rMP	[Ramp stop](rMP): Stop according to a configurable ramp [Max stop time](StM)		
LnF	[Drive lock](LnF): Locking (freewheel stop) without error		

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > USb-

Code	Name/Description	Setting range	Factory settings
tSM	**[UnderV. restart tm]**	1.0 s to 999.9 s	1.0 s
	Time delay before a restart is permitted after a complete standstill for **[UnderV. prevention]**(StP) = **[Ramp stop]**(rMP), if the voltage has reached the normal value.		
UPL	**[Prevention level]**	141 to 318 V	According to inverter performance
	Setting of the level for undervoltage prevention in V. Access is possible if **[UnderV. prevention]**(StP) is not equal to **[No]**(nO). The adjustment range and the factory setting are dependent on the nominal voltage of the inverter as well as on the value of **[Mains voltage]**(UrES).		

ACOPOSinverter P66	[Mains voltage] (UrES)	Setting range: Min. value	Setting range: Max. value	Setting range: Default
8I66S2xxxxx.00-000	[200Vac] (200)	141 Vdc	163 Vdc	163 Vdc
	[220Vac] (220)			
	[230Vac] (230)			
	[240Vac](240)			
8I66T4xxxxx.00-000	[380Vac] (380)	276 Vdc	318 Vdc	318 Vdc
	[400Vac] (400)			
	[440Vac] (440)			
	[460Vac] (460)			
	[500Vac](500)			
8I66T6xxxxx.00-000	[525Vac] (525)	304 Vdc	368 Vdc	368 Vdc
	[600Vac] (600)			

Code	Name/Description	Setting range	Factory settings
StM	**[Max stop time]**	0.01 to 60.00 s	1.00 s
	Ramp-up time if **[UnderV. prevention]**(StP) is set to **[Ramp stop]**(rMP).		
tbS	**[DC bus maintain tm]**	1 to 9,999 s	9,999 s
	Stopping time of the DC bus if **[UnderV. prevention]**(StP) is set to **[DC Maintain]**(MMS).		

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

4.2.3.6.8.13 [IGBT test] (tIt-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > tIt-		
Code	**Name/Description**	**Factory settings**
tIt-	**[IGBT test]**	
Strt	**[IGBT test]**	**[No]**(nO)
nO	**[No]**(nO): No test	
YES	**[Yes]** (YES): The IGBTs are tested on power-up and every time a move command is sent. These tests cause a slight delay (a few ms). In the event of a fault, the inverter will lock. The following faults can be detected: • Inverter output short circuit (terminals U-V-W): SCF displayed. • IGBT error: xtF, where x indicates the number of the affected IGBT. • IGBT short circuit: x2F, where x indicates the number of the affected IGBT	

4.2.3.6.8.14 [4-20 mA LOSS] (LFL-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > LFL-		
Code	**Name/Description**	**Factory settings**
LFL-	**[4-20 mA LOSS]**	
LFL3	**[AI3 4-20mA loss]**	**[Fault ignored]**(nO)
nO	**[Fault ignored]**(nO): Detected error ignored. This is the only possible configuration if **[AI3 min value]**(CrL3) is less than 3 mA.	
YES	**[Freewheel]**(YES): Freewheel	
Stt	**[In accordance with STT]**(Stt): Stop in accordance with the configuration of **[Type of stop]**(Stt), with no error triggered. In this case, the alarm relay does not open and once the fault disappears, the inverter is ready for operation in accordance with the restart conditions of the active command channel (for example, according to **[2/3 wire control]**(tCC) and **[2 wire type]**(tCt), if control is on the terminal side). Configuring an alarm for this fault is recommended (assigned to a logic output, for example) in order to indicate the cause of the stop.	
LFF	**[fallback spd]**(LFF): Change to fallback speed, which is maintained for as long as the fault persists and the move command has not been canceled. (1)	
rLS	**[Spd maint.]**(rLS): The inverter maintains the speed that was applied when the fault occurred, for as long as the fault persists and the move command has not been canceled. (1)	
rMP	**[Ramp stop]**(rMP): Stopping via ramp	
FSt	**[Fast stop]**(FSt): Fast stop	
dCI	**[DC Injection]**(dCI): Stop via DC injection. This function type cannot be used in combination with certain other functions.	

(1) Since the detected fault does not trip a stop in this case, the display of this fault must be assigned to a relay or a logic output.

4.2.3.6.8.15 [FAULT INHIBITION] (InH-)

The parameter is accessible in mode **[Expert]**.

<table>
<tr><th colspan="3">The parameters described below are accessed as follows: DRI- > COnF > FULL > FLt- > InH-</th></tr>
<tr><th>Code</th><th>Name/Description</th><th>Factory settings</th></tr>
<tr><td>InH-</td><td>[FAULT INHIBITION]</td><td></td></tr>
<tr><td>InH
2 s</td><td>[Fault inhibit assign.]

In rare cases, the monitoring functions of the inverter are not desired as they hamper the application. A typical example would be a smoke extraction fan that is used as part of a fire safety system. For example, in the event of a fire, the fan in a smoke extractor needs to work for as long as possible, even if the permissible ambient temperature of the inverter has been exceeded.
With such applications, damage or destruction of the system is acceptable as collateral damage because it prevents other higher-risk damage. For this type of application, a parameter is provided for disabling specific monitoring functions so that automatic error detection and response are no longer active for the device. For disabled monitoring functions, alternative functions must be implemented so that users and/or superordinate control systems can respond appropriately to detected error conditions.
If the overheating monitoring function of an inverter that is used in a smoke extraction fan is disabled, the inverter itself can trigger a fire if errors are not detected. For example, an overheating condition can be displayed on a control panel, without the inverter having to be automatically stopped immediately by the integrated monitoring functions.

Danger!

MONITORING FUNCTIONS DISABLED, NO ERROR DETECTION
Do not use this parameter unless you have performed a detailed risk assessment in line with all applicable regulations and standards for the device and the application.
Implement alternative monitoring functions for disabled monitoring functions that do not trigger any automatic error responses from the inverter. However, you should also enable other types of appropriate, equivalent response in accordance with all applicable regulations and standards as well as risk evaluation considerations.
Start the system with monitoring functions enabled and then test it.
When commissioning, perform tests and simulations in a controlled environment under controlled conditions to test whether the inverter and the system are functioning as expected.
Failure to follow these instructions can result in death or serious injury.

If the assigned input or bit is at 0, fault monitoring is active. If the assigned input or bit is at 1, fault monitoring is inactive. Active faults are reset on a rising edge (change from 0 to 1) of the assigned input or bit.

Advice:

This function does not affect function "Safe Torque Off" or detected errors that would lead to a complete failure.

The following errors can be suppressed:
AnF, CnF, COF, CrF1, dLF, EnF, EPF1, EPF2, FCF2, InFA, InFb, LFF3, ObF, OHF, OLC, OLF, OPF1, OPF2, OSF, OtFL, PHF, PtFL, SLF1, SLF2, SLF3, SOF, SPF, SSF, tJF, tnF and ULF</td><td>[No](nO)</td></tr>
<tr><td>nO
LI1
...</td><td>[No](nO): Function not active
[LI1](LI1): Logic input LI1
[...](...): See the assignment conditions.</td><td></td></tr>
</table>

Parameter that can be modified during operation or when stopped.

2 s To change the assignment of this parameter, press the ENT key for 2 seconds.

4.2.3.6.8.16 [COM. FAULT MANAGEMENT] (CLL-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > CLL-

Code	Name/Description	Factory settings
CLL-	[COM. FAULT MANAGEMENT]	
CLL	[Network fault mgt]	[Freewheel](YES)
	Warning! **LOSS OF CONTROL** **If this parameter is set to [Fault ignored](nO), monitoring of fieldbus module communication is disabled.** • **Do not use this setting unless you have performed a detailed risk assessment in line with all applicable regulations and standards for the device and the application.** • **Only use this setting for tests during commissioning.** • **Make sure that communication monitoring has been re-enabled before completing the commissioning process and performing the final commissioning test.** **Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.**	
	Behavior of the inverter in the event of a communication fault with a communication card	
nO	[Fault ignored](nO): Detected error is ignored	
YES	[Freewheel](YES): Freewheel	
Stt	[In accordance with STT](Stt): Stop in accordance with the configuration of [Type of stop](Stt) without error triggering. In this case, the alarm relay does not open and once the fault disappears, the inverter is ready for operation in accordance with the restart conditions of the active command channel (for example, according to [2/3 wire control](tCC) and [2 wire type](tCt), if control is on the terminal side). Configuring an alarm for this fault is recommended (assigned to a logic output, for example) in order to indicate the cause of the stop.	
LFF	[fallback spd](LFF): Change to fallback speed, which is maintained for as long as the fault persists and the move command has not been canceled. 1)	
rLS	[Spd maint.](rLS): The inverter maintains the speed that was applied when the fault occurred, for as long as the fault persists and the move command has not been canceled. 1)	
rMP	[Ramp stop](rMP): Stopping via ramp	
FSt	[Fast stop](FSt): Fast stop	
dCI	[DC Injection](dCI): Stop via DC injection. This function type cannot be used in combination with certain other functions.	
COL	[CANopen fault mgt]	[Freewheel](YES)
	Warning! **LOSS OF CONTROL** **If this parameter is set to [Fault ign.](nO), monitoring of CANopen com. module communication is disabled.** • **Do not use this setting unless you have performed a detailed risk assessment in line with all applicable regulations and standards for the device and the application.** • **Only use this setting for tests during commissioning.** • **Make sure that communication monitoring has been re-enabled before completing the commissioning process and performing the final commissioning test.** **Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.**	
	Behavior of the inverter in the event of a communication interruption with the integrated CANopen® module	
nO	[Fault ignored](nO): Detected error is ignored	
YES	[Freewheel](YES): Freewheel	
Stt	[In accordance with STT](Stt): Stop in accordance with configuration of [Type of stop](Stt) without triggering an error. In this case, the alarm relay does not open and once the fault disappears, the inverter is ready for operation in accordance with the restart conditions of the active command channel (for example, according to [2/3 wire control](tCC) and [2 wire type](tCt), if control is on the terminal side). Configuring an alarm for this fault is recommended (assigned to a logic output, for example) in order to indicate the cause of the stop.	
LFF	[fallback spd](LFF): Change to fallback speed, which is maintained for as long as the error persists and the move command has not been canceled. 1)	
rLS	[Spd maint.](rLS): The inverter maintains the speed that was applied when the fault occurred, for as long as the fault persists and the move command has not been canceled. 1)	
rMP	[Ramp stop](rMP): Stopping via ramp	
FSt	[Fast stop](FSt): Fast stop	
dCI	[DC Injection](dCI): Stop via DC injection. This function type cannot be used in combination with certain other functions.	

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > CLL-		
Code	**Name/Description**	**Factory settings**
SLL	**[Modbus fault mgt]** **Warning!** **LOSS OF CONTROL** **If this parameter is set to [Fault ign.](nO), monitoring of Modbus module communication is disabled.** • **Do not use this setting unless you have performed a detailed risk assessment in line with all applicable regulations and standards for the device and the application.** • **Only use this setting for tests during commissioning.** • **Make sure that communication monitoring has been re-enabled before completing the commissioning process and performing the final commissioning test.** **Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.** Behavior of the inverter in the event of a communication interruption with the integrated Modbus.	**[Freewheel]**(YES)
nO	**[Fault ignored]**(nO): Detected error is ignored	
YES	**[Freewheel]**(YES): Freewheel	
Stt	**[In accordance with STT]**(Stt): Stop in accordance with the configuration of **[Type of stop]**(Stt), with no error triggered. In this case, the alarm relay does not open and once the fault disappears, the inverter is ready for operation in accordance with the restart conditions of the active command channel (for example, according to **[2/3 wire control]**(tCC) and **[2 wire type]**(tCt), if control is on the terminal side). Configuring an alarm for this fault is recommended (assigned to a logic output, for example) in order to indicate the cause of the stop.	
LFF	**[fallback spd]**(LFF): Change to fallback speed, which is maintained for as long as the fault persists and the move command has not been canceled. [1)]	
rLS	**[Spd maint.]**(rLS): The inverter maintains the speed that was applied when the fault occurred, for as long as the fault persists and the move command has not been canceled. [1)]	
rMP	**[Ramp stop]**(rMP): Stopping via ramp	
FSt	**[Fast stop]**(FSt): Fast stop	
dCI	**[DC Injection]**(dCI): Stop via DC injection. This function type cannot be used in combination with certain other functions.	

1) Since the detected fault does not trip a stop in this case, the display of this fault must be assigned to a relay or a logic output.

4.2.3.6.8.17 [ENCODER FAULT] (Sdd-)

The parameters described below are accessed as follows: DRI- > COnF > FULL > FLt- > Sdd-			
Code	**Name/Description**	**Setting range**	**Factory settings**
Sdd-	**[ENCODER FAULT]**		
Sdd	**[Load slip detection]** Enabling load slip detection.		**[YES]**(YES)
nO	**[No]**(nO): Detected error is ignored.		
YES	**[YES]**(YES): Freewheel stop The event is triggered by a comparison of the output frequency with the speed feedback in accordance with the configuration of parameters FAnF, LAnF, dANF and tAnF. In addition, the event is triggered when the move command is received during tAnF and the prefixes of the output frequency and the speed feedback are found to conflict. If an error is detected, the inverter switches to a freewheel stop, and if the brake logic function is configured, the brake command is set to 0.		
FAnF ★	**[ANF Frequency Thd.]** Displayed if **[Encoder usage]**(EnU) = **[Fdbk monit.]**(SEC).		-
LAnF ★	**[Thresh. load slip]** Displayed if **[Encoder usage]**(EnU) = **[Fdbk monit.]**(SEC).		-
dAnF ★	**[ANF Direction check]** Displayed if **[Encoder usage]**(EnU) = **[Fdbk monit.]**(SEC).		-
tAnF ★	**[ANF Frequency Thd.]** Displayed if **[Encoder usage]**(EnU) = **[Fdbk monit.]**(SEC).		-

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

4.2.3.6.8.18 [TORQUE/CURRENT LIM.] (tId-)

Code	Name/Description		Factory settings
The parameters described below are accessed as follows: DRI- > COnF > FULL > FLt- > tId-			
tId-	**[TORQUE/CURRENT LIM .]**		
SSb	**[Trq/I limit. stop]** Behavior when switching to torque mode or current limiting		**[Fault ignored]**(nO)
nO	**[Fault ignored]**(nO): Detected error is ignored		
YES	**Freewheel]**(YES): Freewheel stop		
Stt	**[In accordance with STT]**(Stt): Stop in accordance with the configuration of **[Type of stop]**(Stt), with no error triggered. In this case, the alarm relay does not open and once the fault disappears, the inverter is ready for operation in accordance with the restart conditions of the active command channel (for example, according to **[2/3 wire control]**(tCC) and **[2 wire type]**(tCt), if control is on the terminal side). Configuring an alarm for this fault is recommended (assigned to a logic output, for example) in order to indicate the cause of the stop.		
LFF	**[fallback spd]**(LFF): Change to fallback speed, which is maintained for as long as the fault persists and the move command has not been canceled. (1)		
rLS	**[Spd maint.]**(rLS): The inverter maintains the speed that was applied when the fault occurred, for as long as the fault persists and the move command has not been canceled. (1)		
rMP	**[Ramp stop]**(rMP): Stopping via ramp		
FSt	**[Fast stop]**(FSt): Fast stop		
dCI	**[DC Injection]**(dCI): Stop via DC injection. This function type cannot be used in combination with certain other functions.		
StO 	**[Trq/I limit. time out]** (If **[Trq/I limit. stop]**(SSb) was configured) Delay for taking into account the SSF limitation.	0 to 9,999 ms	1,000 ms

(1) Since the detected fault does not trip a stop in this case, the display of this fault must be assigned to a relay or a logic output.

 Parameter that can be modified during operation or when stopped.

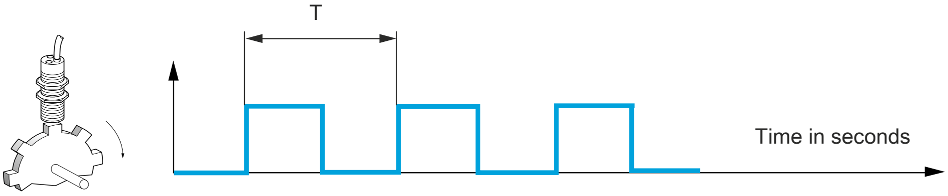
4.2.3.6.8.19 [FREQUENCY METER] (FqF-)

Measurement of motor speed via pulse input.

This function uses the "pulse input" input and is only applicable if the pulse input is not used for another function.

Application example

A notched disk driven by a motor that is connected to a proximity switch can generate a frequency signal proportional to the motor speed.



When applied to the "pulse input" input, this signal provides the following options:

- Measurement and display of the motor speed: Signal frequency = 1/T. This frequency is displayed using parameter [Pulse in. work. freq.](FqS).
- Detection of overspeed; if the measured speed exceeds a predefined threshold value, the inverter will trigger an error.
- Detection of a defective brake; if the brake command is configured. If the speed is not increased fast enough after a brake release command, the inverter will trigger an error. This function enables detection of wear and tear on the brake lining.
- Detection of a speed threshold value, which can be set using [Pulse warning thd.](FqL) and assigned to a relay or logic output.

The parameters described below are accessed as follows: DRI- > COnF > FULL > FLt- > FqF-			
Code	**Name/Description**	**Setting range**	**Factory settings**
FqF-	[FREQUENCY METER]		
FqF	[Frequency meter] Enabling the speed measurement function		[No](nO)
nO YES	[No](nO): Function inactive. All parameters of this function are inaccessible. [YES](YES): Function active; assignment only possible if the "pulse input" input has not been assigned to another function.		
FqC	[Pulse fdbk divisor] Scaling factor of the "pulse input" input (divisor). The achieved frequency is displayed using parameter [Pulse in. work. freq.](FqS).	1.0 to 100.0	1.0
FqA	[Overspeed pulse thresh.] Enabling and setting overspeed monitoring: [Overspeed](SOF).		[No](nO)
nO -	[No](nO): No overspeed monitoring. 1 Hz to 20.00 kHz: Setting the threshold value for triggering the frequency at the "pulse input" input divided by [Pulse fdbk divisor](FqC)		
tdS	[Pulse overspd delay] Delay for taking into account a detected overvoltage error.	0.0 s to 10.0 s	0.0 s
Fdt	[Level fr. pulse ctrl] Enabling and setting "pulse input" input monitoring (speed feedback): [Speed fdback loss](SPF).		[No](nO)
nO -	[No](nO): No speed feedback monitoring 0.1 Hz to 599 Hz: Setting the frequency threshold value of the motor for triggering the speed feedback error (deviation between the estimated frequency and the measured speed).		
Fqt	[Pulse thd. wo Run] Enabling and setting brake monitoring: [Brake feedback](brF). If brake logic [Brake assignment](bLC) is not configured, this parameter is forced to [No](nO).		[No](nO)
nO -	[No](nO): No brake monitoring 1 Hz to 1,000 Hz: Setting of the motor frequency threshold value.		
tqb	[Pulse wo Run delay] Delay for taking into account brake monitoring	0.0 s to 10.0 s	0.0 s

Parameter that can be modified during operation or when stopped.

4.2.3.6.8.20 [DYNAMIC LOAD DETECT.] (dLd-)

Load variation detection

This detection is only possible with the "high-speed hoisting" function. This function is used to detect whether an obstacle has occurred, triggering a sudden (upward) increase or (downward) decrease in the load.

The detection of a load deviation will result in an error: **[Dynamic load fault]**(dLF). The behavior of the inverter when this error occurs can be configured via parameter **[Dyn. load Mgt.]**(dLb).

Load variation detection can also be assigned to a relay or logic output.

Based on the configuration of the high-speed hoisting, two detection modes are possible:

- "Speed reference" mode:
  [High speed hoisting optim](HSO) = **[Speed ref]**(SSO).
  Detection of torque deviation.
  During high-speed operation, the load is compared to the load measured during the frequency step. The permissible load variation and duration can be configured. If exceeded, the inverter switches to fault mode.
- "Current limitation" mode:
  [High speed hoisting optim](HSO) = **[I limit]**(CSO).
  When hoisting at high operational speeds, a load increase results in a speed reduction. Even if high-speed operation is enabled, the inverter will switch to fault mode if the motor frequency falls below threshold value **[I Limit. frequency]**(SCL). The function only detects an increase in load at the high speed range (up to **[I Limit. frequency]**(SCL)).
  With a reduction, operation continues in accordance with the frequency setpoint.

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > FLt- > dLd-			
Code	**Name/Description**	**Setting range**	**Factory settings**
dLd-	**[DYNAMIC LOAD DETECT.]** Load variation detection. This parameter is accessible if **[High speed hoisting optim]**(HSO) is not equal to **[No]**(nO).		
tLd	**[Dynamic load time]** Enabling detection of load variations and setting the delay for taking into account detected error **[Dynamic load fault]**(dLF).		**[No]**(nO)
nO	**[No]**(nO): No detection of variations in load		
-	**0.00 s to 10.00 s**: Setting the delay for taking into account the detected error.		
dLd	**[Dynamic load threshold]** Setting the trigger threshold value for detecting load variations as a percentage of the load measured during the frequency step.	1 to 100%	100%
dLb	**[Dyn. load Mgt.]** Behavior of the inverter in the event of a load variation fault.		**[Freewheel]**(YES)
nO	**[Fault ignored]**(nO): Detected error is ignored		
YES	**[Freewheel]**(YES): Freewheel		
Stt	**[In accordance with STT]**(Stt): Stop in accordance with the configuration of **[Type of stop]**(Stt), with no error triggered. In this case, the alarm relay does not open and once the fault disappears, the inverter is ready for operation in accordance with the restart conditions of the active command channel (in accordance with **[2/3 wire control]**(tCC) and **[2 wire type]**(tCt) for example, if control is on the terminal side). Configuring an alarm for this fault is recommended (assigned to a logic output, for example) in order to indicate the cause of the stop.		
LFF	**[fallback spd]**(LFF): Change to fallback speed, which is maintained for as long as the fault persists and the move command has not been canceled. (1)		
rLS	**[Spd maint.]**(rLS): The inverter maintains the speed that was applied when the fault occurred, for as long as the fault persists and the move command has not been canceled. (1)		
rMP	**[Ramp stop]**(rMP): Stopping via ramp		
FSt	**[Fast stop]**(FSt): Fast stop		

(1) Since the detected fault does not trip a stop in this case, the display of this fault must be assigned to a relay or a logic output.

4.2.3.6.8.21 [AUTO TUNING FAULT] (tnF-)

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > FLt- > tnF-		
Code	**Name/Description**	**Factory settings**
tnF-	[AUTO TUNING FAULT]	
tnL nO YES	[Autotune fault mgt] [Fault ignored](nO): Detected error is ignored [Freewheel](YES): Freewheel	[Freewheel](YES)

4.2.3.6.8.22 [CARDS PAIRING] (PPI-)

The function is only available in mode [Expert](EPr).

This function is used to detect whenever a card has been replaced or the software has been modified in any way.

When a pairing password is entered, the parameters of the cards currently inserted are stored. At each subsequent start, the parameters are checked and if a deviation exists, the inverter locks with the HCF fault. For a restart, the initial situation must be restored or the joining code must be entered again.

The following parameters are verified:

- Card type: For all cards
- Software version: Control card, communication cards.
- Serial number: Control card

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > PPI-			
Code	**Name/Description**	**Setting range**	**Factory settings**
PPI-	[CARDS PAIRING]		
PPI	[Pairing password]	[OFF](OFF) to 9,999	[OFF](OFF)
OFF -	The value [OFF](OFF) indicates that the card pairing function is not active. The value [On](On) indicates that card pairing is enabled and that an access code must be entered in order to unlock the inverter in the event of a pairing error. Once the code has been entered, the inverter is unlocked and the code changes to [ON](On). The PPI code is an unlock code known only to B&R customer support.		

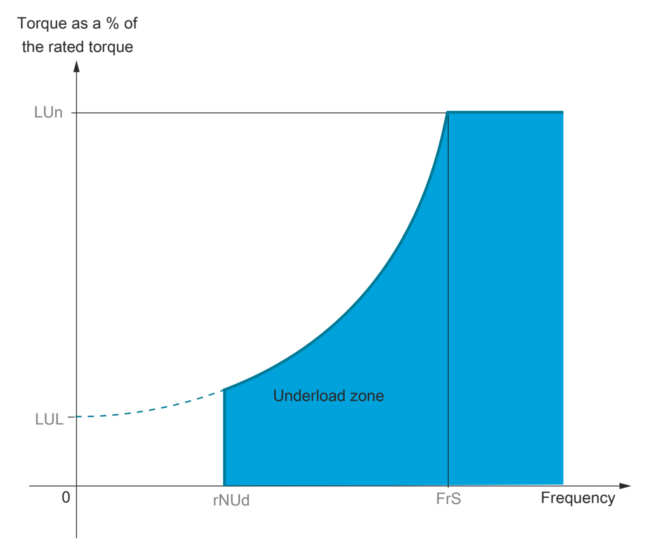
These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

4.2.3.6.8.23 [PROCESS UNDERLOAD] (ULd-)

Underload process error

A process underload is detected when the next event occurs and remains unresolved for at least the configurable time set in [Unld T. Del. Detect](ULt):

- The motor is in persistence state and the torque is below the parameter's set underload limit value ([Unld. Thr. 0. Speed.](LUL), [Unld.Thr.Nom.Speed.](LUn) and [Unld Freq. Thr. Det.](rMUd)).
- The motor is in persistence state if the difference between the frequency setpoint and the motor frequency falls below the configurable threshold value (Srb) set in [Hysteresis Freq.Att.](Srb).



Between frequency 0 and nominal frequency, the characteristic curve produces the following equation: The underload function for frequencies under

$$Torque = LUL + \frac{(LUn - LUL) \times (frequency)^2}{(ratedfrequency)^2}$$

For frequencies below [Underl. det. freq. thresh.val](rMUd), the underload function is not active.

In menu [IN/OUTPUTS](I_O-), a relay or logic output can be assigned to the signal for this error.

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > FLt- > ULd-			
Code	**Name/Description**	**Setting range**	**Factory settings**
ULd-	**[PROCESS UNDERLOAD]**		
ULt	**[Unld T. Del. Detect]** Delay for underload detection. If the value is 0, the function is disabled and the other parameters are not available.	0 to 100 s	0 s
LUn ★ ↻	**[Unld. Thr. Nom. Speed.]** Threshold value for underload when the motor is at nominal frequency (**[Rated motor freq.]**(FrS)) as a percentage of the nominal torque.	20 to 100%	60%
LUL ★ ↻	**[Underload freq.=0]** Threshold value for underload for a frequency of zero, as a percentage of nominal torque.	0 to **[Nom. freq. overload]**(LUn)	0%
rMUd ★ ↻	**[Underl. det. freq. thresh.val]** Minimum frequency threshold value for underload detection.	0 to 599 Hz	0 Hz
Srb ★ ↻	**[Hysteresis Freq.Att.]** Maximum deviation between frequency setpoint and motor frequency, defines persistence state.	0.3 to 599 Hz	0.3 Hz
UdL ★	**[Underload Managmt.]** Behavior on switching to underload detection.		**[Freewheel]**(YES)
nO	**[Fault ignored]**(nO): Detected error is ignored		
YES	**[Freewheel]**(YES): Freewheel		
rMP	**[Ramp stop]**(rMP): Stopping via ramp		
FSt	**[Fast stop]**(FSt): Fast stop		
FtU ★ ↻	**[Underload T.B.Rest.]** This parameter is not available if **[Underload Managmt.]**(UdL) is set to **[Ignore]**(nO). Permissible minimum time frame between underload detection and automatic restart. To enable automatic restart, the value of **[Max. restart time]**(tAr) must exceed the value of this parameter for at least one minute.	0 to 6 min	0 min

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

↻ Parameter that can be modified during operation or when stopped.

4.2.3.6.8.24 [PROCESS OVERLOAD] (OLd-)

Overload process error

A process overload is detected when the next event occurs and persists for the configurable time set in **[Ovld Time Detect.]**(tOL):

- The inverter is in mode "Current limiting".
- The motor is in persistence state and the current is above the overload threshold value defined in **[Ovld Detection Thr.]**(LOC)

The motor is in persistence state if the difference between the frequency setpoint and the motor frequency falls below the configurable threshold value (Srb) set in **[Hysteresis Freq.Att.]**(Srb).

A relay or logic output can be assigned to the signal for this error using menu **[IN/OUTPUTS]**(I_O-).

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > FLt- > OLd-			
Code	**Name/Description**	**Setting range**	**Factory settings**
OLd-	**[PROCESS OVERLOAD]**		
tOL	**[Ovld Time Detect.]** Delay for overload detection. If the value is 0, the function is disabled and the other parameters are not available.	0 to 100 s	0 s
LOC ★ (1)	**[Ovld Detection Thr.]** Overload detection threshold value, as a percentage of the motor nominal current **[Rated mot. current]**(nCr). For the function to be executed, this value must be lower than the threshold current.	70 to 150%	110%
Srb ★ (1)	**[Hysteresis Freq.Att.]** Maximum deviation between frequency setpoint and motor frequency, defines persistence state.	0 to 599 Hz	0.3 Hz
OdL ★ nO YES rMP FSt	**[Ovld.Proces.Mngmt]** Behavior on switching to overload detection. **[Fault ignored]**(nO): Detected error is ignored **[Freewheel]**(YES): Freewheel **[Ramp stop]**(rMP): Stopping via ramp **[Fast stop]**(FSt): Fast stop		**[Freewheel]**(YES)
FtO ★ (1)	**[Overload T.B.Rest.]** This parameter is not available if **[Ovld.Proces.Mngmt]**(OdL) is set to **[Fault ignored]**(nO). Permissible minimum timeframe between overload detection and automatic restart. To enable automatic restart, the value of **[Max. restart time]**(tAr) must exceed the value of this parameter for at least one minute.	0 to 6 min	0 min

(1) This parameter can also be accessed via menus **[SETTINGS]**(SEt-) and **[APPLICATION FUNCT.]**(FUn-).

★	These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.
	Parameter that can be modified during operation or when stopped.

4.2.3.6.8.25 [FALLBACK SPEED] (LFF-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > LFF-			
Code	**Name/Description**	**Setting range**	**Factory settings**
LFF-	**[FALLBACK SPEED]**		
LFF	**[Fallback speed]** Selection of the fallback speed.	0 to 599 Hz	0 Hz

4.2.3.6.8.26 [FAST STOP] (FSt-)

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > FLt- > Fst-			
Code	**Name/Description**	**Setting range**	**Factory settings**
FSt-	[FAST STOP]		
dCF (1)	[Ramp divider] The enabled ramp ([Deceleration](dEC) or [Deceleration 2](dE2)) is subsequently divided by this coefficient during the stop commands. Value 0 corresponds to a minimum ramp time.	0 to 10	4

(1) Access to this parameter is also possible via menus [SETTINGS](SEt-) and [APPLICATION FUNCT.](FUn-).

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

4.2.3.6.8.27 [DC BRAKE] (dCI-)

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > FLt- > dCI-			
Code	**Name/Description**	**Setting range**	**Factory settings**
dCI-	[DC Injection]		
IdC (1)(3)	[DC inject. level 1] **Advice:** **MOTOR OVERHEATING AND DAMAGE** **In order to prevent damage to the motor due to overheating, make sure the connected motor is sized correctly for DC injection braking with regard to influx rate and duration.** **Failure to observe these instructions can result in damage to the equipment.** Level of DC injection braking current activated via logic input or selected as stop mode.	0.1*INV to 1.41*INV (2)	0.64*INV (2)
tdI (1)(3)	[DC injection time 1] **Advice:** **MOTOR OVERHEATING AND DAMAGE** **In order to prevent damage to the motor due to overheating, make sure the connected motor is sized correctly for DC injection braking with regard to influx rate and duration.** **Failure to observe these instructions can result in damage to the equipment.** Maximum duration of current injection [DC inject. level 1](IdC). After this time has elapsed, the direct current change to [DC inject. level 2](IdC2).	0.1 to 30 s	0.5 s
IdC2 (1)(3)	[DC inject. level 2] **Advice:** **MOTOR OVERHEATING AND DAMAGE** **In order to prevent damage to the motor due to overheating, make sure the connected motor is sized correctly for DC injection braking with regard to influx rate and duration.** **Failure to observe these instructions can result in damage to the equipment.** The braking current is activated by the logic input or selected as a stop mode once time span [DC injection time 1](tdI) has expired.	0.1*INV to IdC (2)	0.5*INV (2)
tdC (1)(3)	[DC injection time 2] **Caution!** **RISK OF DAMAGE TO THE MOTOR** • **Lengthy DC braking can cause overheating and damage to the motor.** • **To protect the motor, lengthy DC braking operations must be avoided.** **Failure to observe these instructions can result in damage to the equipment.** Maximum braking time [DC inject. level 2](IdC2) for the DC injection braking, only selected as stop configuration. This parameter is not available if [Type of stop](Stt) is set to [DC Injection](dCI).	0.1 to 30 s	0.5 s

(1) This parameter can also be accessed via menus [SETTINGS](SEt-) and [APPLICATION FUNCT.](FUn-).
(2) Corresponding to the nominal current of the inverter specified on the nameplate.
(3) These settings are independent of function [Auto DC injection](AdC-).

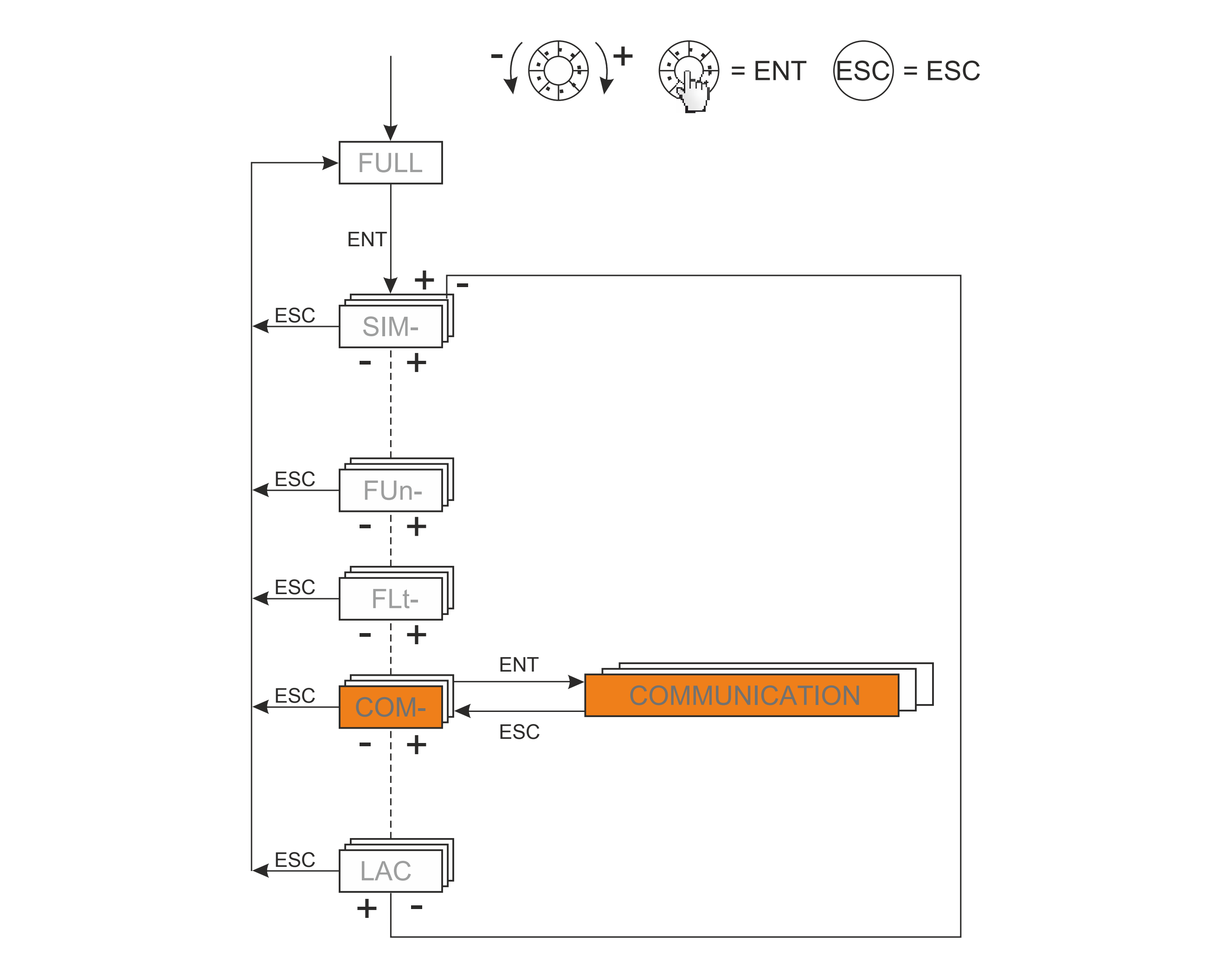
These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

4.2.3.6.9 [COMMUNICATION] (COM-)

With integrated display terminal:

From menu COnF:



4.2.3.6.9.1 [COM. SCANNER INPUT] (ICS-)

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > COM- > ICS-			
Code	**Name/Description**	**Setting range**	**Factory settings**
ICS-	[COM. SCANNER INPUT] [Scan. IN1 address](nMA1) to [Scan. IN4 address 4](nMA4) can be used for communication scanner fast tasks.		
nMA1	[Scan. IN1 address] Address of input word 1		3.201
nMA2	[Scan. IN2 address] Address of input word 2		8.604
nMA3	[Scan. IN3 address] Address of input word 3		0
nMA4	[Scan. IN4 address] Address of input word 4		0
nMA5	[Scan. IN5 address] Address of input word 5		0
nMA6	[Scan. IN6 address] Address of input word 6		0
nMA7	[Scan. IN7 address] Address of input word 7		0
nMA8	[Scan. IN8 address] Address of input word 8		0

4.2.3.6.9.2 [COM SCAN OUTPUT MAP] (OCS-)

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > COM- > OCS-			
Code	**Name/Description**	**Setting range**	**Factory settings**
OCS-	**[COM SCAN OUTPUT MAP]** **[Scan. IN1 address]**(nCA1) to **[Scan. Out4 address]**(nCA4) can be used for communication scanner fast tasks.		
nCA1	**[Scan. Out1 address]** Address of output word 1		8.501
nCA2	**[Scan.Out2 address]** Address of output word 2		8.602
nCA3	**[Scan.Out3 address]** Address of output word 3		0
nCA4	**[Scan.Out4 address]** Address of output word 4		0
nCA5	**[Scan.Out5 address]** Address of output word 5		0
nCA6	**[Scan.Out6 address]** Address of output word 6		0
nCA7	**[Scan.Out7 address]** Address of output word 7		0
nCA8	**[Scan.Out8 address]** Address of output word 8		0

4.2.3.6.9.3 [MODBUS NETWORK] (Md1-)

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > COM- > Md1-			
Code	**Name/Description**	**Setting range**	**Factory settings**
Md1-	**[MODBUS NETWORK]**		
Add OFF -	**[Modbus Address]** **[OFF]**(OFF) 1 to 247	**[OFF]**(OFF) to 247	**[OFF]**(OFF)
AMOC ★ OFF -	**[Modbus add Com. C.]** **[OFF]**(OFF) 1 to 247	**[OFF]**(OFF) to 247	**[OFF]**(OFF)
tbr	**[Modbus baud rate]** 4.8 - 9.6 - 19.2 - 38.4 Kbit/s on the integrated operator display terminal. 4800, 9600, 19200 or 38400 baud on the graphic display terminal.		**[19.2 kbps]**(19.2)
tFO	**[Modbus format]** 1 - 8E1 - 8n1, 8n2		**[8-E-1]**(8E1)
ttO	**[Time Out]** 0.1 to 30 s	0.1 to 30 s	10.0 s
COM1 r0t0 r0t1 r1t0 r1t1	**[Mdb com stat]** **[r0t0]**(r0t0): Modbus, no data received, no data transferred = Communication inactive **[r0t1]**(r0t1): Modbus, no data received, data transferred **[r1t0]**(r1t0): Modbus, data received, no data transferred **[r1t1]**(r1t1): Modbus, data received, data transferred		

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

4.2.3.6.9.4 [CANopen com.] (CnO-)

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > COM- > CnO-			
Code	**Name/Description**	**Setting range**	**Factory settings**
CnO-	**[CANopen com.]**		
AdCO OFF -	**[CANopen address]** **[OFF]**(OFF): OFF 1 to 127	**[OFF]**(OFF) to 127	**[OFF]**(OFF)
bdCO 50 125 250 500 IM	**[CANopen bit rate]** **[50 kbit/s]**(50): 50,000 baud **[125 kbit/s]**(125): 125,000 baud **[250 kbit/s]**(250): 250,000 baud **[500 kbit/s]**(500): 500,000 baud **[1 Mbit/s]**(1M): 1 Mbaud		**[250 kbps]**(250)
ErCO	**[Error code]** Read-only parameter, cannot be modified.	0 to 5	-

4.2.3.6.9.5 [COMMUNICATION CARD] (Cbd-)

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > COM- > Cbd-	
Code	**Name/Description**
Cbd-	**[COMMUNICATION CARD]** For specific documentation on the card used, see section "Interfaces".

4.2.3.6.9.6 [Forced local] (LCF-)

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > COM- > LCF-			
Code	**Name/Description**	**Setting range**	**Factory settings**
LCF-	**[Forced local]**		
FLO	**[Forced local assign.]** "Forced local" assignment. Mode "Forced local" is active if the input state is 1. **[Forced local assign.]**(FLO)is forced to **[No]**(nO), if **[Profile]**(CHCF) = **[I/O profile]**(IO) is set.		**[No]**(nO)
nO LI1 ... LI6 LAI1 LAI2 OL01 ... OL10	**[No]**(nO): Function not active **[LI1]**(LI1): Logic input LI1 ... **[LI6]**(LI6): Logic input LI6 **[LAI1]**(LAI1): Logic input AI1 **[LAI2]**(LAI2): Logic input AI2 **[OL01]**(OL01): Function blocks: Logic output 01 ... **[OL10]**(OL10): Function blocks: Logic output 10		
FLOC	**[Forced local Ref.]** "Forced local" setpoint source assignment.		**[No]**(nO)
nO AI1 AI2 AI3 LCC PI OA01 ... OA10	**[No]**(nO): Not assigned (control via terminals with setpoint of zero). **[AI1]**(AI1): Analog input **[AI2]**(AI2): Analog input **[AI3]**(AI3): Analog input **[HMI]**(LCC): Assignment of setpoint and control to the graphic display terminal or external operator terminal. Setpoint: **[HMI Frequency ref.]**(LFr) Control: Buttons RUN/STOP/FWD/REV. **[RP]**(PI): Pulse input **[OA01]**(OA01): Function blocks: Analog output 01 ... **[OA10]**(OA10): Function blocks: Analog output 10		
FLOt ★	**[Time-out forc. local]** 0.1 to 30 s. This parameter is accessible if **[Forced local assign.]**(FLO) is not equal to **[No]**(nO). Delay before communication monitoring is resumed on exiting mode "Forced local".	0.1 to 30 s	10.0 s

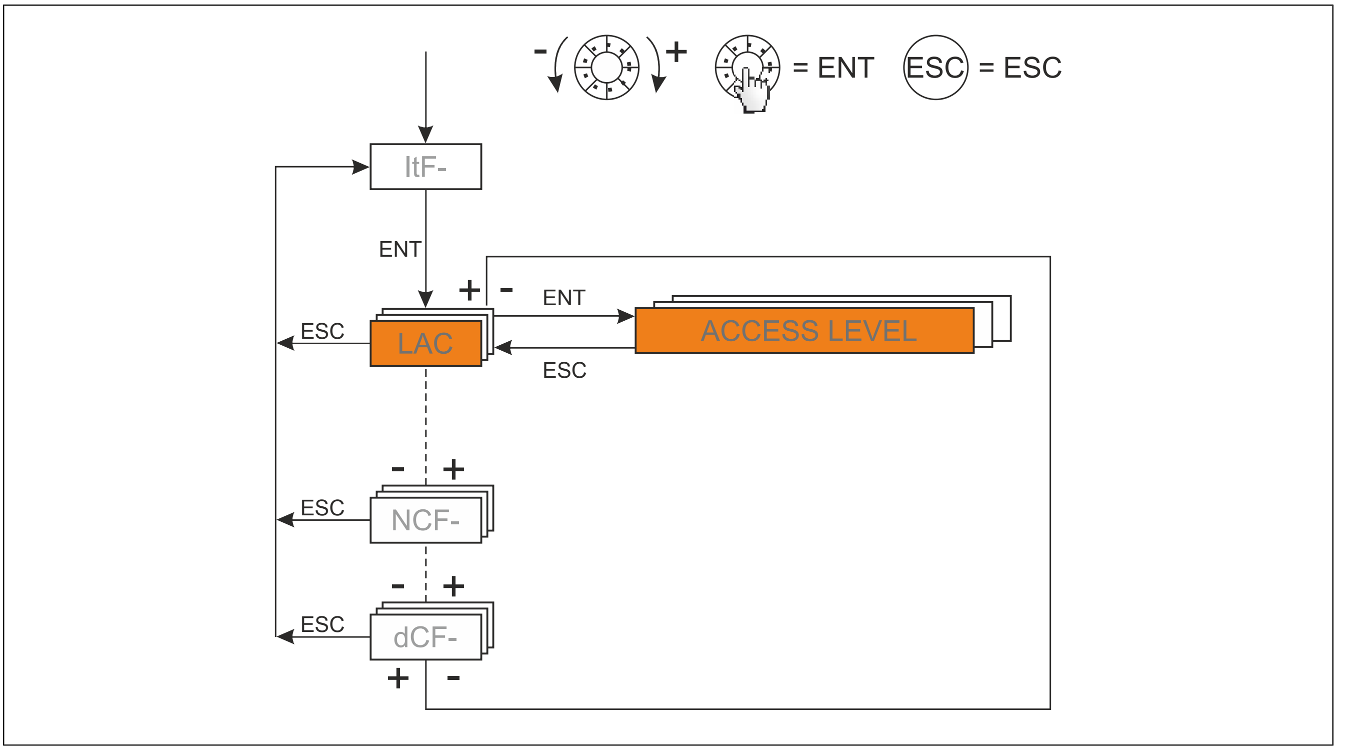
★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

4.2.3.6.9.7 [Fieldbus Identification] (NTID)

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > COM- > NTID		
Code	**Name/Description**	**Factory settings**
NTID	**[Fieldbus Identification]** • This parameter allows the ACOPOSinverter to perform identification via the network. • Changes to the setting values do not take effect until after the ACOPOSinverter has been restarted. • This parameter does not form part of the inverter configuration and cannot be transferred. • The factory setting does not configure the setting values for the parameter.	-
320	**[ATV320]**(320): Inverter identification via the network.	

4.2.4 Interface (ItF)

4.2.4.1 [3.1 ACCESS LEVEL] (LAC)



The parameters described on this page are accessed as follows: DRI- > ITF > LAC		
Code	**Name/Description**	**Factory settings**
LAC	**[3.1 ACCESS LEVEL]**	**[Standard]**(Std)
bAS	**[Base]**(bAS): Limited access to menu **[SIMPLY START]**(SIM-), **[1.2 MONITORING]**(MOn-), **[SETTINGS]**(SEt-), **[Factory settings]**(FCS-), **[5 PASSWORD]**(COd) and **[3.1 ACCESS LEVEL]**(LAC-). Each input can only be assigned to one function.	
Std	**[Standard]**(Std): Access to all menus of the integrated operator terminal. Only one function can be assigned to each input.	
AdU	**[Advanced]**(AdU): Access to all menus of the integrated operator terminal. Several functions can be assigned to each input.	
Epr	**[Expert]**(EPr): Access to all menus of the integrated operator terminal. Several functions can be assigned to each input.	

Parameter that can be modified during operation or when stopped.

Overview of the menus that can be called from the graphic display terminal / integrated display terminal

Menu	Submenu			Access level
[1 DRIVE MENU] (drI-)				Basic bAS
	[1.1 SPEED REFERENCE] (rEF-)			
	[1.2 MONITORING] (Mon-)			
		MMO - (Motor monitoring)		
		IOM - (I/O MAP)		
		SAF - (Safety monitoring)		
		Mfb - (Function Block monitoring)		
		CMM - (Communication Map)		
		MPI - (PI monitoring)		
		Pet - (Consumption monitoring)		
		Alr - (Alarms) (1)		
		Sst - (Other state) (1)		
		Cod - (Access code) (2)		
	[1.3 CONFIGURATION] (COnF)			
		MYMn - (My Menu)		
		FCS - (Factory Settings)		
		FULL - (All parameters)		
			SIM - (Simple start)	
			Set - (Settings)	
			FbM - (Function blocks)	
[2 IDENTIFICATION] (OId-) (1)				
[3 INTERFACE] (ItF-) (1)				
	[3.1 ACCESS LEVEL] (LAC)			
	[3.2 LANGUAGE] (LnG)			
[4 LOAD/SAVE AS] (trA-) (1)				
[5 ACCESS CODE] (Cod-) (1)				
A single function can be assigned to each input.				
[1 DRIVE MENU] (drI-)	[1.2 MONITORING] (Mon-)	dGt - (Diagnostics)		Standard Std
	[1.3 CONFIGURATION] (COnF)	FULL - (All parameters)		
			drC - (Drive data)	
			I_O - (Inputs / Outputs CFG)	
			CtL - (Control)	
			Fun - (Application function)	
			Flt - (Error Management)	
			COM - (Communication)	
[3 INTERFACE] (ItF-)(1)	[3.3 MONITORING CONFIG.] (MCF-)			
A single function can be assigned to each input.				
	[3.4 DISPLAY CONFIG.] (dCF-) (1)			Advanced AdU
A single function can be assigned to each input.				
Expert parameters				Expert Epr
A single function can be assigned to each input.				

(1) Can be accessed only with graphic display terminal
(2) Can be accessed only with handheld (7 segment display)

4.2.4.2 [3.2 LANGUAGE] (LnG)

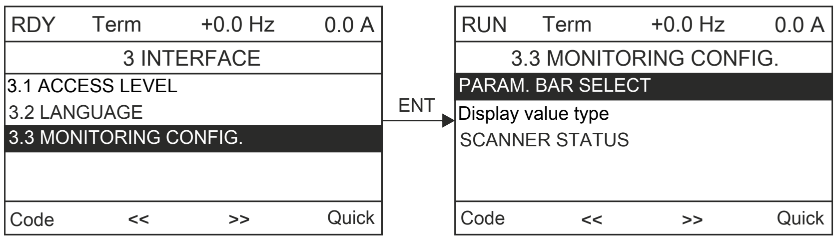
When only one selection is possible, the selected item is indicated by the ✓.
Example: Only one language can be chosen.

The parameters described on this page are accessed as follows: DRI- > ITF > LnG		
Code	**Name/Description**	**Factory setting**
LnG	**[3.2 LANGUAGE]**	**[Language 0]**(LnG0)
	Languages currently available.	
LnG0	**[Language 0]** (LnG0)	
...	...	
LnG9	**[Language 9]**(LnG9)	

Parameter that can be modified during operation or when stopped.

4.2.4.3 [3.3 MONITORING CONFIG.] (MCF-)

This menu can only be accessed with the graphic display terminal.



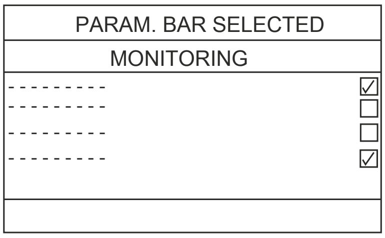
This can be used to configure the information displayed on the graphic display screen during operation.

[PARAM. BAR SELECT]
Selection of 1 to 2 parameters in the upper line
(the first two parameters cannot be changed).

[Display value type]
Selection of the parameters displayed in the middle of the screen and the display mode
(digital values or bar graph)

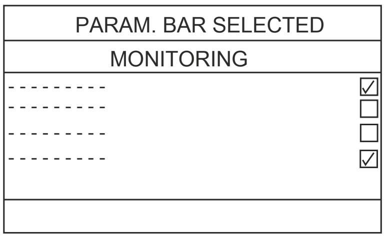
[SCANNER STATUS]
Selection of the displayed words and their format.

The parameters described on this page are accessed as follows: DRI- > ITF > MCF-

Code	Name/Description
MCF-	[3.3 MONITORING CONFIG.]
PbS-	[PARAM. BAR SELECT] [AI1Ref] in V [AI2Ref] in V [AI3Ref] in mA [AO1] in V [ETA state word] [Alarm groups] [Frequency ref.] in Hz: Parameter displayed in the factory setting [Output frequency] in Hz [I motor]In A: Parameter displayed in the factory setting [Motor speed] in rpm [Motor voltage] in V [Motor power] in W [Motor torque] as a % [Mains voltage] in V [Motor thermal state] as a % [Drv.thermal state] as a % [Consumption] in watt hours (Wh) or kilowatt hours (kWh) in accordance with the inverter type [Run time] in hours (motor duty cycle) [Elapsed time] in hours (inverter duty cycle) [IGBT alarm counter] in seconds (accumulated overheating alarm time) [Min. freq time] in seconds [PID speed ref.] as a % [PID feedback] as a % [PID error] as a % [PID Output] in Hz [Config. active] CNF0, 1 or 2 [Utilised param. set] SET1, 2 or 3 The parameter is selected or deselected using ENT (a ✓ appears next to the parameter when it is selected). 1 or 2 parameters can be selected. Example: 

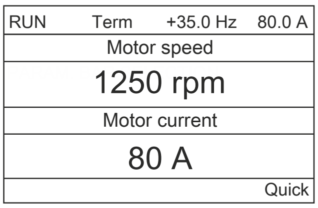
Display value type

The parameters described on this page are accessed as follows: DRI- > ITF > MCF- > MSC-		
Code	**Name/Description**	**Factory settings**
MSC-	**[Display value type]**	
Mdt	**[Display value type]** **[Digital]**(dEC) **[Bar graph]**(bAr) **[List]**(LISt)	**[Digital]**(dEC)
MPC	**[PARAMETER SELECTION]** **[AI1Ref]** in V **[AI2Ref]** in V **[AI3Ref]** in mA **[AO1]** in V **[ETA state word]** **[Alarm groups]** **[Frequency ref.]** in Hz: Parameter displayed in the factory setting **[Output frequency]** in Hz **[Pulse in. work. freq.]** in A: Parameter displayed in the factory setting **[I motor]** in Hz **[Motor speed]** in rpm **[Motor voltage]** in V **[Motor power]** in W **[Motor torque]** as a % **[Mains voltage]** in V **[Motor thermal state]** as a % **[Drv.thermal state]** as a % **[Consumption]** in watt hours (Wh) or kilowatt hours (kWh) in accordance with the inverter type **[Run time]** in hours (motor duty cycle) **[Elapsed time]** in hours (motor duty cycle) **[IGBT alarm counter]** in seconds (accumulated overheating alarm time) **[Min. freq time]** in seconds **[PID speed ref.]** as a % **[PID feedback]** as a % **[PID error]** as a % **[PID Output]** in Hz Parameters are selected or deselected using ENT (a ✓ appears next to the parameter when it is selected).	

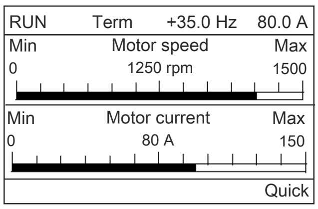


Examples:

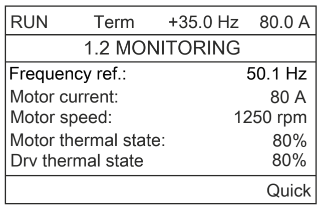
Display of two digital values



Display of two bar graphs



Display of a list of five values



These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

Comm. image.

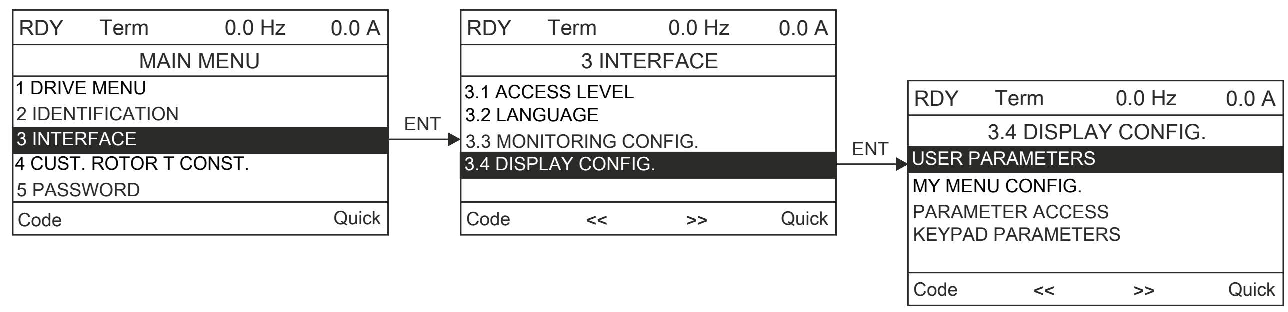
The parameters described on this page are accessed as follows: DRI- > ITF > MCF- > AdL-		
Code	**Name/Description**	**Factory settings**
AdL-	**[COM. MAP CONFIG.]**	
IAd1	**[Word IAd1 1 add. select.]** Select the address of the word to be displayed when you press the << and >> keys (F2 and F3) or turn the handwheel.	0
FAd1 HE SIG nSG	**[Format word 1]** Format of word 1. **[Hex]**(HE) **[Signed]**(SIG) **[Unsigned]**(nSG)	**[Hex]**(HE)
IAd2	**[Word 2 add. select.]** Select the address of the word to be displayed when you press the << and >> keys (F2 and F3) or turn the handwheel.	0
FAd2 HE SIG nSG	**[Format word 2]** Format of word 2. **[Hex]**(HE) **[Signed]**(SIG) **[Unsigned]**(nSG)	**[Hex]**(HE)
IAd3	**[Word 3 add. select.]** Select the address of the word to be displayed when you press the << and >> keys (F2 and F3) or turn the handwheel.	0
FAd3 HE SIG nSG	**[Format word 3]** Format of word 3. **[Hex]**(HE) **[Signed]**(SIG) **[Unsigned]**(nSG)	**[Hex]**(HE)
IAd4	**[Word 4 add. select.]** Select the address of the word to be displayed when you press the << and >> keys (F2 and F3) or turn the handwheel.	0
FAd4 HE SIG nSG	**[Format word 4]** Format of word 4. **[Hex]**(HE) **[Signed]**(SIG) **[Unsigned]**(nSG) The selected words can then be displayed in sub-menu **[COMMUNICATION MAP]** of menu **[1.2 MONITORING]**. Example:	

RUN	Term	+35.0 Hz	80.0 A
	COMMUNICATION MAP		
- - - - - - - - -			
- - - - - - - - -			
W3141:			F230 Hex
	<<	>>	Quick

Parameter that can be modified during operation or when stopped.

4.2.4.4 [3.4 DISPLAY CONFIG.] (dCF-)

This menu can only be accessed with the graphic display terminal. It can be used to customize parameters or a menu and to access parameters.

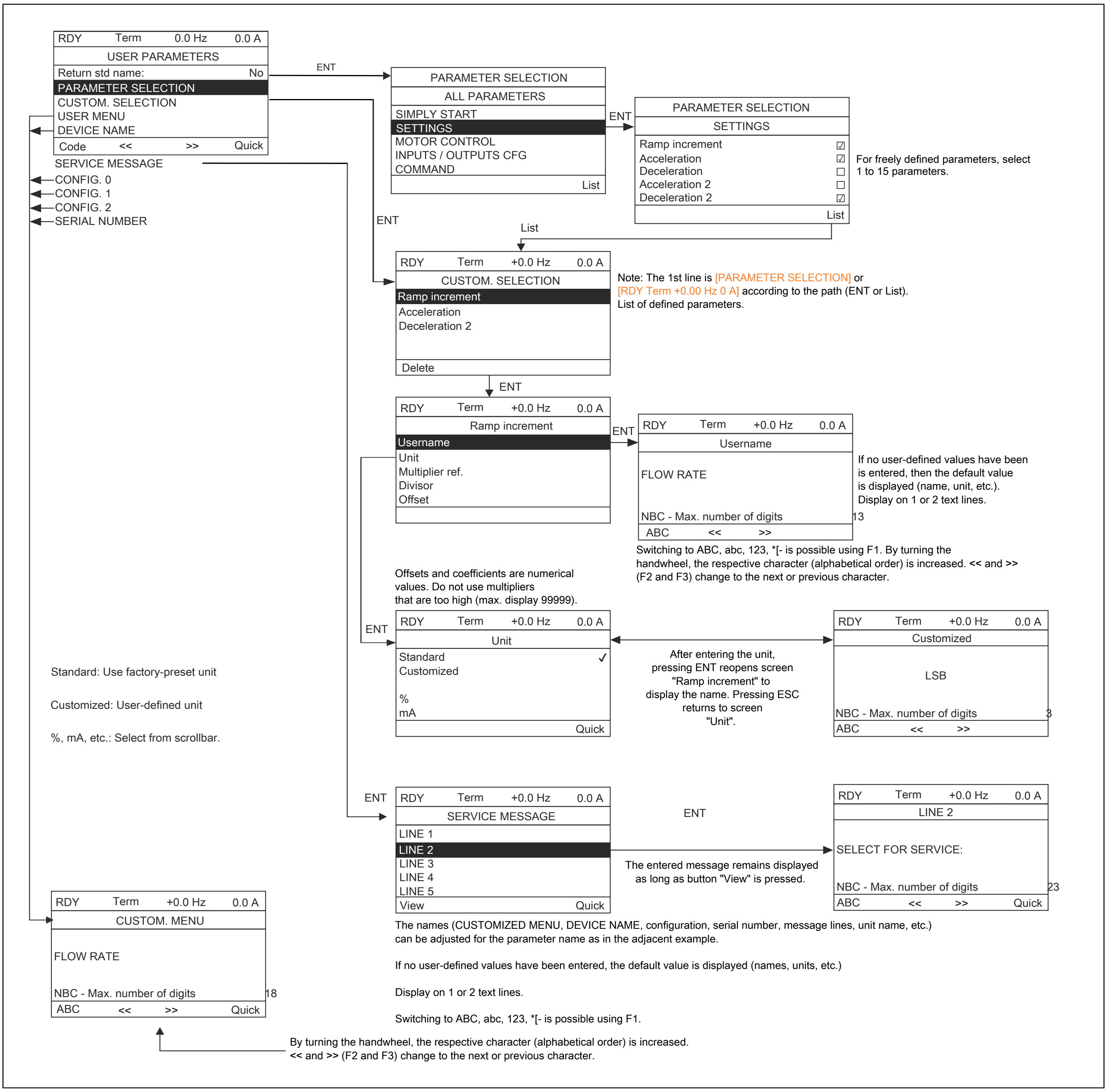


- USER PARAMETERS: Customization of 1 to 15 parameters.
- USER MENU: Creation of a user-defined menu.
- PARAMETER ACCESS: Customization of the visibility and protection mechanisms of menus and parameters.
- KEYPAD PARAMETERS: Adjustment of the contrast and stand-by mode of the graphic display terminal (parameters stored in the terminal rather than in the inverter).

The parameters described on this page are accessed as follows: DRI- > ITF > dCF-	
Code	**Name/Description**
dCF-	**[3.4 DISPLAY CONFIG.]**

User parameters

If **[Return std name]** is set to **[YES]**, the default display is restored but the adjustments are still saved.

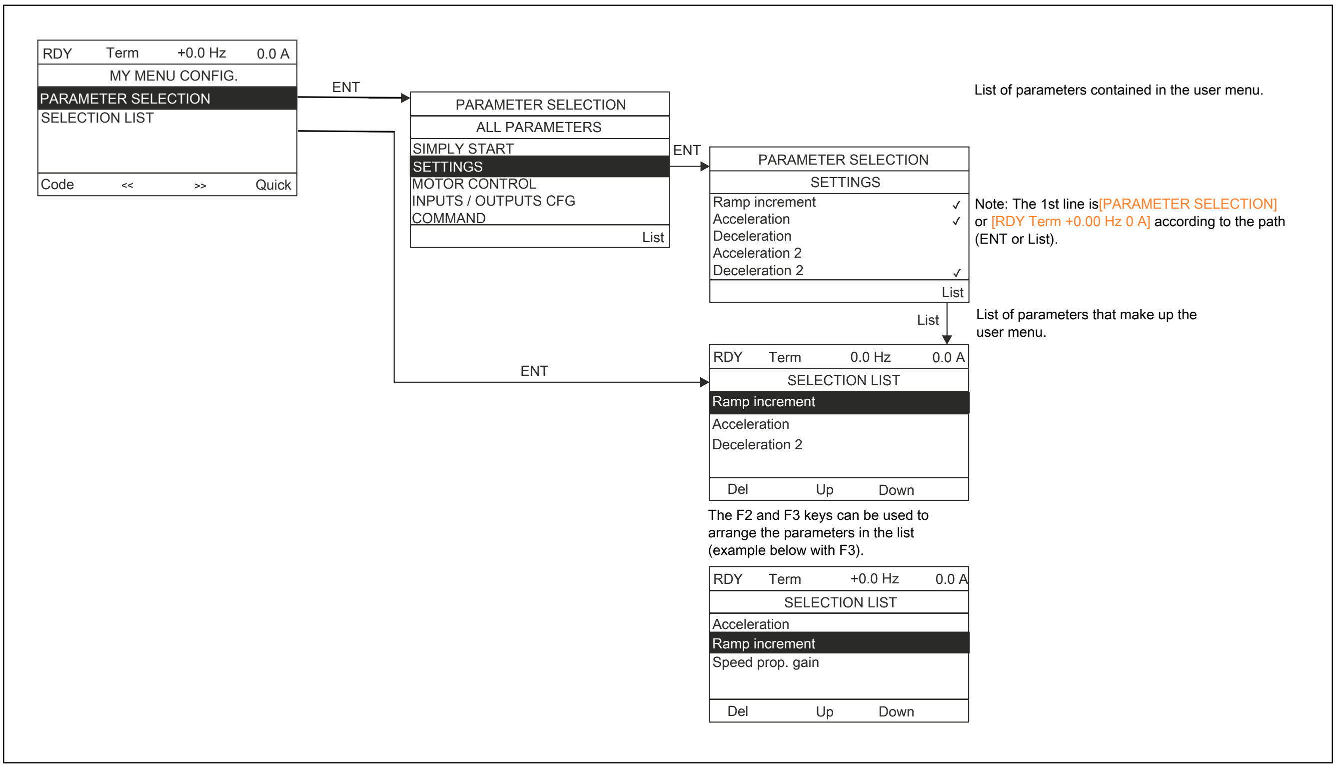


The parameters described on this page are accessed as follows: DRI- > ITF > dCF- > CUP-

Code	Name/Description	Factory settings
CUP-	**[USER PARAMETERS]**	
GSP	**[Return std name]** Displaying standard parameters instead of user-defined parameters.	**[No]**(nO)
nO	**[No]**(nO)	
YES	**[YES]**(YES)	
MYMN	**[USER MENU]**	
PAn	**[DEVICE NAME]**	
SEr-	**[SERVICE MESSAGE]**	
SML01	**[LINE 1]**	
SML02	**[LINE 2]**	
SML03	**[LINE 3]**	
SML04	**[LINE 4]**	
SML05	**[LINE 5]**	
CFN01	**[CONFIG. 0]**	
CFN02	**[CONFIG. 1]**	
CFN03	**[CONFIG. 2]**	
PSn	**[SERIAL NUMBER]**	

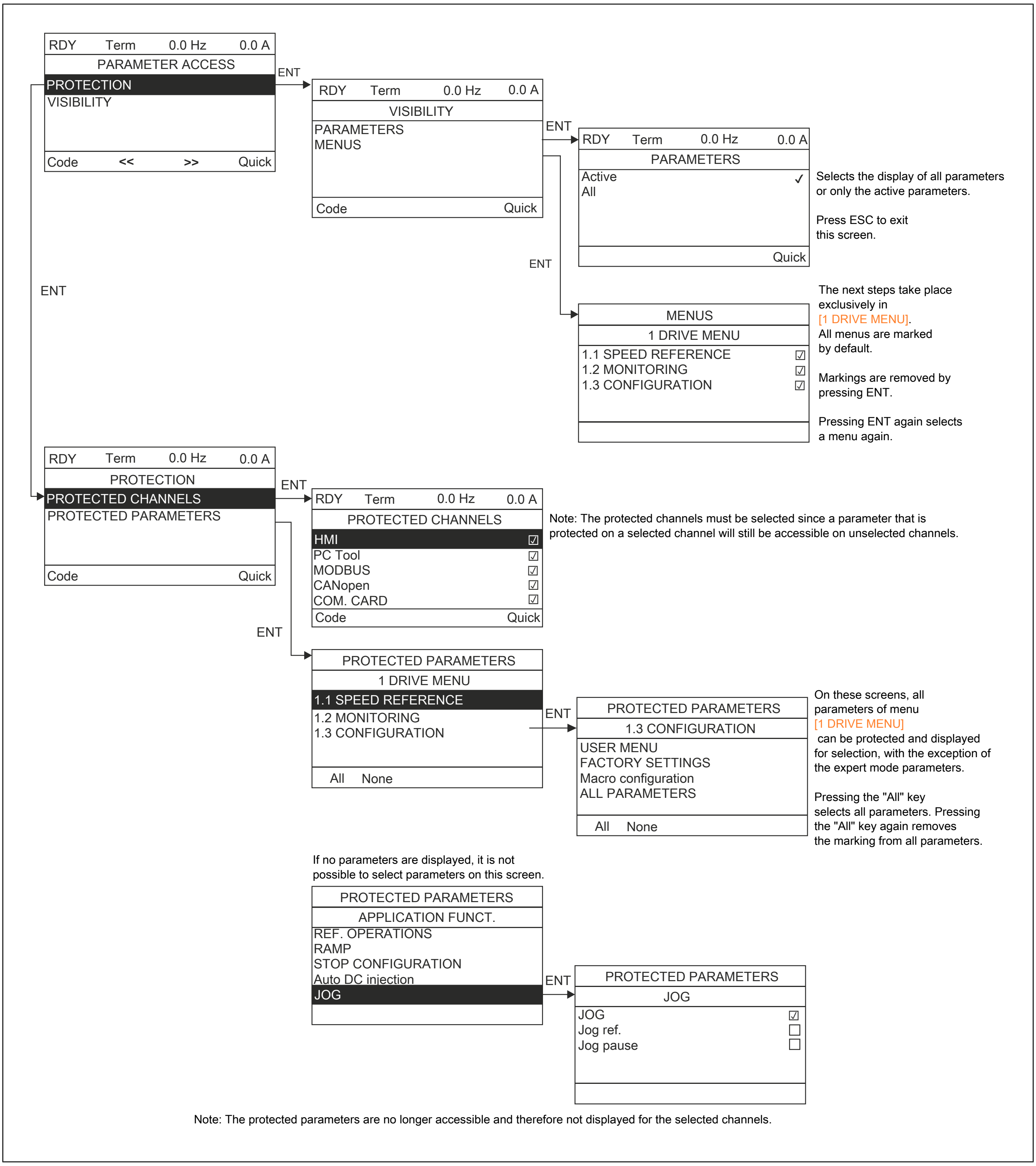
Parameter that can be modified during operation or when stopped.

My menu config.



The parameters described on this page are accessed as follows: DRI- > ITF > dCF- > MYC-	
Code	**Name/Description**
MYC-	**[MY MENU CONFIG.]**

Parameter access



The parameters described on this page are accessed as follows: DRI- > ITF > dCF- > pAC-	
Code	**Name/Description**
pAC-	**[PARAMETER ACCESS]**
prO-	**[PROTECTION]**
pCd-	**[PROTECTED CHANNELS]**
COn P S Mdb CAn nEt	**[HMI]**(COn): Graphic display terminal or external operator terminal **[PC Tool]**(P S): PC software **[Modbus]**(Mdb): Integrated Modbus **[CANopen com.]**(CAn): Integrated CANopen® **[Com. card]** (nEt): Communication card (if used)

The parameters described on this page are accessed as follows: DRI- > ITF > dCF- > pAC- > VIS-		
Code	**Name/Description**	**Factory settings**
VIS-	**[VISIBILITY]**	
PVIS	**[PARAMETERS]** Parameter display: Active parameters only, or all parameters.	**[Active]**(ACt)
ACt	**[Active]**(ACt)	
ALL	**[ALL]**(ALL)	

Parameter that can be modified during operation or when stopped.

Terminal parameters

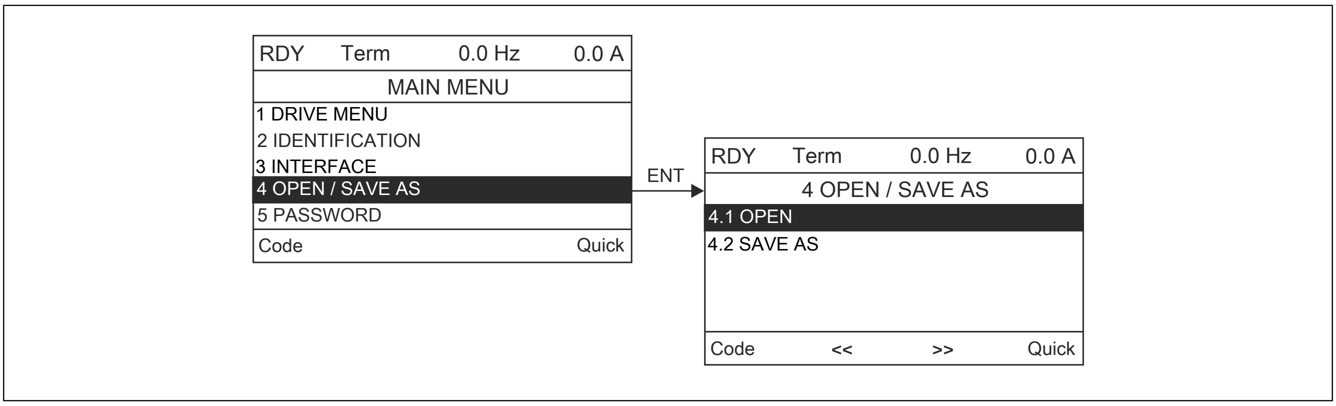
RDY	Term	0.0 Hz	0.0 A
KEYPAD PARAMETERS			
Keypad contrast:			50%
Keypad stand-by:			5 min
Code	<<	>>	Quick

The parameters described on this page are accessed as follows: DRI- > ITF > dCF- > CnL-			
Code	**Name/Description**	**Setting range**	**Factory settings**
CnL-	**[KEYPAD PARAMETERS]**		
CrSt	**[Keypad contrast]** Contrast setting for the keyboard.	0 to 100%	50%
CSbY	**[Keypad stand-by]** Delay setting for keyboard standby.	**[No]**(nO) up to 10 min	5 min
nO	**[No]**(nO): No		

Parameter that can be modified during operation or when stopped.

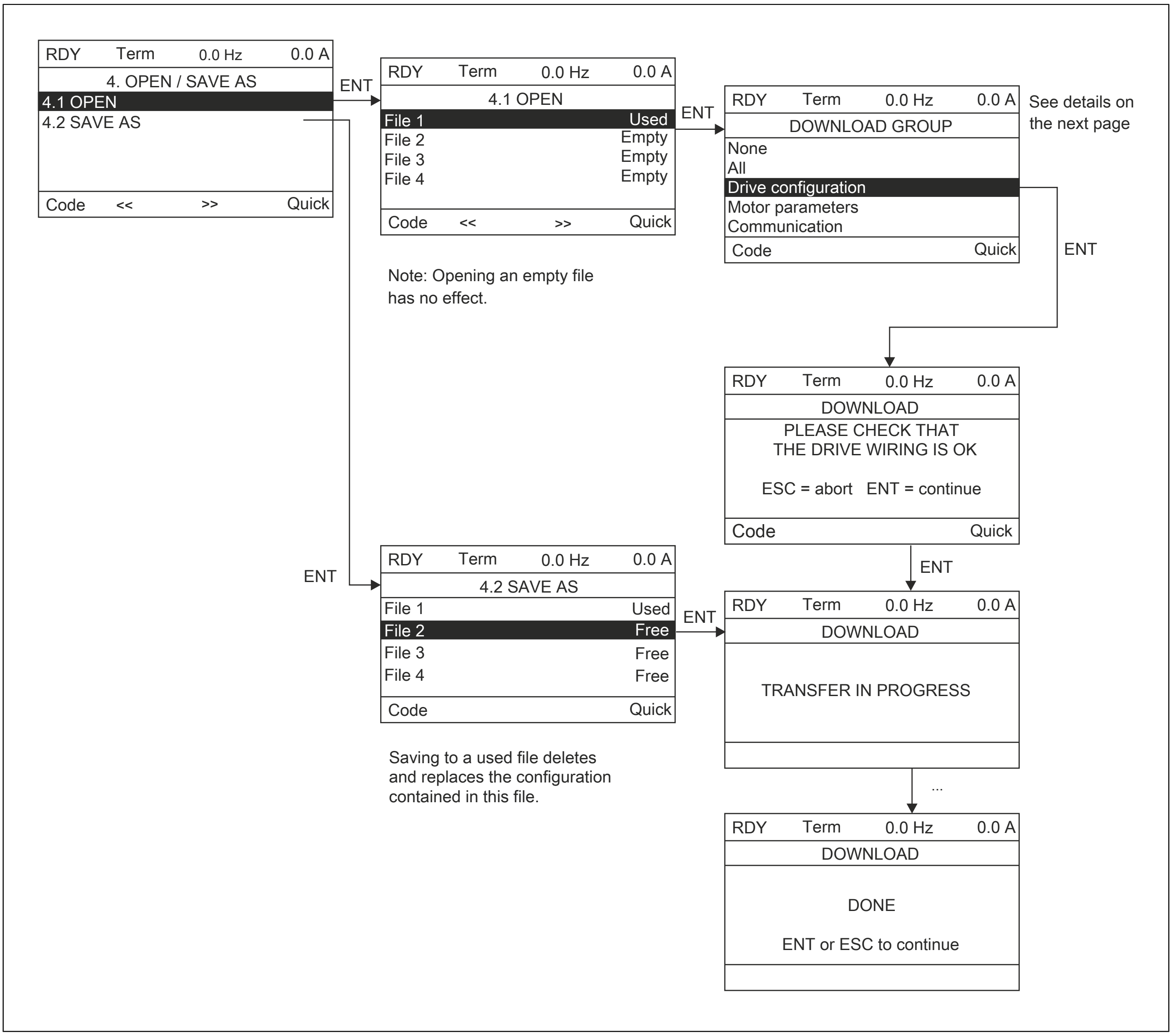
4.2.5 Load / Save as (trA)

This menu can only be accessed with the graphic display terminal.



[4.1 OPEN]: Load one of the four graphic terminal files into the inverter.

[4.2 SAVE AS]: Load the current inverter configuration into the graphic terminal.



Various messages may appear when the download is requested:

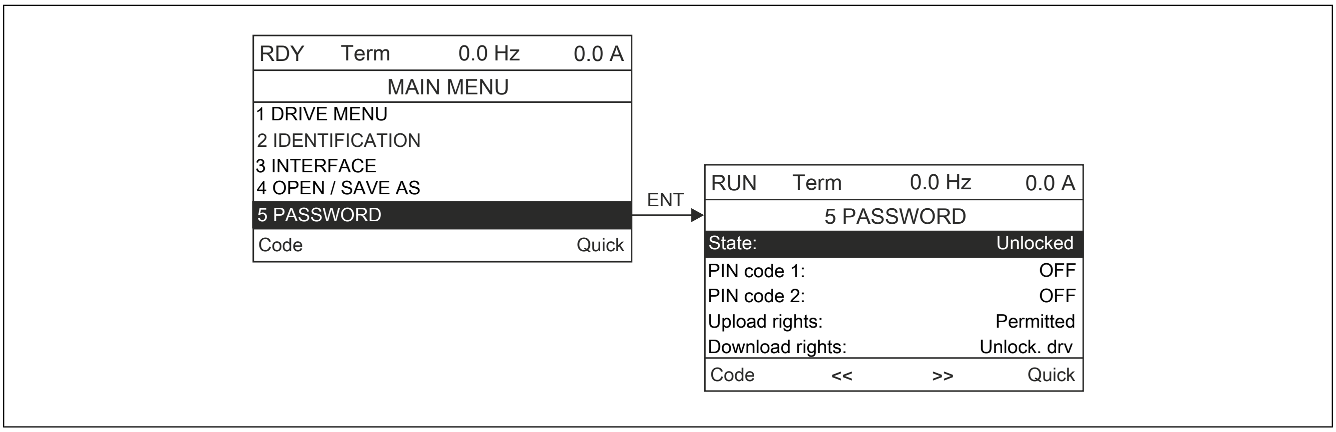
- **[DOWNLOAD IS ACTIVE]**
- **[DOWNLOAD COMPLETE]**
- Error messages if download not possible
- **[Motor parameters are NOT COMPATIBLE. Proceed?]**: In this case the download is possible, but the parameters will be restricted.

DOWNLOAD GROUP

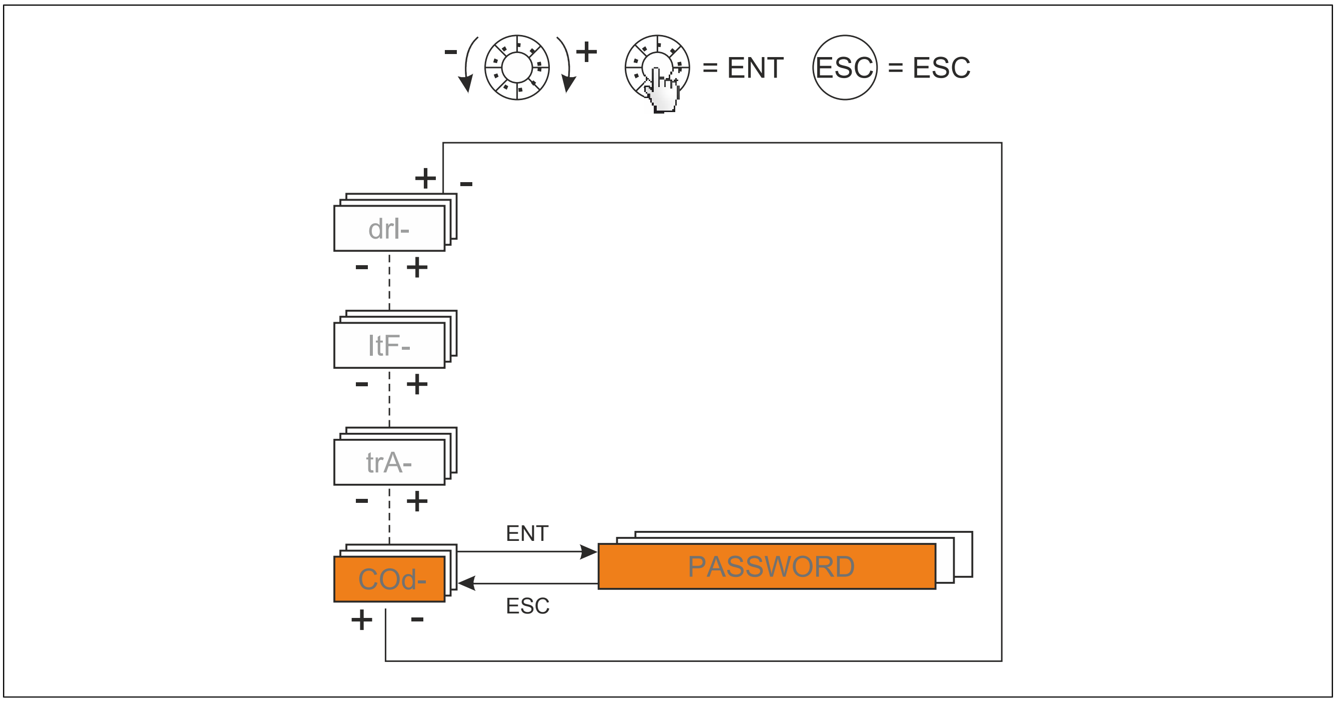
[No]:		No parameters
[ALL]:		All parameters in all menus
[Drive configuration]		The entire menu **[1 INVERTER MENU]** without **[COMMUNI-CATION]**
[Motor param]:	**[Rated motor volt.]**(UnS)	In menu **[MOTOR CONTROL]**(drC-)
	[Rated motor freq.](FrS)	
	[PSI align curr. max](NCr)	
	[Rated motor speed](nSP)	
	[Motor 1 Cosinus Phi](COS)	
	[Rated motor power](nPr)	
	[Motor param choice](MPC)	
	[Tune selection](StUn)	
	[Mot. therm. current](ItH)	
	[IR compensation] (UFr)	
	[Slip compensation] (SLP)	
	[Cust stator resist.](rSA)	
	[Lfw](LFA)	
	[Cust. rotor t const.](trA)	
	[Nominal I sync.] (nCrS)	
	[Nom motor spdsync](nSPS)	
	[Pole pairs](PPnS)	
	[Syn. EMF constant] (PHS)	
	[Autotune L d-axis](LdS)	
	[INDUCT: Lq axis](LqS)	
	[Nominal freq sync.](FrSS)	
	[Cust. stator R syn] (rSAS)	
	[Motor torque](tqS)	
	[Freq. Pkt 1 5Pkt UF](U1)	
	[F1](F1)	
	[Volt. Pt 2 5Pt UF](U2)	
	[Freq Pt 2 5Pt UF](F2)	
	[Volt. Pt 3 5Pt UF](U3)	
	[Freq Pt 3 5Pt UF](F3)	
	[Volt. Pt 4 5Pt UF](U4)	
	[Freq Pt 4 5Pt UF](F4)	
	[Volt. Pt 5 5Pt UF](U5)	
	[Freq Pt 5 5Pt UF](F5)	
	[Expert](EPr)	
	[Mot. therm. current](ItH)	Menu **[SETTINGS]**(SEt-)
[Communication]:		All parameters of menu **[COMMUNICATION]**

4.2.6 Access code (COd)

With graphic display terminal:

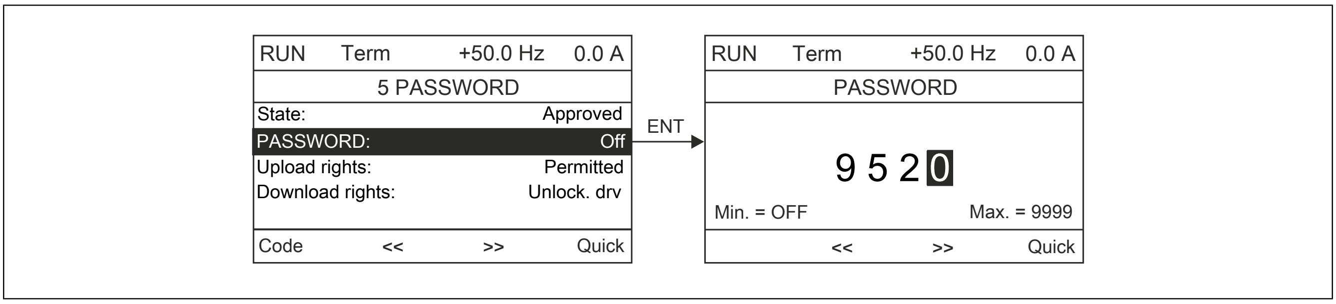


With integrated display terminal



Enables the configuration to be protected with an access code or a password to be entered in order to access a protected configuration.

Example using the graphic display terminal:



- The inverter is unlocked when the access codes are set to **[Unlocked]**(OFF) (no access code), or if the correct code has been entered. All menus are visible.
- Before protecting the configuration with an access code, the following is required:
  - Define the **[Upload rights]**(ULr) and **[Download rights]**(dLr)
  - Make a careful note of the code and keep it in a safe place where you will always be able to find it.
- The inverter has two access codes that allow 2 access levels to be set up:
  - Access code PIN 1 is a public unlock code: 6969.
  - Access code PIN 2 is an unlock code known only to B&R Product Support. It can only be accessed in mode **[Expert]**(EPr).
  - Only one access code can be used, PIN1 or PIN2; the second must be set to **[OFF]**(OFF).

Advice:

When the unlock code is entered, the user access code appears.

The following items are access-protected:

- Revert to the factory settings (Menu **[FACTORY SETTINGS]**(FCS-).
- The parameters and channels protected via menu **[USER MENU]**(MYMn-) as well as the menu itself.
- User-specific adjustment of the display (menu**[3.4 DISPLAY CONFIG.]**(dCF-)).

The parameters described below are accessed as follows: DRI- > COd-			
Code	**Name/Description**	**Setting range**	**Factory settings**
COd-	**[PASSWORD]**		
CSt	**[State]**		**[Unlocked]** (ULC)
	Information parameter, cannot be modified.		
LC	**[Locked]**(LC): The inverter is locked by an access code.		
ULC	**[Unlocked]**(ULC): The inverter is not locked by an access code.		
COd	**[PASSWORD]**	**[OFF]**(OFF) to 9,999	**[OFF]**(OFF)
	1st access code. The value **[OFF]**(OFF) indicates that no access code has been set to **[Unlocked]**(ULC). The value **[ON]**(On) indicates that the inverter is protected and an access code must be entered in order to unlock it. After the correct code has been entered, it remains on the display and the inverter is unlocked until the next time the power supply is disconnected. Access code PIN 1 is a public unlock code: 6969.		
COd2	**[PIN code 2]**	**[OFF]**(OFF) to 9,999	**[OFF]**(OFF)
	This parameter can only be activated in mode **[Expert]**(EPr). 2nd access code. The value **[OFF]**(OFF) indicates that no access code has been set to **[Unlocked]**(ULC). The value **[ON]**(On) indicates that the inverter is protected and an access code must be entered in order to unlock it. After the correct code has been entered, it remains on the display and the inverter is unlocked until the next time the power supply is disconnected. Access code PIN 2 is an unlock code known only to B&R Product Support. If **[PIN code 2]**(COd2) is not set to**[OFF]**(OFF), only menu **[1.2 MONITORING]**(MOn-) is displayed. If **[PIN code 2]**(COd2) is set to**[OF-F]**(OFF), all menus are displayed. If the display settings in menu **[3.4 DISPLAY CONFIG.]**(dCF-) are changed and **[PIN code 2]**(COd2) is not set to**[OFF]**(OF-F), the configured display is retained. If **[PIN code 2]**(COd2) is set to "Off" (inverter unlocked), the display configured in menu **[3.4 DISPLAY CONFIG.]**(dCF-) is retained.		
ULr	**[Upload rights]**		**[Permitted]**(ULr0)
	Read or copy the current configuration in the inverter.		
ULr0	**[Permitted]**(ULr0): The current configuration of the inverter can be loaded into the graphic terminal or the PC software.		
ULr1	**[Not allowed]**(ULr1): The current configuration of the inverter can only be loaded into the graphic terminal or the PC software if the inverter is not protected by an access code or if the correct code is entered.		
dLr	**[Download rights]**		**[Unlock. drv]**(dLr1)
	Writes the current configuration to the inverter or downloads a configuration to the inverter.		
dLr0	**[Locked drv]**(dLr0): A configuration file can only be loaded into the inverter if the inverter is protected by an access code that is the same as the access code for the configuration to be downloaded.		
dLr1	**[Unlock. drv]**(dLr1): A configuration file can be loaded into the inverter or an existing configuration in the inverter can be modified if the inverter has been unlocked (i.e. access code entered) or is not protected by an access code.		
dLr2	**[Not allowed]**(dLr2): Download not allowed.		
dLr3	**[Lock/unlock]**(dLr3): Combination of **[Locked drv]**(dLr0) and **[Unlock. drv]**(dLr1).		

4.3 Maintenance and diagnostics

4.3.1 Maintenance

Limitation of warranty

The warranty does not apply if the product has been opened by anyone other than B&R service administrators.

Service

Caution!

RISK OF DAMAGE TO FREQUENCY INVERTER

The following recommendations in relation to environmental conditions must be observed (temperature, chemical influences, dust).

Failure to observe these instructions can result in damage to the equipment.

For optimized operation, the following measures are recommended.

Environment	Affected components:	Measure	Interval
Physical impact on the product	Housing - Control block (LED display)	Perform a visual inspection of the inverter.	At least once a year
Corrosion	Terminals - Male connectors - Screws - EMC plate	Inspect, and clean if necessary	
Dust	Terminals - Fans - Air vents		
Temperature	In the vicinity of the product	Inspect, and adjust if necessary	
Cooling	Fans	Check operation of the fan.	
		Replace the fans.	After three to five years depending on operating conditions.
Vibration	Terminal connections	Check whether the terminal screws are tightened based on the recommended tightening torque.	At least once a year

Advice:

Fan operation is dependent on the thermal state of the inverter. It is possible for the inverter to be running but not the fan.

Spares and repairs

Maintainable product: Please contact your customer service center.

Lengthy storage periods

If the inverter has not been switched on for a long time, the capacitors must be fully charged before the motor is started.

Fan replacement

A new fan can be ordered within the scope of an ACOPOSinverter P66 maintenance agreement. See www.br-automation.com.

After an interruption to the product's power supply, the fans may continue to run for a certain length of time.

Advice:

OPERATING FANS

Before handling the fans, make sure that they have come to a complete stop.

Failure to observe these instructions can result in damage to the equipment.

Advice:

For additional information, see chapter 3.3.3 "Forming DC bus capacitors" on page 65.

4.3.2 Diagnostics and error correction

> **Danger!**
>
> **RISK OF ELECTRIC SHOCK, ARC FLASH OR EXPLOSION**
>
> **Before performing the tasks described in this section, read the instructions contained in the "Safety Information" paragraph carefully.**
>
> **Failure to follow these instructions can result in death or serious injury.**

4.3.2.1 Error code

- If the display does not light up, check the power supply to the inverter.
- The assignment of the "Fast stop" or "Freewheel" functions will prevent the inverter starting if the corresponding logic inputs are not powered up. The ACOPOSinverter then displays **[Freewheel]** (nSt) for a freewheel stop and **[Fast stop]** (FSt) for a fast stop. This is normal since these functions are active at zero so that the inverter will be stopped safely if there is a wire break.
- Make sure that the input for move commands is enabled according to the selected control mode (parameter**[2/3 wire control]** (tCC) and **[2 wire type]** (tCt)).
- If an input of the function "limit switch" is assigned and is set to zero, then the inverter can only be started with a run command for the opposite direction.
- If the setpoint or command channel is assigned to a communication bus, the inverter displays the message **[Freewheel]** (nSt) when the power supply is connected and remains in mode stop until the communication bus sends a command.

Code	Name/Description
dGt-	**[DIAGNOSTICS]** This menu can only be accessed with the graphic display terminal. It shows the detected errors and their causes in full-text and can be used for the implementation of tests.

4.3.2.2 Clearing the fault

In the event of a detected error:

- Disconnect all power supplies, including the power supply to the control section if applicable.
- Lock all power disconnects in the open position.
- Wait 15 minutes to allow the DC bus capacitors to discharge. (The LEDs on the inverter can no longer display whether there is no DC bus voltage present.)
- Measure the voltage of the DC bus between the PA/+ and PC/- terminals to ensure that the voltage is less than 42 V.
- If the DC bus capacitors do not discharge fully, contact your local B&R representative. The inverter is not permitted to be repaired or put into operation in this case.
- Determine the cause of the error and resolve the error.
- Reinstate the power supply to the inverter to check whether the error has been resolved.

If the detected error can be reset, the inverter can be reset after the cause has been eliminated.

- You can do this by switching off the inverter until the display disappears completely, then switching it on again.
- Automatically, in the cases described for function **[AUTOMATIC RESTART]** (Atr-).
- Via a logic input or a control bit with assignment to function **[FAULT RESET]** (rSt-).
- By pressing STOP/RESET on the keyboard of the graphic display terminal, if the active channel command is HMI (see **[Cmd channel 1]** (Cd1)).

4.3.2.3 Errors that require the power supply to be restarted after elimination of the cause

The cause of the fault must be removed before resetting by turning off and then back on.

Errors ASF, brF, SOF, SPF and tnF can also be corrected locally via a logic input or control bit (parameter **[Fault reset]** (rSF)).

Error	Name	Probable cause	Correcting errors
AnF	**[Load slipping]**	• The difference between the output frequency and the speed feedback is not correct.	• Check motor, gain and stability parameters. • Add a braking resistor. • Check the sizing of the motor/inverter/load. • Check the mechanical connection and wiring of the encoder. • Check the parameter setting.
ASF	**[Angle Error]**	• This error occurs during measurement of the phase shift angle if the motor phase has failed or motor induction is too high.	• Check the speed control parameters. • Check the motor phases and the maximum permissible current for the inverter.
brF	**[Brake feedback]**	• The brake feedback contact does not match the brake logic. • The brake does not stop the motor fast enough (detected by measuring the speed on the pulse input).	• Check the feedback circuit path and the brake control circuit. • Check the mechanical state of the brake. • Check the condition of the brake lining.
CrF1	**[Precharge]**	• Charging relay control error or charging resistor damaged.	• Turn the inverter off and then on again. • Check internal connections. • Contact B&R Product Support.
EEF1	**[Control Eeprom]**	• Internal memory error, control block.	• Check the environment (electromagnetic compatibility). • Switch the inverter off, then switch back on again, restore factory settings. • Contact B&R Product Support.
EEF2	**[Power Eeprom]**	• Internal memory fault, power card	
FCF1	**[Output contactor closed]**	• The output contactor remains closed, even though the conditions for opening the contactor are met.	• Check the contactor and its wiring. • Check the feedback circuit path.
HdF	**[IGBT desaturation]**	• Short circuit or grounding at the inverter output.	• Check the connection cables from the inverter to the motor and the motor insulation.
ILF	**[Internal com. link]**	• Communication between option card and inverter interrupted.	• Check the environment (electromagnetic compatibility). • Check the connections. • Replace the option card. • Contact B&R Product Support.
InF1	**[FI size error]**	• The power card is different from the saved power card.	• Check the power card reference type.
InF2	**[Incompatible PB]**	• The power card is incompatible with the control block.	• Check the reference of the power card and its compatibility.
InF3	**[Internal serial link]**	• Communication between the internal cards interrupted	• Check internal connections. • Contact B&R Product Support.
InF4	**[Internal-mftg zone]**	• Internal data inconsistent	• Recalibrate the inverter (through B&R customer service).
InF6	**[Internal - fault option]**	• The option installed in the inverter is not recognized.	• Check the option type and compatibility.
InF9	**[Internal- I measure]**	• The current measurements are not correct.	• Replace the current transmitter or power card. • Contact B&R Product Support.
InFA	**[Internal-mains circuit]**	• The input stage is not operating correctly.	• Contact B&R Product Support.
InFb	**[Internal- th. sensor]**	• The inverter's temperature sensor is not operating correctly.	• Replace the inverter's temperature sensor. • Contact B&R Product Support.
InFE	**[internal- CPU]**	• Internal microprocessor error.	• Switch off and reset. • Contact B&R Product Support.
OCF	**[Overcurrent]**	• Parameters in menus **[SETTINGS]** (SEt-) and **[MOTOR CONTROL]** (drC-) are not correct. • Inertia or load too high. • Mechanical block.	• Check the parameters. • Check the sizing of the motor/inverter/load. • Check the state of the mechanism. • Lower the value set in **[Overcurrent]** (CLI). • Increase the clock frequency.
SAFF	**[Safety fault]**	• Debounce time exceeded. • SS1 trigger threshold value exceed. • Incorrect configuration: • SLS overspeed triggering detected.	• Check the configuration of the safety functions. • Check the information provided in chapter "Safety functions" of the ACOPOSinverter manual. • Contact B&R Product Support.
SCF1	**[Motor short circuit]**	• Short circuit or grounding at the inverter output.	• Check the connection cables from the inverter to the motor and the motor insulation. • Reduce the clock frequency. • Connect the motor throttles in series. • Check speed control and brake setting. • Increase **[Time to restart]** (ttr) • Increase the clock frequency.

Error	Name	Probable cause	Correcting errors
SCF3	**[Ground short circuit]**	• Significant discharge current if several motors are connected in parallel.	• Check the connection cables from the inverter to the motor and the motor insulation. • Reduce the clock frequency. • Connect the motor throttles in series. • Check speed control and brake setting. • Increase **[Time to restart]** (ttr) • Reduce the clock frequency.
SOF	**[Overspeed]**	• Instability or driving load too high.	• Check the parameters for motor, gain and stability. • Add braking resistor. • Check the sizing of the motor/inverter/load. • Check the parameter settings for function **[FREQUENCY METER]** (FqF-) if these are configured.
SPF	**[Speed fdback loss]**	• There is no signal at input "Pulse input" if this is used for speed measurement. • Encoder feedback signal is missing.	• Check the encoder's configuration parameters. • Check the wiring between the encoder and the inverter. • Check the encoder. • Check the cabling on the input and the sensors used.
tnF	**[Auto-tuning]**	• Special motor or motor whose power is not suitable for the inverter. • Motor not connected to the inverter. • Motor not stopped.	• Check that the motor and inverter are compatible. • Check that the motor is detected during autotuning. • If using an output motor contactor, close this during autotuning. • Check that the motor is stopped during autotuning.

4.3.2.4 Errors that can be acknowledged by an automatic restart after the cause is removed.

These errors can also be reset by switching off and then on again or via a logic input or a control bit (parameter **[Fault reset]** (rSF)).

Error	Name	Probable cause	Correcting errors
bLF	**[Brake control]**	• Braking stroke current not attained. • Threshold of brake engagement frequency **[Brake engage freq.]** (bEn) only regulated when the brake logic is assigned.	• Check the inverter/motor connection. • Check the motor windings. • Check settings **[Brake release I FW]** (Ibr) and **[Brake release I Rev]** (Ird). • Use the recommended settings for **[Brake engage freq.]** (bEn).
CnF	**[Com. card]**	• Communication interruption at communication card	• Check the environment (electromagnetic compatibility). • Check the wiring. • Check timeout. • Replace the option card. • Contact B&R Product Support.
COF	**[CANopen com.]**	• Communication interruption on the CANopen® bus.	• Check the communication bus. • Check timeout.
EPF1	**[extFlt LI/Bit]**	• Error triggered by an external device, depending on the user.	• Check the device that caused the error and switch it on again.
EPF2	**[External fault com.]**	• Fault triggered by a communication network	• Check the device that caused the error and switch it on again.
FbES	**[FB stop flt.]**	• Function blocks were stopped while the motor was running.	• Check the configuration of **[Stop FB Stop motor]** (FbSM).
FCF2	**[Out. contact. open.]**	• The output contactor remains open although the closing conditions have been met.	• Check the contactor and its wiring. • Check the feedback circuit path.
LCF	**[Line contactor]**	• The inverter is not switched on, although the **[Mains V. time out]** (LCt) has expired.	• Check the contactor and its wiring. • Check timeout. • Check the connection to power supply/contactor/inverter.
LFF3	**[AI3 4-20mA loss]**	• 4-20 mA setpoint loss at analog input AI3	• Check the connection on the analog inputs.
ObF	**[Overbraking]**	• Braking too strong or load is too high • Line voltage too high	• Increase deceleration. • If necessary install a braking resistor. • Activate function **[Dec ramp adapt.]** (brA) if it is compatible with the application. • Check the mains voltage.
OCF	**[Overcurrent]**	• Parameters in menu **[SETTINGS]** (SEt-) and **[MOTOR CONTROL]** (drC-) are incorrect. • Inertia or load too high. • Mechanical locking mechanism.	• Check the parameters. • Check the size of the motor/drive/load. • Check the state of the mechanism. • Reduce the **[Current Limit]** (CLI). • Increase the switching frequency.
OHF	**[Drive overheat]**	• Inverter temperature too high	• Check the motor load, inverter ventilation and ambient temperature. Allow the inverter to cool before switching it on again.
OLC	**[Process overload error]**	• Process overload	• Check and eliminate the cause of the overload. • Check the parameters of function **[PROCESS OVERLOAD]** (OLd-).
OLF	**[Motor overload]**	• Triggered by excessive motor current	• Check the setting of the motor thermal protection, check the motor load. Allow the motor to cool before switching it on again.
OPF1	**[1 output phase loss]**	• Loss of one phase at inverter output	• Check the connections between the inverter and the motor.
OPF2	**[3out ph loss]**	• Motor not connected or motor power too low • Output contactor open • Instantaneous instability in the motor current	• Check the connections between the inverter and the motor. • If using a motor contactor, set parameter **[Output Phase Loss]** (OPL) to **[Output cut]** (OAC). • Test to carry out if the motor power is too low or if the motor is not found: In the factory settings, check whether output phase losses detection is enabled **[Output Phase Loss]** (OPL) = **[YES]** (YES). If the inverter is to be tested or maintenance work is to be carried out without accessing a motor corresponding to the inverter model (this applies in particular for high-power inverters), disable the function for output phase loss detection: **[Output Phase Loss]** (OPL) = **[No]** (nO). • Check and optimize the following parameters: **[IR compensation]** (UFr), **[Rated motor volt.]** (UnS) and **[Rated motor volt.]** (nCr) and execute **[Auto-tuning]** (tUn).
OSF	**[Mains overvoltage]**	• Line voltage too high • Disturbed mains supply	• Check the mains voltage.
OtFL	**[LI6=PTC overhead fault]**	• Overheating of PTC probes detected on input LI6	• Check load and rating of the motor. • Check the ventilation of the motor. • Allow the motor to cool before switching it on again. • Check the type and state of the PTC probe.
PtFL	**[LI6=PTC overheat]**	• Opening or short circuit of the PTC probe on input L16	• Check PTC probes and their motor/inverter/wiring

Error	Name	Probable cause	Correcting errors
SCF1	[Motor short circuit]	• Short circuit or grounding at the inverter output.	• Check the cables that connect the inverter to the motor. Check the motor insulation. • Reduce the switching frequency. • Connect the chokes in series with the motor. • Check the settings for the speed control circuit and the brake. • Increase the [Time to restart] (ttr). • Increase the switching frequency.
SCF3	[Ground short circuit]	• Significant ground leakage current at the inverter output when multiple motors are connected in parallel.	• Check the cables that connect the inverter to the motor. Check the motor insulation. • Reduce the switching frequency. • Connect the chokes in series with the motor. • Check the settings for the speed control circuit and the brake. • Increase the [Time to restart] (ttr). • Increase the switching frequency.
SCF4	[IGBT short circuit]	• Power component fault	• Contact B&R Product Support.
SCF5	[Motor short circuit]	• Short circuit at inverter output	• Check the connection cables from the inverter to the motor and the motor insulation. • Contact B&R Product Support.
SLF1	[Modbus com.]	• Communication interruption on the Modbus bus.	• Check the communication bus. • Check timeout.
SLF2	[PC com.]	• Communication interruption with PC software.	• Check the PC software connection cable. • Check timeout.
SLF3	[HMI com.]	• Communication error with the graphic display terminal	• Check the terminal connection. • Check timeout.
SSF	[Torque/current lim]	• Change to torque limiting	• Check for the possible presence of a mechanical problem. • Check the parameters of [TORQUE LIMITATION] (tOL-) and the parameters of [TORQUE OR I LIM. DETECT] (tId-).
tJF	[IGBT overheat]	• Overheating of the inverter	• Check the load/motor/inverter sizing. • Reduce the clock frequency. • Allow the motor to cool before switching it on again.
tnF	[Auto-tuning]	• Special motor or motor whose power is not suitable for the inverter. • Motor is not connected to the inverter. • Motor not stopped.	• Check the compatibility of motor/inverter. • Check the availability of the motor during autotuning. • If you are using an output contactor, close this during autotuning. • Check if the motor is stopped during the tuning operation.
ULF	[Proc. underload Flt]	• Process underload	• Check and eliminate the cause of the underload. • The parameters of function [PROCESS UNDERLOAD] (Uld-).

4.3.2.5 Errors that are acknowledged immediately once the cause of the error has been eliminated

Error	Name	Probable cause	Correcting errors
CFF	[Incorrect config.]	• Option card was changed or removed. • Control block was replaced by a control block that was configured for a different inverter type. • The current configuration is not inconsistent.	• Check that there are no card errors. • In the event of the option card being changed/removed deliberately, see the remarks below. • Check that there are no card errors. • In the event of the control block being changed deliberately, see the remarks below. • Restore the factory settings or the backup configuration (if valid).
CFI CFI2	[Invalid config.]	• Invalid configuration: The configuration loaded via the bus or the communication network is inconsistent.	• Check the last loaded configuration. • Load a compatible configuration.
CSF	[Ch. Sw. fault]	• Switchover to invalid channels.	• Check the function parameters.
dLF	[Dynamic load fault]	• Abnormal load variation	• Check that the load is not blocked by an obstacle. • Restart by resetting the move command.
FbE	[FB fault]	• Function block error	• See [FB fault] (FbFt).
HCF	[Cards pairing]	• Function [CARDS PAIRING] (PPI-) was configured and an inverter card was changed.	• In the event of a card error, reinsert the original card. • Confirm the configuration by entering [Pairing password] (PPI) if the card has been intentionally changed.
PHF	[Input phase loss]	• Inverter incorrectly supplied or a fuse blown • Failure of one phase • 3-phase ACOPOSinverter used on a single-phase line supply • Load with imbalance - this protection function is only effective under load.	• Check the power connection and the fuses. • Use a 3-phase line supply. • Use [Input phase loss] (IPL) = [No] (nO) to disable the error.
USF	[Undervoltage]	• Line supply too low • Transient voltage dip	• Check the voltage and the parameters of [UNDERVOLTAGE MGT] (USb-).

4.3.2.6 Option card changed or removed

If the option card is deleted or replaced by another, the inverter locks in error mode [Incorrect config.] (CFF) when switching on. If the card was intentionally replaced or removed, the error can be cleared by pressing ENT twice. This causes all factory settings for the card-specific parameter groups to be restored. These are:

Card replaced by a card of the same type

- Communication cards: Only the parameters that are specific to communication cards

4.3.2.7 Changing the control unit

If a control block is replaced by a control block that has been configured in another type of inverter, the inverter locks in error mode [Incorrect config.] (CFF) when switching on. If the control block was intentionally replaced, the error can be cleared by pressing ENT twice, which **results in the restoration of all factory settings**.

4.3.2.8 Error that are displayed on the external operator terminal

Code	Name	Description
InIt	[Init]	The microcontroller is initiated. The communication configuration is searched for.
COM.E1)	[Communication error]	Timeout error (50 ms). This message is displayed after 20 communication attempts.
A-171)	[Alarm button]	A key was pressed for longer than 10 seconds. The connection to the keypad was interrupted. Press any key to enable the keypad again.
CLr1)	[Acknowl. confirmation error]	This error is displayed when you press STOP once when the active command channel is the external operator terminal.
dEU.E1)	[Drive disparity]	The brand of the inverter does not match the external operator terminal.
rOM.E1)	[RAM anomaly]	A deviation in the ROM of the external operator terminal was detected during checksum calculation.
rAM.E1)	[RAM anomaly]	A RAM deviation of the external operator terminal was detected.
CPU.E1)	[Other detected faults]	Other errors.

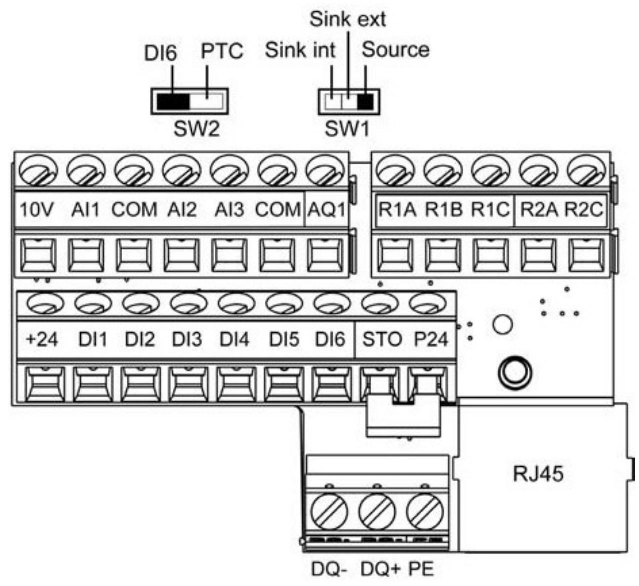
1) Flashes

5 Interfaces

5.1 CANopen

5.1.1 Overview

Connection characteristics



Cable cross sections and tightening torque

Control terminals	Cable cross section for relay output		Cross section for various cables		Tightening torque
	Min.1)	Max.	Min.1)	Max.	
	mm² (AWG)	mm² (AWG)	mm² (AWG)	mm² (AWG)	Nm (lb.in)
All terminals	0.75 (18)	1.5 (16)	0.5 (20)	1.5 (16)	0.5 (4.4)

1) The value corresponds to the minimum permitted cross section for the terminal.

Advice:

Electrical data for the control terminals see "Electrical data for the control terminals" on page 105.

For the RJ45 pinout see "Electrical installation" on page 375.

RJ45 communication port

Connection options:

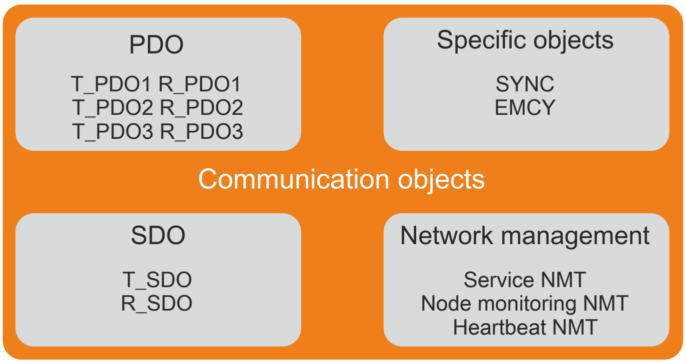
- PC with ACPi SafeConfigurator
- External graphic display terminal via Modbus serial cable
- Modbus or CANopen network
- Tool for loading configurations, etc.

Advice:

Before connecting the RJ45 cable to the product, inspect the cable for damage. Connecting a damaged cable may cause the power supply to the controller to fail.

Software

CANopen manages the communication between the network devices using objects and object dictionaries. A network device can use process data objects (PDO) and service data objects (SDO) in order to request the object data in the object dictionary of another device and, if allowed, write back modified values.



- PDOs (process data objects) for real-time transfer of process data
- SDOs (service data objects) for read and write access to the object dictionary
- Objects for controlling CAN messages:
    - SYNC object (synchronization object) for synchronizing network devices
    - EMCY object (emergency object) for reporting errors from devices or peripheral devices
- Network management services
    - Service NMT for initialization and network control (NMT: Network management).
    - Node monitoring NMT for monitoring network devices
    - Heartbeat NMT for monitoring network devices

5.1.2 Basic information

5.1.2.1 Object dictionary

Description

Each CANopen device maintains an object dictionary containing the objects needed for communication.

Index and subindex

The objects in the object dictionary are addressed by a 16-bit index. For each object, one or more 8-bit subindex entries indicate individual data fields in the object. The index and subindex are displayed in hexadecimal notation.

The following table contains the index and subindex entries based on the object ramps example (203 hex).

Index	Subindex	Name	Explanation
203C hex	00 hex	-	Number of entries
203C hex	01 hex	ACC	Acceleration time
203C hex	02 hex	DEC	Delay time

Object dictionary description

The description of the object dictionary consists of several sections:

- Communication profile range
- RPDO
- TPDO
- Manufacturer-specific
- Application profile (CiA402)

Index (hex)	Object
0000	Not used
0001 to 001F	Static data types
0020 to 003F	Complex data types
0040 to 005F	Not used (manufacturer-specific complex data types)
0060 to 007F	Device profile-specific static data types
0080 to 009F	Device profile-specific complex data types
00A0 to 0FFF	Reserved for further use
1000 to 1FFF	Communication profile range
2000 to 5FFF	ACOPOSinverter-specific profile range
6000 to 9FFF	Standardized device profile range
A000 to FFFF	Reserved for further use

5.1.2.2 Identification communication object

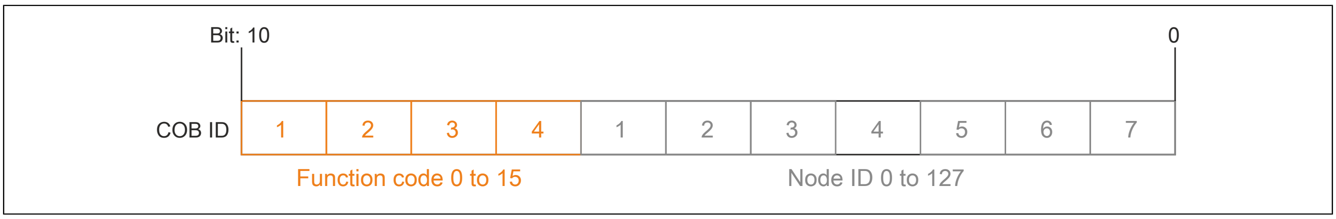
Description

The COB ID (communication object detection) has two tasks in relation to communication object detection control:

- Bus arbitration: Specification of the transfer priorities
- Identification of the communication objects

An 11-bit COB identifier in accordance with specification CAN 3.0 A is defined for CAN communication. It consists of two parts:

- Functional code, 4 bit
- Node address (bridge ID), 7 bit



Function code

The functional code classifies the communication objects. Since the bits of the function code in a COB ID are more important, it also controls the transfer priorities: objects with a low functional code are sent with a higher priority. For example: In the case of simultaneous bus access, an object with functional code 1 is sent before an object with functional code 3.

Node address

Each network device is configured before it can be used on the network. The device is assigned to a unique 7-bit node address (node ID) between 1 (01 hex) and 127 (7F hex). Device address 0 is reserved for broadcast transfers, which are used for simultaneous transfer to all available devices.

COB IDs of the communication objects

The following table shows the COB IDs of the communication objects with the factory settings.

Communication object	Function code	Node address, node ID [1 to 127]	COB ID decimal point (hexadecimal)
Service network management (NMT)	0000	0000000	0 (0 hex)
Synchronization service (SYNC)	0001	0000000	128 (80 hex)
Emergency service (EMCY)	0001	xxxxxxx	128 (80 hex) + Node ID
Transmit PDO1 (TPDO1)	0011	xxxxxxx	384 (180 hex) + Node ID
Received PD01 (RPDO1)	0100	xxxxxxx	512 (200 hex) + Node ID
Transmit PDO2 (TPDO2)	0101	xxxxxxx	640 (280 hex) + Node ID
Received PDO2 (RPDO2)	0110	xxxxxxx	768 (300 hex) + Node ID
Transmit PDO3 (TPDO3)	0111	xxxxxxx	896 (380 hex) + Node ID
Received PDO3 (RPDO3)	1000	xxxxxxx	1024 (400 hex) + Node ID
Transmit SDO (TSDO)	1011	xxxxxxx	1408 (580 hex) + Node ID
Received SDO (RSDO)	1100	xxxxxxx	1536 (600 hex) + Node ID
NMT error control (node monitoring, heartbeat)	1110	xxxxxxx	1792 (700 hex) + Node ID

5.1.2.3 Communication service data

Description

Service data objects (SDO) can be used to access the entries in an object dictionary using the index and the subindex. The values of the objects can be read, and if permitted, also written.

Each network device has at least one SDO server in order to respond to read and write requests from various devices. The TSDO of a client SDO is used for sending data exchange requests; the RSDO is used to receive them.

The data frame of an SDO consists of 8 bytes. SDOs have a higher COB ID than PDOs and are therefore given lower priority when transferred by the CAN bus.

Example of a read request

This example explains how acceleration parameter **[Acceleration]** (ACC) for an ACOPOSinverter is written to CANopen address 4 (COB ID = 580 hex +Node ID or 600 hex + Node ID). The index/subindex value of this parameter is 203C/02 hex. The values are specified in hexadecimal.

Read request: Master > Inverter

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
COB ID	Request code	Object index		Subindex	Request data			
604	40	3C	20	02	00	00	00	00

Read response: Master < Inverter

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
COB ID	Request code	Object index		Subindex	Request data			
584	4B	3C	20	02	E8	03	00	00

The value read from the parameter corresponds to 1000 (03E8 hex), which is equivalent to acceleration **[Acceleration]** (ACC) of 100 s since the unit set for this parameter is 0.1 s.

Example of a write request

This example explains how the value 100 s in acceleration parameter **[Acceleration]** (ACC) for an ACOPOSinverter is written to CANopen address 4 (COB ID 580 hex + Node ID or 600 hex + Node ID). The index/subindex value of this parameter is 203C/02 hex. The values are specified in hexadecimal.

The request code is 2B hex for an item of 2 bytes in length.

Write response: Master > Inverter

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
COB ID	Request code	Object index		Subindex	Request data			
604	2 B	3C	20	02	E8	03	00	00

The request data field specifies value 03E8 hex as written value 1000, which is equivalent to acceleration **[Acceleration]** (ACC) of 100 s, since the unit set for the parameter is 0.1 s.

Write response: Master < Inverter

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
COB ID	Request code	Object index		Subindex	Request data			
584	60	3C	20	02	00	00	00	00

Code requests and code responses

The SDO request code varies according to the specific scenario, which is described in detail in the following table:

Request code	Description of the command	Byte 4	Byte 5	Byte 6	Byte 7
23 hex	Write 4 bytes in data length (e.g. UNSIGNED32)	Bit 7 to 0	Bit 15 to 8	Bit 23 to 16	Bit 31 to 24
2B hex	Write 2 bytes in data length (e.g. UNSIGNED16)	Bit 7 to 0	Bit 15 to 8	00 hex	00 hex
2F hex	Write 1 byte in data length (e.g. UNSIGNED8)	Bit 7 to 0	00 hex	00 hex	00 hex
40 hex	Read 1, byte, 2 bytes or 4 bytes in data length	00 hex	00 hex	00 hex	00 hex
80 hex	Cancel current SDO command	00 hex	00 hex	00 hex	00 hex

The SDO response codes correspond to the request codes and are described in detail in the following table:

Request code	Description of the command	Byte 4	Byte 5	Byte 6	Byte 7
43 hex	Read 4 bytes in data length (response to 40 hex request code)	Bit 7 to 0	Bit 15 to 8	Bit 23 to 16	Bit 31 to 24
4 B hex	Read 2 bytes in data length (response to 40 hex request code)	Bit 7 to 0	Bit 15 to 8	00 hex	00 hex
4F hex	Read 1 byte in data length (response to 40 hex request code)	Bit 7 to 0	00 hex	00 hex	00 hex
60 hex	Write 1 byte, 2 bytes or 4 bytes in data length (response to 23 hex, 2B hex or 2F hex request codes)	00 hex	00 hex	00 hex	00 hex
80 hex	Error: Send cancellation code [1]	00 hex	00 hex	00 hex	00 hex

1) The response data (4 to 7 bytes) corresponds to a 32-bit cancellation code, which is described below.

Cancellation codes

The following table describes the possible cancellation codes that can be used during a data exchange with the product.

Abort code	Description
0503 0000 hex	Segmented transfer: The toggle bit is not switched
0504 0001 hex	Command specifier (CS) is invalid or unknown
0601 0000 hex	Access to the object is not possible
0601 0002 hex	Attempt made to execute a write request to a write-protected parameter
0602 0000 hex	Object does not exist in the object dictionary
0604 0041 hex	PDO object assignment: The object cannot be assigned to the PDO; this error is triggered if parameters 1600 hex, 1602 hex, 1A00 hex, 1A01 hex and 1A02 hex are written to (PDO1, PDO2 and PDO3 assignments)
0604 0042 hex	PDO object assignment: The number and/or length of the parameters that are to be assigned exceed the maximum PDO length
0609 0011 hex	The subindex of the sent object in the request does not exist in the object dictionary.
0609 0030 hex	Outside of the parameter values (for write request, only)
0609 0031 hex	Written parameter value too high
0800 0000 hex	General error triggered

Advice:

The cancellation codes listed in the table were written in accordance with standard convention and therefore must be inverted in the event of a byte-based display for "bytes 4 to 7" (e.g. 0609 0030 hex becomes byte 4: 30 hex, byte 5: 00 hex, byte 6: 09 hex, byte 7: 06 hex)

5.1.2.4 Communication process data

Description

Process data objects (PDO) are used for the real-time exchange of process data, such as current and reference values or the operational readiness of the device. The transfer is carried out quickly, since the data is sent without management data and confirmation from the recipient of the data transfer is not required. Each PDO can be enabled or disabled independently using the 31 bit (valid bit) in subindex 01 hex of the corresponding communication object.

PDO1 details

The first PDO is compatible with the PDO1 of the CiA402 speed mode as standard. It is asynchronous and contains two items of data: the control word (6040 hex, CMD) and the target speed (6042 hex, LFRD) for the output (from inverter to master), and the state word (6041 hex, ETA) and the control effort (6044 hex, RFRD) for the input (from device to master).

PDO2 details

The second PDO set (PDO2) is disabled as standard and is fully configurable (from one to four user-selected words). It is reserved for adjustments and additional controls as well as monitoring functions.

PDO3 details

The third PDO set (PDO3) is reserved. It is disabled as standard and cannot be configured. It contains the following:

- RPDO3 (receive), contains four output words (from master to device) for communication scanner NC1 to NC4
- TPDO3 (transmit), contains four input words (from device to master) for communication scanner NM1 to NM4

Transfer mode

The three PDOs are asynchronous as standard, although the transfer mode can be reconfigured by the user for each PDO in line with the requirements:

- Asynchronous mode (255): The transmit PDO is only sent if the value of the data changes. In this mode, the **inhibit time** and **event timer** can be modified in order to adjust the PDO transfer sequence in the bus.
- Cyclical synchronous mode (1 to 240): The transmit PDO is sent each time a synchronized object (SYNC) is received, or if a pre-configured number of synchronized objects (from 1 to 240) is received.
- Acyclical synchronous mode (0): The transmit PDO is sent each time the value of the data changes, but only during the synchronized window authorized by the next synchronization object (SYNC).

Synchronization object

The synchronization object (SYNC) is sent cyclically by the CANopen master. It does not contain any data and its frame is restricted to its COB identifier (080 hex). The role of this object is to allow synchronous communication mode for CANopen slaves.

5.1.2.5 Network management service

Description

Network management (NMT) forms part of the CANopen communication profile. It is used for initializing the network and the network devices as well as for starting, stopping and monitoring network devices when operating on the network.

NMT services can be divided into the following groups:

- Services for device control, in order to initialize devices for CANopen communication and to monitor the behavior of the devices when operating on the network.
- Service for connection monitoring in order to check the network state of a network device.

Network management of the state machine

The CANopen NMT slave device operates a state machine that automatically changes all devices to pre-operational state after switch-on and internal initialization. In this state, the nodes can be configured and parameterized via SDOs. PDO communication is not allowed.

The NMT master device can switch all nodes or just one individual node to operational state and vice-versa. PDO transfer is allowed in operational state. If a device is switched to stop state, PDO and SDO communication is forced to terminate. Furthermore, this state can be used to achieve specific application behavior.

In operating state, all communication objects are active. The object dictionary can be accessed via SDO.

NMT message description

The NTM services for device control are sent as unconfirmed messages with COB ID 0. They always have the highest priority in a CAN bus.

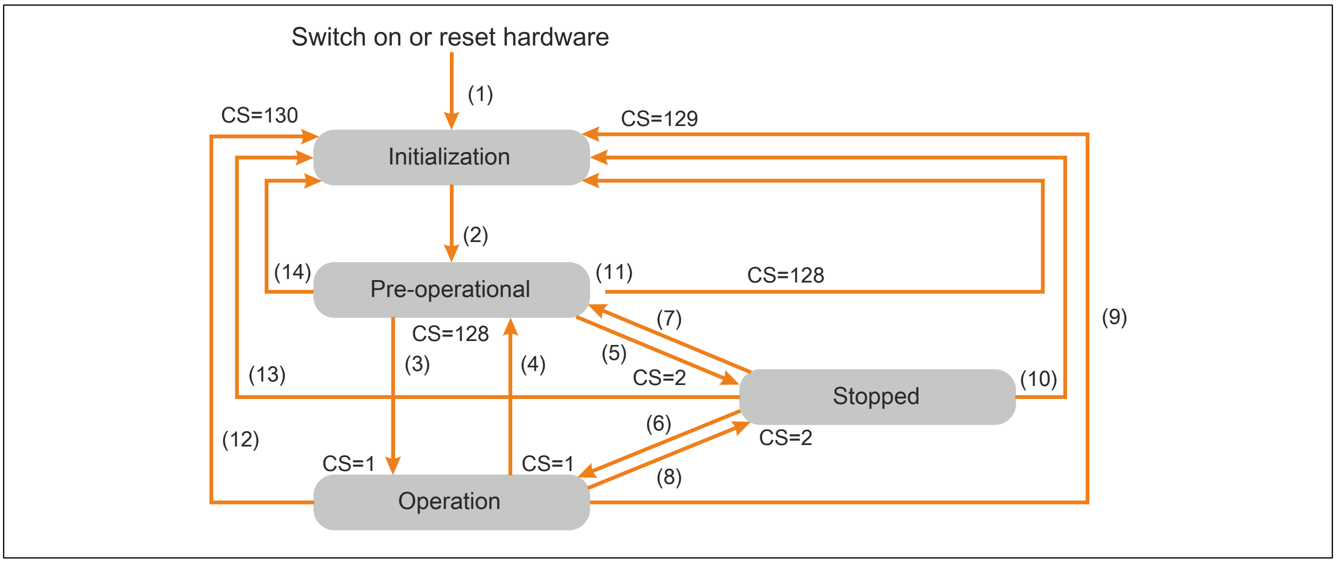
COB ID	Byte 0	Byte 1
0 (000 hex)	Command specifier (CS)	Node ID 1)

1) If the node ID is zero, the command specifier is sent to all CANopen slaves.

The following table contains the command communication symbol that is used for the NMT state machine.

Command specifier (CS)	Explanation
1 (01 hex)	Start_Remote_Node
2 (02 hex)	Stop_Remote_Node
128 (80 hex)	Enter_Pre-Operational_State
129 (81 hex)	Reset_Node
130 (82 hex)	Reset_Communication

NMT state diagram



Transition	Description
(1)	During switch on, the node automatically changes to initialization state
(2)	As soon as initialization has completed, pre-operational state is enabled automatically
(3), (6)	Start_Remote_Node
(4), (7)	Enter_Pre-Operational_State
(5), (8)	Stop_Remote_Node
(9), (10), (11)	Reset_Node
(12), (13), (14)	Reset_Communication

Depending on the communication state of the device, the following services are available:

	Initialization	Pre-operational	Operation	Stopped
PDO			x	
SDO		x	x	
Synchronization (SYNC)		x	x	
Emergency (EMCY)		x	x	
Boot service	x		x	
Network management (NMT)		x	x	x

In pre-operational state, the master can only execute SDOs

In operational state, the master can execute SDOs and PDOs. The device can only be controlled if the user has selected CANopen as the command channel.

In stop mode, the master cannot execute SDOs or PDOs.

If an error is detected and can be reset, the device must be in state "NMT operation", so that the PDO containing check word "CMD" can reset the device using command **Fault Reset Bit**.

Node monitoring service

For communication monitoring, you can either use the node monitoring service described here or the heartbeat service described further below. Only one of these two services can be active at any one time. The node monitoring service on the ACOPOSinverter is disabled as standard.

The master scans the device at regular intervals (**Life Time**) by sending a "Remote transfer request" (RTR). The "actual time" is calculated by multiplying the **Guard Time** and the **Life Time Factor**.

As soon as **Life Time** has elapsed, and the device has not a received a RTR, the following occurs:

- A **Life Guarding** error is triggered.
- An emergency telegram (**EMCY**) is sent.

Node monitoring frame description

COB ID	Byte 0	
1792 (700 hex) + Node ID	Bit 7	Bit 6 to 0
	Switch bit	Node status

The device indicates its NMT state by means of the "NMT information field", which is described here:

Bit 6 to 0 (node status): The current NMT state of the device:

- Initialization (00 hex)
- Stopped (04 hex)
- Operation (05 hex)
- Pre-operational (7F hex)

Bit 7 (switch bit): The value of this bit must change from one device response to the next. The value of the switch bit for the first response after the node monitoring service has been enabled is zero. This bit can only be reset by sending command **Reset_Communication** to the device. If a response is received with the same switch bit value as the previous one, the new response is treated as if it had not be received.

Heartbeat service

If the node monitoring service described above is not enabled, the heartbeat service can be used to monitor communication with any other node that supports this service.

The heartbeat service is disabled as standard on the ACOPOSinverter.

Each **Heartbeat Producer** sends heartbeat messages at regular intervals (**Producer Heartbeat Time**).

All **Heartbeat Consumers** check that they receive these messages in a shorter timeframe than **Consumer Heartbeat Time**.

The **Producer Heartbeat Time** must be shorter than **Consumer Heartbeat Time**. If the device is configured as a consumer with a time period that is equivalent to **Consumer Heartbeat Time** and that has not expired by the time a **heartbeat message** is received, the device will trigger a **heartbeat event** and send an emergency telegram (**EMCY**).

Heartbeat frame description

COB ID	Byte 0	
1792 (700 hex) + Node ID	Bit 7	Bit 6 to 0
	Reserved	Heartbeat production state

The **Heartbeat message**, which is sent from the device, contains field **Heartbeat Producer state** (byte 0), which we will describe here:

Bit 6-0: Heartbeat production state: Current NMT state of the device:

- Initialization (00 hex)
- Stopped (04 hex)
- Ready for operation (05 hex)
- Pre-operational (7F hex)

Bit 7 (switch-bit): Reserved: This bit corresponds to 0

Emergency object

Every time an error is detected or eliminated, an emergency object (**EMCY**) is sent from the device to another CANopen device with higher priority. This is especially the case for detected errors of the type **Heartbeat of Life Guard**. An error object is never repeated.

COB ID	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
128 (80 hex) + node ID	Error code [Errd]		Error register	0	0	0	0	0
	LSB	MSB	Bit 0 = 0 (not an error) or 1 (error)	-	-	-	-	-

Error code "Errd" and its possible values are described in the communication parameter file.

5.1.3 Hardware setup

5.1.3.1 Firmware and description

Compatibility

If the ACOPOSinverter should be operated on a CAN network, a hardware description file of type .eds can be used. This is available as a ZIP archive at www.br-automation.com.

The frequency inverter logs in to the CAN network with the following data:

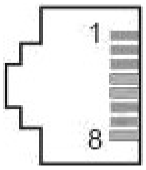
- Device name: 8I66S200018 (equipment number)
- Supplier ID: 0x0200005A
- Product code: 320

Information:

The name of the .eds file contains a reference to the associated firmware version,
For example: SEATV320_020934E.eds corresponds to firmware V02.09 IE 34

5.1.3.2 Electrical installation

Pinout RJ45



Pin	Name	Information
1	CAN	CAN HIGH
2	CAN	CAN LOW
3	CAN	CAN GND
4	EIA-485 (RS-485)	Data (for Modbus communication)
5	EIA-485 (RS-485)	Data\ (for Modbus communication)
6	Reserved	n.c.
7	Power supply	10 VDC (e.g. for handheld, 8I0XD301.300-1)
8	Power supply and EIA-485 (RS-485)	GND (10 V power supply or serial signal)

n.c. Not connected

Cable specifications and maximum bus length

The following table contains information about the maximum length:

Data transfer speed Kbit/s	Maximum bus length m (ft)
50	1000 (3280)
125	500 (1640)
250	250 (820)
500	100 (328)
1000	20 (65)

Reference potential CAN_GND and the shield connection (connector housing) are galvanically separate.

- Maintain galvanic separation in order to prevent ground looping by the CAN bus.
- Use potential compensation conductors.
- Use prefabricated cables to reduce the writing of errors.
- Make sure that the wiring, cables and associated interfaces comply with PELV requirements.

Terminating resistor

Terminating resistors must be placed at either end of a CAN bus line. A 120 Ω terminating resistor is used between CAN_L and CAN_H for this purpose.

5.1.3.3 Cable routing

Installation topology

The following image shows the connection of several devices equipped with CANopen.

5.1.3.4 Bus termination

Introduction

Both ends of a CAN bus line must be terminated. A 120 Ω terminating resistor between CAN_L and CAN_H is used for this purpose. According to CANopen, there are several possible solutions (see "Accessories" on page 531).

5.1.4 Software setup

5.1.4.1 Basic settings

Configuring the communication parameters

Overview

The parameters are described in reference to the graphic end device. These settings can also be used in combination with the commissioning software.

Access

The parameters are accessible from menu **[COMMUNICATION]** (COM), **[CANopen com.]** (CnO-).

[CANopen address] (AdCo)

This parameter defines the address of the device on the network. This parameter is accepted after the switch-on/switch-off cycle.

Access

It is a read/write parameter. The parameter number is 6051 via Modbus access.

Possible settings

The following table shows the parameter settings:

Settings	Code	Value	Description
[OFF]	(oFF)	0	CANopen address not assigned
[1 to 127]	(1 to 127)	1 to 127	CANopen address assigned **Factory setting:** Off

[CANopen bit rate] (bdCO)

This parameter defines the baud rate that is used to transfer the data. This parameter is accepted after the switch-on/switch-off cycle.

Access

It is a read/write parameter. The parameter number is 6053 via Modbus access.

Possible settings

The following table shows the parameter settings:

Settings	Code	Value	Description
[50 kbps]	(50)	38	The baud rate is set to 50 kbit/s.
[125 kbps]	(125)	52	The baud rate is set to 125 kbit/s.
[250 kbps]	(250)	60	The baud rate is set to 250 kbit/s.
[500 kbps]	(500)	68	The baud rate is set to 500 kbit/s.
[1 Mbps]	(1M)	76	The baud rate is set to 1 Mbit/s. **Factory setting:** 250 kbit/s

[Error code] (ErCO)

This parameter indicates the last detected active CANopen error.

Access

It is a write-protected parameter. The parameter number is 6056 via Modbus access.

Possible settings

The following table shows the possible parameter settings.

Settings	Code	Value	Description
[0]	(0)	0	No errors detected since CANopen communication last started.
[1]	(1)	1	Bus off or CANopen overflow.
[2]	(2)	2	Node monitoring error, which requires a return to NMT initialization state.
[3]	(3)	3	CANopen overflow.
[4]	(4)	4	Heartbeat error, which requires a return to NMT initialization state.
[5]	(5)	5	NMT specifies a diagram error.

Advice:

If the motor is running, and a change is made to the NMT state, a [CANopen com.] (COF) is triggered.

5.1.4.2 Profile

5.1.4.2.1 Defining a profile

Profile types

There are 3 types of profile:

- Communication profiles
- Function profiles
- Application profiles

Communication profile

A communication profile describes the characteristics of a bus or a network:

- Cables
- Connectors
- Electrical characteristics
- Access protocol
- Addressing system
- Periodical
- Replacement service
- Messaging service
- …

A communication profile is unique to each fieldbus type (such as Modbus, PROFIBUS DP, etc.) and is used by various device types.

Functional profile

A functional profile describes the behavior of a device type:

- Functions
- Parameter (e.g. name, format, unit, type, etc.)
- Periodical I/O variables
- State diagram
- …

A functional profile is common to all members of a device family (e.g. frequency inverter, encoder, I/O module, displays, etc.).

They may have common or similar parts. The standardized (IEC 61800-7) functional profiles for variable-speed inverters are as follows:

- CiA402
- PROFIDRIVE
- CIP AC drive

CiA402 device profile for inverter and movement control represents the next development of this standard and now forms part of the IEC 61800-7 standard.

Application profile

Application profiles define the services that are provided by devices of a machine. For example, CiA DSP 417-2 V 1.01 part 2: CANopen application profiles for lift control systems - Virtual device definitions.

Interoperability

The goal of communication and functional profiles is to achieve an interoperability of devices connected via fieldbus.

5.1.4.2.2 Functional profiles supported by the inverter

I/O profile

Use of the I/O profile simplifies PLC programming.

The I/O profile reflects the use of end-device bars for control purposes in that one bit is used to control one function.

The I/O profile for the inverter can also be used to control the inverter via field bus. The inverter starts up as soon as command **run** has been sent. 15 bits of the control word (bits 1 to 15) can be assigned to a specific function.

The profiles can be developed to allow simultaneous control of the inverter using the following:

- The end device
- The Modbus control word
- The fieldbus module control word

The I/O profile is supported by the inverter itself and thus by all communication ports.

CiA402 profile

The inverter only starts up after a command sequence.

The control word is standardized.

5 bits of the control words (bits 11 to 15) can be assigned to a function.

The CiA402 profile is supported by the inverter itself and thus by all communication ports.

The inverter supports mode **velocity** of the CiA402 profile.

In the CiA402 profile, there are two modes that are specific to the inverter, characterize commands and refer to the value management:

- **[Separate]** (SEP)
- **[Not separ.]** (SIM)

5.1.4.2.3 Function description

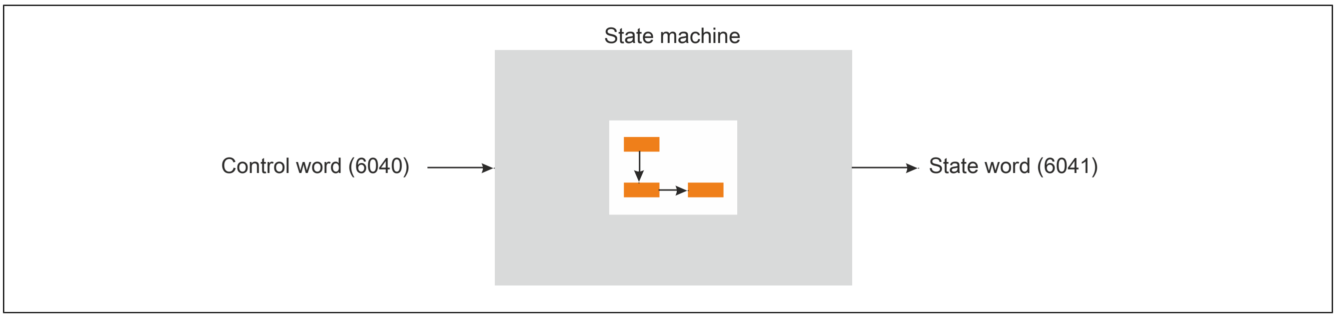
Introduction

The inverter operation state consists of two main functions, which are described in the diagrams below.

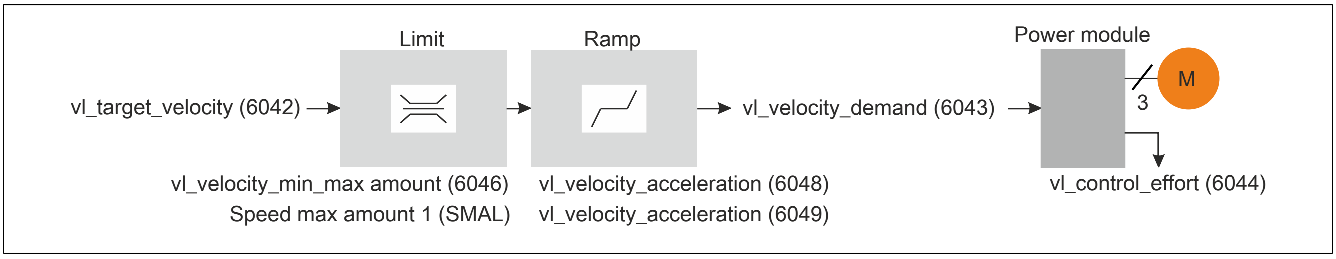
CiA402

The main parameters are shown with their CiA402 names and their CiA402/Drivecom index (the values in the brackets are the CANopen addresses of the parameters).

The following figure shows the control diagram for the inverter operation state:



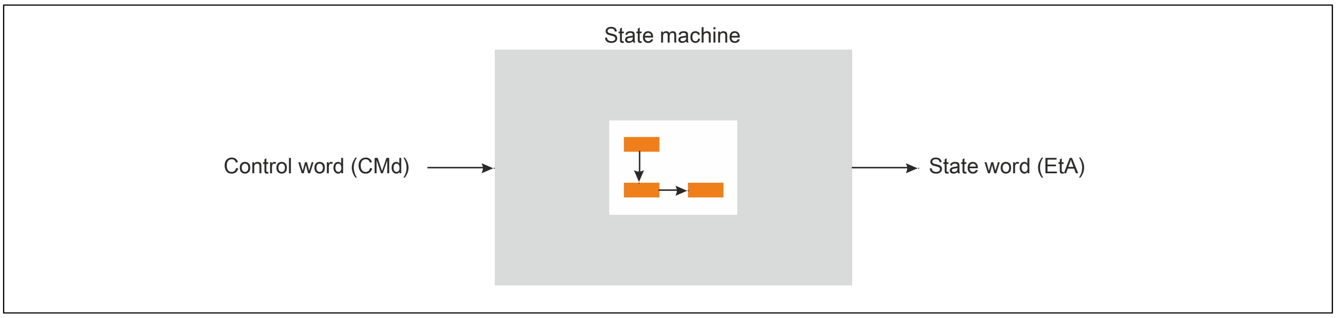
A simplified diagram illustrating speed control in mode **Velocity**:



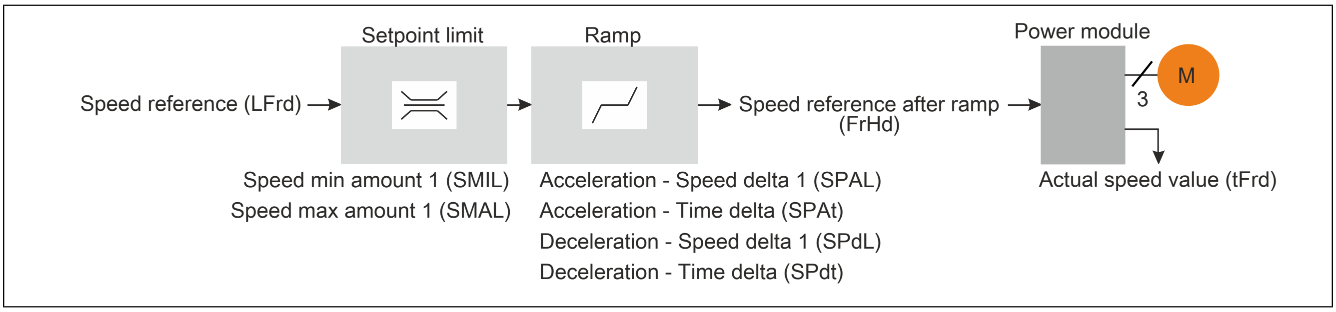
ACOPOSinverter

For the ACOPOSinverter, the corresponding diagrams are as follows:

The following figure shows the control diagram for the inverter operation state:



A simplified diagram illustrating speed control in mode Velocity:



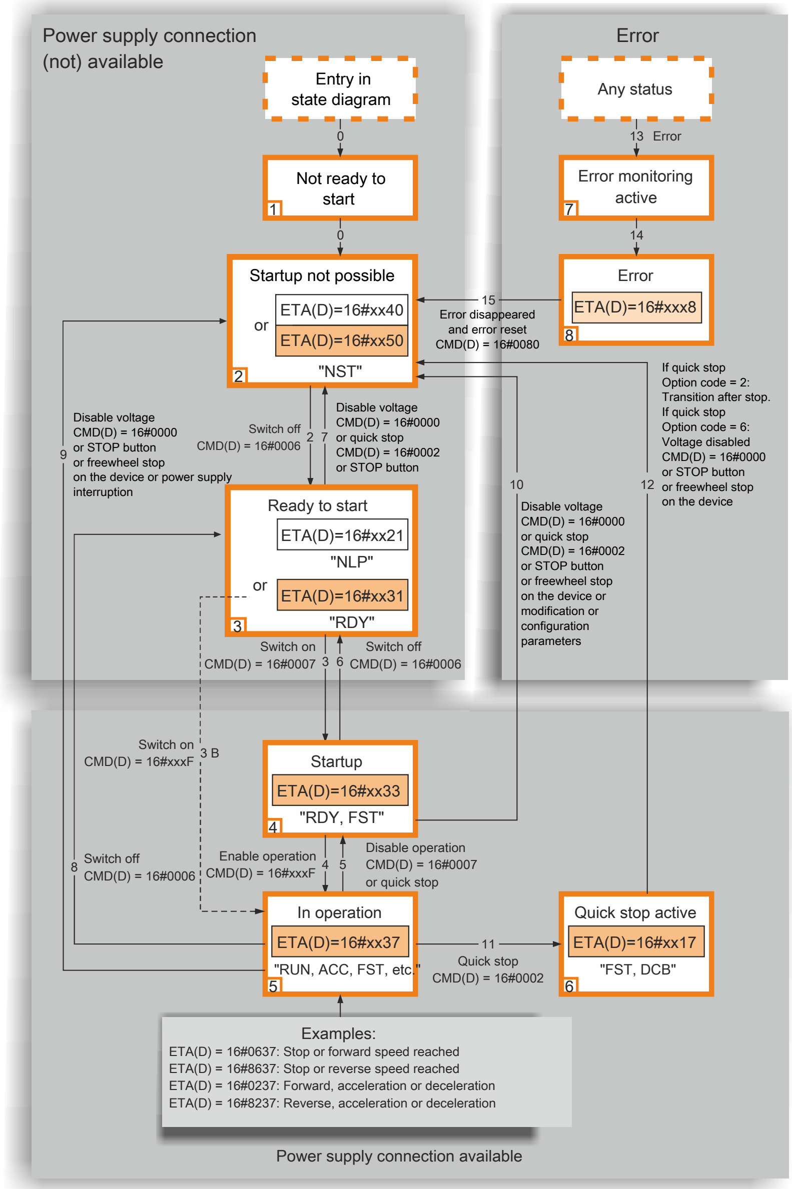
5.1.4.2.4 CIA402 operating state diagram

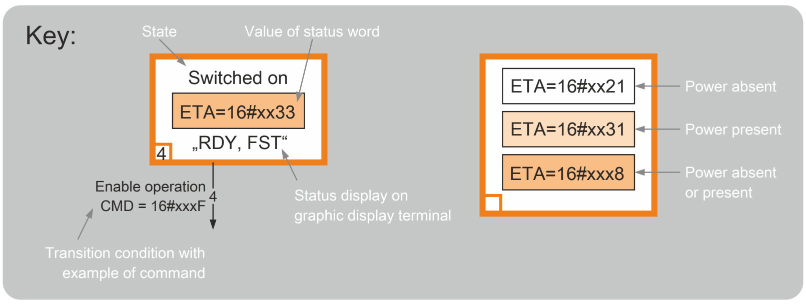
State diagram

Once an operating mode has been enabled and started, the product runs through several operating states.

The state diagram (state machine) shows the relationship between the operating state and the state transition. The operating states are monitored internally and influenced by the monitoring function.

The following diagram shows the CIA402 state diagram:



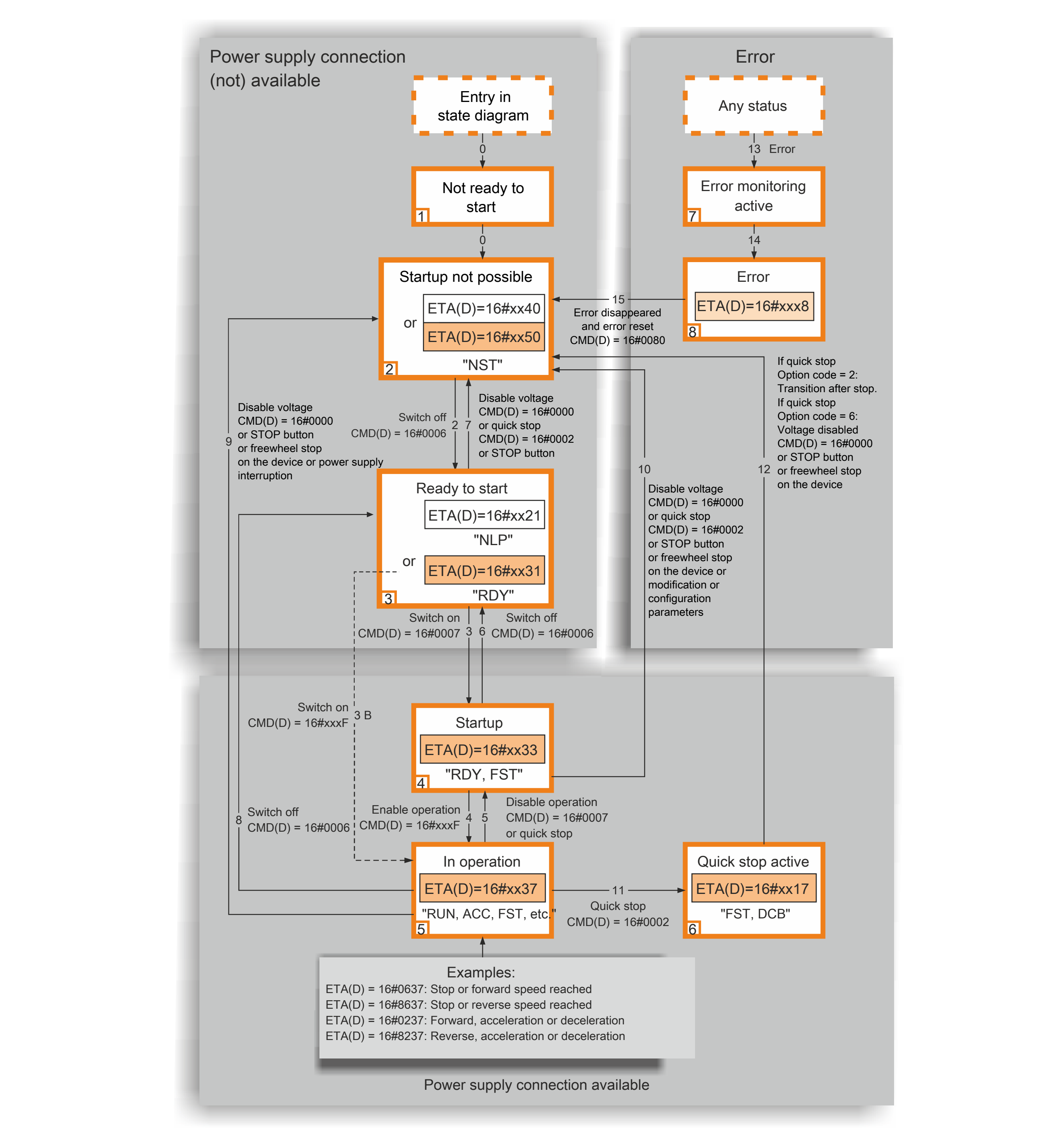


5.1.4.2.5 Description of the operating state

Inverter operating state

The operating state of the inverter changes according to whether control word **[CMD value]** (CMd) is sent or the occurrence of an event (detection of an error, for example).

The inverter operating state can be identified by the value of state word **[ETA state word]** (EtA).



Each state represents an internal reaction for the frequency inverter. The state is changed per the transmitted (CMD(D)) control word or an internal activity (e.g. error). State is identified using the value for state word (ETA(D)).

1) Not ready to start
   Start initialization
   - Transition state not visible for communication network.
2) Start not possible
   The frequency inverter is not active.
   - An AC power supply for the power unit is not necessary for an external controller.
   - An external controller with line contactor does not control the contactor.
   - The frequency inverter is locked and the motor cannot be supplied with power.
   - The configuration and setting parameters can be configured.
3) Ready to start
   Wait for power supply for the power unit.
   - An AC power supply for the power unit is not necessary for an external controller. The system requires this state in order to switch to state 4 - "Start".
   - An external controller with line contactor does not control the contactor.
   - The frequency inverter is locked and the motor cannot be supplied with power.
   - The configuration and setting parameters can be configured.

Caution!

DS402 describes the high voltage power supply of the frequency inverter in state 3 - "Ready for start". There is a difference here between DS402 and the frequency inverter description.

4) Start
   Although the frequency inverter is supplied by AC power, it is in a steady state.
   - A power unit supply is necessary for an external controller.
   - An external controller with line contactor does not control the contactor.
   - The frequency inverter is locked and the motor cannot be supplied with power.
   - The supply stage for the inverter is ready for operation, but the voltage has not been applied at the output.
   - The setting parameters can be configured.
   - Modifying the configuration parameter resets the frequency inverter to state 2 - "Start not possible".
5) Run
   The frequency inverter is in operation.
   - A power unit supply is necessary for an external controller.
   - An external controller with line contactor controls the contactor.
   - The frequency inverter is unlocked and the motor is supplied.
   - The inverter functions are enabled and the motor terminals are supplied with voltage.
   - In the event of a frequency inverter with open-ended control loop and setpoint zero or a stop command, the power supply to the motor and torque will be switched off.
   - **[Auto-tuning]** (tun) requires a power feed to the motor. The frequency inverter must be in state 5 - "In operation" for this purpose.
   - The setting parameters can be configured.
   - The configuration parameters cannot be configured.

Information:

The channel must be valid for transition from state 4 - "Start" to state 5 - "In operation". If the channel is contained within a command or setpoint, the transition to state 4 - "Start" can only take place if the setpoint has been received for the first time. The reaction of the frequency inverter to command "Deactivate operation" is dependent on the value of parameter [Disable Output Trigger Definition] (dotd):

- **If parameter [Disable Output Trigger Definition] (dotd) is in state 0, the inverter changes to state 4 - "Start" and stops in freewheel stop.**
- **If parameter [Disable Output Trigger Definition] (dotd) is in state 1, the frequency inverter stops at the ramp and switches to state 4 - "Start".**

6) Quick stop active
Emergency stop
   - The frequency inverter performs a quick stop. Following a quick stop, a restart is only possible if a switch to state 2 - "Start not possible" is implemented.
   - During quick stop, the frequency inverter is locked and the motor is supplied with power.
   - The configuration parameters cannot be configured.

Information:

The condition for the transition from state 6 - "Quick stop active" to state 2 - "Start not possible" is dependent on the value of parameter [Disable Output Quick Stop] (qStd):

- **If parameter [Disable Output Quick Stop] (qStd) is in state 2, the inverter stops at the quick stop ramp and changes to state 2 - "Start not possible".**
- **If parameter [Disable Output Quick Stop] (qStd) is in state 6, inverter stops in accordance with the quick stop ramp and then remains in state 6 - "Quick stop active" until:**
   - **Command "Disable voltage" has been received.**
   - **STOP has been pressed.**
   - **Command "Freewheel stop" has been received via the operator terminal.**

7) Error monitoring active
Transition state in which the frequency inverter performs an action in accordance with a type of error.
   - Frequency inverter function is enabled or disabled as per the response type configured in the error management parameter.

8) Error
Frequency inverter faulty.
   - The frequency inverter is locked and the motor cannot be supplied with power.

Status	Power unit power supply for external controller	Power supply for motor	Modification of configuration parameter
1 - Not ready to start	Not required	No	Yes
2 - Start not possible	Not required	No	Yes
3 - Ready to start	Not required	No	Yes
4 - Start	Required	No	Yes, back to state 2 - "Start not possible"
5 - Operational	Required	Yes, except for open-control loop and setpoint zero or stop command.	No
6 - Fast stop active	Required	Yes, during quick stop	No
7 - Error monitoring active	Dependent on fault management configuration	Dependent on fault management configuration	-
8 - Error	Not required	No	Yes

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Warning	Start not possible	Fast stop	Power supply possible	Error	Run	Start	Ready to start
Alarm	Power supply for power unit not possible	Emergency stop	Power supply for power unit	Error	Run	Ready	Wait for power supply for power unit

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Direction of rotation	Stop by pressing STOP	Reserved (0)	Reserved (0)	Internal limit active	Target reached	External	Reserved (0)
				Setpoint outside limit	Setpoint reached	Command or setpoint via network	

Status	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	ETA covered by 16#006F[1)]
	Start not possible	Fast stop	Power supply	Error	Run	Start	Ready to start	
1 - Not ready to start	0	x	x	0	0	0	0	-
2 - Start not possible	1	x	x	0	0	0	0	16#0040
3 - Ready to start	0	1	x	0	0	0	1	16#0021
4 - Start	0	1	1	0	0	1	1	16#0023
5 - Operational	0	1	1	0	1	1	1	16#0027
6 - Fast stop active	0	0	1	0	1	1	1	16#0007
7 - Error monitoring active	0	x	x	1	1	1	1	-
8 - Error	0	x	x	1	0	0	0	16#0008[2)] or 16#0028

1) This mask can be used by program PLC for testing diagram state.
2) Fault after state 6 - "Quick stop active"
x In this state, the value of the bit is 0 or 1.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Error reset	Reserved (0)	Reserved (0)	Reserved (0)	Run	Fast stop	Power supply	Authorization via AC supply voltage
0 to 1 transition = Error reset (once reason for error no longer active)				Run command	Emergency stop	Authorization via AC supply voltage	Contactor control

Bit 15	Bit 14	Bit 13	Bit 12
Assignment	Assignment	Assignment	Assignment

Bit 11	Bit 10	Bit 9	Bit 8
Default, direction of rotation command	Reserved (0)	Reserved (0)	Halt
0 = Forward direction queried, 1= Reverse direction queried			Halt

Command	Transition address	Final state	Bit 7	Bit 3	Bit 2	Bit 1	Bit 0	Sample value
			Error reset	Run	Fast stop	Run	Start	
Shutdown	2, 6, 8	3 - Ready to start	x	x	1	1	0	16#0006
Start	3	4 - Start	x	x	1	1	1	16#0007
Run	4	5 - Operational	x	1	1	1	1	16#000F
Not in operation	5	4 - Start	x	0	1	1	1	16#0007
No power supply	7, 9, 10, 12	2 - Start not possible	x	x	x	0	x	16#0000
Fast stop	11	6 - Fast stop active	x	x	0	1	x	16#0002
	7, 10	2 - Start not possible						
Error reset	15	2 - Start not possible	0 > 1	x	x	x	x	16#0080

x Value not relevant for this command.
0>1 Command on rising edge

If CTMD(D) bit 8 in state "True":
The stop command is triggered:
The stop command interrupts the current flow without exiting state 5 - "In operation". The stop is performed in accordance with the ramp defined by parameter STT. Despite the setting for parameter STT, the frequency inverter remains in state 5 - "In operation".
In the event of a frequency inverter with open-ended control loop and setpoint zero or a stop command, the power supply to the motor and torque will be switched off.

If CTMD(D) bit 1 in state "True":
Stop command "High-speed" results in a change to state 4 - "Start".

CMD(D) is reset (CMD(D) = 0):
Stop command "Freewheel" results in a change to state 2 - "Start not possible".

5.1.4.2.6 Summary

Status	Power unit power supply for external controller	Power supply for motor	Modification of configuration parameter
1 - Not ready to start	Not required	No	Yes
2 - Start not possible	Not required	No	Yes
3 - Ready to start	Not required	No	Yes
4 - Start	Required	No	Yes, back to state 2 - "Start not possible"
5 - Operational	Required	Yes, except for open-control loop and setpoint zero or stop command.	No
6 - Fast stop active	Required	Yes, during quick stop	No
7 - Error monitoring active	Dependent on fault management configuration	Dependent on fault management configuration	-
8 - Error	Not required	No	Yes

Advice:

- **In configuration parameter files, configuration parameters are described as R/WS access parameters. Other parameters can be accessed regardless of the operating state.**
- **A setting parameter can be accessed on the inverter in any operating state.**

5.1.4.2.7 CMd command register

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Error reset	Reserved (=0)	Reserved (=0)	Reserved (=0)	Operational	Fast stop	Power supply	Start
0 to 1 transition = Error reset (once reason for error no longer active)				1 = Run command	0 = Fast stop active	Authorization via AC supply voltage	Line contactor control

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Assigned on a manufacturer-specific basis	Assigned on a manufacturer-specific basis	Assigned on a manufacturer-specific basis	Assigned on a manufacturer-specific basis	Manufacturer-specific	Reserved (=0)	Reserved (=0)	Halt
				0 = Forward direction requested, 1= Reverse direction requested			Halt

For a description of the operating state, see "Description of the operating state" on page 382

5.1.4.2.8 Stop commands

Stop command

The Stop command can be used to interrupt a movement without having to exit state 5 - "Operational". The stop is executed in accordance with parameter **[Type of stop]** (Stt).

If command **Stop** is active, the motor is not supplied with power and there is no torque output.

Independently of the assignment of **[Type of stop]** (Stt), inverter parameters **[Fast stop]** (FSt), **[Ramp stop]** (rMP), **[Freewheel]** (nSt) and**[DC Injection]** (dCi) remain in state 5 - "Operational".

Fast stop command

Sending a fast stop command to the terminals or using a bit in the control word assigned to **Fast Stop** will prompt a change to state 4 - "Start".

Freewheel command

Command **Freewheel stop**, which uses a digital input in the end device or a bit in the control word assigned to **Freewheel stop**, will prompt a change to operating state 2 - "Start not possible".

5.1.4.2.9 Assignment of control word bits

Functional code

With the CiA402 profile, the fixed assignment of a functional input is possible using the following codes:

Bit	CANopen
Bit 11	C211
Bit 12	C212
Bit 13	C213
Bit 14	C214
Bit 15	X215

For example, to assign DC injection braking to CANopen bit 13, simply configure parameter **[DC Injection]** (dCI) to the value **[C213]** (C213).

Bit 11 is assigned to operational direction command **[Reverse assign.]** (rrS) as standard.

5.1.4.2.10 [ETA state word] (ETA)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Warning	Switch-on disabled	Fast stop	Power voltage enabled	Error	Operation enabled	Switched on	Ready to be switched on
A warning is active	Power stage disabled	0 = Fast stop is active	Power stage is present	Error detected	Running	Ready	1 = Waiting for power supply

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Manufacturer-specific direction of rotation	Manufacturer-specific stop via STOP button	Reserved (=0)	Reserved (=0)	Internal limit active	Target reached	Remote operation	Reserved (=0)
				Reference value outside limit	Reference value reached	Command or reference value via fieldbus	

Operating state	Bit 6 Start not possible	Bit 5 Fast stop	Bit 4 Power supply	Bit 3 Error	Bit 2 Operational	Bit 1 Started	Bit 0 Ready to start	ETA covered by 006F H[1]
1 - Not ready to start	0	x	x	0	0	0	0	-
2 - Start not possible	1	x	x	0	0	0	0	0040 hex
3 - Ready to start	0	1	x	0	0	0	1	0021 hex
4 - Start	0	1	1	0	0	1	1	0023 hex
5 - Operational	0	1	1	0	1	1	1	0027 hex
6 - Fast stop active	0	0	1	0	1	1	1	0007 hex
7 - Error monitoring active	0	x	x	1	1	1	1	002F hex
8 - Error	0	x	x	1	0	0	0	0008 hex[2] to 0028 hex

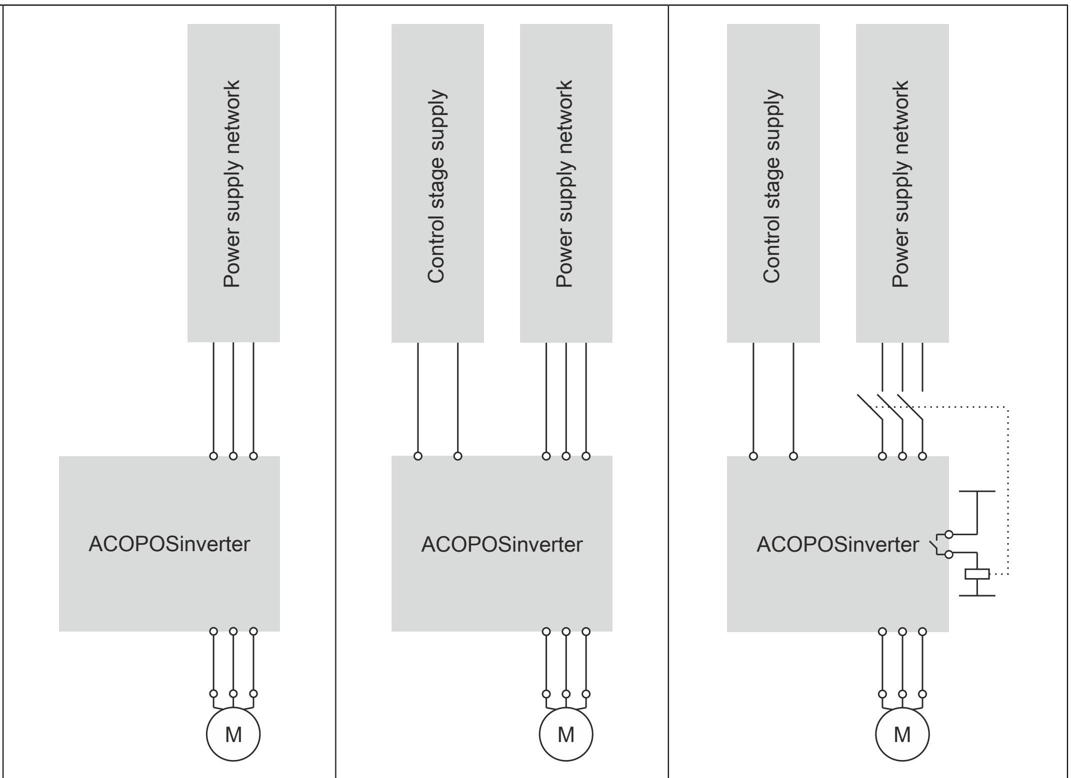
1) This coverage can be used by the PLC program to test the diagram state.
2) Errors resulting from operating state 6 - "Fast stop active" detected.
x In this state, the value of the bit can be 0 or 1.

5.1.4.2.11 Start sequence

Description

The command sequence in the state diagram depends on how the inverter is supplied with power.

There are three possible scenarios:



Power supply network	Direct	Direct	Line contactor controlled by the inverter
Control stage supply	Not separate[1)]	Separate	Separate

1) The power stage supplies the control stage.

5.1.4.2.12 Sequence for an inverter driven by the power supply network

Description

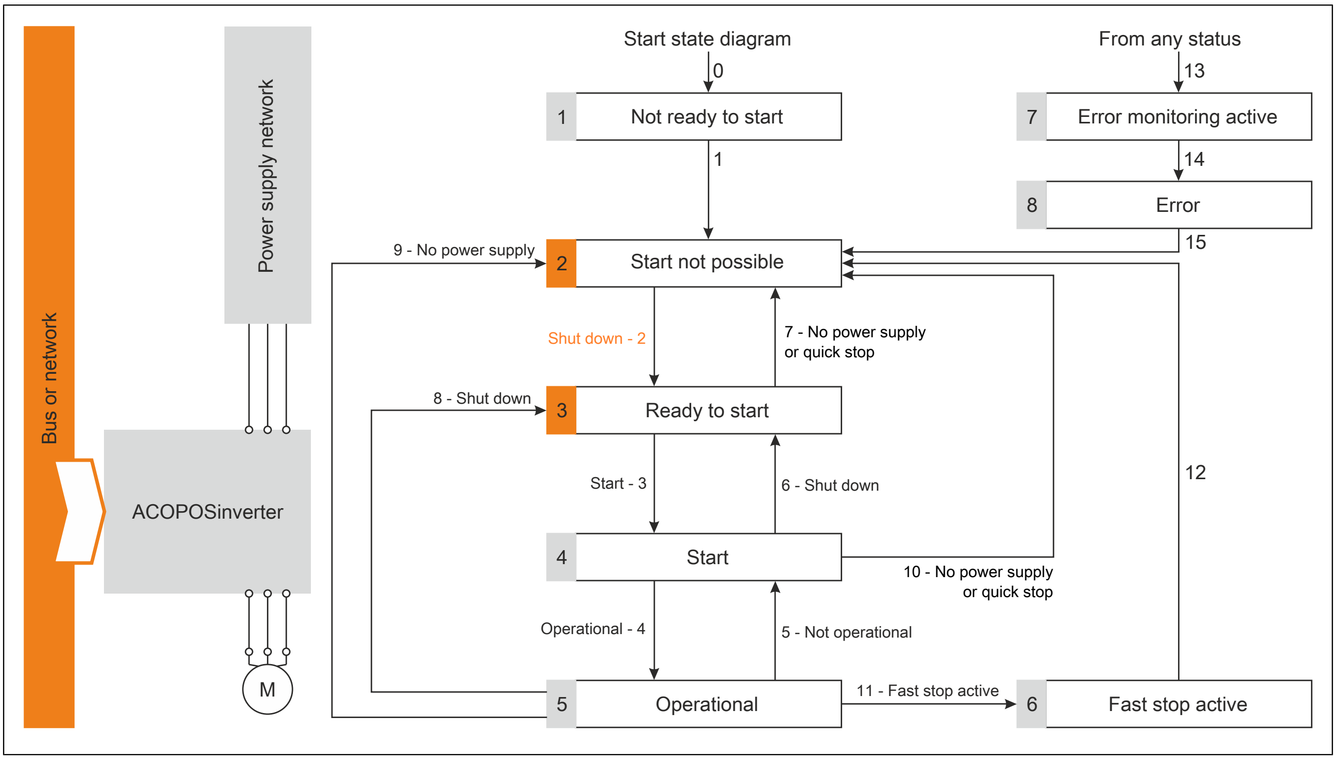
Both the performance and control stages are driven by the power supply network.

If the control stage is supplied with power, the power stage must also be supplied with power.

The following sequence must be applied:

Step 1

Apply command 2 - "Start not possible".



Step 2

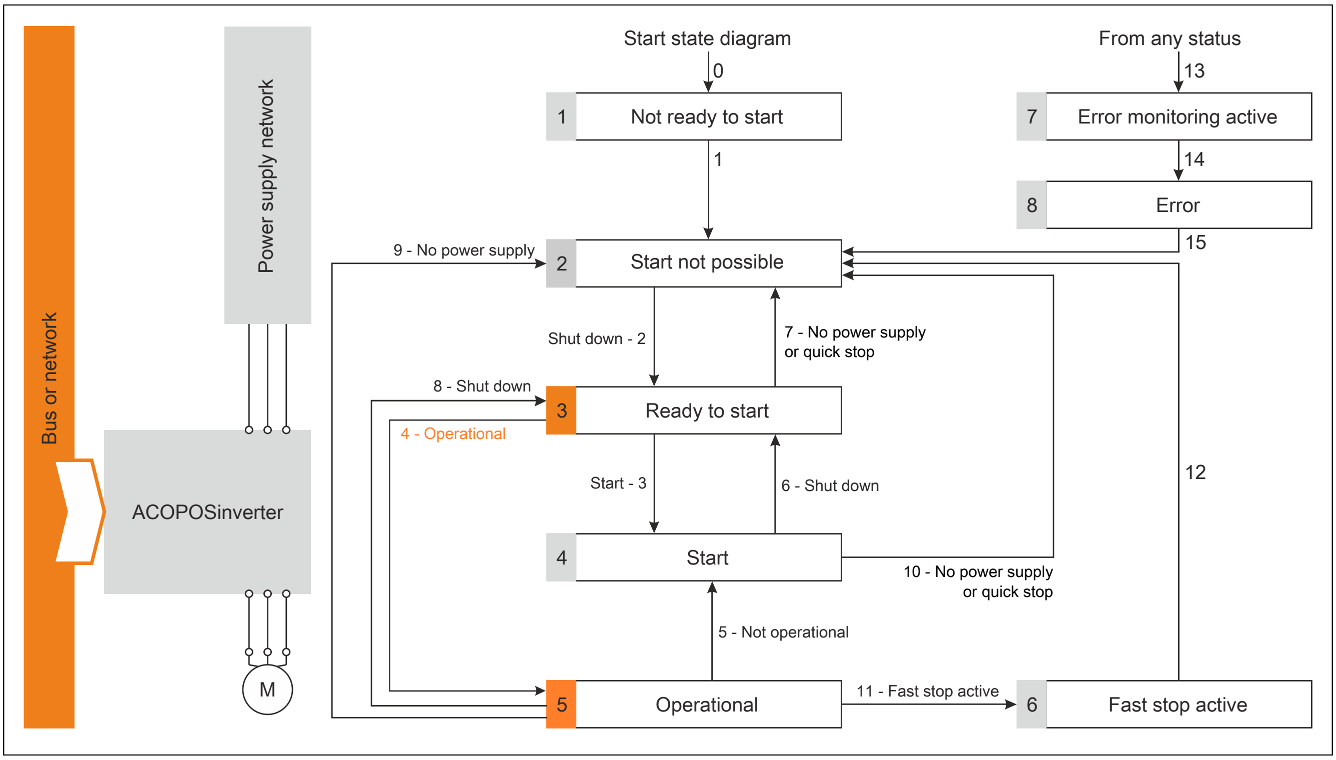
Check that the inverter is in operating state 2 - "Start not possible".

Then apply command 4 - "Start".

The motor can be controlled (send a reference value not equal to zero).

Advice:

Note: It is possible, although not necessary, to apply command 3 - "Ready to start" followed by command 4 - "Start" in order to successfully switch to operating states 3 - "Ready to start", 4 - "Start" and then 5 - "Operational". Command 4 - "Start" is sufficient.



5.1.4.2.13 Sequence for an inverter with a separate control stage

Description

The power and control stages are supplied with power separately.

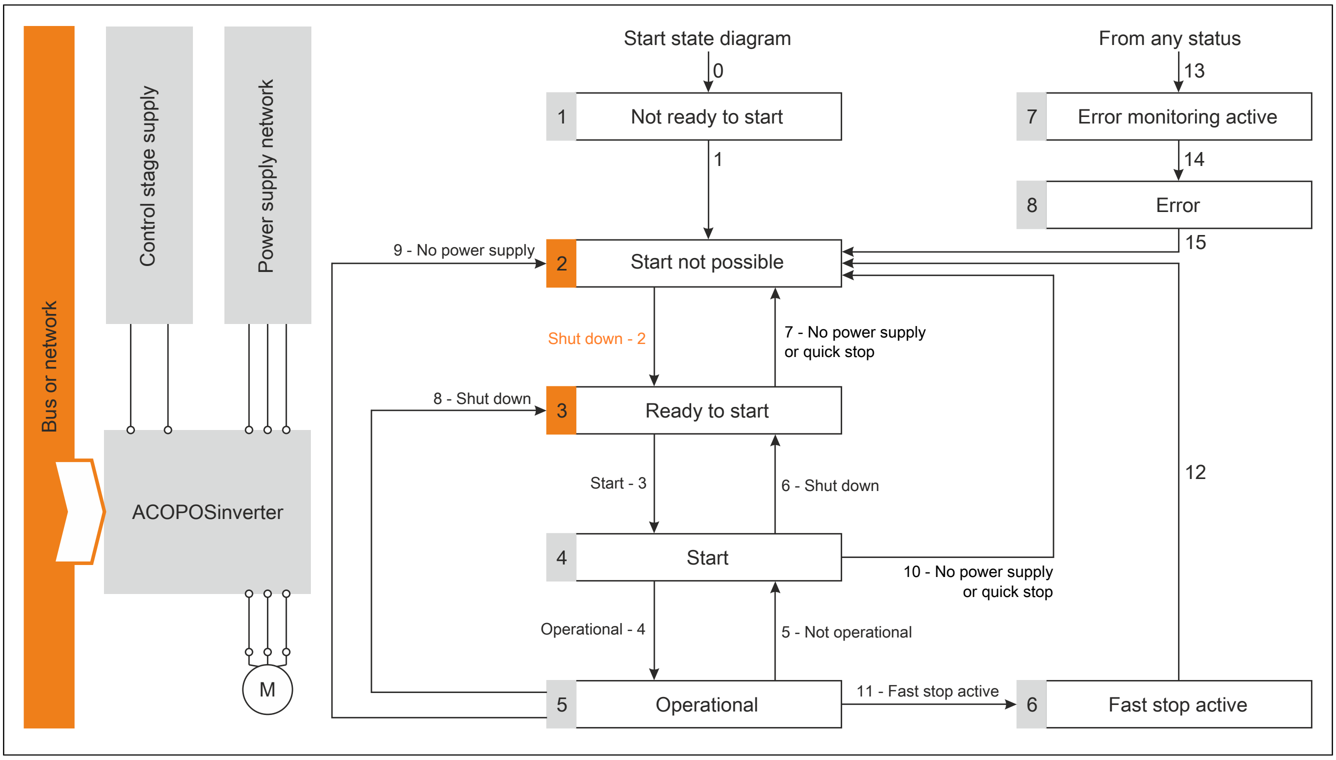
If the control stage is supplied with power, the power stage must also be supplied with power.

The following sequence must be applied:

Step 1

The power supply network is definitely available.

Apply command 2 - "Start not possible".



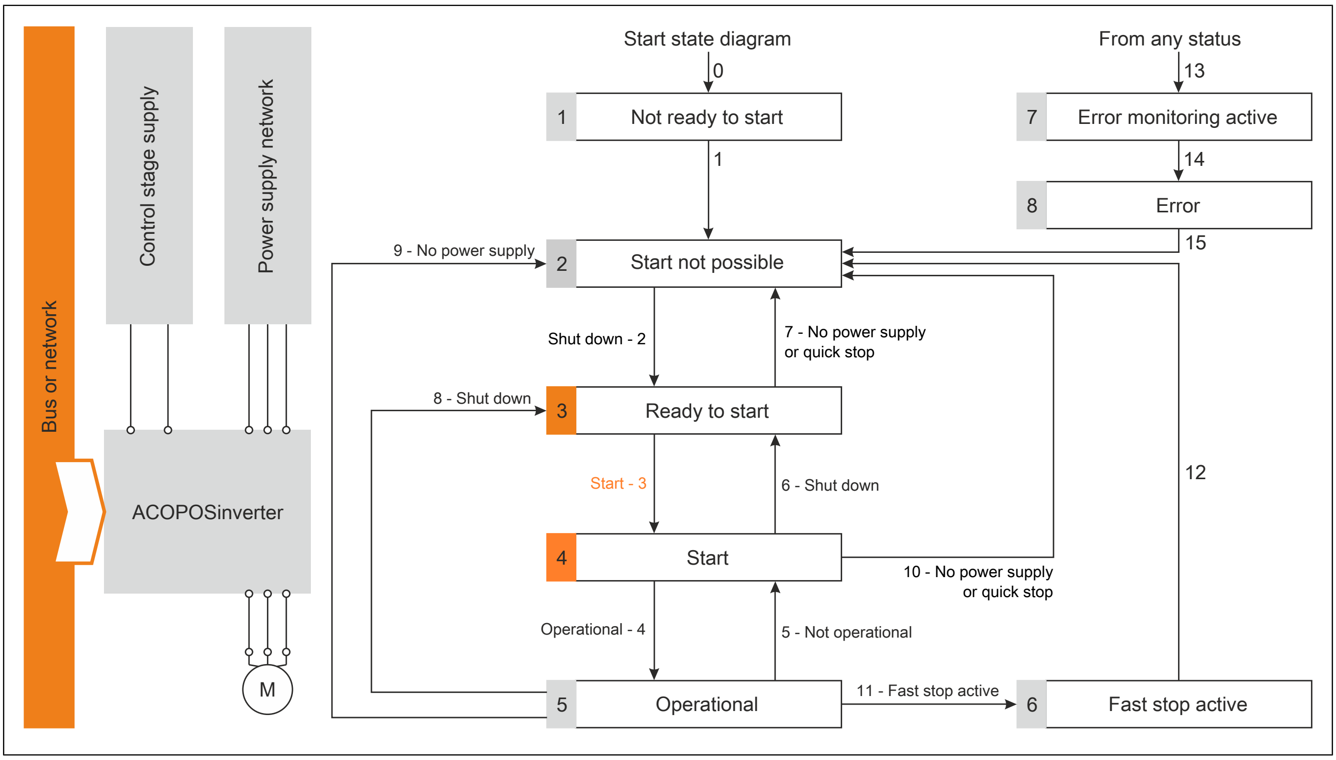
Step 2

Check that the inverter is in operating state 3 - "Ready to start".

Check that the power supply network is available (**Voltage enabled** of state word).

Power supply network	Graphics display	State word
Not available	nLP	21 hex
Available	rdY	31 hex

Apply command 3 - "Ready to start".



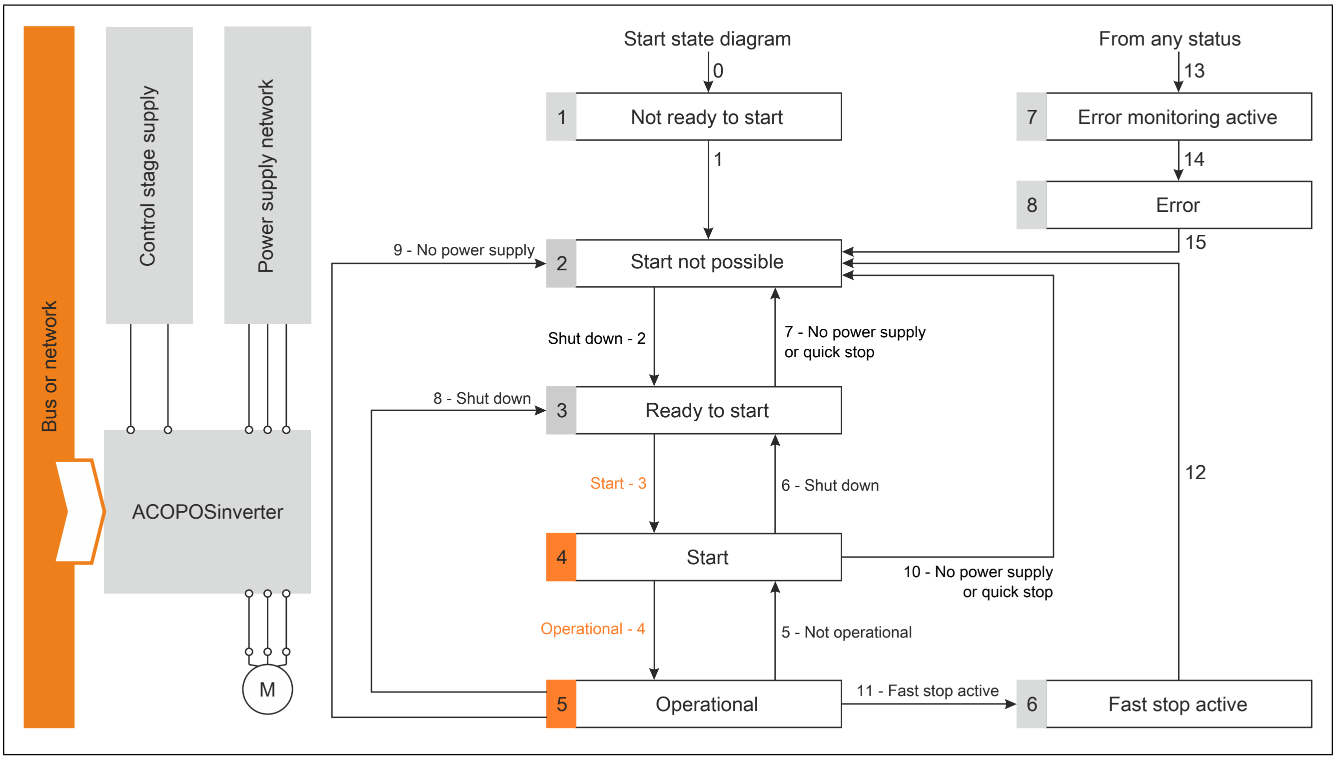
Step 3

Check that the inverter is in operating state 4 - "Start".

Apply command 4 - "Operational".

The motor can be controlled (send a reference value not equal to zero).

If the power supply network is still not available in operating state 4 "Start" after delay **[Mains V. time out]** (LCt), the inverter triggers an error **[Line contactor]** (LCF).



5.1.4.2.14 Sequence for an inverter with line contactor control

Description

The power and control stages are supplied with power separately.

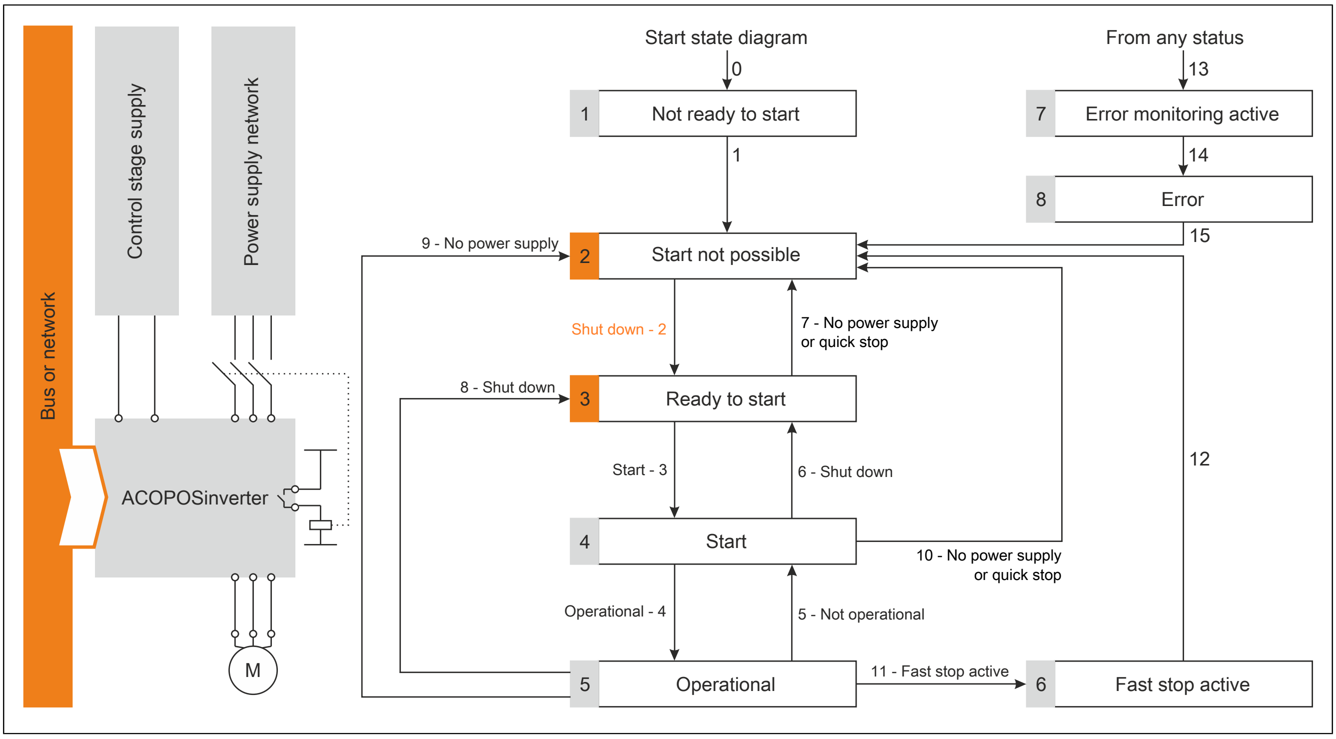
If the control stage is supplied with power, the power stage does not need to be supplied with power also. The inverter controls the line contactor.

The following sequence must be applied:

Step 1

The power supply network is not available since the line contactor is not controlled.

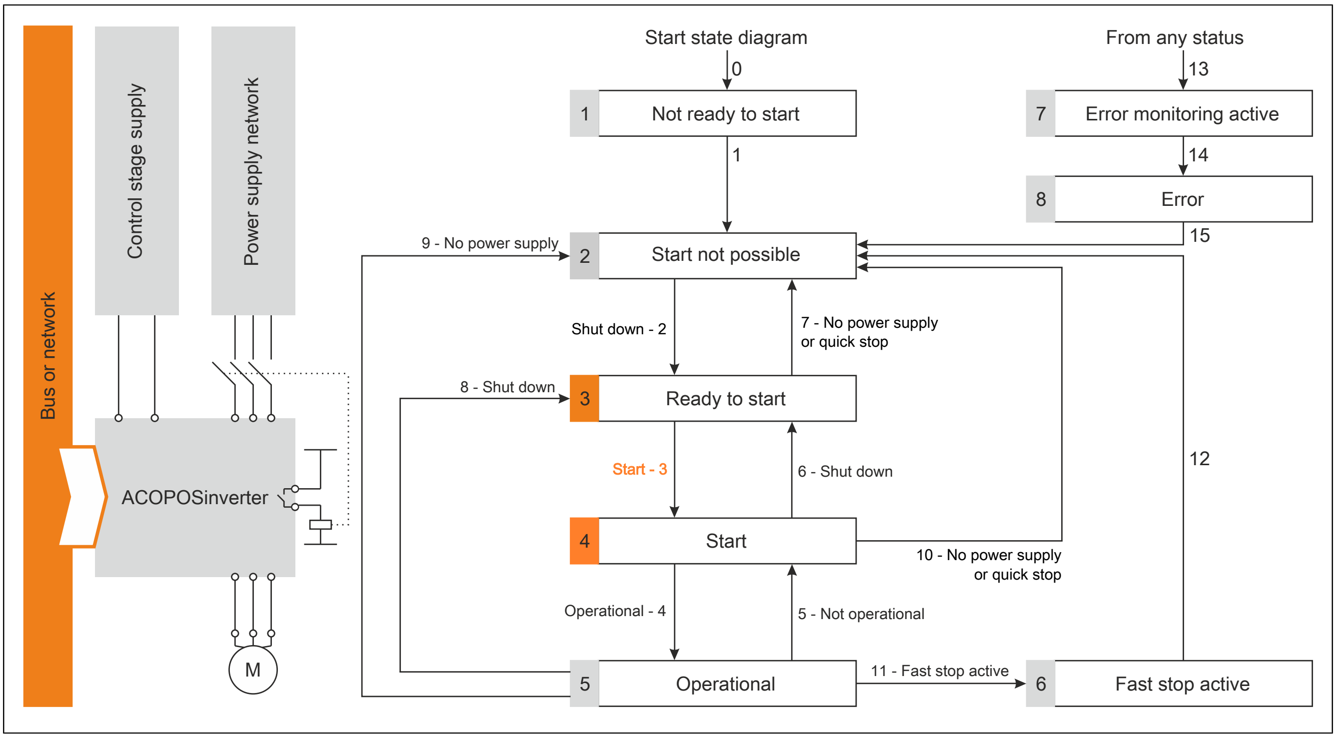
Apply command 2 - "Start not possible".



Step 2

Check that the inverter is in operating state 3 - "Ready to start".

Apply command 2 - "Ready to start", which closes the line contactor and safeguards the power supply to the frequency inverter.



5.1.5 Operation

5.1.5.1 Operating status

Configuring communication error responses

The response of the inverter in the event of a CANopen communication interruption can be configured.

A configuration can be defined using display end-devices and menu **[FAULT MANAGEMENT]** (FLt), sub-menu **[COM. FAULT MANAGEMENT]** (CLL), parameter **[CANopen fault mgt]** (COL).

The values of parameter **[CANopen fault mgt]** (COL), which triggers a transition to operating state error **[CANopen com.]** (COF), are as follows:

Value	Description
[Freewheel] (YES)	Freewheel stop (factory setting)
[Ramp stop] (rMP)	Stop on a ramp
[Fast stop] (FSt)	Fast stop
[DC Injection] (dCI)	DC injection stop

The values of parameters **[CANopen fault mgt]** (COL), which does not trigger a transition to an operating state error, are as follows:

Value	Description
[ign fault] (nO)	The detected error was ignored.
[STOP CONFIGURATION] (Stt)	Stop in accordance with the configuration of **[Normal stop]** (Stt)
[fallback spd] (LFF)	Switch to reduced speed if the detected error persists and the run command has not been canceled.
[Spd maint.] (rLS)	The inverter maintains the speed applied at the time the error was detected as long as the detected error persists and the run command has not been canceled.

The reverse direction of rotation can be configured in menu **[FAULT MANAGEMENT]** (FLt-) / **[FALLBACK SPEED]** (LFF) using parameter **[Fallback speed]** (LFF).

Warning!

LOSS OF CONTROL

If this parameter is set to (nO), CANopen communication monitoring is disabled.

- **Do not use this setting unless you have performed a detailed risk assessment, taking into account all applicable regulations and standards for the device and the application.**
- **Only use this setting for tests performed during the installation.**
- **Check that the communication monitoring has been re-enabled before completing the installation procedure and performing the final installation test.**

Failure to follow these instructions can result in death or serious injury.

5.1.5.2 Operating mode

Configuring the control channel

This section uses three examples to explain how the inverter can be configured to allow operation of a communication network.

- I/O mode - A simple command word (based on forward, backward and reset of binary commands).
- Combined mode (with native CiA402 profile) - Reference value and command word taken from the communication network
- Separate mode (with native CiA402 profile) - Reference and control word taken from separate sources. For example, the control word (in CiA402) is taken from the communication network and the reference value is taken from the HMI.

Configuring the inverter for operation with the I/O profile

									3						2	1
CDXX	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
									Reset						Back	Forward

(1) **[INPUTS / OUTPUTS CFG]** (I_O-), **[Forward]** (Frd) assigned to **[CMD value]** (CMd) bit 0

(2) **[INPUTS / OUTPUTS CFG]** (I_O-), **[Reverse assign.]** (rrS) assigned to **[CMD value]** (CMd) bit 1

(3) **[FAULT MANAGEMENT]** (FLt-), **[FAULT RESET]** (rSt), **[Fault reset]** (rSF) assigned to **[CMD value]** (CMd) bit 7

The settings are as follows:

Code	Channel setting
[Ref.1 channel] (Fr1)	**[HMI]** (LCC)
[Profile] (CHCF)	**[I/O profile]** (IO)
[Cmd switching] (CCS)	**[ch1 active]** (Cd1)
[ch1 active] (Cd1)	**[CANopen com.]** (CAn)

The command word bits can now be configured. To configure these, use menu **[INPUTS / OUTPUTS CFG]** (I_O-):

Code	Channel setting
[Reverse assign.] (rrS)	**[CD01]** (Cd01)

In menu **[FAULT MANAGEMENT]** (FLt-), configure sub-menu **[FAULT RESET]** (rSt):

Code	Channel setting
[Fault reset] (rSF)	**[CD07]** (Cd07)

Configuring the inverter for operation with the CiA402 profile in combined mode

This paragraph describes how to configure the settings for an inverter that is controlled in CiA402 mode. The example focuses on non-separate mode. Additional modes are described in detail in section "Using the ACOPOSinverter without Automation Studio" on page 115.

In menu **[COMMAND]** (CtL-):

- **[Ref.1 channel]** (Fr1) is set according to the specific communication source, as listed in the following table:

Source of control	Channel setting
CANopen	**[CANopen com.]** (CAn)

- **[Ref. 2 switching]** (rFC) is set to standard value **[Ref.1 channel]** (Fr1).
- **[Profile]** (CHCF): Specifies whether the inverter works in combined mode (reference and command from same channel).

For the current example, **[Profile]** (CHCF) is set to **[Not separ.]** (SIM), since reference and control both originate from the communication network.

Profile	Channel setting
Combined CiA402 mode	**[Not separ.]** (SIM)
Separate CiA402 mode	**[Separate]** (SEP)
I/O profile	**[I/O profile]** (IO)

Configuring the inverter for operation with the CiA402 profile in separate mode

Since the combinations can vary, a list of possible settings is available in section "Using the ACOPOSinverter without Automation Studio" on page 115.

For example:

The inverter is controlled by the communication source (CANopen); the reference value is set, however. The check word is taken from the controller and is written in accordance with the CiA402 profile.

The settings are as shown in the table.

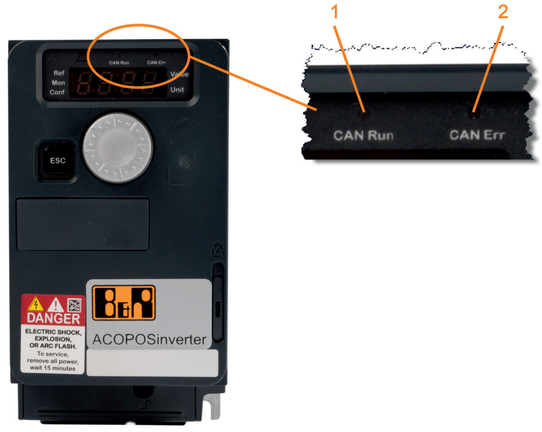
Code	Channel setting
[Ref.1 channel] (Fr1)	**[HMI]** (LCC)
[Profile] (CHCF)	**[Separate]** (SEP)
[ch1 active] (Cd1)	**[CANopen com.]** (CAn)
[Ref. 2 switching] (rFC)	**[Ref.1 channel]** (Fr1)
[Cmd switching] (CCS)	**[ch1 active]** (Cd1)

5.1.6 Diagnostics and error correction

5.1.6.1 State LED fieldbus

LED indicators

The following image describes the LED states for the module:



LED description

Object	LED	Description
1	CAN_RUN	CANopen state
2	CAN_ERR	CANopen error

CANopen state

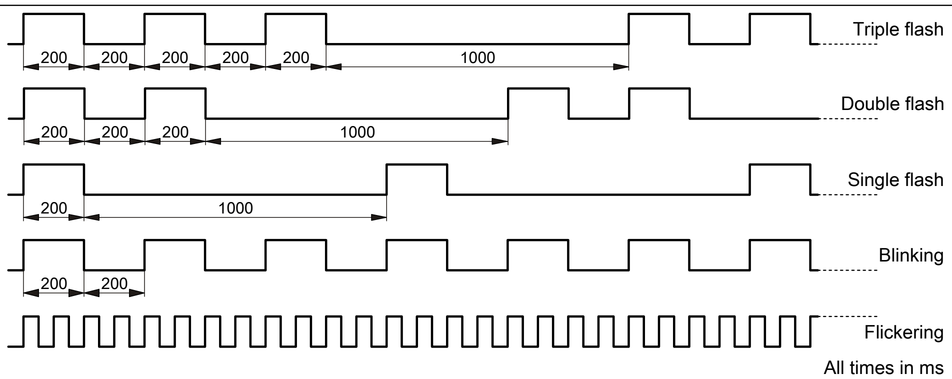
This LED indicates the CANopen state.

Color & state	Description
Off	The CANopen controller is in the **OFF** state.
Green, single flash	The ACOPOSinverter is in the **STOPPED** state.
Green, blinking	The ACOPOSinverter is in the **PRE-OPERATIONAL** state.
Green, on	The ACOPOSinverter is in the **OPERATIONAL** state.

Error status

This LED indicates the CANopen error state:

Color & state	Description
Off	No detected error reported.
Red, single flash	Detected error reported by the ACOPOSinverter CANopen controller (Example: Too many frame errors detected).
Red, double flash	Detected error caused by the occurrence of a node-protection or heartbeat event.
Red, on	The CANopen controller is in the Bus **OFF** state.



NMT diagram

Parameter **[CANopen NMT state]** (nMtS) (logical address 6057, CANopen index/subindex 201E hex/3a) indicates the NMT diagram state. The various possible values are **[Boost]** (bOO), **[Stop]**(StOP), **[Operation]** and **[Pre-op]** (preparing).

This parameter can be accessed from menu **[MONITORING]** (MOn-) → **[COMMUNICATION MAP]** (CMM-) → **[CANopen MAP]** (CnM-).

PDO counter

Parameters[Number of RX PDO] (nbrp) and [Number of TX PDO] (nbtp) indicate the number of received PDOs and the number of PDOs transmitted by the inverter (all PDO sets - PDO1, PDO2 and PDO3 - combined).

The values of the counters are reset to zero as soon as they reach 65535.

This parameter can be accessed from menu [MONITORING] (MOn-) → [COMMUNICATION MAP] (CMM-) → [CANopen MAP] (CnM-).

Last CANopen error detection

Parameter [Error code] (ErCO) (index/subindex 201E hex/39) indicates the last CANopen detected error and retains its value until the last detected error has been deleted.

This parameter is accessible:

- From menu [MONITORING] (MOn-) → [COMMUNICATION MAP] (CMM-) → [CANopen MAP] (CnM-)
- From menu [ALL] (Full) → [COMMUNICATION] (COM-) →[CANopen com.] (CnO-).

The possible values are shown below:

Display	Description
[0]	No errors have been detected since the CANopen communication started.
[1]	Bus off or CANopen overflow.
[2]	Node protection error requires a return to NMT initialization state.
[3]	CANopen overflow (possible alternative values: 32, 64 and 128)
[4]	Heartbeat error requires a return to NMT initialization state
[5]	NMT state diagram error

PDO value display

The values of the assigned parameters in PDOs can be displayed using sub-menus [PDO1 IMAGE] (PO1-), [PDO2 IMAGE] (PO2-) and [PDO3 IMAGE] (PO3-).

These sub-menus are accessible from menu [MONITORING] (MOn-) → [COMMUNICATION MAP] (CMM-) → [CANopen MAP] (CnM-).

The following image shows the content of sub-menu [PDO3 IMAGE] (PO3-):

RUN CAN +50.00 Hz 80 A	
PDO3 MAP	
Received PDO3-1:	1237
Received PDO3-2:	50
Received PDO3-3:	0
Received PDO3-4:	304
Transmit PDO3-1:	231
Code	Quick
Transmit PDO3-2:	642
Transmit PDO3-3:	10
Transmit PDO3-4:	9432

Advice:

On each of these screenshots, and for each transmitted or received PDO, only the words in the [Transmit PDOx-x] or [Received PDOx-x] transmitted or received in the CANopen bus are displayed. This means that in PDO2, which contain only 4 data bytes, (RP21 and RP22), fields [Received PDO2-3] and [Received PDO2-4] are not displayed, for example.

5.1.6.2 Connection for fieldbus mode

If the product cannot be addressed via fieldbus, start by checking the connections. The operating instructions contain the technical data for the device and information about network and device installation. Check the following:

- Power connections to the device
- Fieldbus cable and fieldbus wiring
- Network connections to the device

5.1.6.3 Monitoring of the communication channel

Command and reference channels

All inverter and reference parameters are managed on a channel-specific basis.

Parameter name	Parameter code			
	Taken into account by the inverter	Modbus serial	CANopen	Fieldbus module
Control word	CMd	CMd1	CMd2	CMd3
Extended control word	CMI	CMI1	CMI2	CMI3
Reference speed (rpm)	LFrd	LFd1	LFd2	LFd3
Reference frequency (0.1 Hz)	LFr	LFr1	LFr2	LFr3
Reference for torque control mode (0.1% of the normal torque)	LFr	LFr1	LFr2	LFr3
Reference value supplied by PI controller	PiSP	Pir1	Pir2	Pir3
Reference value supplied by analog multiplier function	MFr	MFr1	MFr2	MFr3

Monitoring of the communication channels

Communication channels are monitored if they are involved in one of the following parameters:

- Control word **[CMD value]** (CMd) from the active command channel
- The control word that contains the switch command (bit configured to**[Cmd switching]** (CCS))
- The control word that contains the switch for reference value 1‘1B (bit configured to **[Ref 1B switching]** (rCb))
- The control word that contains the switch for reference value 1‘2 (bit configured to **[Ref. 2 switching]** (rFC))
- The reference frequency or reference speed (**[HMI Frequency ref.]** (LFr) or (LFRD): Nominal speed value of the active channel for the reference value)
- Reference frequency or reference speed totaled (**[HMI Frequency ref.]** (LFr) or (LFRD): Nominal speed value) 2 (assigned to **[Summing ref. 2]** (SA2))
- Reference frequency or reference speed totaled (**[HMI Frequency ref.]** (LFr) or (LFRD): Nominal speed value) 3 (assigned to **[Summing ref. 3]** (SA3))
- Reference frequency or reference speed subtraction (**[HMI Frequency ref.]** (LFr) or (LFRD): Nominal speed value) 2 (assigned to**[Subtract. ref. 2]** (dA2))
- Reference frequency or reference speed subtraction (**[HMI Frequency ref.]** (LFr) or (LFRD): Nominal speed value) 3 (assigned to**[SubParam3]** (dA3))
- The reference value provided by the PID controller (PISP)
- The PID controller feedback (**[AIV1 assignment]** (AIV1))
- The multiplication coefficient of the reference values (**[Multiplying coeff.]** (MFr)) 2 (assigned to **[Multiplier ref. 2]** (MA2))
- The multiplication coefficient of the reference values (**[Multiplying coeff.]** (MFr)) 3 (assigned to **[Ref. multi 3]** (MA3))

As soon as one of these parameters has been written to a communication channel, it enables monitoring for this channel.

If a communication warning has been sent by a monitored port or fieldbus module (in coordination with the protocol criterion), the inverter triggers a communication interruption.

The inverter responds in accordance with the communication interruption configuration (operating state error, maintenance, return, etc.).

If a communication warning appears for a channel that is not monitored, the inverter does not trigger any communication interruption.

Enabling communication channels

A communication channel is enabled if all parameters involved have been written at least once. The converter cannot start until all channels involved in the command and reference value have been enabled.

For example:
An inverter in the DSP402 profile is connected to an active communication channel.
In order to change from state 4 - "Start" to state 5 - "Operational", it is mandatory for the reference value and the command to be written at least once.

A communication channel is disabled in the following cases:

- In the event of a communication warning
- In mode **forced local**

> ## Advice:
>
> **When mode forced local ends:**
>
> - **Commands run, the direction and the local reference value set via forced local are copied to the active channels by the inverter (retained).**
> - **Monitoring of the active channels for the command and reference values is performed after time delay [Time-out forc. local] (FLOt).**
> - **Inverter control is not effective until the inverter has received the reference and the command from the active channel.**

5.1.6.4 Diagnostics control signal

Introduction

On the graphic display terminal, sub-menu **[MONITORING]** (MON-), **[COMMUNICATION MAP]** (CMM-) can be used to display the control signal diagnostics information for the inverter and controller:

- Active command channel**[Command channel]** (CMdC)
- Value of control word **[Cmd value]** (CMd) of active command channel **[Command channel]** (CMdC)
- Active reference frequency channel **[Channel ref. active]** (rFCC)
- Value of reference frequency **[Frequency ref.]** (FrH) of active target channel **[Channel ref. active]** (rFCC)
- Value of operating state word **[ETA state word]** (EtA)
- Specific data for all available fieldbuses is available in the dedicated sub-menu.
- In sub-menu**[CMD word image]** (CWI): Control words for all channels
- In sub-menu **[Freq. ref. word map]** (rWI): Reference frequency values produced by all channels

Control word display

Parameter **[Command channel]** (CMdC) displays the active communication channel.

Parameter **[Cmd value]** (CMd) indicates the hexadecimal value of control word (CMD), which is used to control the inverter.

Sub-menu **[CMD word image]** (CWI), parameter **[CANopen cmd.]** (CMd2), are used to display the hexadecimal value of the CANopen control word.

Reference frequency display

Parameter **[Channel ref. active]** (rFCC) displays the active channel for the reference frequency.

Parameter **[HMI Frequency ref.]** (LFr) displays the value (in 0.1 Hz units) for the reference frequency used for controlling the inverter.

Sub-menu **[FREQ. REF. WORD MAP]** (rWI), parameter **[CANopen ref.]** (LFr2), are used to display the value (in 0.1 Hz units) of the CANopen reference frequency.

Operating state word display

Parameter **[ETA state word]** (EtA) indicates the value of operating state word (ETA).

The table contains the bit details of parameter **[ETA state word]** (ETA):

Bit	Description
DRIVECOM	Control word
Bit0 = 1	Ready to be switched on
Bit1 = 1	Switched on
Bit2 = 1	Operation enabled
Bit3 = 1	Operating state error
Bit4 = 1	Power stage
Bit5 = 0	Fast stop
Bit6 = 1	Switch-on disabled
Bit7 = 1	Warning
Bit8 = 1	DRIVECOM reserved
Bit9 = 0	Forced local mode has been executed
Bit10 = 1	Reference value reached (long-term state)
Bit11 = 1	Reference value exceeded (< LSP or > HSP)
Bit12	Reserved
Bit13	Reserved
Bit14 = 1	Stop forced using key **STOP**
Bit15= 0	Motor rotation in forward direction (or stopped)

5.1.7 Object overview

5.1.7.1 Communication profile range

Communication objects

The table contains the communication objects supported by the inverter:

Index	Subindex	Access	Type	Default value	Description
1000 hex	00 hex	Write-protected	Unsigned32	00410192 hex	Inverter type: Bit 16 to 23 = Inverter mode type Bit 00 to 15 = Inverter profile number (402)
1001 hex	00 hex	Write-protected	Unsigned8	00 hex	Detected error register: Detected errors (1) or undetected errors (0)
1003 hex	00 hex	Write-protected	Unsigned32	00000005 hex	Number of detected errors: No detected errors (0) or one or more detected errors (>0) in object 16#1003, only the value 0 can be written
	01 hex	Write-protected	Unsigned32	00000000 hex	Standard detected error field: Bit 16 to 31 = Additional information (every 0 s) Bit 00 to 15 = Error code (Errd)
1005 hex	00 hex	Read/Write	Unsigned32	00000080 hex	COB ID SYNC MESSAGE
1008 hex	00 hex	Write-protected	Visible character string	ACOPOSinverter	Inverter name
100C hex	00 hex	Read/Write	Unsigned16	0000 hex	Protective interval: The node protection protocol is inhibited as standard; the unit of this object is 1 ms
100D hex	00 hex	Read/Write	Unsigned16	0000 hex	Lifetime factor: Multiplier applied to **Guard Time** in order to obtain **Life Time**.
1010 hex	00 hex	Write-protected	Unsigned32	0002 hex	Saving parameters: Number of entries
	01 hex	Read/Write	Unsigned32	0000 hex	Saving parameters: Save all parameters
	02 hex	Read/Write	Unsigned32	0000 hex	Saving parameters: Save communication parameters
1011 hex	00 hex	Write-protected	Unsigned8	00002 hex	Restore standard parameters: Number of entries
	01 hex	Read/Write	Unsigned32	0000 hex	Restore standard parameters: Restore all parameters
	02 hex	Read/Write	Unsigned32	0000 hex	Restore standard parameters: Restore COM parameters
1014 hex	00 hex	Write-protected	Unsigned32	00000080 hex + Node number	COB ID emergency message: COB ID used for EMCY service
1016 hex	00 hex	Write-protected	Unsigned8	01 hex	Consumer heartbeat time - Number of entries
	01 hex	Read/Write	Unsigned32	00000000 hex	Consumer heartbeat time: Bits 16 to 23 = Manufacturer node number Bits 00 to 15 = Heartbeat time (unit = 1 ms)
1017 hex	00 hex	Read/Write	Unsigned32	00000000 hex	Manufacturer heartbeat time

5.1.7.2 SDO server parameter

Communication object

The table contains the communication objects that will be used for the SDO inverter:

Index	Subindex	Access	Type	Default value	Description
1200 hex	00 hex	Write-protected	Unsigned8	02 hex	SDO server - Number of entries
	01 hex	Write-protected	Unsigned32	00000600 hex + Node number	SDO server - COB ID Client → Frequency inverter (received)
	02 hex	Write-protected	Unsigned32	00000580 hex + Node number	SDO server - COB ID Client ← Frequency inverter (transferred)

5.1.7.3 PDO parameter received

Communication objects

The table contains the communication objects that will be used for configuring the inverter's received PDOs:

Index	Subindex	Access	Type	Default value	Description
1400 hex	00 hex	Write-protected	Unsigned8	02 hex	Received PDO1 - Number of entries
	01 hex	Read/Write	Unsigned32	00000200 hex + Node number	Received PDO1 - COB ID
	02 hex	Read/Write	Unsigned32	000000FF hex	Received PDO1 - Communication type: Standard value: Event-controlled
1401 hex	00 hex	Write-protected	Unsigned8	02 hex	Received PDO2 - Number of entries
	01 hex	Read/Write	Unsigned32	80000300 hex + Node number	Received PDO2 - COB ID
	02 hex	Read/Write	Unsigned32	000000FF hex	Received PDO2 - Communication type: Standard value: Event-controlled
1402 hex	00 hex	Write-protected	Unsigned8	02 hex	Receive PDO3 - Number of entries
	01 hex	Read/Write	Unsigned32	80000400 hex + Node number	Receive PDO3 - COB ID
	02 hex	Read/Write	Unsigned32	000000FF hex	Received PDO3 - Transmission type: Standard value: Event-controlled

5.1.7.4 PDO1, PDO2 and PDO3 mapping received

Communication objects

The table contains the communication objects that will be used for mapping the inverter's PDOs:

Index	Subindex	Access	Type	Default value	Description
1600 hex	00 hex	Read/Write	Unsigned8	02 hex	Received mapping objects - Number of mapped objects: 0 to 4 objects can be mapped for this PDO
	01 hex	Read/Write	Unsigned32	60400010 hex	Received PDO1 mapping - First mapped object: Control word CMDD (6040 hex)
	02 hex	Read/Write	Unsigned32	60420010 hex	Received PDO1 mapping - Second mapped object: Speed reference LFRD (6042 hex)
	03 hex	Read/Write	Unsigned32	00000000 hex	Received PDO1 mapping: No third mapped object
	04 hex	Read/Write	Unsigned32	00000000 hex	Received PDO1 mapping: No fourth mapped object
1601 hex	00 hex	Read/Write	Unsigned8	00 hex	Received PDO2 mapping - Number of mapped objects: 0 to 4 objects can be mapped for this PDO
	01 hex	Read/Write	Unsigned32	00000000 hex	Received PDO2 mapping: No first mapped object
	02 hex	Read/Write	Unsigned32	00000000 hex	Received PDO2 mapping: No second mapped object
	03 hex	Read/Write	Unsigned32	00000000 hex	Received PDO2 mapping: No third mapped object
	04 hex	Read/Write	Unsigned32	00000000 hex	Received PDO2 mapping: No fourth mapped object
1602 hex	00 hex	Write-protected	Unsigned8	04 hex	Received PDO3 mapping - Number of mapped objects: 0 to 4 objects can be mapped for this PDO
	01 hex	Write-protected	Unsigned32	20613E10 hex	Received PDO3 mapping - First mapped object: **[Com Scan Out1 val.]** (nC1)
	02 hex	Write-protected	Unsigned32	20613F10 hex	Received PDO3 mapping - Second mapped object: **[Com Scan Out2 val.]** (nC2)
	03 hex	Write-protected	Unsigned32	20614010 hex	Received PDO3 mapping - Third mapped object: **[Com Scan Out3 val.]** (nC3)
	04 hex	Write-protected	Unsigned32	20614110 hex	Received PDO3 mapping - Fourth mapped object: **[Com Scan Out4 val.]** (nC4)

5.1.7.5 Transmit PDO parameter

Communication objects

The table contains the communication objects that will be used for configuring the inverter's transmitted PDOs:

Index	Subindex	Access	Type	Default value	Description
1800 hex	00 hex	Write-protected	Unsigned8	05 hex	Transmitted PDO1 - Number of entries
	01 hex	Read/Write	Unsigned32	00000180 hex + Node number	Transmitted PDO1 - COB ID
	02 hex	Read/Write	Unsigned8	FF hex	Transmitted PDO1 - Transmission type: Three modes are available for this PDO: **Asynchronous** (255), **synchronously cyclic** (1-240) and **synchronously acyclic** (0)
	03 hex	Read/Write	Unsigned16	300	Transmitted PDO1 - Inhibition period: Minimum time between two transmissions: Unit = 100 ms
	04 hex	Read/Write	Unsigned8	-	Transmitted PDO1 - Reserved
	05 hex	Read/Write	Unsigned16	1000	Transmitted PDO1 - Event timer: In **asynchronous** mode, this object sets a minimum transmission speed for this PDO; Unit = 1 ms
1801 hex	00 hex	Write-protected	Unsigned8	05 hex	Transmitted PDO2 - Number of entries
	01 hex	Read/Write	Unsigned32	80000280 hex + Node number	Transmitted PDO2 - COB ID
	02 hex	Read/Write	Unsigned8	FF hex	Transmitted PDO2 - Transmission type: Three modes are available for this PDO: **Asynchronous** (255), **synchronously cyclic** (1-240) and **synchronously acyclic** (0)
	03 hex	Read/Write	Unsigned16	300	Transmitted PDO2 - Inhibition period: Minimum time between two transmissions; Unit = 100 ms
	04 hex	Read/Write	Unsigned8	-	Transmitted PDO2 - Reserved
	05 hex	Read/Write	Unsigned16	1000	Transmitted PDO2 - Event timer: In **asynchronous** mode, this object sets a minimum transmission speed for this PDO; Unit = 1 ms
1802	00 hex	Write-protected	Unsigned8	05 hex	Transmitted PDO3 - Number of entries
	01 hex	Read/Write	Unsigned32	80000380 hex + Node number	Transmitted PDO3 - COB ID
	02 hex	Read/Write	Unsigned8	FF hex	Transmitted PDO3 - Transmission type: Three modes are available for this PDO: **Asynchronous** (255), **synchronously cyclic** (1-240) and **synchronously acyclic** (0)
	03 hex	Read/Write	Unsigned16	30	Transmitted PDO3 - Inhibition period: Minimum time between two transmissions; Unit = 1 ms
	04 hex	Read/Write	Unsigned8	-	Transmitted PDO3 - Reserved
	05 hex	Read/Write	Unsigned16	1000	Transmitted PDO3 - Event timer: In **asynchronous** mode, this object sets a minimum transmission speed for this PDO; Unit = 1 ms

5.1.7.6 Send PDO1, PDO2 and PDO3 mapping

Communication object

The table contains the communication objects that will be used for mapping the PDOs on the inverter:

Index	Subindex	Access	Type	Default value	Description
1A00 hex	00 hex	Read/Write	Unsigned8	02 hex	Transmitted PD01 mapping - Number of mapped objects
	01 hex	Read/Write	Unsigned32	60410010 hex	Transmitted PDO1 mapping - First mapped object: **[ETA state word]** (ETA) (6041 hex)
	02 hex	Read/Write	Unsigned32	60440010 hex	Transmitted PDO1 mapping - Second mapped object: Control effort (rFRD) (6044 hex)
	03 hex	Read/Write	Unsigned32	00000000 hex	Transmitted PDO1 mapping: No third mapped object
	04 hex	Read/Write	Unsigned32	00000000 hex	Transmitted PDO1 mapping: No fourth mapped object
1A01 hex	00 hex	Read/Write	Unsigned8	00 hex	Transmitted PDO2 mapping - Number of mapped objects
	01 hex	Read/Write	Unsigned32	00000000 hex	Not mapped
	02 hex	Read/Write	Unsigned32	00000000 hex	Not mapped
	03 hex	Read/Write	Unsigned32	00000000 hex	Not mapped
	04 hex	Read/Write	Unsigned32	00000000 hex	Not mapped
1A02 hex	00 hex	Write-protected	Unsigned8	04 hex	Transmitted PDO3 mapping - Number of mapped objects
	01 hex	Write-protected	Unsigned32	20612A10 hex	Transmitted PDO3 mapping - First mapped object: **[Com Scan In1 val.]** (nM1)
	02 hex	Write-protected	Unsigned32	20612B10 hex	Transmitted PDO3 mapping - Second mapped object: **[Com Scan In2 val.]** (nM2)
	03 hex	Write-protected	Unsigned32	20612C10 hex	Transmitted PDO3 mapping - Third mapped object: **[Com Scan In3 val.]** (nM3)
	04 hex	Write-protected	Unsigned32	20612D10 hex	Transmitted PDO3 mapping - Fourth mapped object: **[Com Scan In4 val.]** (nM4)

5.1.7.7 Vendor-specific area

ACOPOSinverter parameters are based on and also documented with their CANopen address.

Advice:

For CANopen addresses, see the communication parameters Excel table.

5.1.7.8 Application profile range

Standardized objects

The table contains the standardized objects in accordance with speed mode profile CiA402, which is supported by the inverter:

Index	Description	
603F hex	Error code	
6040 hex	Control word	
6041 hex	Status word	
6042 hex	Target speed	
6043 hex	Speed demand	
6044 hex	Control effort	
6046 hex	01 hex	Speed minimum height
	02 hex	Speed maximum height
6048 hex	Speed acceleration	
	01 hex	Delta speed
	02 hex	Delta time
604 B hex	Setpoint factor	
	01 hex	Setpoint factor counter
	02 hex	Setpoint factor denominator
605A hex	Quick stop option code	
605C hex	Option code disabled	
6060 hex	Types of operation	
6061 hex	Types of operation displays	
6077 hex	Torque current value	
6502 hex	Supported device types	

5.2 X2X Link

5.2.1 General information

This product is a plug-in interface for the ACOPOSinverter P66. Parameters available on the CAN interface can also be retrieved and written on the X2X interface. One input and one output have each been implemented for X2X. A shield connection and shield grounding are provided.

- Automatic firmware update via AS
- Power supply of interface card via inverter
- Electrical isolation between fieldbus and X2X Link
- Requires freely pre-assembled X2X cable

5.2.2 Order data

Model number	Short description	Figure
	Interface modules	
8I0IF109.400-1	ACOPOSinverter P66 interface module, 2x X2X Link interface	
	Optional accessories	
	Terminal blocks	
8TB2104.2010-00	4-pin screw clamp, single row, spacing: 5.08 mm, label 1: numbered serially	
8TB2108.2010-00	8-pin screw clamp, single row, spacing: 5.08 mm, label 1: numbered serially	
8TB2108.2210-00	Push-in terminal block 8-pin, 1-row, spacing: 5.08 mm, label 1: numbered consecutively	
	Terminals	
8TB2104.2210-00	Push-in terminal block 4-pin, 1-row, spacing: 5.08 mm, label 1: 4 3 2 1	

Table 23: 8I0IF109.400-1 - Order data

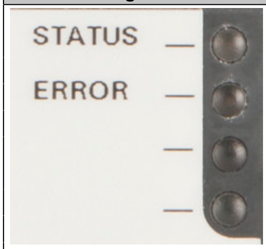
5.2.3 Technical data

Model number	8I0IF109.400-1
Short description	
Bus receiver	X2X Link bus receiver
General information	
B&R ID code	0xF259
Status indicators	Operating state, module status
Diagnostics	
Module run/error	Yes, using LED status indicator and software
Overload	Yes, using LED status indicator and software
Power consumption	
External I/O	500 mW
Additional power dissipation caused by actuators (resistive) [W]	-
Electrical isolation	
X2X Link - Frequency inverter	Yes
Certifications	
CE	Yes
UL	Not relevant
CSA	Not relevant
Operating conditions	
Mounting orientation	
Vertical	Yes
Installation elevation above sea level	
0 to 2000 m	No limitation
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m
Degree of protection per EN 60529	IP20
Ambient conditions	
Temperature	
Operation	-10 to 60°C
Storage	-40 to 85°C
Transport	-40 to 85°C
Relative humidity	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Note	Terminal blocks must be ordered separately. 2x 8TB2104.2010-00 (corresponds to 0TB704.9) or 2x 8TB2104.2210-00 (corresponds to 0TB704.91) or 1x 8TB2108.2010-00 or 1x 8TB2108.2210-00

Table 24: 8I0IF109.400-1 - Technical data

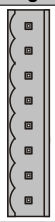
5.2.4 LED status indicators

For a description of different operating modes, see section "Additional information - Diagnostic LEDs" of the X20 system user's manual.

Figure	LED	Color	Status	Description
	STATUS	Green	Off	No power to module
			Single flash	Mode RESET[1)]
			Double flash	Mode BOOT[1)] (during firmware update)
			Blinking	Mode PREOPERATIONAL[1)]
			On	Mode RUN[1)]
	ERROR	Red	Off	Module not supplied with power or everything OK
			Single flash	Cyclic data scanner on frequency inverter not running
			Double flash	Power supply below the warning level of 20.4 V
			Triple flash	No communication with the frequency inverter
	STATUS + ERROR	Solid red / Single green flash		Invalid firmware

1) The operating states are described in Automation Help under "Real-time operating system - Method of operation - Operating states".

5.2.5 Pinout

Figure	Terminal	Description
	1	X2X
	2	GND
	3	X2X\
	4	Shield
	5	X2X
	6	GND
	7	X2X\
	8	Shield

5.2.6 Use of ACOPOSinverter with Automation Studio

Several hardware upgrades have been created for use of the frequency inverter in Automation Studio (one upgrade per communication card). The hardware device description files include the standard interfaces for a POWERLINK CN or X2X slave, expanded by communication data points and configuration parameters of the frequency inverter.

In ACOPOSinverter P76, communication card POWERLINK comes preinstalled in the device for outbound delivery. There are various communication cards for ACOPOSinverter P66 (e.g. POWERLINK and X2X). For this product, the corresponding communication card is delivered separately and must be installed on the frequency inverter before commissioning.

Information:

The interface between frequency inverter and communication card does not support hot plugging, i.e. the communication card must be installed when the power is switched off.

For the complete register table for the ACOPOSinverter, see chapter 5.3.12 "Register description" on page 458 or the following Excel file:

ACOPOSinverter - Communication Parameters

5.2.6.1 Automation Studio

Several hardware upgrades have been created for use of the frequency inverter in Automation Studio (one upgrade per communication card). The hardware device description files include the standard interfaces for a POWERLINK CN or X2X slave, expanded by communication data points and configuration parameters of the frequency inverter.

In ACOPOSinverter P76, communication card POWERLINK comes preinstalled in the device for outbound delivery. There are various communication cards for ACOPOSinverter P66 (e.g. POWERLINK and X2X). For this product, the corresponding communication card is delivered separately and must be installed on the frequency inverter before commissioning.

Information:

The interface between frequency inverter and communication card does not support hot plugging, i.e. the communication card must be installed when the power is switched off.

5.2.6.2 ACOPOSinverter Communication

5.2.6.2.1 I/O mapping

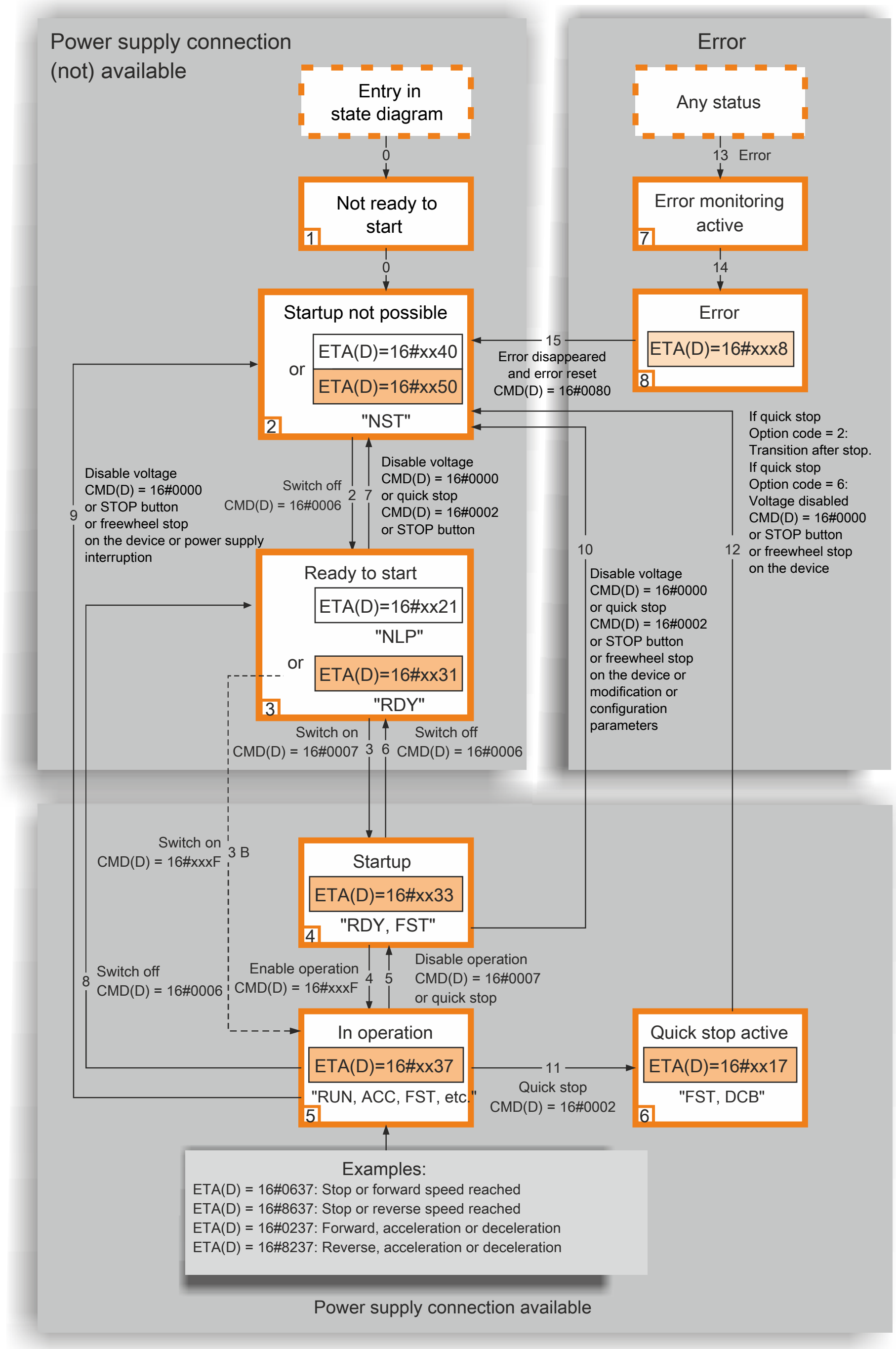
The default interface for I/O mapping provides access to the essential data points of the frequency inverter. These include:

- ERRD
    - Error message per DS402
    - See list of error messages in chapter "Data point ERRD" on page 414
- ETAD
    - Status word per DS402
    - For more information, see state machine DS402 in section "Data points ETA(D) and CMD(D) and state machine for standard "DS402"" on page 410.
- CMDD

- Command word per DS402
- For more information, see state machine DS402 in section "Data points ETA(D) and CMD(D) and state machine for standard "DS402"" on page 410.

- LFRD
  - Setpoint generation per DS402
  - In the default setting, the setpoint is specified in rpm.
- FROD
  - Setpoint feedback per DS402
  - In the default setting, the setpoint is reported in rpm.
- RFRD
  - Actual value feedback per DS402
  - In the default setting, the setpoint is reported in rpm.

5.2.6.2.2 Data points ETA(D) and CMD(D) and state machine for standard "DS402"



Each state represents an internal reaction for the frequency inverter. The state is changed per the transmitted (CMD(D)) control word or an internal activity (e.g. error). State is identified using the value for state word (ETA(D)).

1) Not ready to start
   Start initialization
   - Transition state not visible for communication network.
2) Start not possible
   The frequency inverter is not active.
   - An AC power supply for the power unit is not necessary for an external controller.
   - An external controller with line contactor does not control the contactor.
   - The frequency inverter is locked and the motor cannot be supplied with power.
   - The configuration and setting parameters can be configured.
3) Ready to start
   Wait for power supply for the power unit.
   - An AC power supply for the power unit is not necessary for an external controller. The system requires this state in order to switch to state 4 - "Start".
   - An external controller with line contactor does not control the contactor.
   - The frequency inverter is locked and the motor cannot be supplied with power.
   - The configuration and setting parameters can be configured.

   Caution!

   DS402 describes the high voltage power supply of the frequency inverter in state 3 - "Ready for start". There is a difference here between DS402 and the frequency inverter description.
4) Start
   Although the frequency inverter is supplied by AC power, it is in a steady state.
   - A power unit supply is necessary for an external controller.
   - An external controller with line contactor does not control the contactor.
   - The frequency inverter is locked and the motor cannot be supplied with power.
   - The supply stage for the inverter is ready for operation, but the voltage has not been applied at the output.
   - The setting parameters can be configured.
   - Modifying the configuration parameter resets the frequency inverter to state 2 - "Start not possible".
5) Run
   The frequency inverter is in operation.
   - A power unit supply is necessary for an external controller.
   - An external controller with line contactor controls the contactor.
   - The frequency inverter is unlocked and the motor is supplied.
   - The inverter functions are enabled and the motor terminals are supplied with voltage.
   - In the event of a frequency inverter with open-ended control loop and setpoint zero or a stop command, the power supply to the motor and torque will be switched off.
   - **[Auto-tuning]** (tun) requires a power feed to the motor. The frequency inverter must be in state 5 - "In operation" for this purpose.
   - The setting parameters can be configured.
   - The configuration parameters cannot be configured.

> **Information:**
>
> **The channel must be valid for transition from state 4 - "Start" to state 5 - "In operation". If the channel is contained within a command or setpoint, the transition to state 4 - "Start" can only take place if the setpoint has been received for the first time. The reaction of the frequency inverter to command "Deactivate operation" is dependent on the value of parameter [Disable Output Trigger Definition] (dotd):**
>
> - **If parameter [Disable Output Trigger Definition] (dotd) is in state 0, the inverter changes to state 4 - "Start" and stops in freewheel stop.**
> - **If parameter [Disable Output Trigger Definition] (dotd) is in state 1, the frequency inverter stops at the ramp and switches to state 4 - "Start".**

6) Quick stop active
   Emergency stop
   - The frequency inverter performs a quick stop. Following a quick stop, a restart is only possible if a switch to state 2 - "Start not possible" is implemented.
   - During quick stop, the frequency inverter is locked and the motor is supplied with power.
   - The configuration parameters cannot be configured.

> **Information:**
>
> **The condition for the transition from state 6 - "Quick stop active" to state 2 - "Start not possible" is dependent on the value of parameter [Disable Output Quick Stop] (qStd):**
>
> - **If parameter [Disable Output Quick Stop] (qStd) is in state 2, the inverter stops at the quick stop ramp and changes to state 2 - "Start not possible".**
> - **If parameter [Disable Output Quick Stop] (qStd) is in state 6, inverter stops in accordance with the quick stop ramp and then remains in state 6 - "Quick stop active" until:**
>   - **Command "Disable voltage" has been received.**
>   - **STOP has been pressed.**
>   - **Command "Freewheel stop" has been received via the operator terminal.**

7) Error monitoring active
   Transition state in which the frequency inverter performs an action in accordance with a type of error.
   - Frequency inverter function is enabled or disabled as per the response type configured in the error management parameter.

8) Error
   Frequency inverter faulty.
   - The frequency inverter is locked and the motor cannot be supplied with power.

Status	Power unit power supply for external controller	Power supply for motor	Modification of configuration parameter
1 - Not ready to start	Not required	No	Yes
2 - Start not possible	Not required	No	Yes
3 - Ready to start	Not required	No	Yes
4 - Start	Required	No	Yes, back to state 2 - "Start not possible"
5 - Operational	Required	Yes, except for open-control loop and setpoint zero or stop command.	No
6 - Fast stop active	Required	Yes, during quick stop	No
7 - Error monitoring active	Dependent on fault management configuration	Dependent on fault management configuration	-
8 - Error	Not required	No	Yes

Structure of state word ETA(D)

Bit 7	Bit 6	Bit 5	Bit 4
Warning	Start not possible	Fast stop	Power supply possible
Alarm	Power supply for power unit not possible	Emergency stop	Power supply for power unit

Bit 3	Bit 2	Bit 1	Bit 0
Error	Run	Start	Ready to start
Error	Run	Ready	Wait for power supply for power unit

Bit 15	Bit 14	Bit 13	Bit 12
Direction of rotation	Stop by pressing STOP	Reserved (0)	Reserved (0)

Bit 11	Bit 10	Bit 9	Bit 8
Internal limit active	Target reached	External	Reserved (0)
Setpoint outside limit	Setpoint reached	Command or setpoint via network	

Status	Bit 6 Start not possible	Bit 5 Fast stop	Bit 4 Power supply	Bit 3 Error	Bit 2 Run	Bit 1 Start	Bit 0 Ready to start	ETA covered by 16#006F[1]
1 - Not ready to start	0	x	x	0	0	0	0	-
2 - Start not possible	1	x	x	0	0	0	0	16#0040
3 - Ready to start	0	1	x	0	0	0	1	16#0021
4 - Start	0	1	1	0	0	1	1	16#0023
5 - Operational	0	1	1	0	1	1	1	16#0027
6 - Fast stop active	0	0	1	0	1	1	1	16#0007
7 - Error monitoring active	0	x	x	1	1	1	1	-
8 - Error	0	x	x	1	0	0	0	16#0008[2] or 16#0028

1) This mask can be used by program PLC for testing diagram state.
2) Fault after state 6 - "Quick stop active"
x In this state, the value of the bit is 0 or 1.

Structure of control word CMD(D)

Bit 7	Bit 6	Bit 5	Bit 4
Error reset	Reserved (0)	Reserved (0)	Reserved (0)
0 to 1 transition = Error reset (once reason for error no longer active)			

Bit 3	Bit 2	Bit 1	Bit 0
Run	Fast stop	Power supply	Authorization via AC supply voltage
Run command	Emergency stop	Authorization via AC supply voltage	Contactor control

Bit 15	Bit 14	Bit 13	Bit 12
Assignment	Assignment	Assignment	Assignment

Bit 11	Bit 10	Bit 9	Bit 8
Default, direction of rotation command	Reserved (0)	Reserved (0)	Halt
0 = Forward direction queried, 1= Reverse direction queried			Halt

Command	Transition address	Final state	Bit 7 Error reset	Bit 3 Run	Bit 2 Fast stop	Bit 1 Run	Bit 0 Start	Sample value
Shutdown	2, 6, 8	3 - Ready to start	x	x	1	1	0	16#0006
Start	3	4 - Start	x	x	1	1	1	16#0007
Run	4	5 - Operational	x	1	1	1	1	16#000F
Not in operation	5	4 - Start	x	0	1	1	1	16#0007
No power supply	7, 9, 10, 12	2 - Start not possible	x	x	x	0	x	16#0000
Fast stop	11	6 - Fast stop active	x	x	0	1	x	16#0002
	7, 10	2 - Start not possible						
Error reset	15	2 - Start not possible	0 > 1	x	x	x	x	16#0080

x Value not relevant for this command.
0>1 Command on rising edge

Stop command

If CTMD(D) bit 8 in state "True":
The stop command is triggered:
The stop command interrupts the current flow without exiting state 5 - "In operation". The stop is performed in accordance with the ramp defined by parameter STT. Despite the setting for parameter STT, the frequency inverter remains in state 5 - "In operation".
In the event of a frequency inverter with open-ended control loop and setpoint zero or a stop command, the power supply to the motor and torque will be switched off.

If CTMD(D) bit 1 in state "True":
Stop command "High-speed" results in a change to state 4 - "Start".

CMD(D) is reset (CMD(D) = 0):
Stop command "Freewheel" results in a change to state 2 - "Start not possible".

5.2.6.2.3 Data point ERRD

If bit 3 reports state word (ETAD) "True", the frequency inverter will be in state "Error". The cause of the error can be analyzed using the standardized error code (data point: ERRD) or the device-specific error code (data points: LFT).

Error messages			
Code (ERRD)	**Explanation**	**Code (LFT)**	**Display**
0x0000	No error saved	0	(NOF)
0x1000	Charging relay error	10	(CRF)
0x1000	Motor overload error	17	(OLF)
0x1000	Overspeed error	24	(SOF)
0x1000	Hardware error	67	(HDF)
0x1000	CPU error (RAM, memory, task, …)	69	(INFE)
0x1000	Channel change error	99	(CSF)
0x1000	Angle setting error	105	(ASF)
0x2230	IGBT short-circuit error	55	(SCF4)
0x2310	Overcurrent error	9	(OCF)
0x2311	Torque overload error	101	(OLF)
0x2320	Motor short-circuit error	23	(SCF1)
0x2320	Load short-circuit error during ionic load	56	(SCF5)
0x2330	Direct ground short circuit error	32	(SCF3)
0x3110	Oversupply error	19	(OSF)
0x3120	Undervoltage error	22	(USF)
0x3130	Main input 1 phase loss	21	(PHF)
0x3310	Overbraking error	18	(OBF)
0x3310	Motor 1 phase loss	20	(OPF1)
0x3310	Motor 3 phase loss	33	(OPF2)
0x4210	Frequency inverter overheating error	16	(OHF)
0x4210	IGBT overheating error	54	(TJF)
0x4310	Motor overheating error from PtCL - Default product	50	(OTFL)
0x5000	Output contactor - Engaged contactor	58	(FCF1)
0x5000	Output contactor - Open-ended contactor	59	(FCF2)
0x5000	Line contactor failure	64	(LCF)
0x5210	Current measurement loop error	51	(INF9)
0x5210	Input phase failure error	52	(INFA)
0x5210	Thermosensor error (OC or SC)	53	(INFB)
0x5530	EEPROM controller error	2	(EEF1)
0x5530	EEPROM power error	30	(EEF2)
0x6100	Unspecified frequency inverter assessment	26	(INF1)
0x6100	Unspecified or incompatible power board	27	(INF2)
0x6100	Internal communication error of the serial connection	28	(INF3)
0x6100	Invalid industrialization zone	29	(INF4)
0x6100	Hardware configuration error	73	(HCF)
0x6300	Invalid configuration during startup	3	(CFF)
0x6300	Incorrect parameter configuration	4	(CFI)
0x6300	Configuration transmission error	77	(CFI2)
0x7000	Unspecified or incompatible option board	68	(INF6)
0x7110	Braking contactor error	41	(BRF)
0x7300	Direction error	12	(ANF)
0x7300	PtCL error (OC or SC)	49	(PTFL)
0x7300	AI3 4-20 mA failure error	71	(LFF3)
0x7310	Speed encoder response loss	11	(SRF)
0x7510	Local serial Modbus communication error	5	(SLF1)
0x7510	Remote control panel communication error	45	(SLF3)
0x7520	Option internal communication error	6	(ILF)
0x7520	Option NET internal communication error	7	(CNF)
0x7530	Power suite communication error	42	(SLF2)
0x8100	CANopen communication error	34	(COF)
0x9000	External error via LI or local connection	8	(EPF1)
0x9000	External error from communication board	38	(EPF2)
0xFF00	Error setting	25	(TNF)
0xFF01	Braking motor 3-phase loss	35	(BLF)
0xFF02	Torque current limiting error	44	(SSF)
0xFF03	Torque underload error	100	(ULF)
0xFF03	Safety function error If one or several safety functions were activated using file DTM (ACPi parameter tool), data points STOS, SS1S, SLSS and GDLS can be used to evaluate the status response of the safety functions.	107	(SAFF)
0xFF80	Dynamic load error	76	(DLF)

5.2.6.2.4 Data point HMIS (device-specific state word)

Data points HMIS and LFT are device-specific, i.e. do not correspond to standard "DS402". For this reason, if these data points are used, they must be implemented separately in the Automation Studio project application.

State word HMIS can be used to read back the current state of the frequency inverter. In this way, data point HMIS functions as a device-specific counterpart to ETAD.

Status messages		
Code (HMIS)		Explanation
0	(TUN)	Current process: Autotuning
1	(DCB)	Current process: Generator operation or DC bus circuit energy regeneration
2	(RDY)	Current process: Wait for next command (DC bus circuit adequately supplied)
3	(NST)	Current process: Wait for next command (boot procedure complete)
4	(RUN)	Current process: Wait for next setpoint • Display (RUN) will be overwritten on the 7-segment display with the current setpoint.
5	(ACC)	Current process: Accelerate (actual value < setpoint) • Display (ACC) will be overwritten on the 7-segment display with the current setpoint.
6	(DEC)	Current process: Delay (actual value > setpoint) • Display (DEC) will be overwritten on the 7-segment display with the current setpoint.
7	(CLI)	Current process: General current limiting active
8	(FST)	Current process: Quick stop
9	(FLU)	Current process: Premagnetization of motor
11	(NLP)	Current process: Wait for next command (DC bus circuit undersupplied)
12	(PRA)	Current process: PRA function active "Power removal"
13	(CTL)	Current process: Controlled stop
14	(OBR)	Current process: Adjusted decline
15	(SOC)	Current process: Standby (UVW switched off)
17	(USA)	Current process: Warning DC bus circuit undersupplied
18	(TC)	Current process: Device in factory mode "Test"
19	(ST)	Current process: Self-test in progress
20	(FA)	Current process: Self-test canceled
21	(YES)	Current process: Self-test successfully completed
22	(EP)	Current process: EEPROM test
23	(FLT)	Current process: Drive in error • Display (FLT) will be overwritten on the 7-segment display with the current value for data point LFT • For further information, see data point LFT
25	(DCP)	Current process: Device in factory mode "Flash"
28	(SS1)	Current process: Safety function SS1 active • For further information, see SS1S data point
29	(SLS)	Current process: Safety function SLS active • For further information, see data point SLSS
30	(STO)	Current process: Safety function STO active • For further information, see data point STOS
31	(SMS)	Current process: Safety function SMS active
32	(GDL)	Current process: Safety function GDL active • For additional information, see data point GDLS.

If state word HIMS reports the value 23, the frequency inverter will be in state "Error". The error source can be analyzed using standardized error code (data point: ERRD) or device-specific error code (data points: LFT).

5.2.6.2.5 Data point LFT (device-specific error messages)

The HMIS and LFT data points are device-specific, i.e. do not correspond to standard "DS402". For this reason, if these data points are used, they must be implemented separately in the Automation Studio project application. Data point LFT saves the last error code. In this way, data point LFT functions as a device-specific counterpart to ERRD.

Error messages			
Code (LFT)	**Display**	**Explanation**	**ERRD code**
0	(NOF)	No error saved	0x0000
2	(EEF1)	EEPROM controller error	0x5530
3	(CFF)	Invalid configuration during startup	0x6300
4	(CFI)	Incorrect parameter configuration	0x6300
5	(SLF1)	Local serial Modbus communication error	0x7510
6	(ILF)	Option internal communication error	0x7520
7	(CNF)	Option NET internal communication error	0x7520
8	(EPF1)	External error via LI or local connection	0x9000
9	(OCF)	Overcurrent error	0x2310
10	(CRF)	Charging relay error	0x1000
11	(SRF)	Speed encoder response loss	0x7310
12	(ANF)	Direction error	0x7300
16	(OHF)	Frequency inverter overheating error	0x4210
17	(OLF)	Torque overload error	0x1000
18	(OBF)	Overbraking error	0x3310
19	(OSF)	Oversupply error	0x3110
20	(OPF1)	Motor 1 phase loss	0x3310
21	(PHF)	Main input 1 phase loss	0x3130
22	(USF)	Undervoltage error	0x3120
23	(SCF1)	Motor short-circuit error	0x2320
24	(SOF)	Overspeed error	0x1000
25	(TNF)	Error setting	0xFF00
26	(INF1)	Unspecified frequency inverter assessment	0x6100
27	(INF2)	Unspecified or incompatible power board	0x6100
28	(INF3)	Internal communication error of the serial connection	0x6100
29	(INF4)	Invalid industrialization zone	0x6100
30	(EEF2)	EEPROM power error	0x5530
32	(SCF3)	Direct ground short circuit error	0x2330
33	(OPF2)	Motor 3 phase loss	0x3310
34	(COF)	CANopen communication error	0x8100
35	(BLF)	Braking motor 3-phase loss	0xFF01
38	(EPF2)	External error from communication board	0x9000
41	(BRF)	Braking contactor error	0x7110
42	(SLF2)	Power suite communication error	0x7530
44	(SSF)	Torque current limiting error	0xFF02
45	(SLF3)	Remote control panel communication error	0x7510
49	(PTFL)	PtCL error (OC or SC)	0x7300
50	(OTFL)	Motor overheating error from PtCL - Default product	0x4310
51	(INF9)	Current measurement loop error	0x5210
52	(INFA)	Input phase failure error	0x5210
53	(INFB)	Thermosensor error (OC or SC)	0x5210
54	(TJF)	IGBT overheating error	0x4210
55	(SCF4)	IGBT short-circuit error	0x2230
56	(SCF5)	Load short-circuit error during ionic load	0x2320
58	(FCF1)	Output contactor - Engaged contactor	0x5000
59	(FCF2)	Output contactor - Open-ended contactor	0x5000
64	(LCF)	Line contactor failure	0x5000
67	(HDF)	Hardware error	0x1000
68	(INF6)	Unspecified or incompatible option board	0x7000
69	(INFE)	CPU error (RAM, memory, task, …)	0x1000
71	(LFF3)	AI3 4-20 mA failure error	0x7300
73	(HCF)	Hardware configuration error	0x6100
76	(DLF)	Dynamic load error	0xFF80
77	(CFI2)	Configuration transmission error	0x6300
99	(CSF)	Channel change error	0x1000
100	(ULF)	Torque underload error	0xFF03
101	(OLF)	Torque overload error	0x2311
105	(ASF)	Angle setting error	0x1000
107	(SAFF)	Safety function error	0xFF03

Information:

The abbreviation in brackets on the 7-segment display is read if ESC is pressed multiple times. HIMS code 23 will be overwritten on the 7-segment display with the respective LFT code.

5.2.6.3 ACOPOSinverter Configuration

5.2.6.3.1 Configuration I/O

Additional setting options have been implemented in configuration I/O for inserting other data points in mapping I/O and modifying drive functionality.

5.2.6.3.2 Adjusting mapping I/O

Default data points in mapping I/O enable the use of the drive in accordance with guidelines for standard "DS402". Alternatively, setpoint generation can be switched from rpm to hertz.

It is also possible to transmit up to ten additional input variables cyclically in order to trace the frequency inverter processes. In this way, the frequency inverter process can be adjusted to the individual requirements of the user

5.2.6.3.3 Configuring the frequency inverter

The device offers several adjustment possibilities, including:

- Drive for induction motors and synchronous motors
- Motor management: Torque or slip control
- Axis management: Speed or frequency input
- Setpoint processing in rpm or hertz
- General limiting of the output current and torque
- Optional load management (torque monitoring)

5.2.6.3.4 Recommended procedure

Several setting options at the beginning of the view affect other configuration switches positioned below. It is therefore recommended to adjust the frequency inverter configuration interface from bottom to top.

5.2.6.3.4.1 Configuration of I/Os (terminal block)

I/O settings should be defined first. The selected functionality for the outputs can have a particular effect on other setting options.

5.2.6.3.4.2 Notification of motor data (motor)

Values for the used motors should be entered once configuration I/O has been completed. The information about the motor nameplate should be read and entered into the Configuration View. For optimal control of the motor, the tuning parameters should be adjusted to the respective combination of drive, motor cable and motor at the time the axis is controlled. These additional parameters can either be directly entered or calculated during the first transition in "Operation enabled" using autotuning (for more information about the tuning process, see "Tuning" on page 418).

> **Notice!**
>
> **Values in the nameplate section must be specified within the permissible boundaries for the frequency inverter being used. Both the upper limit and the lower limit for the value must be observed. After notification of motor data, it is recommended to load the Automation Studio project to the CPU in order to transfer the frequency inverter to state RUN beforehand.**
>
> **The necessary adjustments in section "Drive" (see "Configuration of the controller in ACOPOSinverter (drive)" on page 418) should only be made if "ModuleOk = True" is reported back in the mapping I/O of the frequency inverter after the download.**

5.2.6.3.4.3 Tuning

The nominal values entered on the nameplate form the basic information for the tuning process.

ASY	Induction motor		SYN	Synchronous motor	
FRS	Frequency	Frequency	TQS	Torque	Torque
NSP	Speed	Speed	PPNS	Pole pairs	Number of pole pairs
UNS	Voltage	Voltage	NSPS	Speed	Speed
NCR	Current	Current	NCRS	Current	Current
COW	Cosine(φ)	Cosinus(φ)			
NPR	Power	Direction			

1) For describing the induction motor, either the cosine (φ) or the power rating must be entered. It is recommended to enter a value for the cosine (φ).

This data notifies ACOPOSinverter of the properties of the connected motor. This makes it possible to create an idealized model. In reality, other influencing factors must be taken into account. The following tuning parameters will be used to realistically map the entire system of motor, motor cable and ACOPOSinverter:

ASY	Induction motor	SYN	Synchronous motor
RSA	Stator resistance	RSAS	Stator resistance
LFA	Leakage inductance	LDS	Leakage inductance d part
IDA	Magnetizing current	LQS	Leakage inductance d part
TRA	Rotor time const.	PHS	Permanent magnet flux

Optimally configured tuning parameters improve axis control. Automation Studio offers the option of entering values directly into configuration I/O or having them automatically calculated in the first transition in state 5 - "Operation enabled".

Information:

If the values have been automatically calculated during the first transition in state 5 - "Operation enabled", tuning can be triggered again via the delete command (set register "TUN"to 2 once) in the next transition in state 5 - "Operation enabled".

5.2.6.3.4.4 Configuration of the controller in ACOPOSinverter (drive)

Notice!

Before phase "Drive" is adapted for configuration I/O, parameters for the terminal block and motor sections should be defined. In some Automation Studio versions, after configuring the outputs or providing notification of the motor type, the Configuration View for the module must be closed and reopened in order for phase "Drive" to display in full.

Dependence: Configuration of I/Os and drive

See "Configuration of the controller in ACOPOSinverter (drive)" on page 418.

Additional frequency inverter functions can be enabled using the R2, LO1 and DO1 outputs. These include:

- BLC: Brakes control (Type: BLC)
- LLC: Control of line contactor
- OCC: Control of motor contactor

If any of these functions has been assigned to an output, additional configuration parameters will be enabled in section "Drive" (see "Configuration of the controller in ACOPOSinverter (drive)" on page 418).

Information:

Activating function BLC will only succeed if the motor type is induction motor.

Dependency: Selecting motor type and parameter CTT

Factors including motor type, i.e. synchronous motor/induction motor, are defined in section "Motor". This selection will partially affect the value of parameter CTT "Motor management".

- If an induction motor is selected in section "Motor", parameter CTT cannot be set to "(SYN) M control; synchronous motor". If this combination is configured, parameter CTT will not download and the frequency inverter will work with the default configuration for induction motors (in this case, motor management is set to "(STD) Slip control; M const., F~f").
- If a synchronous motor is selected in section "Motor", the frequency inverter always works with the default motor management for synchronous motors, i.e. parameter CTT will be internally set to "(SYN) M control; synchronous motor". A combination of synchronous motor and another value for CTT is invalid and will be corrected upon download. In this case, the motor is controlled with default values for "(SYN) M control; synchronous motor".

Access

Settings in section "Access" are preset to a controller for using ACOPOSinverter. As these settings only need to be adjusted in rare cases, it is recommended not to change them.

General current limiting and torque limiting

Both the current flow and the transmitted torque can be limited. Limitation can be statistic (non-variable for the duration) or dynamic (variable for the duration).
Static limitation of the current can be set via the Configuration View and enabled or disabled using a digital input.
For dynamic limitation of the current, temperature model I^2t has been implemented in ACOPOSinverter in order to evaluate motor temperature. Limitation is triggered when a very high amount of current is supplied to the motor over a long period of time.
Static limitation of the torque can be set via the Configuration View for input and output i.e. for normal operation and generator operation. Variable limitation of the dynamic torque limiting can take place via an analog input or directly via a data point in mapping I/O. To limit the torque via a data point in mapping I/O, either register AIV1 or AIV2 may be used.

- Values between 0 and 1000 must be specified for AIV1. The default value thus corresponds to 0 to 1000% of the specified nominal torque of the motor.
- Values between 0 and 8192 must be specified for AIV2. The default value also relates to 0 to 100% of the specified nominal torque of the motor.

Load management: Difference to general torque limiting

The purpose of load management is the monitoring of the torque during runtime, i.e. using load management does not directly influence the PWM output process and therefore control of the motor.
Additional upper and lower limits for the output torque are defined for load management. If the current value of the torque lies outside of the permitted range, warnings or alarms will be created. These warning and alarms can be used subsequently as triggers for other functions.

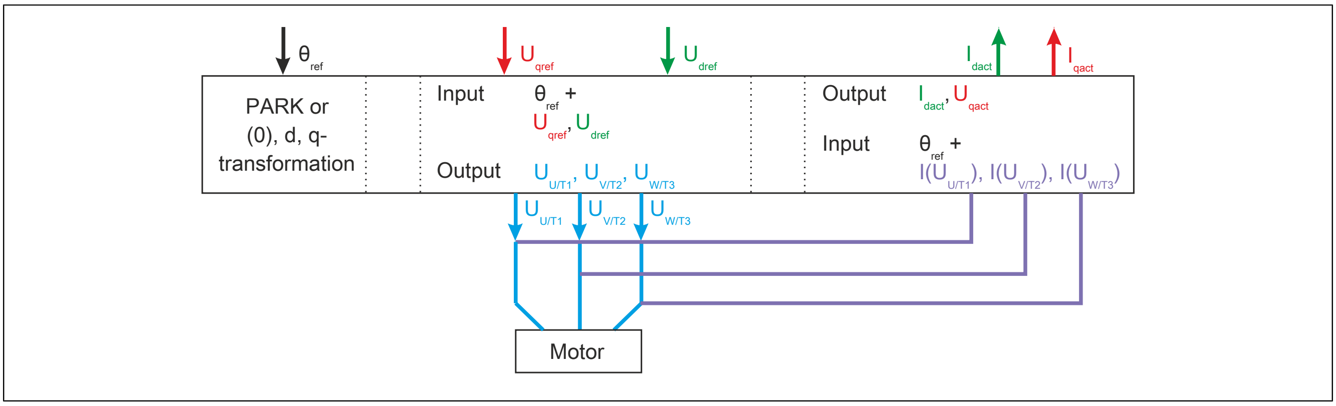
Motor management - Part 1

The essential component of motor management is based on the mathematical information of the Park transform (also known as the dq0 transformation). This enables an electrical rotating field size to be represented as a vector in a two-dimensional coordinate system that circles a single point; which means that by using an angle θ that describes the current position of the vector, sinusoidal voltages can be expressed as a pair of limbs comprising a "d-ratio" and a "q-ratio", e.g.

$U_{U/T1}$, $U_{V/T2}$ or $U_{W/T3}$ < θ (angle) > U_d, U_q

The mathematical transformation is reversible and can be applied to other sizes in the rotating field, e.g.

$U_{U/T1}$, $U_{V/T2}$ or $U_{W/T3}$ < θ (angle) > U_d, U_q



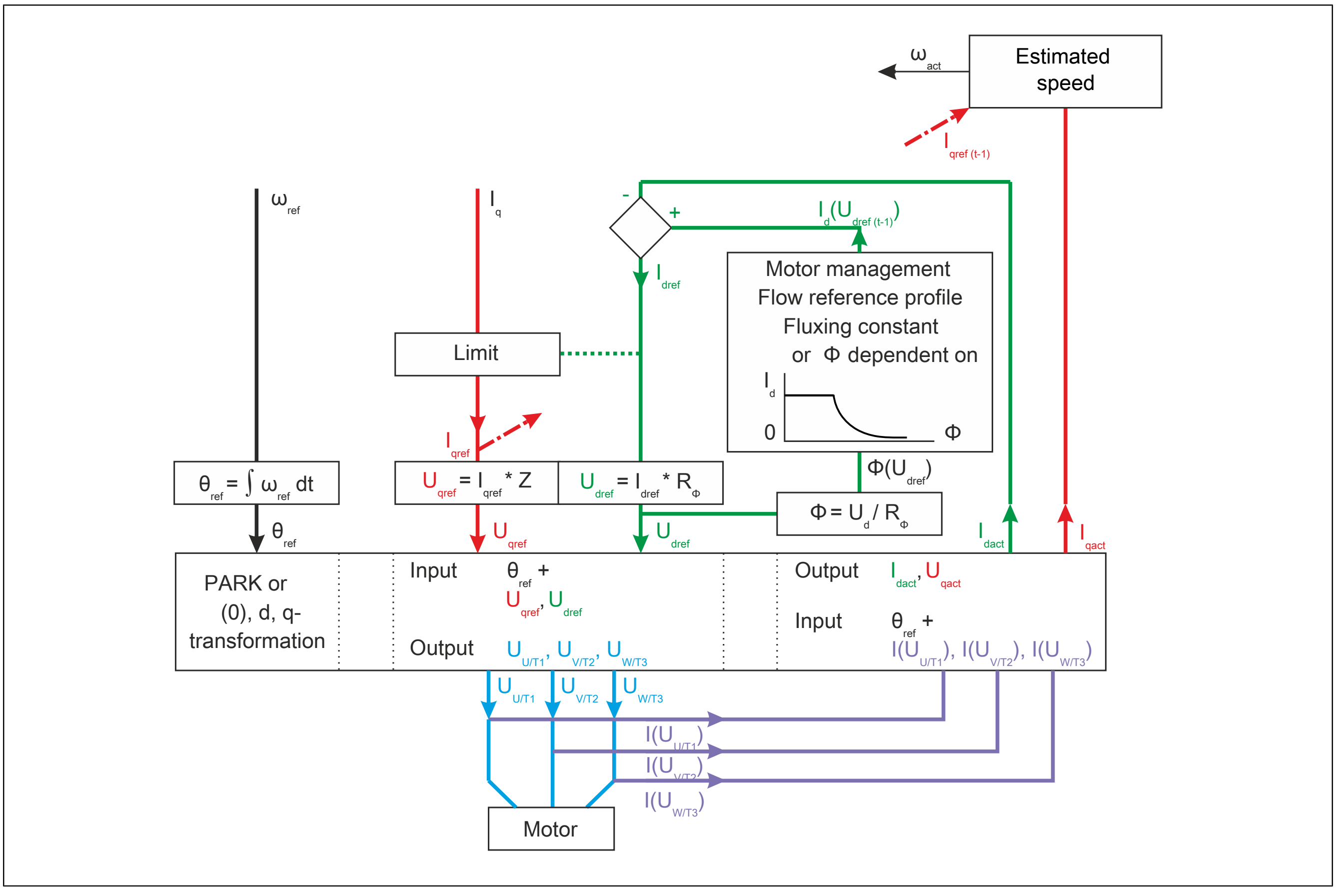
Three controlled variables are necessary for controlling PWM output on ACOPOSinverter:

- $θ_{ref}$: Reference angle of vectors
- U_d: d-ratio of the output voltage (magnetization)
- U_q: q-ratio of the output voltage (field strength)

To calculate voltage values for all three phases of output PWM from this data, the reference angle for $U_{V/T2}$ will be subjected to an offset of 120° and $U_{W/T3}$ to an offset of 240°.

If a three-phase motor is attached to PWN output of ACOPOSinverter, the corresponding currents will flow during output control. These are measured, averaged and then expressed in accordance with Park transform principles as vectors with d-ratio and q-ratio within the frequency inverter.

The d-ratio represents the intensity of the magnetic flow and is regulated using cascades. The outer control loop is based on the current measurement at the output. The inner control loop is represented using a reference profile, which is selected during motor management selection.



Current angular velocity (ω_{act}) is calculated using the current actual value and the previously requested setpoint for I_q. The application also supplies the requested value for speed (LFRD) and electrical frequency (LFR). The setpoint for the angular velocity (ω_{set}) corresponds to the formula:

- ω_{set} = 2 π f = 2 π LFR
- ω_{set} = 2 π (n_{mech} * Pole pairs / 60) = 2 π (LFRD * Pole pairs / 60)

To extrapolate from a value for angular velocity ω to angle θ, a derivative with respect to time occurs at the end of control of angle θ.

The q-ratio is an expression of field strength and therefore torque. The reference value for I_q can be limited. This limitation results from application specifications (e.g. CLI, TAA) and is influenced by the current reference value for ID.

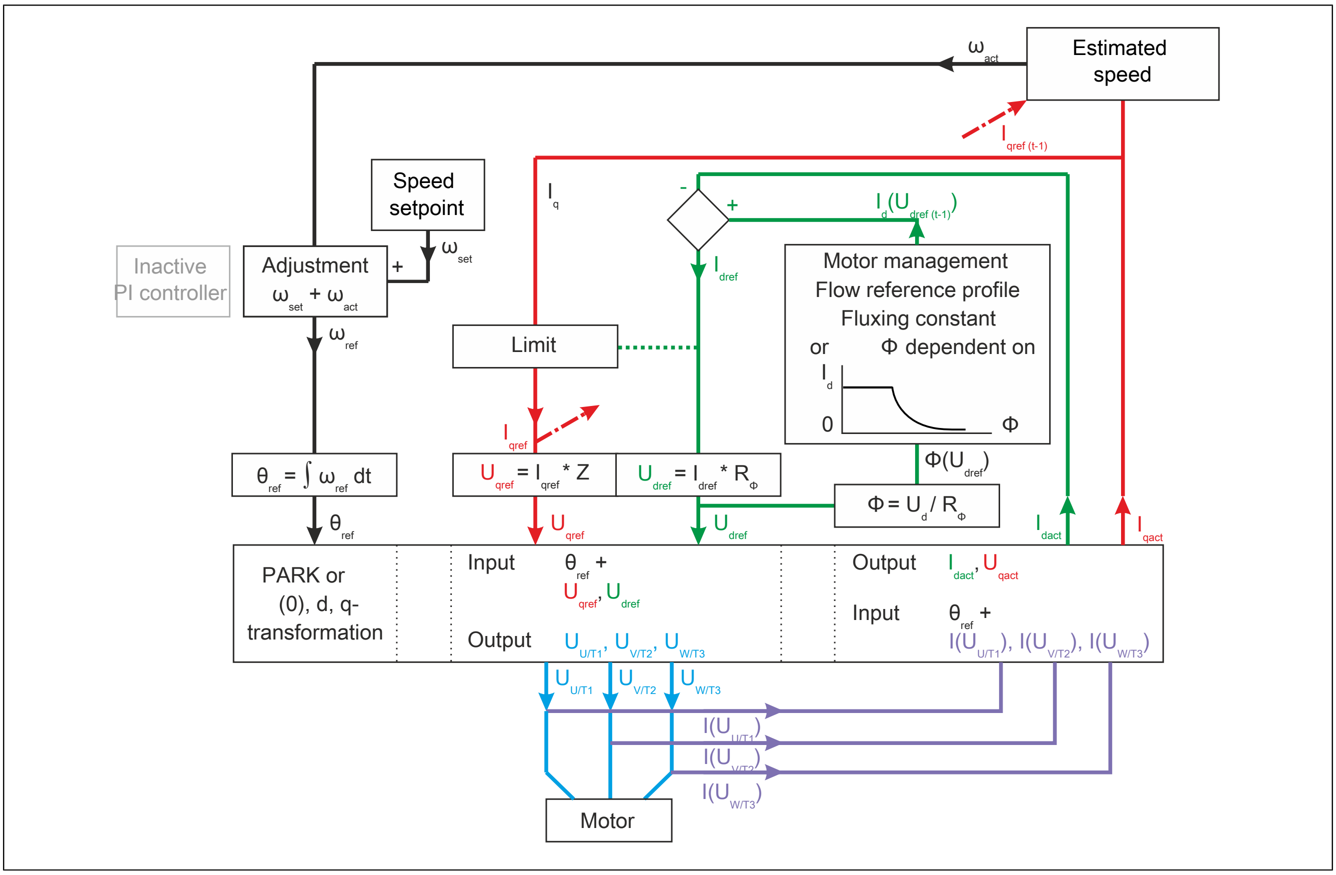
The way in which the information for I_{qact}, ω_{act} and ω_{set} is used for calculating angle θ and for controlling U_q is determined by the slip control or torque control.

Setpoint processing during slip control

Values for ω_{act} and ω_{set} are added together during slip control. This "adjusted" angular velocity is then used for calculating reference angle θ. The q-portion is calculated as a single control loop based on the current measurement at output PWM. This relatively simple procedure for calculating necessary reference values suffices for some simple applications using induction motors. It is based on a unique mathematical correlation and is error-tolerant, i.e. can be used even if the tuning parameter has been calculated inaccurately. Slip control is unsuitable for use with higher dynamics since the system is relatively slow, i.e. it requires a relatively long time to achieve a steady state.

Information:

Slip control is not recommended for using ACOPOSinverter with a controller.



Setpoint processing during torque control

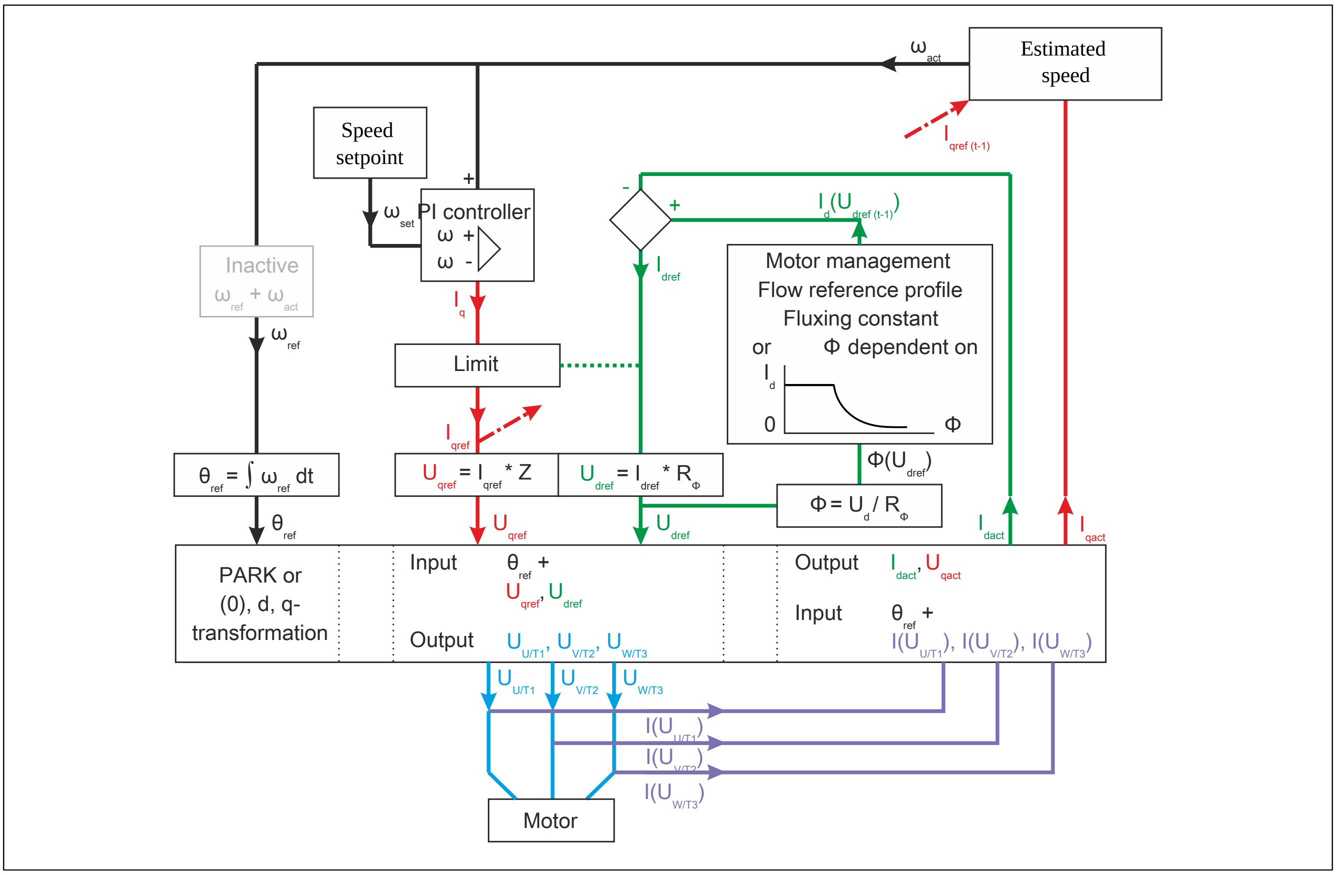
During torque control, the value ω_{act} is used as a basis for calculating the reference angle θ. The q-portion is calculated using a PI controller. The next (unlimited) reference value for I_q is calculated from the difference in speed between ω_{act} and ω_{set}.

Due to PI control, this procedure for calculating the necessary reference values achieves a very high dynamic, meaning that new reference values for speed can be implemented quicker and can be used with both induction motors and synchronous motors.

Since this procedure is based on projections, it requires reliable values for the tuning parameters, however.

Information:

Slip control is not recommended for using ACOPOSinverter with a controller.



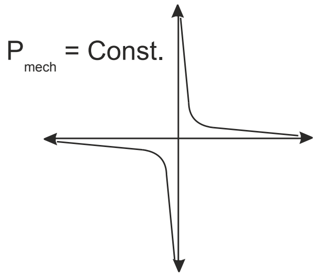
Motor management - Part 2

Power is the most important variable for describing a system comprising a drive and motor. For normal operation or motor operation, electrical power (P_{el}) is converted to mechanical power (P_{mech}) and for generator operation, mechanical power (P_{mech}) is converted to electrical power (P_{el}).

Information:

- $\mathbf{P_{el,\,3ph} = \sqrt{3} * U * I * \cos(\varphi)}$
- $\mathbf{P_{mech} = M * 2 * \pi * f = M * \omega}$

On closer inspection of mechanical power (P_{mech}), the particular interaction between torque (M) and angular velocity (ω) at constant power yields a hyperbolic distribution between these sizes.



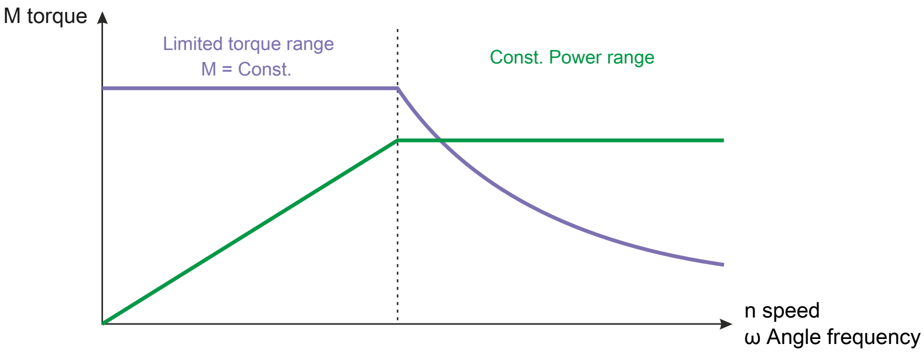
The speed/torque diagram is a general specification that can be created for any motor. In electric motors, speed is directly dependent on DC voltage frequency; the y-axis is therefore often displayed as a frequency axis and divided into two sections. Frequencies greater than nominal frequency are subjected to what is known as field suppression, i.e. in this frequency range it may appear that the maximum power of the motor is output and the specified nominal torque can no longer be fully established.

Torque is normally limited to nominal torque in the frequency range between 0 Hz and nominal frequency, so the maximum possible power does not need to be fully output.

The various types of ACOPOSinverter motor management relate to the frequency range between 0 Hz and nominal frequency. According to how electrical power behaves in relation to frequency (speed), either the full torque is available or energy consumption is reduced.

n/M diagram: M const., P~f

The idealized speed/torque diagram with high torque at low speed corresponds to the following:



Axis management: Speed/frequency data

Mechanical parameters for the rotating axis have been implemented in ACOPOSinverter in a way that corresponds to standard "DS402".

The speed data relates to a rotating axis that is not provided by the frequency inverter itself. Output PWM (U/T1, V/T2, W/T3) only outputs DC voltage with regulated frequency. Since these electrical sizes are designated for controlling a three-phase motor, a calculation model has been implemented into the drive to describe the effect of the output DC voltage on the connected motor. Viewing the rotating axis functions in this way as a high-level abstraction layer, which enables easier management of the entire system of frequency inverter and motor system. The frequency inverter internally converts the speed data [rpm] to elevated frequency [Hz]. The number of pole pairs of the motor must be taken into account for this. The following applies:

$n_{mech.}$ [rpm] * Pole pairs = $f_{el.}$ [Hz] * 60

Information:

Since the frequency inverter primarily controls the electrical frequency of the output DC voltage, it displays the currently generated electrical frequency by default in state 5 "In operation". If necessary, a conversion factor can be applied to this value using parameter SDS.

Special functions of the controller in ACOPOSinverter

The frequency inverter offers special functions that may be used in connection with a controller.

- Positioning via limit switch
- PID regulation of frequency setpoint
- High-speed hoisting

Activating this function results in pre-processing of the setpoint transmitted by the drive controller. Adjusted setpoints will then be used for motor management. The special functions represent custom solutions for highly specific applications. We recommend using the special functions only if the Automation Studio project cannot display the application you want.

5.2.7 Register description

5.2.7.1 System requirements

The following minimum versions are recommended to generally be able to use all functions:

- Automation Studio 4.1.4
- Automation Runtime D4.10

5.2.7.2 General data points

In addition to the registers described in the register description, the module has additional general data points. These are not module-specific but contain general information such as serial number or hardware variant.

General data points are described in section "Additional information - General data points" of the X20 system user's manual.

5.2.7.3 Overview of registers for the communication card (X2X)

5.2.7.3.1 Overview of registers

Register	Name	Data type	Read		Write	
			Cyclic	Acyclic	Cyclic	Acyclic
1	Status of the module	USINT	●			
	UnderVoltage	Bit 0				
	ComIntStart	Bit 4				
	ComIntReady	Bit 5				
	ComIntErrorGen	Bit 6				
	ComIntErrorCyc	Bit 7				
2	SupplyVoltage	UINT	●			
20	ACPi_ModuleID	UINT	●			
28	ACPi_SerialNumber	UDINT	●			

5.2.7.3.2 Status of the module

This register monitors the module status.

Bit	Name	Value	Information
0	UnderVoltage	0	Power supply above the warning level of 20.4 V.
		1	Power supply below the warning level of 20.4 V.
4	ComIntStart	0	No communication to the frequency inverter.
		1	Communication to the frequency inverter.
5	ComIntReady	0	Cyclic data scanner on frequency inverter not running.
		1	Cyclic data scanner on frequency inverter running.
6	ComIntErrorGen	0	Communication to the frequency inverter.
		1	No communication to the frequency inverter.
7	ComIntErrorCyc	0	Cyclic data scanner on frequency inverter running.
		1	Cyclic data scanner on frequency inverter not running.
8 to 15	Reserved	0	

5.2.7.3.3 Bus power supply current

Name:
SupplyVoltage

This register indicates the measured supply voltage with a resolution of 0.1 V.

5.2.7.4 Overview of registers for the ACOPOSinverter

5.2.7.4.1 Basic values of drive

Modbus	X2X	Name	Data type	Read		Write	
"ADL"	"Address"			Cyclical	Acyclic	Cyclical	Acyclic
3009	2009	PRT_Input	UINT		●		
3011	2011	NCV_Input	UINT		●		
3012	2012	VCAL_Input	UINT		●		
3013	2013	NCVI_Input	UINT		●		
3014	2014	VCAI_Input	UINT		●		
3016	2016	IMAX_Input	UINT		●		
3017	2017	INV_Input	UINT		●		
3018	2018	VMAX_Input	UINT		●		

5.2.7.4.2 Terminal block inputs/outputs

Modbus	X2X	Name	Data type	Read		Write	
"ADL"	"Address"			Cyclic	Acyclic	Cyclic	Acyclic
5232	3132	AI1R_Input	INT	●	●		
5233	3133	AI2R_Input	INT	●	●		
5234	3134	AI3R_Input	INT	●	●		
5202	3102	IL1R_Input	UINT	●	●		
5202	3102	Status of the digital inputs	USINT	●			
		IL1R_Input_LI1	Bit 0				
		IL1R_Input_LI2	Bit 1				
		IL1R_Input_LI3	Bit 2				
		IL1R_Input_LI4	Bit 3				
		IL1R_Input_LI5	Bit 4				
		IL1R_Input_LI6	Bit 5				
		IL1R_Input_LAI1	Bit 6				
		IL1R_Input_LAI2	Bit 7				
13308	7158	HSC_Input	UINT	●	●		
13305	7155	PIFR_Input	INT	●	●		
13307	7157	PFRC_Input	UINT		●		
14603	7803	FQS_Input	UINT	●	●		
5261	1281	AO1R_Output	UINT			●	
5251	1280	AO1I_Input	UINT	●	●		
5212	3112	Configuration of digital outputs	UINT			●	
		OL1R_Output_R1	Bit 0				
		OL1R_Output_R2	Bit 1				
		OL1R_Output_LO1	Bit 8				
5211	3111	OL1I_Input	UINT		●		
5211	3111	OL1I_Input	UINT	●			
		OL1I_Input_R1	Bit 0				
		OL1I_Input_R2	Bit 1				
		OL1I_Input_LO1	Bit 8				

Modbus	X2X	Name		Data type	Read		Write	
"ADL"	"Address"				Cyclic	Acyclic	Cyclic	Acyclic
Configuration of the analog inputs								
4402	2702	AI1T_Input	AI1T_Output	UINT		●		●
4403	2703	AI2T_Input	AI2T_Output	UINT		●		●
4404	2704	AI3T_Input	AI3T_Output	UINT		●		●
4412	2712	UIL1_Input	UIL1_Output	UINT		●		●
4413	2713	UIL2_Input	UIL2_Output	UINT		●		●
4422	2722	UIH1_Input	UIH1_Output	UINT		●		●
4423	2723	UIH2_Input	UIH2_Output	UINT		●		●
4434	2734	CRL3_Input	CRL3_Output	UINT		●		●
4444	2744	CRH3_Input	CRH3_Output	UINT		●		●
4452	8894	AI1F_Input	AI1F_Output	UINT		●		●
4453	8895	AI2F_Input	AI2F_Output	UINT		●		●
4454	8896	AI3F_Input	AI3F_Output	UINT		●		●
4462	8904	AI1E_Input	AI1E_Output	UINT		●		●
4463	8905	AI2E_Input	AI2E_Output	UINT		●		●
4464	8906	AI3E_Input	AI3E_Output	UINT		●		●
4472	8914	AI1S_Input	AI1S_Output	UINT		●		●
4473	8915	AI2S_Input	AI2S_Output	UINT		●		●
4474	8916	AI3S_Input	AI3S_Output	UINT		●		●
4482	8924	AI1L_Input	AI1L_Output	UINT		●		●
4483	8925	AI2L_Input	AI2L_Output	UINT		●		●
4484	8926	AI3L_Input	AI3L_Output	UINT		●		●
5284	9326	AIC2_Input	AIC2_Output	UINT		●		●
Configuration of the analog outputs								
4601	2801	AO1T_Input	AO1T_Output	UINT		●		●
4611	2811	AO1F_Input	AO1F_Output	UINT		●		●
4621	2821	UOL1_Input	UOL1_Output	UINT		●		●
4631	2831	UOH1_Input	UOH1_Output	UINT		●		●
4641	2841	AOL1_Input	AOL1_Output	UINT		●		●
4651	8993	AOH1_Input	AOH1_Output	UINT		●		●
4661	9003	ASL1_Input	ASL1_Output	UINT		●		●
4671	9013	ASH1_Input	ASH1_Output	UINT		●		●
4293	8835	AOF1_Input	AOF1_Output	UINT		●		●
4261	8803	DO1S_Input	DO1S_Output	UINT		●		●
4271	8813	DO1H_Input	DO1H_Output	UINT		●		●
4281	8823	DO1D_Input	DO1D_Output	UINT		●		●
Configuration of the digital inputs								
4001	2501	L1D_Input	L1D_Output	UINT		●		●
4002	2502	L2D_Input	L2D_Output	UINT		●		●
4003	2503	L3D_Input	L3D_Output	UINT		●		●
4004	2504	L4D_Input	L4D_Output	UINT		●		●
4005	2505	L5D_Input	L5D_Output	UINT		●		●
4006	2506	L6D_Input	L6D_Output	UINT		●		●
4021	2521	LA1D_Input	LA1D_Output	UINT		●		●
4022	2522	LA2D_Input	LA2D_Output	UINT		●		●
Configuration of the digital outputs								
4201	2601	R1S_Input	R1S_Output	UINT		●		●
4202	2602	R2S_Input	R2S_Output	UINT		●		●
4209	2609	LO1S_Input	LO1S_Output	UINT		●		●
4221	2621	R1H_Input	R1H_Output	UINT		●		●
4222	2622	R2H_Input	R2H_Output	UINT		●		●
4229	2629	LO1H_Input	LO1H_Output	UINT		●		●
4241	2641	R1D_Input	R1D_Output	UINT		●		●
4242	2642	R2D_Input	R2D_Output	UINT		●		●
4249	2649	LO1D_Input	LO1D_Output	UINT		●		●
4290	8832	R1F_Input	R1F_Output	UINT		●		●
4291	8833	R2F_Input	R2F_Output	UINT		●		●
4292	8834	LO1F_Input	LO1F_Output	UINT		●		●
5001	3001	R1_Input	R1_Output	UINT		●		●
5002	3002	R2_Input	R2_Output	UINT		●		●
5009	3009	LO1_Input	LO1_Output	UINT		●		●
5021	3021	AO1_Input	AO1_Output	UINT		●		●
5031	3031	DO1_Input	DO1_Output	UINT		●		●
Additional signals (derived from digital input LI5)								
13302	7152	PIL_Input	PIL_Output	UINT		●		●
13303	7153	PFR_Input	PFR_Output	UINT		●		●
13304	7154	PFI_Input	PFI_Output	UINT		●		●
13306	7156	PFRI_Input	PFRI_Output	UINT		●		●
14601	7801	FQF_Input	FQF_Output	UINT		●		●
14602	7802	FQC_Input	FQC_Output	UINT		●		●
14604	7804	FQA_Input	FQA_Output	UINT		●		●
14605	7805	TDS_Input	TDS_Output	UINT		●		●
14606	7806	FDT_Input	FDT_Output	UINT		●		●

Modbus	X2X	Name		Data type	Read		Write	
"ADL"	"Address"				Cyclic	Acyclic	Cyclic	Acyclic
14607	7807	FQT_Input	FQT_Output	UINT		●		●
14608	7808	TQB_Input	TQB_Output	UINT		●		●
14609	7809	FQL_Input	FQL_Output	UINT		●		●
Additional signals (derived from digital input LI6)								
13203	7103	PTCL_Input	PTCL_Output	UINT		●		●

5.2.7.4.3 Communication (with setpoint in rpm)

Modbus	X2X	Name	Data type	Read		Write	
"ADL"	"Address"		Cyclical	Cyclical	Acyclic	Cyclical	Acyclic
Optional status responses							
3240	2140	HMIS_Input	UINT	●	●		
7121	4071	LFT_Input	UINT	●	●		
3206	2106	ETI_Input	UINT	●	●		
3209	2109	THD_Input	UINT	●	●		
9630	5330	THR_Input	UINT	●	●		
13205	7105	PTCI_Input	UINT	●	●		
64034	1288	ALGR_Input	UINT	●	●		
15322	8172	STOS_Input	UINT	●			
15315	8165	SS1S_Input	UINT	●			
15304	8154	SLSS_Input	UINT	●			
15383	1290	SMSS_Input	UINT	●			
15393	1289	GDLS_Input	UINT	●			
3699	8541	INF6_Input	UINT		●		
11980	12672	RPE_Input	INT		●		
11981	12673	RPF_Input	UINT		●		
11982	12674	RPC_Input	UINT		●		
11983	12675	RPO_Input	INT		●		
State and command register (default)							
8603	4803	ETAD_Input	UINT		●		
8603	4803	ETAD_Input	UINT	●			
		ETAD_Input_rtso	Bit 0				
		ETAD_Input_so	Bit 1				
		ETAD_Input_oe	Bit 2				
		ETAD_Input_f	Bit 3				
		ETAD_Input_ve	Bit 4				
		ETAD_Input_qs	Bit 5				
		ETAD_Input_sod	Bit 6				
		ETAD_Input_w	Bit 7				
		ETAD_Input_rm	Bit 9				
		ETAD_Input_tr	Bit 10				
		ETAD_Input_ila	Bit 11				
		ETAD_Input_ms14	Bit 14				
		ETAD_Input_ms15	Bit 15				
8606	4806	ERRD_Input	UINT	●	●		
8504	4754	CMI_Output	UINT		●		●
8601	4801	CMDD_Output	UINT		●	●	
8602	4802	LFRD_Output	INT		●	●	
8641	4841	FROD_Input	INT	●	●		
8604	4804	RFRD_Input	INT	●	●		
Optional responses and additional setpoints							
3205	2105	OTR_Input	INT	●	●		
3205	2105	OTRN_Input	INT	●	●		
5281	1282	AIV1_Output	UINT		●	●	
5283	1283	AIV2_Output	INT		●	●	
8503	4753	PISP_Output	UINT		●	●	
8605	4805	FRHD_Input	INT	●	●		
3203	2103	FRH_Input	INT	●	●		
9021	5021	FRO_Input	INT	●	●		
3202	2102	RFR_Input	INT	●	●		
3208	2108	UOP_Input	UINT	●	●		
3204	2104	LCR_Input	UINT	●	●		
3211	2111	OPR_Input	INT	●	●		
3217	2117	SLC_Input	INT	●	●		
3207	2107	ULN_Input	UINT	●	●		
9645	5345	SMOT_Input	UINT		●		
9609	5309	TUS_Input	UINT		●		
9676	11518	RDAE_Input	INT		●		
13927	7477	ASOD_Input	UINT		●		
9634	5334	I2TM_Input	UINT		●		
3120	2070	RPR_Output	UINT				●

Modbus	X2X	Name	Data type	Read		Write	
"ADL"	"Address"		Cyclical	Cyclical	Acyclic	Cyclical	Acyclic
3230	2130	APH_Input	UINT		●		
3231	2131	RTH_Input	UINT		●		
3232	2132	RTHI_Input	UINT		●		
3233	2133	PTH_Input	UINT		●		
3234	2134	UNT_Input	UINT		●		
Error history							
7393	10385	FNB_Input	UINT		●		
7200 + Index	4100 + Index	**LFT:** DP0_Input DP[0…8]_Input	UINT		●		
7210 + Index	4110 + Index	**ETAD:** EP0_Input EP[0…8]_Input	UINT		●		
7220 + Index	4120 + Index	**ETI:** IP0_Input IP[0…8]_Input	UINT		●		
7230 + Index	4130 + Index	**CMDD:** CMP0_Input CMP[0…8]_Input	UINT		●		
7240 + Index	4140 + Index	**LCR:** LCP0_Input LCP[0…8]_Input	INT		●		
7250 + Index	10292 + Index	**RFR:** RFP0_Input RFP[0…8]_Input	INT		●		
7260 + Index	10302 + Index	**RTHI:** RTP0_Input RTP[0…8]_Input	UINT		●		
7270 + Index	10312 + Index	**ULN:** ULP0_Input ULP[0…8]_Input	UINT		●		
7280 + Index	10322 + Index	**THR:** THP0_Input THP[0…8]_Input	UINT		●		
7320 + Index	4170 + Index	**HMIS:** HS0_Input HS[0…8]_Input	UINT		●		
7330 + Index	4180 + Index	**OTR:** OTP0_Input OTP[0…8]_Input	INT		●		
7340 + Index	4190 + Index	**THD:** TDP0_Input TDP[0…8]_Input	UINT		●		

5.2.7.4.4 Communication (with setpoint in Hz)

Modbus	X2X	Name	Data type	Read		Write	
"ADL"	"Address"			Cyclical	Acyclic	Cyclical	Acyclic
Optional status responses							
3240	2140	HMIS_Input	UINT	●	●		
7121	4071	LFT_Input	UINT	●	●		
3206	2106	ETI_Input	UINT	●	●		
3209	2109	THD_Input	UINT	●	●		
9630	5330	THR_Input	UINT	●	●		
13205	7105	PTCI_Input	UINT	●	●		
64034	1288	ALGR_Input	UINT	●	●		
15322	8172	STOS_Input	UINT	●			
15315	8165	SS1S_Input	UINT	●			
15304	8154	SLSS_Input	UINT	●			
15383	1290	SMSS_Input	UINT	●			
15393	1289	GDLS_Input	UINT	●			
3699	8541	INF6_Input	UINT		●		
11980	12672	RPE_Input	INT		●		
11981	12673	RPF_Input	UINT		●		
11982	12674	RPC_Input	UINT		●		
11983	12675	RPO_Input	INT		●		
State and command register (default)							
8603	4803	ETAD_Input	UINT		●		
8603	4803	ETAD_Input	UINT	●			
		ETAD_Input_rtso	Bit 0				
		ETAD_Input_so	Bit 1				
		ETAD_Input_oe	Bit 2				
		ETAD_Input_f	Bit 3				
		ETAD_Input_ve	Bit 4				
		ETAD_Input_qs	Bit 5				
		ETAD_Input_sod	Bit 6				
		ETAD_Input_w	Bit 7				
		ETAD_Input_rm	Bit 9				
		ETAD_Input_tr	Bit 10				
		ETAD_Input_ila	Bit 11				
		ETAD_Input_ms14	Bit 14				
		ETAD_Input_ms15	Bit 15				
8606	4806	ERRD_Input	UINT	●	●		
8504	4754	CMI_Output	UINT				●
8601	4801	CMDD_Output	UINT		●	●	

Modbus	X2X	Name	Data type	Read		Write	
"ADL"	"Address"			Cyclical	Acyclic	Cyclical	Acyclic
8502	4752	LFR_Output	INT		●	●	
9021	5021	FRO_Input	INT	●	●		
3202	2102	RFR_Input	INT	●	●		
Optional responses and additional setpoints							
3205	2105	OTR_Input	INT	●	●		
3205	2105	OTRN_Input	INT	●	●		
5281	1282	AIV1_Output	UINT		●	●	
5283	1283	AIV2_Output	INT		●	●	
8503	4753	PISP_Output	UINT		●	●	
3203	2103	FRH_Input	INT	●	●		
8605	4805	FRHD_Input	INT	●	●		
8641	4841	FROD_Input	INT	●	●		
8604	4804	RFRD_Input	INT	●	●		
3208	2108	UOP_Input	UINT	●	●		
3204	2104	LCR_Input	UINT	●	●		
3211	2111	OPR_Input	INT	●	●		
3217	2117	SLC_Input	INT	●	●		
3207	2107	ULN_Input	UINT	●	●		
9645	5345	SMOT_Input	UINT		●		
9609	5309	TUS_Input	UINT		●		
9676	11518	RDAE_Input	INT		●		
13927	7477	ASOD_Input	UINT		●		
9634	5334	I2TM_Input	UINT		●		
3120	2070	RPR_Output	UINT				●
3230	2130	APH_Input	UINT		●		
3231	2131	RTH_Input	UINT		●		
3232	2132	RTHI_Input	UINT		●		
3233	2133	PTH_Input	UINT		●		
3234	2134	UNT_Input	UINT		●		
Error history							
7393	10385	FNB_Input	UINT		●		
7200 + Index	4100 + Index	**LFT:** DP0_Input DP[0…8]_Input	UINT		●		
7210 + Index	4110 + Index	**ETAD:** EP0_Input EP[0…8]_Input	UINT		●		
7220 + Index	4120 + Index	**ETI:** IP0_Input IP[0…8]_Input	UINT		●		
7230 + Index	4130 + Index	**CMDD:** CMP0_Input CMP[0…8]_Input	UINT		●		
7240 + Index	4140 + Index	**LCR:** LCP0_Input LCP[0…8]_Input	INT		●		
7250 + Index	10292 + Index	**RFR:** RFP0_Input RFP[0…8]_Input	INT		●		
7260 + Index	10302 + Index	**RTHI:** RTP0_Input RTP[0…8]_Input	UINT		●		
7270 + Index	10312 + Index	**ULN:** ULP0_Input ULP[0…8]_Input	UINT		●		
7280 + Index	10322 + Index	**THR:** THP0_Input THP[0…8]_Input	UINT		●		
7320 + Index	4170 + Index	**HMIS:** HS0_Input HS[0…8]_Input	UINT		●		
7330 + Index	4180 + Index	**OTR:** OTP0_Input OTP[0…8]_Input	INT		●		
7340 + Index	4190 + Index	**THD:** TDP0_Input TDP[0…8]_Input	UINT		●		

5.2.7.4.5 Configuration

Modbus	X2X	Name		Data type	Read		Write	
"ADL"	"Address"				Cyclical	Acyclic	Cyclical	Acyclic
General								
3015	2015	BFR_Input	BFR_Output	UINT		●		●
3052	8194	CFG_Input	CFG_Output	UINT		●		●
3022	2022	FRY_Input	FRY_Output	UINT		●		●
3006	2006	LAC_Input	LAC_Output	UINT		●		●
Nameplate (induction motor)								
9601	5301	UNS_Input	UNS_Output	UINT		●		●
9602	5302	FRS_Input	FRS_Output	UINT		●		●
9603	5303	NCR_Input	NCR_Output	UINT		●		●
9604	5304	NSP_Input	NSP_Output	UINT		●		●
9614	5314	MPC_Input	MPC_Output	UINT		●		●
9606	5306	COS_Input	COS_Output	UINT		●		●
9613	5313	NPR_Input	NPR_Output	UINT		●		●

Modbus	X2X	Name		Data type	Read		Write	
"ADL"	"Address"				Cyclical	Acyclic	Cyclical	Acyclic
Nameplate (SYN motor)								
13925	7475	AST_Input	AST_Output	UINT		●		●
9670	11512	NCRS_Input	NCRS_Output	UINT		●		●
9671	11513	NSPS_Input	NSPS_Output	UINT		●		●
9684	11526	TQS_Input	TQS_Output	UINT		●		●
9672	11514	PPNS_Input	PPNS_Output	UINT		●		●
Tuning settings								
9608	5308	TUN_Input	TUN_Output	UINT		●		●
9617	5317	STUN_Input	STUN_Output	UINT		●		●
9610	5310	TUL_Input	TUL_Output	UINT		●		●
Tuning results (induction motor)								
9642	5342	RSA_Input	RSA_Output	UINT		●		●
9652	11494	IDA_Input	IDA_Output	UINT		●		●
9662	11504	LFA_Input	LFA_Output	UINT		●		●
9667	11509	TRA_Input	TRA_Output	UINT		●		●
Tuning results (SYN motor)								
9673	11515	PHS_Input	PHS_Output	UINT		●		●
9674	11516	LDS_Input	LDS_Output	UINT		●		●
9675	11517	LQS_Input	LQS_Output	UINT		●		●
9682	11524	RSAS_Input	RSAS_Output	UINT		●		●
Premagnetization								
13901	7451	FLI_Input	FLI_Output	UINT		●		●
13902	7452	FLU_Input	FLU_Output	UINT		●		●
13910	7460	BOA_Input	BOA_Output	UINT		●		●
13911	7461	FAB_Input	FAB_Output	UINT		●		●
13912	7462	BOO_Input	BOO_Output	INT		●		●
High frequency injection for synchronous motor								
15600	14592	HFI_Input	HFI_Output	UINT		●		●
15601	14593	FRI_Input	FRI_Output	UINT		●		●
15602	14594	HIR_Input	HIR_Output	UINT		●		●
15603	14595	SPB_Input	SPB_Output	UINT		●		●
15604	14596	SPF_Input	SPF_Output	UINT		●		●
15605	14597	ILR_Input	ILR_Output	UINT		●		●
15606	14598	SIR_Input	SIR_Output	UINT		●		●
15607	14598	MCR_Input	SIR_Output	UINT		●		●
15608	14600	PEC_Input	PEC_Output	UINT		●		●
Access								
8401	4701	CHCF_Input	CHCF_Output	UINT		●		●
8402	4702	COP_Input	COP_Output	UINT		●		●
8403	4703	CSB_Input	CSB_Output	UINT		●		●
8411	4711	RFC_Input	RFC_Output	UINT		●		●
8412	4712	RCB_Input	RCB_Output	UINT		●		●
8413	4713	FR1_Input	FR1_Output	UINT		●		●
8414	4714	FR2_Input	FR2_Output	UINT		●		●
8415	4715	FR1B_Input	FR1B_Output	UINT		●		●
8421	4721	CCS_Input	CCS_Output	UINT		●		●
8423	4723	CD1_Input	CD1_Output	UINT		●		●
8424	4724	CD2_Input	CD2_Output	UINT		●		●
11101	6051	TCC_Input	TCC_Output	UINT		●		●
11102	6052	TCT_Input	TCT_Output	UINT		●		●
11103	6053	RUN_Input	RUN_Output	UINT		●		●
11104	6054	FRD_Input	FRD_Output	UINT		●		●
11105	6055	RRS_Input	RRS_Output	UINT		●		●
DC bus circuit								
13801	7401	URES_Input	URES_Output	UINT		●		●
13802	7402	USL_Input	USL_Output	UINT		●		●
13803	7403	USB_Input	USB_Output	UINT		●		●
13804	7404	UST_Input	UST_Output	UINT		●		●
13811	7411	UPL_Input	UPL_Output	UINT		●		●
13812	7412	TBS_Input	TBS_Output	UINT		●		●
13813	7413	TSM_Input	TSM_Output	UINT		●		●
13814	7414	STM_Input	STM_Output	UINT		●		●
13850	13592	DCCM_Input	DCCM_Output	UINT		●		●
13851	13593	DCCC_Input	DCCC_Output	UINT		●		●
14101	7551	UBR_Input	UBR_Output	UINT		●		●
PWM management								
12601	6801	SVL_Input	SVL_Output	UINT		●		●
12602	6802	SOP_Input	SOP_Output	UINT		●		●
General current/torque limiting								
9201	5101	CLI_Input	CLI_Output	UINT		●		●
9202	5102	LC2_Input	LC2_Output	UINT		●		●
9203	5103	CL2_Input	CL2_Output	UINT		●		●
9210	5110	TLA_Input	TLA_Output	UINT		●		●

Modbus	X2X	Name		Data type	Read		Write	
"ADL"	"Address"				Cyclical	Acyclic	Cyclical	Acyclic
9211	5111	TLIM_Input	TLIM_Output	UINT		●		●
9212	5112	TLIG_Input	TLIG_Output	UINT		●		●
9213	5113	TLC_Input	TLC_Output	UINT		●		●
9214	5114	TAA_Input	TAA_Output	UINT		●		●
9215	5115	INTP_Input	INTP_Output	UINT		●		●
9240	5140	SSB_Input	SSB_Output	UINT		●		●
9241	5141	STO_Input	STO_Output	UINT		●		●
9260	11302	INT_Input	INT_Output	UINT		●		●
Motor management								
9607	5307	CTT_Input	CTT_Output	UINT		●		●
9611	5311	OPL_Input	OPL_Output	UINT		●		●
9612	5312	THT_Input	THT_Output	UINT		●		●
9615	5315	AUT_Input	AUT_Output	UINT		●		●
9616	5316	MTM_Input	MTM_Output	UINT		●		●
9619	5319	TUNU_Input	TUNU_Output	UINT		●		●
9622	5322	ITH_Input	ITH_Output	UINT		●		●
9623	5323	UFR_Input	UFR_Output	UINT		●		●
9624	5324	PFL_Input	PFL_Output	UINT		●		●
9625	5325	SLP_Input	SLP_Output	UINT		●		●
9629	5329	SPGU_Input	SPGU_Output	UINT		●		●
9631	5331	I2TA_Input	I2TA_Output	UINT		●		●
9632	5332	I2TI_Input	I2TI_Output	UINT		●		●
9633	5333	I2TT_Input	I2TT_Output	UINT		●		●
12403	6703	U1_Input	U1_Output	UINT		●		●
12404	6704	F1_Input	F1_Output	UINT		●		●
12405	6705	U2_Input	U2_Output	UINT		●		●
12406	6706	F2_Input	F2_Output	UINT		●		●
12407	6707	U3_Input	U3_Output	UINT		●		●
12408	6708	F3_Input	F3_Output	UINT		●		●
12409	6709	U4_Input	U4_Output	UINT		●		●
12410	6710	F4_Input	F4_Output	UINT		●		●
12411	6711	U5_Input	U5_Output	UINT		●		●
12412	6712	F5_Input	F5_Output	UINT		●		●
9103	5053	SPG_Input	SPG_Output	UINT		●		●
9104	5054	SIT_Input	SIT_Output	UINT		●		●
9105	5055	SFC_Input	SFC_Output	UINT		●		●
9115	5065	FFH_Input	FFH_Output	UINT		●		●
9116	5066	CRTF_Input	CRTF_Output	UINT		●		●
Axis management								
3101	2051	SFT_Input	SFT_Output	UINT		●		●
3102	2052	SFR_Input	SFR_Output	UINT		●		●
3103	2053	TFR_Input	TFR_Output	UINT		●		●
3104	2054	HSP_Input	HSP_Output	UINT		●		●
15101	8051	SH2_Input	SH2_Output	UINT		●		●
15102	8052	SH4_Input	SH4_Output	UINT		●		●
15110	8060	HSP2_Input	HSP2_Output	UINT		●		●
15111	8061	HSP3_Input	HSP3_Output	UINT		●		●
15112	8062	HSP4_Input	HSP4_Output	UINT		●		●
3105	2055	LSP_Input	LSP_Output	UINT		●		●
11701	6351	TLS_Input	TLS_Output	UINT		●		●
3106	2056	BSP_Input	BSP_Output	UINT		●		●
3107	2057	NRD_Input	NRD_Output	UINT		●		●
3108	2058	RIN_Input	RIN_Output	UINT		●		●
Resonant frequency								
11301	6151	JPF_Input	JPF_Output	UINT		●		●
11302	6152	JF2_Input	JF2_Output	UINT		●		●
11303	6153	JF3_Input	JF3_Output	UINT		●		●
11311	6161	JFH_Input	JFH_Output	UINT		●		●
Speed adjustment (ramps)								
9001	5001	ACC_Input	ACC_Output	UINT		●		●
9002	5002	DEC_Input	DEC_Output	UINT		●		●
9003	5003	BRA_Input	BRA_Output	UINT		●		●
9004	5004	RPT_Input	RPT_Output	UINT		●		●
9005	5005	TA1_Input	TA1_Output	UINT		●		●
9006	5006	TA2_Input	TA2_Output	UINT		●		●
9007	5007	TA3_Input	TA3_Output	UINT		●		●
9008	5008	TA4_Input	TA4_Output	UINT		●		●
9010	5010	RPS_Input	RPS_Output	UINT		●		●
9011	5011	FRT_Input	FRT_Output	UINT		●		●
9012	5012	AC2_Input	AC2_Output	UINT		●		●
9013	5013	DE2_Input	DE2_Output	UINT		●		●
9020	5020	INR_Input	INR_Output	UINT		●		●
8651	10993	QSTD_Input	QSTD_Output	UINT		●		●

Modbus	X2X	Name		Data type	Read		Write	
"ADL"	"Address"				Cyclical	Acyclic	Cyclical	Acyclic
8652	10994	DOTD_Input	DOTD_Output	UINT		●		●
11201	6101	STT_Input	STT_Output	UINT		●		●
11202	6102	NST_Input	NST_Output	UINT		●		●
11204	6104	FST_Input	FST_Output	UINT		●		●
11220	6120	FFT_Input	FFT_Output	UINT		●		●
11230	6130	DCF_Input	DCF_Output	UINT		●		●
Load management								
14401	7701	SRB_Input	SRB_Output	UINT		●		●
14411	7711	ULT_Input	ULT_Output	UINT		●		●
14412	7712	UDL_Input	UDL_Output	UINT		●		●
14413	7713	FTU_Input	FTU_Output	UINT		●		●
14414	7714	RMUD_Input	RMUD_Output	UINT		●		●
14415	7715	LUL_Input	LUL_Output	UINT		●		●
14416	7716	LUN_Input	LUN_Output	UINT		●		●
14421	7721	TOL_Input	TOL_Output	UINT		●		●
14422	7722	ODL_Input	ODL_Output	UINT		●		●
14423	7723	FTO_Input	FTO_Output	UINT		●		●
14425	7725	LOC_Input	LOC_Output	UINT		●		●
Brake controller (DCI)								
11203	6103	DCI_Input	DCI_Output	UINT		●		●
11210	6110	IDC_Input	IDC_Output	UINT		●		●
11211	6111	TDC_Input	TDC_Output	UINT		●		●
11212	6112	IDC2_Input	IDC2_Output	UINT		●		●
11213	6113	TDI_Input	TDI_Output	UINT		●		●
10401	5701	ADC_Input	ADC_Output	UINT		●		●
10402	5702	TDC1_Input	TDC1_Output	UINT		●		●
10403	5703	SDC1_Input	SDC1_Output	UINT		●		●
10404	5704	TDC2_Input	TDC2_Output	UINT		●		●
10405	5705	SDC2_Input	SDC2_Output	UINT		●		●
10499	11941	TAFI_Input	TAFI_Output	UINT		●		●
Brake controller (BLC)								
10001	5501	BLC_Input	BLC_Output	UINT		●		●
10003	5503	BEN_Input	BEN_Output	INT		●		●
10004	5504	BRT_Input	BRT_Output	UINT		●		●
10005	5505	BET_Input	BET_Output	UINT		●		●
10006	5506	IBR_Input	IBR_Output	UINT		●		●
10007	5507	BIP_Input	BIP_Output	UINT		●		●
10008	5508	BST_Input	BST_Output	UINT		●		●
10009	5509	BCI_Input	BCI_Output	UINT		●		●
10010	5510	TBE_Input	TBE_Output	UINT		●		●
10011	5511	IRD_Input	IRD_Output	UINT		●		●
10012	5512	BIR_Input	BIR_Output	INT		●		●
10013	5513	JDC_Input	JDC_Output	INT		●		●
10015	5515	BRR_Input	BRR_Output	UINT		●		●
10020	5520	BED_Input	BED_Output	UINT		●		●
10022	5522	TTR_Input	TTR_Input	UINT		●		●
10050	11692	BRH_Input	BRH_Output	UINT		●		●
10070	11712	PES_Input	PES_Output	UINT		●		●
10071	11713	LP1_Input	LP1_Output	UINT		●		●
10072	11714	CP1_Input	CP1_Output	INT		●		●
10073	11715	LP2_Input	LP2_Output	UINT		●		●
10074	11716	CP2_Input	CP2_Output	INT		●		●
10075	11717	IBRA_Input	IBRA_Output	UINT		●		●
Line contactor control								
13601	7301	LES_Input	LES_Output	UINT		●		●
13602	7302	LLC_Input	LLC_Output	UINT		●		●
13603	7303	LCT_Input	LCT_Output	UINT		●		●
Motor contactor control								
13101	7051	DBS_Input	DBS_Output	UINT		●		●
13102	7052	DAS_Input	DAS_Output	UINT		●		●
13103	7053	RCA_Input	RCA_Output	UINT		●		●
13104	7054	OCC_Input	OCC_Output	UINT		●		●
Error behavior								
7002	4002	IPL_Input	IPL_Output	UINT		●		●
7004	4004	STP_Input	STP_Output	UINT		●		●
7005	4005	SDD_Input	SDD_Output	UINT		●		●
7006	4006	EPL_Input	EPL_Output	UINT		●		●
7008	4008	OHL_Input	OHL_Output	UINT		●		●
7009	4009	OLL_Input	OLL_Output	UINT		●		●
7010	4010	SLL_Input	SLL_Output	UINT		●		●
7011	4011	COL_Input	COL_Output	UINT		●		●
7012	4012	TNL_Input	TNL_Output	UINT		●		●
7013	4013	LFL3_Input	LFL3_Output	UINT		●		●

Modbus	X2X	Name		Data type	Read		Write	
"ADL"	"Address"				Cyclical	Acyclic	Cyclical	Acyclic
7015	4015	CLL_Input	CLL_Output	UINT		●		●
7018	4018	SCL3_Input	SCL3_Output	UINT		●		●
7020	4020	DCFF_Input	DCFF_Output	UINT		●		●
7080	10222	LFF_Input	LFF_Output	UINT		●		●
7081	10223	ODT_Input	ODT_Output	UINT		●		●
7090	10232	LET_Input	LET_Output	UINT		●		●
Error diagnostics								
3112	2062	STRT_Input	STRT_Output	UINT		●		●
3121	2071	RFLT_Input	RFLT_Output	UINT		●		●
3130	2080	FFM_Input	FFM_Output	UINT		●		●
7122	4072	ATR_Input	ATR_Output	UINT		●		●
7123	4073	TAR_Input	TAR_Output	UINT		●		●
7124	4074	RSF_Input	RSF_Output	UINT		●		●
7125	4075	INH_Input	INH_Output	UINT		●		●
7128	4078	RP_Input	RP_Output	UINT		●		●
7129	4079	RPA_Input	RPA_Output	UINT		●		●
7130	4080	CIC_Input	CIC_Output	UINT		●		●
7131	4081	ETF_Input	ETF_Output	UINT		●		●
7132	4082	CNF_Input	CNF_Output	UINT		●		●
7134	4084	ILF1_Input	ILF1_Output	UINT		●		●
7150	10242	HRFC_Input	HRFC_Output	UINT		●		●
User-defined threshold values								
11001	6001	CTD_Input	CTD_Output	UINT		●		●
11002	6002	TTD_Input	TTD_Output	UINT		●		●
11003	6003	FTD_Input	FTD_Output	UINT		●		●
11004	6004	F2D_Input	F2D_Output	UINT		●		●
11006	6006	TTD2_Input	TTD2_Output	UINT		●		●
11007	6007	TTD3_Input	TTD3_Output	UINT		●		●
11009	6009	THA_Input	THA_Output	UINT		●		●
11015	6015	TTL_Input	TTL_Output	INT		●		●
11016	6016	TTH_Input	TTH_Output	INT		●		●
11021	6021	SAT_Input	SAT_Output	UINT		●		●
User-defined alarm groups								
12801	6901	GA11_Input	GA11_Output	UINT		●		●
12802	6902	GA12_Input	GA12_Output	UINT		●		●
12803	6903	GA21_Input	GA21_Output	UINT		●		●
12804	6904	GA22_Input	GA22_Output	UINT		●		●
12805	6905	GA31_Input	GA31_Output	UINT		●		●
12806	6906	GA32_Input	GA32_Output	UINT		●		●
12807	6907	GA13_Input	GA13_Output	UINT		●		●
12808	6908	GA23_Input	GA23_Output	UINT		●		●
12809	6909	GA33_Input	GA33_Output	UINT		●		●
Handheld settings								
64002	14601	PST_Input	PST_Output	UINT		●		●
64035	14602	PVIS_Input	PVIS_Output	UINT		●		●
Display settings								
12001	6501	SDS_Input	SDS_Output	UINT		●		●
Special function: "Limit switch"								
12501	6751	SAF_Input	SAF_Output	UINT		●		●
12502	6752	SAR_Input	SAR_Output	UINT		●		●
12503	6753	DAF_Input	DAF_Output	UINT		●		●
12504	6754	DAR_Input	DAR_Output	UINT		●		●
12505	6755	DSF_Input	DSF_Output	UINT		●		●
12506	6756	PAS_Input	PAS_Output	UINT		●		●
12507	6757	CLS_Input	CLS_Output	UINT		●		●
12508	6758	SAL_Input	SAL_Output	UINT		●		●
12509	6759	DAL_Input	DAL_Output	UINT		●		●
12511	6761	NLS_Input	NLS_Output	UINT		●		●
12521	6771	STD_Input	STD_Output	UINT		●		●
12522	6772	SFD_Input	SFD_Output	UINT		●		●
12523	6773	MSTP_Input	MSTP_Output	UINT		●		●
12524	6774	PRST_Input	PRST_Output	UINT		●		●
Special function: "PID controller"								
11901	6451	PIF_Input	PIF_Output	UINT		●		●
11904	6454	PIF1_Input	PIF1_Output	UINT		●		●
11905	6455	PIF2_Input	PIF2_Output	UINT		●		●
11906	6456	PIP1_Input	PIP1_Output	UINT		●		●
11907	6457	PIP2_Input	PIP2_Output	UINT		●		●
11908	6458	PII_Input	PII_Output	UINT		●		●
11909	6459	PR2_Input	PR2_Output	UINT		●		●
11910	6460	PR4_Input	PR4_Output	UINT		●		●
11920	6470	RPI_Input	RPI_Output	UINT		●		●
11921	6471	RP2_Input	RP2_Output	UINT		●		●

Modbus	X2X	Name		Data type	Read		Write	
"ADL"	"Address"				Cyclical	Acyclic	Cyclical	Acyclic
11922	6472	RP3_Input	RP3_Output	UINT		●		●
11923	6473	RP4_Input	RP4_Output	UINT		●		●
11940	6490	PIC_Input	PIC_Output	UINT		●		●
11941	6491	RPG_Input	RPG_Output	UINT		●		●
11942	6492	RIG_Input	RIG_Output	UINT		●		●
11943	6493	RDG_Input	RDG_Output	UINT		●		●
11944	6494	PIS_Input	PIS_Output	UINT		●		●
11950	12642	FPI_Input	FPI_Output	UINT		●		●
11951	12643	PSR_Input	PSR_Output	UINT		●		●
11952	12644	POL_Input	POL_Output	INT		●		●
11953	12645	POH_Input	POH_Output	INT		●		●
11954	12646	PIM_Input	PIM_Output	UINT		●		●
11960	12652	RSL_Input	RSL_Output	UINT		●		●
11961	12653	PAL_Input	PAL_Output	UINT		●		●
11962	12654	PAH_Input	PAH_Output	UINT		●		●
11963	12655	PER_Input	PER_Output	UINT		●		●
11970	12662	PAU_Input	PAU_Output	UINT		●		●
11984	12676	PRP_Input	PRP_Output	UINT		●		●

5.2.7.5 Minimum cycle time

The minimum cycle time specifies the time up to which the bus cycle can be reduced without communication errors occurring. It is important to note that very fast cycles reduce the idle time available for handling monitoring, diagnostics and acyclic commands.

Minimum cycle time
400 µs

5.3 POWERLINK

5.3.1 General information

POWERLINK is a standard protocol for Fast Ethernet with hard real-time characteristics. The POWERLINK Standardization Group (EPSG) ensures that the standard remains open and is continually developed: www.ethernet-powerlink.org.

- POWERLINK V2 for real-time Ethernet communication
- Firmware update via fieldbus
- Integrated hub for efficient cabling
- PollResponse Chaining
- Dynamic node allocation (DNA)

5.3.2 Order data

Model number	Short description	Figure
	Interface modules	
8I0IF108.400-3	ACOPOSinverter P66 interface module, 2x POWERLINK interface	

Table 25: 8I0IF108.400-3 - Order data

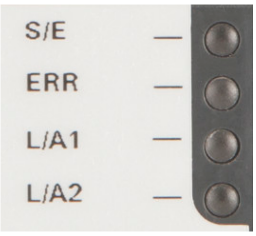
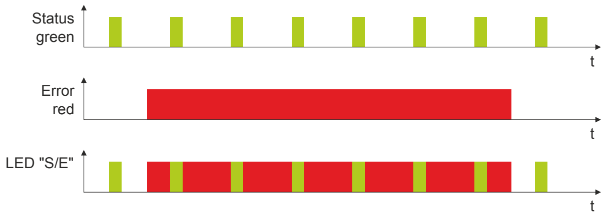
5.3.3 Technical data

Model number	**8I0IF108.400-3**
Short description	
Communication module	POWERLINK V2 controlled node
General information	
B&R ID code	0xF25B
Status indicators	Module status, bus function
Diagnostics	
Module status	Yes, using LED status indicator and software
Bus function	Yes, using LED status indicator and software
Certifications	
CE	Yes
UL	Not relevant
CSA	Not relevant
Interfaces	
Fieldbus	POWERLINK V2 controlled node
Type	V2 type 3 [1)]
Variant	2x shielded RJ45 (hub)
Cable length	Max. 100 m between 2 stations (segment length)
Transfer rate	100 Mbit/s
Transfer	
Physical layer	100BASE-TX
Half-duplex	Yes
Full-duplex	No
Autonegotiation	Yes
Auto-MDI/MDIX	Yes
Hub propagation delay	0.96 to 1 µs
Operating conditions	
Mounting orientation	
Horizontal	Yes
Vertical	Yes
Installation elevation above sea level	
0 to 2000 m	No limitation
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m
Degree of protection per EN 60529	IP20
Ambient conditions	
Temperature	
Operation	-10 to 60°C
Storage	-25 to 70°C
Transport	-25 to 70°C
Relative humidity	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing

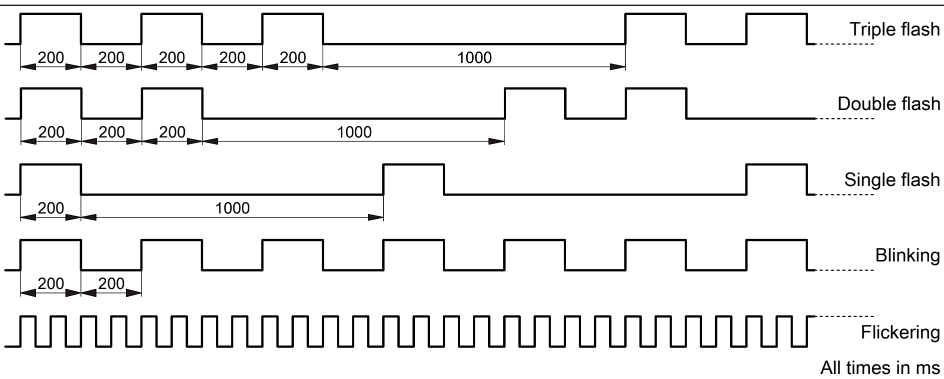
Table 26: 8I0IF108.400-3 - Technical data

1) See Automation Help under "Communication / POWERLINK / General information / Hardware - IF/LS" for more information.

5.3.4 LED status indicators

Figure	LED	Color	Status	Description
	S/E	Green	Off	No power supply or mode NOT_ACTIVE. The controlled node (CN) is either not supplied with power, or it is in state NOT_ACTIVE. The CN waits in this state for about 5 seconds after a restart. Communication is not possible with the CN. If no POWERLINK communication is detected during these 5 seconds, the CN enters state BASIC_ETHERNET (flickering). If POWERLINK communication is detected before this time expires, however, the CN immediately enters state PRE_OPERATIONAL_1.
			Flickering	Mode BASIC_ETHERNET. The CN has not detected any POWERLINK communication. In this state, it is possible to communicate directly with the CN (e.g. with UDP, IP, etc.) If communication POWERLINK is detected in this state, the CN switches to PRE_OPERATIONAL_1.
			Single flash	Mode PRE_OPERATIONAL_1. When operating on a POWERLINK V1 manager, the CN switches directly to PRE_OPERATIONAL_2. When operated on a POWERLINK V2 manager, the CN waits until an SoC frame is received and then switches to the PRE_OPERATIONAL_2 state.
			Double flash	Mode PRE_OPERATIONAL_2. The CN is normally configured by the manager in this state. It is then switched to state READY_TO_OPERATE by command (POWERLINK V2) or by setting the "data valid" flag in the output data (POWERLINK V1).
			Triple flash	Mode READY_TO_OPERATE. In network POWERLINK V1, the CN switches automatically to OPERATIONAL as soon as input data is present. In a POWERLINK V2 network, the manager switches to the OPERATIONAL state by issuing a command.
			On	Mode OPERATIONAL. The PDO mapping is active and cyclic data is evaluated.
			Blinking	Mode STOPPED. Output data is not being output, and no input data is being provided. It is only possible to switch to or leave this state after the manager has given the appropriate command.
		Red	On	The controlled node (CN) is in an error state (failed Ethernet frames, increased number of collisions on the network, etc.). If an error occurs in the following states, then the green LED blinks over the red LED: • PRE_OPERATIONAL_1 • PRE_OPERATIONAL_2 • READY_TO_OPERATE  Note: • Several red blinking signals are displayed immediately after the device is switched on. This is not an error, however. • The LED is lit red for CNs with configured physical node number 0 but that have not yet been assigned a node number via dynamic node allocation (DNA).
	L/A IFx	Green	On	The link to the remote station is established.
			Blinking	The link to the remote station is established, and Ethernet activity is taking place on the bus.
	E	Red	On	Fault of a critical module (RAM, flash memory, hardware or internal communication error) occurred.

LED status indicators - Blink times



5.3.4.1 System stop error codes

A system stop error can occur due to incorrect configuration or defective hardware.

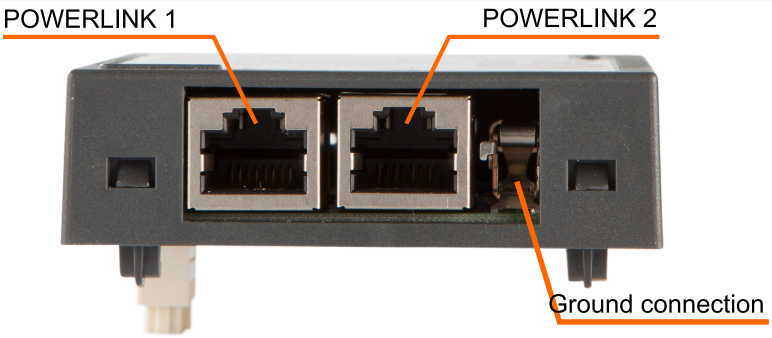
The error code is indicated by LED "S/E" blinking red. The blinking signal of the error code consists of 4 switch-on phases with short (150 ms) or long (600 ms) duration. The error code is repeated every 2 seconds.

Error description	Error code indicated by red "Status" LED									
RAM error: The module is defective and must be replaced.	●	●	●	-	Pause	●	●	●	-	Pause
Bus error: The module or a system component is defective and must be replaced. **Information:** **The module does not support hot plugging.**	-	●	●	●	Pause	-	●	●	●	Pause

Table 27: Status/Error ("S/E") LED - System stop error codes

Legend: ● ... 150 ms
- ... 600 ms
Pause ... 2-second pause

5.3.5 Operating and connection elements



5.3.6 POWERLINK node number

Node numbers between 0x00 (0) and 0xEF (239) are permitted.

The POWERLINK node number is configured using the integrated operator terminal or handwheel.

Parameters are called as follows:

[DRIVE MENU](DRI),

[CONFIGURATION](CONF-),

[FULL](FULL-),

[COMMUNICATION](COM-),

[COMMUNICATION CARD](Cbd-):

Code	Name/Description	Setting range	Factory settings
(ADRC)	**[Address]**	0 to 239	0

5.3.7 Dynamic node allocation (DNA)

Bus controller POWERLINK offers the option of receiving dynamically assigned node numbers.

This has the following advantages:

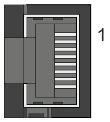
- No setting of the node number switch
- Easier installation
- Reduced error sources

For information regarding configuration as well as an example, see Automation Help → Communication → POWERLINK → General information → Dynamic node allocation (DNA)

Information:

Interface IF1 must always be used as the input from the preceding node.

5.3.8 Ethernet interface

Interface	Pinout		
	Pin	Ethernet	
 RJ45 shielded	1	RXD	Receive data
	2	RXD\	Receive data\
	3	TXD	Transmit data
	4	Termination	
	5	Termination	
	6	TXD\	Transmit data\
	7	Termination	
	8	Termination	

5.3.9 SG3

This module is not supported on SG3 target systems.

5.3.10 SG4

The communication module comes with preinstalled firmware. The firmware is also part of the hardware upgrade.

If the hardware upgrade currently used in Automation Studio contains a different firmware version, this will be loaded to the communication module during project download.

5.3.11 Use of ACOPOSinverter with Automation Studio

Several hardware upgrades have been created for use of the frequency inverter in Automation Studio (one upgrade per communication card). The hardware device description files include the standard interfaces for a POWERLINK CN or X2X slave, expanded by communication data points and configuration parameters of the frequency inverter.

In ACOPOSinverter P76, communication card POWERLINK comes preinstalled in the device for outbound delivery. There are various communication cards for ACOPOSinverter P66 (e.g. POWERLINK and X2X). For this product, the corresponding communication card is delivered separately and must be installed on the frequency inverter before commissioning.

Information:

The interface between frequency inverter and communication card does not support hot plugging, i.e. the communication card must be installed when the power is switched off.

For the complete register table for the ACOPOSinverter, see chapter 5.3.12 "Register description" on page 458 or the following Excel file:

ACOPOSinverter - Communication Parameters

5.3.11.1 Automation Studio

Several hardware upgrades have been created for use of the frequency inverter in Automation Studio (one upgrade per communication card). The hardware device description files include the standard interfaces for a POWERLINK CN or X2X slave, expanded by communication data points and configuration parameters of the frequency inverter.

In ACOPOSinverter P76, communication card POWERLINK comes preinstalled in the device for outbound delivery. There are various communication cards for ACOPOSinverter P66 (e.g. POWERLINK and X2X). For this product, the corresponding communication card is delivered separately and must be installed on the frequency inverter before commissioning.

Information:

The interface between frequency inverter and communication card does not support hot plugging, i.e. the communication card must be installed when the power is switched off.

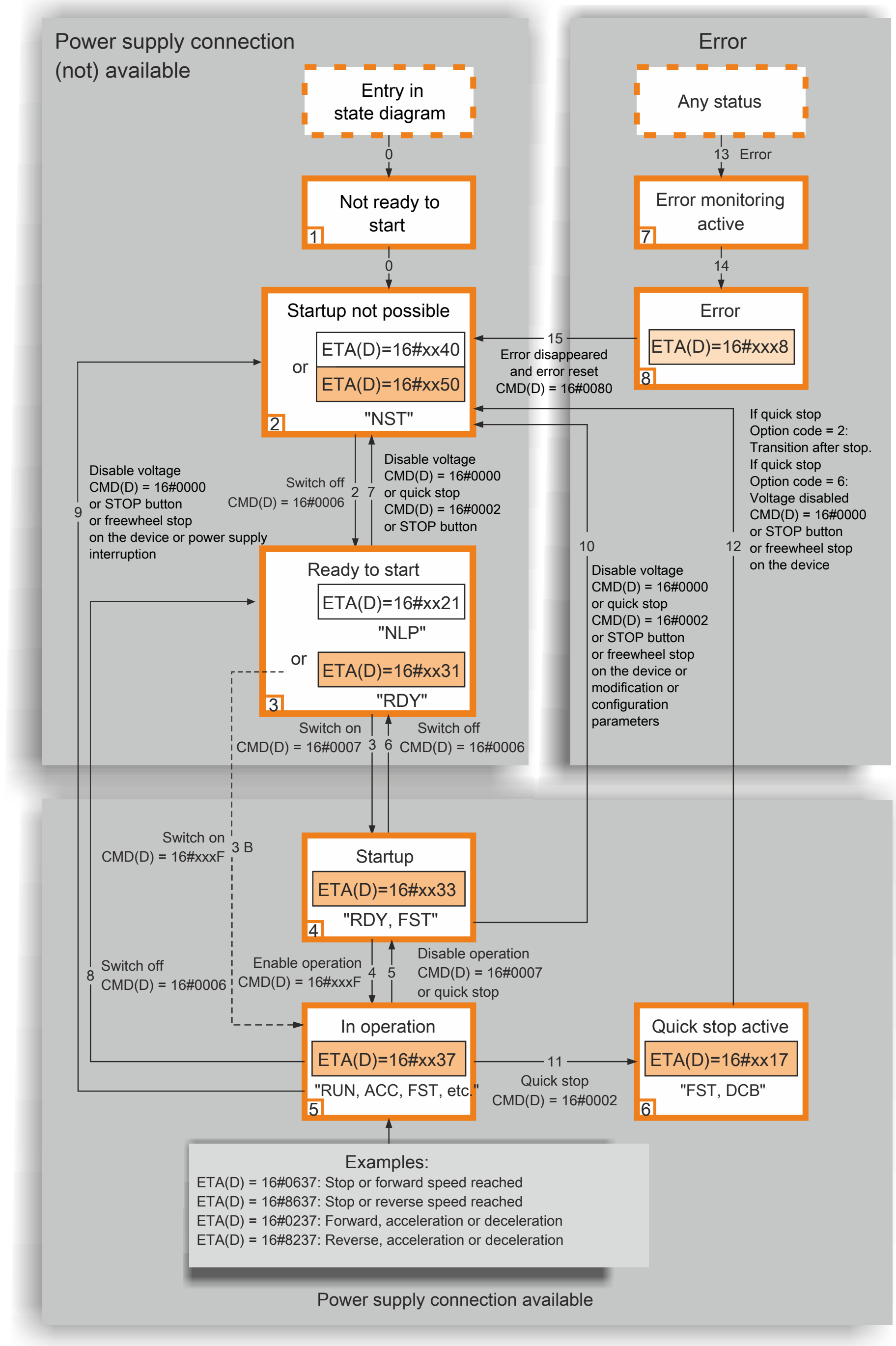
5.3.11.2 ACOPOSinverter Communication

5.3.11.2.1 I/O mapping

The default interface for I/O mapping provides access to the essential data points of the frequency inverter. These include:

- ERRD
  - Error message per DS402
  - See list of error messages in chapter "Data point ERRD" on page 446
- ETAD
  - Status word per DS402
  - For more information, see state machine DS402 in section "Data points ETA(D) and CMD(D) and state machine for standard "DS402"" on page 442.
- CMDD
  - Command word per DS402
  - For more information, see state machine DS402 in section "Data points ETA(D) and CMD(D) and state machine for standard "DS402"" on page 442.
- LFRD
  - Setpoint generation per DS402
  - In the default setting, the setpoint is specified in rpm.
- FROD
  - Setpoint feedback per DS402
  - In the default setting, the setpoint is reported in rpm.
- RFRD
  - Actual value feedback per DS402
  - In the default setting, the setpoint is reported in rpm.

5.3.11.2.2 Data points ETA(D) and CMD(D) and state machine for standard "DS402"



Each state represents an internal reaction for the frequency inverter. The state is changed per the transmitted (CMD(D)) control word or an internal activity (e.g. error). State is identified using the value for state word (ETA(D)).

1) Not ready to start
   Start initialization
    - Transition state not visible for communication network.
2) Start not possible
   The frequency inverter is not active.
    - An AC power supply for the power unit is not necessary for an external controller.
    - An external controller with line contactor does not control the contactor.
    - The frequency inverter is locked and the motor cannot be supplied with power.
    - The configuration and setting parameters can be configured.
3) Ready to start
   Wait for power supply for the power unit.
    - An AC power supply for the power unit is not necessary for an external controller. The system requires this state in order to switch to state 4 - "Start".
    - An external controller with line contactor does not control the contactor.
    - The frequency inverter is locked and the motor cannot be supplied with power.
    - The configuration and setting parameters can be configured.

Caution!

DS402 describes the high voltage power supply of the frequency inverter in state 3 - "Ready for start". There is a difference here between DS402 and the frequency inverter description.

4) Start
   Although the frequency inverter is supplied by AC power, it is in a steady state.
    - A power unit supply is necessary for an external controller.
    - An external controller with line contactor does not control the contactor.
    - The frequency inverter is locked and the motor cannot be supplied with power.
    - The supply stage for the inverter is ready for operation, but the voltage has not been applied at the output.
    - The setting parameters can be configured.
    - Modifying the configuration parameter resets the frequency inverter to state 2 - "Start not possible".
5) Run
   The frequency inverter is in operation.
    - A power unit supply is necessary for an external controller.
    - An external controller with line contactor controls the contactor.
    - The frequency inverter is unlocked and the motor is supplied.
    - The inverter functions are enabled and the motor terminals are supplied with voltage.
    - In the event of a frequency inverter with open-ended control loop and setpoint zero or a stop command, the power supply to the motor and torque will be switched off.
    - **[Auto-tuning]** (tun) requires a power feed to the motor. The frequency inverter must be in state 5 - "In operation" for this purpose.
    - The setting parameters can be configured.
    - The configuration parameters cannot be configured.

Information:

The channel must be valid for transition from state 4 - "Start" to state 5 - "In operation". If the channel is contained within a command or setpoint, the transition to state 4 - "Start" can only take place if the setpoint has been received for the first time. The reaction of the frequency inverter to command "Deactivate operation" is dependent on the value of parameter [Disable Output Trigger Definition] (dotd):

- **If parameter [Disable Output Trigger Definition] (dotd) is in state 0, the inverter changes to state 4 - "Start" and stops in freewheel stop.**
- **If parameter [Disable Output Trigger Definition] (dotd) is in state 1, the frequency inverter stops at the ramp and switches to state 4 - "Start".**

6) Quick stop active
Emergency stop
   - The frequency inverter performs a quick stop. Following a quick stop, a restart is only possible if a switch to state 2 - "Start not possible" is implemented.
   - During quick stop, the frequency inverter is locked and the motor is supplied with power.
   - The configuration parameters cannot be configured.

Information:

The condition for the transition from state 6 - "Quick stop active" to state 2 - "Start not possible" is dependent on the value of parameter [Disable Output Quick Stop] (qStd):

- **If parameter [Disable Output Quick Stop] (qStd) is in state 2, the inverter stops at the quick stop ramp and changes to state 2 - "Start not possible".**
- **If parameter [Disable Output Quick Stop] (qStd) is in state 6, inverter stops in accordance with the quick stop ramp and then remains in state 6 - "Quick stop active" until:**
  - **Command "Disable voltage" has been received.**
  - **STOP has been pressed.**
  - **Command "Freewheel stop" has been received via the operator terminal.**

7) Error monitoring active
Transition state in which the frequency inverter performs an action in accordance with a type of error.
   - Frequency inverter function is enabled or disabled as per the response type configured in the error management parameter.

8) Error
Frequency inverter faulty.
   - The frequency inverter is locked and the motor cannot be supplied with power.

Status	Power unit power supply for external controller	Power supply for motor	Modification of configuration parameter
1 - Not ready to start	Not required	No	Yes
2 - Start not possible	Not required	No	Yes
3 - Ready to start	Not required	No	Yes
4 - Start	Required	No	Yes, back to state 2 - "Start not possible"
5 - Operational	Required	Yes, except for open-control loop and setpoint zero or stop command.	No
6 - Fast stop active	Required	Yes, during quick stop	No
7 - Error monitoring active	Dependent on fault management configuration	Dependent on fault management configuration	-
8 - Error	Not required	No	Yes

Structure of state word ETA(D)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Warning	Start not possible	Fast stop	Power supply possible	Error	Run	Start	Ready to start
Alarm	Power supply for power unit not possible	Emergency stop	Power supply for power unit	Error	Run	Ready	Wait for power supply for power unit

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Direction of rotation	Stop by pressing STOP	Reserved (0)	Reserved (0)	Internal limit active	Target reached	External	Reserved (0)
				Setpoint outside limit	Setpoint reached	Command or setpoint via network	

Status	Bit 6 Start not possible	Bit 5 Fast stop	Bit 4 Power supply	Bit 3 Error	Bit 2 Run	Bit 1 Start	Bit 0 Ready to start	ETA covered by 16#006F[1]
1 - Not ready to start	0	x	x	0	0	0	0	-
2 - Start not possible	1	x	x	0	0	0	0	16#0040
3 - Ready to start	0	1	x	0	0	0	1	16#0021
4 - Start	0	1	1	0	0	1	1	16#0023
5 - Operational	0	1	1	0	1	1	1	16#0027
6 - Fast stop active	0	0	1	0	1	1	1	16#0007
7 - Error monitoring active	0	x	x	1	1	1	1	-
8 - Error	0	x	x	1	0	0	0	16#0008[2] or 16#0028

1) This mask can be used by program PLC for testing diagram state.
2) Fault after state 6 - "Quick stop active"
x In this state, the value of the bit is 0 or 1.

Structure of control word CMD(D)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Error reset	Reserved (0)	Reserved (0)	Reserved (0)	Run	Fast stop	Power supply	Authorization via AC supply voltage
0 to 1 transition = Error reset (once reason for error no longer active)				Run command	Emergency stop	Authorization via AC supply voltage	Contactor control

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Assignment	Assignment	Assignment	Assignment	Default, direction of rotation command	Reserved (0)	Reserved (0)	Halt
				0 = Forward direction queried, 1= Reverse direction queried			Halt

Command	Transition address	Final state	Bit 7 Error reset	Bit 3 Run	Bit 2 Fast stop	Bit 1 Run	Bit 0 Start	Sample value
Shutdown	2, 6, 8	3 - Ready to start	x	x	1	1	0	16#0006
Start	3	4 - Start	x	x	1	1	1	16#0007
Run	4	5 - Operational	x	1	1	1	1	16#000F
Not in operation	5	4 - Start	x	0	1	1	1	16#0007
No power supply	7, 9, 10, 12	2 - Start not possible	x	x	x	0	x	16#0000
Fast stop	11	6 - Fast stop active	x	x	0	1	x	16#0002
	7, 10	2 - Start not possible						
Error reset	15	2 - Start not possible	0 > 1	x	x	x	x	16#0080

x Value not relevant for this command.
0>1 Command on rising edge

Stop command

If CTMD(D) bit 8 in state "True":
The stop command is triggered:
The stop command interrupts the current flow without exiting state 5 - "In operation". The stop is performed in accordance with the ramp defined by parameter STT. Despite the setting for parameter STT, the frequency inverter remains in state 5 - "In operation".
In the event of a frequency inverter with open-ended control loop and setpoint zero or a stop command, the power supply to the motor and torque will be switched off.

If CTMD(D) bit 1 in state "True":
Stop command "High-speed" results in a change to state 4 - "Start".

CMD(D) is reset (CMD(D) = 0):
Stop command "Freewheel" results in a change to state 2 - "Start not possible".

5.3.11.2.3 Data point ERRD

If bit 3 reports state word (ETAD) "True", the frequency inverter will be in state "Error". The cause of the error can be analyzed using the standardized error code (data point: ERRD) or the device-specific error code (data points: LFT).

Error messages			
Code (ERRD)	**Explanation**	**Code (LFT)**	**Display**
0x0000	No error saved	0	(NOF)
0x1000	Charging relay error	10	(CRF)
0x1000	Motor overload error	17	(OLF)
0x1000	Overspeed error	24	(SOF)
0x1000	Hardware error	67	(HDF)
0x1000	CPU error (RAM, memory, task, …)	69	(INFE)
0x1000	Channel change error	99	(CSF)
0x1000	Angle setting error	105	(ASF)
0x2230	IGBT short-circuit error	55	(SCF4)
0x2310	Overcurrent error	9	(OCF)
0x2311	Torque overload error	101	(OLF)
0x2320	Motor short-circuit error	23	(SCF1)
0x2320	Load short-circuit error during ionic load	56	(SCF5)
0x2330	Direct ground short circuit error	32	(SCF3)
0x3110	Oversupply error	19	(OSF)
0x3120	Undervoltage error	22	(USF)
0x3130	Main input 1 phase loss	21	(PHF)
0x3310	Overbraking error	18	(OBF)
0x3310	Motor 1 phase loss	20	(OPF1)
0x3310	Motor 3 phase loss	33	(OPF2)
0x4210	Frequency inverter overheating error	16	(OHF)
0x4210	IGBT overheating error	54	(TJF)
0x4310	Motor overheating error from PtCL - Default product	50	(OTFL)
0x5000	Output contactor - Engaged contactor	58	(FCF1)
0x5000	Output contactor - Open-ended contactor	59	(FCF2)
0x5000	Line contactor failure	64	(LCF)
0x5210	Current measurement loop error	51	(INF9)
0x5210	Input phase failure error	52	(INFA)
0x5210	Thermosensor error (OC or SC)	53	(INFB)
0x5530	EEPROM controller error	2	(EEF1)
0x5530	EEPROM power error	30	(EEF2)
0x6100	Unspecified frequency inverter assessment	26	(INF1)
0x6100	Unspecified or incompatible power board	27	(INF2)
0x6100	Internal communication error of the serial connection	28	(INF3)
0x6100	Invalid industrialization zone	29	(INF4)
0x6100	Hardware configuration error	73	(HCF)
0x6300	Invalid configuration during startup	3	(CFF)
0x6300	Incorrect parameter configuration	4	(CFI)
0x6300	Configuration transmission error	77	(CFI2)
0x7000	Unspecified or incompatible option board	68	(INF6)
0x7110	Braking contactor error	41	(BRF)
0x7300	Direction error	12	(ANF)
0x7300	PtCL error (OC or SC)	49	(PTFL)
0x7300	AI3 4-20 mA failure error	71	(LFF3)
0x7310	Speed encoder response loss	11	(SRF)
0x7510	Local serial Modbus communication error	5	(SLF1)
0x7510	Remote control panel communication error	45	(SLF3)
0x7520	Option internal communication error	6	(ILF)
0x7520	Option NET internal communication error	7	(CNF)
0x7530	Power suite communication error	42	(SLF2)
0x8100	CANopen communication error	34	(COF)
0x9000	External error via LI or local connection	8	(EPF1)
0x9000	External error from communication board	38	(EPF2)
0xFF00	Error setting	25	(TNF)
0xFF01	Braking motor 3-phase loss	35	(BLF)
0xFF02	Torque current limiting error	44	(SSF)
0xFF03	Torque underload error	100	(ULF)
0xFF03	Safety function error If one or several safety functions were activated using file DTM (ACPi parameter tool), data points STOS, SS1S, SLSS and GDLS can be used to evaluate the status response of the safety functions.	107	(SAFF)
0xFF80	Dynamic load error	76	(DLF)

5.3.11.2.4 Data point HMIS (device-specific state word)

Data points HMIS and LFT are device-specific, i.e. do not correspond to standard "DS402". For this reason, if these data points are used, they must be implemented separately in the Automation Studio project application.

State word HMIS can be used to read back the current state of the frequency inverter. In this way, data point HMIS functions as a device-specific counterpart to ETAD.

Status messages		
Code (HMIS)		Explanation
0	(TUN)	Current process: Autotuning
1	(DCB)	Current process: Generator operation or DC bus circuit energy regeneration
2	(RDY)	Current process: Wait for next command (DC bus circuit adequately supplied)
3	(NST)	Current process: Wait for next command (boot procedure complete)
4	(RUN)	Current process: Wait for next setpoint • Display (RUN) will be overwritten on the 7-segment display with the current setpoint.
5	(ACC)	Current process: Accelerate (actual value < setpoint) • Display (ACC) will be overwritten on the 7-segment display with the current setpoint.
6	(DEC)	Current process: Delay (actual value > setpoint) • Display (DEC) will be overwritten on the 7-segment display with the current setpoint.
7	(CLI)	Current process: General current limiting active
8	(FST)	Current process: Quick stop
9	(FLU)	Current process: Premagnetization of motor
11	(NLP)	Current process: Wait for next command (DC bus circuit undersupplied)
12	(PRA)	Current process: PRA function active "Power removal"
13	(CTL)	Current process: Controlled stop
14	(OBR)	Current process: Adjusted decline
15	(SOC)	Current process: Standby (UVW switched off)
17	(USA)	Current process: Warning DC bus circuit undersupplied
18	(TC)	Current process: Device in factory mode "Test"
19	(ST)	Current process: Self-test in progress
20	(FA)	Current process: Self-test canceled
21	(YES)	Current process: Self-test successfully completed
22	(EP)	Current process: EEPROM test
23	(FLT)	Current process: Drive in error • Display (FLT) will be overwritten on the 7-segment display with the current value for data point LFT • For further information, see data point LFT
25	(DCP)	Current process: Device in factory mode "Flash"
28	(SS1)	Current process: Safety function SS1 active • For further information, see SS1S data point
29	(SLS)	Current process: Safety function SLS active • For further information, see data point SLSS
30	(STO)	Current process: Safety function STO active • For further information, see data point STOS
31	(SMS)	Current process: Safety function SMS active
32	(GDL)	Current process: Safety function GDL active • For additional information, see data point GDLS.

If state word HIMS reports the value 23, the frequency inverter will be in state "Error". The error source can be analyzed using standardized error code (data point: ERRD) or device-specific error code (data points: LFT).

5.3.11.2.5 Data point LFT (device-specific error messages)

The HMIS and LFT data points are device-specific, i.e. do not correspond to standard "DS402". For this reason, if these data points are used, they must be implemented separately in the Automation Studio project application. Data point LFT saves the last error code. In this way, data point LFT functions as a device-specific counterpart to ERRD.

Error messages			
Code (LFT)	**Display**	**Explanation**	**ERRD code**
0	(NOF)	No error saved	0x0000
2	(EEF1)	EEPROM controller error	0x5530
3	(CFF)	Invalid configuration during startup	0x6300
4	(CFI)	Incorrect parameter configuration	0x6300
5	(SLF1)	Local serial Modbus communication error	0x7510
6	(ILF)	Option internal communication error	0x7520
7	(CNF)	Option NET internal communication error	0x7520
8	(EPF1)	External error via LI or local connection	0x9000
9	(OCF)	Overcurrent error	0x2310
10	(CRF)	Charging relay error	0x1000
11	(SRF)	Speed encoder response loss	0x7310
12	(ANF)	Direction error	0x7300
16	(OHF)	Frequency inverter overheating error	0x4210
17	(OLF)	Torque overload error	0x1000
18	(OBF)	Overbraking error	0x3310
19	(OSF)	Oversupply error	0x3110
20	(OPF1)	Motor 1 phase loss	0x3310
21	(PHF)	Main input 1 phase loss	0x3130
22	(USF)	Undervoltage error	0x3120
23	(SCF1)	Motor short-circuit error	0x2320
24	(SOF)	Overspeed error	0x1000
25	(TNF)	Error setting	0xFF00
26	(INF1)	Unspecified frequency inverter assessment	0x6100
27	(INF2)	Unspecified or incompatible power board	0x6100
28	(INF3)	Internal communication error of the serial connection	0x6100
29	(INF4)	Invalid industrialization zone	0x6100
30	(EEF2)	EEPROM power error	0x5530
32	(SCF3)	Direct ground short circuit error	0x2330
33	(OPF2)	Motor 3 phase loss	0x3310
34	(COF)	CANopen communication error	0x8100
35	(BLF)	Braking motor 3-phase loss	0xFF01
38	(EPF2)	External error from communication board	0x9000
41	(BRF)	Braking contactor error	0x7110
42	(SLF2)	Power suite communication error	0x7530
44	(SSF)	Torque current limiting error	0xFF02
45	(SLF3)	Remote control panel communication error	0x7510
49	(PTFL)	PtCL error (OC or SC)	0x7300
50	(OTFL)	Motor overheating error from PtCL - Default product	0x4310
51	(INF9)	Current measurement loop error	0x5210
52	(INFA)	Input phase failure error	0x5210
53	(INFB)	Thermosensor error (OC or SC)	0x5210
54	(TJF)	IGBT overheating error	0x4210
55	(SCF4)	IGBT short-circuit error	0x2230
56	(SCF5)	Load short-circuit error during ionic load	0x2320
58	(FCF1)	Output contactor - Engaged contactor	0x5000
59	(FCF2)	Output contactor - Open-ended contactor	0x5000
64	(LCF)	Line contactor failure	0x5000
67	(HDF)	Hardware error	0x1000
68	(INF6)	Unspecified or incompatible option board	0x7000
69	(INFE)	CPU error (RAM, memory, task, …)	0x1000
71	(LFF3)	AI3 4-20 mA failure error	0x7300
73	(HCF)	Hardware configuration error	0x6100
76	(DLF)	Dynamic load error	0xFF80
77	(CFI2)	Configuration transmission error	0x6300
99	(CSF)	Channel change error	0x1000
100	(ULF)	Torque underload error	0xFF03
101	(OLF)	Torque overload error	0x2311
105	(ASF)	Angle setting error	0x1000
107	(SAFF)	Safety function error	0xFF03

Information:

The abbreviation in brackets on the 7-segment display is read if ESC is pressed multiple times. HIMS code 23 will be overwritten on the 7-segment display with the respective LFT code.

5.3.11.3 ACOPOSinverter Configuration

5.3.11.3.1 Configuration I/O

Additional setting options have been implemented in configuration I/O for inserting other data points in mapping I/O and modifying drive functionality.

5.3.11.3.2 Adjusting mapping I/O

Default data points in mapping I/O enable the use of the drive in accordance with guidelines for standard "DS402". Alternatively, setpoint generation can be switched from rpm to hertz.

It is also possible to transmit up to ten additional input variables cyclically in order to trace the frequency inverter processes. In this way, the frequency inverter process can be adjusted to the individual requirements of the user

5.3.11.3.3 Configuring the frequency inverter

The device offers several adjustment possibilities, including:

- Drive for induction motors and synchronous motors
- Motor management: Torque or slip control
- Axis management: Speed or frequency input
- Setpoint processing in rpm or hertz
- General limiting of the output current and torque
- Optional load management (torque monitoring)

5.3.11.3.4 Recommended procedure

Several setting options at the beginning of the view affect other configuration switches positioned below. It is therefore recommended to adjust the frequency inverter configuration interface from bottom to top.

5.3.11.3.4.1 Configuration of I/Os (terminal block)

I/O settings should be defined first. The selected functionality for the outputs can have a particular effect on other setting options.

5.3.11.3.4.2 Notification of motor data (motor)

Values for the used motors should be entered once configuration I/O has been completed. The information about the motor nameplate should be read and entered into the Configuration View. For optimal control of the motor, the tuning parameters should be adjusted to the respective combination of drive, motor cable and motor at the time the axis is controlled. These additional parameters can either be directly entered or calculated during the first transition in "Operation enabled" using autotuning (for more information about the tuning process, see "Tuning" on page 450).

Notice!

Values in the nameplate section must be specified within the permissible boundaries for the frequency inverter being used. Both the upper limit and the lower limit for the value must be observed. After notification of motor data, it is recommended to load the Automation Studio project to the CPU in order to transfer the frequency inverter to state RUN beforehand.

The necessary adjustments in section "Drive" (see "Configuration of the controller in ACOPOSinverter (drive)" on page 450) should only be made if "ModuleOk = True" is reported back in the mapping I/O of the frequency inverter after the download.

5.3.11.3.4.3 Tuning

The nominal values entered on the nameplate form the basic information for the tuning process.

ASY	Induction motor		SYN	Synchronous motor	
FRS	Frequency	Frequency	TQS	Torque	Torque
NSP	Speed	Speed	PPNS	Pole pairs	Number of pole pairs
UNS	Voltage	Voltage	NSPS	Speed	Speed
NCR	Current	Current	NCRS	Current	Current
COW	Cosine(φ)	Cosinus(φ)			
NPR	Power	Direction			

1) For describing the induction motor, either the cosine (φ) or the power rating must be entered. It is recommended to enter a value for the cosine (φ).

This data notifies ACOPOSinverter of the properties of the connected motor. This makes it possible to create an idealized model. In reality, other influencing factors must be taken into account. The following tuning parameters will be used to realistically map the entire system of motor, motor cable and ACOPOSinverter:

ASY	Induction motor	SYN	Synchronous motor
RSA	Stator resistance	RSAS	Stator resistance
LFA	Leakage inductance	LDS	Leakage inductance d part
IDA	Magnetizing current	LQS	Leakage inductance d part
TRA	Rotor time const.	PHS	Permanent magnet flux

Optimally configured tuning parameters improve axis control. Automation Studio offers the option of entering values directly into configuration I/O or having them automatically calculated in the first transition in state 5 - "Operation enabled".

Information:

If the values have been automatically calculated during the first transition in state 5 - "Operation enabled", tuning can be triggered again via the delete command (set register "TUN"to 2 once) in the next transition in state 5 - "Operation enabled".

5.3.11.3.4.4 Configuration of the controller in ACOPOSinverter (drive)

Notice!

Before phase "Drive" is adapted for configuration I/O, parameters for the terminal block and motor sections should be defined. In some Automation Studio versions, after configuring the outputs or providing notification of the motor type, the Configuration View for the module must be closed and reopened in order for phase "Drive" to display in full.

Dependence: Configuration of I/Os and drive

See "Configuration of the controller in ACOPOSinverter (drive)" on page 450.

Additional frequency inverter functions can be enabled using the R2, LO1 and DO1 outputs. These include:

- BLC: Brakes control (Type: BLC)
- LLC: Control of line contactor
- OCC: Control of motor contactor

If any of these functions has been assigned to an output, additional configuration parameters will be enabled in section "Drive" (see "Configuration of the controller in ACOPOSinverter (drive)" on page 450).

Information:

Activating function BLC will only succeed if the motor type is induction motor.

Dependency: Selecting motor type and parameter CTT

Factors including motor type, i.e. synchronous motor/induction motor, are defined in section "Motor". This selection will partially affect the value of parameter CTT "Motor management".

- If an induction motor is selected in section "Motor", parameter CTT cannot be set to "(SYN) M control; synchronous motor". If this combination is configured, parameter CTT will not download and the frequency inverter will work with the default configuration for induction motors (in this case, motor management is set to "(STD) Slip control; M const., F~f").
- If a synchronous motor is selected in section "Motor", the frequency inverter always works with the default motor management for synchronous motors, i.e. parameter CTT will be internally set to "(SYN) M control; synchronous motor". A combination of synchronous motor and another value for CTT is invalid and will be corrected upon download. In this case, the motor is controlled with default values for "(SYN) M control; synchronous motor".

Access

Settings in section "Access" are preset to a controller for using ACOPOSinverter. As these settings only need to be adjusted in rare cases, it is recommended not to change them.

General current limiting and torque limiting

Both the current flow and the transmitted torque can be limited. Limitation can be statistic (non-variable for the duration) or dynamic (variable for the duration).
Static limitation of the current can be set via the Configuration View and enabled or disabled using a digital input.
For dynamic limitation of the current, temperature model I^2t has been implemented in ACOPOSinverter in order to evaluate motor temperature. Limitation is triggered when a very high amount of current is supplied to the motor over a long period of time.
Static limitation of the torque can be set via the Configuration View for input and output i.e. for normal operation and generator operation. Variable limitation of the dynamic torque limiting can take place via an analog input or directly via a data point in mapping I/O. To limit the torque via a data point in mapping I/O, either register AIV1 or AIV2 may be used.

- Values between 0 and 1000 must be specified for AIV1. The default value thus corresponds to 0 to 1000% of the specified nominal torque of the motor.
- Values between 0 and 8192 must be specified for AIV2. The default value also relates to 0 to 100% of the specified nominal torque of the motor.

Load management: Difference to general torque limiting

The purpose of load management is the monitoring of the torque during runtime, i.e. using load management does not directly influence the PWM output process and therefore control of the motor.
Additional upper and lower limits for the output torque are defined for load management. If the current value of the torque lies outside of the permitted range, warnings or alarms will be created. These warning and alarms can be used subsequently as triggers for other functions.

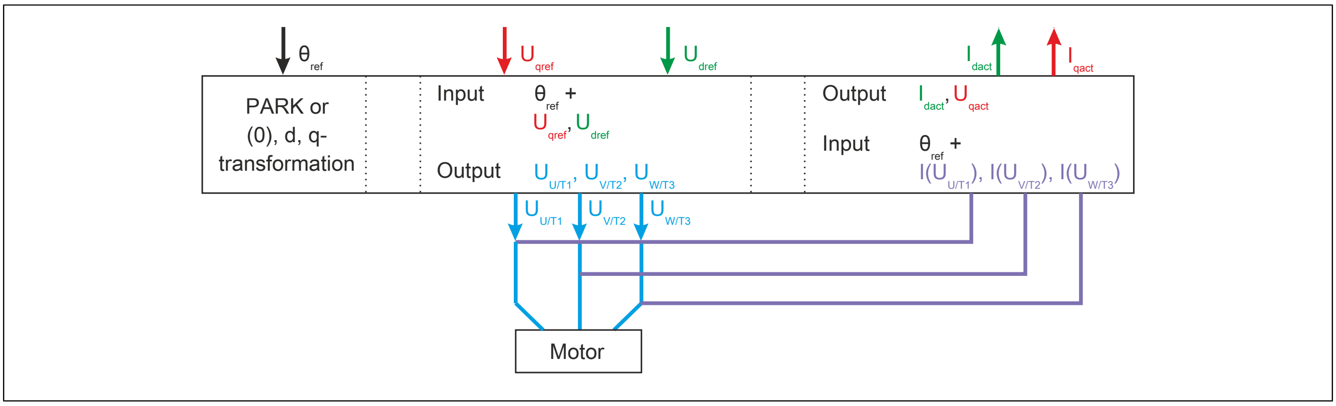
Motor management - Part 1

The essential component of motor management is based on the mathematical information of the Park transform (also known as the dq0 transformation). This enables an electrical rotating field size to be represented as a vector in a two-dimensional coordinate system that circles a single point; which means that by using an angle θ that describes the current position of the vector, sinusoidal voltages can be expressed as a pair of limbs comprising a "d-ratio" and a "q-ratio", e.g.

$U_{U/T1}$, $U_{V/T2}$ or $U_{W/T3}$ < θ (angle) > U_d, U_q

The mathematical transformation is reversible and can be applied to other sizes in the rotating field, e.g.

$U_{U/T1}$, $U_{V/T2}$ or $U_{W/T3}$ < θ (angle) > U_d, U_q



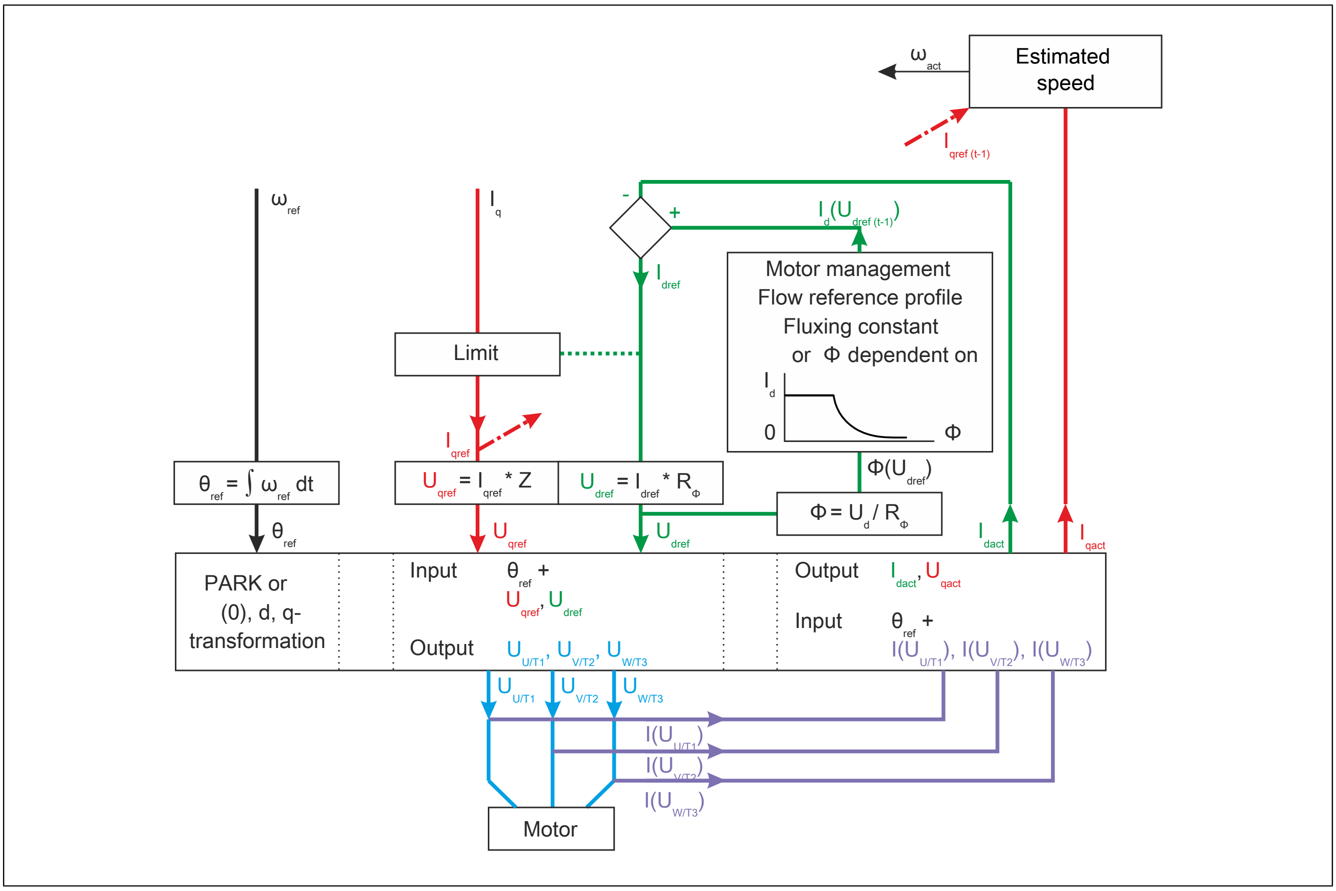
Three controlled variables are necessary for controlling PWM output on ACOPOSinverter:

- θ_{ref}: Reference angle of vectors
- U_d: d-ratio of the output voltage (magnetization)
- U_q: q-ratio of the output voltage (field strength)

To calculate voltage values for all three phases of output PWM from this data, the reference angle for $U_{V/T2}$ will be subjected to an offset of 120° and $U_{W/T3}$ to an offset of 240°.

If a three-phase motor is attached to PWN output of ACOPOSinverter, the corresponding currents will flow during output control. These are measured, averaged and then expressed in accordance with Park transform principles as vectors with d-ratio and q-ratio within the frequency inverter.

The d-ratio represents the intensity of the magnetic flow and is regulated using cascades. The outer control loop is based on the current measurement at the output. The inner control loop is represented using a reference profile, which is selected during motor management selection.



Current angular velocity (ω_{act}) is calculated using the current actual value and the previously requested setpoint for I_q. The application also supplies the requested value for speed (LFRD) and electrical frequency (LFR). The setpoint for the angular velocity (ω_{set}) corresponds to the formula:

- $\omega_{set} = 2\ \pi\ f = 2\ \pi$ LFR
- $\omega_{set} = 2\ \pi\ (n_{mech}$ * Pole pairs / 60) = 2 π (LFRD * Pole pairs / 60)

To extrapolate from a value for angular velocity ω to angle θ, a derivative with respect to time occurs at the end of control of angle θ.

The q-ratio is an expression of field strength and therefore torque. The reference value for I_q can be limited. This limitation results from application specifications (e.g. CLI, TAA) and is influenced by the current reference value for ID.

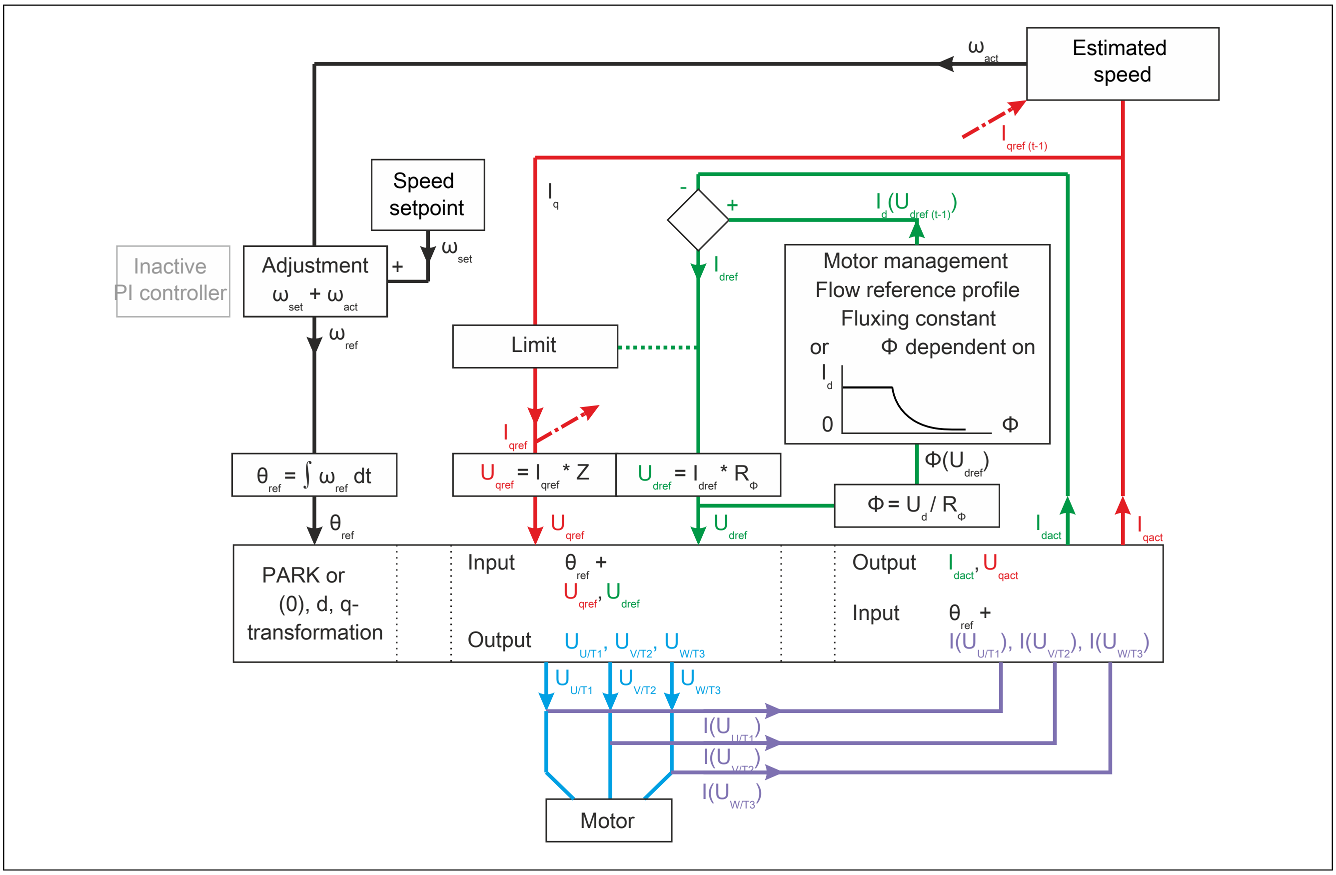
The way in which the information for I_{qact}, ω_{act} and ω_{set} is used for calculating angle θ and for controlling U_q is determined by the slip control or torque control.

Setpoint processing during slip control

Values for ω_{act} and ω_{set} are added together during slip control. This "adjusted" angular velocity is then used for calculating reference angle θ. The q-portion is calculated as a single control loop based on the current measurement at output PWM. This relatively simple procedure for calculating necessary reference values suffices for some simple applications using induction motors. It is based on a unique mathematical correlation and is error-tolerant, i.e. can be used even if the tuning parameter has been calculated inaccurately. Slip control is unsuitable for use with higher dynamics since the system is relatively slow, i.e. it requires a relatively long time to achieve a steady state.

Information:

Slip control is not recommended for using ACOPOSinverter with a controller.



Setpoint processing during torque control

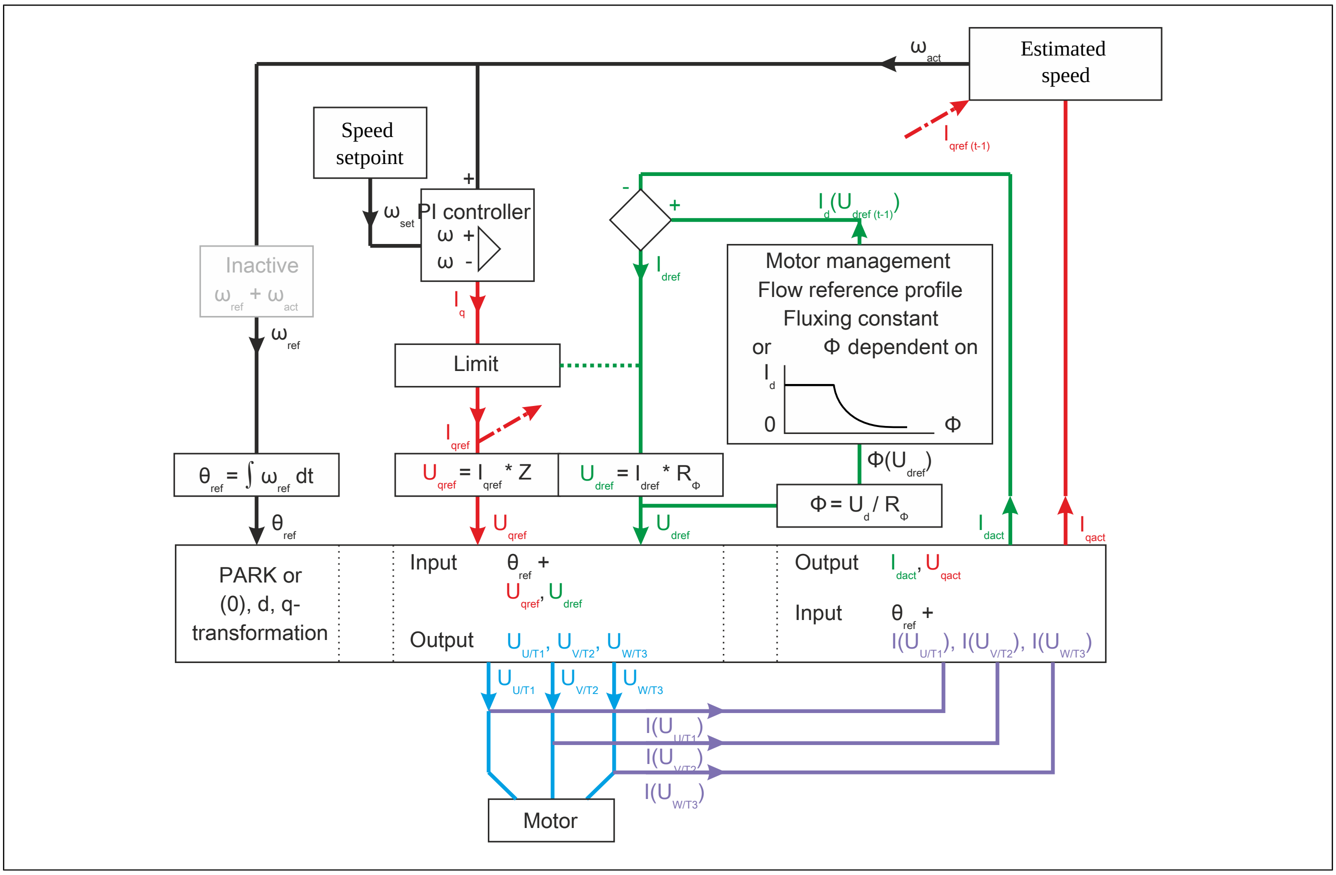
During torque control, the value ω_{act} is used as a basis for calculating the reference angle θ. The q-portion is calculated using a PI controller. The next (unlimited) reference value for I_q is calculated from the difference in speed between ω_{act} and ω_{set}.

Due to PI control, this procedure for calculating the necessary reference values achieves a very high dynamic, meaning that new reference values for speed can be implemented quicker and can be used with both induction motors and synchronous motors.

Since this procedure is based on projections, it requires reliable values for the tuning parameters, however.

Information:

Slip control is not recommended for using ACOPOSinverter with a controller.



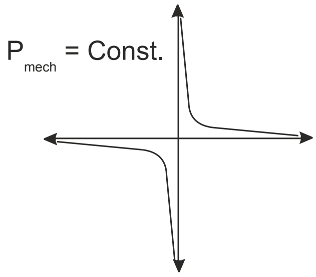
Motor management - Part 2

Power is the most important variable for describing a system comprising a drive and motor. For normal operation or motor operation, electrical power (P_{el}) is converted to mechanical power (P_{mech}) and for generator operation, mechanical power (P_{mech}) is converted to electrical power (P_{el}).

Information:

- $\mathbf{P_{el,\,3ph} = \sqrt{3} * U * I * \cos(\varphi)}$
- $\mathbf{P_{mech} = M * 2 * \pi * f = M * \omega}$

On closer inspection of mechanical power (P_{mech}), the particular interaction between torque (M) and angular velocity (ω) at constant power yields a hyperbolic distribution between these sizes.



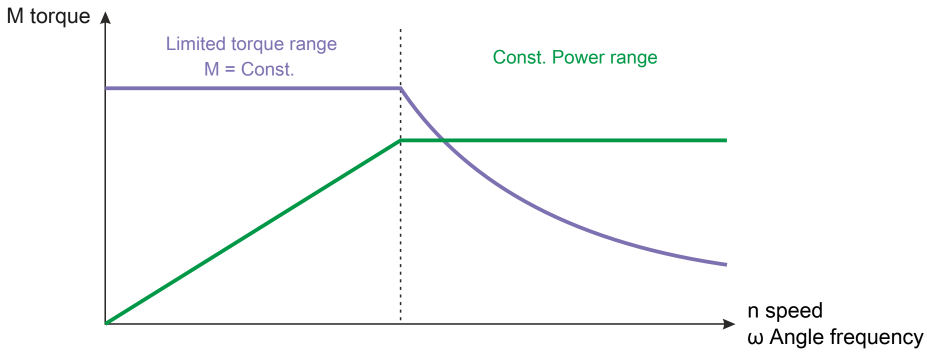
The speed/torque diagram is a general specification that can be created for any motor. In electric motors, speed is directly dependent on DC voltage frequency; the y-axis is therefore often displayed as a frequency axis and divided into two sections. Frequencies greater than nominal frequency are subjected to what is known as field suppression, i.e. in this frequency range it may appear that the maximum power of the motor is output and the specified nominal torque can no longer be fully established.

Torque is normally limited to nominal torque in the frequency range between 0 Hz and nominal frequency, so the maximum possible power does not need to be fully output.

The various types of ACOPOSinverter motor management relate to the frequency range between 0 Hz and nominal frequency. According to how electrical power behaves in relation to frequency (speed), either the full torque is available or energy consumption is reduced.

n/M diagram: M const., P~f

The idealized speed/torque diagram with high torque at low speed corresponds to the following:



Axis management: Speed/frequency data

Mechanical parameters for the rotating axis have been implemented in ACOPOSinverter in a way that corresponds to standard "DS402".

The speed data relates to a rotating axis that is not provided by the frequency inverter itself. Output PWM (U/T1, V/T2, W/T3) only outputs DC voltage with regulated frequency. Since these electrical sizes are designated for controlling a three-phase motor, a calculation model has been implemented into the drive to describe the effect of the output DC voltage on the connected motor. Viewing the rotating axis functions in this way as a high-level abstraction layer, which enables easier management of the entire system of frequency inverter and motor system. The frequency inverter internally converts the speed data [rpm] to elevated frequency [Hz]. The number of pole pairs of the motor must be taken into account for this. The following applies:

$n_{mech.}$ [rpm] * Pole pairs = $f_{el.}$ [Hz] * 60

Information:

Since the frequency inverter primarily controls the electrical frequency of the output DC voltage, it displays the currently generated electrical frequency by default in state 5 "In operation". If necessary, a conversion factor can be applied to this value using parameter SDS.

Special functions of the controller in ACOPOSinverter

The frequency inverter offers special functions that may be used in connection with a controller.

- Positioning via limit switch
- PID regulation of frequency setpoint
- High-speed hoisting

Activating this function results in pre-processing of the setpoint transmitted by the drive controller. Adjusted setpoints will then be used for motor management. The special functions represent custom solutions for highly specific applications. We recommend using the special functions only if the Automation Studio project cannot display the application you want.

5.3.12 Register description

5.3.12.1 System requirements

The following minimum versions are recommended to generally be able to use all functions:

- Automation Studio 4.1.4
- Automation Runtime D4.10

5.3.12.2 Basic values of drive

Modbus	POWERLINK, CAN		Name	Data type	Read		Write	
"ADL"	"Index"	"Subindex"			Cyclical	Acyclic	Cyclical	Acyclic
3009	0x2000	0x0A	PRT_Input	UINT		●		
3011	0x2000	0x0C	NCV_Input	UINT		●		
3012	0x2000	0x0D	VCAL_Input	UINT		●		
3013	0x2000	0x0E	NCVI_Input	UINT		●		
3016	0x2000	0x11	IMAX_Input	UINT		●		
3017	0x2000	0x12	INV_Input	UINT		●		
3018	0x2000	0x13	VMAX_Input	UINT		●		

5.3.12.3 Terminal block inputs/outputs

Modbus	POWERLINK, CAN		Name	Data type	Read		Write	
"ADL"	"Index"	"Subindex"			Cyclic	Acyclic	Cyclic	Acyclic
5232	0x2016	0x21	AI1R_Input	INT	●	●		
5233	0x2016	0x22	AI2R_Input	INT	●	●		
5234	0x2016	0x23	AI3R_Input	INT	●	●		
5202	0x2016	0x03	IL1R_Input	UINT	●	●		
5202	0x2016	0x03	Status of the digital inputs	USINT	●			
			IL1R_Input_LI1	Bit 0				
			IL1R_Input_LI2	Bit 1				
			IL1R_Input_LI3	Bit 2				
			IL1R_Input_LI4	Bit 3				
			IL1R_Input_LI5	Bit 4				
			IL1R_Input_LI6	Bit 5				
			IL1R_Input_LAI1	Bit 6				
			IL1R_Input_LAI2	Bit 7				
13308	0x2067	0x09	HSC_Input	UINT	●	●		
13305	0x2067	0x06	PIFR_Input	INT	●	●		
13307	0x2067	0x08	PFRC_Input	UINT		●		
14603	0x2074	0x04	FQS_Input	UINT	●	●		
5261	0x2016	0x3E	AO1R_Output	UINT			●	
5251	0x2016	0x34	AO1I_Input	UINT	●	●		
5212	0x2016	0x0D	Configuration of digital outputs	UINT			●	
			OL1R_Output_R1	Bit 0				
			OL1R_Output_R2	Bit 1				
			OL1R_Output_LO1	Bit 8				
5211	0x2016	0x0C	OL1I_Input	UINT		●		
5211	0x2016	0x0C	OL1I_Input	UINT	●			
			OL1I_Input_R1	Bit 0				
			OL1I_Input_R2	Bit 1				
			OL1I_Input_LO1	Bit 8				

Modbus	POWERLINK, CAN		Name		Data type	Read		Write	
"ADL"	"Index"	"Subindex"				Cyclic	Acyclic	Cyclic	Acyclic
Configuration of the analog inputs									
4402	0x200E	0x03	AI1T_Input	AI1T_Output	UINT		●		●
4403	0x200E	0x04	AI2T_Input	AI2T_Output	UINT		●		●
4404	0x200E	0x05	AI3T_Input	AI3T_Output	UINT		●		●
4412	0x200E	0x0D	UIL1_Input	UIL1_Output	UINT		●		●
4413	0x200E	0x0E	UIL2_Input	UIL2_Output	UINT		●		●
4422	0x200E	0x17	UIH1_Input	UIH1_Output	UINT		●		●
4423	0x200E	0x18	UIH2_Input	UIH2_Output	UINT		●		●
4434	0x200E	0x23	CRL3_Input	CRL3_Output	UINT		●		●
4444	0x200E	0x2D	CRH3_Input	CRH3_Output	UINT		●		●
4452	0x200E	0x35	AI1F_Input	AI1F_Output	UINT		●		●
4453	0x200E	0x36	AI2F_Input	AI2F_Output	UINT		●		●
4454	0x200E	0x37	AI3F_Input	AI3F_Output	UINT		●		●
4462	0x200E	0x3F	AI1E_Input	AI1E_Output	UINT		●		●
4463	0x200E	0x40	AI2E_Input	AI2E_Output	UINT		●		●
4464	0x200E	0x41	AI3E_Input	AI3E_Output	UINT		●		●
4472	0x200E	0x49	AI1S_Input	AI1S_Output	UINT		●		●

Modbus	POWERLINK, CAN		Name		Data type	Read		Write	
"ADL"	"Index"	"Subindex"				Cyclic	Acyclic	Cyclic	Acyclic
4473	0x200E	0x4A	AI2S_Input	AI2S_Output	UINT		●		●
4474	0x200E	0x4B	AI3S_Input	AI3S_Output	UINT		●		●
4482	0x200E	0x53	AI1L_Input	AI1L_Output	UINT		●		●
4483	0x200E	0x54	AI2L_Input	AI2L_Output	UINT		●		●
4484	0x200E	0x55	AI3L_Input	AI3L_Output	UINT		●		●
5284	0x2016	0x55	AIC2_Input	AIC2_Output	UINT		●		●
Configuration of analog outputs									
4601	0x2010	0x02	AO1T_Input	AO1T_Output	UINT		●		●
4611	0x2010	0x0C	AO1F_Input	AO1F_Output	UINT		●		●
4621	0x2010	0x16	UOL1_Input	UOL1_Output	UINT		●		●
4631	0x2010	0x20	UOH1_Input	UOH1_Output	UINT		●		●
4641	0x2010	0x2A	AOL1_Input	AOL1_Output	UINT		●		●
4651	0x2010	0x34	AOH1_Input	AOH1_Output	UINT		●		●
4661	0x2010	0x3E	ASL1_Input	ASL1_Output	UINT		●		●
4671	0x2010	0x48	ASH1_Input	ASH1_Output	UINT		●		●
4293	0x200C	0x5E	AOF1_Input	AOF1_Output	UINT		●		●
4261	0x200C	0x3E	DO1S_Input	DO1S_Output	UINT		●		●
4271	0x200C	0x48	DO1H_Input	DO1H_Output	UINT		●		●
4281	0x200C	0x52	DO1D_Input	DO1D_Output	UINT		●		●
Configuration of digital inputs									
4001	0x200A	0x02	L1D_Input	L1D_Output	UINT		●		●
4002	0x200A	0x03	L2D_Input	L2D_Output	UINT		●		●
4003	0x200A	0x04	L3D_Input	L3D_Output	UINT		●		●
4004	0x200A	0x05	L4D_Input	L4D_Output	UINT		●		●
4005	0x200A	0x06	L5D_Input	L5D_Output	UINT		●		●
4006	0x200A	0x07	L6D_Input	L6D_Output	UINT		●		●
4021	0x200A	0x16	LA1D_Input	LA1D_Output	UINT		●		●
4022	0x200A	0x17	LA2D_Input	LA2D_Output	UINT		●		●
Configuration of digital outputs									
4201	0x200C	0x02	R1S_Input	R1S_Output	UINT		●		●
4202	0x200C	0x03	R2S_Input	R2S_Output	UINT		●		●
4209	0x200C	0x0A	LO1S_Input	LO1S_Output	UINT		●		●
4221	0x200C	0x16	R1H_Input	R1H_Output	UINT		●		●
4222	0x200C	0x17	R2H_Input	R2H_Output	UINT		●		●
4229	0x200C	0x1E	LO1H_Input	LO1H_Output	UINT		●		●
4241	0x200C	0x2A	R1D_Input	R1D_Output	UINT		●		●
4242	0x200C	0x2B	R2D_Input	R2D_Output	UINT		●		●
4249	0x200C	0x32	LO1D_Input	LO1D_Output	UINT		●		●
4290	0x200C	0x5B	R1F_Input	R1F_Output	UINT		●		●
4291	0x200C	0x5C	R2F_Input	R2F_Output	UINT		●		●
4292	0x200C	0x5D	LO1F_Input	LO1F_Output	UINT		●		●
5001	0x2014	0x02	R1_Input	R1_Output	UINT		●		●
5002	0x2014	0x03	R2_Input	R2_Output	UINT		●		●
5009	0x2014	0x0A	LO1_Input	LO1_Output	UINT		●		●
5021	0x2014	0x16	AO1_Input	AO1_Output	UINT		●		●
5031	0x2014	0x20	DO1_Input	DO1_Output	UINT		●		●
Additional signals (derived from digital input LI5)									
13302	0x2067	0x03	PIL_Input	PIL_Output	UINT		●		●
13303	0x2067	0x04	PFR_Input	PFR_Output	UINT		●		●
13304	0x2067	0x05	PFI_Input	PFI_Output	UINT		●		●
13306	0x2067	0x07	PFRI_Input	PFRI_Output	UINT		●		●
14601	0x2074	0x02	FQF_Input	FQF_Output	UINT		●		●
14602	0x2074	0x03	FQC_Input	FQC_Output	UINT		●		●
14604	0x2074	0x05	FQA_Input	FQA_Output	UINT		●		●
14605	0x2074	0x06	TDS_Input	TDS_Output	UINT		●		●
14606	0x2074	0x07	FDT_Input	FDT_Output	UINT		●		●
14607	0x2074	0x08	FQT_Input	FQT_Output	UINT		●		●
14608	0x2074	0x09	TQB_Input	TQB_Output	UINT		●		●
14609	0x2074	0x0A	FQL_Input	FQL_Output	UINT		●		●
Additional signals (derived from digital input LI6)									
13203	0x2066	0x04	PTCL_Input	PTCL_Output	UINT		●		●

5.3.12.4 Communication (with setpoint in rpm)

Modbus	POWERLINK, CAN		Name	Data type	Read		Write	
"ADL"	"Index"	"Subindex"			Cyclical	Acyclic	Cyclical	Acyclic
Optional status responses								
3240	0x2002	0x29	HMIS_Input	UINT	●	●		
7121	0x2029	0x16	LFT_Input	UINT	●	●		
3206	0x2002	0x07	ETI_Input	UINT	●	●		
3209	0x2002	0x0A	THD_Input	UINT	●	●		

Modbus	POWERLINK, CAN		Name	Data type	Read		Write	
"ADL"	"Index"	"Subindex"			Cyclical	Acyclic	Cyclical	Acyclic
9630	0x2042	0x1F	THR_Input	UINT	●	●		
13205	0x2066	0x06	PTCI_Input	UINT	●	●		
64034	0x2262	0x23	ALGR_Input	UINT	●	●		
15322	0x207B	0x17	STOS_Input	UINT	●			
15315	0x207B	0x10	SS1S_Input	UINT	●			
15304	0x207B	0x05	SLSS_Input	UINT	●			
15383	0x207B	0x55	SMSS_Input	UINT	●			
15393	0x207B	0x5E	GDLS_Input	UINT	●			
3699	0x2006	0x64	INF6_Input	UINT		●		
11980	0x2059	0x51	RPE_Input	INT		●		
11981	0x2059	0x52	RPF_Input	UINT		●		
11982	0x2059	0x53	RPC_Input	UINT		●		
11983	0x2059	0x54	RPO_Input	INT		●		
State and command register (default)								
8603	0x2038	0x04	ETAD_Input	UINT		●		
8603	0x2038	0x04	ETAD_Input	UINT	●			
			ETAD_Input_rtso	Bit 0				
			ETAD_Input_so	Bit 1				
			ETAD_Input_oe	Bit 2				
			ETAD_Input_f	Bit 3				
			ETAD_Input_ve	Bit 4				
			ETAD_Input_qs	Bit 5				
			ETAD_Input_sod	Bit 6				
			ETAD_Input_w	Bit 7				
			ETAD_Input_rm	Bit 9				
			ETAD_Input_tr	Bit 10				
			ETAD_Input_ila	Bit 11				
			ETAD_Input_ms14	Bit 14				
			ETAD_Input_ms15	Bit 15				
8606	0x2038	0x07	ERRD_Input	UINT	●	●		
8504	0x2037	0x05	CMI_Output	UINT				●
8601	0x2038	0x02	CMDD_Output	UINT		●	●	
8602	0x2038	0x03	LFRD_Output	INT		●	●	
8641	0x2038	0x2A	FROD_Input	INT	●	●		
8604	0x2038	0x05	RFRD_Input	INT	●	●		
Optional responses and additional setpoints								
3205	0x2002	0x06	OTR_Input	INT	●	●		
3205	0x2002	0x06	OTRN_Input	INT	●	●		
5281	0x2016	0x52	AIV1_Output	UINT		●	●	
5283	0x2016	0x54	AIV2_Output	INT		●	●	
8503	0x2037	0x04	PISP_Output	UINT		●	●	
8605	0x2038	0x06	FRHD_Input	INT	●	●		
3203	0x2002	0x04	FRH_Input	INT	●	●		
9021	0x203C	0x16	FRO_Input	INT	●	●		
3202	0x2002	0x03	RFR_Input	INT	●	●		
3208	0x2002	0x09	UOP_Input	UINT	●	●		
3204	0x2002	0x05	LCR_Input	UINT	●	●		
3211	0x2002	0x0C	OPR_Input	INT	●	●		
3217	0x2002	0x12	SLC_Input	INT	●	●		
3207	0x2002	0x08	ULN_Input	UINT	●	●		
9645	0x2042	0x2E	SMOT_Input	UINT		●		
9609	0x2042	0x0A	TUS_Input	UINT		●		
9676	0x2042	0x4D	RDAE_Input	INT		●		
13927	0x206D	0x1C	ASOD_Input	UINT		●		
9634	0x2042	0x23	I2TM_Input	UINT		●		
3120	0x2001	0x15	RPR_Output	UINT				●
3230	0x2002	0x1F	APH_Input	UINT		●		
3231	0x2002	0x20	RTH_Input	UINT		●		
3232	0x2002	0x21	RTHI_Input	UINT		●		
3233	0x2002	0x22	PTH_Input	UINT		●		
3234	0x2002	0x23	UNT_Input	UINT		●		
Error history								
7393	0x202B	0x5E	FNB_Input	UINT		●		
7200 + Index	0x202A	0x01 + Index	**LFT:** DP0_Input DP[0…8]_Input	UINT		●		
7210 + Index	0x202A	0x0B + Index	**ETAD:** EP0_Input EP[0…8]_Input	UINT		●		
7220 + Index	0x202A	0x15 + Index	**ETI:** IP0_Input IP[0…8]_Input	UINT		●		
7230 + Index	0x202A	0x1F + Index	**CMDD:** CMP0_Input CMP[0…8]_Input	UINT		●		
7240 + Index	0x202A	0x29 + Index	**LCR:** LCP0_Input LCP[0…8]_Input	INT		●		

Modbus	POWERLINK, CAN		Name	Data type	Read		Write	
"ADL"	"Index"	"Subindex"			Cyclical	Acyclic	Cyclical	Acyclic
7250 + Index	0x202A	0x33 + Index	**RFR:** RFP0_Input RFP[0…8]_Input	INT		●		
7260 + Index	0x202A	0x3D + Index	**RTHI:** RTP0_Input RTP[0…8]_Input	UINT		●		
7270 + Index	0x202A	0x47 + Index	**ULN:** ULP0_Input ULP[0…8]_Input	UINT		●		
7280 + Index	0x202A	0x51 + Index	**THR:** THP0_Input THP[0…8]_Input	UINT		●		
7320 + Index	0x202B	0x15 + Index	**HMIS:** HS0_Input HS[0…8]_Input	UINT		●		
7330 + Index	0x202B	0x1F + Index	**OTR:** OTP0_Input OTP[0…8]_Input	INT		●		
7340 + Index	0x202B	0x29 + Index	**THD:** TDP0_Input TDP[0…8]_Input	UINT		●		

5.3.12.5 Communication (with setpoint in Hz)

Modbus	POWERLINK, CAN		Name	Data type	Read		Write	
"ADL"	"Index"	"Subindex"			Cyclical	Acyclic	Cyclical	Acyclic
Optional status responses								
3240	0x2002	0x29	HMIS_Input	UINT	●	●		
7121	0x2029	0x16	LFT_Input	UINT	●	●		
3206	0x2002	0x07	ETI_Input	UINT	●	●		
3209	0x2002	0x0A	THD_Input	UINT	●	●		
9630	0x2042	0x1F	THR_Input	UINT	●	●		
13205	0x2066	0x06	PTCI_Input	UINT	●	●		
64034	0x2262	0x23	ALGR_Input	UINT	●	●		
15322	0x207B	0x17	STOS_Input	UINT	●			
15315	0x207B	0x10	SS1S_Input	UINT	●			
15304	0x207B	0x05	SLSS_Input	UINT	●			
15383	0x207B	0x55	SMSS_Input	UINT	●			
15393	0x207B	0x5E	GDLS_Input	UINT	●			
3699	0x2006	0x64	INF6_Input	UINT		●		
11980	0x2059	0x51	RPE_Input	INT		●		
11981	0x2059	0x52	RPF_Input	UINT		●		
11982	0x2059	0x53	RPC_Input	UINT		●		
11983	0x2059	0x54	RPO_Input	INT		●		
State and command register (default)								
8603	0x2038	0x04	ETAD_Input	UINT		●		
8603	0x2038	0x04	ETAD_Input	UINT	●			
			ETAD_Input_rtso	Bit 0				
			ETAD_Input_so	Bit 1				
			ETAD_Input_oe	Bit 2				
			ETAD_Input_f	Bit 3				
			ETAD_Input_ve	Bit 4				
			ETAD_Input_qs	Bit 5				
			ETAD_Input_sod	Bit 6				
			ETAD_Input_w	Bit 7				
			ETAD_Input_rm	Bit 9				
			ETAD_Input_tr	Bit 10				
			ETAD_Input_ila	Bit 11				
			ETAD_Input_ms14	Bit 14				
			ETAD_Input_ms15	Bit 15				
8606	0x2038	0x07	ERRD_Input	UINT	●	●		
8504	0x2037	0x05	CMI_Output	UINT				●
8601	0x2038	0x02	CMDD_Output	UINT		●	●	
8502	0x2037	0x03	LFR_Output	INT		●	●	
9021	0x203C	0x16	FRO_Input	INT	●	●		
3202	0x2002	0x03	RFR_Input	INT	●	●		
Optional responses and additional setpoints								
3205	0x2002	0x06	OTR_Input	INT	●	●		
3205	0x2002	0x06	OTRN_Input	INT	●	●		
5281	0x2016	0x52	AIV1_Output	UINT		●	●	
5283	0x2016	0x54	AIV2_Output	INT		●	●	
8503	0x2037	0x04	PISP_Output	UINT		●	●	
3203	0x2002	0x04	FRH_Input	INT	●	●		
8605	0x2038	0x06	FRHD_Input	INT	●	●		
8641	0x2038	0x2A	FROD_Input	INT	●	●		
8604	0x2038	0x05	RFRD_Input	INT	●	●		
3208	0x2002	0x09	UOP_Input	UINT	●	●		
3204	0x2002	0x05	LCR_Input	UINT	●	●		
3211	0x2002	0x0C	OPR_Input	INT	●	●		

Modbus	POWERLINK, CAN		Name	Data type	Read		Write	
"ADL"	"Index"	"Subindex"			Cyclical	Acyclic	Cyclical	Acyclic
3217	0x2002	0x12	SLC_Input	INT	●	●		
3207	0x2002	0x08	ULN_Input	UINT	●	●		
9645	0x2042	0x2E	SMOT_Input	UINT		●		
9609	0x2042	0x0A	TUS_Input	UINT		●		
9676	0x2042	0x4D	RDAE_Input	INT		●		
13927	0x206D	0x1C	ASOD_Input	UINT		●		
9634	0x2042	0x23	I2TM_Input	UINT		●		
3120	0x2001	0x15	RPR_Output	UINT				●
3230	0x2002	0x1F	APH_Input	UINT		●		
3231	0x2002	0x20	RTH_Input	UINT		●		
3232	0x2002	0x21	RTHI_Input	UINT		●		
3233	0x2002	0x22	PTH_Input	UINT		●		
3234	0x2002	0x23	UNT_Input	UINT		●		
Error history								
7393	0x202B	0x5E	FNB_Input	UINT		●		
7200 + Index	0x202A	0x01 + Index	**LFT:** DP0_Input DP[0…8]_Input	UINT		●		
7210 + Index	0x202A	0x0B + Index	**ETAD:** EP0_Input EP[0…8]_Input	UINT		●		
7220 + Index	0x202A	0x15 + Index	**ETI:** IP0_Input IP[0…8]_Input	UINT		●		
7230 + Index	0x202A	0x1F + Index	**CMDD:** CMP0_Input CMP[0…8]_Input	UINT		●		
7240 + Index	0x202A	0x29 + Index	**LCR:** LCP0_Input LCP[0…8]_Input	INT		●		
7250 + Index	0x202A	0x33 + Index	**RFR:** RFP0_Input RFP[0…8]_Input	INT		●		
7260 + Index	0x202A	0x3D + Index	**RTHI:** RTP0_Input RTP[0…8]_Input	UINT		●		
7270 + Index	0x202A	0x47 + Index	**ULN:** ULP0_Input ULP[0…8]_Input	UINT		●		
7280 + Index	0x202A	0x51 + Index	**THR:** THP0_Input THP[0…8]_Input	UINT		●		
7320 + Index	0x202B	0x15 + Index	**HMIS:** HS0_Input HS[0…8]_Input	UINT		●		
7330 + Index	0x202B	0x1F + Index	**OTR:** OTP0_Input OTP[0…8]_Input	INT		●		
7340 + Index	0x202B	0x29 + Index	**THD:** TDP0_Input TDP[0…8]_Input	UINT		●		

5.3.12.6 Configuration

Modbus	POWERLINK, CAN		Name		Data type	Read		Write	
"ADL"	"Index"	"Subindex"				Cyclical	Acyclic	Cyclical	Acyclic
General									
3015	0x2000	0x10	BFR_Input	BFR_Output	UINT		●		●
3052	0x2000	0x35	CFG_Input	CFG_Output	UINT		●		●
3022	0x2000	0x17	FRY_Input	FRY_Output	UINT		●		●
3006	0x2000	0x07	LAC_Input	LAC_Output	UINT		●		●
Nameplate (induction motor)									
9601	0x2042	0x02	UNS_Input	UNS_Output	UINT		●		●
9602	0x2042	0x03	FRS_Input	FRS_Output	UINT		●		●
9603	0x2042	0x04	NCR_Input	NCR_Output	UINT		●		●
9604	0x2042	0x05	NSP_Input	NSP_Output	UINT		●		●
9614	0x2042	0x0F	MPC_Input	MPC_Output	UINT		●		●
9606	0x2042	0x07	COS_Input	COS_Output	UINT		●		●
9613	0x2042	0x0E	NPR_Input	NPR_Output	UINT		●		●
Nameplate (SYN motor)									
13925	0x206D	0x1A	AST_Input	AST_Output	UINT		●		●
9670	0x2042	0x47	NCRS_Input	NCRS_Output	UINT		●		●
9671	0x2042	0x48	NSPS_Input	NSPS_Output	UINT		●		●
9684	0x2042	0x55	TQS_Input	TQS_Output	UINT		●		●
9672	0x2042	0x49	PPNS_Input	PPNS_Output	UINT		●		●
Tuning settings									
9608	0x2042	0x09	TUN_Input	TUN_Output	UINT		●		●
9617	0x2042	0x12	STUN_Input	STUN_Output	UINT		●		●
9610	0x2042	0x0B	TUL_Input	TUL_Output	UINT		●		●
Tuning results (induction motor)									
9642	0x2042	0x2B	RSA_Input	RSA_Output	UINT		●		●
9652	0x2042	0x35	IDA_Input	IDA_Output	UINT		●		●
9662	0x2042	0x3F	LFA_Input	LFA_Output	UINT		●		●
9667	0x2042	0x44	TRA_Input	TRA_Output	UINT		●		●

Modbus	POWERLINK, CAN		Name		Data type	Read		Write	
"ADL"	"Index"	"Subindex"				Cyclical	Acyclic	Cyclical	Acyclic
Tuning results (SYN motor)									
9673	0x2042	0x4A	PHS_Input	PHS_Output	UINT		●		●
9674	0x2042	0x4B	LDS_Input	LDS_Output	UINT		●		●
9675	0x2042	0x4C	LQS_Input	LQS_Output	UINT		●		●
9682	0x2042	0x53	RSAS_Input	RSAS_Output	UINT		●		●
Premagnetization									
13901	0x206D	0x02	FLI_Input	FLI_Output	UINT		●		●
13902	0x206D	0x03	FLU_Input	FLU_Output	UINT		●		●
13910	0x206D	0x0B	BOA_Input	BOA_Output	UINT		●		●
13911	0x206D	0x0C	FAB_Input	FAB_Output	UINT		●		●
13912	0x206D	0x0D	BOO_Input	BOO_Output	INT		●		●
High frequency injection for synchronous motors									
15600	0x207E	0x01	HFI_Input	HFI_Output	UINT		●		●
15601	0x207E	0x02	FRI_Input	FRI_Output	UINT		●		●
15602	0x207E	0x03	HIR_Input	HIR_Output	UINT		●		●
15603	0x207E	0x04	SPB_Input	SPB_Output	UINT		●		●
15604	0x207E	0x05	SPF_Input	SPF_Output	UINT		●		●
15605	0x207E	0x06	ILR_Input	ILR_Output	UINT		●		●
15606	0x207E	0x07	SIR_Input	SIR_Output	UINT		●		●
15607	0x207E	0x08	MCR_Input	SIR_Output	UINT		●		●
15608	0x207E	0x09	PEC_Input	PEC_Output	UINT		●		●
Access									
8401	0x2036	0x02	CHCF_Input	CHCF_Output	UINT		●		●
8402	0x2036	0x03	COP_Input	COP_Output	UINT		●		●
8403	0x2036	0x04	CSB_Input	CSB_Output	UINT		●		●
8411	0x2036	0x0C	RFC_Input	RFC_Output	UINT		●		●
8412	0x2036	0x0D	RCB_Input	RCB_Output	UINT		●		●
8413	0x2036	0x0E	FR1_Input	FR1_Output	UINT		●		●
8414	0x2036	0x0F	FR2_Input	FR2_Output	UINT		●		●
8415	0x2036	0x10	FR1B_Input	FR1B_Output	UINT		●		●
8421	0x2036	0x16	CCS_Input	CCS_Output	UINT		●		●
8423	0x2036	0x18	CD1_Input	CD1_Output	UINT		●		●
8424	0x2036	0x19	CD2_Input	CD2_Output	UINT		●		●
11101	0x2051	0x02	TCC_Input	TCC_Output	UINT		●		●
11102	0x2051	0x03	TCT_Input	TCT_Output	UINT		●		●
11103	0x2051	0x04	RUN_Input	RUN_Output	UINT		●		●
11104	0x2051	0x05	FRD_Input	FRD_Output	UINT		●		●
11105	0x2051	0x06	RRS_Input	RRS_Output	UINT		●		●
DC bus circuit									
13801	0x206C	0x02	URES_Input	URES_Output	UINT		●		●
13802	0x206C	0x03	USL_Input	USL_Output	UINT		●		●
13803	0x206C	0x04	USB_Input	USB_Output	UINT		●		●
13804	0x206C	0x05	UST_Input	UST_Output	UINT		●		●
13811	0x206C	0x0C	UPL_Input	UPL_Output	UINT		●		●
13812	0x206C	0x0D	TBS_Input	TBS_Output	UINT		●		●
13813	0x206C	0x0E	TSM_Input	TSM_Output	UINT		●		●
13814	0x206C	0x0F	STM_Input	STM_Output	UINT		●		●
13850	0x206C	0x33	DCCM_Input	DCCM_Output	UINT		●		●
13851	0x206C	0x34	DCCC_Input	DCCC_Output	UINT		●		●
14101	0x206F	0x02	VBR_Input	VBR_Output	UINT		●		●
PWM management									
12601	0x2060	0x02	SVL_Input	SVL_Output	UINT		●		●
12602	0x2060	0x03	SOP_Input	SOP_Output	UINT		●		●
General current/torque limiting									
9201	0x203E	0x02	CLI_Input	CLI_Output	UINT		●		●
9202	0x203E	0x03	LC2_Input	LC2_Output	UINT		●		●
9203	0x203E	0x04	CL2_Input	CL2_Output	UINT		●		●
9210	0x203E	0x0B	TLA_Input	TLA_Output	UINT		●		●
9211	0x203E	0x0C	TLIM_Input	TLIM_Output	UINT		●		●
9212	0x203E	0x0D	TLIG_Input	TLIG_Output	UINT		●		●
9213	0x203E	0x0E	TLC_Input	TLC_Output	UINT		●		●
9214	0x203E	0x0F	TAA_Input	TAA_Output	UINT		●		●
9215	0x203E	0x10	INTP_Input	INTP_Output	UINT		●		●
9240	0x203E	0x29	SSB_Input	SSB_Output	UINT		●		●
9241	0x203E	0x2A	STO_Input	STO_Output	UINT		●		●
9260	0x203E	0x3D	INT_Input	INT_Output	UINT		●		●
Motor management									
9607	0x2042	0x08	CTT_Input	CTT_Output	UINT		●		●
9611	0x2042	0x0C	OPL_Input	OPL_Output	UINT		●		●
9612	0x2042	0x0D	THT_Input	THT_Output	UINT		●		●
9615	0x2042	0x10	AUT_Input	AUT_Output	UINT		●		●
9616	0x2042	0x11	MTM_Input	MTM_Output	UINT		●		●
9619	0x2042	0x14	TUNU_Input	TUNU_Output	UINT		●		●

Modbus	POWERLINK, CAN		Name		Data type	Read		Write	
"ADL"	"Index"	"Subindex"				Cyclical	Acyclic	Cyclical	Acyclic
9622	0x2042	0x17	ITH_Input	ITH_Output	UINT		●		●
9623	0x2042	0x18	UFR_Input	UFR_Output	UINT		●		●
9624	0x2042	0x19	PFL_Input	PFL_Output	UINT		●		●
9625	0x2042	0x1A	SLP_Input	SLP_Output	UINT		●		●
9629	0x2042	0x1E	SPGU_Input	SPGU_Output	UINT		●		●
9631	0x2042	0x20	I2TA_Input	I2TA_Output	UINT		●		●
9632	0x2042	0x21	I2TI_Input	I2TI_Output	UINT		●		●
9633	0x2042	0x22	I2TT_Input	I2TT_Output	UINT		●		●
12403	0x205E	0x04	U1_Input	U1_Output	UINT		●		●
12404	0x205E	0x05	F1_Input	F1_Output	UINT		●		●
12405	0x205E	0x06	U2_Input	U2_Output	UINT		●		●
12406	0x205E	0x07	F2_Input	F2_Output	UINT		●		●
12407	0x205E	0x08	U3_Input	U3_Output	UINT		●		●
12408	0x205E	0x09	F3_Input	F3_Output	UINT		●		●
12409	0x205E	0x0A	U4_Input	U4_Output	UINT		●		●
12410	0x205E	0x0B	F4_Input	F4_Output	UINT		●		●
12411	0x205E	0x0C	U5_Input	U5_Output	UINT		●		●
12412	0x205E	0x0D	F5_Input	F5_Output	UINT		●		●
9103	0x203D	0x04	SPG_Input	SPG_Output	UINT		●		●
9104	0x203D	0x05	SIT_Input	SIT_Output	UINT		●		●
9105	0x203D	0x06	SFC_Input	SFC_Output	UINT		●		●
9115	0x203D	0x10	FFH_Input	FFH_Output	UINT		●		●
9116	0x203D	0x11	CRTF_Input	CRTF_Output	UINT		●		●
Axis management									
3101	0x2001	0x02	SFT_Input	SFT_Output	UINT		●		●
3102	0x2001	0x03	SFR_Input	SFR_Output	UINT		●		●
3104	0x2001	0x05	HSP_Input	HSP_Output	UINT		●		●
15101	0x2079	0x02	SH2_Input	SH2_Output	UINT		●		●
15102	0x2079	0x03	SH4_Input	SH4_Output	UINT		●		●
15110	0x2079	0x0B	HSP2_Input	HSP2_Output	UINT		●		●
15111	0x2079	0x0C	HSP3_Input	HSP3_Output	UINT		●		●
15112	0x2079	0x0D	HSP4_Input	HSP4_Output	UINT		●		●
3105	0x2001	0x06	LSP_Input	LSP_Output	UINT		●		●
11701	0x2057	0x02	TLS_Input	TLS_Output	UINT		●		●
3106	0x2001	0x07	BSP_Input	BSP_Output	UINT		●		●
3107	0x2001	0x08	NRD_Input	NRD_Output	UINT		●		●
3108	0x2001	0x09	RIN_Input	RIN_Output	UINT		●		●
Resonant frequency									
11301	0x2053	0x02	JPF_Input	JPF_Output	UINT		●		●
11302	0x2053	0x03	JF2_Input	JF2_Output	UINT		●		●
11303	0x2053	0x04	JF3_Input	JF3_Output	UINT		●		●
11311	0x2053	0x0C	JFH_Input	JFH_Output	UINT		●		●
Speed adjustment (ramps)									
9001	0x203C	0x02	ACC_Input	ACC_Output	UINT		●		●
9002	0x203C	0x03	DEC_Input	DEC_Output	UINT		●		●
9003	0x203C	0x04	BRA_Input	BRA_Output	UINT		●		●
9004	0x203C	0x05	RPT_Input	RPT_Output	UINT		●		●
9005	0x203C	0x06	TA1_Input	TA1_Output	UINT		●		●
9006	0x203C	0x07	TA2_Input	TA2_Output	UINT		●		●
9007	0x203C	0x08	TA3_Input	TA3_Output	UINT		●		●
9008	0x203C	0x09	TA4_Input	TA4_Output	UINT		●		●
9010	0x203C	0x0B	RPS_Input	RPS_Output	UINT		●		●
9011	0x203C	0x0C	FRT_Input	FRT_Output	UINT		●		●
9012	0x203C	0x0D	AC2_Input	AC2_Output	UINT		●		●
9013	0x203C	0x0E	DE2_Input	DE2_Output	UINT		●		●
9020	0x203C	0x15	INR_Input	INR_Output	UINT		●		●
8651	0x2038	0x34	QSTD_Input	QSTD_Output	UINT		●		●
8652	0x2038	0x35	DOTD_Input	DOTD_Output	UINT		●		●
11201	0x2052	0x02	STT_Input	STT_Output	UINT		●		●
11202	0x2052	0x03	NST_Input	NST_Output	UINT		●		●
11204	0x2052	0x05	FST_Input	FST_Output	UINT		●		●
11220	0x2052	0x15	FFT_Input	FFT_Output	UINT		●		●
11230	0x2052	0x1F	DCF_Input	DCF_Output	UINT		●		●
Load management									
14401	0x2072	0x02	SRB_Input	SRB_Output	UINT		●		●
14411	0x2072	0x0C	ULT_Input	ULT_Output	UINT		●		●
14412	0x2072	0x0D	UDL_Input	UDL_Output	UINT		●		●
14413	0x2072	0x0E	FTU_Input	FTU_Output	UINT		●		●
14414	0x2072	0x0F	RMUD_Input	RMUD_Output	UINT		●		●
14415	0x2072	0x10	LUL_Input	LUL_Output	UINT		●		●
14416	0x2072	0x11	LUN_Input	LUN_Output	UINT		●		●
14421	0x2072	0x16	TOL_Input	TOL_Output	UINT		●		●
14422	0x2072	0x17	ODL_Input	ODL_Output	UINT		●		●

Modbus	POWERLINK, CAN		Name		Data type	Read		Write	
"ADL"	"Index"	"Subindex"				Cyclical	Acyclic	Cyclical	Acyclic
14423	0x2072	0x18	FTO_Input	FTO_Output	UINT		●		●
14425	0x2072	0x1A	LOC_Input	LOC_Output	UINT		●		●
Brake controller (DCI)									
11203	0x2052	0x04	DCI_Input	DCI_Output	UINT		●		●
11210	0x2052	0x0B	IDC_Input	IDC_Output	UINT		●		●
11211	0x2052	0x0C	TDC_Input	TDC_Output	UINT		●		●
11212	0x2052	0x0D	IDC2_Input	IDC2_Output	UINT		●		●
11213	0x2052	0x0E	TDI_Input	TDI_Output	UINT		●		●
10401	0x204A	0x02	ADC_Input	ADC_Output	UINT		●		●
10402	0x204A	0x03	TDC1_Input	TDC1_Output	UINT		●		●
10403	0x204A	0x04	SDC1_Input	SDC1_Output	UINT		●		●
10404	0x204A	0x05	TDC2_Input	TDC2_Output	UINT		●		●
10405	0x204A	0x06	SDC2_Input	SDC2_Output	UINT		●		●
10499	0x204A	0x64	TAFI_Input	TAFI_Output	UINT		●		●
Brake controller (BLC)									
10001	0x2046	0x02	BLC_Input	BLC_Output	UINT		●		●
10003	0x2046	0x04	BEN_Input	BEN_Output	INT		●		●
10004	0x2046	0x05	BRT_Input	BRT_Output	UINT		●		●
10005	0x2046	0x06	BET_Input	BET_Output	UINT		●		●
10006	0x2046	0x07	IBR_Input	IBR_Output	UINT		●		●
10007	0x2046	0x08	BIP_Input	BIP_Output	UINT		●		●
10008	0x2046	0x09	BST_Input	BST_Output	UINT		●		●
10009	0x2046	0x0A	BCI_Input	BCI_Output	UINT		●		●
10010	0x2046	0x0B	TBE_Input	TBE_Output	UINT		●		●
10011	0x2046	0x0C	IRD_Input	IRD_Output	UINT		●		●
10012	0x2046	0x0D	BIR_Input	BIR_Output	INT		●		●
10013	0x2046	0x0E	JDC_Input	JDC_Output	INT		●		●
10015	0x2046	0x10	BRR_Input	BRR_Output	UINT		●		●
10020	0x2046	0x15	BED_Input	BED_Output	UINT		●		●
10022	0x2046	0x17	TTR_Input	TTR_Input	UINT		●		●
10050	0x2046	0x33	BRH_Input	BRH_Output	UINT		●		●
10070	0x2046	0x47	PES_Input	PES_Output	UINT		●		●
10071	0x2046	0x48	LP1_Input	LP1_Output	UINT		●		●
10072	0x2046	0x49	CP1_Input	CP1_Output	INT		●		●
10073	0x2046	0x4A	LP2_Input	LP2_Output	UINT		●		●
10074	0x2046	0x4B	CP2_Input	CP2_Output	INT		●		●
10075	0x2046	0x4C	IBRA_Input	IBRA_Output	UINT		●		●
Line contactor control									
13601	0x206A	0x02	LES_Input	LES_Output	UINT		●		●
13602	0x206A	0x03	LLC_Input	LLC_Output	UINT		●		●
13603	0x206A	0x04	LCT_Input	LCT_Output	UINT		●		●
Motor contactor control									
13101	0x2065	0x02	DBS_Input	DBS_Output	UINT		●		●
13102	0x2065	0x03	DAS_Input	DAS_Output	UINT		●		●
13103	0x2065	0x04	RCA_Input	RCA_Output	UINT		●		●
13104	0x2065	0x05	OCC_Input	OCC_Output	UINT		●		●
Error behavior									
7002	0x2028	0x03	IPL_Input	IPL_Output	UINT		●		●
7004	0x2028	0x05	STP_Input	STP_Output	UINT		●		●
7005	0x2028	0x06	SDD_Input	SDD_Output	UINT		●		●
7006	0x2028	0x07	EPL_Input	EPL_Output	UINT		●		●
7008	0x2028	0x09	OHL_Input	OHL_Output	UINT		●		●
7009	0x2028	0x0A	OLL_Input	OLL_Output	UINT		●		●
7010	0x2028	0x0B	SLL_Input	SLL_Output	UINT		●		●
7011	0x2028	0x0C	COL_Input	COL_Output	UINT		●		●
7012	0x2028	0x0D	TNL_Input	TNL_Output	UINT		●		●
7013	0x2028	0x0E	LFL3_Input	LFL3_Output	UINT		●		●
7015	0x2028	0x10	CLL_Input	CLL_Output	UINT		●		●
7018	0x2028	0x13	SCL3_Input	SCL3_Output	UINT		●		●
7020	0x2028	0x15	DCFF_Input	DCFF_Output	UINT		●		●
7080	0x2028	0x51	LFF_Input	LFF_Output	UINT		●		●
7081	0x2028	0x52	ODT_Input	ODT_Output	UINT		●		●
7090	0x2028	0x5B	LET_Input	LET_Output	UINT		●		●
Error diagnostics									
3112	0x2001	0x0D	STRT_Input	STRT_Output	UINT		●		●
3121	0x2001	0x16	RFLT_Input	RFLT_Output	UINT		●		●
3130	0x2001	0x1F	FFM_Input	FFM_Output	UINT		●		●
7122	0x2029	0x17	ATR_Input	ATR_Output	UINT		●		●
7123	0x2029	0x18	TAR_Input	TAR_Output	UINT		●		●
7124	0x2029	0x19	RSF_Input	RSF_Output	UINT		●		●
7125	0x2029	0x1A	INH_Input	INH_Output	UINT		●		●
7128	0x2029	0x1D	RP_Input	RP_Output	UINT		●		●
7129	0x2029	0x1E	RPA_Input	RPA_Output	UINT		●		●

Modbus	POWERLINK, CAN		Name		Data type	Read		Write	
"ADL"	"Index"	"Sub-index"				Cyclical	Acyclic	Cyclical	Acyclic
7130	0x2029	0x1F	CIC_Input	CIC_Output	UINT		●		●
7131	0x2029	0x20	ETF_Input	ETF_Output	UINT		●		●
7132	0x2029	0x21	CNF_Input	CNF_Output	UINT		●		●
7134	0x2029	0x23	ILF1_Input	ILF1_Output	UINT		●		●
7150	0x2029	0x33	HRFC_Input	HRFC_Output	UINT		●		●
User-defined threshold values									
11001	0x2050	0x02	CTD_Input	CTD_Output	UINT		●		●
11002	0x2050	0x03	TTD_Input	TTD_Output	UINT		●		●
11003	0x2050	0x04	FTD_Input	FTD_Output	UINT		●		●
11004	0x2050	0x05	F2D_Input	F2D_Output	UINT		●		●
11006	0x2050	0x07	TTD2_Input	TTD2_Output	UINT		●		●
11007	0x2050	0x08	TTD3_Input	TTD3_Output	UINT		●		●
11009	0x2050	0x0A	THA_Input	THA_Output	UINT		●		●
11015	0x2050	0x10	TTL_Input	TTL_Output	INT		●		●
11016	0x2050	0x11	TTH_Input	TTH_Output	INT		●		●
11021	0x2050	0x16	SAT_Input	SAT_Output	UINT		●		●
User-defined alarm groups									
12801	0x2062	0x02	GA11_Input	GA11_Output	UINT		●		●
12802	0x2062	0x03	GA12_Input	GA12_Output	UINT		●		●
12803	0x2062	0x04	GA21_Input	GA21_Output	UINT		●		●
12804	0x2062	0x05	GA22_Input	GA22_Output	UINT		●		●
12805	0x2062	0x06	GA31_Input	GA31_Output	UINT		●		●
12806	0x2062	0x07	GA32_Input	GA32_Output	UINT		●		●
12807	0x2062	0x08	GA13_Input	GA13_Output	UINT		●		●
12808	0x2062	0x09	GA23_Input	GA23_Output	UINT		●		●
12809	0x2062	0x0A	GA33_Input	GA33_Output	UINT		●		●
Handheld settings									
64002	0x2262	0x03	PST_Input	PST_Output	UINT		●		●
64035	0x2262	0x24	PVIS_Input	PVIS_Output	UINT		●		●
Display settings									
12001	0x205A	0x02	SDS_Input	SDS_Output	UINT		●		●
Special function: "Limit switch"									
12501	0x205F	0x02	SAF_Input	SAF_Output	UINT		●		●
12502	0x205F	0x03	SAR_Input	SAR_Output	UINT		●		●
12503	0x205F	0x04	DAF_Input	DAF_Output	UINT		●		●
12504	0x205F	0x05	DAR_Input	DAR_Output	UINT		●		●
12505	0x205F	0x06	DSF_Input	DSF_Output	UINT		●		●
12506	0x205F	0x07	PAS_Input	PAS_Output	UINT		●		●
12507	0x205F	0x08	CLS_Input	CLS_Output	UINT		●		●
12508	0x205F	0x09	SAL_Input	SAL_Output	UINT		●		●
12509	0x205F	0x0A	DAL_Input	DAL_Output	UINT		●		●
12511	0x205F	0x0C	NLS_Input	NLS_Output	UINT		●		●
12521	0x205F	0x16	STD_Input	STD_Output	UINT		●		●
12522	0x205F	0x17	SFD_Input	SFD_Output	UINT		●		●
12523	0x205F	0x18	MSTP_Input	MSTP_Output	UINT		●		●
12524	0x205F	0x19	PRST_Input	PRST_Output	UINT		●		●
Special function: "PID controller"									
11901	0x2059	0x02	PIF_Input	PIF_Output	UINT		●		●
11904	0x2059	0x05	PIF1_Input	PIF1_Output	UINT		●		●
11905	0x2059	0x06	PIF2_Input	PIF2_Output	UINT		●		●
11906	0x2059	0x07	PIP1_Input	PIP1_Output	UINT		●		●
11907	0x2059	0x08	PIP2_Input	PIP2_Output	UINT		●		●
11908	0x2059	0x09	PII_Input	PII_Output	UINT		●		●
11909	0x2059	0x0A	PR2_Input	PR2_Output	UINT		●		●
11910	0x2059	0x0B	PR4_Input	PR4_Output	UINT		●		●
11920	0x2059	0x15	RPI_Input	RPI_Output	UINT		●		●
11921	0x2059	0x16	RP2_Input	RP2_Output	UINT		●		●
11922	0x2059	0x17	RP3_Input	RP3_Output	UINT		●		●
11923	0x2059	0x18	RP4_Input	RP4_Output	UINT		●		●
11940	0x2059	0x29	PIC_Input	PIC_Output	UINT		●		●
11941	0x2059	0x2A	RPG_Input	RPG_Output	UINT		●		●
11942	0x2059	0x2B	RIG_Input	RIG_Output	UINT		●		●
11943	0x2059	0x2C	RDG_Input	RDG_Output	UINT		●		●
11944	0x2059	0x2D	PIS_Input	PIS_Output	UINT		●		●
11950	0x2059	0x33	FPI_Input	FPI_Output	UINT		●		●
11951	0x2059	0x34	PSR_Input	PSR_Output	UINT		●		●
11952	0x2059	0x35	POL_Input	POL_Output	INT		●		●
11953	0x2059	0x36	POH_Input	POH_Output	INT		●		●
11954	0x2059	0x37	PIM_Input	PIM_Output	UINT		●		●
11960	0x2059	0x3D	RSL_Input	RSL_Output	UINT		●		●
11961	0x2059	0x3E	PAL_Input	PAL_Output	UINT		●		●

Modbus	POWERLINK, CAN		Name		Data type	Read		Write	
"ADL"	"Index"	"Subindex"				Cyclical	Acyclic	Cyclical	Acyclic
11962	0x2059	0x3F	PAH_Input	PAH_Output	UINT		●		●
11963	0x2059	0x40	PER_Input	PER_Output	UINT		●		●
11970	0x2059	0x47	PAU_Input	PAU_Output	UINT		●		●
11984	0x2059	0x55	PRP_Input	PRP_Output	UINT		●		●

5.3.12.7 Minimum cycle time

The minimum cycle time specifies the time up to which the bus cycle can be reduced without communication errors occurring. It is important to note that very fast cycles reduce the idle time available for handling monitoring, diagnostics and acyclic commands.

Minimum cycle time
400 µs

6 Safety functions

6.1 General information

6.1.1 Introduction

Overview

The safety functions integrated into the ACOPOSinverter are designed to ensure that the installation is maintained in a safe state and to prevent the occurrence of dangerous states. In some cases, further safety-related systems separate from the frequency inverter (e.g. a mechanical brake) may be necessary to maintain the safe state once the power supply has been interrupted.
The safety functions are configured using the ACPi Parameter Tool.
Integrated safety functions provide the following advantages:

- Additional safety functions that comply with standards
- No external safety equipment required
- Reduced wiring and space requirements
- Reduced costs

The ACOPOSinverter frequency inverters meet the requirements of the standards for the implementation of safety functions.

Safety functions in accordance with IEC 61800-5-2

Definitions

Abbreviation	Description
STO	**Safe torque off** No power that could result in a rotation or exertion of force is transferred to the motor.
SLS	**Safe limited speed** The SLS function prevents the motor speed from exceeding the defined limit. If the motor speed exceeds the defined limit, the STO safety function is activated.
SS1	**Safe stop 1** • Initiates and monitors the motor deceleration rate within defined limits in order to stop the motor. • Introduces function "Safe stop" if the motor speed falls below the specified limit value.

Safety functions not in accordance with IEC 61800-5-2

Definitions

Abbreviation	Description
SMS	**Safe maximum speed** The SMS function prevents the motor speed from exceeding the defined limit. If the motor speed exceeds the defined limit, the STO safety function is activated. The SMS function can only be activated or deactivated using the commissioning software. When the function is deactivated , it continuously monitors the stator frequency irrespective of the operating mode.
GDL	**Safety door lock** The GDL function enables the safety door to be unlocked when the motor is switched off.

Writing conventions

The menus of the graphic display terminal are displayed in brackets.
The menus of the integrated 7-character segment display are displayed in parentheses.
The parameter names are displayed in brackets on the graphic display terminal.
The parameter codes are displayed in parentheses on the integrated 7-segment display.

Connection examples

Advice:

Connection examples for the ACOPOSinverter and safety modules can be found in the "Integrated safety technology" user's manual for integrated safety function (MASAFETY):

- **Connection examples**

Warning!

The parallel connection/wiring of STO inputs of several inverters is not permitted.

Configuration no. 1:

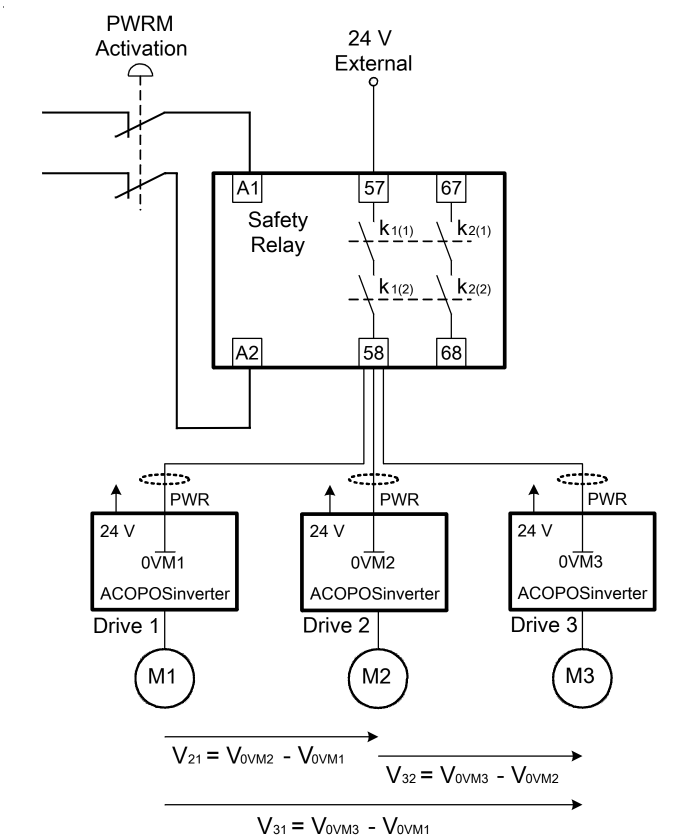
Only one safety contact of the external 24 V power supply is used to activate the power removal safety functions (PWRM activation) on the ACOPOSinverter.

Task: As shown in configuration 1, after the PWRM safety circuit has been triggered, the voltage on the STO inputs is removed, switching off the power supply for motors M1, M2 and M3 via the STO function.

Assessment: Due to electromagnetic phenomena, unintended potential differences may occur between the reference potentials of the STO inputs (0VMx). Depending on the cabling/structure of the cabling system, the potential differences (V21, V31, V32) can become so large that the intended safety function can no longer be ensured.

Result: The failure of the safety functions results in a dangerous fault that is not detected by the internal diagnostic functions in the inverters. The configuration 1 wiring diagram is not permitted when using power removal safety functions (PWRM activation).

Note: The wiring as shown in configuration 1 is not permitted even when using the internal 24 V power supply of the inverters with the safety relay.



6.1.2 Certifications

EC declaration of conformity

The EC declaration of conformity for the EMC Directive is available at www.br-automation.com.

Certification for functional safety

The integrated safety functions are compatible and certified with the following guideline: : IEC 61800-5-2 Ed. 1 "Adjustable speed electrical power frequency inverter systems - Part 5-2: Safety requirements - Functional safety".

As a product standard, IEC 61800-5-2 sets forth safety-related aspects for power drive systems with integrated safety functions (PDS (SR)) within the framework laid out in the IEC 61508 Ed. 2.

The compliance of the safety functions listed in this guide with the IEC 61800-5-2 standard simplifies the integration of a PDS (SR) (power drive system suitable for safety-related applications) into a safety-related control system using the principles of IEC 61508 or IEC 13849-1 as well as of IEC 62061 for process systems and machines.

The defined safety functions are the following:

- SIL 2 and SIL 3 capability in compliance with standards IEC 61800-5-2 and IEC 61508 Ed. 2
- Fulfillment of performance level "d" and "e" in compliance with IEC 13849-1
- Compliance with category 3 and 4 of European standard IEC 13849-1 (EN 954-1)

See also "Capability characteristics of safety functions" on page 505.

The operating mode with safety requirement is tested in high demand or continuous operation in accordance with standard IEC 61800-5-2.

The certificate for functional safety is available at www.br-automation.com.

6.1.3 Basic information

Functional safety

Automation and safety technology are two areas that in the past were completely separated from one another but have recently become more and more integrated.

The development and installation of complex automation solutions is considerably simplified through the use of integrated safety functions.

The requirements in terms of safety technology generally depend on the application.

The requirement level is determined by the potential risks and hazards of the specific application.

Standard IEC 61508

Standard IEC 61508 "Functional safety of electrical / electronic / programmable safety-related systems" provides coverage for safety-related functionality.

Instead of an individual component, an entire chain of functions (e.g. ranging from a sensor through to the logical processing units and the actuator) is considered a single unit.

This functional chain must meet the requirements of the specific safety integrity level as a whole.

Such a basis allows systems and components to be developed that can be used in various safety applications with comparable levels of risk.

SIL - Safety integrity level

Standard IEC 61508 defines four safety integrity levels (SIL) for safety functions.

SIL 1 is the lowest level, SIL 4 the highest.

A hazard and risk analysis forms the basis for determining the required safety integrity level.

This analysis is used to determine whether the respective chain of functions can be viewed as a safety function and which potential hazards must be covered.

PFH - Probability of a dangerous failure per hour

To maintain the safety function, standard IEC 61508 prescribes measures that vary depending on the required safety integrity level and are intended to avoid and control the errors determined.

All components of a safety function must undergo a probability assessment to determine the effectiveness of the measures to control the errors determined.

This assessment makes a decision based on the PFH (average frequency of a dangerous failure per hour) of a safety system.

This is the probability of a dangerous failure occurring in a safety system with the result that the safety function cannot be executed properly.

Depending on the SIL, the PFH value for the entire safety system is not permitted to exceed certain values.

The individual PFH values of a function chain are added together. The result is not permitted to exceed the maximum values defined in the standard.

Performance level	Average frequency of a dangerous failure per hour (PFH) in high demand or continuous operation
4	$\geq 10^{-9}$ to $<10^{-8}$
3	$\geq 10^{-8}$ to $<10^{-7}$
2	$\geq 10^{-7}$ to $<10^{-6}$
1	$\geq 10^{-6}$ to $<10^{-5}$

PL - Performance Level

ISO standard 13849-1 defines five performance levels (PL) for safety functions.

"a" is the lowest and "e" is the highest level.

The five levels (a, b, c, d and e) correspond to the various values of the average probability of a dangerous failure.

Performance level	Probability of a dangerous failure per hour
e	$\geq 10^{-8}$ to $<10^{-7}$
d	$\geq 10^{-7}$ to $<10^{-6}$
c	$\geq 10^{-6}$ to $<3x10^{-6}$
b	$\geq 3x10^{-6}$ to $<10^{-5}$
a	$\geq 10^{-5}$ to $<10^{-4}$

HFT - Hardware fault tolerance and SFF - Safe failure fraction

Depending on the applicable SIL for the safety system, standard IEC 61508 stipulates a specific hardware detected fault tolerance (HFT) in connection with a special safe failure fraction (SFF).

The hardware fault tolerance describes the system's ability to execute the required safety function despite the fact that one or more hardware faults have been detected.

The safe failure fraction (SFF) is defined as the rate of safe failures and of detected dangerous states relative to the total failure rate of the system.

$$SFF = \frac{\Sigma\lambda_S + \Sigma\lambda_{Dd}}{\Sigma\lambda_S + \Sigma\lambda_{Dd} + \Sigma\lambda_{Du}}$$

Per IEC 61508, the maximum achievable safety integrity level of a system is partially determined by the hardware fault tolerance (HFT) and safe failure fraction (SFF) of the system.

Standard IEC 61508 distinguishes between two types of subsystems (type A subsystem, type B subsystem).

The specification of these types is based on criteria set forth by the standard for safety-related components.

SFF	HFT for type A subsystem			HFT for type B subsystem		
	0	1	2	0	1	2
<60%	SIL 1	SIL 2	SIL 3	-	SIL 1	SIL 2
60% to < 90%	SIL 2	SIL 3	SIL 4	SIL 1	SIL 2	SIL 3
60% to <99%	SIL 3	SIL 4	SIL 4	SIL 2	SIL 3	SIL 4
≥99%	SIL 3	SIL 4	SIL 4	SIL 3	SIL 4	SIL 4

PFD - Probability of dangerous failure on demand

Standard IEC 61508 defines the SIL using requirements that are divided into two main categories: hardware safety integrity and systematic safety integrity. A device or system must meet the requirements of both categories in order to attain a specified SIL.

The SIL requirements for the hardware safety integrity are based on a probability analysis of the device. In order to attain a specified SIL, the device must comply with the specifications regarding the maximum probability of dangerous failure and the minimum safe failure fraction. The concept of a dangerous failure must be strictly defined for the relevant system. This normally takes place in the form of restrictive requirements, the integrity of which is checked during the entire system development. The required target values vary depending on the probability of a requirement, on the complexity of the device(s) and on the redundancy type used.

The PFD values (probability of dangerous failure on demand) and the RRF values (risk reduction factor) in low-demand operation for various SILs are defined as follows in standard IEC 61508:

SIL	PFD	PFD (performance)	RRF
1	0.1 to 0.01	10^{-1} to 10^{-2}	10 to 100
2	0.01 to 0.001	10^{-2} to 10^{-3}	100 to 1000
3	0.001 to 0.0001	10^{-3} to 10^{-4}	1000 to 10,000
4	0.0001 to 0.00001	10^{-4} to 10^{-5}	10,000 to 100,000

The following values are valid for high demand or continuous operation:

SIL	PFH	PFH (performance)	RRF
1	0.00001 to 0.000001	10^{-5} to 10^{-6}	100,000 to 1,000,000
2	0.000001 to 0.0000001	10^{-6} to 10^{-7}	1,000,000 to 10,000,000
3	0.0000001 to 0.00000001	10^{-7} to 10^{-8}	10,000,000 to 100,000,000
4	0.00000001 to 0.000000001	10^{-8} to 10^{-9}	100,000,000 to 1,000,0000,000

The dangers of a control system must be identified and assessed within the scope of a risk analysis. These risks must continue to be reduced until their overall contribution to the danger is considered acceptable. The permissible level of these risks is specified as a safety requirement in the form of a target value for the "probability of a dangerous failure in a specified time frame": a discrete SIL.

Error avoidance measures

Systematic errors and faults in the specification, hardware and software, as well as errors and faults detected during the operation and maintenance of the safety system must be avoided to the maximum degree possible. In order that these requirements are complied with, standard IEC 61508 specifies a series of error avoidance measures that must be implemented depending on the required SIL. These error avoidance measures must cover the entire service life of the safety system, i.e. from development of the system right through until it is taken out of commission.

6.2 Description

6.2.1 Safety function "Safe Torque Off " (STO)

Overview

Safety function STO (Safe Torque Off) does not place the DC bus in standby mode. Safety function STO only places the motor in standby mode. The DC bus voltage and the mains voltage for the drive are still present.

Danger!

RISK OF ELECTRIC SHOCK

- **Do not use safety function STO for purposes other than its intended function.**
- **Use a suitable switch that belongs to the circuit of safety function STO to disconnect the drive from the mains voltage supply.**

Failure to follow these instructions will result in death or serious injury.

When safety function STO is triggered, the performance level is disabled immediately. In the case of vertical applications or external forces that act on the drive shaft, additional measures may need to be taken in certain circumstances to stop the motor and keep it stopped when safety function STO is being used, e.g. by applying the service brake.

Warning!

INADEQUATE DECLARATION OR UNINTENDED SYSTEM OPERATION

- **Make sure that the use of function STO does not lead to unsafe conditions.**
- **If your operation requires stoppage, ensure that the motor comes to a safe stop when function STO is used.**

Failure to follow these instructions can result in death, serious injury or damage to property.

This function places the motor in a state without torque and/or prevents an unexpected startup of the motor.

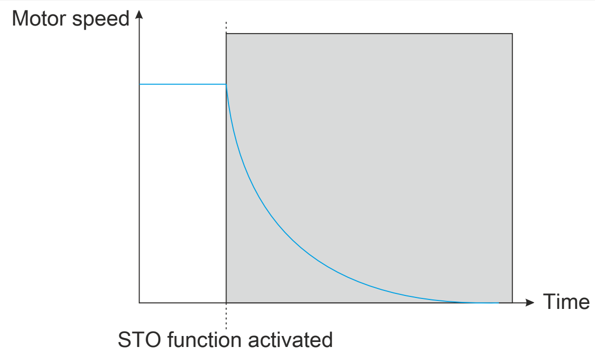
Function "Safe Torque Off" (STO) serves to effectively prevent an unexpected start-up of the motor. This ensures a safe shutdown, as only the power transfer to the motor is interrupted while the main circuits of the frequency inverter continue to be supplied with power.

The principles and requirements for avoiding an unexpected startup of the motor are described in standard EN 1037:1995+A1 (German version: DIN EN 1037:2008-11).

Logic input STO is assigned to this safety function and cannot be changed.

If the triggering of safety function STO requires a dual-channel control, the function can also be activated using the safety-related logic inputs.

Safety function STO is configured using the commissioning software. The state of safety function STO can be displayed using the HMI on the frequency inverter or using the commissioning software.



Reference guidelines for safety function STO

Safety function STO is defined as follows in section 4.2.2.2 of standard IEC 61800-5-2 (version 1.0 2007.07):

No power that could result in a rotation (or in a movement in the case of linear motors) is transferred to the motor. The PDS (SR) (power drive system suitable for safety-related applications) does not send any energy to the motor that can generate a torque (or power in the case of linear motors).

- NOTE 1: This safety function corresponds to a category 0 uncontrolled stop in accordance with IEC 60204-1.
- NOTE 2: This safety function may be used where it is necessary to disconnect the power supply to prevent an unexpected startup.
- NOTE 3: Situations in which external influences are present (e.g. falling of hanging loads) may require additional measures (e.g. mechanical brake).
- NOTE 4: Electronic instruments and contactors are unsuitable for providing protection against electric shock. Additional insulation measures may be necessary.

Safety function level (SF) of safety function STO

Configuration	SIL Safety integrity level in accordance with IEC 61508	PL Performance level in accordance with ISO 13849-1
STO with or without safety module	SIL 2	PL d
STO and LI3 with or without safety module	SIL 3	PL e
LI3 and LI4	SIL 2	PL d
LI5 and LI6	SIL 2	PL d

Emergency functions

Standard IEC 60204-1 describes two emergency functions:

- **Emergency switch-off set-up:**
  External switching components are required for this function. It cannot be implemented with functions based on the frequency inverter such as "Safe Torque Off" (STO).
- **Emergency stop set-up:**
  An emergency stop set-up must work in such a way that when it is activated the dangerous movement of the machine stops and the machine cannot start up again under any circumstances, even if the emergency stop is removed.
  An emergency stop set-up must be designed as a category 0 or category 1 stop.
  A category 0 stop means that the power transferred to the motor is cut off immediately. A category 0 stop corresponds to function "Safe Torque Off" (STO) in accordance with the definition in standard EN 61800-5-2.
  In addition to the requirements for stopping (see IEC 60204-1, section 9.2.5.3), the following provisions apply to the emergency stop set-up:
  - It must have priority over all other functions in all operating modes.
  - A reset is only permitted to be executed as a manual action at the place where the command was initiated. The reset command is not permitted to allow the machine to start up again directly. Instead, it can only enable it to be restarted.
  - With regard to the machine environment (IEC 60204-1 and Machinery Directive), the motor is not permitted to automatically start up again when safety function STO is being used to manage a category 0 emergency shutdown if safety function STO was triggered and deactivated (with or without switching off and on the power supply). For this reason, an additional safety module is required if the machine automatically starts up again after safety function STO has been deactivated.

6.2.2 Safety function "Safe Stop 1" (SS1)

Overview

Safety function "Safe Stop 1" (SS1) monitors the deceleration in accordance with a specific deceleration ramp and safely switches off the torque once standstill has been reached.

If safety function SS1 is activated, it receives priority over all other functions in all operating modes (except for function STO, which has the highest priority).

The SS1 deceleration ramp is specified in the unit Hz/s. The ramp is configured using two parameters:

[SS1 ramp unit] (SSrU) (Hz/s) is used to define the unit for the ramp in 1 Hz/s, 10 Hz/s and 100 Hz/s

[SS1 ramp value] (SSrt) (0,1) is used to define the value for the ramp.

Calculating the ramp

Ramp = SSrU x SSrt

Example: For SSrU = 10 Hz/s and SSrt = 5.0, the value of the deceleration ramp is 50 Hz/s.

Safety function SS1 is configured using the commissioning software. For more information, see see "Commissioning" on page 519.

The state of safety function SS1 can be displayed using the HMI on the frequency inverter or using the commissioning software.

Behavior when function SS1 is activated

When safety function SS1 is activated, it monitors the deceleration of the motor in accordance with the defined deceleration ramp until standstill is reached and ensures that the motor speed is not above a monitored limit that is determined by the defined deceleration ramp and parameter **[SS1 trip threshold]** (SStt).

If the defined limit is exceeded:

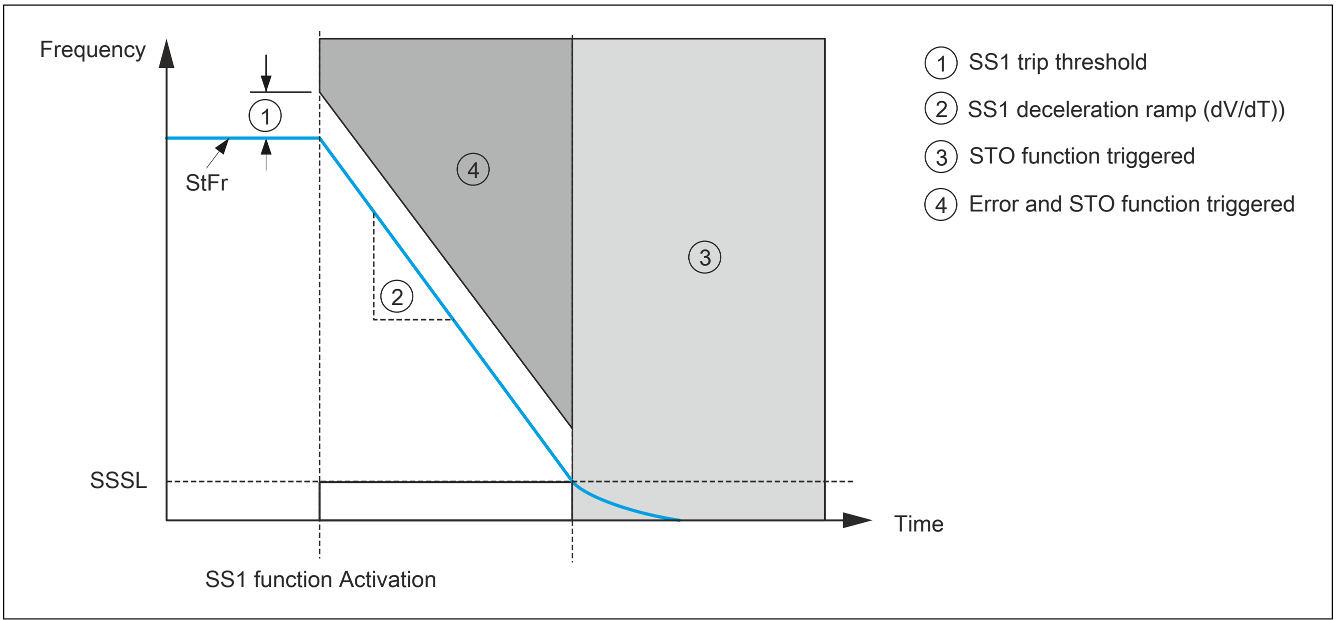
- An error is triggered and error code **[Safe function fault]** (SAFF) is displayed.
- Safety function STO is activated.

As soon as **[Standstill level]** (SSSL) has been reached, safety function STO is activated.

Function SS1 continues to remain active if the request is removed before standstill has been reached.

Advice:

Error detection is dependent on [Stator Frequency] (StFr).



Behavior when function SS1 is deactivated

After an SS1 stop, issue a new move command (even if the move command is set as level).

SS1 reference guidelines

Function SS1 is defined as follows in section 4.2.2.2 of standard IEC 61800-5-2 standard:

The PDS (SR) (power drive system suitable for safety-related applications) executes the following actions:

- It initiates and controls the motor deceleration rate within defined limits in order to stop the motor and introduces function STO when the motor speed falls below a defined limit.
- Alternatively, it initiates and monitors the motor deceleration rate within defined limits in order to stop the motor and introduces function STO when the motor speed falls below a defined limit.
- Alternatively it initiates the motor deceleration and introduces function STO after an application-specific time delay has elapsed.

Advice:

This safety function corresponds to a category 1 controlled stop in accordance with IEC 60204-1.

Safety function level (SF) of safety function SS1

Function	Configuration	SIL Safety integrity level in accordance with IEC 61508	PL Performance level in accordance with ISO 13849-1
SS1 type C	STO with safety relay	SIL 2	PL d
	STO and LI3 with safety relay	SIL 3	PL e
SS1 type B	LI3 and LI4	SIL 2	PL d
	LI5 and LI6	SIL 2	PL d

Category 1 emergency stop

An emergency stop set-up must work in such a way that when it is activated the dangerous movement of the machine stops and the machine cannot start up again under any circumstances, even if the emergency stop is removed.

An emergency stop set-up must be designed as a category 0 or category 1 stop.

A category 1 stop is a controlled shutdown whereby the energy supply to the motor to execute the shutdown process is maintained and is only interrupted once this process has been completed.

A category 1 stop corresponds to function **[Safe ramp]** (SS1) in accordance with the definition in standard EN 61800-5-2.

In addition to the requirements for stop (see IEC 60204-1, section 9.2.5.3), the following provisions apply to the emergency stop set-up:

- It must have priority over all other functions in all operating modes.
- A reset is only permitted to be executed as a manual action at the place where the command was initiated. The reset command is not permitted to allow the machine to start up again directly. Instead, it can only enable it to be restarted.

With regard to the machine environment (IEC 60204-1 and Machinery Directive), the motor is not permitted to automatically start up again when safety function SS1 is being used to manage a category 1 emergency shutdown if safety function SS1 was triggered and deactivated (with or without switching off and on the power supply). For this reason, an additional safety module is required if the machine automatically starts up again after safety function SS1 has been deactivated.

6.2.3 Safety function "Safely Limited Speed" (SLS)

Overview

This function is used to limit the speed of a motor.

There are six types of SLS function:

- SLS type 1: Limits the motor speed to the actual speed.
- SLS type 2: Limits the motor speed to a value set using a parameter.
- SLS type 3: Corresponds to type 2 but there is a specific behavior if the motor speed exceeds the threshold set using a parameter.
- SLS type 4: Limits the motor speed to a value set using a parameter. The direction of rotation can be changed while the safety function is active.
- SLS type 5: Corresponds to type 4 but there is a specific behavior if the motor speed exceeds the threshold set using a parameter.
- SLS type 6: Corresponds to type 4 but there is a specific behavior if the motor speed exceeds the threshold set using a parameter.

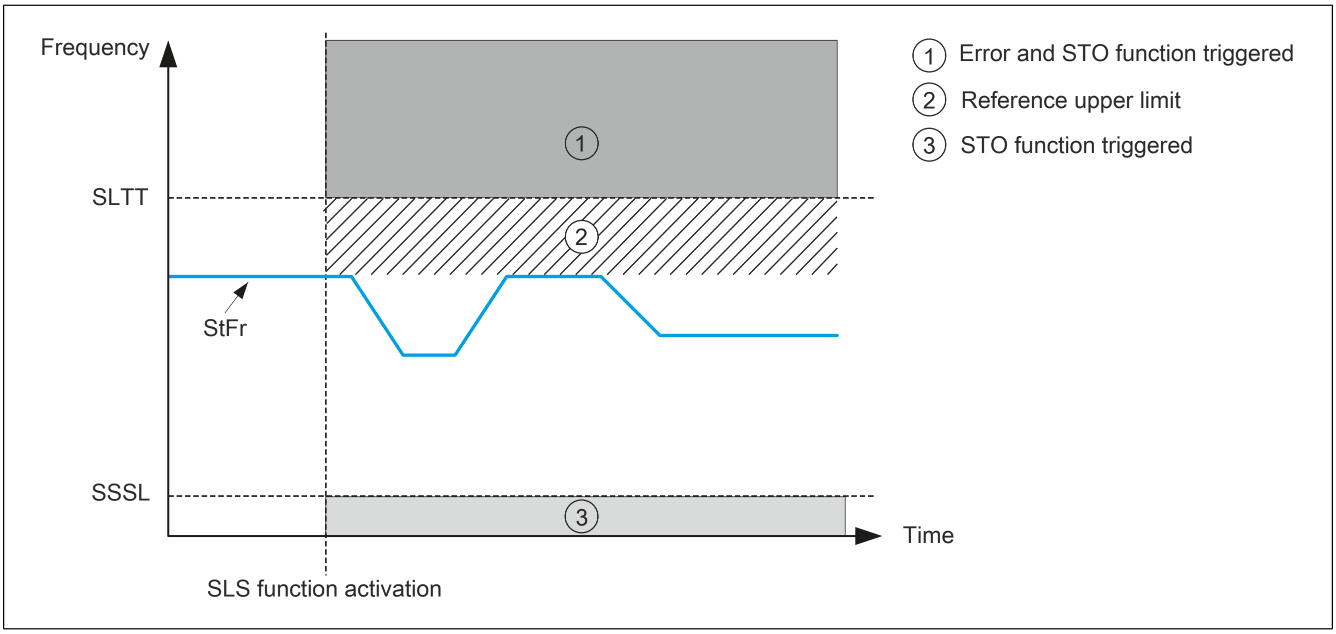
Advice:

SLS types 2 and 3 use parameter [SLS Wait time] (SLwt) so that the motor can run below [Standstill level] (SSSL) for a specific period after safety function SLS has been activated.

Safety function SLS is configured using the commissioning software. For more information, see "Commissioning" on page 519.

The state of safety function SLS can be displayed using the HMI of the frequency inverter or using the commissioning software.

Behavior when safety function SLS type 1 is activated



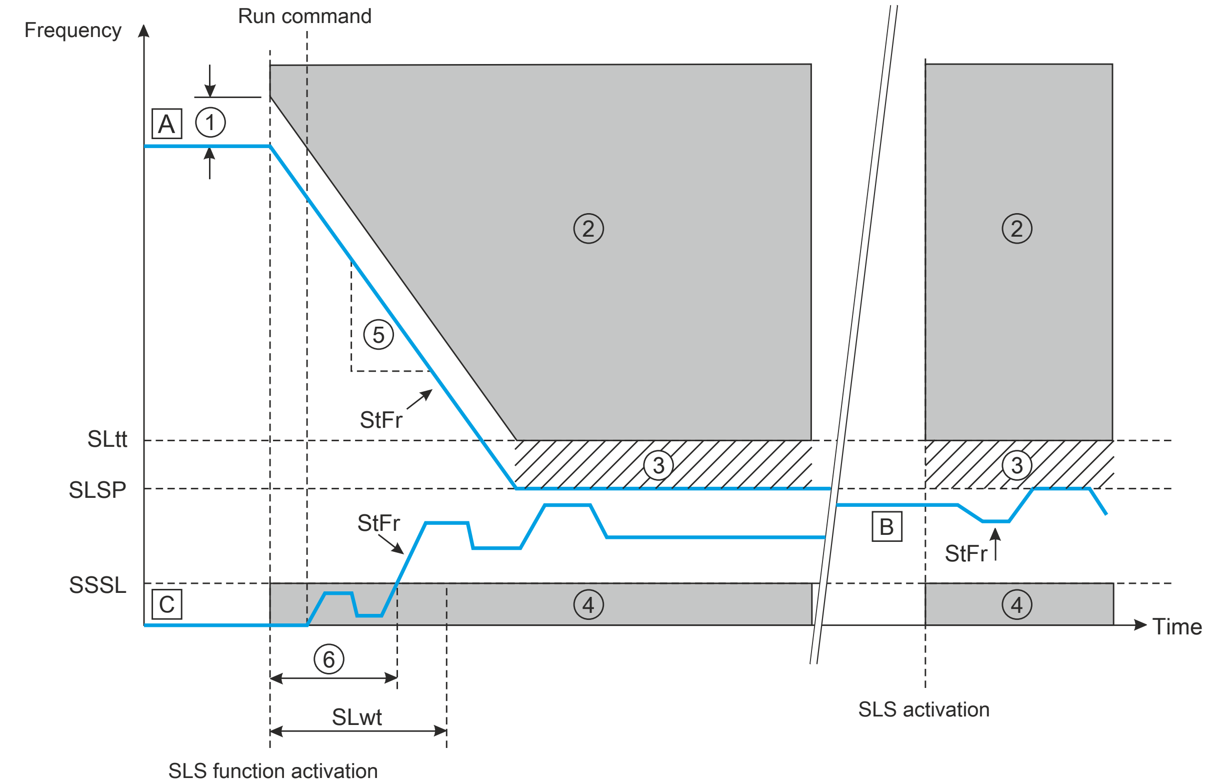
When the safety function is activated:

- If [Stator Frequency] (StFr) is above [SLS tolerance threshold] (SLtt), safety function STO is activated and an error is triggered with error code [Safe function fault] (SAFF).
- If [Stator Frequency] (StFr) is below [SLS tolerance threshold] (SLtt), the stator frequency is limited to the actual stator frequency. The frequency setpoint only varies between this value and the SSSL standstill value.

While the function is activated:

- If [Stator Frequency] (StFr) falls and reaches [Standstill level] (SSSL), safety function STO is activated.
- If [Stator Frequency] (StFr) rises and reaches [SLS tolerance threshold] (SLtt), safety function STO is activated and an error is triggered with error code [Safe function fault] (SAFF).

Behavior when safety function SLS type 2 is activated



1 SS1 trip threshold
2 Error and STO function triggered
3 Upper reference limit value
4 STO function triggered
5 SS1 deceleration ramp (dV/dT)
6 Time frame required by [Stator Frequency](StFr) to exceed SSSL

[A]: **[Stator Frequency]** (StFr) is above **[Reference]** (SLSP).

[B]: **[Stator Frequency]** (StFr) is between **[Standstill level]** (SSSL) and **[Reference]** (SLSP).

[C]: **[Stator Frequency]** (StFr) is below **[Standstill level]** (SSSL) and **[SLS Wait time]** (SLwt) ≠ 0.

When the function is activated:

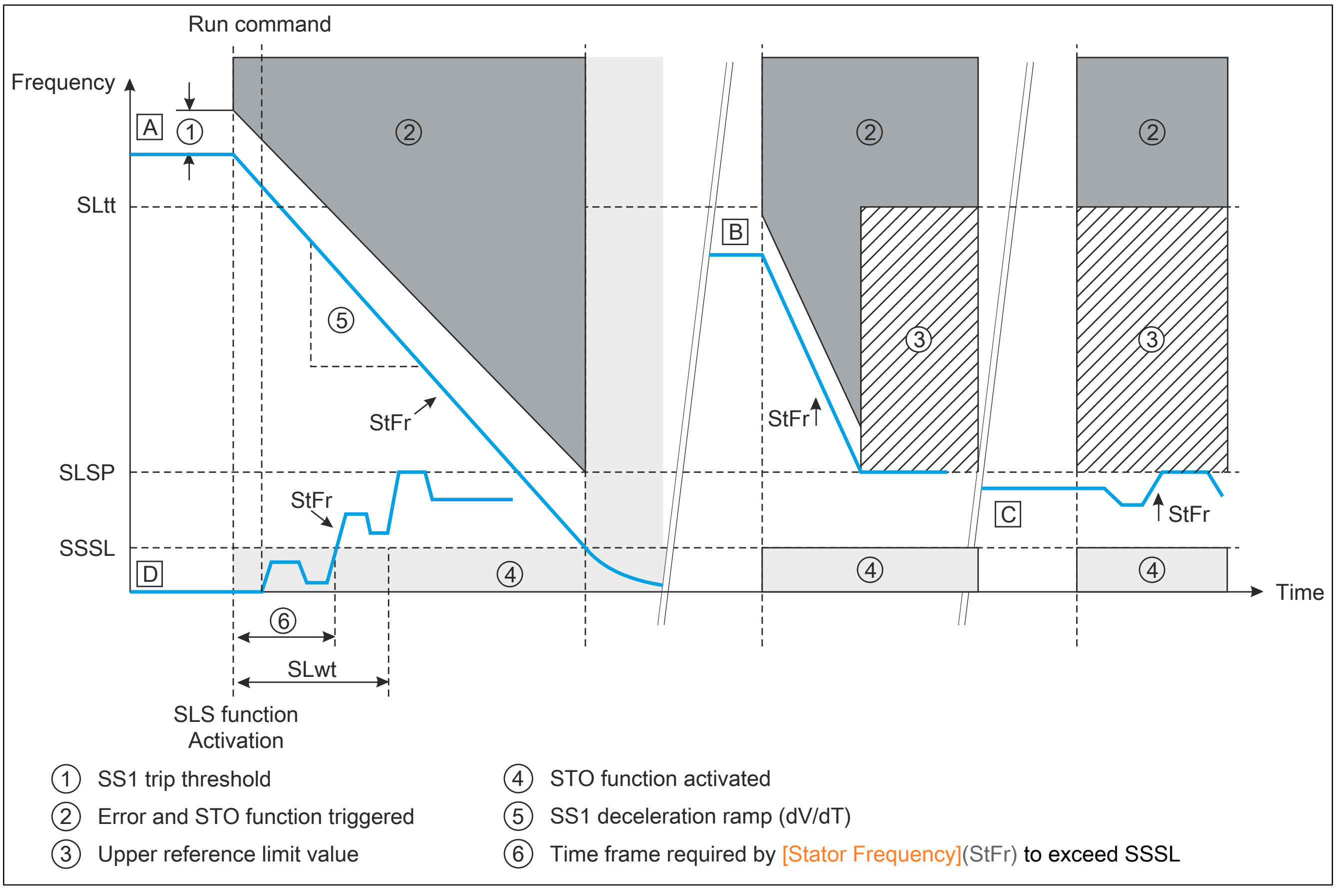
- If **[Stator Frequency]** (StFr) is above **[Reference]** (SLSP), the frequency inverter decelerates in accordance with the SS1 deceleration ramp until **[Reference]** (SLSP) is reached (see case A).
- If **[Stator Frequency]** (StFr) is below the SLSP, the current reference value is not changed but is instead limited to just **[Reference]** (SLSP) (see case B).
- If **[Stator Frequency]** (StFr) is still below **[Standstill level]** (SSSL) of the frequency after **[SLS Wait time]** (SLwt) has expired, safety function STO is activated (see case C).

While the function is activated:

- The reference frequency value can only vary between **[Reference]** (SLSP) and **[Standstill level]** (SSSL).
- If **[Stator Frequency]** (StFr) falls and reaches **[Standstill level]** (SSSL), safety function STO is activated.
- If **[Stator Frequency]** (StFr) rises and reaches **[SLS tolerance threshold]** (SLtt), safety function STO is activated and an error is triggered with error code **[Safe function fault]** (SAFF).

Behavior when safety function SLS type 3 is activated

SLS type 3 exhibits the same behavior as SLS type 2 with the following exception: If **[Stator Frequency]** (StFr) is above **[SLS tolerance threshold]** (SLtt), safety function SS1 is activated instead of deceleration occurring to **[Reference]** (SLSP) (see case A).



[A]: **[Stator Frequency]** (StFr) is above **[SLS tolerance threshold]** (SLtt).

[B]: **[Stator Frequency]** (StFr) is between **[Reference]** (SLSP) and **[SLS tolerance threshold]** (SLtt).

[C]: **[Stator Frequency]** (StFr) is between **[Standstill level]** (SSSL) and **[Reference]** (SLSP).

[D]: **[Stator Frequency]** (StFr) is below **[Standstill level]** (SSSL) and **[SLS Wait time]** (SLwt) ≠ 0.

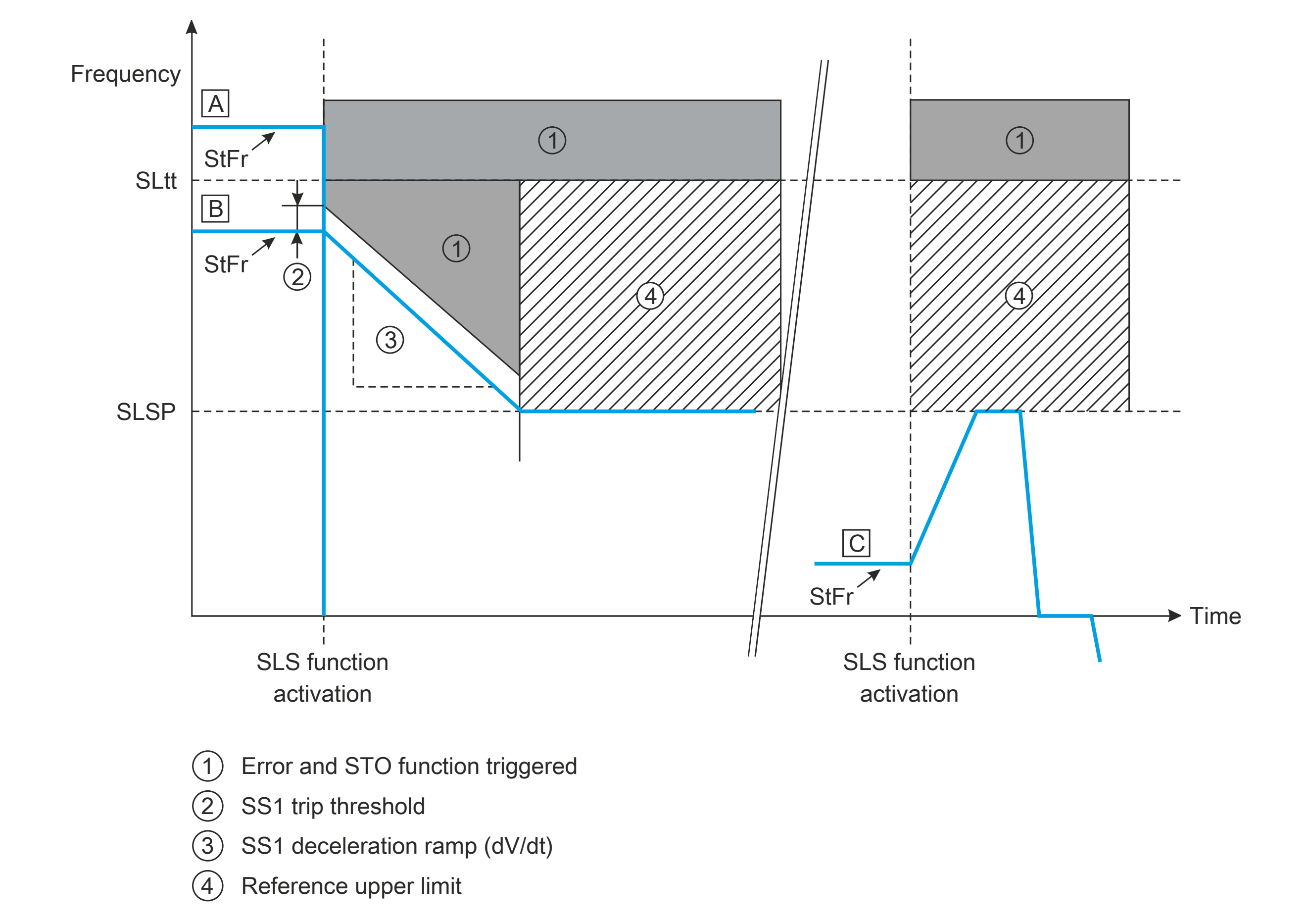
When the function is activated:

- If **[Stator Frequency]** (StFr) is above **[SLS tolerance threshold]** (SLtt), safety function SS1 is activated (see case A).
- If **[Stator Frequency]** (StFr) is between **[SLS tolerance threshold]** (SLtt) and **[Reference]** (SLSP), the frequency inverter decelerates in accordance with the SS1 deceleration ramp until **[Reference]** (SLSP) has been reached (see case B).
- If **[Stator Frequency]** (StFr) is below **[Reference]** (SLSP), the current reference value is not changed but is instead limited to just **[Reference]** (SLSP) (see case C).
- If **[Stator Frequency]** (StFr) is still below **[Standstill level]** (SSSL) of the frequency after **[SLS Wait time]** (SLwt) has expired, safety function STO is activated (see case D).

While the function is activated:

- The reference frequency value can only vary between **[Reference]** (SLSP) and **[Standstill level]** (SSSL).
- If **[Stator Frequency]**(StFr) falls and reaches **[Standstill level]** (SSSL) of the frequency, safety function STO is activated.
- If **[Stator Frequency]** (StFr) rises and reaches **[SLS tolerance threshold]** (SLtt), safety function STO is activated and an error is triggered with error code **[Safe function fault]** (SAFF).

Behavior when safety function SLS type 4 is activated



[A]: **[Stator Frequency]** (StFr) is above **[SLS tolerance threshold]** (SLtt).

[B]: **[Stator Frequency]** (StFr) is between **[Reference]** (SLSP) and **[SLS tolerance threshold]** (SLtt).

[C]: **[Stator Frequency]** (StFr) is below **[Reference]** (SLSP).

Advice:

If (SLTT) ≤ (SLSP) for SLS type 4, an SAFF error is triggered.

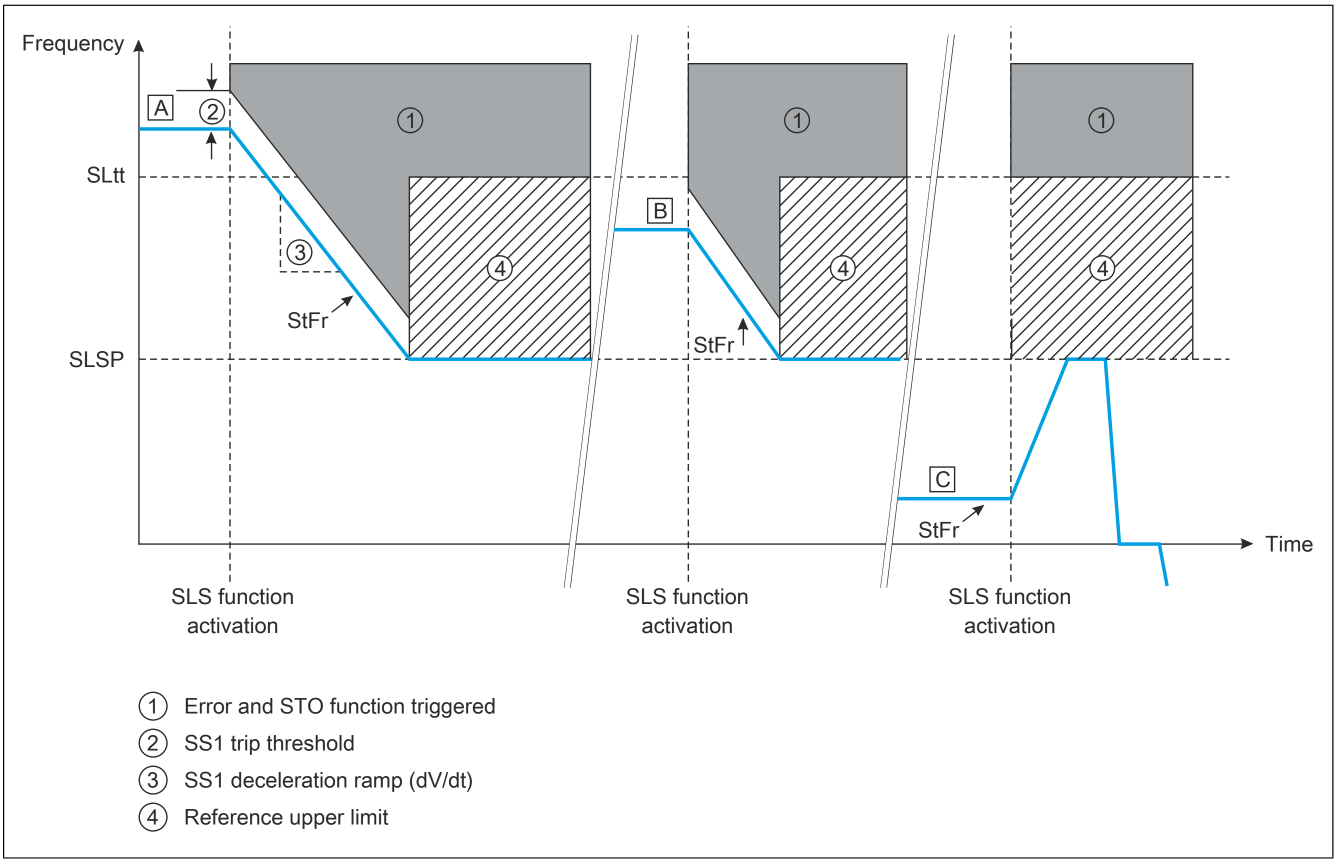
When the function is activated:

- If **[Stator Frequency]** (StFr) is above **[SLS tolerance threshold]** (SLtt), safety function STO and error code **[Safe function fault]** (SAFF) are activated (see case A).
- If **[Stator Frequency]** (StFr) is between **[SLS tolerance threshold]** (SLtt) and **[Reference]** (SLSP), the frequency inverter decelerates in accordance with the SS1 deceleration ramp until **[Reference]**(SLSP) has been reached (see case B).
- If **[Stator Frequency]** (StFr) is below **[Reference]** (SLSP), the current reference value is not changed but is instead limited to just **[Reference]** (SLSP) (see case C).

While the function is activated:

- The reference frequency value can vary between **[Reference]** (SLSP) in both directions.
- If **[Stator Frequency]** (StFr) rises and reaches **[SLS tolerance threshold]** (SLtt), safety function STO is activated and an error is triggered with error code **[Safe function fault]** (SAFF).

Behavior when safety function SLS type 5 is activated



[A]: **[Stator Frequency]** (StFr) is above **[SLS tolerance threshold]** (SLtt).

[B]: **[Stator Frequency]** (StFr) is between **[Reference]** (SLSP) and **[SLS tolerance threshold]** (SLtt).

[C]: **[Stator Frequency]** (StFr) is below **[Reference]** (SLSP).

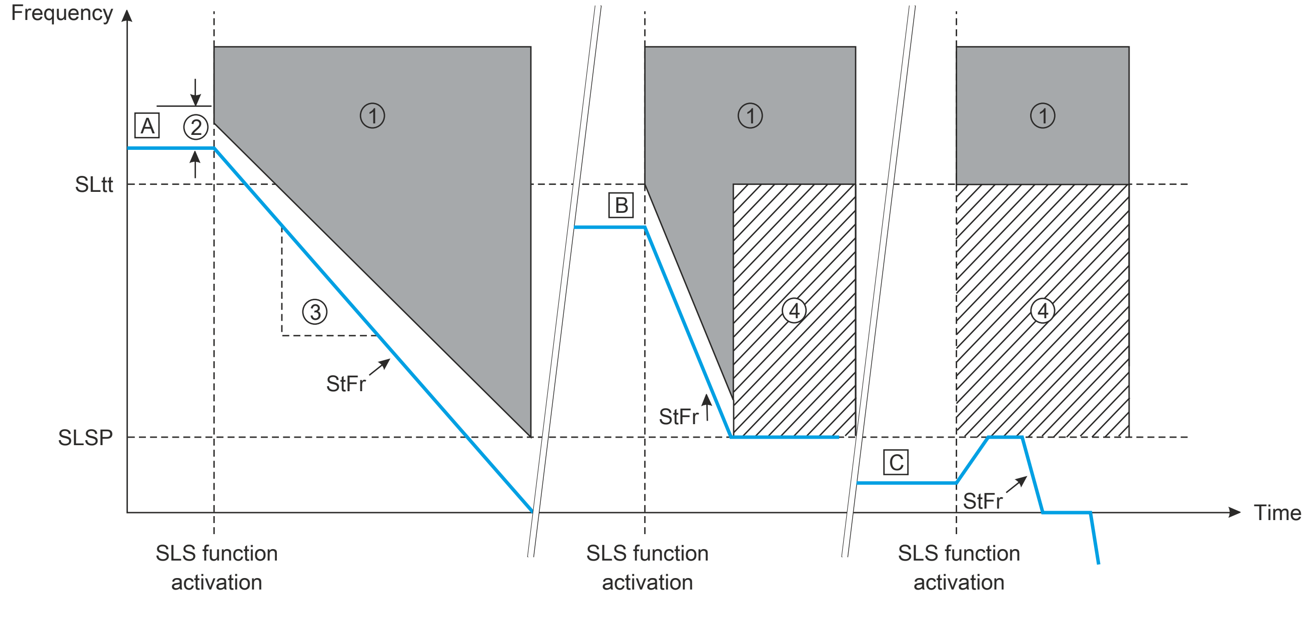
When the function is activated:

- If **[Stator Frequency]** (StFr) is above **[SLS tolerance threshold]** (SLtt), the frequency inverter decelerates in accordance with the SS1 deceleration ramp until **[Reference]** (SLSP) has been reached (see case A).
- If **[Stator Frequency]** (StFr) is between **[SLS tolerance threshold]** (SLtt) and **[Reference]** (SLSP), the frequency inverter decelerates in accordance with the SS1 deceleration ramp until **[Reference]** (SLSP) has been reached (see case B).
- If **[Stator Frequency]** (StFr) is below **[Reference]** (SLSP), the current reference value is not changed but is instead limited to just **[Reference]** (SLSP) (see case C).

While the function is activated:

- The reference frequency value can vary between **[Reference]** (SLSP) in both directions.
- If **[Stator Frequency]** (StFr) rises and reaches **[SLS tolerance threshold]** (SLtt), safety function STO is activated and an error is triggered with error code **[Safe function fault]** (SAFF).

Behavior when safety function SLS type 6 is activated



① Error and STO function triggered
② SS1 trip threshold
③ SS1 deceleration ramp (dV/dT)
④ Reference upper limit
⑤ STO function triggered

[A]: **[Stator Frequency]** (StFr) is above **[SLS tolerance threshold]** (SLtt).

[B]: **[Stator Frequency]** (StFr) is between **[Reference]** (SLSP) and **[SLS tolerance threshold]** (SLtt).

[C]: **[Stator Frequency]** (StFr) is below **[Reference]** (SLSP).

When the function is activated:

- If **[Stator Frequency]** (StFr) is above **[SLS tolerance threshold]** (SLtt), the frequency inverter decelerates in accordance with the SS1 deceleration ramp until a value of 0 Hz has been reached (see case A).
- If **[Stator Frequency]** (StFr) is between **[SLS tolerance threshold]** (SLtt) and **[Reference]** (SLSP), the frequency inverter decelerates in accordance with the SS1 deceleration ramp until **[Reference]** (SLSP) has been reached (see case B).
- If **[Stator Frequency]** (StFr) is below **[Reference]** (SLSP), the current reference value is not changed but is instead limited to just **[Reference]** (SLSP) (see case C).

While the function is activated:

- The reference frequency value can vary between **[Reference]** (SLSP) in both directions.
- If **[Stator Frequency]** (StFr) rises and reaches **[SLS tolerance threshold]** (SLtt), safety function STO is activated and an error is triggered with error code **[Safe function fault]** (SAFF).

Behavior when safety function SLS is deactivated for all SLS types

If...	Then...
The frequency inverter is still operational when the function is deactivated.	The frequency setpoint of the active channel is applied.
Safety function STO was activated and the frequency inverter is not in an error state.	A new move command must be applied.
Safety function SLS types 2, 3 and 4 are deactivated while the frequency inverter is decelerating to [Reference] (SLSP) according to the SS1 deceleration ramp. Safety function SLS type 3 is deactivated while safety function SS1 is activated.	Safety function SLS remains activated until [Reference] (SLSP) has been reached. STO is activated. If [Standstill level] (SSSL) is reached and a new move command must be applied.
A stop command is applied.	Safety function "SLS" remains enabled and the frequency inverter decelerates until it comes to a standstill. Function STO will be activated for SLS type 1, 2 or 3 if [Stator Frequency] (StFr)decreases and the frequency reaches [Standstill level] (SSSL).
An error is detected.	Safety function "SLS" remains active and the frequency inverter is running according to the configured error response. Function STO will be activated for SLS type 1, 2 or 3 after [Standstill level] (SSSL) of the frequency has been reached. The frequency inverter can be reset as soon as the error is resolved.

SLS reference guidelines

Safety function SLS is defined in section 4.2.3.4 of the IEC standard 61800-5-2 as follows: Function SLS helps to prevent the motor speed from exceeding the defined limit value.

Safety function level (SF) of safety function SLS

Configuration	SIL Safety integrity level in accordance with IEC 61508	PL Power stage per ISO 13849-1
LI3 and LI4	SIL 2	PL d
LI5 and LI6	SIL 2	PL d

6.2.4 Safety function SMS (Safe Maximum Speed)

Overview

This function prevents the motor speed from exceeding the defined safe maximum speed limit value.

Safety function SMS is configured using the commissioning software. For more information, see "Commissioning" on page 519.

Parameter [SMS Activation] (SMSA) activates and deactivates function SMS.

The following parameters can be used to define two speed limit values:

- [SMS Low Limit] (SMLL): Used for selecting the lower speed limit.
- [SMS High Limit] (SMLH): Used for selecting the upper speed limit.

Depending on setting [SMS Assignment] (SMLS), [SMS Low Limit] (SMLL) or [SMS High Limit] (SMLH) apply as the limit value for the safe maximum speed.

If[SMS Assignment] (SMLS) is set to L34 or L56 (logic input 3 and 4 or logic input 5 and 6), the following applies:

- If logic input is Low (0), [SMS Low Limit] (SMLL) applies as the limit value for the safe maximum speed.
- If logic input is High (1), [SMS High Limit] (SMLH) applies as the limit value for the safe maximum speed.

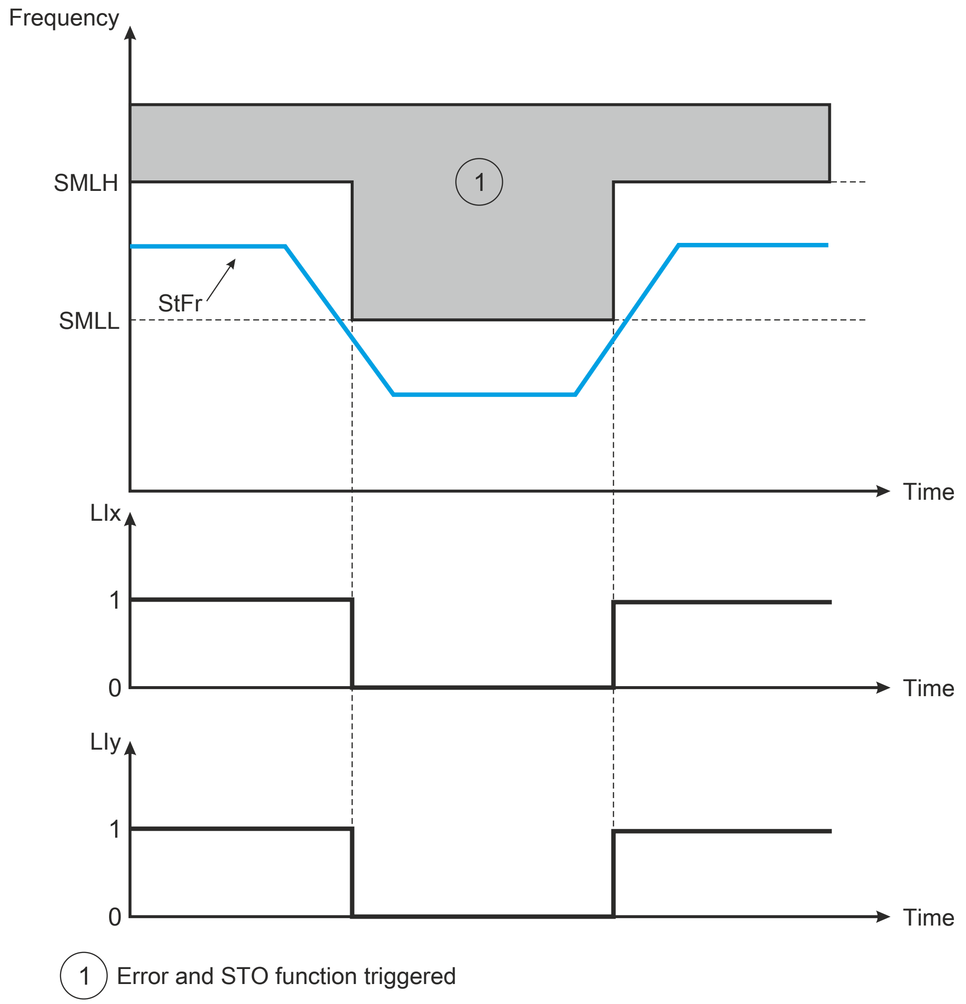
If[SMS Assignment] (SMLS) is set to NO, [SMS Low Limit] (SMLL) applies as the limit value for the safe maximum speed.

Advice:

- **Function SMS is not used to set the speed setpoint.**
- **The speed setpoint should be set via an active speed setpoint channel according to the setting for [SMS Low Limit] (SMLL) and [SMS High Limit] (SMLH).**

The state of safety function SMS is displayed on the graphic display terminal of the frequency inverter and on the monitoring tab of the commissioning software.

Behavior when safety function SMS is activated



While the function is activated, the following applies:

- When logic inputs (LIx and LIy) are Low (0) and **[Stator Frequency]** (StFR) increases and reaches **[SMS Low Limit]** (SMLL), function STO is triggered and an error with error code **[Safe function fault]** (SAFF) is displayed.
- When logic inputs (LIx and LIy) are High (1) and **[Stator Frequency]** (StFR) increases and reaches **[SMS High Limit]** (SMLH), function STO is triggered and an error with error code **[Safe function fault]** (SAFF) is displayed.
- When logic inputs (LIx and LIy) are not assigned and**[Stator Frequency]** (StFR) increases and reaches **[SMS Low Limit]** (SMLL), function STO is triggered and an error with error code **[Safe function fault]** (SAFF) is displayed.

Reference guidelines for function SMS

Safety function SMS is not defined in the IEC 61800-5-2 guidelines. Function SMS prevents the motor speed from exceeding the specified speed limit. If the motor speed exceeds the specified speed limit, safety function STO is triggered. Function SMS can only be activated and deactivated with the commissioning software. When the function is deactivated , it continuously monitors the stator frequency irrespective of the operating mode.

Safety function level (SF) of safety function SMS

Configuration	Safety Integrity Level (SIL) in accordance with IEC 61508	Power stage (PL) per ISO 13849-1
LI3 and LI4	SIL 2	PL d
LI5 and LI6	SIL 2	PL d
No	SIL 2	PL d

6.2.5 Safety function GDL (safety gate interlock)

Overview

This function is used to unlock the safety gate after a preset delay when the motor is switched off. The front door of the machine can only be opened when the motor has been switched off beforehand. This function is designed to help ensure user safety.

For details of the certified wiring diagram see single motor drive according to IEC 61508 and IEC 62061 for function GDL (see "Single drive in accordance with IEC 61508 and IEC 62061 with the GDL safety function." on page 518).

Parameter **[GDL Assignment]** (GDLA) activates and deactivates function GDL.

Function GDL uses parameter LO1.

The following parameters can be used to set two delays.

- **[GDL Long Delay]** (GLLD): Long delay after any stop command (e.g. STO, stop ramp, DC injection braking) except SS1 stop ensures that the machine is stopped.
- **[GDL Short Delay]** (GLSD): Short delay after SS1 ramp to ensure that the machine is stopped.

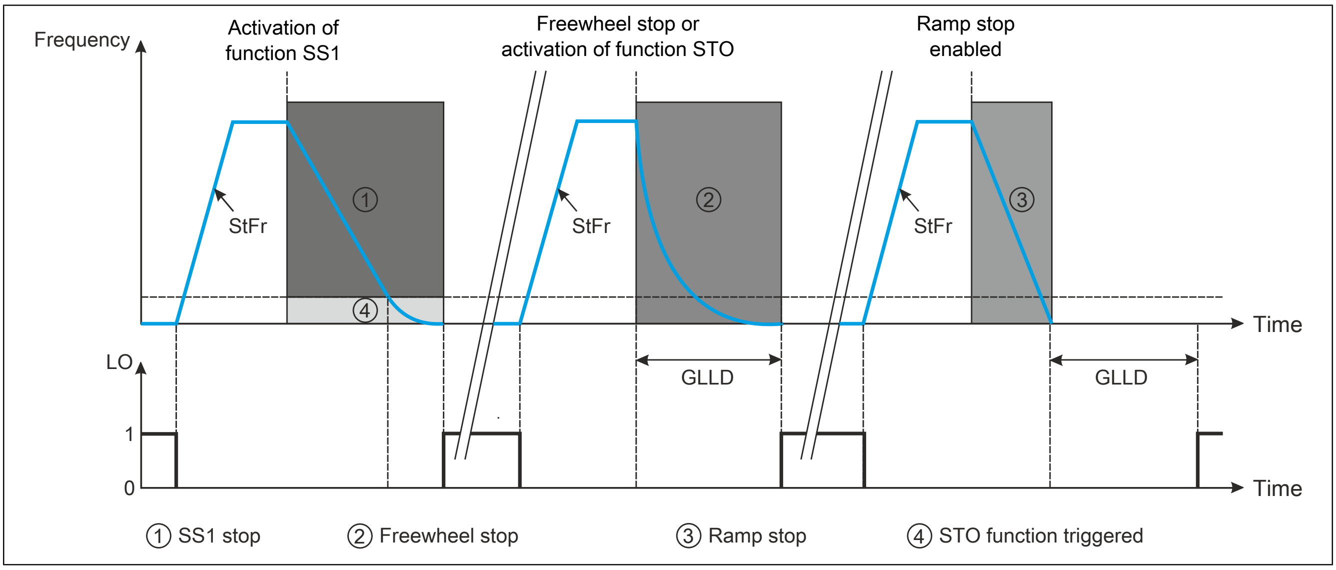
Advice:

[GDL Long Delay] (GLLD) and [GDL Short Delay] (GLSD) will be defined on the basis of the characteristics and requirements of the machine.

Safety function GDL is configured using the commissioning software. For more information, see "Commissioning" on page 519.

The state of safety function GDL is displayed on the graphic display terminal of the frequency inverter and on the monitoring tab of the commissioning software.

Behavior when safety function GDL is activated



While the function is activated, the following applies:

- If safety function SS1 is triggered, logic output (LO) changes to High (1) after **[Guard Door Locking Short Delay]** (GLSD) expiry and the safety gate is unlocked.
- If a stop is triggered with a freewheel stop or safety function STO is triggered, logic output (LO) changes to High (1) after **[Guard Door Locking Long Delay]** (GLLD) expiry and the safety gate is unlocked.
- If a ramp stop is triggered, logic output (LO) changes to High (1) after **[Guard Door Locking Long Delay]** (GLLD) expiry and the safety gate is unlocked.

Reference guidelines for function GDL

Safety function GDL is not defined in the IEC 61800-5-2 guidelines. Function GDL enables the unlocking of the safety gate when the motor is switched off.

Safety function level (SF) of safety function GDL

Configuration	Safety Integrity Level (SIL) in accordance with IEC 61508	Power stage (PL) per ISO 13849-1
STO with safety module	SIL 1	PL c

6.3 Calculation of parameters relating to safety

6.3.1 SLS type 1

Record application data

The following data must be recorded before beginning to configure function SLS:

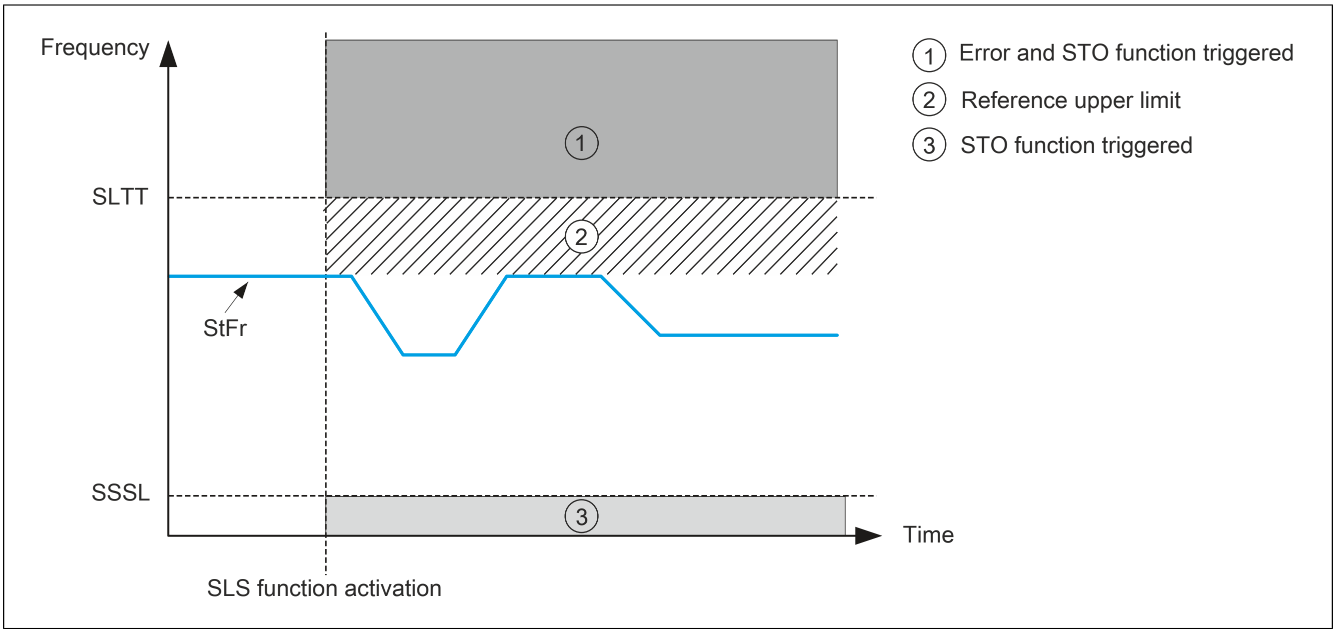
Code	Description	Unit	Note
(FrS)	[Rated motor freq.]	Hz	See motor nameplates.
(nSp)	[Rated motor speed]	rpm	See motor nameplates.
ppn	Number of motor pole pairs	-	See motor nameplates.
Max. HSP freq	Maximum motor frequency in normal operation.	Hz	This value is equal to or lower than value [High speed] (HSP).

Calculation of the nominal value of slip compensation "Fslip" (Hz) for the motor:

$$Fslip = FrS - \frac{Nsp \times ppn}{60}$$

Configuration of the function

Outline diagram



Standstill value

The recommended standstill value is: *SSSL = Fslip*

If a different standstill value is required for the application, it can be configured in accordance with parameter SSSL.

Threshold value of the output frequency.

The recommended parameter value is *SLtt = 1.2 x Max. freq HSP + Fslip*

Test and set the configuration

Once configured, check that function SLS behaves as expected.

If an error is triggered with error code[Safe function fault] (SAFF), follow the corrective measures detailed below.

Context	Inverter state	Tuning the inverter
SLS activated and motor running with frozen frequency setpoint	• SAFF error code • SFFE.7 = 1	Motor frequency has reached its threshold value. An instability in the frequency may be the reason for the error. Check and correct the cause. The value of SLtt can be changed to increase the tolerance value according to the instability of the drive system.

Example

Code	Description	Unit
(FrS)	**[Rated motor freq.]**	50 Hz
(nSp)	**[Rated motor speed]**	1350 rpm
ppn	Number of motor pole pairs	2
Max. HSP freq	Maximum motor frequency in normal operation. This value is equal to or lower than value **[High speed]** (HSP).	50 Hz

With these numeric values, the configuration of SLS type 1 is as follows:

$$Fslip = 50 - \frac{1350 \times 2}{60} = 5 \ Hz$$

SSSL = Fslip = 5 Hz

SLtt = 1.2 x Max. freq HSP + Fslip = 1.2 x 50 + 5 = 65 Hz

6.3.2 SLS type 2, type 3, type 4, type 5 and type 6

Record application data

The following data must be recorded before beginning to configure function SLS:

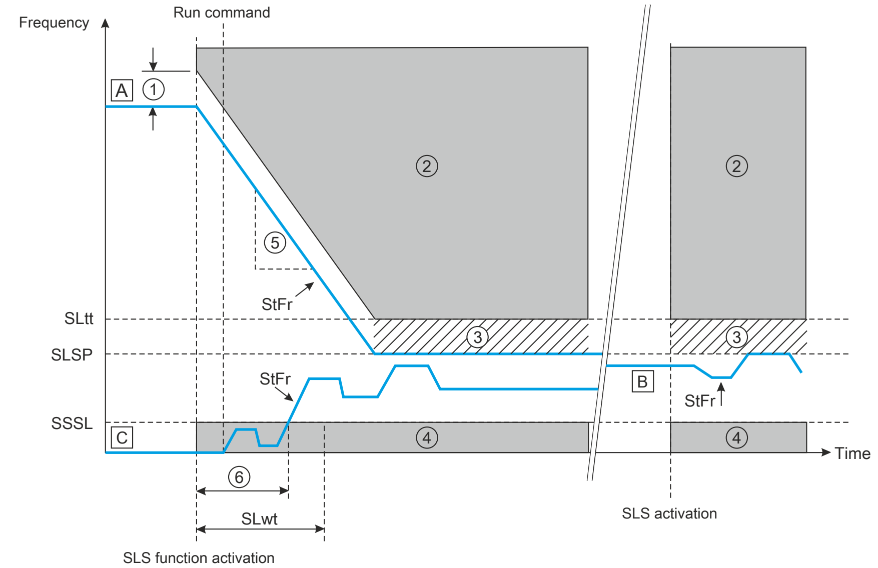
Code	Description	Unit	Note
(FrS)	**[Rated motor freq.]**	Hz	See motor nameplates.
(nSp)	**[Rated motor speed]**	rpm	See motor nameplates.
ppn	Number of motor pole pairs	-	See motor nameplates.
Max. HSP freq	Maximum motor frequency in normal operation.	Hz	This value is equal to or lower than value **[High speed]** (HSP).
SS1 deceleration ramp	Deceleration ramp to be applied when SS1 ramp is triggered	Hz	-

Calculation of the nominal value of slip compensation "Fslip" (Hz) for the motor:

$$Fslip = FrS - \frac{Nsp \times ppn}{60}$$

Configuration of the function

Outline diagram



[A]: **[Stator Frequency]** (StFr) is above **[Reference]** (SLSP).

[B]: **[Stator Frequency]** (StFr) is between **[Standstill level]** (SSSL) and **[Reference]** (SLSP).

[C]: **[Stator Frequency]** (StFr) is under **[Standstill level]** (SSSL) and **[SLS delay]** (SLwt) ≠ 0.

Standstill value

The recommended standstill value is: *SSSL = Fslip* If a different standstill value is required for the application, it can be configured in accordance with parameter SSSL.

Ramp value and ramp unit

Set parameter (SSrt) (ramp value) and (SSrU) (ramp unit) according to the deceleration ramp that is to be applied when safety function SS1 is activated.
Ramp calculation: Ramp = SSrU x SSrt
Example 1: If SSrU = 1 Hz/s and SSrt = 500.0, the deceleration ramp is 500.0 Hz/s and the accuracy is 0.1 Hz.
Example 2: If SSrU = 10 Hz/s and SSrt = 50.0, the deceleration ramp is 500 Hz/s and the accuracy is 1 Hz.
Use the table to set the correct accuracy according to the deceleration ramp to be applied when safety function SS1 is activated.

Min.	Max.	Accuracy	SSrt	SSrU
0.1 Hz/s	599 Hz/s	0.1 Hz/s	1 Hz/s	SS1 deceleration ramp
599 Hz/s	5990 Hz/s	1 Hz/s	10 Hz/s	SS1 deceleration ramp/10
5990 Hz/s	59900 Hz/s	10 Hz/s	100 Hz/s	SS1 deceleration ramp/100

SLS setpoint

Set SLS setpoint parameter (SLSP) to: *SLSP= Fsetpoint (SLS)*

Motor frequency and ramp threshold value

The recommended motor frequency threshold value is *SLtt = 1.2 x SLSP + Fslip* and the recommended threshold value of the SS1 ramp is *SStt = 0.2 x Max. Freq HSP*.

SLS delay

Set **[SLS delay]** (SLwt) to a value over 0 ms, so that over a specific time frame the motor can run under **[Standstill level]** (SSSL), once safety function SLS has been activated.

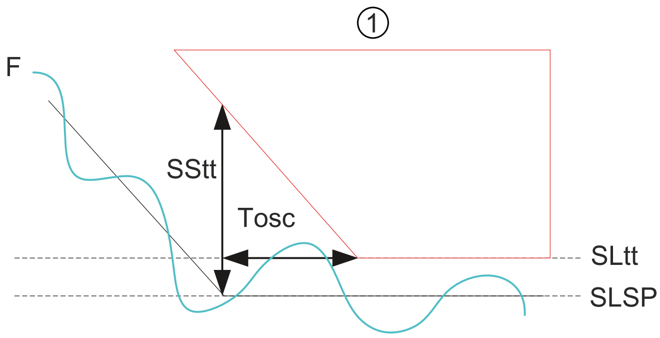
Advice:

When SLS type 4 is configured, [SLS delay] (SLwt) must be set to 0, as otherwise an error is triggered and error code [Safe function fault] (SAFF) is displayed.

Test and set the configuration

Once configured, check that function SLS behaves as expected.

If an error is triggered with error code **[Safe function fault]**(SAFF), follow the corrective measures detailed below.

Context	Inverter state	Tuning the inverter
SLS activated and deceleration ramp in progress	• SAFF error code • SFFE.3 = 1	Motor frequency has reached its threshold value. An instability in the frequency may be the reason for the error. Check and correct the cause. The value of SLtt can be changed to increase the tolerance value in correspondence to the drive system instability.
SLS activated and ramp end at SLSP frequency	• SAFF error code • SFFE.3 = 1 or • SFFE.7 = 1	Stabilization of the motor frequency at SLSP is taking too long and has reached the error detection conditions of the safety function.  1 Safety function error detection Tosc: T oscillation F: Frequency The fluctuations must fall below (SLtt), before time frame T (oscillation) has expired. If the condition has not been removed, an error will be triggered and error code **[Safe function fault]** (SAFF) is displayed. The relationship between (SStt) and T (oscillation) is as follows: $T\left(osc\right)=\frac{SSTT - \left(SLTT - SLSP - Fslip\right)}{SSRT \times SSRU}$ Motor frequency has reached its threshold value. An instability in the frequency may be the reason for the error. Check and correct the cause. The value of SStt can be changed to increase the tolerance value according to the fluctuations of the drive system.
SLS activated and motor running with SLSP frequency	• SAFF error code • SFFE.7 = 1	Motor frequency has reached its threshold value. An instability in the frequency may be the reason for the error. Check and correct the cause. The value of SLtt can be changed to increase the tolerance value in correspondence to the drive system instability.

Example

Code	Description	Unit
(FrS)	Rated motor frequency	50 Hz
(nSp)	Rated motor speed	1,350 rpm
ppn	Number of motor pole pairs	2
Max. HSP freq	Maximum motor frequency in normal operation. This value is equal to or lower than value **[High speed]** (HSP).	50 Hz
Fsetpoint(SLS)	Motor frequency setpoint	15 Hz
SS1 deceleration ramp	Deceleration ramp to be applied when SS1 is triggered	20 Hz/s

With these numeric values, the configuration of SLS types 2, 3 and 4 is as follows:

$$Fslip = 50 - \frac{1350 \times 2}{60} = 5 \ Hz$$

SSSL = *Fsl*ip = 5 Hz
SSrU = 1 Hz/s and *SSrt* = 20 when SS1 deceleration ramp = 20 Hz/s (accuracy: 0.1 Hz)
SLSP = *Fsetpoint(SLS)* = 15 Hz
SLtt = 1.2 x *SLSP* + *Fslip* = 1.2 x 15 + 5 = 23 Hz
SStt = 0.2 x Max. Freq HSP = 0.2 x 50 = 10 Hz

$$T\left(oscillation\right) = \frac{SSSt - \left(SLtt - SLSP - Fslip\right)}{SSrt \times SSrU} = \frac{10 - \left(23 - 15 - 5\right)}{20 \times 1} = 350 \ ms$$

In this example, the frequency fluctuations are permitted to exceed SLtt for 350 ms.

6.3.3 SS1

Record application data

The following data must be recorded before configuring function SS1:

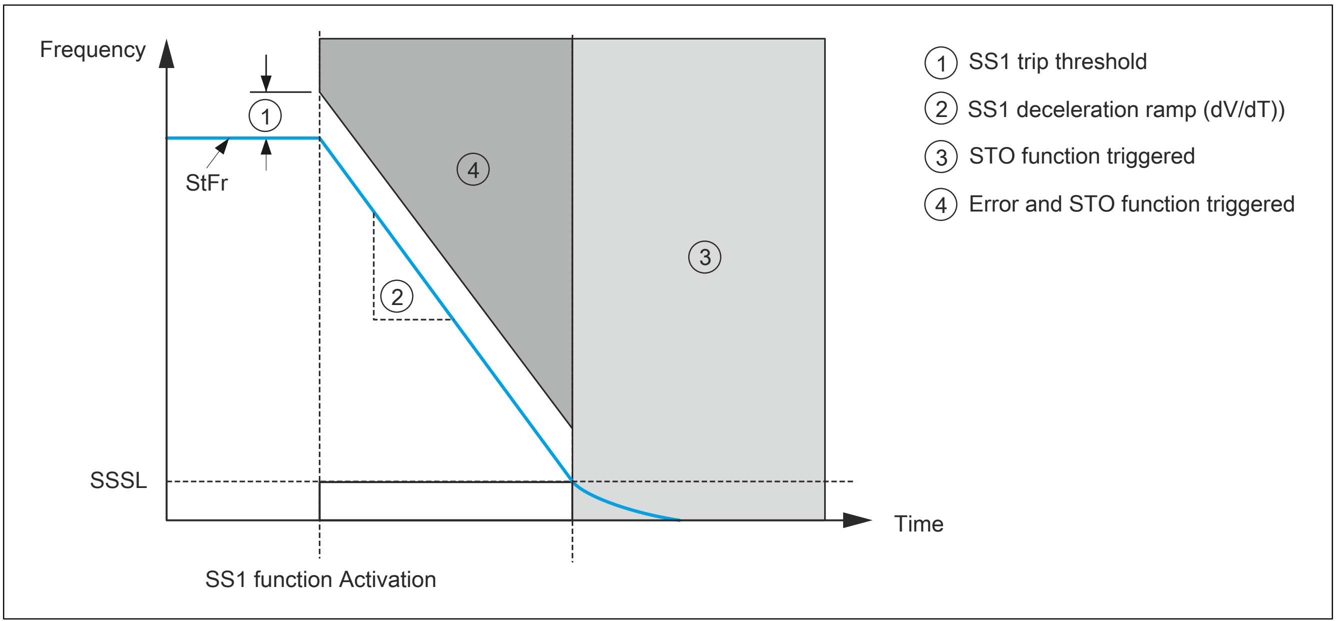
Code	Description	Unit	Note
FrS	Rated motor frequency	Hz	From the motor
(nSp)	Rated motor speed	rpm	From the motor
ppn	Number of motor pole pairs	-	From the motor
Max. HSP freq	Maximum motor frequency in normal operation.	Hz	This value is equal to or lower than value **[High speed]** (HSP).

Calculation of the nominal value of slip compensation "Fslip" (Hz) for the motor:

$$Fslip = FrS - \frac{Nsp \times ppn}{60}$$

Configuration of the function

Outline diagram



Standstill value

The recommended standstill value is: *SSSL = Fslip*
If a different standstill value is required for the application, it can be configured in accordance with parameter SSSL.

Ramp value and ramp unit

Set parameter SSrt (ramp value) and SSrU (ramp unit) according to the deceleration ramp to be applied when safety function SS1 is activated.
Ramp calculation: Ramp = SSrU x SSrt
Example 1: If SSrU = 1 Hz/s and SSrt = 500, the deceleration ramp is 500 Hz/s and the accuracy is 0.1 Hz.
Example 2: If SSrU = 10 Hz/s and SSrt = 50, the deceleration ramp is 500 Hz/s and the accuracy is 1 Hz.
Use the table to set the correct accuracy according to the deceleration ramp to be applied when safety function SS1 is activated.

Min.	Max.	Accuracy	SSrU	SSrt
0.1 Hz/s	599 Hz/s	0.1 Hz/s	1 Hz/s	SS1 deceleration ramp
599 Hz/s	5990 Hz/s	1 Hz/s	10 Hz/s	SS1 deceleration ramp/10
5990 Hz/s	59900 Hz/s	10 Hz/s	100 Hz/s	SS1 deceleration ramp/100

Ramp threshold

The limit value for ramp activation SS1 will be calculated as follows: *SStt = 0.2 x Max. Freq HSP*
This value is equal to or lower than value **[High speed]** (HSP).

Test and set the configuration

Once configured check that safety function SS1 behaves as expected.
If an error is triggered with error code **[Safe function fault]** (SAFF), follow the corrective measures detailed below.

Context	Inverter state	Tuning the inverter
SS1 activated and **[Standstill level]** (SSSL) has not been reached yet	• SAFF error code • SFFE.3 = 1	Motor frequency has reached its threshold value. An instability in the frequency may be the reason for the error. Check and correct the cause. The value of SStt can be changed to increase the tolerance value according to the instability of the drive system.

Example

Code	Description	Unit
(FrS)	Rated motor frequency	50 Hz
(nSp)	Rated motor speed	1,350 rpm
ppn	Number of motor pole pairs	2
Max. HSP freq	Maximum motor frequency in normal operation.	50 Hz
SS1 decel-eration ramp	Deceleration ramp to be applied when SS1 is triggered	20 Hz/s

With these numeric values, the configuration of SS1 is as follows:

$$Fslip = 50 - \frac{1350 \times 2}{60} = 5 \ Hz$$

SSSL = *Fslip* = 5 Hz
SSrU = 1 Hz/s and *SSrt* = 20 when SS1 deceleration ramp = 20 Hz/s (accuracy: 0.1 Hz)
SStt = 0.2 x *Max. Freq HSP* = 0.2 x 50 = 10 Hz

6.3.4 SMS

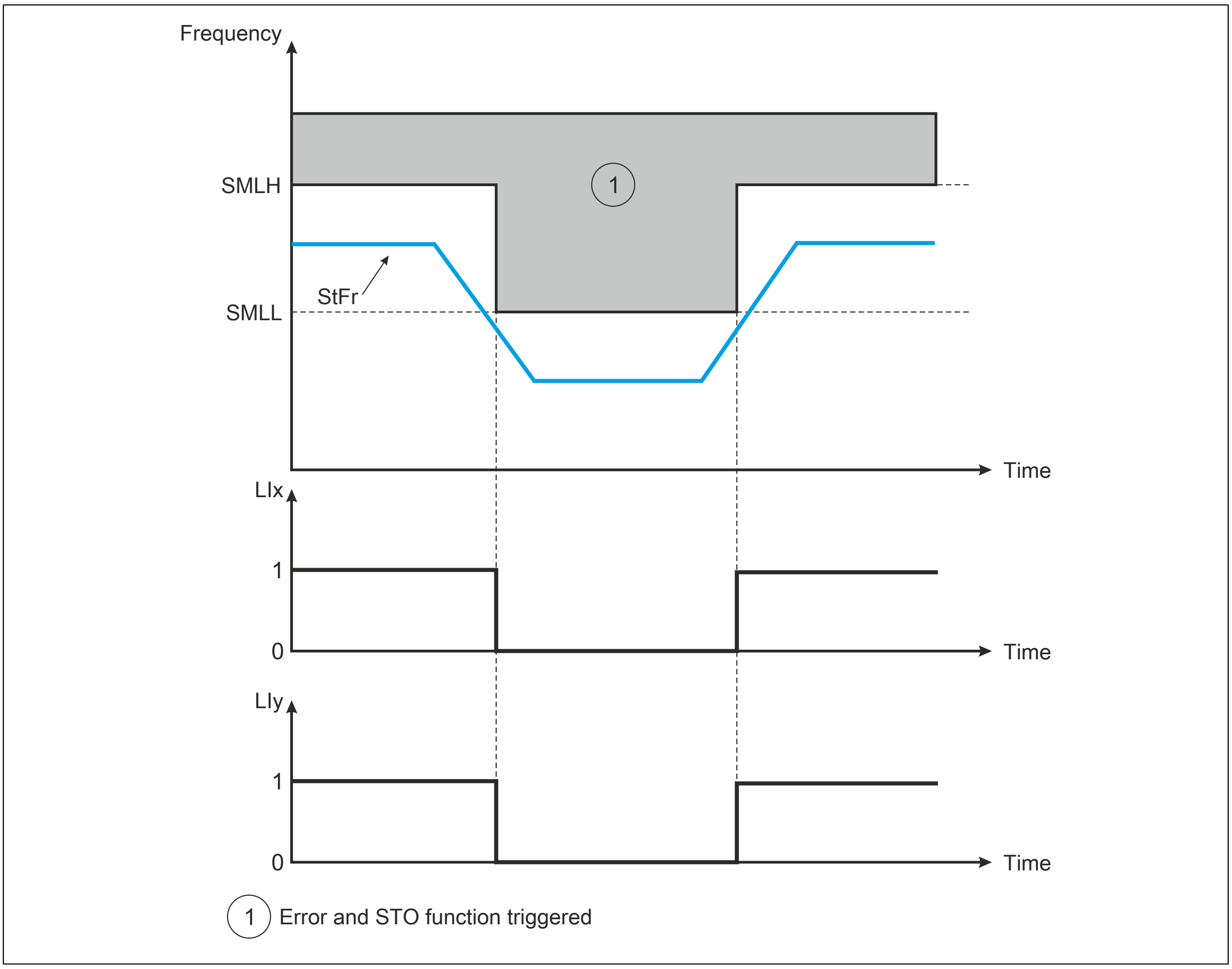
Record application data

The following data must be recorded before beginning to configure function SMS:

Code	Description	Unit	Note
PPn	Number of motor pole pairs	-	See motor nameplates.

Max. output frequency in Hz = ((Max. speed in U/Min)/60)* PPn

Configuration of the function



SMLL > Max. output frequency
SMLH > Max. output frequency

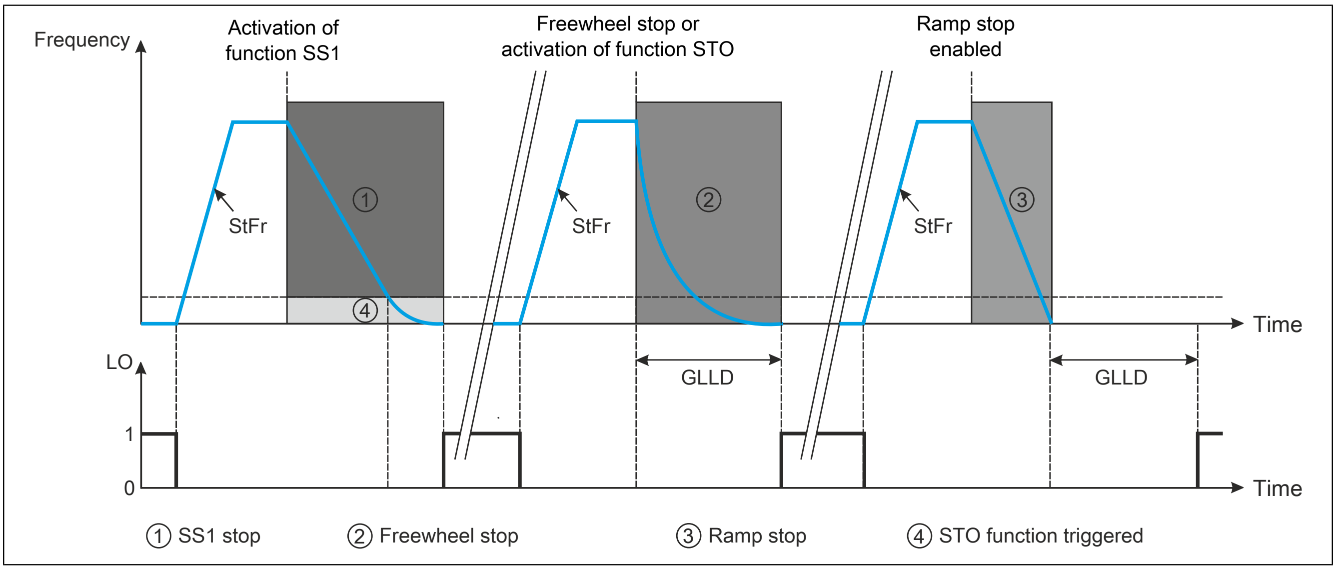
6.3.5 GDL

Record application data

The following data must be recorded before beginning to configure function GDL:

Code	Description	Unit	Note
(GLSD)	[GDL short delay]	s	Maximum delay after the SS1 ramp to stop the machine.
(GLLD)	[GDL long delay]	s	Maximum delay after activation of function STO or after a normal deceleration ramp command to stop the machine.

Configuration of the function



Test and set the configuration

Once the configuration of GDL is completed:

- Activate safety function SS1 and check whether the logic output on stopping the machine changes to High (1).
- Activate safety function STO and check whether the logic output on stopping the machine changes to High (1).

6.4 Behavior of safety functions

6.4.1 Limitations

Motor type

Safety functions SLS, SS1 and SMS for the ACOPOSinverter are only applicable for induction motors with open-loop control.

Safety functions STO and GDL can be used with synchronous and induction motors.

Requirements for using safety functions

The following conditions must be met for smooth operation:

- The motor is sized for this application and is not at the capacity limit.
- The frequency inverter has been sufficiently configured taking into account the electrical data such as mains voltage, sequence and motor as well as the conditions of use and is not at the limit of its capacity.
- If required, the appropriate options will be used.
  Example: Brake resistor or motor choke.
- The inverter has been well adjusted to the speed and torque requirements of the application; The frequency setpoint profile applied to the frequency inverter control loop is followed.

Logic input requirements

- Mode "sink" will not be used with safety function. If you are using the safety function, you must connect the logic input in mode "Source".
- PTC on LI6 is not compatible with the safety function provided on this input. When using safety function on LI6, do not set the PTC switch to PTC.
- If you use the pulse input, you cannot set the safety function on LI5 at the same time.

6.4.2 Error inhibition

If a safety function has been configured, error **[Safe function fault]** (SAFF) cannot be inhibited using function **[Fault inhibit assign.]** (InH)

6.4.3 Priority of safety functions

1) Safety function "STO has the highest priority. If safety function STO is triggered, a safe torque shutdown takes place independently of the other active functions.
2) Safety function SS1 has medium priority compared to the other safety functions.
3) Safety functions SLS and GDL have the lowest priority.

6.4.4 Factory settings

If the safety functions are configured and you restore the factory settings, only the parameters that do not relate to safety are reset to the factory settings. The settings of parameters that relate to safety can only be reset with the setup software. For more information, see "Commissioning" on page 519.

6.4.5 Configuration download

You can transfer a configuration in all situations. If a safety function has been configured, then the functions that are using the same logic inputs are not configured.

Example: If the downloaded configuration comprises functions (preset speed, etc.) on LI3-4-5-6 and a safety function has been configured on these logic inputs in the frequency inverter, then the safety function is not cleared. Functions with the same logic inputs as safety functions are not transferred. Modes "Multiple configuration/multi-motor" and "Macro configuration" are subject to the same rules.

6.4.6 Priority of safety functions and functions that do not relate to safety

For more information about these functions see "Using the ACOPOSinverter without Automation Studio" on page 115.

o: Compatible functions

x: Incompatible functions

▲◄: The function indicated by an arrow has priority over the other function.

Function of the frequency inverter	SLS	SS1	STO	SMS
[High speed hoisting optim] (HSH-)	▲	▲	▲	▲
[+/- speed] (UPd-)	▲	▲	▲	▲
[Skip Frequency] (JPF)	▲	o	o	▲
[Low speed time out] (tLS)	o	o	▲	o
[Multimotors] (MMC-)	The configuration must be consistent with the 3 motors.		o	The configuration must be consistent with the 3 motors.
[PRESET SPEEDS] (PSS-)	▲	o	▲	▲
[PID regul.] (PId-)	▲	o	o	▲
[RAMP] (rPt-)	▲	▲	▲	o
[Freewheel] (nSt)	◄	◄	▲	o
[Fast stop assignment] (FSt)	▲: SLS ramp ◄: SLS stable	▲	▲	o
[TRAVERSE CONTROL] (tr0-)	▲	▲	▲	▲
[EXTERNAL ERROR] (EtF-)	◄: NST x: DCI ▲: Fast, ramp, fallback, maintenance		◄: NST ▲: DCI ▲: Fast, ramp, fall-back, maintenance	◄: NST x: DCI ▲: Fast, ramp, fall-back, maintenance
[AUTOMATIC RESTART] (Atr-)	▲	▲	▲	▲
[FAULT RESET] (rSt-)	▲	▲	▲	▲
[JOG] (JOG-)	▲	▲	▲	▲
[STOP CONFIGURATION] (Stt-)				
[Stop ramp] (rMP)	▲: SLS ramp ◄: SLS stable	▲	▲	▲
[Fast stop] (FSt)	▲: SLS ramp ◄: SLS stable	▲	▲	◄
[DC braking] (dCI)	x	x	▲	x
[+- SPEED AROUND REF]] (SrE-)	▲	▲	▲	▲
[Positioning by sensor] (LPO-)	▲: SLS ramp and position not observed	▲: Position not observed	▲	▲
[RP input] (PFrC)	o: If the safety function is not assigned to LI5			
[PROCESS UNDERLOAD] (ULF)	▲	▲	▲	▲
[Process overload] (OLC)	▲	▲	▲	▲
[Rope slack config.] (rSd)	x	x	x	x
[UnderV. prevention] (StP)	x	x	▲	▲
[AUTO DC INJECTION] (AdC-)	x	x	▲	x
[DC braking assignment] (dCI)	x	x	▲	x
[Load sharing] (LbA)	o: If the value of [Stator frequency] (StFr) is over the threshold value of the motor frequency, error SAFF is triggered.	▲	▲	▲
[Motor control type] (Ctt)				
[Standard] (Std)	x	x	o	x
[SVC V] (UUC)	o	o	o	o
[V/F Quad.] (UFq)	x	x	o	x
[Energy Sav.] (nLd)	x	x	o	x
[Sync. mot.] (SYn)	x	x	o	x
[U/F 5 points] (UF5)	x	x	o	x
[Output Phase Loss] (OPL)	x: The safety function detected an output phase loss.		o	x: The safety function detected an output phase loss.
[Output cut] (OAC)	x	x	x	x
[Dec ramp adapt.] (brA)	o: If the value of [Stator frequency] (StFr) is over the threshold value of the motor frequency, error SAFF is triggered.		▲	o
[REF. OPERATIONS] (OAI-)	▲	▲	o	▲
[2 wire] (2C)	o: Run command on transition ▲: Move command at level is not compatible			
[PTC MANAGEMENT] (PtC-)	o: Inactive if the safety function is not assigned to LI6			
[Forced local] (LCF-)	▲	▲	o	▲
[LI configuration]	o: Inactive if the safety function is not assigned to a logic input			
[MULTIMOTORS/CONFIG.] (MMC-)	o: Except for safety relevant parameters			
[Fault inhibition] (InH)	x	x	x	x
[Profile] (CHCF)	The logic input used by a safety function cannot be modified.			
[Macro configuration] (CFG)	▲: The macro configuration can be overlapped if the safety function is using a logic input requested by the macro configuration.			
[Motor short circuit] (SCF1)	▲	▲	o	▲
[Ground short circuit] (SCF3)	▲	▲	o	▲

Function of the frequency inverter	SLS	SS1	STO	SMS
[Overspeed] (SOF)	▲	▲	o	▲
[Sync. mot.] (SYn)	x	x	o	x
[Configuration transfer]	o: Except for safety relevant parameters			
[Energy Sav.] (nLd)	x	x	o	x

6.5 Display of the safety function through HMI

6.5.1 State of safety functions

Description

The state of the safety functions can be displayed using the HMI of the frequency inverter or the setup software. The HMI of the frequency inverter can be the local HMI on the product, the graphic display terminal or the external operator terminal. There is a register for each safety function. For more information about the safety functions Introduction.
You can use this register with an HMI as follows: **[2 MONITORING]** (MOn-) --> **[MONIT. SAFETY]** (SAF-)

- **[STO status]** (StOS): State of safety function STO (Safe Torque Off)
- **[SLS status]** (SLSS): State of safety function SLS (Safe limited speed)
- **[SS1 status]** (SS1S): State of safety function SS1 (Safe Stop 1)
- **[SMS status]** (SMSS): State of safety function SMS (Safe Maximum Speed)
- **[GDL status]** (GDLS): State of safety function GDL (Safety gate interlock)

The state registers are not permitted for any safety-relevant use.

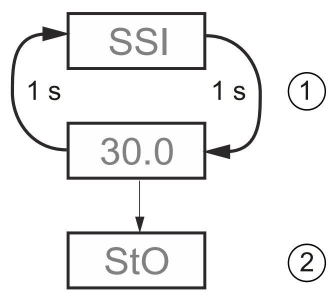
For more information about this register see "Safety functions display and states" on page 525.

6.5.2 Special HMI

Description

If a safety function is triggered, some information is displayed.

Example using the local HMI of the product upon triggering of safety function SS1:



(1) The name of safety function (SS1) and the current display parameter are displayed alternately as long as the motor is decelerating according to the defined deceleration ramp and has come to a standstill.

(2) ONce **[Standstill level]** (SSSL) has been reached, safety function STO is activated and displayed.

6.5.3 Error code description

Description

If a safety function detects an error, the frequency inverter shows **[Safe function fault]** (SAFF). This detected error can only be reset by switching the frequency inverter off and back on again.

If you want to display possible reasons for the error tripping, you can use the register.

This register can be displayed on the graphic display terminal or using the setup software.

[DRIVE MENU] --> **[MONITORING]** --> **[DIAGNOSTICS]** --> **[ADDITIONAL ERROR INFO]**

[Safety fault reg.] (SFFE)

Bit	Description
Bit0=1	Timeout on debouncing the logic input (check the value for the debounce time LIDT according to the application).
Bit1	Reserved
Bit2=1	Motor speed prefix changed during SS1 ramp.
Bit3=1	Motor frequency reached its threshold value during SS1 ramp.
Bit4	Reserved
Bit5	Reserved
Bit6=1	Motor speed prefix changed during SLS safety limit.
Bit7=1	Motor frequency reached its threshold value during SS1.
Bit8	Reserved
Bit9	Reserved
Bit10	Reserved
Bit11	Reserved
Bit12	Reserved
Bit13=1	Measurement of motor speed not possible (check the motor wiring).
Bit14=1	Motor ground short circuit detected (check the motor wiring).
Bit15=1	Motor short circuit detected (check the motor wiring).

This register is reset after switching the power supply off and back on.

You can also access this register under **[DRIVE MENU]** --> **[MONITORING]** --> **[MONIT. SAFETY]**

[Safety error register 1] (SAF1)

This error register is used for application control.

Bit	Description
Bit0=1	PWRM consistency error detected.
Bit1=1	Error detected in parameters of safety functions.
Bit2=1	The automatic test carried out in the application detected an error.
Bit3=1	The diagnostics test on the safety function detected an error.
Bit4=1	The diagnostics on the logic input detected an error.
Bit5=1	Safety function SMS or GDL detected an error. For more information, see 500.
Bit6=1	Watchdog management application active.
Bit7=1	Error detected in motor control.
Bit8=1	Error detected in internal serial connection.
Bit9=1	Error detected on enabling the logic input.
Bit10=1	Function "Safe torque off" triggered an error.
Bit11=1	The application interface detected a safety function error.
Bit12=1	Function "Safe stop 1" detected a safety function error.
Bit13=1	Function "Safe limited speed" triggered an error.
Bit14=1	The motor data is damaged.
Bit15=1	Error detected in data flow of the internal serial connection.

This register is reset after switching the power supply off and back on.

[Safety fault Reg2] (SAF2)

This error register is used for motor control.

Bit	Description
Bit0=1	The consistency test on the stator frequency detected an error.
Bit1=1	Error detected in stator frequency calculation.
Bit2=1	Motor control watchdog management active.
Bit3=1	Motor control hardware watchdog active.
Bit4=1	The automatic test carried out on the motor control detected an error.
Bit5=1	Error detected in chain test.
Bit6=1	Error detected in internal serial connection.
Bit7=1	Error detected through direct short circuit.
Bit8=1	Error detected in PWM of the frequency inverter.
Bit9=1	Internal error of the GDL safety function.
Bit10	Reserved
Bit11=1	The application interface detected a safety function error.
Bit12	Reserved
Bit13	Reserved
Bit14=1	The motor data is damaged.
Bit15=1	Error detected in data flow of the internal serial connection.

This register is reset after switching the power supply off and back on.

[Safety error subregister 00] (SF00)

This error register is used for automated application tests.

Bit	Description
Bit0	Reserved
Bit1=1	RAM stack overrun:
Bit2=1	Error detected in integrity of the RAM address.
Bit3=1	Error detected accessing RAM data
Bit4=1	Error detected in flash checksum.
Bit5	Reserved
Bit6	Reserved
Bit7	Reserved
Bit8	Reserved
Bit9=1	Fast task overrun
Bit10=1	Slow task overrun
Bit11=1	Application task overrun
Bit12	Reserved
Bit13	Reserved
Bit14=1	The PWRM line is not enabled during the initialization phase.
Bit15=1	The hardware watchdog application is not executed after the initialization phase.

This register is reset after switching the power supply off and back on.

[Safety error subregister 01] (SF01)

This diagnostics error register is used for logic inputs.

Bit	Description
Bit0=1	Management error detected in state machine.
Bit1=1	Data required for the test administration is corrupt.
Bit2=1	Error detected on channel selection.
Bit3=1	Test - Error detected in state machine.
Bit4=1	Test requirement is corrupt.
Bit5=1	Pointer for the test procedure is damaged.
Bit6=1	Incorrect test action provided.
Bit7=1	Error detected on collecting the results.
Bit8=1	Error detected at LI3; Cannot activate safety function
Bit9=1	Error detected at LI4; Cannot activate safety function.
Bit10=1	Error detected at LI5; Cannot activate safety function.
Bit11=1	Error detected at LI6; Cannot activate safety function.
Bit12=1	The test sequence was updated during ongoing diagnostics.
Bit13=1	Error detected in test type management.
Bit14	Reserved
Bit15	Reserved

This register is reset after switching the power supply off and back on.

[Safety error subregister 02] (SF02)

This register is used for detected errors relating to application watchdog management.

Bit	Description
Bit0=1	Error detected in fast task.
Bit1=1	Error detected in slow task.
Bit2=1	Error detected in application task.
Bit3=1	Error detected in background task.
Bit4=1	Error detected in fast task/input of safety function.
Bit5=1	Error detected in slow task/input of safety function.
Bit6=1	Error detected in application task/input of safety function.
Bit7=1	Error detected in application task/handling of safety function.
Bit8=1	Error detected in background task of safety function.
Bit9	Reserved
Bit10	Reserved
Bit11	Reserved
Bit12	Reserved
Bit13	Reserved
Bit14	Reserved
Bit15	Reserved

This register is reset after switching the power supply off and back on.

[Safety error subregister 03] (SF03)

Bit	Description
Bit0=1	Debounce timeout.
Bit1=1	Input not consistent.
Bit2=1	Consistency test - Error detected in state machine.
Bit3=1	Consistency test - Debounce timeout corrupt.
Bit4=1	Error detected in response time data.
Bit5=1	Response time corrupt.
Bit6=1	Non-defined consumer requested.
Bit7=1	Error detected in configuration.
Bit8=1	The inputs are not in nominal mode.
Bit9	Reserved
Bit10	Reserved
Bit11	Reserved
Bit12	Reserved
Bit13	Reserved
Bit14	Reserved
Bit15	Reserved

This register is reset after switching the power supply off and back on.

[Safety error subregister 04] (SF04)

This is a register for errors detected in function **[Safe stop]** (STO).

Bit	Description
Bit0=1	No signal configured.
Bit1=1	Error detected in state machine.
Bit2=1	Error detected in internal data.
Bit3	Reserved
Bit4	Reserved
Bit5	Reserved
Bit6	Reserved
Bit7	Reserved
Bit8=1	SMS overspeed error detected.
Bit9=1	SMS internal error detected.
Bit10	Reserved
Bit11	Reserved
Bit12=1	GDL internal error detected 1.
Bit13=1	GDL internal error detected 2.
Bit14	Reserved
Bit15	Reserved

This register is reset after switching the power supply off and back on.

[Safety error subregister 05] (SF05)

This register is used for detected errors relating to function **[Safe ramp]** (SS1).

Bit	Description
Bit0=1	Error detected in state machine.
Bit1=1	Motor speed prefix changed during stop.
Bit2=1	Motor speed has reached the motor frequency threshold value.
Bit3=1	Theoretical motor speed is corrupt.
Bit4=1	Non-authorized configuration
Bit5=1	Error detected in calculation of the theoretical motor speed.
Bit6	Reserved
Bit7=1	Review of speed prefix: Error detected in consistency.
Bit8=1	Internal SS1 request corrupt.
Bit9	Reserved
Bit10	Reserved
Bit11	Reserved
Bit12	Reserved
Bit13	Reserved
Bit14	Reserved
Bit15	Reserved

This register is reset after switching the power supply off and back on.

[Safety error subregister 06] (SF06)

This register is used for detected errors relating to function **[Spd limited]** (SLS).

Bit	Description
Bit0=1	Error detected in state machine.
Bit1=1	Motor speed prefix changed during limits.
Bit2=1	Motor speed has reached the motor frequency threshold value.
Bit3=1	Data corrupt.
Bit4	Reserved
Bit5	Reserved
Bit6	Reserved
Bit7	Reserved
Bit8	Reserved
Bit9	Reserved
Bit10	Reserved
Bit11	Reserved
Bit12	Reserved
Bit13	Reserved
Bit14	Reserved
Bit15	Reserved

This register is reset after switching the power supply off and back on.

[Safety error subregister 07] (SF07)

This register is used for detected errors relating to application watchdog management.

Bit	Description
Bit0	Reserved
Bit1	Reserved
Bit2	Reserved
Bit3	Reserved
Bit4	Reserved
Bit5	Reserved
Bit6	Reserved
Bit7	Reserved
Bit8	Reserved
Bit9	Reserved
Bit10	Reserved
Bit11	Reserved
Bit12	Reserved
Bit13	Reserved
Bit14	Reserved
Bit15	Reserved

This register is reset after switching the power supply off and back on.

[Safety error subregister 08] (SF08)

This register is used for detected errors relating to application watchdog management.

Bit	Description
Bit0=1	Error detected in PWM task.
Bit1=1	Error detected in Fixed Task.
Bit2=1	Error detected in ATMC watchdog.
Bit3=1	Error detected in DYNFCT watchdog.
Bit4	Reserved
Bit5	Reserved
Bit6	Reserved
Bit7	Reserved
Bit8	Reserved
Bit9	Reserved
Bit10	Reserved
Bit11	Reserved
Bit12	Reserved
Bit13	Reserved
Bit14	Reserved
Bit15	Reserved

This register is reset after switching the power supply off and back on.

[Safety error subregister 09] (SF09)

This register is used for detected errors relating to automated motor control tests.

Bit	Description
Bit0	Reserved
Bit1=1	RAM stack overrun.
Bit2=1	Error detected in integrity of the RAM address.
Bit3=1	Error detected accessing RAM data
Bit4=1	Error in flash checksum.
Bit5	Reserved
Bit6	Reserved
Bit7	Reserved
Bit8	Reserved
Bit9=1	Task overrun 1 ms.
Bit10=1	PWM Task overrun.
Bit11=1	Fixed Task overrun.
Bit12	Reserved
Bit13	Reserved
Bit14=1	Unintentional interruption.
Bit15=1	The hardware watchdog is not executed after the initialization phase.

This register is reset after switching the power supply off and back on.

[Safety error subregister 10] (SF10)

This register is used for detected errors relating to direct motor control short circuits.

Bit	Description
Bit0=1	Ground short circuit - Error detected in configuration.
Bit1=1	Short circuit - Error detected in configuration.
Bit2=1	Ground short circuit
Bit3=1	Short circuit
Bit4	Reserved
Bit5	Reserved
Bit6	Reserved
Bit7	Reserved
Bit8	Reserved
Bit9	Reserved
Bit10	Reserved
Bit11	Reserved
Bit12	Reserved
Bit13	Reserved
Bit14	Reserved
Bit15	Reserved

This register is reset after switching the power supply off and back on.

[Safety error subregister 11] (SF11)

This register is used for detected errors relating to the motor control dynamic activity check.

Bit	Description
Bit0=1	The application requested diagnostics of the direct short circuit.
Bit1=1	The application requested a consistency test on the stator frequency calculation (voltage and current).
Bit2=1	The application requested diagnostics on the speed statistics delivered by the motor control.
Bit3	Reserved
Bit4	Reserved
Bit5	Reserved
Bit6	Reserved
Bit7	Reserved
Bit8=1	The motor control diagnostics of the direct short circuit is enabled.
Bit9=1	The motor control consistency test on the stator frequency calculation is enabled.
Bit10=1	The motor control diagnostics from the speed statistics delivered by the motor control is enabled.
Bit11	Reserved
Bit12	Reserved
Bit13	Reserved
Bit14	Reserved
Bit15	Reserved

This register is reset after switching the power supply off and back on.

6.6 Technical data

6.6.1 Electrical data

Logic type

Contrary to the typical definition of sink and source, the following statements apply to this product:

Sink: The inputs and outputs need a voltage sink, i.e. the current flows out of the inputs and outputs.

Source: The inputs and outputs need a voltage source, i.e. the current flows into the inputs and outputs.

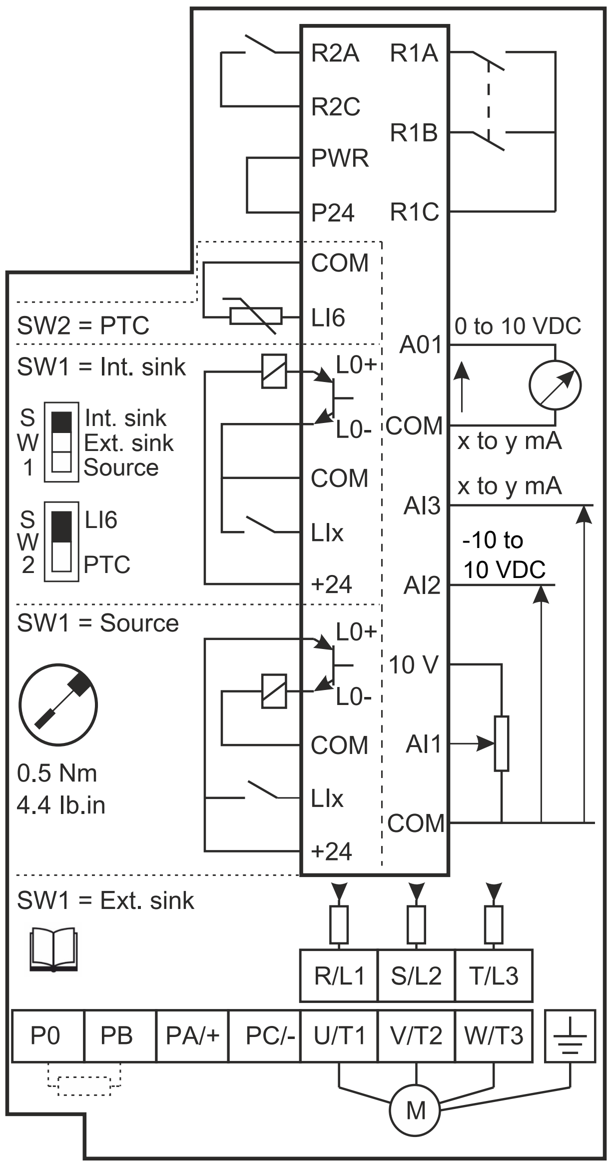
The logic inputs and outputs of the frequency inverter can be wired for logic type 1 or logic type 2.

Logic type	Active state
1	Output drags current (sink = Dip) Current flows to the input
2	Output supply is provided by input current Current (source)

Safety functions are only permitted to be used in mode "Source".

The signal inputs are protected against polarity reversal, while the outputs are protected against short circuits. The inputs and outputs are electrically isolated.

Wiring diagram



6.6.2 Setup and operation of the safety function

Logic input

General logic inputs can be used to trigger a safety function.
Logic inputs must be combined in pairs to obtain a redundant request. Only four general logic inputs can be linked to safety functions: LI3, LI4, LI5, LI6. The logic input pairs are determined as follows:

- LI3 and LI4
- LI5 and LI6
- An additional combination is only allowed for function STO: LI3 and STO.

Logic input pairs can only be assigned once they are linked to a safety function.
If you connect a safety function to a logic input you cannot connect any other function (safety relevant or not) to this logic input. If you connect a function that is not related to safety to a logic input you cannot connect any other function to this logic input.

6.6.3 Capability characteristics of safety functions

The safety functions of the PDS(SR) are part of a global system.

If the qualitative and quantitative objectives set by the end-use application require settings to perform the safety functions safely, the responsibility for these additional development elements (e.g. management of the mechanical motor brake) lies with the integrator of the BDM (Basic Drive Module).

In addition, the output data generated when safety functions are used (error relay activation, display of error codes or information, etc.) are not considered safety information.

Configuration of the machine application

Standard	STO		SS1 Type C [5]		SLS/STO /SS1/ SMS type B[6]	
	STO	STO and LI3	STO with safety relay or equivalent	STO and LI3 with safety relay or equivalent	LI3 LI4	LI5 LI6
IEC 61800-5-2 / IEC 61508	SIL 2	SIL 3	SIL 2	SIL 3	SIL 2	
IEC 62061[1]	SIL 2	SIL 3 CL	SIL 2 CL	SIL 3 CL	SIL 2 CL	
IEC 62061[2]	Category 3	Category 4	Category 3	Category 4	Category 3	
ISO 13849-1[3]	PL d	PL e	PL d	PL e	PL d	
IEC 60204-1[4]	Stop category 0	Stop category 0	Stop category 1	Stop category 1		

1) Since the IEC 62061 standard is an integration standard, the standard differentiates between the global safety function (i.e classification according to SIL 2 or SIL 3 for the ACOPOSinverter) according to the charts process system SF - Case 1 and process system SF - Case 2) and components that constitute the safety function (i.e. classification according to SIL 2 CL or SIL 3 CL for the ACOPOSinverter).
2) Per table 6 of IEC 62061 standard (2005).
3) Per table 4 of EN 13849-1 standard (2008).
4) If protection against power supply failure or voltage reduction and subsequent recovery in accordance with IEC 60204-1 is required, a safety relay or equivalent must be used.
5) SS1 type C: The power drive system initiates motor deceleration and initiates function STO after an application-specific time delay.
6) SS1 type B: The power drive system initiates and monitors the motor deceleration rate within specified limits to stop the motor and initiates function STO when the motor speed falls below a specified limit.

Configuration of the process application

Standard	STO		SS1 Type C [2]		SLS/STO /SS1/ SMS type B[3]	
	STO	STO and LI3	STO with safety relay or equivalent	STO and LI3 with safety relay or equivalent	LI3 LI4	LI5 LI6
IEC 61800-5-2 / IEC 61508	SIL 2	SIL 3	SIL 2	SIL 3	SIL 2	
IEC 62061[1]	SIL 2 CL	SIL 3 CL	SIL 2 CL	SIL 3 CL	SIL 2 CL	

1) Since the IEC 62061 standard is an integration standard, the standard differentiates between the global safety function (i.e classification according to SIL 2 or SIL 3 for the ACOPOSinverter) according to diagrams FALL 1 and FALL 2 and components that constitute the safety function (i.e. classification according to SIL 2 CL or SIL 3 CL for the ACOPOSinverter).
2) SS1 type C: The power drive system initiates motor deceleration and initiates function STO after an application-specific time delay.
3) SS1 type B: The power drive system initiates and monitors the motor deceleration rate within specified limits to stop the motor and initiates function STO when the motor speed falls below a specified limit.

Input signals of the safety functions

Input signals of the safety functions	Units	Value for LI3 to LI6	Value for STO
Logic 0 (U_{low})	V	<5	<2
Logic 1 (U_{high})	V	>11	>17
Impedance (24 V)	kΩ	3.5	1.5
Debounce time	ms	<1	<1
Response time of the safety function	ms	<10	<10

Feasibility study synthesis

Function	Standard	Input	STO input	STO input & LI3	LI3 & LI4 or LI5 & LI6
STO	IEC 61508	SFF	96.7%	96%	94.8%
		PFD_{10y}	7.26×10^{-4}	4.00×10^{-4}	2.44×10^{-3}
		PFD_{1y}	7.18×10^{-5}	3.92×10^{-5}	2.33×10^{-4}
		PFH_{equ_1y}	8.20 FIT	4.47 FIT	26.6 FIT
		Technology type	B	B	B
		HFT	1	1	0
		DC	93.1%	91.5%	90%
		SIL capability	2	3	2
	IEC 62061	SIL CL capability	2	3	2
	ISO 13849-1	PL	d	e	d
		Category	3	4	3
		MTTFd in years	13900	"L1" 3850 "L2" 29300	4290
SS1 type B	IEC 61508	SFF	96.7%	96%	94.8%
		PFD_{10y}	7.26×10^{-4}	4.00×10^{-4}	2.44×10^{-3}
		PFD_{1y}	7.18×10^{-5}	3.92×10^{-5}	2.33×10^{-4}
		PFH_{equ_1y}	8.20 FIT	4.47 FIT	26.6 FIT
		Technology type	B	B	B
		HFT	1	1	0
		DC	93.1%	91.5%	90%
		SIL capability	2	3	2
	IEC 62061	SIL CL capability	2	3	2
	ISO 13849-1	PL	d	e	d
		Category	3	4	3
		MTTFd in years	13900	"L1" 3850 "L2" 29300	4290
SLS SMS	IEC 61508	SFF			93.3%
		PFD_{10y}			2.72×10^{-3}
		PFH_{equ_10y}			31.1 FIT
		Technology type			B
		HFT			0
		DC			78.7%
		SIL capability			2
	IEC 62061	SIL CL capability			2
	ISO 13849-1	PL			d
		Category			3
		MTTFd in years			3670

Function	Standard	Input	LO1
GDL	IEC 61508	SFF	85%
		PFD_{10y}	8.2×10^{-4}
		PFD_{1y}	8.2×10^{-3}
		PFH_{equ_1y}	187 FIT
		Technology type	B
		HFT	0
		DC	71%
		SIL capability	1
	IEC 62061	SIL CL capability	1
	ISO 13849-1	PL	c
		Category	2
		MTTFd in years	609

A preventative annual activation of the safety function is recommended. However, the safety levels are achieved with lower margins without annual activation. The machine requires the safety module for function STO. To avoid the use of a safety module, the parameters of function "Restart" must be part of the safety function. See details about the relevance of the safety module.

Advice:

The table above is insufficient for assessing the power stage (PL) of a PDS. The PL assessment must take place at system level. The installer or integrator of the BDM (Basic Drive Module) must include sensor data with figures from the above table when assessing PL System sensor data.

6.6.4 Debounce time and response time

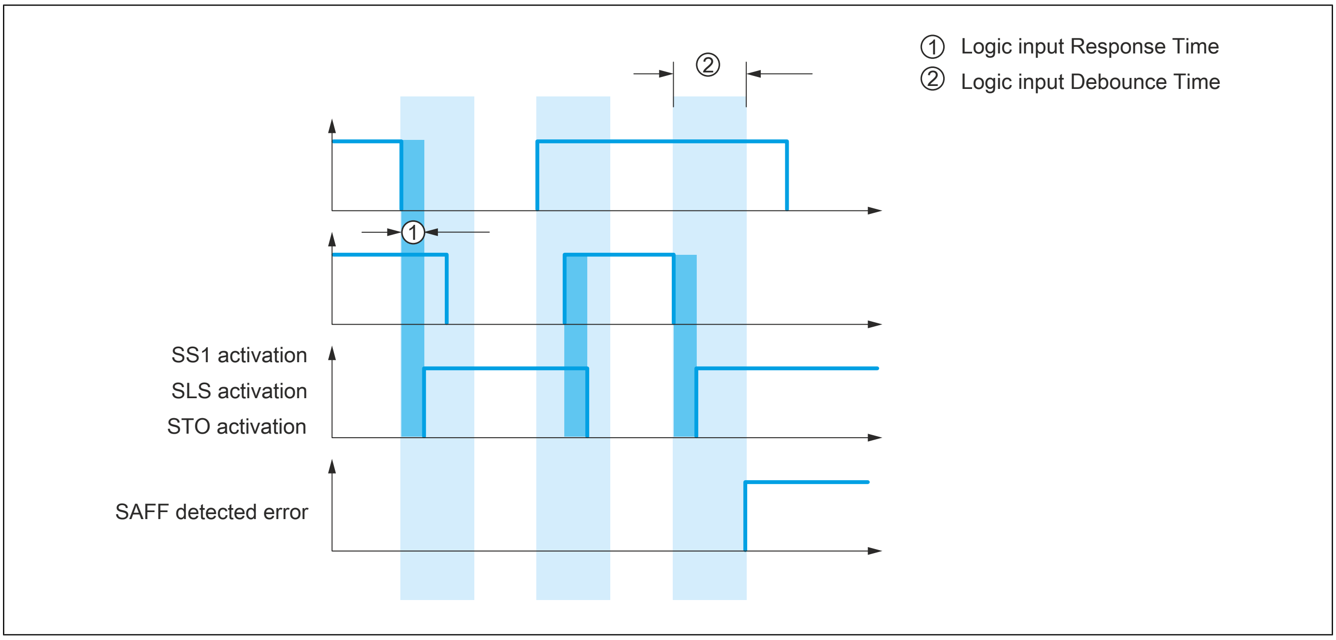
Description

In the ACOPOSinverter, there are two parameters for configuring logic inputs for safety functions (LI3, LI4, LI5, LI6).

The consistency of the individual logic input pairs is continuously checked.

[LI debounce time] (LIdt): A different logic state is permitted between LI3/LI4 or LI5/LI6 for the duration of the debounce time. Otherwise, an error will be triggered.

[LI response time] (LIrt): The logic input response time controls the delay until the safety function is activated.



6.7 Certified architectures

6.7.1 Introduction

Certified architectures

> **Advice:**
>
> **For certification with respect to functional aspects, only the PDS (SR) (power drive system suitable for safety type applications) is taken into account, not the complete system in which it will be integrated in order to ensure the functional safety of a machine, system or process.**

The certified architectures are listed below:

- Multiple drive with safety relay - Case 1
- Multiple drive with safety relay - Case 2
- Multiple drive without safety module
- Single drive with safety relay - Case 1
- Single drive with safety relay - Case 2
- Single drive with safety relay - Case 1
- Single drive with safety relay - Case 2
- Single drive per IEC 61508 and IEC 60204-1 - Case 1
- Single drive per IEC 61508 and IEC 60204-1 - Case 2
- Single drive per IEC 61508 and IEC 62061 with safety function GDL

The safety functions of the PDS (SR) are part of a global system.

If the qualitative and quantitative objectives relating to safety set by the type of end-use require settings to perform the safety functions safely, the responsibility for these additional development elements (e.g. management of the mechanical motor brake) lies with the integrator of the BDM (Basic Drive Module).

In addition, the output data generated when safety functions are used (error relay activation, display of error codes or information, etc.) are not considered safety information.

6.7.2 Multiple drive with safety relay XPS AF - Case 1

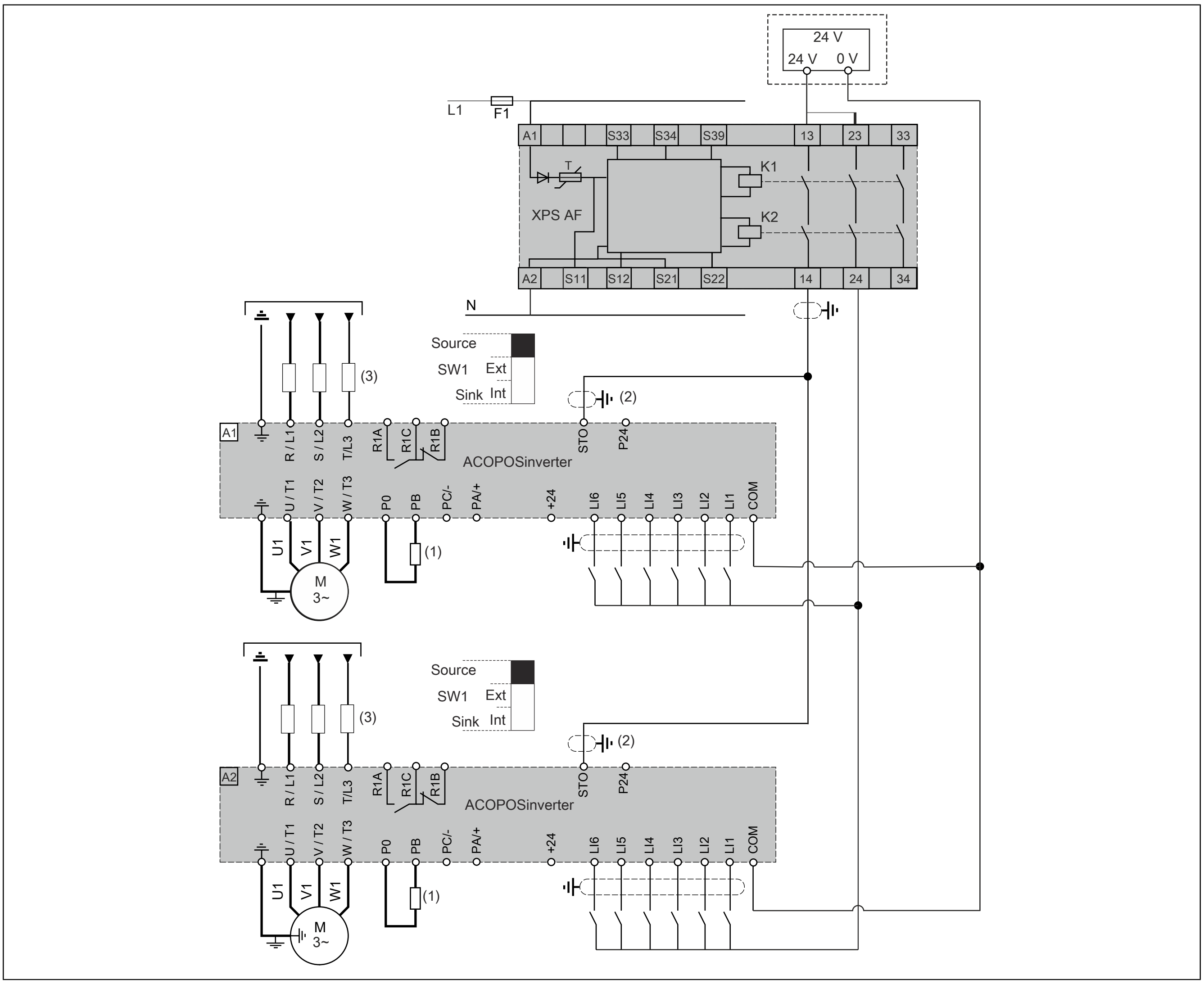
Multiple drive with safety relay per EN 954-1, IEC 13849-1 and IEC 60204-1 (machine)

The following configurations correspond to the wiring diagram below:

- Machine with STO category 4, PL e / SIL 3 with safety relay or equivalent and LI3 set to STO.
- SLS category 3, PL d/SIL 2 or SS1 type B category 3 on LI5/LI6.

Or

- Machine with STO category 4, PL e / SIL 3 with safety relay or equivalent and LI3 set to STO.
- LI4 and LI5/LI6 are not set to a safety function.



(1) Braking resistor (if used)
(2) Standard coaxial cable type RG174/U in accordance with MILC17 or KX3B according to NF C 93-550, outer diameter 2.54 mm, maximum length 15 m. The cable shield must be grounded.
(3) Line choke (if used)
(4) Multiple drive is possible with another frequency inverter (for example: ACOPOSinverter P84 with PWR connection).

Advice:

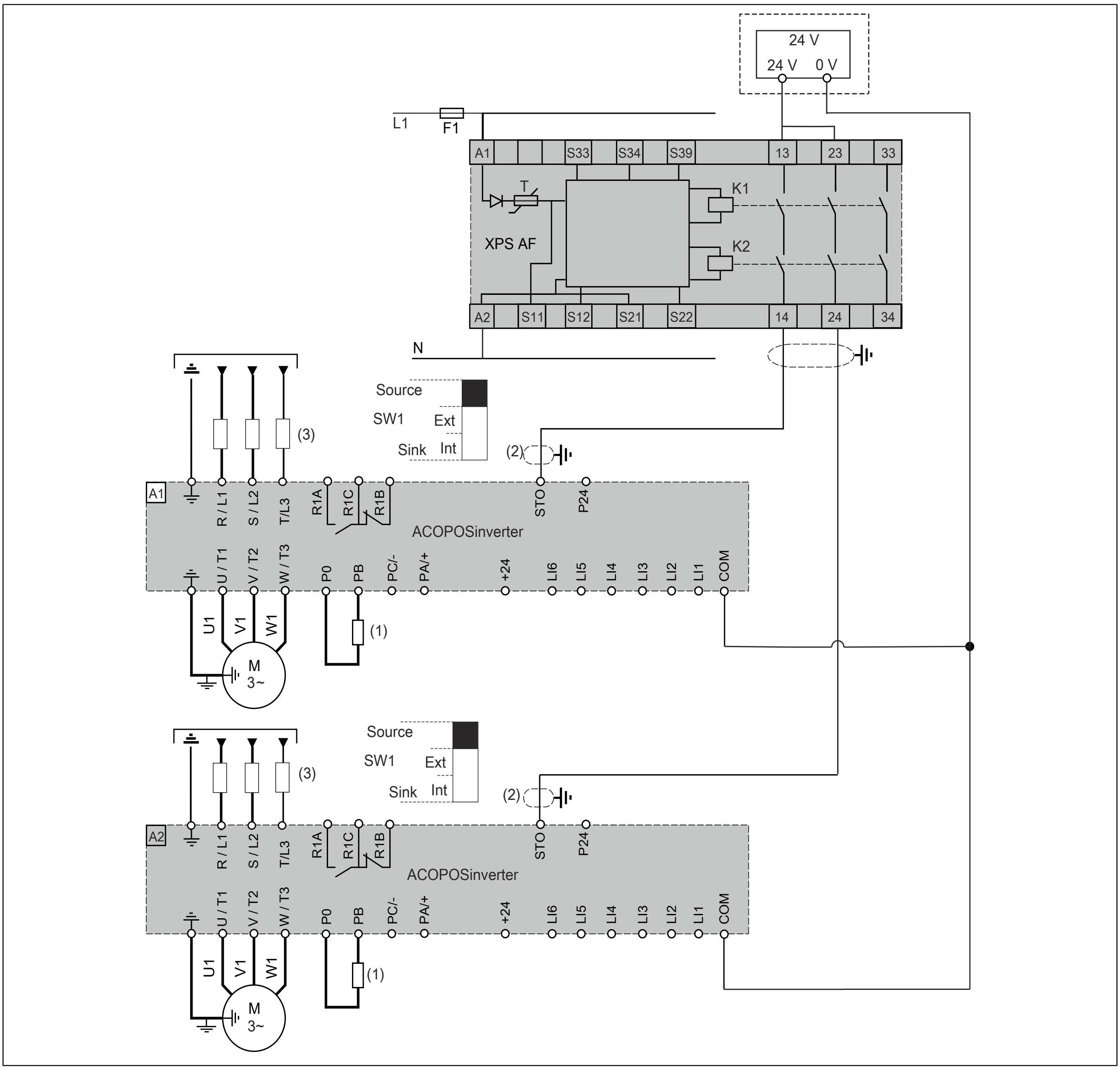
For additional information about the characteristics of the control terminal, see "Installation" on page 58.

6.7.3 Multiple drive with safety relay XPS AF - Case 2

Multiple drive with safety relay per EN 954-1, IEC 13849-1 and IEC 60204-1 (machine)

The following configurations correspond to the wiring diagram below:

- Machine with STO category 3, PL d/SIL 3 with safety relay or equivalent.
- SLS category 3, PL d/SIL 2 or SS1 type B category 3 on LI3/LI4 or LI5/LI6.



(1) Braking resistor (if used)
(2) Standard coaxial cable type RG174/U in accordance with MILC17 or KX3B according to NF C 93-550, outer diameter 2.54 mm, maximum length 15 m. The cable shield must be grounded.
(3) Line choke (if used)
(4) Multiple drive is possible with another frequency inverter (for example: ACOPOSinverter P84 with PWR connection).

Advice:

For additional information about the characteristics of the control terminal, see "Installation" on page 58.

6.7.4 Multiple drive without safety module

Multiple drive without safety relay according to IEC 61508

The following configurations correspond to the wiring diagram below:

- STO SIL 2 on STO.
- SLS SIL 2 or SS1 type B SIL 2 on LI3/LI4 or LI5/LI6.

Or

- STO SIL 2 on STO.
- SLS or SS1 type B on LI3/LI4
- LI5/LI6 is not set to a safety function.

Or

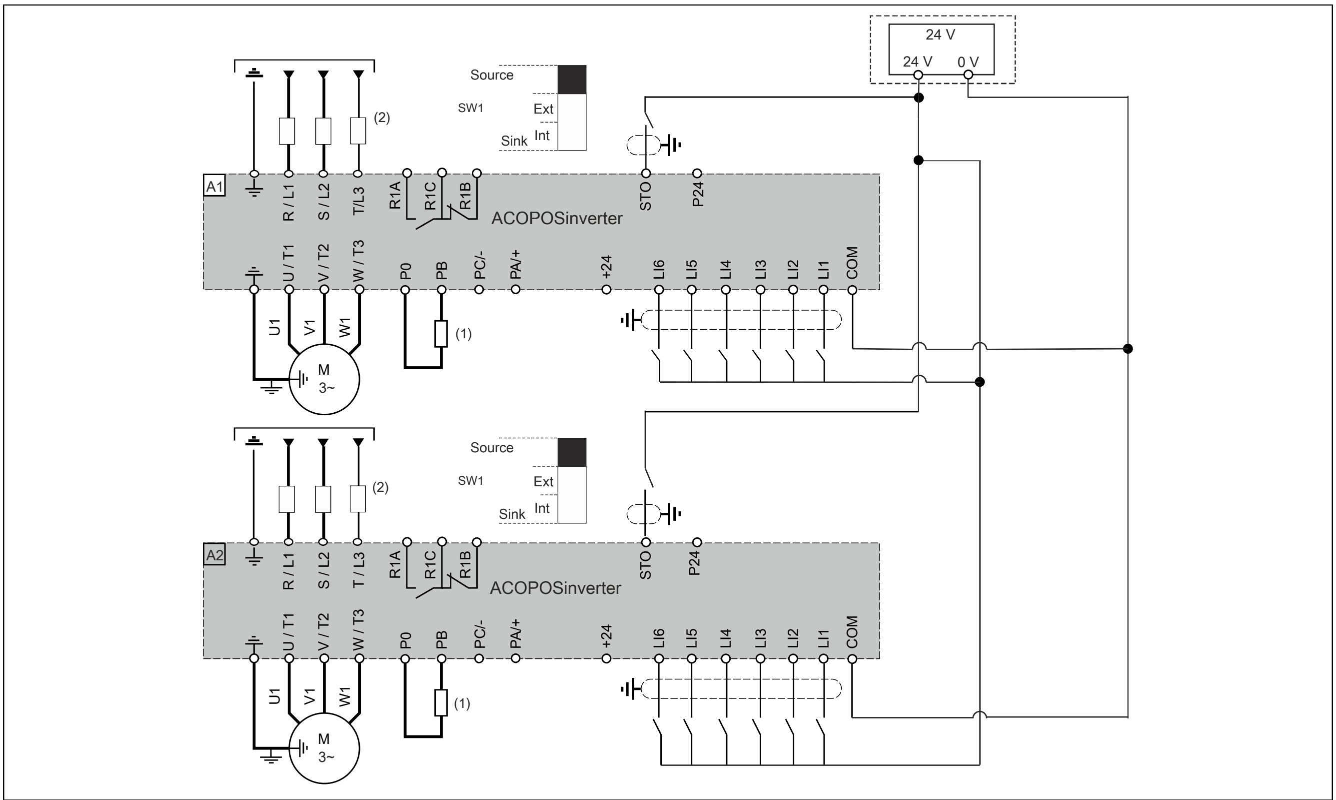
- STO SIL 2 on STO.
- LI3/LI4 and LI5/LI6 are not set to a safety function.

Or

- STO SIL 3 on STO and LI3.
- SLS SIL 2 or SS1 type B SIL 2 on LI5/LI6
- LI4 is not set to a safety function.

Or

- STO SIL 3 on STO and LI3.
- LI4 and LI5/LI6 are not set to a safety function.



(1) Braking resistor (if used)
(2) Line chokes (if used)

Advice:

For additional information about the characteristics of the control terminal, **see "Installation" on page 58****.**

6.7.5 Single drive with safety switching device XPS AV - Case 1

Single drive with safety switching device in accordance with EN 954-1, IEC 13849-1 and IEC 60204-1 (machine)

The following configurations correspond to the wiring diagram below:

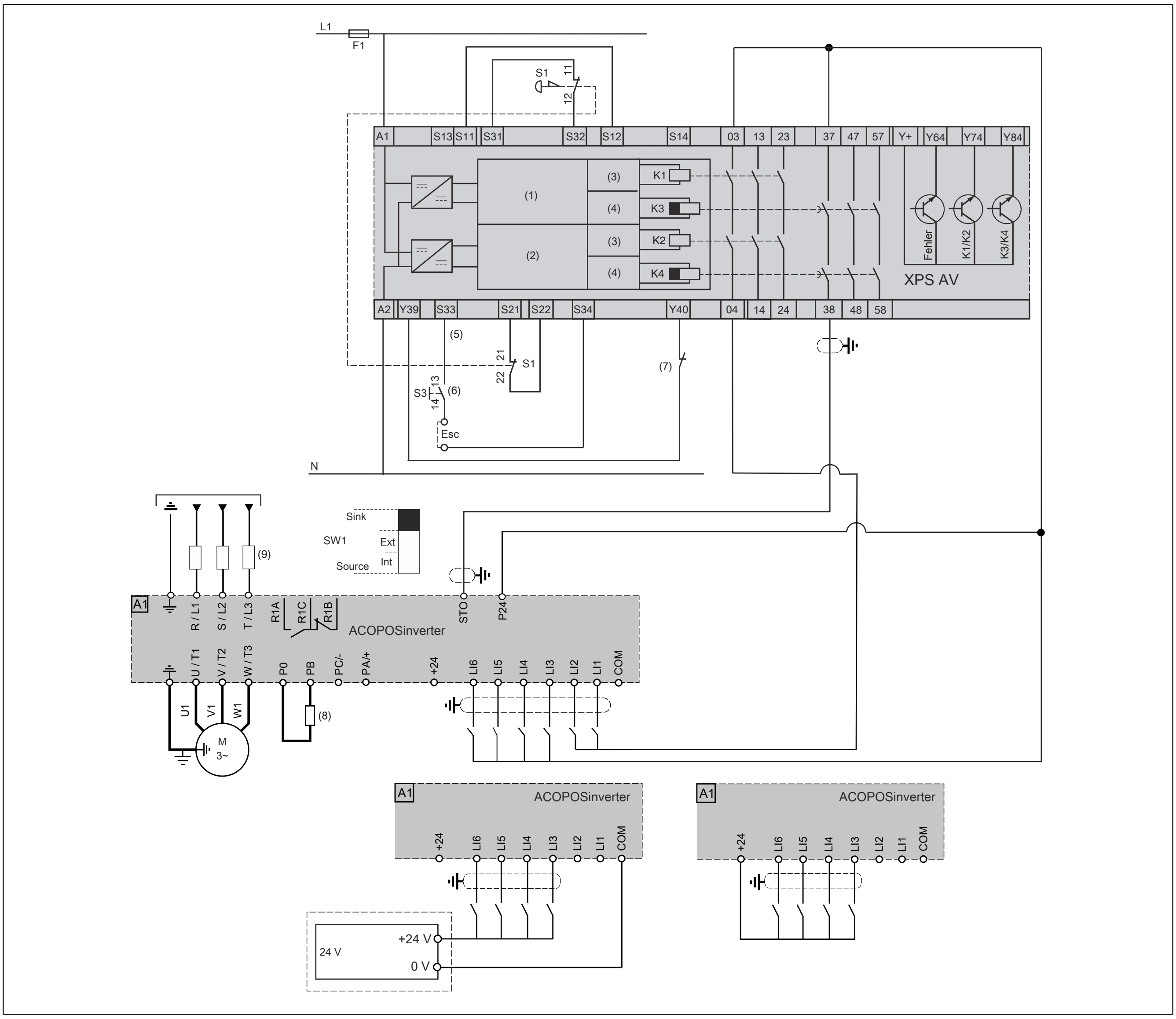
- SS1 type C category 3, PL d/SIL 2 on STO with safety switching device or equivalent.

Or

- SS1 type C category 3, PL d/SIL 2 on STO with safety switching device or equivalent.
- SLS category 3, PL d/SIL 2 or SS1 type B category 3 at LI3/LI4.
- LI5/LI6 is not set to a safety function.

Or

- SS1 type C category 3, PL d/SIL 2 on STO and LI3 with safety switching device or equivalent.
- LI3/LI4 and LI5/LI6 are not set to a safety function.



(1) Channel logic
(2) Channel 2 logic
(3) Output 1
(4) Output 2
(5) Emergency switch-off
(6) Start
(7) Stop delay
(8) Braking resistor (if used)
(9) Line chokes (if used).

Advice:

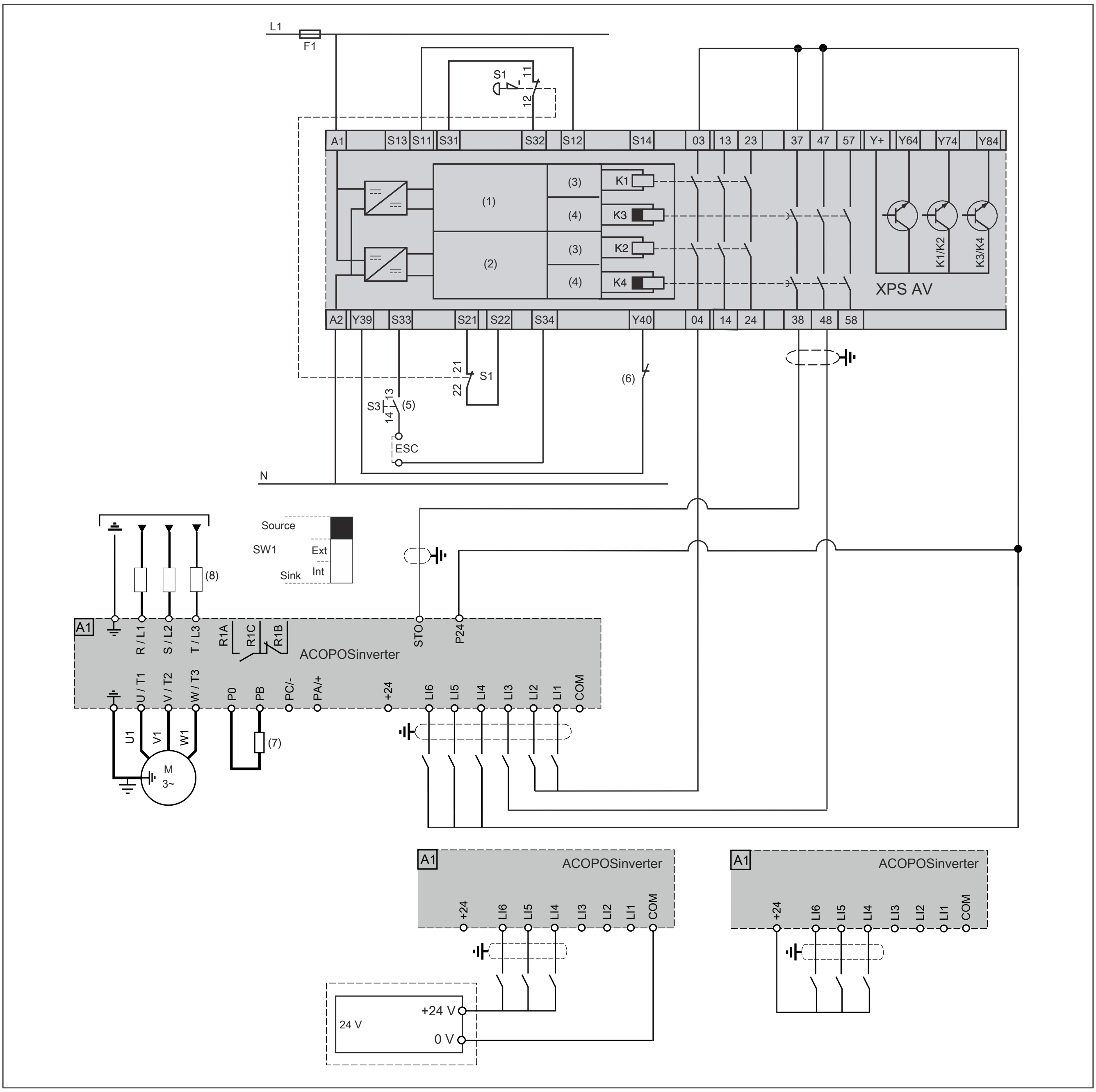
For additional information about the characteristics of the control terminal, see "Installation" on page 58.

6.7.6 Single drive with safety switching device XPS AV - Case 2

Single drive with safety switching device in accordance with EN 954-1, IEC 13849-1 and IEC 60204-1 (machine)

The following configurations correspond to the wiring diagram below:

- SS1 type C category 4, PL e/SIL 3 on STO and LI3 with safety switching device or equivalent.
- SLS category 3, PL d/SIL 2 or SS1 type B category 3 PL d/SIL 2 on LI5/LI6.
- LI4 is not set to a safety function.



(1) Channel logic
(2) Channel 2 logic
(3) Output 1
(4) Output 2
(5) Emergency switch-off
(6) Stop delay
(7) Braking resistor (if used)
(8) Line chokes (if used)

Advice:

For additional information about the characteristics of the control terminal, see "Installation" on page 58.

6.7.7 Single drive with safety switching device XPS AF - Case 1

Single drive with safety switching device in accordance with EN 954-1, IEC 13849-1, IEC 62061 and IEC 60204-1 (machine)

The following configurations correspond to the wiring diagram below:

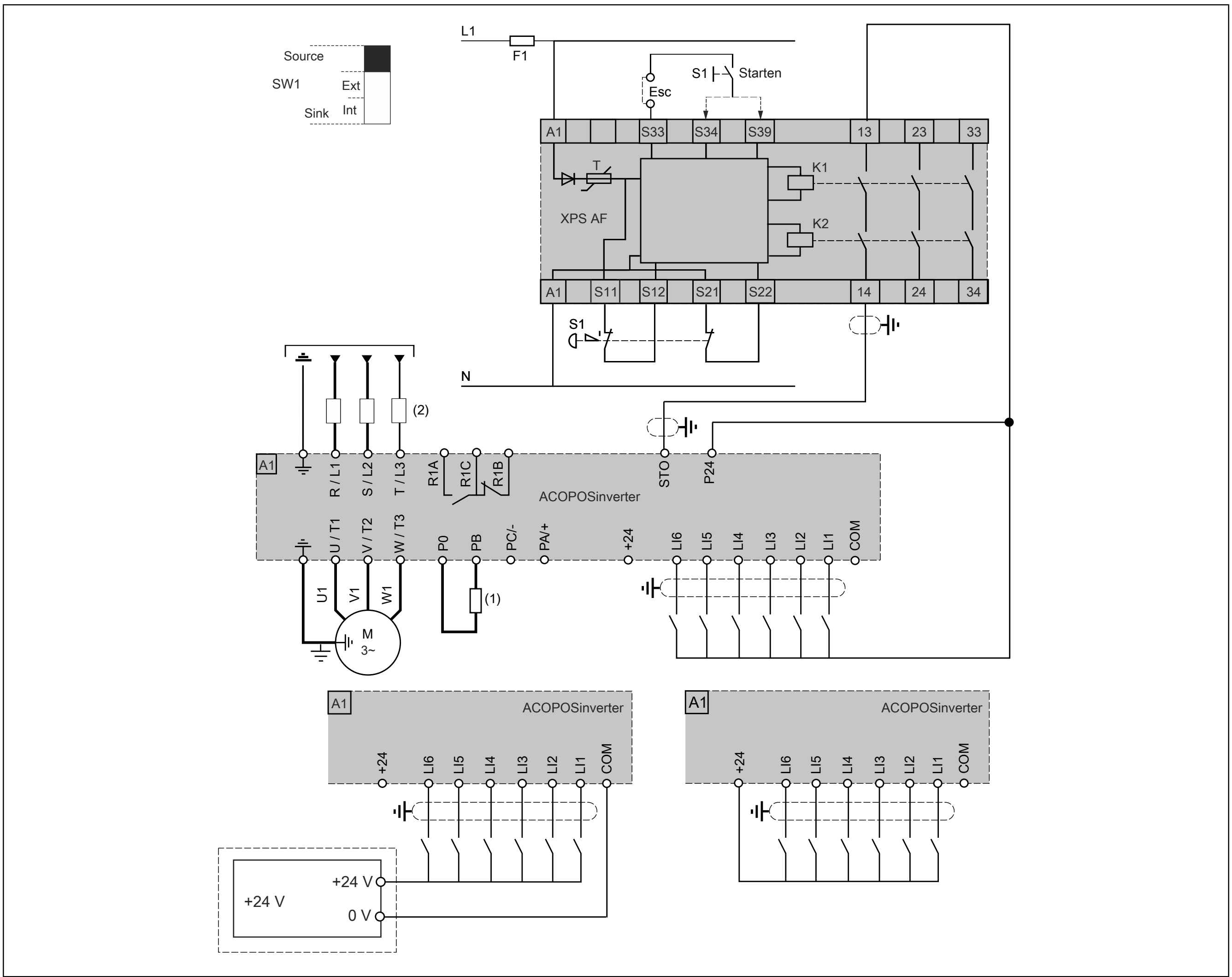
- STO category 3, PL d/SIL 2 on STO with safety switching device or equivalent.
- SLS category 3, PL d/SIL 2 or SS1 type B category 3 on LI3/LI4 or LI5/LI6.

Or

- STO category 3, PL d/SIL 2 on STO with safety switching device or equivalent.
- SLS category 3, PL d/SIL 2 or SS1 type B category 3 at LI3/LI4.
- LI5/LI6 is not set to a safety function.

Or

- STO category 3, PL d/SIL 2 on STO with safety switching device or equivalent.
- LI3/LI4 and LI5/LI6 are not set to a safety function.



(1) Braking resistor (if used)
(2) Line chokes (if used)

Advice:

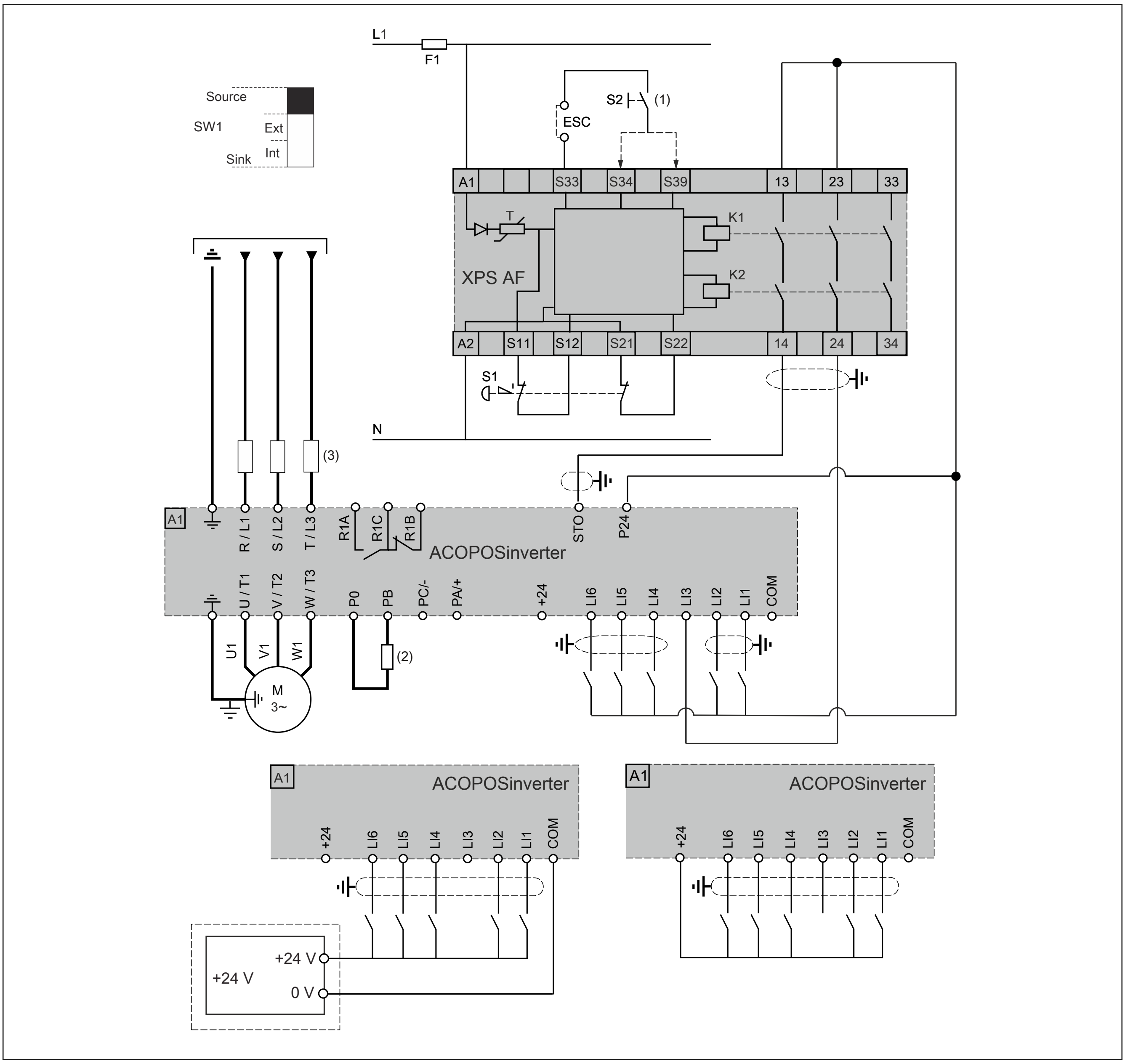
For additional information about the characteristics of the control terminal, see "Installation" on page 58.

6.7.8 Single drive with safety switching device XPS AF - Case 2

Single drive with safety switching device in accordance with EN 954-1, IEC 13849-1, IEC 62061 and IEC 60204-1 (machine)

The following configurations correspond to the wiring diagram below:

- STO category 4, PL e/SIL 3 on STO with safety switching device or equivalent and LI3 set to STO.
- SLS category 3, PL d/SIL 2 or SS1 type B category 3 on LI5/LI6.
- LI4 is not set to a safety function.



(1) Start
(2) Braking resistor (if used)
(3) Line chokes (if used)

Advice:

For additional information about the characteristics of the control terminal, see "Installation" on page 58.

6.7.9 Single drive per IEC 61508 and IEC 60204-1 - Case 1

Single drive in accordance with IEC 61508 and IEC 60204-1 without protection from interruption of power supply or power reduction and subsequent rotation.

The following configurations correspond to the wiring diagram below:

- STO SIL 2 on STO.
- STO or SLS SIL 2 or SS1 type B SIL 2 on LI3/LI4 or LI5/LI6.

Or

- STO SIL 2 on STO.
- STO or SLS or SS1 type B on LI3/LI4.
- LI5/LI6 is not set to a safety function.

Or

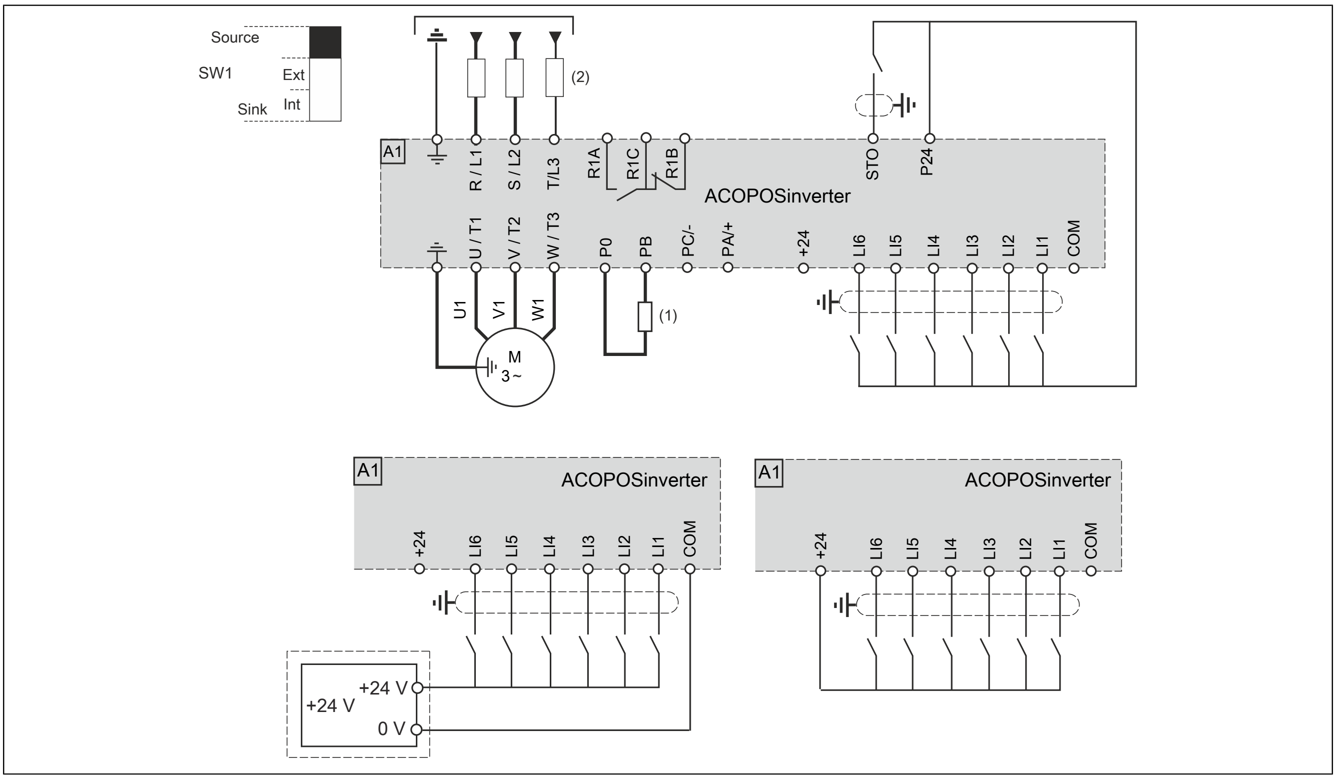
- STO SIL 2 on STO.
- LI3/LI4 and LI5/LI6 are not set to a safety function.

Or

- STO SIL 3 on STO and LI3.
- SLS SIL 2 or SS1 type B SIL 2 on LI5/LI6
- LI4 is not set to a safety function.

Or

- STO SIL 3 on STO and LI3.
- LI4 and LI5/LI6 are not set to a safety function.



(1) Braking resistor (if used)

(2) Line chokes (if used)

Advice:

For additional information about the characteristics of the control terminal, see "Installation" on page 58.

6.7.10 Single drive per IEC 61508 and IEC 60204-1 - Case 2

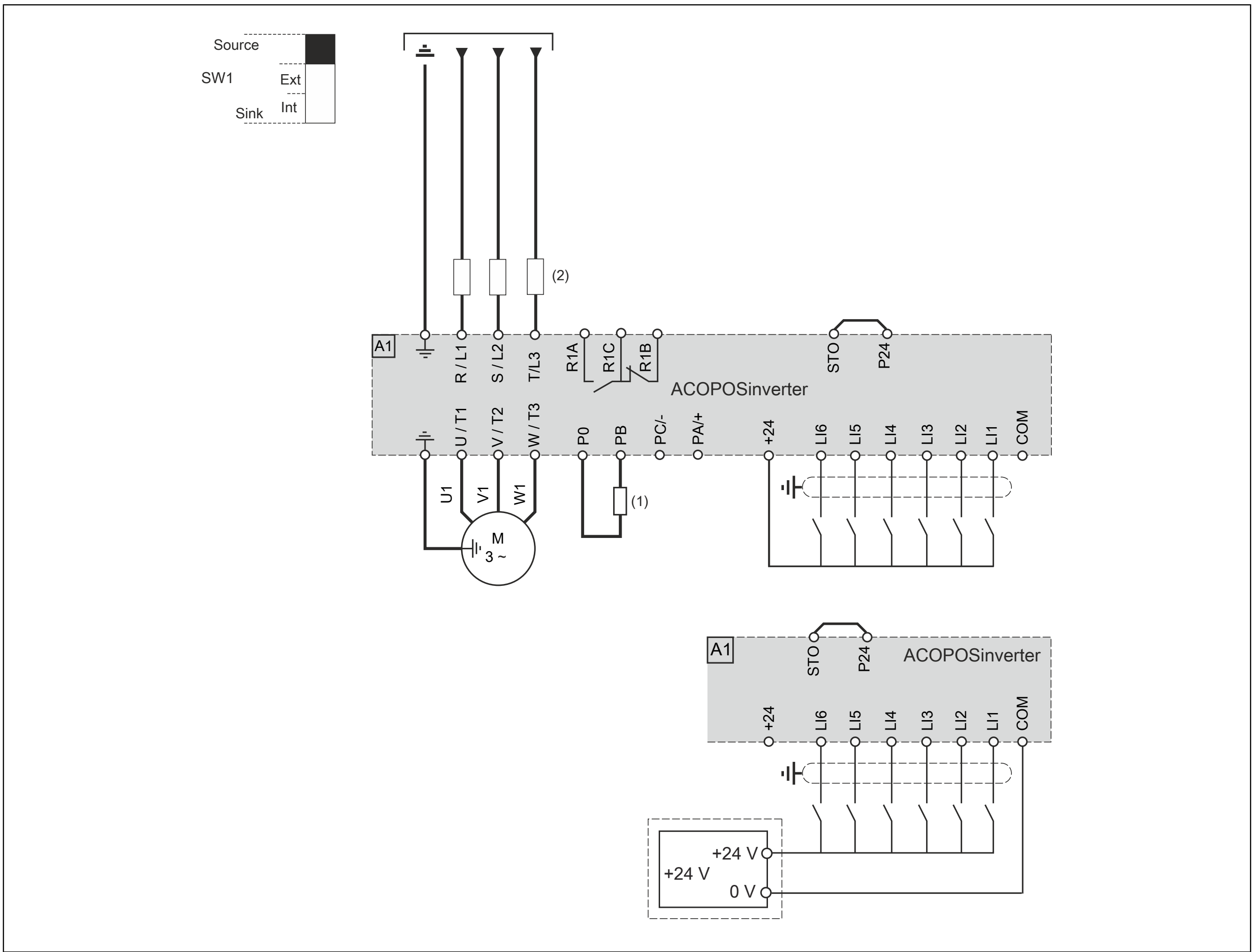
Single drive in accordance with IEC 61508 and IEC 60204-1 without protection from interruption of power supply or power reduction and subsequent rotation.

The following configurations correspond to the wiring diagram below:

- STO SIL 2 on LI3 and LI4.
- SLS SIL 2 or SS1 type B SIL 2 on LI5/LI6

Or

- STO SIL 2 on LI3 and LI4.
- LI5/LI6 is not set to a safety function.



(1) Braking resistor (if used)
(2) Line chokes (if used)

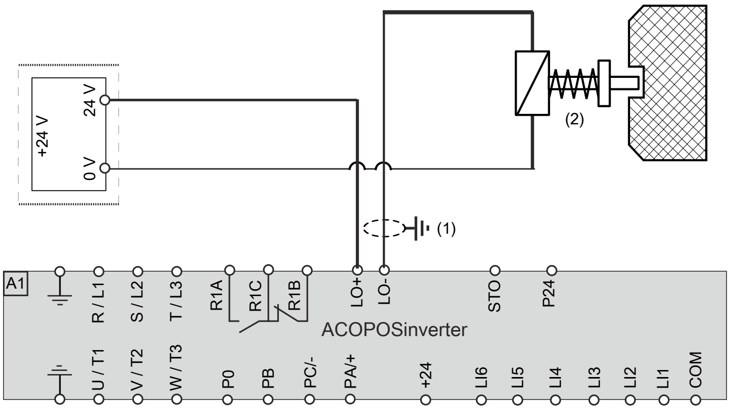
Advice:

For additional information about the characteristics of the control terminal, see "Installation" on page 58.

6.7.11 Single drive in accordance with IEC 61508 and IEC 62061 with the GDL safety function.

Certified wiring diagram

GDL category 2, PL c/SIL 1 is applicable to the following wiring diagram.



(1) Standard coaxial cable, type RG174/U in accordance with MIL-C17 or KX3B in accordance with NF C 93-550. Maximum external diameter 2.54 mm, maximum length 15 m. The cable shield must be grounded.
(2) Safety door locking

6.8 Commissioning

6.8.1 Tab "Safety functions"

Introduction

Click tab "Safety functions" to access **Safety functions**. All current safety function configurations are displayed on this read-only screen.

Tab **Safety functions** provides access to the following:

- An overview of the safety functions available in the ACOPOSinverter (accessible online/offline)
- The states of all inputs/outputs in mode "Connected"
- General information about the machine (online/offline)

The following dialog boxes can also be accessed:

- Configuration
    - Configure (available in connected mode only)
    - Reset configuration
    - Copy from DEVICE to a PC
    - Copy from PC to the DEVICE
- Password configuration
    - Change password
    - Reset password

Prerequisite

Before configuring safety parameters, ensure that the device firmware and the DTM version are the same.

Steps for configuring safety functions

If:	Then:
If not in mode online,	On the menu bar, click Communication → Connect to device or click the Connect to device symbol.
If in mode online,	Click button "Configure" on tab "Safety functions".

Once connected:

1) Click button "Configure" on tab "Safety functions".
   Comment: Dialog box "Define configuration password" is displayed:
    - Enter the new configuration password in field "Enter new password".
    - In field "Confirm new password", enter the password again.
    - Click OK.

   > **Advice:**
   >
   > **Your password must comply with the following:**
   >
   > - **It must consist of a numerical value between 1 and 9999.**
   > - **It is not permitted to be longer than four characters.**
   > - **It is not permitted to have a value of 0.**

   Result: Window "Safety function configuration" is opened.

If:	Then:
You have already defined a password,	Enter your configuration password for the safety functions in dialog box "Enter configuration password" and click OK. Result: Window "Safety function configuration" is opened.

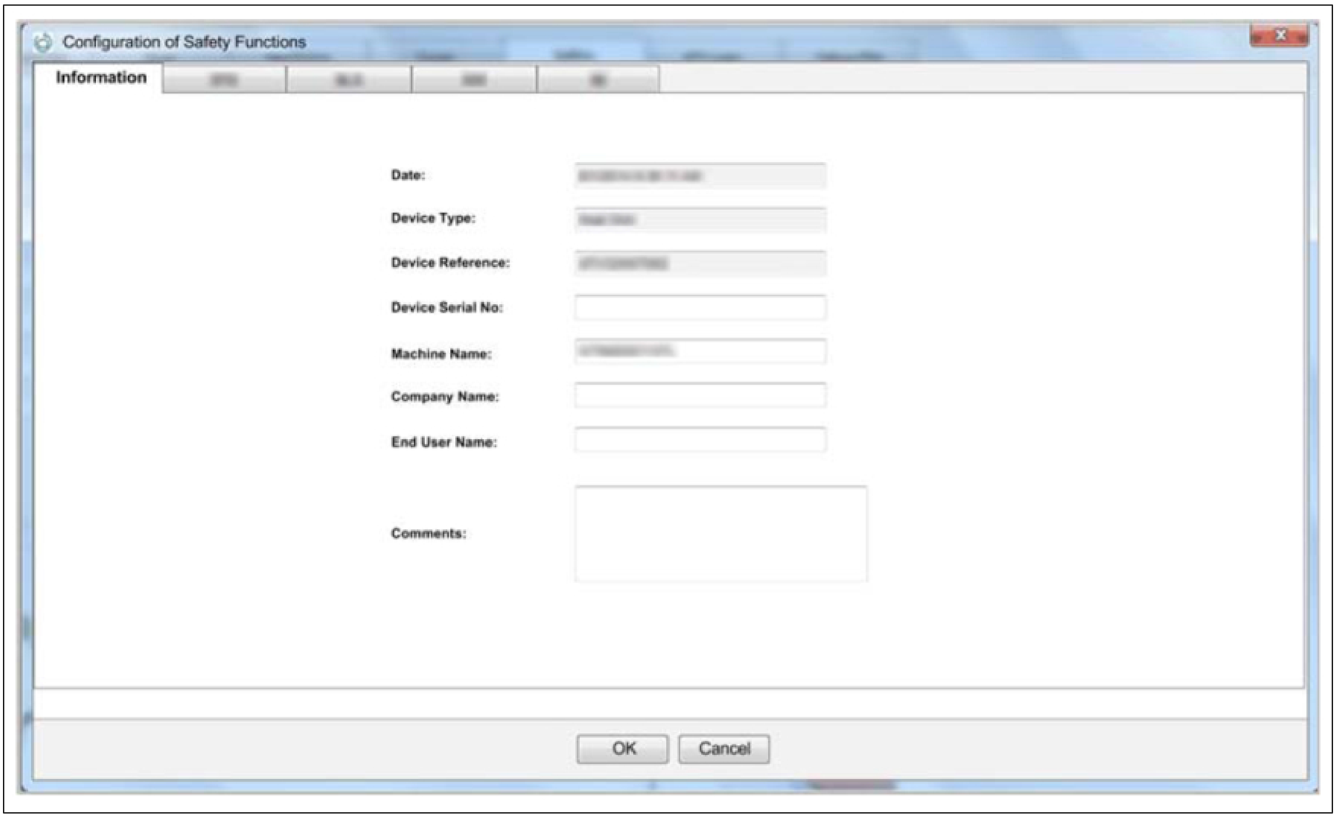
6.8.2 Window "Safety function configuration"

Overview

Window "Safety function configuration" contains the tabs "Information", "STO", "SLS", "SS1", "SMS", "GDL" and "Input/output".

Tab "Information"

On tab "Information", you can define and display product system information.



The following data is automatically entered by the ACPi parameter tool:

- Date (format depends on the local options and the language settings of the PC)
- Device type
- Model number of the inverter

The following data must be entered manually:

- Device serial number (numerical value)
- Device name
- Company name
- End-user name
- Comments

Tab "STO" (Safe Torque Off)

For more information about the STO function, see see "Safety function "Safe Torque Off " (STO)" on page 473. For this function, only the connected input blocks are permitted to be selected in the field. The parameter to be administered is STOA.

Code	Name/Description	Factory settings
StO	[Safe stop]	
StOA	[STO function activated]	[No]
nO	[No]: Not assigned	
L34	[LI3 and LI4]: LI3/4 Low state	
L56	[LI5 and LI6]: LI5/6 Low state	
L3PW	[LI3 and STO]: LI3/STO Low state This parameter allows you to configure the channel that is used to trigger the STO function. If STOA is set to No , the STO function is always active, but only on the STO input.	

Tab "SLS" (Safely Limited Speed)

For more information about the SLS function, see see "Safety function "Safely Limited Speed" (SLS)" on page 477.

Code	Name/Description	Setting range	Factory setting
SLS	[Spd limited]		
SLSA nO L34 L56	[SLS function activated] [No]: Not assigned [LI3 and LI4]: LI3/4 Low state [LI5 and LI6]: LI5/6 Low state This parameter allows you to configure the channel that is used to trigger the SLS function.		[No]
SLt tYp1 tYp2 tYp3 tYp4	[Safely limited speed element type] This parameter is used to select the SLS type. [Type 1]: SLS type 1 [Type 2]: SLS type 2 [Type 3]: SLS type 3 [Type 4]: SLS type 4 For information about the behavior of the various types, see the functional description.		[Type 1]
SLSP	[SLS reference] This parameter is only visible if SLT = Type 2 or SLT = Type 3 or SLT = Type 4. SLSP is used to set the maximum speed.	0 to 599 Hz	0 Hz
SLtt	[SLS tolerance threshold] The behavior of this parameter depends on the value for SLT; see above.	0 to 599 Hz	0 Hz
SLwt	[SLS delay] This parameter is used to set the maximum time, so that (StFr) is greater than (SSSL). Once (SLwt) has been reached, the STO safety function is activated. The unit of this parameter is 1 ms. Example: If the value is set to 2000 units, the SLS delay in seconds will be: 2000 x 1 ms = 2 s This parameter can only be changed if SLT = type 2 or SLT = type 3 For SLS =type 1 and SLS = type 4, SLwt is always set to 0.	0 to 5000 ms	0 Hz
SSrt	[SS1 ramp value] The unit depends on the SSRU parameter. Use this parameter to set the value of the SS1 deceleration ramp. SS1 ramp = (SSRT) x (SSRU); example: If (SSRT) = 250 and (SSRU) = 1 Hz/s, the deceleration ramp is = 250 Hz/s. The parameter is similar to the SS1 safety function. For more information, see see "SS1" on page 490.	1 to 5990	1
SSrU 1H 10H 100H	[SS1 ramp unit] [1 Hz/s] [10 Hz/s] [100 Hz/s] This parameter is used to set the SSrt unit. This parameter is similar to the configuration for the SS1 safety function. For more information, see SS1		[1 Hz/s]
SStt	[SS1 trip threshold] This parameter defines the tolerance range around the deceleration ramp within which the frequency can vary. It is similar to the SS1 safety function configured on another tab.	0 to 599 Hz	0 Hz
SSSL	[SLS/SS1 standstill level] This parameter defines the frequency at which the frequency inverter should change to STO state at the end of the SS1 ramp. It is similar to the SS1 safety function configured on another tab.	0 to 599 Hz	0 Hz

Tab "Safe stop 1" (SS1)

For more information about the SS1 function, seesee "Safety function "Safe Stop 1" (SS1)" on page 475.

Code	Name/Description	Setting range	Factory setting
SS1	[Safe ramp]		
SS1A nO L34 L56	[Safe stop 1 activation] [No]: Not assigned [LI3 and LI4]: LI3/4 Low state [LI5 and LI6]: LI5/6 Low state This parameter allows you to configure the channel that is used to trigger the SS1 function.		[No]
SSrt	[SS1 ramp value] The unit depends on the SSRU parameter. Use this parameter to set the value of the SS1 deceleration ramp. SS1 ramp = (SSRT) x (SSRU); example: If (SSRT) = 250 and (SSRU) = 1 Hz/s, the deceleration ramp is = 250 Hz/s. This parameter is similar to the SLS safety function configured on another tab.	1 to 800	1
SSrU 1H 10H 100H	[SS1 ramp unit] [1 Hz/s] [10 Hz/s] [100 Hz/s] This parameter is used to set the SSrt unit. It is similar to the SLS safety function configured on another tab.		[1 Hz/s]
SStt	[SS1 trip threshold] This parameter defines the tolerance range around the deceleration ramp within which the frequency can vary. It is similar to the configuration for the SLS safety function.	0 to 599 Hz	0 Hz
SSSL	[SLS/SS1 standstill level] This parameter defines the frequency at which the frequency inverter should change to STO state at the end of the SS1 ramp. It is similar to the SLS safety function configured on another tab.	0 to 599 Hz	0 Hz

Tab "SMS" (Safe Maximum Speed)

For more information about the SMS function, see see "Safety function SMS (Safe Maximum Speed)" on page 483.

Code		Name/Description	Setting range	Factory setting
SMS		[SMS status]		
SMSA		[SMS Activation]		[No]
	nO	[No]: The SMS function is not active.		
	Yes	[YES]: The SMS function is active. This parameter allows you to configure the channel that is used to trigger the SMS function.		
SMLS		[SMS Assignment] This parameter is used to select the limit value for the safe maximum speed.		[No]
	nO	[No]: [SMS Low Limit] (SMLL) is selected as the limit value for the safe maximum speed.		
	L34	[LI3 and LI4] • If logic inputs 3/4 are in Low state (0), [SMS Low Limit] (SMLL) is selected as the limit value for the safe maximum speed. • If logic inputs 3/4 are in High state (1), [SMS High Limit] (SMLH) is selected as the limit value for the safe maximum speed.		
	L56	[LI5 and LI6] • If logic inputs 5/6 are in Low state (0), [SMS Low Limit] (SMLL) is selected as the limit value for the safe maximum speed. • If logic inputs 5/6 are in High state (1), [SMS High Limit] (SMLH) is selected as the limit value for the safe maximum speed.		
SMLL		[SMS Low Limit] This parameter is used to set the lower speed limit.	0 to 599 Hz	0 Hz
SMLH		[SMS High Limit] This parameter is used to set the upper speed limit.	0 to 599 Hz	0 Hz

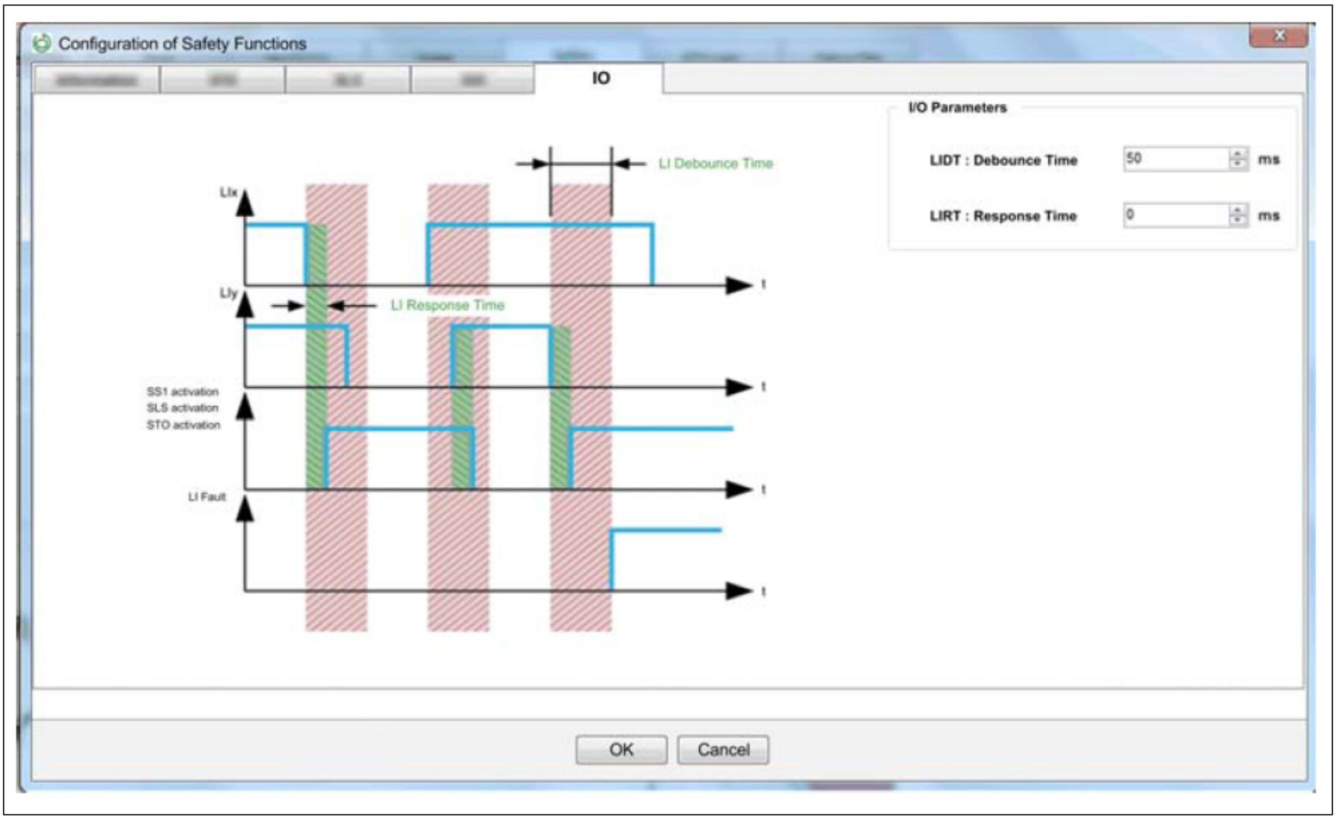
Tab "Safety door locking" (GDL)

For more information about the GDL function, see see "Safety function GDL (safety gate interlock)" on page 485.

Code		Name/Description	Setting range	Factory setting
GdL		[Safety door locking]		
GdLA		[GDL Assignment]		[No]
	nO	[No]: Safety door locking is not assigned.		
	YES	[YES]: Safety door locking is assigned. **Advice:** **(GdLA) can only be set to [YES] if the LO1 parameter is set to [No].** This parameter allows you to configure the channel that is used to trigger the GDL function.		
GLLd		[GDL long delay] This parameter is used to set the long delay for triggering of the GDL safety function. Maximum delay after activation of the STO function or after a normal deceleration ramp command to stop the machine. **Advice:** **The value for [GDL long delay] must be higher than the value for [GDL short delay]**	1 to 3600 s	1 s
GLSd		[GDL short delay] This parameter is used to set the short delay for triggering of the GDL safety function. Maximum delay after the SS1 ramp for stopping the machine.	1 to 3600 s	1 s

Input/output configuration

The figure below shows the input/output tab.



Code	Name/Description	Setting range	Factory setting
I/O	[Inputs/outputs]		
LIdt	[LI debounce time]	0 to 2000 ms	50 ms
	In most cases, the two logic inputs for a logic input pair used for safety functions (LI3-LI4 or LI5-LI6 or STO-LI3) are not 100% synchronized. Because there is a slight delay between the transition for both logic inputs, their state does not change at the same time. (LIdt) is the parameter that is used to set this delay. If both logic inputs change to a state with a delay of less than (LIdt), this is regarded as a simultaneous transition of the logic inputs. If the delay is longer than (LIdt), the frequency inverter regards the logic inputs as no longer synchronized and triggers an error.		
LIrt	[LI response time]	0 to 50 ms	0 ms
	This parameter is used to filter short pulses at the logic input (only for LI3-LI4 or LI5-LI6; does not affect STO). Some applications send short pulses in order to test the line. This parameter is used to filter out these short pulses. Commands are only taken into account if the pulse duration exceeds (LIrt). If the duration is below this value, the frequency inverter assumes that there is no command pending: the command is filtered out.		

Password configuration - Change password

Use this function to change the configuration password in the frequency inverter.

To change the configuration password, proceed as follows:

1) On tab **Safety functions**, click button **Change password**.
   Result: Dialog box **Change configuration password** is displayed.
2) On dialog box **Change configuration password**, proceed as follows:
   - Enter the existing configuration password in field **Enter current password**.
   - Enter the new configuration password in field **Enter new password**.
   - Re-enter the password in field **Confirm new password**.
   - Click **OK**.

> ## Advice:
> **The same password must be entered in fields Enter new password and Confirm new password.**

> ## Advice:
> **Your password must comply with the following:**
> - **Must consist of a numerical value between 1 and 9999.**
> - **It is not permitted to be longer than four characters.**
> - **It is not permitted to have a value of 0.**

Result: The configuration password has been changed.

Password configuration - Reset password

This function is intended for cases where you have forgotten the configuration password that was defined in the frequency inverter. To reset the frequency inverter, the universal password is required. This password can be obtained from the B&R Support department.
Once you have reset the device, it reverts to the undefined configuration password and the session is automatically closed.
The functional configuration remains unchanged, however.

Reset configuration

This function is used to reset the configuration of the safety function to the factory settings.
On tab **Safety functions**, click button **Reset configuration**.
Enter the password and then confirm your selection.
After this action, all safety parameters are reset to the factory settings.

6.8.3 Safety functions display and states

Code	Name/Description
SAF-	Menu [MONIT. SAFETY]: Visible in the ACPi parameter tool and on the graphic display terminal.
StFr	[Stator Frequency] Displays the calculated stator frequency in Hz.
StOS	[STO state] State of the STO (Safe Torque Off) safety function
IdLE	[Idle]: STO has not been executed
StO	[Safe stop]: STO has been executed
FLt	[Fault]: Error detected in STO
SLSS	[SLS state] State of the SLS (Safely Limited Speed) safety function
nO	[Not config.]: SLS not configured
IdLE	[Idle]: SLS has not been executed
SSI	[Safe ramp]: SLS ramp has been executed
StO	[Safe stop]: SLS request for Safe Torque Off has been executed
FLt	[Fault]: Error detected in SLS
WAIt	[Idle]: SLS is awaiting activation.
Strt	[Started]: SLS in temporary operation
SMSS	[SMS state] State of the SMS (Safe Maximum Speed) safety function
nO	[Not config.]: SMS is not configured.
SMS	[Active]: SMS is in active state.
FTI	[Internal Err.]: Internal SMS error detected
FTO	[Max Speed]: SMS overspeed error detected
GDLS	[GDL status] State of the GDL (Safety door locking) safety function
nO	[Not config.]: GDL is not configured.
OFF	[Inactive]: GDL is in inactive state.
STD	[Short delay]: GDL is in "Short delay" state.
LGD	[Long delay]: GDL is in "Long delay" state.
ON	[Active]: GDL is in active state.
FLT	[Internal Err.]: Internal GDL error detected
SS1S	[SS1 state] State of the "Safe Stop 1" safety function
nO	[Not config.]: SS1 not configured
IdLE	[Idle]: SS1 has not been executed
SSI	[Safe ramp]: SS1 ramp has been executed
StO	[Safe stop]: SS1 request for "Safe Torque Off" has been executed.
FLt	[Fault]: Error detected in SS1
SAF-	Menu [MONIT. SAFETY]: Visible in the ACPi parameter tool only
SFtY	[Safety drive status] Safety function state of the frequency inverter
IStd	[Standard inverter]: Standard product with no configured safety function
SAFE	[Safety drive]: Product with at least one configured safety function

6.8.4 Copying the safety configuration from the device to a PC and vice versa

Overview

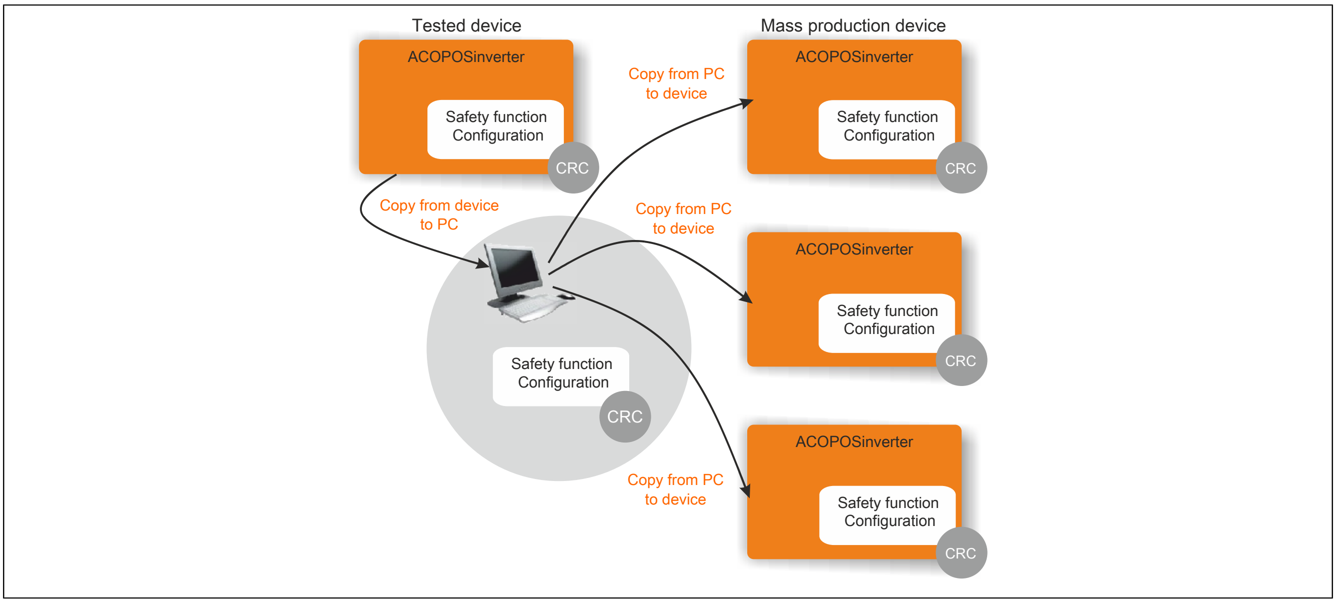
This function is used for copying a tested safety configuration for various frequency inverters and adding it to a different device of the same type.

This function can be used for the following:

- Identifying a unique safety configuration on the frequency inverter
- Copying the safety configuration file from the frequency inverter to a PC
- Copying the safety configuration file from a PC to a frequency inverter

Architecture

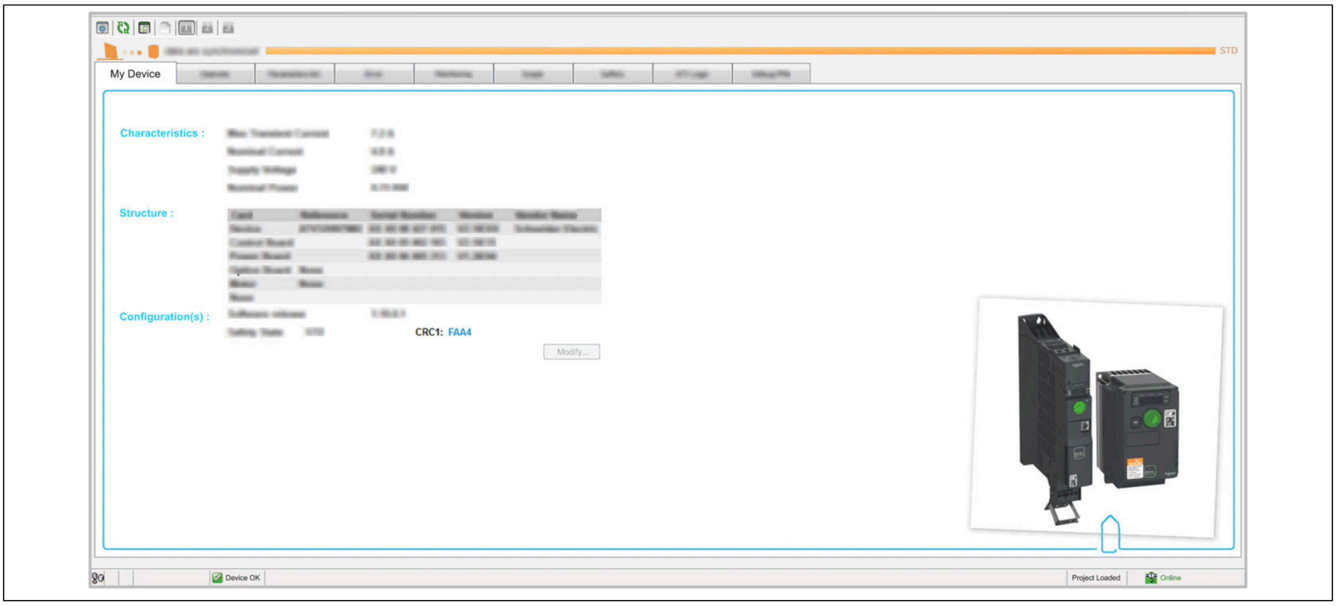
The figure below shows the architecture for copying the safety configuration from the device to a PC and vice versa:



Identification of a unique safety configuration

The safety configuration is identified using CRC. All safety-relevant parameters are used for the calculation.

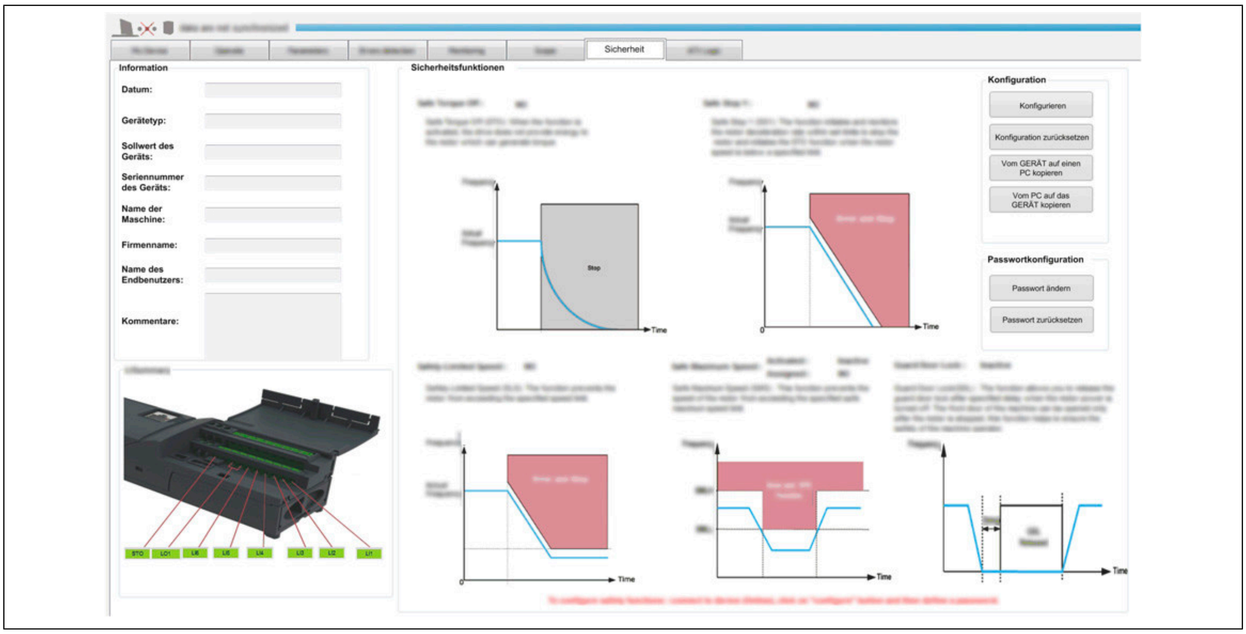
The CRC value is available on tab **My device**. Once the frequency inverter has been fully tested, make a note of the CRC value.



Copy from the device to a PC

To copy a configuration file from the device to a PC, proceed as follows:

1) On tab **Safety functions**, click button **Copy from the DEVICE to a PC**.



Result: Dialog box **Copy from device to PC** is opened.

2) Enter the configuration password in dialog box **Enter configuration password** and click **OK**.
   Result: The CRC1 value is displayed.
3) Make a note of the CRC1 value and click **Save**.
   Result: Window **Save file** is opened.
4) In window**Save file**, proceed as follows:
   - Select or create the following folder:
   - Enter the name of the file in field **File name**.
   - Click on **Save**.

   Result: Message **Safety-relevant parameters saved successfully** is displayed on the screen. This confirms that the file has been saved successfully in the required location.

Advice:

The configuration file cannot be copied from the device to a PC in the following cases:

- **If the motor is switched on**
- **If a function block is in operational state (Operational)**
- **If function Forced local is active**
- **If a safety function is activated**

Copying from a PC to the device

Warning!

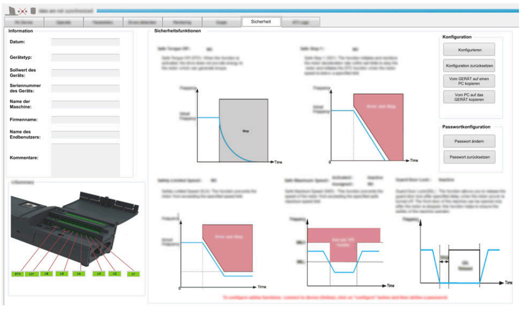
UNINTENDED OPERATION OF THE DEVICE

- **Connect the device to the PC via a point-to-point connection.**
- **In accordance with IEC 61800-5-2, only qualified personnel are permitted to copy configuration files from a PC to a device.**
- **After copying the configuration file from the PC to the device, test the configuration of the safety functions.**

Failure to follow these instructions can result in death, serious injury or damage to property.

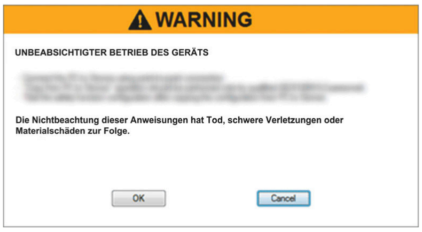
To copy a configuration file from a PC to the device, proceed as follows:

1) On tab **Safety functions**, click button **Copy from the PC to the DEVICE**.



Result: A warning message (**Warning**) is displayed. Read the instructions before proceeding with the copy operation.

2) Click **OK**.



Result: Window **Open file** is opened.

3) In window **Open file**, proceed as follows:

   ◦ Select a .sfty file.
   ◦ Click on **Open**.

   Result: The CRC1 value is displayed.

4) Check whether the CRC1 value corresponds to the value that was noted when copying the configuration from the device to the PC. If both values are the same, click **Continue**.
   Result: Dialog box **Copy from the PC to the DEVICE** is opened.
5) Enter the password (49157) in dialog box **Enter copied password** and click **OK**.
   Result: The configuration has been successfully copied from the PC to the device. A commissioning test must be performed on the safety functions.

Advice:

The configuration file cannot be copied from the PC to the device in the following cases:

- **If the motor is switched on**
- **If a function block is in operational state (Operational)**
- **If function Forced local is active**
- **If the configuration for the safety function is on the device already**

6.8.5 Device signature

Overview

The aim of the test is to confirm both the correct configuration of the defined safety functions and the test mechanisms. It is also designed to test the response behavior of specific monitoring functions to the explicit input of values outside the tolerance limits.

The test must cover all inverter-specific monitoring functions as well as all global integrated safety functions of the ACOPOSinverter.

Requirements for acceptance testing

- The machine is correctly wired.
- All safety-relevant equipment such as monitoring devices for safety doors, light barriers and emergency switching-off devices are connected and ready for operation.
- All motor and command parameters are correctly configured in the inverter.

Procedure for acceptance testing

Configuration of the acceptance test is set using the ACPi parameter tool.

1) Select option **Device** → **Safety function** → **Device signature** and complete the following five steps.
2) **General information**
   To add this step to the final report, select **Add to device signature**.
   Click **Next**.
   The information displayed here corresponds to section **Identification** of tab **Safety functions**.
3) **Functional summary**
   To add a function to the final report, select **Add to device signature**.
   Click **Next.**
   This step is broken down into interim steps.
   Each interim step corresponds to a safety function:
   - STO
   - SLS
   - SS1

   The functional diagram and parameter values are shown in an interim step for each function.
   Further comments can be added to a text field.
4) **I/O summary**
   To add a function to the final report, select **Add to device signature**.
   Click **Next**.
   The information displayed here corresponds to section **Overview of logic inputs** on tab **Safety functions**:
   - The logic input assigned to a safety function is shown in red and indicates the associated safety function.
   - Logic inputs that are not assigned to any safety function are displayed in green and do not indicate any assignment.
5) **Test**
   To add a function to the final report, select **Add to device signature**.
   Click **Next**.
   In this step, select the checkbox if you have tested your safety functions. This confirms that the functions exhibit the correct behavior for the overall equipment.
6) **Key**
   Click **Complete** to create the report.
   The checksum of the safety-relevant configuration is displayed as calculated. To send it to the connected device in this format, click **Transfer**.
   This allows you to compare the value of the checksum with the value that is displayed in the identification menu of the graphic display terminal.

Acceptance report

The ACPi parameter tool generates the acceptance report.

This function delivers a final report if one or more safety functions have been configured and tested. The report applies as a device signature and certifies that all safety functions are ready for operation. The acceptance report can be printed as an additional document or saved in PDF format.

If changes are made to the inverter configuration (not just to safety-relevant parameters), the acceptance test must be performed again.

7 Accessories

7.1 Overview

Model number	Description	Page
Graphics display		
8I0XD301.300-1	ACPi P74/P76/P84 graphics display	532
8I0XD302.300-1	ACPiP74/P76/P84 graphics display remote kit	
8I0XD303.300-1	ACPiP74/P76/P84 graphics display front cover	
8I0XD304.301-1	ACPiP74/P76/P84 graphics display cable 1 m	
8I0XD304.303-1	ACPiP74/P76/P84 graphics display cable 3 m	
8I0XD304.305-1	ACPiP74/P76/P84 graphics display cable 5 m	
8I0XD304.310-1	ACPiP74/P76/P84 graphics display cable 10 m	
8I0XD305.300-1	ACPiP74/P76/P84 graphics display RJ45 adapter	
Mains choke		
8I0CS004.000-1	ACPi mains choke 1-phase 4 A	533
8I0CS007.000-1	ACPi mains choke 1-phase 7 A	
8I0CS018.000-1	ACPi mains choke 1-phase 18 A	
8I0CT004.000-1	ACPi mains choke 3-phase 4 A	
8I0CT010.000-1	ACPi mains choke 3-phase 10 A	
8I0CT016.000-1	ACPi mains choke 3-phase 17 A	
8I0CT030.000-1	ACPi mains choke 3-phase 30 A	
Additional EMC filters		
8I0FS009.200-2	ACPi P74/P76 EMC filter 1-phase 9 A	538
8I0FS016.200-1	ACPi P74/P76 EMC filter 1-phase 16 A	
8I0FS022.200-1	ACPi P74/P76 EMC filter 1-phase 22 A	
8I0FT015.200-1	ACPi P74/P76 EMC filter 3-phase 15 A	
8I0FT025.200-1	ACPi P74/P76 EMC filter 3-phase 25 A	
Braking resistors		
8I0BR028.000-1	ACPi braking resistor 28 ohms 0.2 kW	543
8I0BR060.000-1	ACPi braking resistor 60 ohms 0.1 kW	
8I0BR100.000-1	ACPi braking resistor 100 ohms 0.05 kW	
USB accessories		
8I0XC001.003-1	ACPi USB Modbus universal cable	545
CANopen terminal adapter		
8I0CA001.000-1	CANopen terminal adapter - 2 RJ45	546
8I0XT001.000-1	ACPi terminating resistor 120 Ω for CAN	
DC bus cable		
8I0XC003.400-1	ACPi P74/P76 DC bus cable, 0.18 m ,5 pcs.	547
X2X Link cables		
X67CA0X99.1000	Cable for custom assembly, 100 m	548
X67CA0X99.5000	Cable for custom assembly, 500 m	

7.2 Graphics display

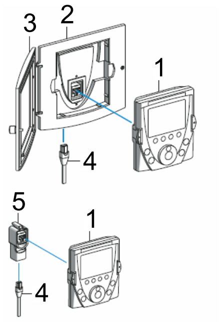
The optional graphic display can be used with ACOPOSinverter. It allows the following:

- Controlling, aligning and configuring the inverter
- Displaying current values (motor, I/O, etc.)
- Saving and downloading configurations (4 configuration files can be saved)

The following accessories are available:

- A remote mounting kit for mounting in the door of a control cabinet with IP54 protection
- A transparent cover that can be fastened to the remote mounting mechanism for IP65 protection
- A cable for connecting the graphics display to device ACOPOSinverter.
- An RJ45 adapter for connecting the graphics display to the remote cable

(1) 8I0XD301.300-1
(2) 8I0XD302.300-1
(3) 8I0XD303.300-1
(4) 8I0XD304.301-1, 8I0XD304.303-1, 8I0XD304.305-1, 8I0XD304.310-1
(5) 8I0XD305.300-1



7.2.1 Order data

Model number	Short description
	ACOPOSinverter P74/P84 - Graphics display
8I0XD301.300-1	ACOPOSinverter P74/P84 graphics display, 8 lines, 240 x 160 pixels, backlight, function keys, navigation keys, IP54 protection
8I0XD302.300-1	Remote installation kit for graphics display, IP54 protection
8I0XD303.300-1	Front cover for the remote installation kit for graphics display, IP65 protection
8I0XD304.301-1	Graphics display remote cable 1 m for ACOPOSinverter P74/P84 (RJ45 - RJ45)
8I0XD304.303-1	Graphics display remote cable 3 m for ACOPOSinverter P74/P84 (RJ45 - RJ45)
8I0XD304.305-1	Graphics display remote cable 5 m for ACOPOSinverter P74/P84 (RJ45 - RJ45)
8I0XD304.310-1	Graphics display remote cable 10 m for ACOPOSinverter P74/P84 (RJ45 - RJ45)
8I0XD305.300-1	RJ45 adapter for graphic display

Table 28: 8I0XD301.300-1, 8I0XD302.300-1, 8I0XD303.300-1, 8I0XD304.301-1, 8I0XD304.303-1, 8I0XD304.305-1, 8I0XD304.310-1, 8I0XD305.300-1 - Order data

7.3 Mains choke

- Improved protection against overvoltages in the mains supply and reduced distortion factor of the current generated by the inverter.
- Limitation of the mains current.
- Using mains chokes is recommended when the following conditions apply:
    - Multiple inverters connected in parallel with little space between them.
    - Mains supply with disturbances from other devices (interference, overvoltage)
    - Line supply with voltage imbalance between phases >1.8% of the nominal voltage
    - Inverter supplied via a line with very low impedance (10x higher than the inverter's nominal voltage when close to power transformers).
    - Large number of frequency inverters connected on one line.
    - Reduction of overloads on capacitors for cosine ϕ correction if the system has equipment for power factor correction.

7.3.1 Order data

Model number	Short description
	ACOPOSinverter P74/P76/P84 - Line chokes
8I0CS004.000-1	Mains choke 1-phase 4 A, for ACOPOSinverter P74/P76 1x 200 to 240 V, 0.18 to 0.37 kW
8I0CS007.000-1	Mains choke 1-phase 7 A, for ACOPOSinverter P74/P76 1x 200 to 240 V, 0.55 to 0.75 kW
8I0CS018.000-1	Mains choke 1-phase 18 A, for ACOPOSinverter P74 1x 200 to 240 V, 1.1 to 2.2 kW
8I0CT004.000-1	Mains choke 3-phase 4 A, for ACOPOSinverter P74 3x 380 to 500 V, 0.37 to 1.5 kW, for ACOPOSinverter P84 3x 200 to 240 V, 0.37 to 0.75 kW and 3x 380 to 480 V, 0.75 to 1.5 kW
8I0CT010.000-1	Mains choke 3-phase 10 A, for ACOPOSinverter P74 3x 380 to 500 V, 2.2 to 4 kW, for ACOPOSinverter P84 3x 200 to 240 V, 1.5 to 2.2 kW and 3x 380 to 480 V, 2.2 to 4 kW
8I0CT016.000-1	Mains choke, 3-phase 17 A, for ACOPOSinverter P74 3x 380 to 500 V, 5.5 to 7.5 kW, for ACOPOSinverter P84 3x 200 to 240 V, 3 kW and 3x 380 to 480 V, 5.5 to 7.5 kW
8I0CT030.000-1	Mains choke 3-phase 30 A, for ACOPOSinverter P74 3x 380 to 500 V, 11 to 15 kW, for ACOPOSinverter P84 3x 200 to 240 V, 4 to 5.5 kW and 3x 380 to 480 V, 11 to 15 kW

Table 29: 8I0CS004.000-1, 8I0CS007.000-1, 8I0CS018.000-1, 8I0CT004.000-1, 8I0CT010.000-1, 8I0CT016.000-1, 8I0CT030.000-1 - Order data

7.3.2 Technical data

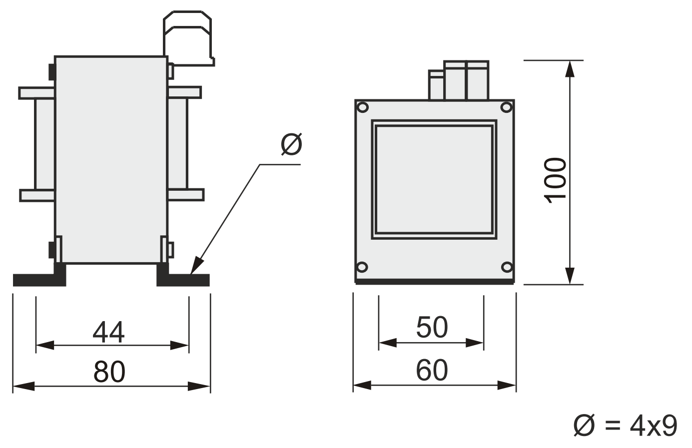
Model number	8I0CS004.000-1	8I0CS007.000-1	8I0CS018.000-1	8I0CT004.000-1	8I0CT010.000-1	8I0CT016.000-1	8I0CT030.000-1
General information							
Certifications							
CE	Yes						
KC	Yes						
Mains connection							
Power dissipation	17 W	20 W	30 W	45 W	65 W	75 W	90 W
Inductance	10 mH	5 mH	2 mH	10 mH	4 mH	2 mH	1 mH
Nominal current	4 A	7 A	18 A	4 A 1)	10 A 1)	17 A 1)	30 A 1)
Voltage drop	From 3 to 5% of the rated supply voltage. Higher values result in torque loss.						
Saturation current	-						
Operating conditions							
Installation elevation above sea level	0 to 1000 m						
Degree of protection							
Choke	IP00						
Terminals	IP20						IP10
Max. relative humidity	95%, non-condensing No dripping water						
Ambient temperature	0 to 45°C						
Max. ambient temperature	Up to 55°C 2)						
Maximum installation elevation	3000 m 3)						
Ambient conditions							
Temperature							
Storage	-25 to 70°C						
Mechanical properties							
Weight	0.63 kg	0.88 kg	1.99 kg	1.5 kg	3.0 kg	3.5 kg	6.0 kg
General information							
Conformity to standard	IEC 61800-5-1 (protection level 1 regarding overvoltages in the mains supply according to VDE 0160)						

Table 30: 8I0CS004.000-1, 8I0CS007.000-1, 8I0CS018.000-1, 8I0CT004.000-1, 8I0CT010.000-1, 8I0CT016.000-1, 8I0CT030.000-1 - Technical data

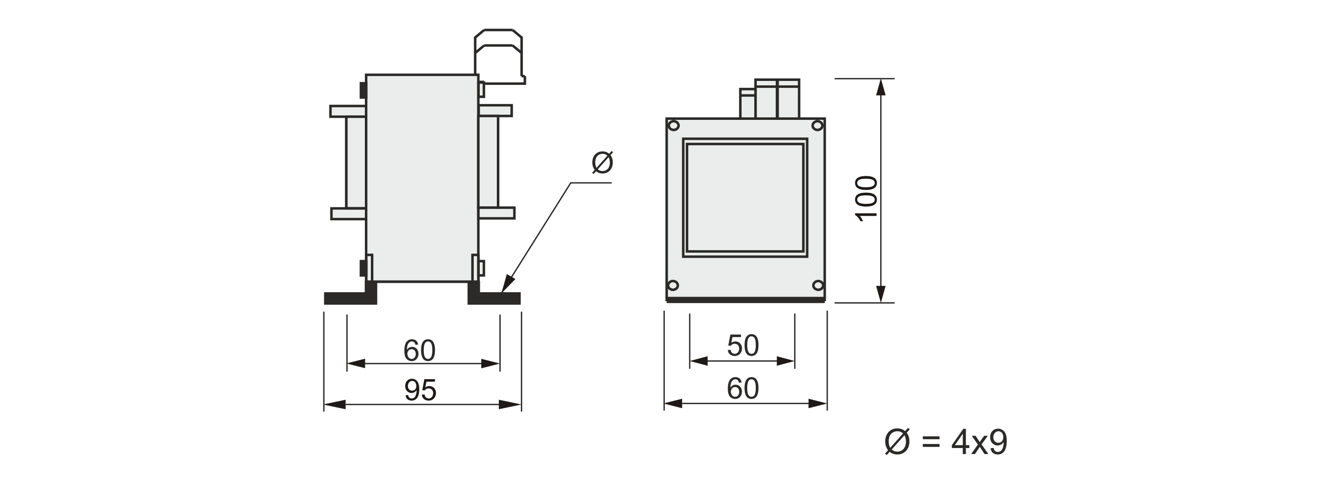
1) Max. current = 1.65 x rated current for 60 seconds.
2) With current reduction of 2% per °C above 45°C.
3) From 1000 to 3000 m, current reduced by 1% per 100 m

7.3.3 Dimensions

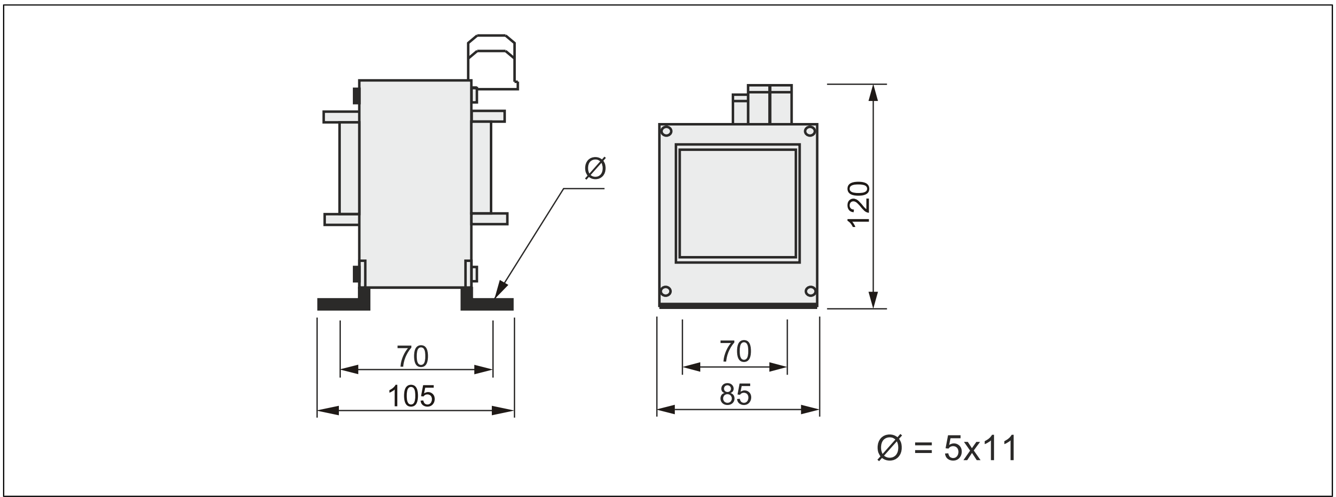
8I0CS004.000-1



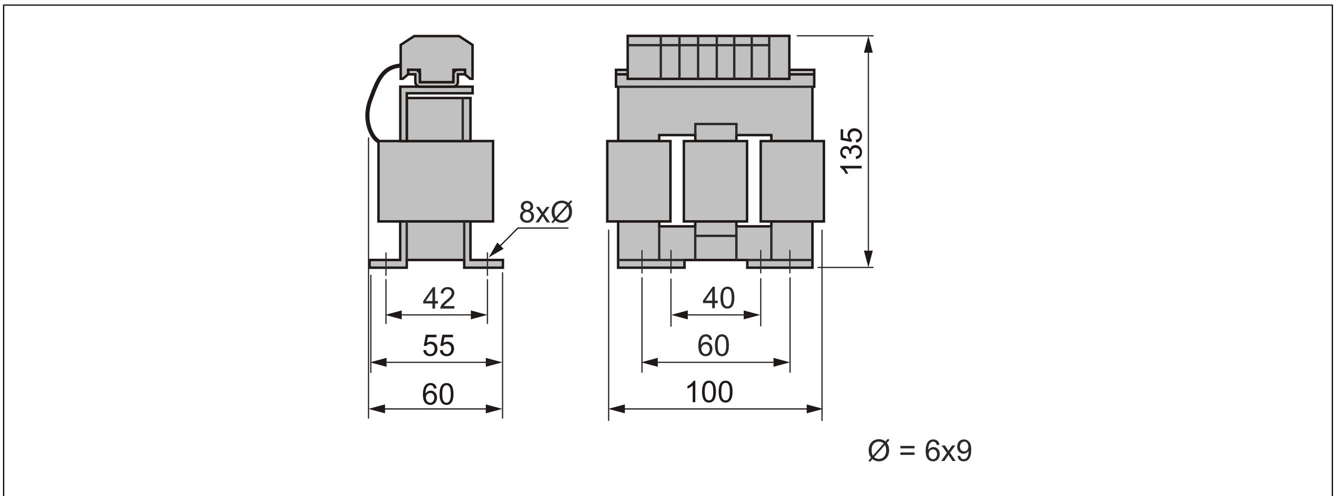
8I0CS007.000-1



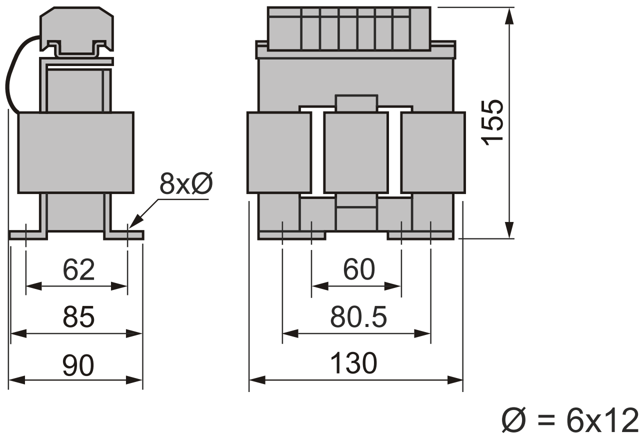
8I0CS018.000-1



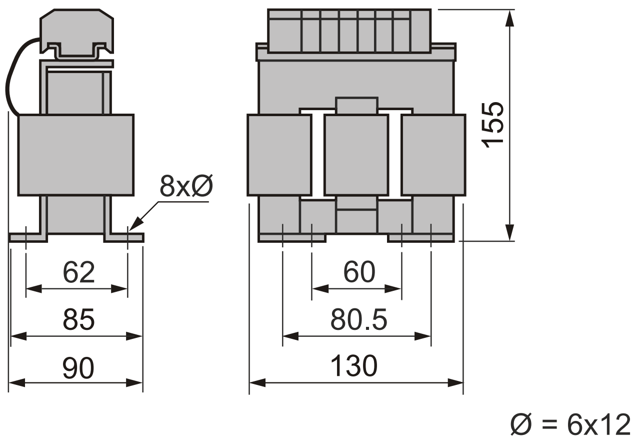
8I0CT004.000-1



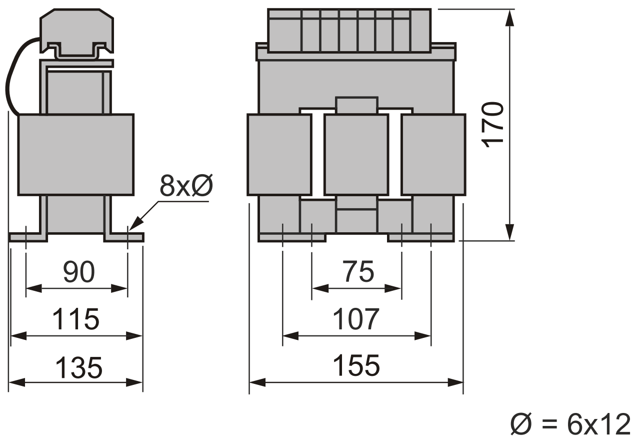
8I0CT010.000-1



8I0CT016.000-1

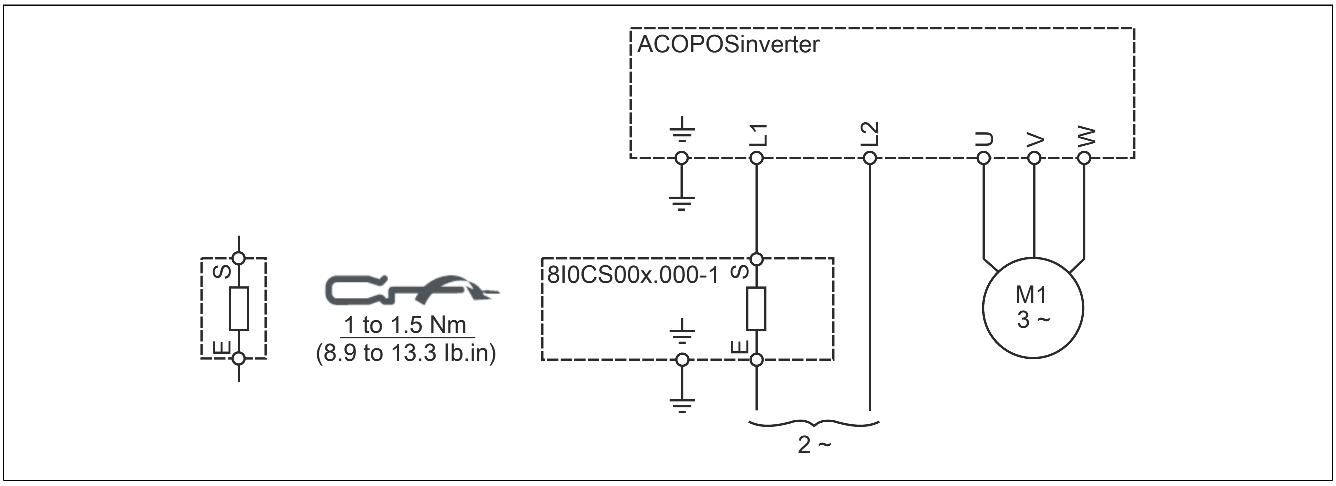


8I0CT030.000-1

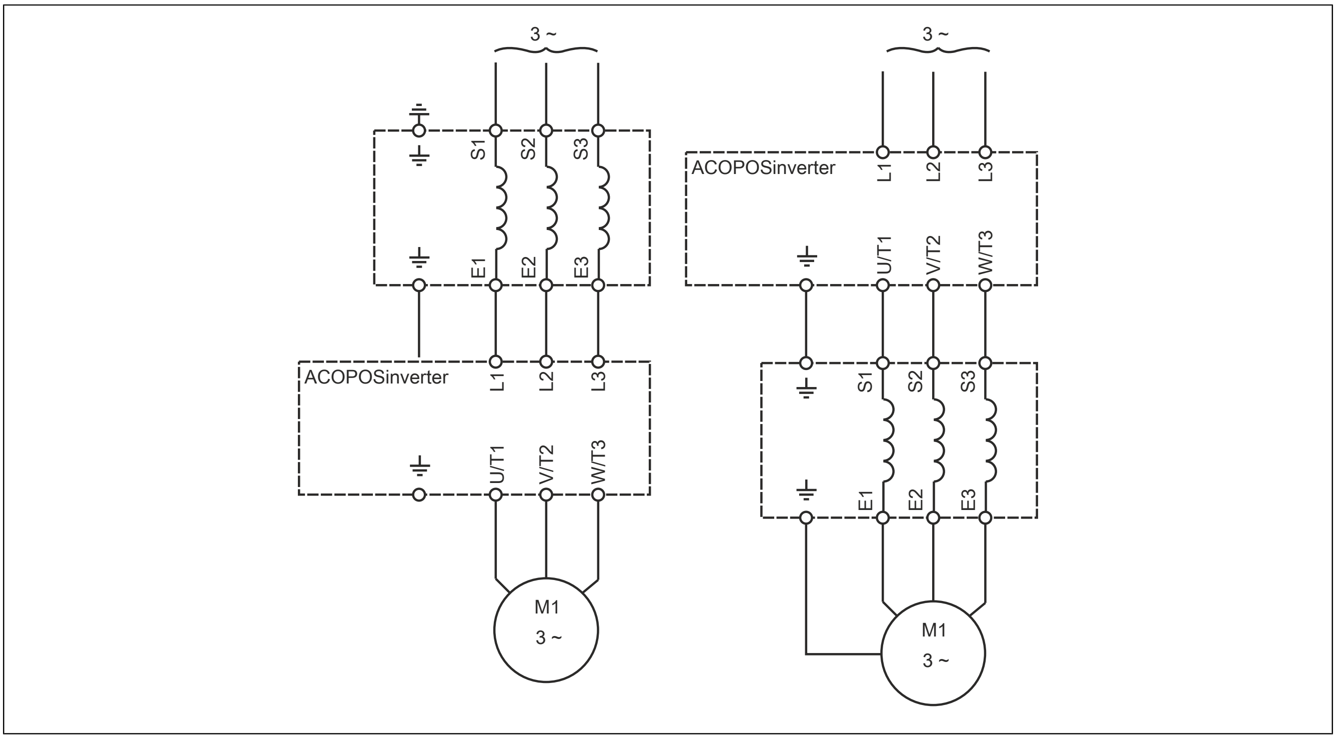


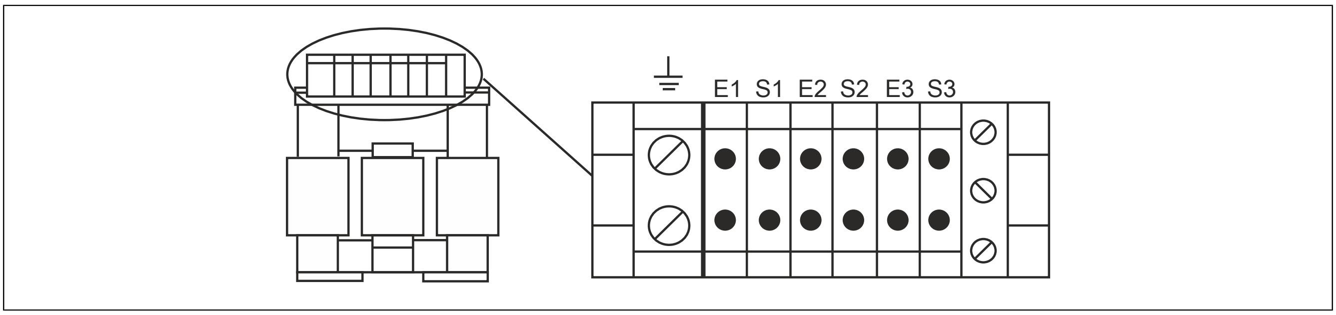
7.3.4 Installation

8I0CS0xx.000-1



8I0CT0xx.000-1





7.4 Additional EMC filters

- Additional EMC filters are intended to reduce line-conducted emissions from the mains supply to a level under the limits specified in IEC/EN 61800-3, category C1, C2 or C3 in environment 1 (public power system) or 2 (industrial power system), depending on the inverter power.
- The data for determining the permissible length of the shielded motor cable is listed in the technical data for ACOPOSinverter under "Line-conducted and radiated emissions".
- Additional EMC filters can only be used for connection types TN (neutral) and TT (neutral-ground).

7.4.1 Order data

Model number	Short description	Figure
	ACOPOSinverter P74/P76 - Additional EMC input filters	
8I0FS009.200-2	EMC filter 1-phase 9 A, side installation, for ACOPOSinverter P74/P76 1x 200 to 240 V, 0.18 to 0.75 kW	
8I0FS016.200-1	EMC filter 1-phase 16 A, side installation, for ACOPOSinverter P74/P76 1x 200 to 240 V, 1.1 to 1.5 kW	
8I0FS022.200-1	EMC filter 1-phase 22 A, side installation, for ACOPOSinverter P74/P76 1x 200 to 240 V, 2.2 kW	
8I0FT015.200-1	EMC filter 3-phase 15 A, side installation, for ACOPOSinverter P74/P76 3x 380 to 500 V, 0.37 to 1.5 kW	
8I0FT025.200-1	EMC filter 3-phase 25 A, side installation for ACOPOSinverter P74 3x 380 to 500 V, 2.2 to 4 kW	

Table 31: 8I0FS009.200-2, 8I0FS016.200-1, 8I0FS022.200-1, 8I0FT015.200-1, 8I0FT025.200-1 - Order data

7.4.2 Technical data

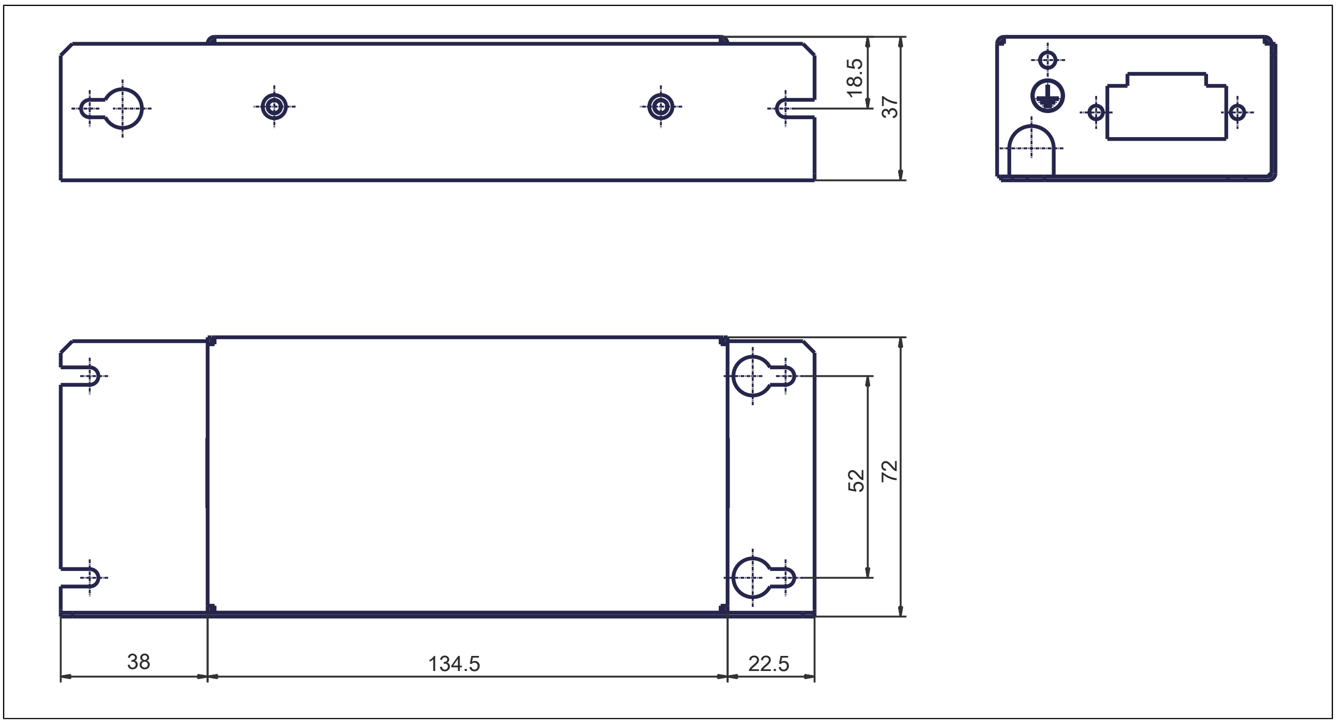
Model number	8I0FS009.200-2	8I0FS016.200-1	8I0FS022.200-1	8I0FT015.200-1	8I0FT025.200-1
General information					
Certifications					
CE	-	Yes			
KC	-	Yes			
Mains connection					
Power dissipation	3.7 W	6.9 W	7.5 W	9.9 W	15.8 W
Max. nominal voltage	1x 240 VAC +10%			3x 500 VAC +10%	
Nominal filter current	9 A	16 A	22 A	15 A	25 A
Max. fault current	100 mA	150 mA	80 mA	15 mA	35 mA
Operating conditions					
Installation elevation above sea level	0 to 1000 m [1)]				
Degree of protection per EN 60529	IP20 and IP41 on the upper part	IP21 and IP41 on the upper part			
Max. relative humidity per IEC 60068-2-3	93%, non-condensing No dripping water	95%, non-condensing No dripping water			
Ambient temperature	-10 to 50°C	-10 to 60°C			
Ambient conditions					
Temperature					
Storage	-25 to 70°C				
Mechanical properties					
Weight	0.6 kg	0.775 kg	1.13 kg	1.0 kg	1.65 kg
Installation	Below or next to the inverter				
General information					
Conformity to standard	EN 133200				

Table 32: 8I0FS009.200-2, 8I0FS016.200-1, 8I0FS022.200-1, 8I0FT015.200-1, 8I0FT025.200-1 - Technical data

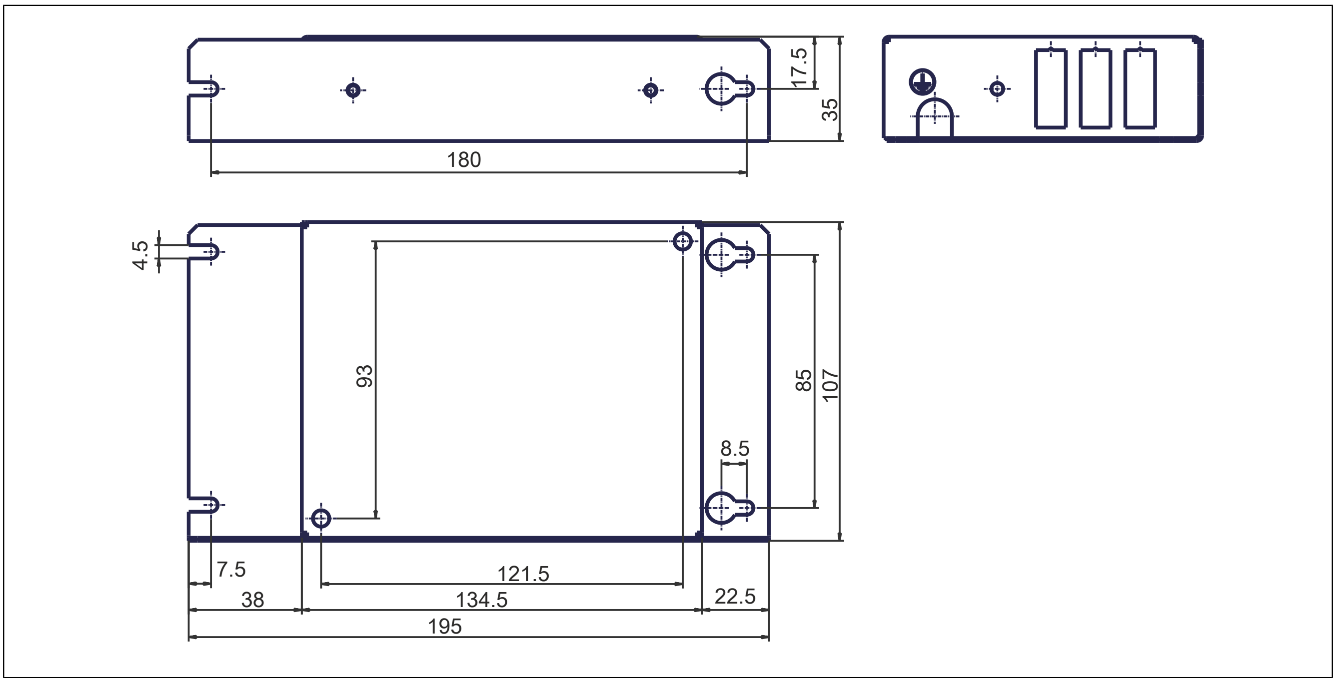
1) Over 1000 m, current reduced by 1% per 100 m

7.4.3 Dimensions

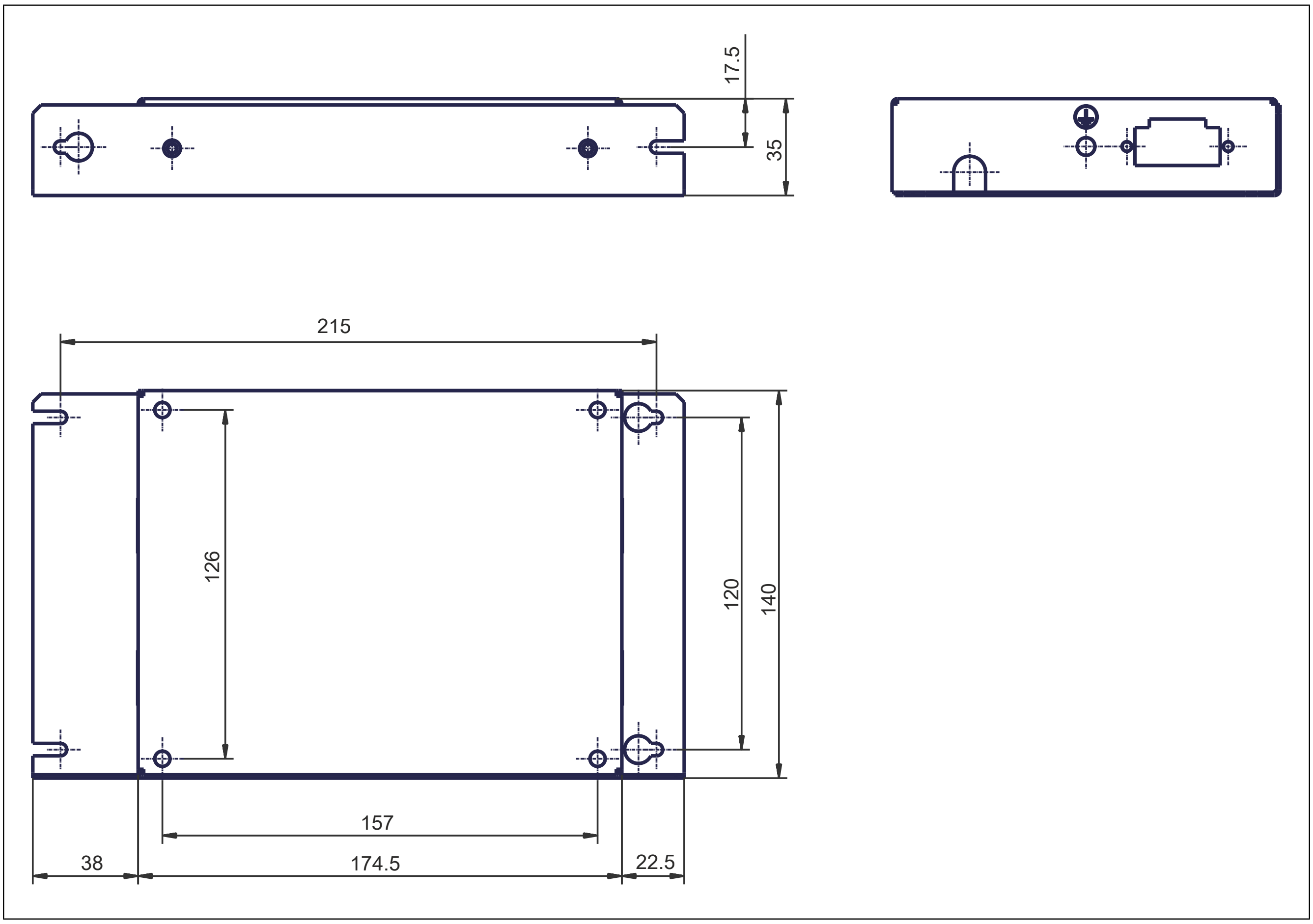
8I0FS009.200-2



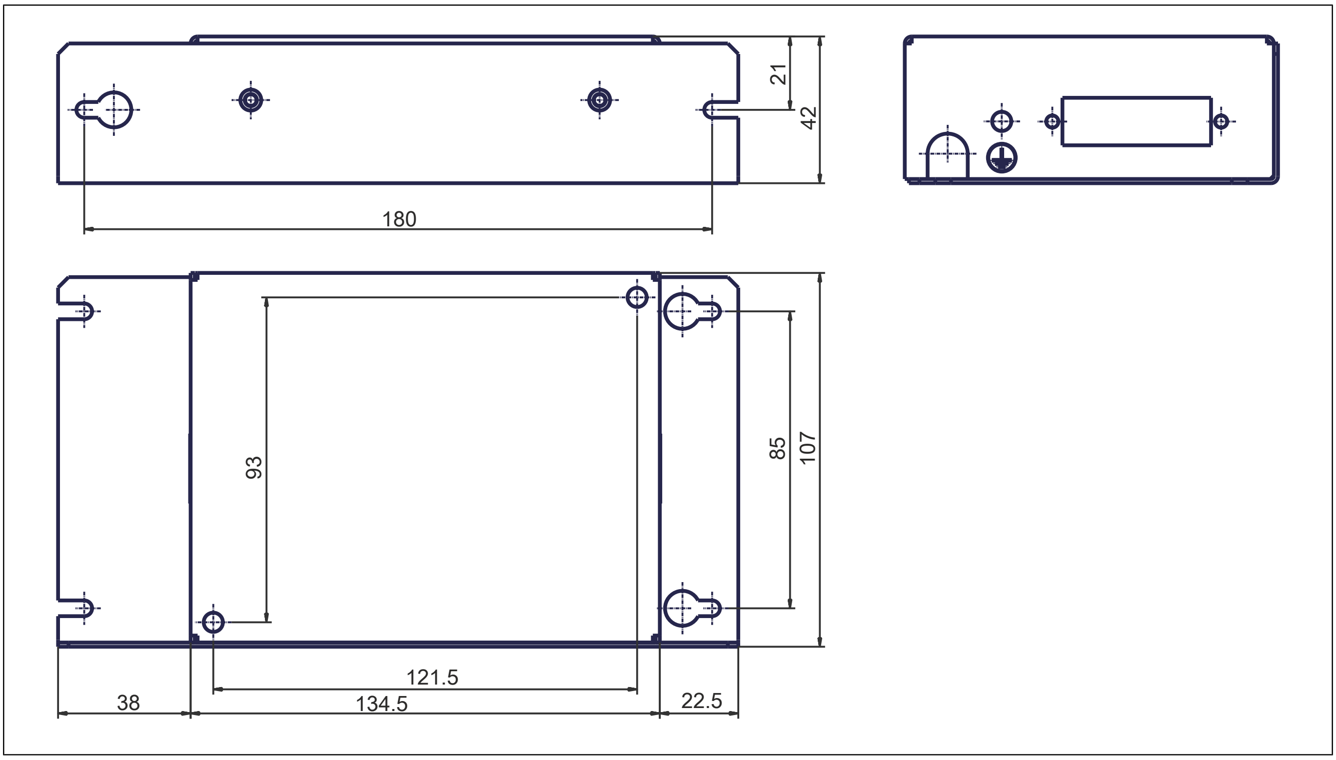
8I0FS016.200-1



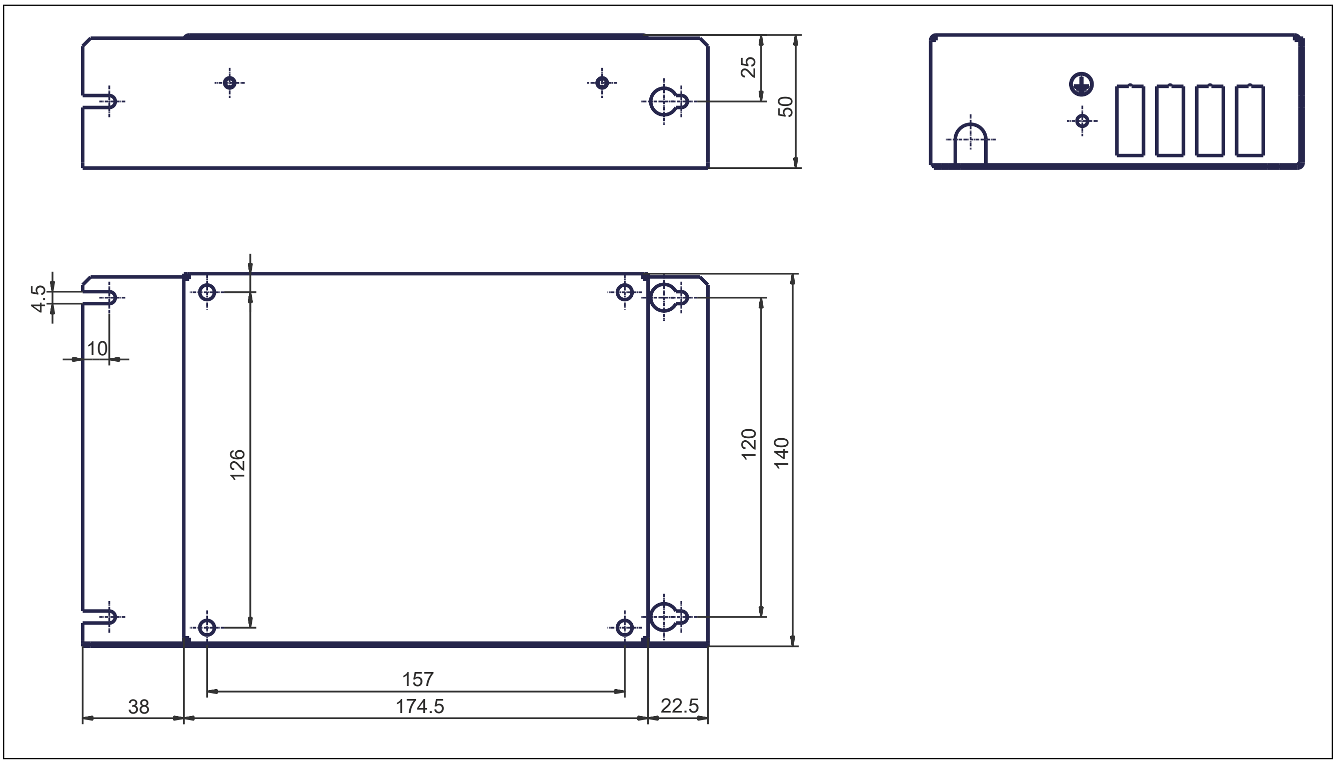
8I0FS022.200-1



8I0FT015.200-1

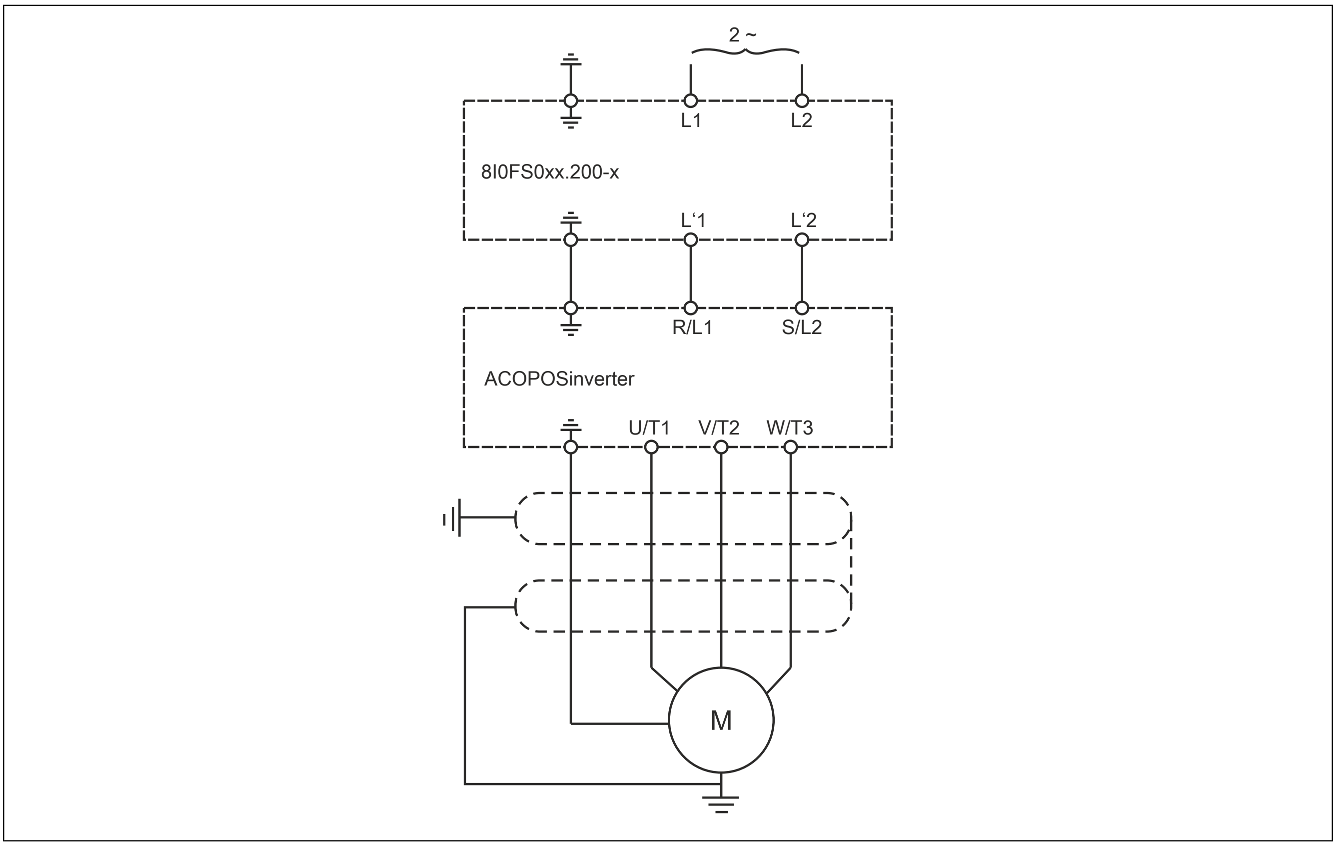


8I0FT025.200-1

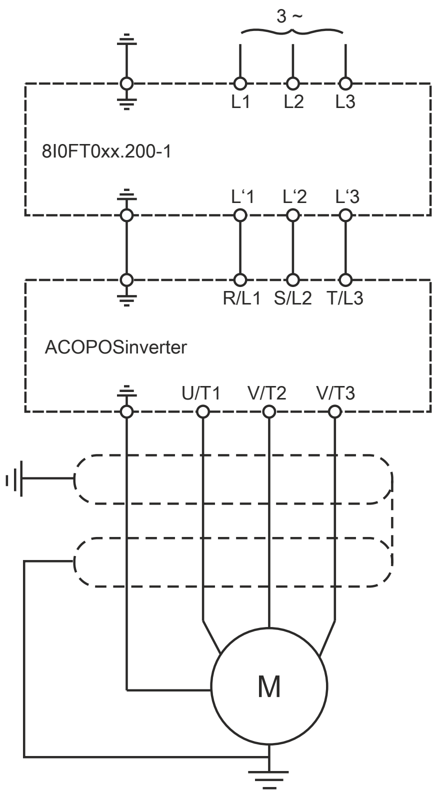


7.4.4 Installation

8I0FS0xx.200-x



8I0FT0xx.200-1

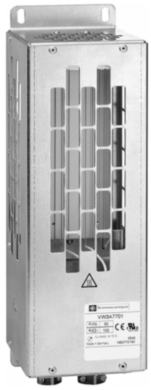


7.5 Braking resistors

The braking resistor allows the inverter to continue running when braking to a stop or decelerating by branching off the brake energy. It permits a maximum short-term braking torque.

The resistors are intended for installation on the outside of the housing are not permitted to interfere with natural cooling. Incoming and outgoing air is not permitted to be blocked. The air must be free of dust, condensation and corrosive gases.

7.5.1 Order data



Model number	Short description
	Optional braking resistors
8I0BR028.000-1	Braking resistor 28 Ω, continuous braking power 0.2 kW, for ACOPOSinverter P74 3x 380 to 500 V, 11 to 15 kW, for ACOPOSinverter P84 3x 200 to 240 V, 3 to 4 kW and 3x 380 to 480 V, 11 to 15 kW
8I0BR060.000-1	Braking resistor 60 Ω, continuous braking power 0.1 kW, for ACOPOSinverter P74 1x200 to 240 V, 2.2 kW and 3x 380 to 500 V, 5.5 to 7.5 kW, for ACOPOSinverter P84 3x 200 to 240 V, 1.5 to 2.2 kW and 3x 380 to 480 V, 5.5 to 7.5 kW
8I0BR100.000-1	Braking resistor 100 Ω, continuous braking power 0.05 kW, for ACOPOSinverter P74/P76 1x200 to 240 V, 0.18 to 1.5 kW and 3x 380 to 500 V, 0.37 to 4 kW for ACOPOSinverter P84 3x 200 to 240 V, 0.37 to 0.75 kW and 3x 380 to 480 V, 0.75 to 4 kW

Table 33: 8I0BR028.000-1, 8I0BR060.000-1, 8I0BR100.000-1 - Order data

7.5.2 Technical data

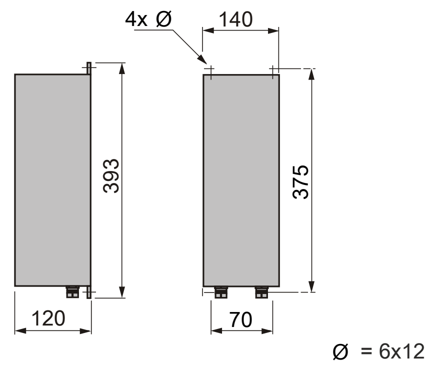
Model number	8I0BR028.000-1	8I0BR060.000-1	8I0BR100.000-1
General information			
Certifications			
CE	Yes		
KC	Yes		
Operating conditions			
Rated protection of housing	IP20		
Ambient temperature	0 to 50°C		
Ambient conditions			
Temperature			
Storage	-25 to 70°C		
Mechanical properties			
Weight	3.5 kg	2.4 kg	2 kg
Properties			
Resistance value at 20°C	28 Ω	60 Ω	100 Ω
Average available power at 50°C	0.2 kW [1]	0.1 kW [1]	0.05 kW [1]
Thermal protection	Using temperature-controlled switches or the inverter		
Temperature controlled switch			
Activation temperature	120°C		
Max. voltage / Max. current	250 VAC / 1 A		
Min. voltage / Min. current	24 VDC / 0.1 A		
Max. contact resistance	60 mΩ		
Connection recommendation	The switch should be connected within the sequence (so it can be used for signaling or line contactor control)		

Table 34: 8I0BR028.000-1, 8I0BR060.000-1, 8I0BR100.000-1 - Technical data

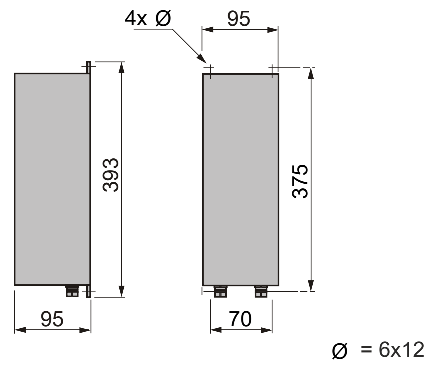
1) Load factors for resistances: The value for the average power that can be transfered from the resistor to the housing at 50°C is aligned to a brake load factor that corresponds to most standard applications.
For 8I0BR100.000-1 to 8I0BR003.000-1:
- Braking for 2 s with a braking torque of 0.6 Tn for a 40 second cycle
- Braking for 0.8 s with a braking torque of 1.5 Tn for a 40 second cycle
For 8I0BR003.001-1 to 8I0BR001.004-1:
- Braking for 10 s with a braking torque of 2 Tn for a 30 second cycle

7.5.3 Dimensions

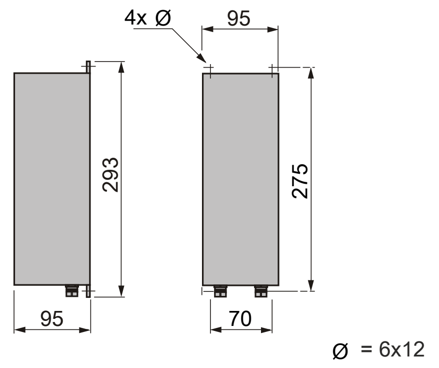
8I0BR028.000-1



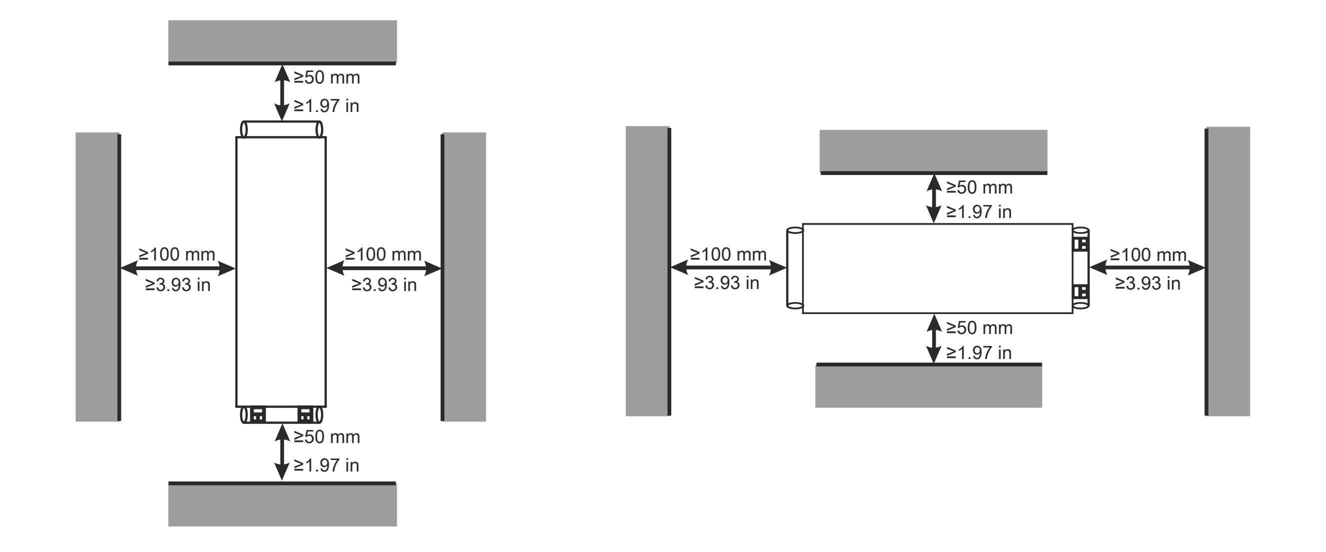
8I0BR060.000-1

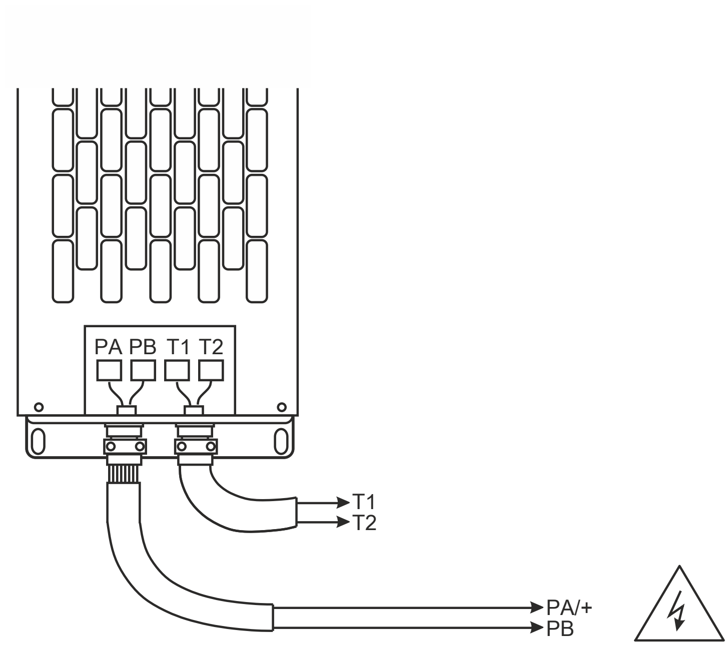


8I0BR100.000-1



7.5.4 Installation





7.6 USB accessories

7.6.1 Order data

Model number	Short description	Figure
	ACOPOSinverter P74/P76 - USB accessories	
8I0XC001.003-1	ACOPOSinverter USB Modbus universal cable 3 m, PC - ACOPOSinverter connection	

Table 35: 8I0XC001.003-1 - Order data

7.7 CANopen terminal adapter

7.7.1 Order data

Model number	Short description	Figure
	CANopen accessories	
8I0CA001.000-1	CANopen terminal adapter - 2x RJ45 connectors for daisy chain connection of CANopen bus ≤0.3 m, 1x RJ45 cable for connecting to drive	
8I0XT001.000-1	ACOPOSinverter terminating resistor 120 Ω, RJ45 connector	

Table 36: 8I0CA001.000-1, 8I0XT001.000-1 - Order data

7.7.2 Technical data

Model number	8I0CA001.000-1	8I0XT001.000-1
Short description		
Accessories	CANopen terminal adapter	ACOPOSinverter P66 terminating resistor 120 Ω
General information		
Connection	-	RJ45
Certifications		
KC	-	Yes
Interfaces		
Terminating resistor	8I0XT001.000-1	-
Mechanical properties		
Dimensions		
Length	≤0.3 m	-
Brief overview		
Content of delivery	1 piece, 8I0XT001.000-1 must be ordered separately.	-

Table 37: 8I0CA001.000-1, 8I0XT001.000-1 - Technical data

7.8 DC bus cable

7.8.1 Order data

Model number	Short description	Figure
	ACOPOSinverter P74/P76 - DC bus cable	
8I0XC003.400-1	ACPi P74/P76 DC bus cable, 0.18 m, 5 pcs.	

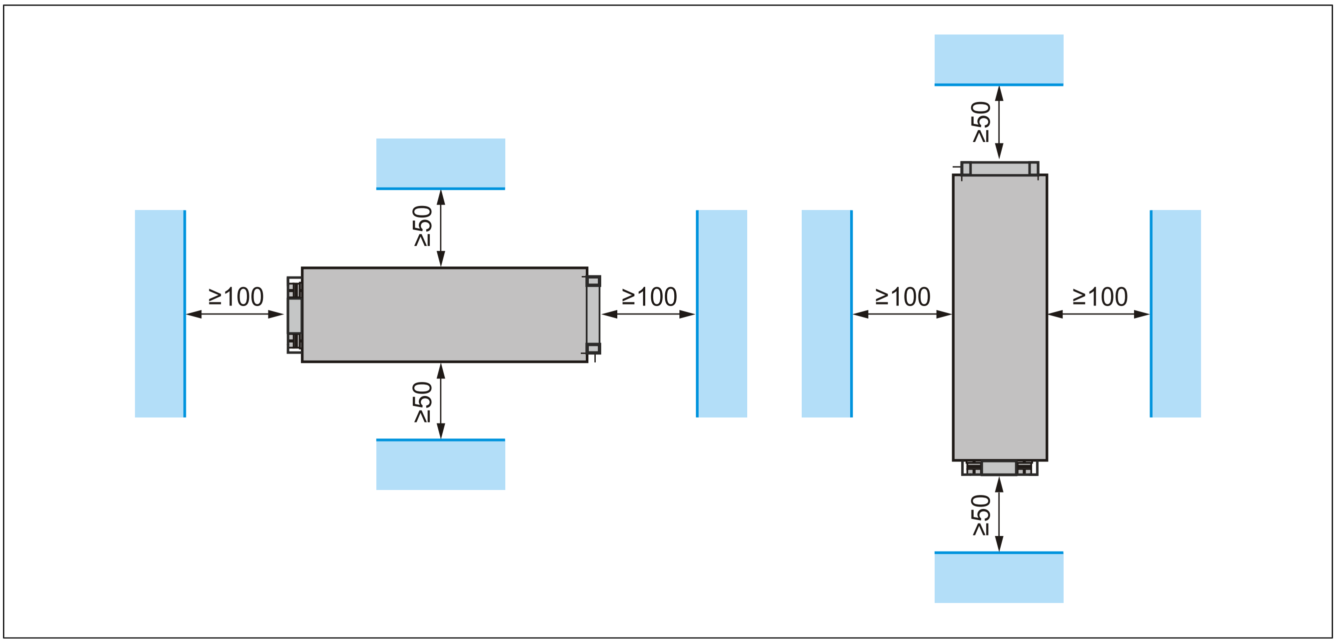
Table 38: 8I0XC003.400-1 - Order data

7.8.2 Technical data

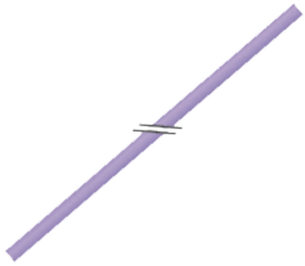
Model number	**8I0XC003.400-1**
Short description	
Accessories	ACPi P74 DC bus cable
Mechanical properties	
Dimensions	
Length	0.18 m
Brief overview	
Content of delivery	5 pcs.

Table 39: 8I0XC003.400-1 - Technical data

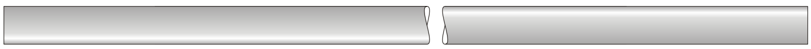
7.8.3 Installation



7.9 X2X Link cables

	Short description, model number
Length	X2X Link cable for custom assembly
100 m	X67CA0X99.1000
500 m	X67CA0X99.5000
	

7.9.1 X67CA0X99.xxxx

Dimensions			
			
Pinout			
	Description	Wire colors	
For custom Wiring	X2X+	Red	For custom Wiring
	X2X	White	
	X2X⊥	Black	
	X2X\	Blue	
	SHLD	-	

7.9.2 Technical data

Model number	X67CA0X99.1000	X67CA0X99.5000
Short description		
Accessories	X2X Link cable for custom assembly, 100 m	X2X Link cable for custom assembly, 500 m
General information		
Note	Halogen-free	
Durability	Flame-retardant	
Type	Custom assembly	
Cable cross section		
Data cables		
AWG	2x 24 AWG	
mm²	2x 0.25 mm²	
Supply lines		
AWG	2x 22 AWG	
mm²	2x 0.34 mm²	
Cable construction		
Signal line		
Shield	Pair shielding with aluminum foil	
Stranding	Twisted pair wires	
Cable stranding	0.35 mm² (22 AWG) with filler	
Cable shield	Tinned copper braiding, coverage >85%	
Outer jacket		
Material	Thermoplastic polyurethane (TPU)	
Color	Violet	
Labeling	B&R X67CA0X99.1000 Rev. G0 ESCHA FC	B&R X67CA0X99.5000 Rev. G0 ESCHA FC
Wires		
Type	Tinned copper ETB1 Data line: Fine stranded wire (19x 0.13 mm) Supply line: Fine stranded wire (19x 0.15 mm)	
Wire colors		
Data cables	Blue, white	
Supply lines	Red, black	
Wire insulation		
Data cables	Cell polyethylene (PE)	
Supply lines	Polypropylene (PP)	
Electrical properties		
Rated voltage	250 V	
Nominal current	Max. 4 A / Contact at 40°C	
Operating voltage	Max. 250 V	

Table 40: X67CA0X99.1000, X67CA0X99.5000 - Technical data

Model number	X67CA0X99.1000	X67CA0X99.5000
Degree of insulation	Category II per IEC 61076-2	
Conductor resistance	Data line: ≤78 Ω/km Supply line: ≤55 Ω/km	
Insulation resistance	≥100 MΩ	
Operating conditions		
Degree of protection per EN 60529		
Connector/Coupling	IP67, only when screwed in	
Ambient conditions		
Temperature		
Transport	-40 to 80°C	
Fixed installation	-40 to 80°C	
Flexible installation [1)]	-25 to 60°C	
Mechanical properties		
Dimensions		
Length	100 m	500 m
Diameter	6.9 mm ±0.2 mm	
Bend radius	≥15x outer diameter	
Drag chain data		
Acceleration	Max. 4 m/s²	
Flex cycles	Min. 2 million	
Velocity	Max. 3 m/s	
Weight	0.063 kg/m	

Table 40: X67CA0X99.1000, X67CA0X99.5000 - Technical data

1) In cable drag chain operation

8 EC declaration of conformity

This document was originally written in the German language. The German edition therefore represents the original instruction manual in accordance with the 2006/42/EC machinery directive. Documents in other languages are to be viewed as translations of the original instruction manual.

Product manufacturer

B&R Industrial Automation GmbH

B&R Strasse 1

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AUSTRIA

The EC declarations of conformity can be downloaded from the B&R website (www.br-automation.com).