

# **ACOPOS Inverter P76**

## **User's manual**

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## **Publishing information**

B&R Industrial Automation GmbH

B&R Strasse 1

5142 Eggelsberg

Austria

Telephone: +43 7748 6586-0

Fax: +43 7748 6586-26

[office@br-automation.com](mailto:office@br-automation.com)

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# 1 Safety information

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Read through these instructions carefully and familiarize yourself with the device before installing, operating or servicing it. The warning notices listed below are included in all documentation and on the device itself and indicate potential risks and hazards or specific information that illustrates or simplifies a procedure.

## Notes

### **Danger!**

**DANGER** indicates a direct hazard that will result in death or serious injury if not avoided.

### **Warning!**

**WARNING** indicates a potential hazard that can result in death, serious injury and/or material damage if not avoided.

### **Caution!**

**CAUTION** indicates a potential hazard that can result in personal injury and/or material damage if not avoided.

### **Note:**

**NOTE** without the use of the danger symbol indicates a possible hazard that can result in material damage if not avoided.

The term "inverter" in the context of this manual refers to the control unit of the frequency inverter as defined by the NEC.

Only qualified personnel are permitted to install, operate, service and repair electrical devices. B&R assumes no responsibility for possible consequences resulting from the 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 damage resulting from the use of this material.

Qualified personnel are employees who have skills and knowledge regarding the design and operation of this electrical equipment and installations and who have completed training to recognize and avoid potential hazards.

## **Personnel qualifications**

Work on and with this product is only permitted to be carried out by appropriately trained and authorized personnel who are familiar with the contents of this manual and all associated product documentation. In addition, such personnel must have participated in safety training to recognize and avoid the hazards associated with the use of this product. Personnel must have sufficient technical training, know-how and experience and be able to foresee and identify potential hazards that may arise from the use of the product, the changing of settings and the mechanical, electrical and electronic equipment of the entire system. All personnel working on and with the product must be familiar with all applicable standards, guidelines and accident prevention regulations.

## **Intended use**

This product is an inverter for three-phase synchronous and induction motors and designed for industrial use according to the specifications and instructions in this manual. When using the product, all relevant safety regulations and guidelines as well as the specified requirements and technical data must be observed. The product must be installed outside the ATEX zone. Before use, a risk assessment must be carried out with regard to the intended application. Based on the results of this analysis, appropriate safety measures must be implemented. Since the product is used as a component of a complete system, personal safety must be ensured by appropriate design of the complete system (for example, appropriate machine design). Any use other than that expressly permitted is prohibited and may present hazards. Only qualified personnel are permitted to install, operate, control and service electrical devices.

## Product-related information

**Danger!****RISK OF ELECTRIC SHOCK OR ARC AND RISK OF EXPLOSION**

- Work on and with this drive system is only permitted to be carried out by appropriately trained and authorized personnel who are familiar with the contents of this manual and all associated product documentation and who have completed safety training to recognize and avoid the hazards involved. Installation, adjustment, repair and servicing must be carried out by qualified personnel.
- The system integrator is responsible for compliance with all relevant local and national electrical engineering requirements and any other applicable regulations regarding the protective grounding of all equipment.
- Many components of the product, including the printed circuits, are supplied by the mains voltage.
- Only use electrically insulated tools and measuring instruments with the correct rated voltage.
- Do not touch any unshielded components or terminals when voltage is applied.
- Motors can generate voltage when the shaft is rotated. Before performing any work on the drive system, secure the motor shaft against being driven by an external source.
- With AC voltage, voltage can be coupled out to unused conductors in the motor cable. Insulate unused conductors in the motor cable at both ends.
- 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:
  - Disconnect all power supplies, including any external voltage to the control unit. Note that the circuit breaker or main power disconnect switch does not de-energize all circuits.
  - 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 "Checking for the absence of voltage" in the product installation instructions.
- Before switching on the power supply to the inverter system:
  - Ensure that work is completed and that there are no hazards resulting from installation.
  - If the mains input terminals and motor output terminals are grounded and shorted, remove the grounding and shorts circuits from the main input terminals and motor output terminals.
  - Ensure that all devices are properly grounded.
  - Ensure that all protective equipment such as covers, doors and screens are installed or closed.
- Install and close all covers before switching on the power supply.

**Failure to follow these instructions will result in death or life-threatening injury.**

Inverter systems can cause unexpected movements due to incorrect wiring, incorrect settings, incorrect data other errors.

## Warning!

### UNINTENDED OPERATION OF THE EQUIPMENT

- All EMC requirements must be strictly observed during wiring.
- Operating the product using unknown or unsuitable settings or data is not permitted.
- Perform a comprehensive commissioning test.

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

Damaged products and accessories may cause electric shock or unexpected operation of the equipment.

## Danger!

### ELECTRIC SHOCK OR UNEXPECTED OPERATION OF THE EQUIPMENT

The use of damaged products or accessory products is not permitted.

Failure to follow these instructions will result in death or life-threatening injury.

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

## Warning!

### LOSS OF CONTROL

- When developing a control plan, it is necessary to take into account possible error states of the control paths and provide means for certain critical control functions through which a safe state can be achieved after path failure. 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 accident prevention regulations and local safety codes<sup>1)</sup> must be followed.
- Each implementation of the product must be individually and carefully tested for proper operation before being put into service.

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

## Note:

### IRREPARABLE DAMAGE DUE TO INCORRECT MAINS VOLTAGE

- Before switching on and configuring the product, it must be ensured that it is approved for the existing mains voltage.

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

During operating, the products described in these instructions can reach temperatures above 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, ensure that it has cooled down sufficiently.
- Ensure that there is sufficient heat dissipation by performing a test run at maximum load.

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

The product is approved for use outside danger zones (explosive atmospheres). Install the device only in areas free of hazardous atmospheres.

<sup>1)</sup> For the USA: For additional information, 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!**

### **RISK OF EXPLOSION**

**Install and use this device only outside danger zones.**

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

Machines, controllers and associated devices are usually integrated into the network. Unauthorized persons and malware can gain access to the machine or other devices on the machine's network/fieldbus and connected networks via insufficiently secured access to software and networks.

## **Warning!**

### **UNAUTHORIZED ACCESS TO THE MACHINE VIA SOFTWARE AND NETWORK**

**In your hazard and risk analysis, take into account all dangers that may arise by accessing and operating the network/fieldbus and develop a suitable cybersecurity concept.**

**Ensure that the hardware and software infrastructure into which the machine will be integrated, as well as the organizational policies and guidelines, cover access to this infrastructure by taking into account the results of the hazard and risk analysis, that they are implemented according to best practices and standards and that they address IT and cybersecurity concerns (e.g. ISO/IEC 27000 for common criteria for assessing the security of information technology systems, ISO/IEC 15408, IEC 62351, ISA/IEC 62443, NIST Cybersecurity Framework, Information Security Forum - "Standard of good practice for information security").**

**Ensure the effectiveness of your IT and cybersecurity system by using appropriate, proven methods.**

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

## **Warning!**

### **LOSS OF CONTROL**

**Perform a comprehensive commissioning test to ensure that the communication monitoring system properly detects communication interruptions.**

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

## 1.1 Intended use

In all cases, applicable national and international standards, regulations and safety measures must be taken into account and observed!

The B&R products described in this manual are intended for use in industry and industrial applications. The intended use includes control, operation, monitoring, drive and HMI tasks as part of automation processes in machines and systems.

B&R products are only permitted to be used in their original condition. Modifications and extensions are only permitted if they are described in this manual.

B&R excludes liability for damage of any kind resulting from the use of B&R products in any intended way.

B&R products have not been designed, developed and manufactured for use that involves fatal risks or hazards that could result in death, injury, serious physical harm or other loss without the assurance of exceptionally stringent safety precautions.

B&R products are explicitly not intended for use in the following applications:

- Monitoring and control of thermonuclear processes
- Weapon systems control
- Flight and traffic control systems for passenger and freight transport
- Health monitoring and life support systems

The B&R products described in this manual are designed as "open equipment" (EN 61131-2) and "open type equipment" (UL). They are therefore designated for installation in an enclosed control cabinet.

Servo drives, inverter modules and frequency inverters from B&R are not dual-use goods per Annex I of Council Regulation (EC) No. 428/2009 | 3A225, amended by Commission Delegated Regulation (EU) No. 2015/2420. The electrical output frequency of these modules is monitored; if the limit frequency is exceeded, the current movement is aborted and an error is reported.

Servo drives, inverter modules and frequency inverters with the dual-use option are dual-use goods per Annex I of Council Regulation (EC) No. 428/2009 | 3A225, amended by Commission Delegated Regulation (EU) No. 2015/2420. The electrical output frequency of these modules is not monitored. Modules with the dual-use option are subject to various export restrictions.

## 2 General information

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The products in the ACOPOSinverter family add a cost-optimized drive solution for motors to the B&R portfolio. The drives have been especially designed for use with asynchronous motors in efficiency classes IE2 and IE3, but they can also be used with synchronous motors.

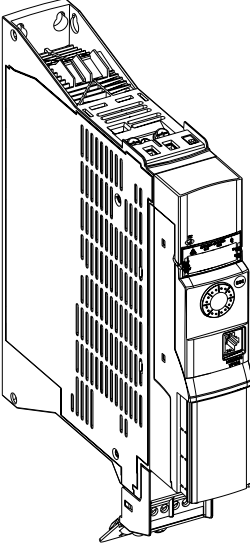
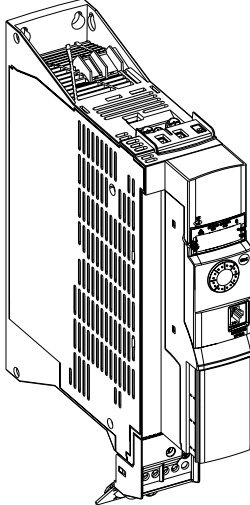
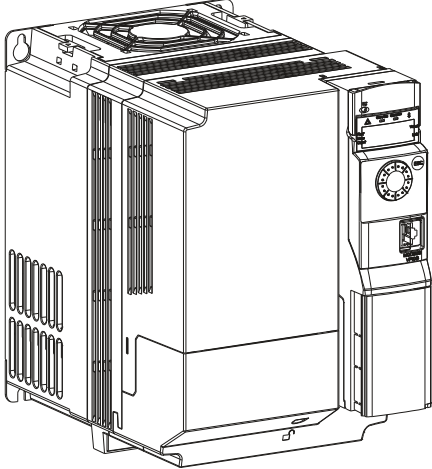
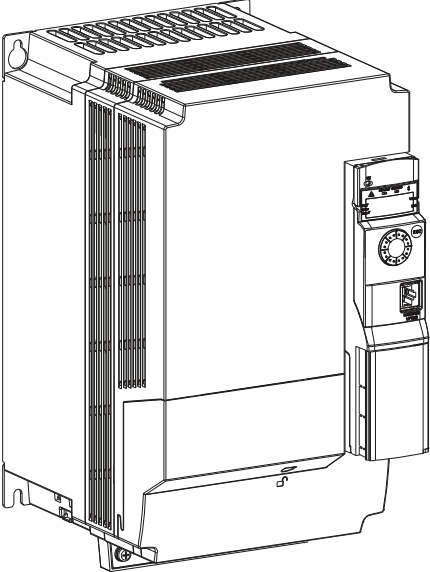
The product family differentiates between mains voltages and motor cable classes. The ACOPOSinverter is supplied with up to 240 V or 500 V and can control motors in the power classes 0.18 kW to 15 kW (IEC) or 0.25 HP to 20 HP (NEMA).

A communication card is required to operate an ACOPOSinverter on a controller. Communication cards of type POWERLINK and X2X have been fully integrated, i.e. special configuration and user interfaces for Automation Studio have been designed to make it easier to commission the drive and to integrate it into B&R in-house development environments mapp Motion and mapp Cockpit. Depending on the requirement specifications, it is possible to choose between two function models. Smaller applications can be implemented with the license-free "Direct control" function model; demanding applications (e.g. with several drives) can be implemented with mapp Motion.

### 2.1 Device overview

The ACOPOSinverter P76 family of products comprises four inverter sizes (1, 2, 3 and 4) and is ideally suited for integration in compact, powerful inverter solutions with high-performance requirements.

## Four inverter sizes

<p><b>Size 1</b> 8176S200018.00-000, 8176S200037.00-000, 8176S200055.00-000, 8176S200075.00-000, 8176T400037.00-000, 8176T400055.00-000, 8176T400075.00-000, 8176T400110.00-000, 8176T400150.00-000</p> <ul style="list-style-type: none"> <li>• 240 V 1-phase from 0.18 kW to 0.75 kW (0.25 to 1 HP)</li> <li>• 400 V 3-phase from 0.37 kW to 1.5 kW (0.5 to 2 HP)</li> </ul> 	<p><b>Size 2</b> 8176S200110.00-000, 8176S200150.00-000, 8176S200220.00-000, 8176T400220.00-000, 8176T400300.00-000, 8176T400400.00-000</p> <ul style="list-style-type: none"> <li>• 240 V 1-phase from 1.1 kW to 2.2 kW (1 1/2 to 5 HP)</li> <li>• 400 V 3-phase from 2.2 kW to 4 kW (3 to 5 HP)</li> </ul> 
<p><b>Size 3</b> 8176T400550.00-000, 8176T400750.00-000</p> <ul style="list-style-type: none"> <li>• 400 V 3-phase from 5.5 kW to 7.5 kW (7 1/2 and 10 HP)</li> </ul> 	<p><b>Size 4</b> 8176T401100.00-000, 8176T401500.00-000</p> <ul style="list-style-type: none"> <li>• 400 V 3-phase from 11 kW to 15 kW (15 and 20 HP)</li> </ul> 

## 2.2 Model number key

Product area																	
8											Motion group						
Product family																	
I											ACOPOSinverter						
Model																	
76											ACOPOSinverter P76						
Number of phases																	
S											1-phase						
T											3-phase						
Voltage range																	
2											200 to 240 V						
4											380 to 500 V						
Nominal power																	
0-9											W x 10 <sup>5</sup>						
0-9	0-9											W x 10 <sup>4</sup>					
0-9	0-9	0-9											W x 10 <sup>3</sup>				
0-9	0-9	0-9	0-9											W x 10 <sup>2</sup>			
0-9	0-9	0-9	0-9	0-9											W x 10		
Interface																	
.	0-F											Version					
.	0P											POWERLINK					
Version																	
.	000											Version control					
Examples																	
8	I	76	S	2	0	0	0	1	8	.	00	-	000	ACOPOSinverter P76, 1 x 200-240 V, 0.18 kW, integrated EMC filter and brake chopper, shield plate included in delivery			
8	I	76	S	2	0	0	0	1	8	.	0P	-	000	ACOPOSinverter P76, 1 x 200-240 V, 0.18 kW, integrated EMC filter and brake chopper, shield plate included in delivery, POWERLINK interface			
8	I	76	T	4	0	0	3	0	0	.	00	-	000	ACOPOSinverter P76, 3 x 380-500 V, 3.0 kW, integrated EMC filter and brake chopper, shield plate included in delivery			
8	I	76	T	4	0	0	3	0	0	.	0P	-	000	ACOPOSinverter P76, 3 x 380-500 V, 3.0 kW, integrated EMC filter and brake chopper, shield plate included in delivery, POWERLINK interface			

## 3 Technical data

### 3.1 8I76S200018.00-000, 8I76S200037.00-000, 8I76S200055.00-000, 8I76S200075.00-000

#### 3.1.1 Order data

Order number	Short description	Figure
	<b>ACOPOSinverter P76 - 1-phase 200 to 240 V</b>	
8I76S200018.00-000	Base device for ACOPOSinverter P76 and P74new, 1x 200 to 240 V, 0.18 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I76S200037.00-000	Base device for ACOPOSinverter P76 and P74new, 1x 200 to 240 V, 0.37 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I76S200055.00-000	Base device for ACOPOSinverter P76 and P74new, 1x 200 to 240 V, 0.55 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I76S200075.00-000	Base device for ACOPOSinverter P76 and P74new, 1x 200 to 240 V, 0.75 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
	<b>Optional accessories</b>	
	<b>Cable and adapters</b>	
8I0XC001.003-1	USB adapter cable, USB to Modbus, for ACOPOSinverter.	
8I0XC003.400-1	DC bus cable, 0.18 m, 5 pcs., for ACOPOSinverter	
8I0XD304.301-1	RJ45 cable, 1 m, for remote use of the display for the ACOPOSinverter.	
8I0XD304.303-1	RJ45 cable, 3 m, for remote use of the display for the ACOPOSinverter.	
8I0XD304.305-1	RJ45 cable, 5 m, for remote use of the display for the ACOPOSinverter.	
8I0XD304.310-1	RJ45 cable, 10 m, for remote use of the display for the ACOPOSinverter.	
	<b>Fans (spare part)</b>	
8I0XF074.010-1	ACPI P76, P74/P74new fan 1-ph. 200...240 VAC: Power output class: 0.18 - 0.75 kW 3-ph. 380...500 VAC: Power output class: 0.37 - 1.5 kW	
	<b>Graphic display terminal</b>	
8I0XD301.300-1	Graphics display for ACOPOSinverter, 240 x 160 pixels, 8 lines, backlight, function keys, navigation key, IP54 protection.	
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.	
8I0XD305.300-1	Female to female adapter, RJ45, for graphics display of the ACOPOSinverter.	
	<b>Optional braking resistors</b>	
8I0BR100.000-1	Braking resistor ohmic value: 100 Ω continuous braking power: 0.05 kW degree of protection (IP): IP20	
	<b>Optional line chokes</b>	
8I0CS004.000-1	Mains choke 1-phase 4 A Can be used for ACOPOSinverter P66, P74new, P76 1x 200 to 240 VAC: 0.18 to 0.37 kW	
8I0CS007.000-1	Mains choke 1-phase 7 A Can be used for ACOPOSinverter P66, P74new, P76 1x 200 to 240 VAC: 0.55 to 0.75 kW	
	<b>Undefined</b>	
8I0FS009.200-1	EMC filter 1-phase 9 A, side installation, for ACOPOSinverter P74 1x 200-240 V, 0.18-0.75 kW	

Table 1: 8I76S200018.00-000, 8I76S200037.00-000, 8I76S200055.00-000, 8I76S200075.00-000 - Order data

## 3.1.2 Technical data

Order number	8176S200018.00-000	8176S200037.00-000	8176S200055.00-000	8176S200075.00-000
<b>General information</b>				
Certifications				
CE	Yes			
UKCA	Yes			
UL	UL E225616 Power conversion equipment			
CSA	CSA E272421 Industrial control equipment			
<b>Motor power</b>				
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)
<b>Mains connection</b>				
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 <sup>1)</sup>			
Inrush current	Max. 9.6 A <sup>2)</sup>			
Mains current				
At 200 VAC	3.1 A <sup>3)</sup>	5.2 A <sup>3)</sup>	6.9 A <sup>3)</sup>	8.9 A <sup>3)</sup>
At 240 VAC	2.6 A <sup>3)</sup>	4.3 A <sup>3)</sup>	5.8 A <sup>3)</sup>	7.5 A <sup>3)</sup>
Power dissipation at nominal load and nominal clock frequency	25 W	38 W	42 W	51 W
Integrated EMC filter	Yes <sup>4)</sup>			
<b>Line-conducted and radiated emissions</b>				
With integrated filter				
Motor cable length per IEC/EN 61800-3 Cat. C1 environment 1 (public power network)	-			
Motor cable length per IEC/EN 61800-3 Cat. C2 environment 1 (public power network)	C2 level of 2 to 4 kHz with 10 m cable C2 level of 4 to 12 kHz with 5 m cable			
Motor cable length per IEC/EN 61800-3 Cat. C3 environment 2 (industrial power system)	10 m <sup>5)</sup>			
With add-on filter	810FS009.200-2			
With add-on filter				
Motor cable length per IEC/EN 61800-3 Cat. C1 environment 1 (public power network)	C1 level of 2 to 16 kHz with 20 m cable			
Motor cable length per IEC/EN 61800-3 Cat. C2 environment 1 (public power network)	C2 level of 2 to 6 kHz with 50 m cable C2 level at 2 kHz with 100 m cable			
Motor cable length per IEC/EN 61800-3 Cat. C3 environment 2 (industrial power system)	50 m <sup>5)</sup>			
<b>Motor connection</b>				
Nominal output current	1.5 A <sup>6)</sup>	3.3 A <sup>6)</sup>	3.7 A <sup>6)</sup>	4.8 A <sup>6)</sup>
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 ( <a href="http://www.br-automation.com">www.br-automation.com</a> ).		The derating curves are included in the installation instructions, which can be downloaded from <a href="http://www.br-automation.com">www.br-automation.com</a> .	
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 <sup>7)</sup>	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		Up to 170% of the nominal motor torque	

Table 2: 8176S200018.00-000, 8176S200037.00-000, 8176S200055.00-000, 8176S200075.00-000 - Technical data

Order number	8176S200018.00-000	8176S200037.00-000	8176S200055.00-000	8176S200075.00-000
Max. motor cable length				
Shielded cable	50 m			
Non-shielded cable	100 m			
Motor control profiles				
Induction motor	Sensorless vector control: 1. Voltage controlled with constant torque → standard mode 2. Voltage controlled with variable torque → energy saving mode e.g. for fans and pumps Sensorless slip control: 1. With V/f characteristic curve for constant torque → standard mode 2. With V/f characteristic curve for constant torque (up to 6 f-ranges) → Custom mode 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. Voltage controlled with constant torque → standard mode			
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: Overvoltage and undervoltage of the mains supply, mains phase failure with 3-phase power supply			
<b>Brake chopper</b>				
Integrated dynamic brake transistors	Yes			
Min. resistance value (external)	40 Ω			
<b>24 VDC power supply</b>				
Input voltage	24 VDC (-15%/+20%)			
Current	Max. 1.1 A			
<b>Available internal power supplies</b>				
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			
<b>Interfaces</b>				
POWERLINK				
Type	Type 3 <sup>8)</sup>			
<b>Digital inputs</b>				
Quantity	6 <sup>9)</sup>			
Nominal voltage	24 VDC (max. 30 VDC)			
Input circuit	Source or sink			
Electrical isolation				
Input - ACOPOSinverter	Yes			
Input - Input	No			
Sampling time	8 ms ±0.7 ms			
Digital input 5				
Max. input frequency	20 kHz			
<b>Safe input - STO (Safe Torque Off)</b>				
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			
<b>Analog inputs</b>				
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			
<b>Digital outputs</b>				
Quantity	1			
Nominal voltage	24 VDC -15%/+20%		24 VDC -15% / +20%	
Max. voltage	30 VDC			
Output circuit	Source or sink			

Table 2: 8176S200018.00-000, 8176S200037.00-000, 8176S200055.00-000, 8176S200075.00-000 - Technical data

## Technical data

Order number	8176S200018.00-000	8176S200037.00-000	8176S200055.00-000	8176S200075.00-000
Sampling time	2 ms			
Max. current	100 mA			
<b>Relay outputs</b>				
Quantity	2			
Nominal voltage	30 VDC / 250 VAC			
Switching current range	Min. switching current: 5 mA at 24 VDC Max. switching current: R1 at $\cos \varphi = 1$ : 3 A at 250 VAC / 4 A at 30 VDC R2 at $\cos \varphi = 1$ : 5 A R1 and R2 at $\cos \varphi = 0.4$ : 2 A			
Variant				
Relay 1	1 changeover contact			
Relay 2	1 normally open contact			
<b>Electrical isolation</b>				
Output - ACOPOSinverter	Yes			
Output - Output	No			
Response time (max.)	2 ms			
<b>Analog outputs</b>				
Quantity	1			
Output	0 to 10 V or 0 to 20 mA			
Nonlinearity	$\pm 0.3\%$			
Basic accuracy	At 25°C: $\pm 1\%$ At -10 to 60°C: $\pm 2\%$			
<b>Electrical isolation</b>				
Output - ACOPOSinverter	Yes			
Output - Output	No			
<b>Max. load impedance</b>				
Voltage	470 $\Omega$			
Current	800 $\Omega$			
Update time	2 ms			
Resolution	10-bit			
<b>Electrical properties</b>				
<b>Energy efficiency (IE classification)</b>				
Efficiency data	IE (10, 25): 2.7% (1x 200 VAC), 2.2% (1x 240 VAC) IE (50, 25): 2.5% (1x 200 VAC), 2.1% (1x 240 VAC) IE (10, 50): 2.7% (1x 200 VAC), 2.4% (1x 240 VAC) IE (50, 50): 2.7% (1x 200 VAC), 2.2% (1x 240 VAC) IE (90, 50): 2.9% (1x 200 VAC), 2.4% (1x 240 VAC) IE (10, 100): 3.1% (1x 200 VAC), 2.7% (1x 240 VAC) IE (50, 100): 3.1% (1x 200 VAC), 2.7% (1x 240 VAC) IE (90, 100): 3.5% (1x 200 VAC), 2.9% (1x 240 VAC)	IE (10, 25): 1.8% (1x 200 VAC), 1.3% (1x 240 VAC) IE (50, 25): 1.8% (1x 200 VAC), 1.2% (1x 240 VAC) IE (10, 50): 2% (1x 200 VAC), 1.5% (1x 240 VAC) IE (50, 50): 1.8% (1x 200 VAC), 1.5% (1x 240 VAC) IE (90, 50): 1.9% (1x 200 VAC), 1.5% (1x 240 VAC) IE (10, 100): 2.5% (1x 200 VAC), 2.1% (1x 240 VAC) IE (50, 100): 2.4% (1x 200 VAC), 2% (1x 240 VAC) IE (90, 100): 2.6% (1x 200 VAC), 2.2% (1x 240 VAC)	IE (10, 25): 1.8% (1x 200 VAC), 1.2% (1x 240 VAC) IE (50, 25): 1.6% (1x 200 VAC), 1.2% (1x 240 VAC) IE (10, 50): 2% (1x 200 VAC), 1.5% (1x 240 VAC) IE (50, 50): 1.8% (1x 200 VAC), 1.4% (1x 240 VAC) IE (90, 50): 2% (1x 200 VAC), 1.5% (1x 240 VAC) IE (10, 100): 2.4% (1x 200 VAC), 2.1% (1x 240 VAC) IE (50, 100): 2.3% (1x 200 VAC), 2% (1x 240 VAC) IE (90, 100): 2.7% (1x 200 VAC), 2.2% (1x 240 VAC)	IE (10, 25): 1.3% (1x 200 VAC), 1.2% (1x 240 VAC) IE (50, 25): 1.3% (1x 200 VAC), 1.1% (1x 240 VAC) IE (10, 50): 1.6% (1x 200 VAC), 1.4% (1x 240 VAC) IE (50, 50): 1.6% (1x 200 VAC), 1.3% (1x 240 VAC) IE (90, 50): 1.7% (1x 200 VAC), 1.4% (1x 240 VAC) IE (10, 100): 2.4% (1x 200 VAC), 2.1% (1x 240 VAC) IE (50, 100): 2.3% (1x 200 VAC), 1.9% (1x 240 VAC) IE (90, 100): 2.7% (1x 200 VAC), 2.2% (1x 240 VAC)
Nominal losses in standby mode	6 W			
<b>Operating conditions</b>				
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	$\leq 1000$ m without derating 1000 to 2000 m with Derating <sup>10)</sup>			
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 $\pm 10^\circ$			
<b>Ambient conditions</b>				
Temperature				
Operation	-10 to 50°C without derating 50 to 60°C with derating			
Storage	-25 to 70°C			
Max. vibration resistance	1 g, 13 to 200 Hz EN/IEC 60068-2-6 1.5 mm peak to peak 3 to 13 Hz EN/IEC 60068-2-6			

Table 2: 8176S200018.00-000, 8176S200037.00-000, 8176S200055.00-000, 8176S200075.00-000 - Technical data

Order number	8176S200018.00-000	8176S200037.00-000	8176S200055.00-000	8176S200075.00-000
<b>Mechanical properties</b>				
Dimensions				
Width	45 mm			
Height	325 mm			
Depth	232 mm			
Weight	2.4 kg			

Table 2: 8176S200018.00-000, 8176S200037.00-000, 8176S200055.00-000, 8176S200075.00-000 - Technical data

- 1) With mains choke max. I<sub>sc</sub> 22 kA for 200/240 V.
- 2) Peak current when switching on for maximum voltage (240 V +10% or 500 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 (I<sub>sc</sub>).
- 4) Inverter is provided with an integrated Category C2 EMC filter. This filter can be switched off.
- 5) The selection table for the filters specifies maximum length for the shielded cables between motors and inverters. These maximum cable lengths only serve as a reference point since they depend on the capacity of the motors and the cables being used. The total length must be taken into account when motors are connected in parallel. These values apply at a nominal clock frequency of 4 kHz.
- 6) 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.
- 7) The inverter is designed to operate for a maximum of 60 seconds at 150% nominal current.
- 8) For additional information, see section "Communication / POWERLINK / General information / Hardware - CN" in Automation Help.
- 9) 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
- 10) Over 1000 m, load reduced by 1% per 100 m.

## 3.2 8I76S200110.00-000, 8I76S200150.00-000, 8I76S200220.00-000

### 3.2.1 Order data

Order number	Short description	Figure
	<b>ACOPOSinverter P76 - 1-phase 200 to 240 V</b>	
8I76S200110.00-000	Base device for ACOPOSinverter P76 and P74new, 1x 200 to 240 V, 1.1 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I76S200150.00-000	Base device for ACOPOSinverter P76 and P74new, 1x 200 to 240 V, 1.5 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I76S200220.00-000	Base device for ACOPOSinverter P76 and P74new, 1x 200 to 240 V, 2.2 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
	<b>Optional accessories</b>	
	<b>Cable and adapters</b>	
8I0XC001.003-1	USB adapter cable, USB to Modbus, for ACOPOSinverter.	
8I0XC003.400-1	DC bus cable, 0.18 m, 5 pcs., for ACOPOSinverter	
8I0XD304.301-1	RJ45 cable, 1 m, for remote use of the display for the ACOPOSinverter.	
8I0XD304.303-1	RJ45 cable, 3 m, for remote use of the display for the ACOPOSinverter.	
8I0XD304.305-1	RJ45 cable, 5 m, for remote use of the display for the ACOPOSinverter.	
8I0XD304.310-1	RJ45 cable, 10 m, for remote use of the display for the ACOPOSinverter.	
	<b>Fans (spare part)</b>	
8I0XF074.020-1	ACPi P76, P74/P74new fan 1-ph. 200...240 VAC: Power output class: 1.1 - 2.2 kW 3-ph. 380...500 VAC: Power output class: 2.2 - 4 kW	
	<b>Graphic display terminal</b>	
8I0XD301.300-1	Graphics display for ACOPOSinverter, 240 x 160 pixels, 8 lines, backlight, function keys, navigation key, IP54 protection.	
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.	
8I0XD305.300-1	Female to female adapter, RJ45, for graphics display of the ACOPOSinverter.	
	<b>Optional EMC filters</b>	
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).	
8I0FS022.200-2	ACPi additional EMC input filter 1-phase 22 A supply voltage 1-phase: 200...240 V 50/60 Hz	
	<b>Optional braking resistors</b>	
8I0BR060.000-1	Braking resistor ohmic value: 60 Ω continuous braking power: 0.10 kW degree of protection (IP): IP20	
8I0BR100.000-1	Braking resistor ohmic value: 100 Ω continuous braking power: 0.05 kW degree of protection (IP): IP20	
	<b>Optional line chokes</b>	
8I0CS018.000-1	Mains choke 1-phase 18 A Can be used for ACOPOSinverter P66, P74new, P76 1x 200 to 240 VAC: 1.1 to 2.2 kW	

Table 3: 8I76S200110.00-000, 8I76S200150.00-000, 8I76S200220.00-000 - Order data

### 3.2.2 Technical data

Order number	8I76S200110.00-000	8I76S200150.00-000	8I76S200220.00-000
<b>General information</b>			
Certifications			
CE		Yes	
UKCA		Yes	
UL		UL E225616	
CSA		Power conversion equipment CSA E272421	
		Industrial control equipment	
<b>Motor power</b>			
Specified on nameplate	1.1 kW (1.5 HP)	1.5 kW (2 HP)	2.2 kW (3 HP)
<b>Mains connection</b>			
Mains input voltage	1x 200 VAC -15% to 240 VAC +10%		
Frequency	50 to 60 Hz ±5%		
Apparent power (at 240 VAC)	2.4 kVA	3.2 kVA	4.4 kVA
Max. assumed short-circuit current (Isc) (short-circuit current at connection point)	1 kA <sup>1)</sup>		
Inrush current	Max. 19.1 A <sup>2)</sup>		
Mains current			
At 200 VAC	12.1 A <sup>3)</sup>	15.9 A <sup>3)</sup>	21.9 A <sup>3)</sup>
At 240 VAC	10.2 A <sup>3)</sup>	13.3 A <sup>3)</sup>	18.4 A <sup>3)</sup>
Power dissipation at nominal load and nominal clock frequency	64 W	81 W	102 W
Integrated EMC filter	Yes <sup>4)</sup>		
<b>Line-conducted and radiated emissions</b>			
With integrated filter			
Motor cable length per IEC/EN 61800-3 Cat. C1 environment 1 (public power network)	-		
Motor cable length per IEC/EN 61800-3 Cat. C2 environment 1 (public power network)	C2 level of 2 to 4 kHz with 10 m cable C2 level of 4 to 12 kHz with 5 m cable		
Motor cable length per IEC/EN 61800-3 Cat. C3 environment 2 (industrial power system)	10 m <sup>5)</sup>		
With add-on filter	8I0FS016.200-1		8I0FS022.200-1
With add-on filter			
Motor cable length per IEC/EN 61800-3 Cat. C1 environment 1 (public power network)	C1 level of 2 to 16 kHz with 20 m cable		C1 level of 2 to 16 kHz with 10 m cable C1 level of 2 to 6 kHz with 20 m cable
Motor cable length per IEC/EN 61800-3 Cat. C2 environment 1 (public power network)	C2 level of 2 to 6 kHz with 50 m cable C2 level at 2 kHz with 100 m cable		C2 level of 2 to 6 kHz with 50 m cable C2 level of 2 to 4 kHz with 100 m cable
Motor cable length per IEC/EN 61800-3 Cat. C3 environment 2 (industrial power system)	50 m <sup>5)</sup>		
<b>Motor connection</b>			
Nominal output current	6.9 A <sup>6)</sup>	8 A <sup>6)</sup>	11 A <sup>6)</sup>
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 instruc- tions, which can be downloaded from <a href="http://www.br-automation.com">www.br-automation.com</a> .		
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 <sup>7)</sup>	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 nominal motor torque		
Max. motor cable length			
Shielded cable	50 m		
Non-shielded cable	100 m		

Table 4: 8I76S200110.00-000, 8I76S200150.00-000, 8I76S200220.00-000 - Technical data

## Technical data

Order number	8176S200110.00-000	8176S200150.00-000	8176S200220.00-000
Motor control profiles			
Induction motor	<p>Sensorless vector control:</p> <ol style="list-style-type: none"> <li>1. Voltage controlled with constant torque → standard mode</li> <li>2. Voltage controlled with variable torque → energy saving mode e.g. for fans and pumps</li> </ol> <p>Sensorless slip control:</p> <ol style="list-style-type: none"> <li>1. With V/f characteristic curve for constant torque → standard mode</li> <li>2. With V/f characteristic curve for constant torque (up to 6 f-ranges) → Custom mode for special applications</li> <li>3. With V/f characteristic curve for quadratically increasing torque → Energy-saving profile, e.g. for fans and pumps</li> </ol>		
Synchronous motor	<p>Sensorless vector control:</p> <ol style="list-style-type: none"> <li>1. Voltage controlled with constant torque → standard mode</li> </ol>		
Main protective functions of inverter	<p>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: Overvoltage and undervoltage of the mains supply, mains phase failure with 3-phase power supply</p>		
<b>Brake chopper</b>			
Integrated dynamic brake transistors	Yes		
Min. resistance value (external)	27 Ω		25 Ω
<b>24 VDC power supply</b>			
Input voltage	24 VDC (-15%/+20%)		
Current	Max. 1.1 A		
<b>Available internal power supplies</b>			
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		
<b>Interfaces</b>			
POWERLINK			
Type	Type 3 <sup>8)</sup>		
<b>Digital inputs</b>			
Quantity	6 <sup>9)</sup>		
Nominal voltage	24 VDC (max. 30 VDC)		
Input circuit	Source or sink		
Electrical isolation			
Input - ACOPOSinverter	Yes		
Input - Input	No		
Sampling time	8 ms ±0.7 ms		
Digital input 5			
Max. input frequency	20 kHz		
<b>Safe input - STO (Safe Torque Off)</b>			
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		
<b>Analog inputs</b>			
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		
<b>Digital outputs</b>			
Quantity	1		
Nominal voltage	24 VDC -15% / +20%		
Max. voltage	30 VDC		
Output circuit	Source or sink		
Sampling time	2 ms		

Table 4: 8176S200110.00-000, 8176S200150.00-000, 8176S200220.00-000 - Technical data

Order number	8I76S200110.00-000	8I76S200150.00-000	8I76S200220.00-000
Max. current	100 mA		
<b>Relay outputs</b>			
Quantity	2		
Nominal voltage	30 VDC / 250 VAC		
Switching current range	Min. switching current: 5 mA at 24 VDC Max. switching current: R1 at $\cos \varphi = 1$ : 3 A at 250 VAC / 4 A at 30 VDC R2 at $\cos \varphi = 1$ : 5 A R1 and R2 at $\cos \varphi = 0.4$ : 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		
<b>Analog outputs</b>			
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		
<b>Electrical properties</b>			
Energy efficiency (IE classification)			
Efficiency data	IE (10, 25): 1.3% (1x 200 VAC), 1.1% (1x 240 VAC) IE (50, 25): 1.2% (1x 200 VAC), 1% (1x 240 VAC) IE (10, 50): 1.6% (1x 200 VAC), 1.3% (1x 240 VAC) IE (50, 50): 1.5% (1x 200 VAC), 1.2% (1x 240 VAC) IE (90, 50): 1.6% (1x 200 VAC), 1.3% (1x 240 VAC) IE (10, 100): 2.3% (1x 200 VAC), 2% (1x 240 VAC) IE (50, 100): 2.2% (1x 200 VAC), 1.8% (1x 240 VAC) IE (90, 100): 2.5% (1x 200 VAC), 2% (1x 240 VAC)	IE (10, 25): 1.2% (1x 200 VAC), 1.1% (1x 240 VAC) IE (50, 25): 1.1% (1x 200 VAC), 1% (1x 240 VAC) IE (10, 50): 1.6% (1x 200 VAC), 1.3% (1x 240 VAC) IE (50, 50): 1.4% (1x 200 VAC), 1.2% (1x 240 VAC) IE (90, 50): 1.6% (1x 200 VAC), 1.3% (1x 240 VAC) IE (10, 100): 2.3% (1x 200 VAC), 2% (1x 240 VAC) IE (50, 100): 2.2% (1x 200 VAC), 1.9% (1x 240 VAC) IE (90, 100): 2.6% (1x 200 VAC), 2.1% (1x 240 VAC)	IE (10, 25): 1.1% (1x 200 VAC), 0.9% (1x 240 VAC) IE (50, 25): 1% (1x 200 VAC), 0.8% (1x 240 VAC) IE (10, 50): 1.3% (1x 200 VAC), 1.1% (1x 240 VAC) IE (50, 50): 1.3% (1x 200 VAC), 1.1% (1x 240 VAC) IE (90, 50): 1.5% (1x 200 VAC), 1.2% (1x 240 VAC) IE (10, 100): 2% (1x 200 VAC), 1.7% (1x 240 VAC) IE (50, 100): 2% (1x 200 VAC), 1.7% (1x 240 VAC) IE (90, 100): 2.4% (1x 200 VAC), 2% (1x 240 VAC)
Nominal losses in standby mode	7 W		
<b>Operating conditions</b>			
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 <sup>10)</sup>		
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°		
<b>Ambient conditions</b>			
Temperature			
Operation	-10 to 50°C without derating 50 to 60°C with derating		
Storage	-25 to 70°C		
Max. vibration resistance	1 g <sub>n</sub> 13 to 200 Hz EN/IEC 60068-2-6 1.5 mm peak to peak 3 to 13 Hz EN/IEC 60068-2-6		
<b>Mechanical properties</b>			
Dimensions			
Width	60 mm		
Height	325 mm		
Depth	232 mm		
Weight	2.9 kg		

Table 4: 8I76S200110.00-000, 8I76S200150.00-000, 8I76S200220.00-000 - Technical data

- 1) With mains choke max. I<sub>sc</sub> 22 kA for 200/240 V.
- 2) Peak current when switching on for maximum voltage (240 V +10% or 500 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 (I<sub>sc</sub>).
- 4) Inverter is provided with an integrated Category C2 EMC filter. This filter can be switched off.

## Technical data

- 5) The selection table for the filters specifies maximum length for the shielded cables between motors and inverters. These maximum cable lengths only serve as a reference point since they depend on the capacity of the motors and the cables being used. The total length must be taken into account when motors are connected in parallel. These values apply at a nominal clock frequency of 4 kHz.
- 6) 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.
- 7) The inverter is designed to operate for a maximum of 60 seconds at 150% nominal current.
- 8) For additional information, see section "Communication / POWERLINK / General information / Hardware - CN" in Automation Help.
- 9) 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 k $\Omega$ , reset value 1.8 k $\Omega$ , short-circuit proof <50  $\Omega$
- 10) Over 1000 m, load reduced by 1% per 100 m.

### 3.3 8176T400037.00-000, 8176T400055.00-000, 8176T400075.00-000, 8176T400110.00-000, 8176T400150.00-000

#### 3.3.1 Order data

Order number	Short description	Figure
	<b>ACOPOSinverter P76 - 3-phase 380 to 500 V</b>	
8176T400037.00-000	Base device for ACOPOSinverter P76 and P74new, 3x 380 to 500 V, 0.37 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8176T400055.00-000	Base device for ACOPOSinverter P76 and P74new, 3x 380 to 500 V, 0.55 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8176T400075.00-000	Base device for ACOPOSinverter P76 and P74new, 3x 380 to 500 V, 0.75 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8176T400110.00-000	Base device for ACOPOSinverter P76 and P74new, 3x 380 to 500 V, 1.1 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8176T400150.00-000	Base device for ACOPOSinverter P76 and P74new, 3x 380 to 500 V, 1.5 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
	<b>Optional accessories</b>	
	<b>Additional EMC filters</b>	
810FT015.200-1	ACOPOSinverter additional EMC input filter 3-phase 15 A, supply voltage: 380 to 480 V, 50/60 Hz	
	<b>Cable and adapters</b>	
810XC001.003-1	USB adapter cable, USB to Modbus, for ACOPOSinverter.	
810XC003.400-1	DC bus cable, 0.18 m, 5 pcs., for ACOPOSinverter	
810XD304.301-1	RJ45 cable, 1 m, for remote use of the display for the ACOPOSinverter.	
810XD304.303-1	RJ45 cable, 3 m, for remote use of the display for the ACOPOSinverter.	
810XD304.305-1	RJ45 cable, 5 m, for remote use of the display for the ACOPOSinverter.	
810XD304.310-1	RJ45 cable, 10 m, for remote use of the display for the ACOPOSinverter.	
	<b>Fans (spare part)</b>	
810XF074.010-1	ACPi P76, P74/P74new fan 1-ph. 200...240 VAC: Power output class: 0.18 - 0.75 kW 3-ph. 380...500 VAC: Power output class: 0.37 - 1.5 kW	
	<b>Graphic display terminal</b>	
810XD301.300-1	Graphics display for ACOPOSinverter, 240 x 160 pixels, 8 lines, backlight, function keys, navigation key, IP54 protection.	
810XD302.300-1	Installation kit, IP54 protection, for graphic display of the ACOPOSinverter.	
810XD303.300-1	Front cover for installation kit, IP65 protection, for graphic display of the ACOPOSinverter.	
810XD305.300-1	Female to female adapter, RJ45, for graphics display of the ACOPOSinverter.	
	<b>Optional braking resistors</b>	
810BR100.000-1	Braking resistor ohmic value: 100 Ω continuous braking power: 0.05 kW degree of protection (IP): IP20	
	<b>Optional line chokes</b>	
810CT004.000-1	Mains choke 3-phase, 4 A, 50/60 for ACOPOSinverter	

Table 5: 8176T400037.00-000, 8176T400055.00-000, 8176T400075.00-000, 8176T400110.00-000, 8176T400150.00-000 - Order data

## 3.3.2 Technical data

Order number	8I76T400037.00-000	8I76T400055.00-000	8I76T400075.00-000	8I76T400110.00-000	8I76T400150.00-000
<b>General information</b>					
Certifications					
CE	Yes				
UKCA	Yes				
UL	UL E225616 Power conversion equipment				
CSA	CSA E272421 Industrial control equipment				
<b>Motor power</b>					
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)	1.5 kW (2 HP)
<b>Mains connection</b>					
Mains input voltage	3x 380 VAC -15% to 500 VAC +10%				
Frequency	50 to 60 Hz $\pm$ 5%				
Apparent power (at 500 VAC)	1.2 kVA	1.6 kVA	2.1 kVA	2.9 kVA	3.8 kVA
Max. assumed short-circuit current (Isc) (short-circuit current at connection point)	5 kA <sup>1)</sup>				
Inrush current	Max. 10 A <sup>2)</sup>				
Mains current					
At 380 VAC	1.8 A <sup>3)</sup>	2.4 A <sup>3)</sup>	3.2 A <sup>3)</sup>	4.4 A <sup>3)</sup>	5.8 A <sup>3)</sup>
At 500 VAC	1.4 A <sup>3)</sup>	1.9 A <sup>3)</sup>	2.4 A <sup>3)</sup>	3.4 A <sup>3)</sup>	4.4 A <sup>3)</sup>
Power dissipation at nominal load and nominal clock frequency	27 W	31 W	37 W	50 W	63 W
Integrated EMC filter	Yes <sup>4)</sup>				
<b>Line-conducted and radiated emissions</b>					
With integrated filter					
Motor cable length per IEC/EN 61800-3 Cat. C1 environment 1 (public power network)	-				
Motor cable length per IEC/EN 61800-3 Cat. C2 environment 1 (public power network)	C2 level of 4 to 12 kHz with 5 m cable				
Motor cable length per IEC/EN 61800-3 Cat. C3 environment 2 (industrial power system)	5 m <sup>5)</sup>				
With add-on filter	8I0FT015.200-1				
With add-on filter					
Motor cable length per IEC/EN 61800-3 Cat. C1 environment 1 (public power network)	C1 level of 2 to 16 kHz with 20 m cable				
Motor cable length per IEC/EN 61800-3 Cat. C2 environment 1 (public power network)	C2 level of 2 to 16 kHz with 50 m cable				
Motor cable length per IEC/EN 61800-3 Cat. C3 environment 2 (industrial power system)	50 m <sup>5)</sup>				
<b>Motor connection</b>					
Nominal output current	1.5 A <sup>6)</sup>	1.9 A <sup>6)</sup>	2.3 A <sup>6)</sup>	3 A <sup>6)</sup>	4.1 A <sup>6)</sup>
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 ( <a href="http://www.br-automation.com">www.br-automation.com</a> ).				
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 <sup>7)</sup>	2.3 A	2.9 A	3.5 A	4.5 A	6.2 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				

Table 6: 8I76T400037.00-000, 8I76T400055.00-000, 8I76T400075.00-000, 8I76T400110.00-000, 8I76T400150.00-000 - Technical data

Order number	8176T400037.00-000	8176T400055.00-000	8176T400075.00-000	8176T400110.00-000	8176T400150.00-000
Max. motor cable length					
Shielded cable	50 m				
Non-shielded cable	100 m				
Motor control profiles					
Induction motor	Sensorless vector control: 1. Voltage controlled with constant torque → standard mode 2. Voltage controlled with variable torque → energy saving mode e.g. for fans and pumps Sensorless slip control: 1. With V/f characteristic curve for constant torque → standard mode 2. With V/f characteristic curve for constant torque (up to 6 f-ranges) → Custom mode 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. Voltage controlled with constant torque → standard mode				
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: Overvoltage and undervoltage of the mains supply, mains phase failure with 3-phase power supply				
<b>Brake chopper</b>					
Integrated dynamic brake transistors	Yes				
Min. resistance value (external)	80 Ω		54 Ω		
<b>24 VDC power supply</b>					
Input voltage	24 VDC (-15%/+20%)				
Current	Max. 1.1 A				
<b>Available internal power supplies</b>					
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				
<b>Interfaces</b>					
POWERLINK					
Type	Type 3 <sup>8)</sup>				
<b>Digital inputs</b>					
Quantity	6 <sup>9)</sup>				
Nominal voltage	24 VDC (max. 30 VDC)				
Input circuit	Source or sink				
Electrical isolation					
Input - ACOPOSinverter	Yes				
Input - Input	No				
Sampling time	8 ms ±0.7 ms				
Digital input 5					
Max. input frequency	20 kHz				
<b>Safe input - STO (Safe Torque Off)</b>					
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				
<b>Analog inputs</b>					
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				
<b>Digital outputs</b>					
Quantity	1				
Nominal voltage	24 VDC -15%/+20%				
Max. voltage	30 VDC				

Table 6: 8176T400037.00-000, 8176T400055.00-000, 8176T400075.00-000, 8176T400110.00-000, 8176T400150.00-000 - Technical data

## Technical data

Order number	8I76T400037.00-000	8I76T400055.00-000	8I76T400075.00-000	8I76T400110.00-000	8I76T400150.00-000
Output circuit	Source or sink				
Sampling time	2 ms				
Max. current	100 mA				
<b>Relay outputs</b>					
Quantity	2				
Nominal voltage	30 VDC / 250 VAC				
Switching current range	Min. switching current: 5 mA at 24 VDC Max. switching current: R1 at $\cos \varphi = 1$ : 3 A at 250 VAC / 4 A at 30 VDC R2 at $\cos \varphi = 1$ : 5 A R1 and R2 at $\cos \varphi = 0.4$ : 2 A				
Variant					
Relay 1	1 changeover contact				
Relay 2	1 normally open contact				
<b>Electrical isolation</b>					
Output - ACOPOSinverter	Yes				
Output - Output	No				
Response time (max.)	2 ms				
<b>Analog outputs</b>					
Quantity	1				
Output	0 to 10 V or 0 to 20 mA				
Nonlinearity	$\pm 0.3\%$				
Basic accuracy	At 25°C: $\pm 1\%$ At -10 to 60°C: $\pm 2\%$				
<b>Electrical isolation</b>					
Output - ACOPOSinverter	Yes				
Output - Output	No				
<b>Max. load impedance</b>					
Voltage	470 $\Omega$				
Current	800 $\Omega$				
Update time	2 ms				
Resolution	10-bit				
<b>Electrical properties</b>					
Energy efficiency (IE classification)					
Efficiency data	IE (10, 25): 1.8% (3x 380 VAC), 1.4% (3x 500 VAC) IE (50, 25): 1.7% (3x 380 VAC), 1.3% (3x 500 VAC) IE (10, 50): 1.9% (3x 380 VAC), 1.6% (3x 500 VAC) IE (50, 50): 1.8% (3x 380 VAC), 1.5% (3x 500 VAC) IE (90, 50): 1.8% (3x 380 VAC), 1.5% (3x 500 VAC) IE (10, 100): 2.2% (3x 380 VAC), 2% (3x 500 VAC) IE (50, 100): 2.1% (3x 380 VAC), 1.9% (3x 500 VAC) IE (90, 100): 2.3% (3x 380 VAC), 1.9% (3x 500 VAC)	IE (10, 25): 1.6% (3x 380 VAC), 1.2% (3x 500 VAC) IE (50, 25): 1.5% (3x 380 VAC), 1.2% (3x 500 VAC) IE (10, 50): 1.7% (3x 380 VAC), 1.4% (3x 500 VAC) IE (50, 50): 1.6% (3x 380 VAC), 1.3% (3x 500 VAC) IE (90, 50): 1.7% (3x 380 VAC), 1.3% (3x 500 VAC) IE (10, 100): 2.1% (3x 380 VAC), 1.8% (3x 500 VAC) IE (50, 100): 1.9% (3x 380 VAC), 1.6% (3x 500 VAC) IE (90, 100): 2.1% (3x 380 VAC), 1.8% (3x 500 VAC)	IE (10, 25): 1.3% (3x 380 VAC), 1.1% (3x 500 VAC) IE (50, 25): 1.1% (3x 380 VAC), 1% (3x 500 VAC) IE (10, 50): 1.5% (3x 380 VAC), 1.3% (3x 500 VAC) IE (50, 50): 1.3% (3x 380 VAC), 1.2% (3x 500 VAC) IE (90, 50): 1.4% (3x 380 VAC), 1.2% (3x 500 VAC) IE (10, 100): 1.9% (3x 380 VAC), 1.7% (3x 500 VAC) IE (50, 100): 1.8% (3x 380 VAC), 1.6% (3x 500 VAC) IE (90, 100): 2% (3x 380 VAC), 1.7% (3x 500 VAC)	IE (10, 25): 1.1% (3x 380 VAC), 1% (3x 500 VAC) IE (50, 25): 1% (3x 380 VAC), 0.9% (3x 500 VAC) IE (10, 50): 1.3% (3x 380 VAC), 1.2% (3x 500 VAC) IE (50, 50): 1.2% (3x 380 VAC), 1% (3x 500 VAC) IE (90, 50): 1.3% (3x 380 VAC), 1.1% (3x 500 VAC) IE (10, 100): 1.8% (3x 380 VAC), 1.6% (3x 500 VAC) IE (50, 100): 1.7% (3x 380 VAC), 1.5% (3x 500 VAC) IE (90, 100): 2% (3x 380 VAC), 1.6% (3x 500 VAC)	IE (10, 25): 1% (3x 380 VAC), 0.9% (3x 500 VAC) IE (50, 25): 0.9% (3x 380 VAC), 0.8% (3x 500 VAC) IE (10, 50): 1.2% (3x 380 VAC), 1.1% (3x 500 VAC) IE (50, 50): 1.1% (3x 380 VAC), 1% (3x 500 VAC) IE (90, 50): 1.2% (3x 380 VAC), 1% (3x 500 VAC) IE (10, 100): 1.7% (3x 380 VAC), 1.5% (3x 500 VAC) IE (50, 100): 1.7% (3x 380 VAC), 1.4% (3x 500 VAC) IE (90, 100): 2% (3x 380 VAC), 1.6% (3x 500 VAC)
Nominal losses in standby mode	8 W (3x 380 VAC), 9 W (3x 500 VAC)				
<b>Operating conditions</b>					
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	$\leq 1000$ m without derating 1000 to 3000 m with Derating <sup>10)</sup>				
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 $\pm 10^\circ$				
<b>Ambient conditions</b>					
Temperature					
Operation	-10 to 50°C without derating 50 to 60°C with derating				
Storage	-25 to 70°C				

Table 6: 8I76T400037.00-000, 8I76T400055.00-000, 8I76T400075.00-000, 8I76T400110.00-000, 8I76T400150.00-000 - Technical data

Order number	8176T400037.00-000	8176T400055.00-000	8176T400075.00-000	8176T400110.00-000	8176T400150.00-000
Max. vibration resistance	1 g <sub>n</sub> 13 to 200 Hz EN/IEC 60068-2-6 1.5 mm peak to peak 3 to 13 Hz EN/IEC 60068-2-6				
<b>Mechanical properties</b>					
Dimensions					
Width	45 mm				
Height	325 mm				
Depth	232 mm				
Weight	2.5 kg				

Table 6: 8176T400037.00-000, 8176T400055.00-000, 8176T400075.00-000, 8176T400110.00-000, 8176T400150.00-000 - Technical data

- 1) With mains choke max. I<sub>sc</sub> 65 kA for 380/500 V.
- 2) Peak current when switching on for maximum voltage (240 V +10% or 500 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 (I<sub>sc</sub>).
- 4) Inverter is provided with an integrated Category C2 EMC filter. This filter can be switched off.
- 5) The selection table for the filters specifies maximum length for the shielded cables between motors and inverters. These maximum cable lengths only serve as a reference point since they depend on the capacity of the motors and the cables being used. The total length must be taken into account when motors are connected in parallel. These values apply at a nominal clock frequency of 4 kHz.
- 6) 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.
- 7) The inverter is designed to operate for a maximum of 60 seconds at 150% nominal current.
- 8) For additional information, see section "Communication / POWERLINK / General information / Hardware - CN" in Automation Help.
- 9) 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
- 10) Over 1000 m, load reduced by 1% per 100 m.

### 3.4 8176T400220.00-000, 8176T400300.00-000, 8176T400400.00-000

#### 3.4.1 Order data

Order number	Short description	Figure
	<b>ACOPOSinverter P76 - 3-phase 380 to 500 V</b>	
8176T400220.00-000	Base device for ACOPOSinverter P76 and P74new, 3x 380 to 500 V, 2.2 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8176T400300.00-000	Base device for ACOPOSinverter P76 and P74new, 3x 380 to 500 V, 3 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8176T400400.00-000	Base device for ACOPOSinverter P76 and P74new, 3x 380 to 500 V, 4 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
	<b>Optional accessories</b>	
	<b>Additional EMC filters</b>	
810FT015.200-1	ACOPOSinverter additional EMC input filter 3-phase 15 A, supply voltage: 380 to 480 V, 50/60 Hz	
	<b>Cable and adapters</b>	
810XC001.003-1	USB adapter cable, USB to Modbus, for ACOPOSinverter.	
810XC003.400-1	DC bus cable, 0.18 m, 5 pcs., for ACOPOSinverter	
810XD304.301-1	RJ45 cable, 1 m, for remote use of the display for the ACOPOSinverter.	
810XD304.303-1	RJ45 cable, 3 m, for remote use of the display for the ACOPOSinverter.	
810XD304.305-1	RJ45 cable, 5 m, for remote use of the display for the ACOPOSinverter.	
810XD304.310-1	RJ45 cable, 10 m, for remote use of the display for the ACOPOSinverter.	
	<b>Fans (spare part)</b>	
810XF074.020-1	ACPi P76, P74/P74new fan 1-ph. 200...240 VAC: Power output class: 1.1 - 2.2 kW 3-ph. 380...500 VAC: Power output class: 2.2 - 4 kW	
	<b>Graphic display terminal</b>	
810XD301.300-1	Graphics display for ACOPOSinverter, 240 x 160 pixels, 8 lines, backlight, function keys, navigation key, IP54 protection.	
810XD302.300-1	Installation kit, IP54 protection, for graphic display of the ACOPOSinverter.	
810XD303.300-1	Front cover for installation kit, IP65 protection, for graphic display of the ACOPOSinverter.	
810XD305.300-1	Female to female adapter, RJ45, for graphics display of the ACOPOSinverter.	
	<b>Optional braking resistors</b>	
810BR100.000-1	Braking resistor ohmic value: 100 Ω continuous braking power: 0.05 kW degree of protection (IP): IP20	
	<b>Optional line chokes</b>	
810CT010.000-1	Mains choke 3-phase, 10 A, 50/60 Hz for ACOPOSinverter	

Table 7: 8176T400220.00-000, 8176T400300.00-000, 8176T400400.00-000 - Order data

## 3.4.2 Technical data

Order number	8I76T400220.00-000	8I76T400300.00-000	8I76T400400.00-000
<b>General information</b>			
Certifications			
CE		Yes	
UKCA		Yes	
UL		UL E225616	
CSA		Power conversion equipment CSA E272421 Industrial control equipment	
<b>Motor power</b>			
Specified on nameplate	2.2 kW (3 HP)	3 kW (4 HP)	4 kW (5 HP)
<b>Mains connection</b>			
Mains input voltage	3x 380 VAC -15% to 500 VAC +10%		
Frequency	50 to 60 Hz ±5%		
Apparent power (at 500 VAC)	5.3 kVA	6.8 kVA	8.6 kVA
Max. assumed short-circuit current (I <sub>sc</sub> ) (short-circuit current at connection point)	5 kA <sup>1)</sup>		
Inrush current	Max. 10 A <sup>2)</sup>		
Mains current			
At 380 VAC	8 A <sup>3)</sup>	10.3 A <sup>3)</sup>	12.9 A <sup>3)</sup>
At 500 VAC	6.1 A <sup>3)</sup>	7.8 A <sup>3)</sup>	9.9 A <sup>3)</sup>
Power dissipation at nominal load and nominal clock frequency	78 W	100 W	125 W
Integrated EMC filter	Yes <sup>4)</sup>		
<b>Line-conducted and radiated emissions</b>			
With integrated filter			
Motor cable length per IEC/EN 61800-3 Cat. C1 environment 1 (public power network)	-		
Motor cable length per IEC/EN 61800-3 Cat. C2 environment 1 (public power network)	C2 level of 4 to 12 kHz with 5 m cable		
Motor cable length per IEC/EN 61800-3 Cat. C3 environment 2 (industrial power system)	5 m <sup>5)</sup>		
With add-on filter	8IOFT015.200-1		
With add-on filter			
Motor cable length per IEC/EN 61800-3 Cat. C1 environment 1 (public power network)	C1 level of 2 to 16 kHz with 20 m cable		
Motor cable length per IEC/EN 61800-3 Cat. C2 environment 1 (public power network)	C2 level of 2 to 16 kHz with 50 m cable		
Motor cable length per IEC/EN 61800-3 Cat. C3 environment 2 (industrial power system)	50 m <sup>5)</sup>		
<b>Motor connection</b>			
Nominal output current	5.5 A <sup>6)</sup>	7.1 A <sup>6)</sup>	9.5 A <sup>6)</sup>
Derating of continuous output current depending on ambient temperature	No derating (up to 50°C)		
At nominal clock frequency (4 kHz)	The derating curves are included in the installation instructions, which can be downloaded from the website ( <a href="http://www.br-automation.com">www.br-automation.com</a> ).		
Other clock frequencies			
Derating of continuous output current depending on installation elevation	Starting at 1000 m above sea level		
Starting at 1000 m above sea level	1%, per 100 m		
Max. transient current for 60 s <sup>7)</sup>	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	Up to 170% of the rated motor torque		
With braking resistor			
Max. motor cable length			
Shielded cable	50 m		
Non-shielded cable	100 m		
Motor control profiles			
Induction motor	Sensorless vector control: 1. Voltage controlled with constant torque → standard mode 2. Voltage controlled with variable torque → energy saving mode e.g. for fans and pumps Sensorless slip control: 1. With V/f characteristic curve for constant torque → standard mode 2. With V/f characteristic curve for constant torque (up to 6 f-ranges) → Custom mode 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. Voltage controlled with constant torque → standard mode		

Table 8: 8I76T400220.00-000, 8I76T400300.00-000, 8I76T400400.00-000 - Technical data

## Technical data

Order number	8176T400220.00-000	8176T400300.00-000	8176T400400.00-000
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: Overvoltage and undervoltage of the mains supply, mains phase failure with 3-phase power supply		
<b>Brake chopper</b>			
Integrated dynamic brake transistors	Yes		
Min. resistance value (external)	54 Ω		36 Ω
<b>24 VDC power supply</b>			
Input voltage	24 VDC (-15%/+20%)		
Current	Max. 1.1 A		
<b>Available internal power supplies</b>			
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		
<b>Interfaces</b>			
POWERLINK			
Type	Type 3 <sup>8)</sup>		
<b>Digital inputs</b>			
Quantity	6 <sup>9)</sup>		
Nominal voltage	24 VDC (max. 30 VDC)		
Input circuit	Source or sink		
Electrical isolation			
Input - ACOPOSinverter	Yes		
Input - Input	No		
Sampling time	8 ms ±0.7 ms		
Digital input 5			
Max. input frequency	20 kHz		
<b>Safe input - STO (Safe Torque Off)</b>			
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		
<b>Analog inputs</b>			
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		
<b>Digital outputs</b>			
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		
<b>Relay outputs</b>			
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		

Table 8: 8176T400220.00-000, 8176T400300.00-000, 8176T400400.00-000 - Technical data

Order number	8I76T400220.00-000	8I76T400300.00-000	8I76T400400.00-000
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	
<b>Analog outputs</b>			
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	
<b>Electrical properties</b>			
Energy efficiency (IE classification)			
Efficiency data	IE (10, 25): 0.9% (3x 380 VAC), 0.8% (3x 500 VAC) IE (50, 25): 0.8% (3x 380 VAC), 0.7% (3x 500 VAC) IE (10, 50): 1.1% (3x 380 VAC), 1% (3x 500 VAC) IE (50, 50): 1.1% (3x 380 VAC), 0.9% (3x 500 VAC) IE (90, 50): 1.2% (3x 380 VAC), 0.9% (3x 500 VAC) IE (10, 100): 1.6% (3x 380 VAC), 1.4% (3x 500 VAC) IE (50, 100): 1.6% (3x 380 VAC), 1.3% (3x 500 VAC) IE (90, 100): 1.9% (3x 380 VAC), 1.5% (3x 500 VAC)	IE (10, 25): 0.9% (3x 380 VAC), 0.8% (3x 500 VAC) IE (50, 25): 0.8% (3x 380 VAC), 0.7% (3x 500 VAC) IE (10, 50): 1.1% (3x 380 VAC), 1% (3x 500 VAC) IE (50, 50): 1% (3x 380 VAC), 0.9% (3x 500 VAC) IE (90, 50): 1.1% (3x 380 VAC), 0.9% (3x 500 VAC) IE (10, 100): 1.6% (3x 380 VAC), 1.4% (3x 500 VAC) IE (50, 100): 1.6% (3x 380 VAC), 1.3% (3x 500 VAC) IE (90, 100): 1.9% (3x 380 VAC), 1.5% (3x 500 VAC)	IE (10, 25): 0.8% (3x 380 VAC), 0.6% (3x 500 VAC) IE (50, 25): 0.7% (3x 380 VAC), 0.5% (3x 500 VAC) IE (10, 50): 1% (3x 380 VAC), 0.7% (3x 500 VAC) IE (50, 50): 0.9% (3x 380 VAC), 0.7% (3x 500 VAC) IE (90, 50): 1% (3x 380 VAC), 0.7% (3x 500 VAC) IE (10, 100): 1.5% (3x 380 VAC), 1.3% (3x 500 VAC) IE (50, 100): 1.4% (3x 380 VAC), 1.2% (3x 500 VAC) IE (90, 100): 1.7% (3x 380 VAC), 1.3% (3x 500 VAC)
Nominal losses in standby mode		8 W (3x 380 VAC), 10 W (3x 500 VAC)	
<b>Operating conditions</b>			
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 <sup>10)</sup>	
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°	
<b>Ambient conditions</b>			
Temperature			
Operation		-10 to 50°C without derating 50 to 60°C with derating	
Storage		-25 to 70°C	
Max. vibration resistance		1 g <sub>n</sub> 13 to 200 Hz EN/IEC 60068-2-6 1.5 mm peak to peak 3 to 13 Hz EN/IEC 60068-2-6	
<b>Mechanical properties</b>			
Dimensions			
Width		60 mm	
Height		325 mm	
Depth		232 mm	
Weight		3 kg	

Table 8: 8I76T400220.00-000, 8I76T400300.00-000, 8I76T400400.00-000 - Technical data

- 1) With mains choke max. I<sub>sc</sub> 65 kA for 380/500 V.
- 2) Peak current when switching on for maximum voltage (240 V +10% or 500 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 (I<sub>sc</sub>).
- 4) Inverter is provided with an integrated Category C2 EMC filter. This filter can be switched off.
- 5) The selection table for the filters specifies maximum length for the shielded cables between motors and inverters. These maximum cable lengths only serve as a reference point since they depend on the capacity of the motors and the cables being used. The total length must be taken into account when motors are connected in parallel. These values apply at a nominal clock frequency of 4 kHz.
- 6) 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.
- 7) The inverter is designed to operate for a maximum of 60 seconds at 150% nominal current.
- 8) For additional information, see section "Communication / POWERLINK / General information / Hardware - CN" in Automation Help.
- 9) 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
- 10) Over 1000 m, load reduced by 1% per 100 m.

### 3.5 8I76T400550.00-000, 8I76T400750.00-000, 8I76T401100.00-000, 8I76T401500.00-000

#### 3.5.1 Order data

Order number	Short description	Figure
	<b>ACOPOSinverter P76 - 3-phase 380 to 500 V</b>	
8I76T400550.00-000	Base device for ACOPOSinverter P76 and P74new, 3x 380 to 500 V, 5.5 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I76T400750.00-000	Base device for ACOPOSinverter P76 and P74new, 3x 380 to 500 V, 7.5 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I76T401100.00-000	Base device for ACOPOSinverter P76 and P74new, 3x 380 to 500 V, 11 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
8I76T401500.00-000	Base device for ACOPOSinverter P76 and P74new, 3x 380 to 500 V, 15 kW, integrated EMC filter and brake chopper, shield plate included in delivery	
<b>Optional accessories</b>		
<b>Cable and adapters</b>		
8I0XC001.003-1	USB adapter cable, USB to Modbus, for ACOPOSinverter.	
8I0XD304.301-1	RJ45 cable, 1 m, for remote use of the display for the ACOPOSinverter.	
8I0XD304.303-1	RJ45 cable, 3 m, for remote use of the display for the ACOPOSinverter.	
8I0XD304.305-1	RJ45 cable, 5 m, for remote use of the display for the ACOPOSinverter.	
8I0XD304.310-1	RJ45 cable, 10 m, for remote use of the display for the ACOPOSinverter.	
<b>Fans (spare part)</b>		
8I0XF074.030-1	ACPI P66 fan 3-ph. 200...240 VAC: Power output class: 5.5 - 7.5 kW 3-ph. 380...500 VAC: Power output class: 5.5 - 7.5 kW 3-ph. 525...600 VAC: Power output class: 5.5 - 7.5 kW ACPI P76, P74/P74new fan 3-ph. 380...500 VAC: Power output class: 5.5 - 7.5 kW	
8I0XF074.040-1	ACPI P66 fan 3-ph. 200...240 VAC: Power output class: 11 - 15 kW 3-ph. 380...500 VAC: Power output class: 11 - 15 kW 3-ph. 525...600 VAC: Power output class: 11 - 15 kW ACPI P76, P74/P74new fan 3-ph. 380...500 VAC: Power output class: 11 - 15 kW	
<b>Graphic display terminal</b>		
8I0XD301.300-1	Graphics display for ACOPOSinverter, 240 x 160 pixels, 8 lines, backlight, function keys, navigation key, IP54 protection.	
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.	
8I0XD305.300-1	Female to female adapter, RJ45, for graphics display of the ACOPOSinverter.	
<b>Optional EMC filters</b>		
8I0FT047.200-1	47 A EMC filter for ACOPOSinverter P76 and P74new (3-phase 380-500 V, 5.5-7.5 kW).	
8I0FT049.200-1	49 A EMC filter for ACOPOSinverter P76 and P74new (3-phase 380-500 V, 11-15 kW).	
<b>Optional braking resistors</b>		
8I0BR028.000-1	Braking resistor ohmic value: 28 Ω continuous braking power: 0.20 kW degree of protection (IP): IP20	
8I0BR060.000-1	Braking resistor ohmic value: 60 Ω continuous braking power: 0.10 kW degree of protection (IP): IP20	
<b>Optional line chokes</b>		
8I0CT016.000-1	Mains choke 3-phase, 17 A, 50/60 Hz for ACOPOSinverter	
8I0CT030.000-1	Mains choke 3-phase, 30 A, 50/60 Hz for ACOPOSinverter	

Table 9: 8I76T400550.00-000, 8I76T400750.00-000, 8I76T401100.00-000, 8I76T401500.00-000 - Order data

## 3.5.2 Technical data

Order number	8I76T400550.00-000	8I76T400750.00-000	8I76T401100.00-000	8I76T401500.00-000
<b>General information</b>				
Certifications				
CE	Yes			
UKCA	Yes			
UL	UL E225616 Power conversion equipment			
CSA	CSA E272421 Industrial control equipment			
<b>Motor power</b>				
Specified on nameplate	5.5 kW (7.5 HP)	7.5 kW (10 HP)	11 kW (15 HP)	15 kW (20 HP)
<b>Mains connection</b>				
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 <sup>1)</sup>			
Inrush current	Max. 27.6 A <sup>2)</sup>		Max. 36.7 A <sup>2)</sup>	
Mains current				
At 380 VAC	19.8 A <sup>3)</sup>	25.5 A <sup>3)</sup>	35.4 A <sup>3)</sup>	46.5 A <sup>3)</sup>
At 500 VAC	15.2 A <sup>3)</sup>	19.6 A <sup>3)</sup>	27.2 A <sup>3)</sup>	35.5 A <sup>3)</sup>
Power dissipation at nominal load and nominal clock frequency	233 W	263 W	403 W	480 W
Integrated EMC filter	Yes <sup>4)</sup>			
<b>Line-conducted and radiated emissions</b>				
With integrated filter				
Motor cable length per IEC/EN 61800-3 Cat. C1 environment 1 (public power network)	-			
Motor cable length per IEC/EN 61800-3 Cat. C2 environment 1 (public power network)	C2 level of 4 to 12 kHz with 5 m cable			
Motor cable length per IEC/EN 61800-3 Cat. C3 environment 2 (industrial power system)	5 m <sup>5)</sup>			
With add-on filter	8I0FT047.200-1		8I0FT049.200-1	
With add-on filter				
Motor cable length per IEC/EN 61800-3 Cat. C1 environment 1 (public power network)	C1 level of 2 to 16 kHz with 10 m cable		C1 level of 2 to 16 kHz with 5 m cable C1 level of 2 to 8 kHz with 10 m cable C1 level of 2 to 4 kHz with 20 m cable	
Motor cable length per IEC/EN 61800-3 Cat. C2 environment 1 (public power network)	C2 level of 2 to 16 kHz with 50 m cable C2 level of 2 to 12 kHz with 100 m cable			
Motor cable length per IEC/EN 61800-3 Cat. C3 environment 2 (industrial power system)	50 m <sup>5)</sup>			
<b>Motor connection</b>				
Nominal output current	14.3 A <sup>6)</sup>	17 A <sup>6)</sup>	27.7 A <sup>6)</sup>	33 A <sup>6)</sup>
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 ( <a href="http://www.br-automation.com">www.br-automation.com</a> ).			
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 <sup>7)</sup>	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			

Table 10: 8I76T400550.00-000, 8I76T400750.00-000, 8I76T401100.00-000, 8I76T401500.00-000 - Technical data

## Technical data

Order number	8I76T400550.00-000	8I76T400750.00-000	8I76T401100.00-000	8I76T401500.00-000
Motor control profiles				
Induction motor	Sensorless vector control: 1. Voltage controlled with constant torque → standard mode 2. Voltage controlled with variable torque → energy saving mode e.g. for fans and pumps Sensorless slip control: 1. With V/f characteristic curve for constant torque → standard mode 2. With V/f characteristic curve for constant torque (up to 6 f-ranges) → Custom mode 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. Voltage controlled with constant torque → standard mode			
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: Overvoltage and undervoltage of the mains supply, mains phase failure with 3-phase power supply			
<b>Brake chopper</b>				
Integrated dynamic brake transistors	Yes			
Min. resistance value (external)	27 Ω		16 Ω	
<b>24 VDC power supply</b>				
Input voltage	24 VDC (-15%/+20%)			
Current	Max. 1.1 A			
<b>Available internal power supplies</b>				
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			
<b>Interfaces</b>				
POWERLINK				
Type	Type 3 <sup>8)</sup>			
<b>Digital inputs</b>				
Quantity	6 <sup>9)</sup>			
Nominal voltage	24 VDC (max. 30 VDC)			
Input circuit	Source or sink			
Electrical isolation				
Input - ACOPOSinverter	Yes			
Input - Input	No			
Sampling time	8 ms ±0.7 ms			
Digital input 5				
Max. input frequency	20 kHz			
<b>Safe input - STO (Safe Torque Off)</b>				
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			
<b>Analog inputs</b>				
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			
<b>Digital outputs</b>				
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			

Table 10: 8I76T400550.00-000, 8I76T400750.00-000, 8I76T401100.00-000, 8I76T401500.00-000 - Technical data

Order number	8I76T400550.00-000	8I76T400750.00-000	8I76T401100.00-000	8I76T401500.00-000
<b>Relay outputs</b>				
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			
<b>Analog outputs</b>				
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			
<b>Electrical properties</b>				
Energy efficiency (IE classification)				
Efficiency data	IE (10, 25): 0.7% (3x 380 VAC), 0.6% (3x 500 VAC) IE (50, 25): 0.6% (3x 380 VAC), 0.5% (3x 500 VAC) IE (10, 50): 0.9% (3x 380 VAC), 0.8% (3x 500 VAC) IE (50, 50): 0.9% (3x 380 VAC), 0.7% (3x 500 VAC) IE (90, 50): 1% (3x 380 VAC), 0.8% (3x 500 VAC) IE (10, 100): 1.6% (3x 380 VAC), 1.4% (3x 500 VAC) IE (50, 100): 1.6% (3x 380 VAC), 1.3% (3x 500 VAC) IE (90, 100): 2% (3x 380 VAC), 1.5% (3x 500 VAC)	IE (10, 25): 0.6% (3x 380 VAC), 0.5% (3x 500 VAC) IE (50, 25): 0.6% (3x 380 VAC), 0.5% (3x 500 VAC) IE (10, 50): 0.8% (3x 380 VAC), 0.7% (3x 500 VAC) IE (50, 50): 0.8% (3x 380 VAC), 0.7% (3x 500 VAC) IE (90, 50): 0.9% (3x 380 VAC), 0.7% (3x 500 VAC) IE (10, 100): 1.5% (3x 380 VAC), 1.3% (3x 500 VAC) IE (50, 100): 1.5% (3x 380 VAC), 1.2% (3x 500 VAC) IE (90, 100): 1.9% (3x 380 VAC), 1.4% (3x 500 VAC)	IE (10, 25): 0.6% (3x 380 VAC), 0.5% (3x 500 VAC) IE (50, 25): 0.6% (3x 380 VAC), 0.5% (3x 500 VAC) IE (10, 50): 0.9% (3x 380 VAC), 0.7% (3x 500 VAC) IE (50, 50): 0.8% (3x 380 VAC), 0.7% (3x 500 VAC) IE (90, 50): 0.9% (3x 380 VAC), 0.7% (3x 500 VAC) IE (10, 100): 1.6% (3x 380 VAC), 1.3% (3x 500 VAC) IE (50, 100): 1.5% (3x 380 VAC), 1.2% (3x 500 VAC) IE (90, 100): 1.9% (3x 380 VAC), 1.4% (3x 500 VAC)	IE (10, 25): 0.6% (3x 380 VAC), 0.5% (3x 500 VAC) IE (50, 25): 0.5% (3x 380 VAC), 0.4% (3x 500 VAC) IE (10, 50): 0.8% (3x 380 VAC), 0.7% (3x 500 VAC) IE (50, 50): 0.8% (3x 380 VAC), 0.6% (3x 500 VAC) IE (90, 50): 0.9% (3x 380 VAC), 0.7% (3x 500 VAC) IE (10, 100): 1.5% (3x 380 VAC), 1.3% (3x 500 VAC) IE (50, 100): 1.5% (3x 380 VAC), 1.2% (3x 500 VAC) IE (90, 100): 1.9% (3x 380 VAC), 1.4% (3x 500 VAC)
Nominal losses in standby mode	8 W (3x 380 VAC), 10 W (3x 500 VAC)		10 W (3x 380 VAC), 11 W (3x 500 VAC)	
<b>Operating conditions</b>				
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 <sup>10)</sup>			
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°			
<b>Ambient conditions</b>				
Temperature				
Operation	-10 to 50°C without derating 50 to 60°C with derating			
Storage	-25 to 70°C			
Max. vibration resistance	1 g <sub>r</sub> , 13 to 200 Hz EN/IEC 60068-2-6 1.5 mm peak to peak 3 to 13 Hz EN/IEC 60068-2-6			
<b>Mechanical properties</b>				
Dimensions				
Width	150 mm		180 mm	
Height	308 mm		404 mm	
Height without shield plate	232 mm		330 mm	
Depth	232 mm			
Weight	7.5 kg		8.7 kg	8.8 kg

Table 10: 8I76T400550.00-000, 8I76T400750.00-000, 8I76T401100.00-000, 8I76T401500.00-000 - Technical data

- 1) With mains choke max. I<sub>sc</sub> 65 kA for 380/500 V.
- 2) Peak current when switching on for maximum voltage (240 V +10% or 500 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 (I<sub>sc</sub>).

## Technical data

- 4) Inverter is provided with an integrated Category C2 EMC filter. This filter can be switched off.
- 5) The selection table for the filters specifies maximum length for the shielded cables between motors and inverters. These maximum cable lengths only serve as a reference point since they depend on the capacity of the motors and the cables being used. The total length must be taken into account when motors are connected in parallel. These values apply at a nominal clock frequency of 4 kHz.
- 6) 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.
- 7) The inverter is designed to operate for a maximum of 60 seconds at 150% nominal current.
- 8) For additional information, see section "Communication / POWERLINK / General information / Hardware - CN" in Automation Help.
- 9) 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 k $\Omega$ , reset value 1.8 k $\Omega$ , short-circuit proof <50  $\Omega$
- 10) Over 1000 m, load reduced by 1% per 100 m.

## 4 Installation

### 4.1 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 additional information, see section "[Wiring the power unit](#)" on page 65.

#### **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 under "Testing for absence of voltage".
- 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:

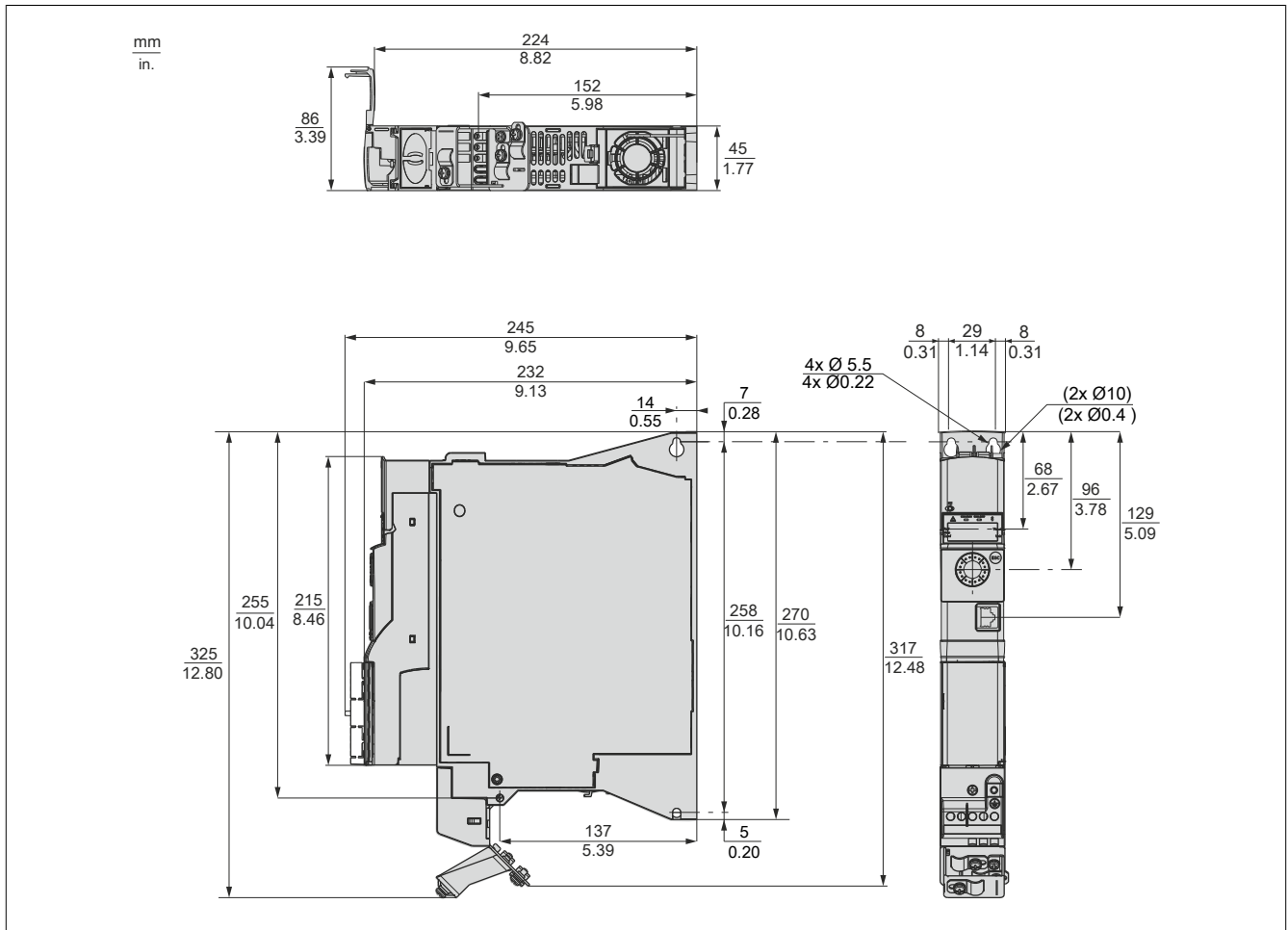
- 1) Measure the voltage on the DC bus between the DC bus terminals (PA/+, PC/-) to ensure that the voltage is less than 42 VDC. You can do this using a voltmeter with the correct rated voltage.
- 2) If the DC bus capacitors do not discharge correctly, contact your local B&R representative. In this case, 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.

**4.2 Mechanical data**

**Note:**

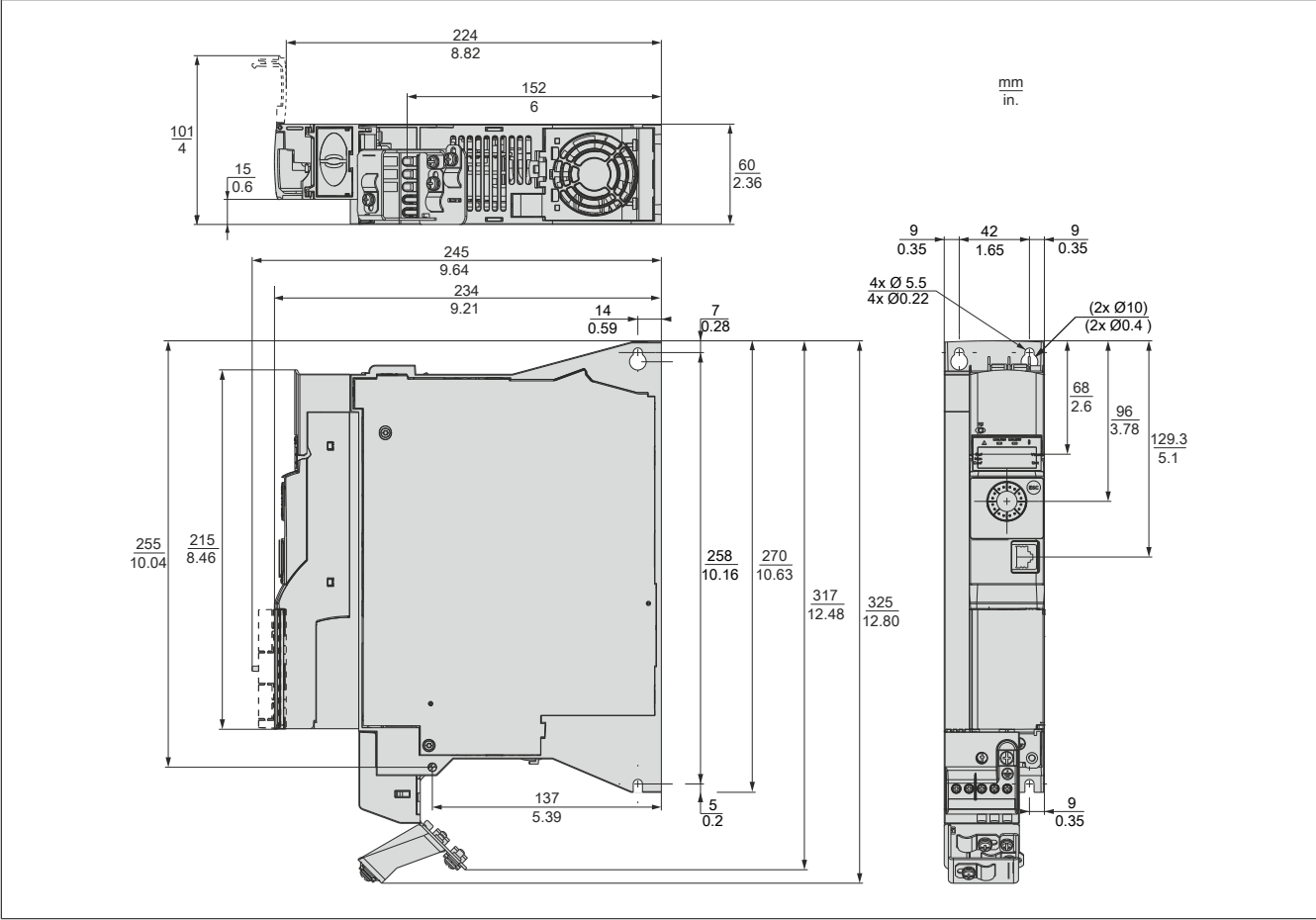
If you intend to use the additional slot option, when planning your installation take into account that all depth values must be increased by 40 mm. This optional module is inserted between the graphic display terminal and the inverter, which is why an increased depth is required. It allows for the connection of an optional module.

**Size 1 - Dimensions and weights**



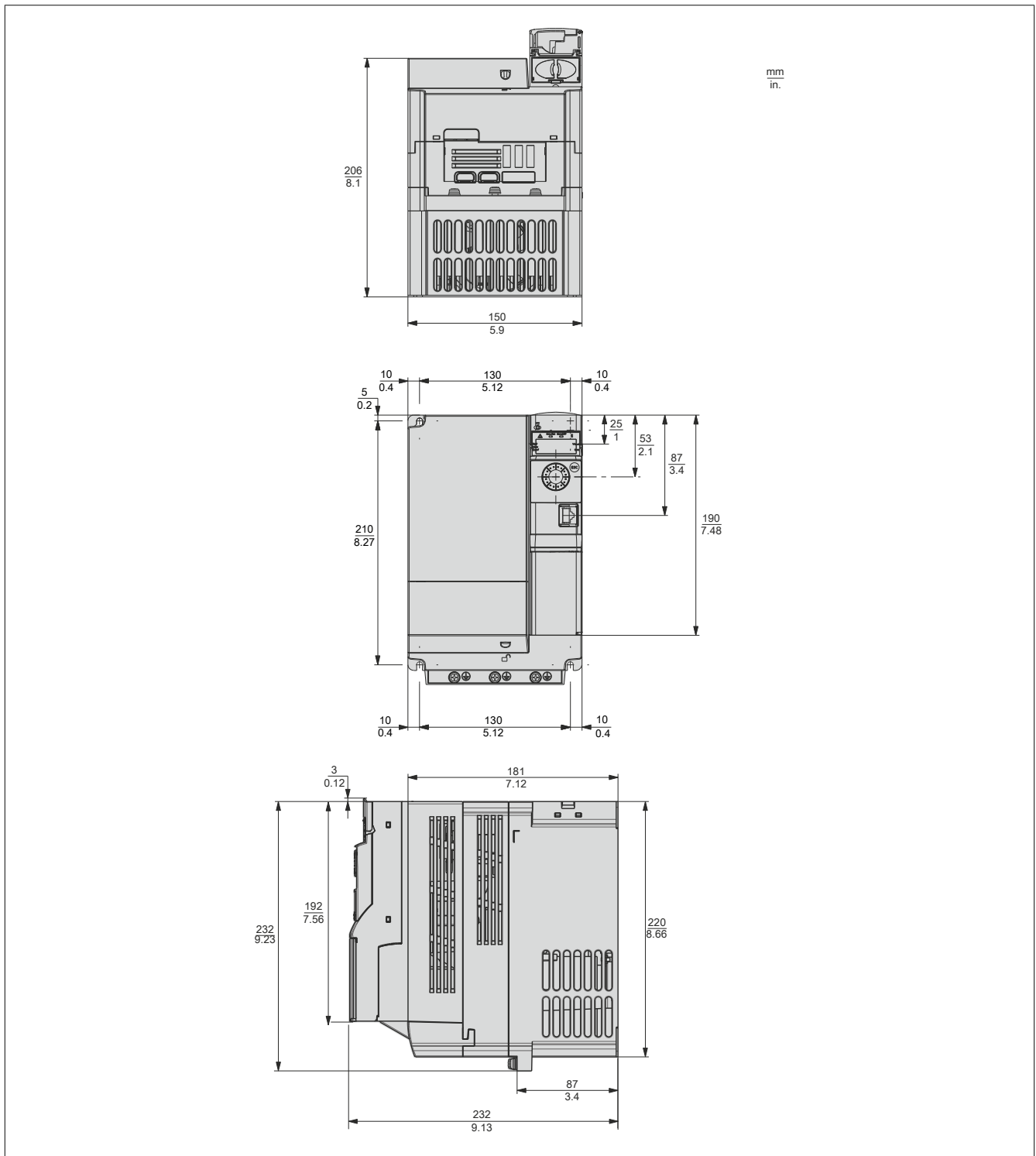
Order number	Weight (kg)	Weight (lb)
8176S200018.00-000, 8176S200037.00-000, 8176S200055.00-000, 8176S200075.00-000	2.4	5.3
8176T400037.00-000, 8176T400055.00-000, 8176T400150.00-000, 8176T400075.00-000, 8176T400110.00-000	2.5	5.5

Size 2 - Dimensions and weights



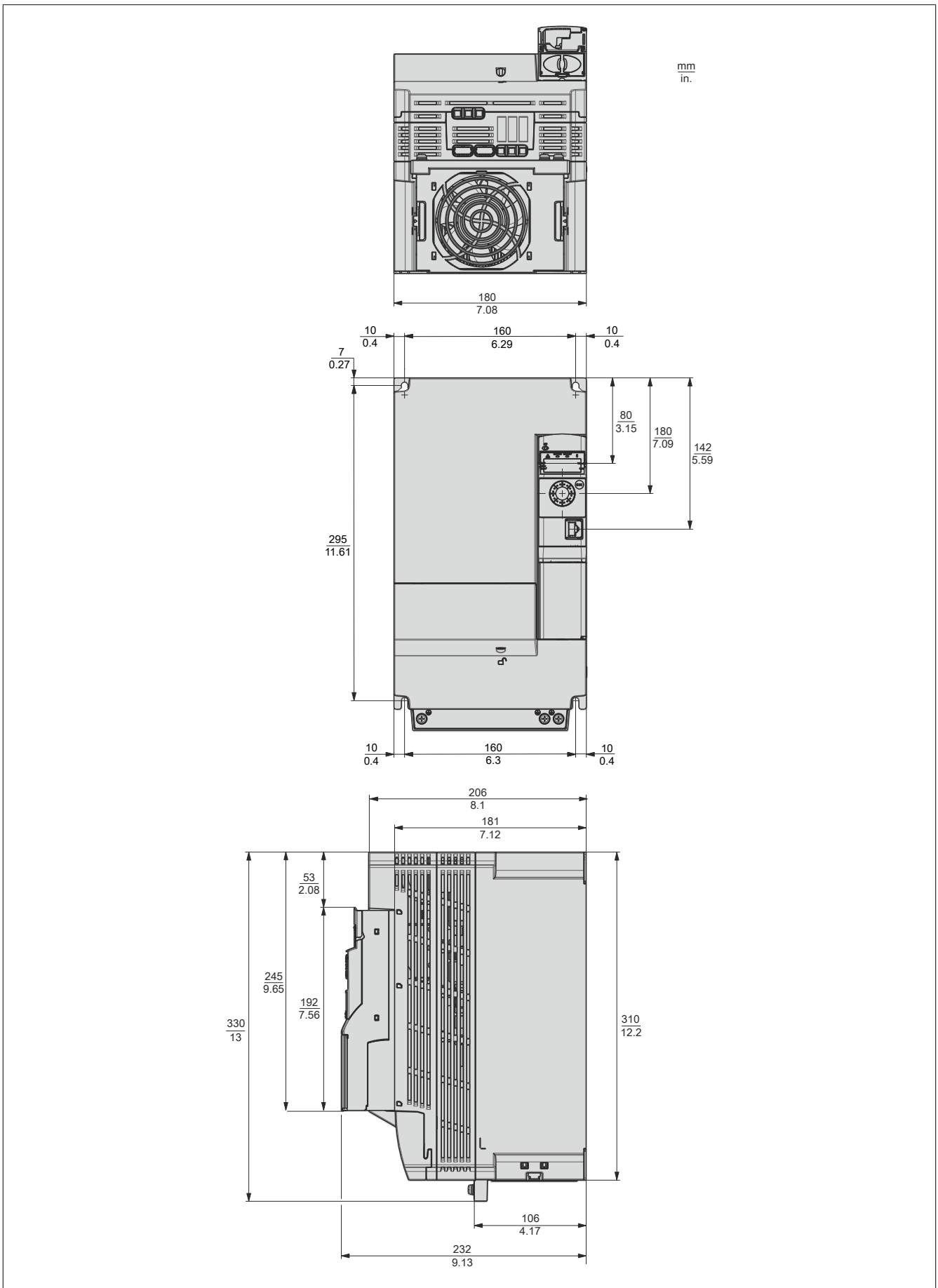
Order number	Weight (kg)	Weight (lb)
8176S200110.00-000, 8176S200150.00-000, 8176S200220.00-000	2.9	6.4
8176T400220.00-000, 8176T400300.00-000, 8176T400400.00-000	3	6.6

Size 3 - Dimensions and weights



Order number	Weight (kg)	Weight (lb)
8176T400550.00-000, 8176T400750.00-000	7.5	16.5
8176T400550.00-000, 8176T400750.00-000 with EMC plate	7.7	17

Size 4 - Dimensions and weights



## Installation

Order number	Weight (kg)	Weight (lb)
8I76T401100.00-000	8.7	19.2
8I76T401100.00-000 with EMC plate	8.9	19.6
8I76T401500.00-000	8.8	19.4
8I76T401500.00-000 with EMC plate	9	19.8

## 4.3 Installing the frequency inverter

### 4.3.1 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.

## 4.3.2 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.

## 4.3.3 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.**

### 4.3.3.1 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.**

### 4.3.4 Mounting conditions

#### Before you begin

Conductive foreign bodies, dust and faulty parts can cause parasitic voltage.

#### **Danger!**

##### **ELECTRIC SHOCK CAUSED BY FOREIGN BODIES OR DAMAGE**

- Use of damaged products is not permitted
- Foreign objects such as small parts, screws or wire ends are not permitted to enter the product.
- To prevent sedimentation and the entry of moisture, check that all gaskets and cable grommets are positioned correctly.

**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.**

Electrical power drives can generate strong local electrical and magnetic fields. This can cause interference for electromagnetically sensitive devices.

#### **Warning!**

##### **ELECTROMAGNETIC FIELDS**

- Make sure that anyone with an electronic medical implant, such as a pacemaker, keeps a safe distance from the inverter.
- Do not set up any electromagnetically sensitive devices in the vicinity of the inverter.

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

## Affix a label containing safety instructions

The inverter is shipped with a set of labels.

- 1) The safety regulations of your specific country must be taken into account.
- 2) Select the relevant label for your specific country.
- 3) Affix the label onto the front of the device in a prominent position. See the example below:

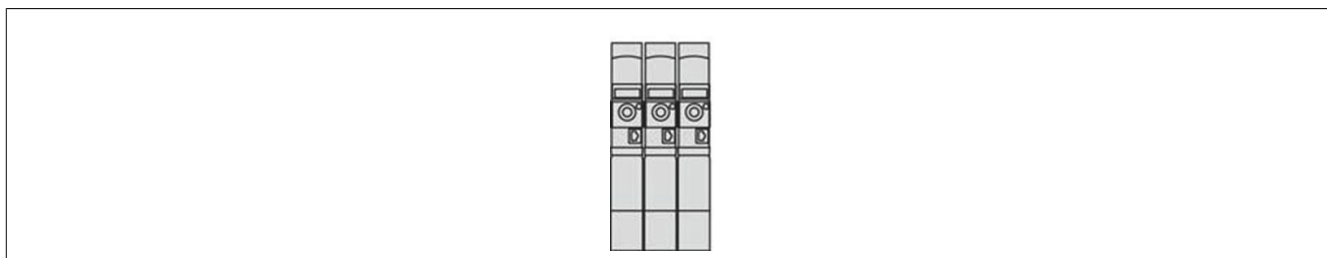


## Installation methods

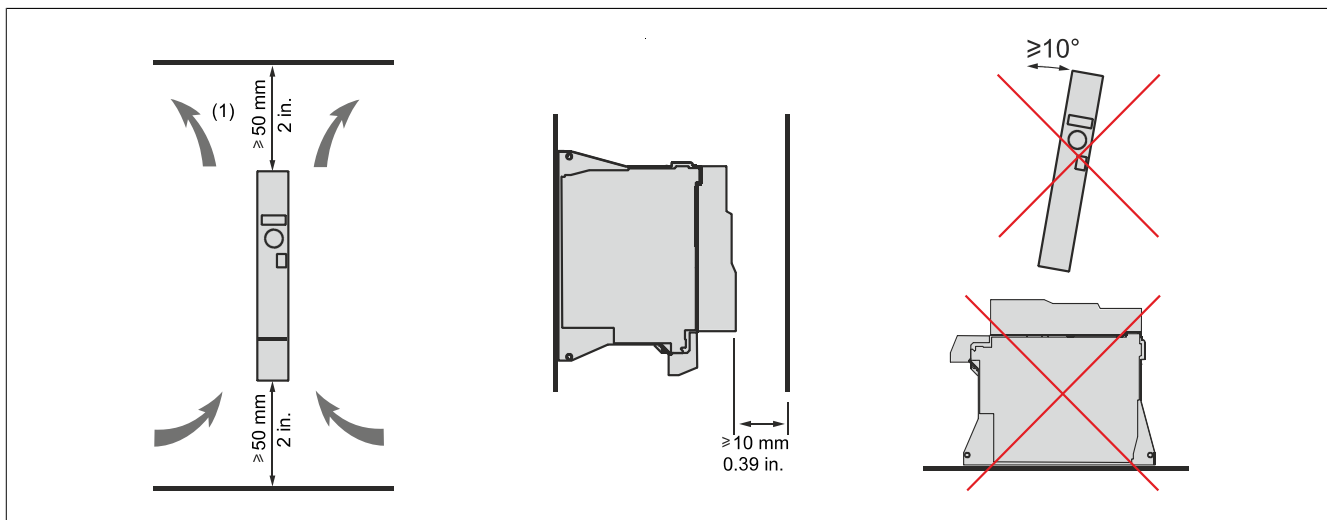
The inverter has been designed to operate in ambient temperatures of up to 50°C (122°F) and to operate continuously based on a clock frequency of 4 kHz.

For operation above this temperature (up to 60°C (140°F)) or continuous operation with a clock frequency higher than 4 kHz, the nominal inverter current should be reduced according to the derating characteristic curve.

If the clock frequency exceeds 4 kHz, it will be reduced automatically by the inverter if the temperature increases excessively. Size 1 and size 2 inverters can also be equipped with an optional GV2 circuit breaker (1).



## Spacing and mounting position



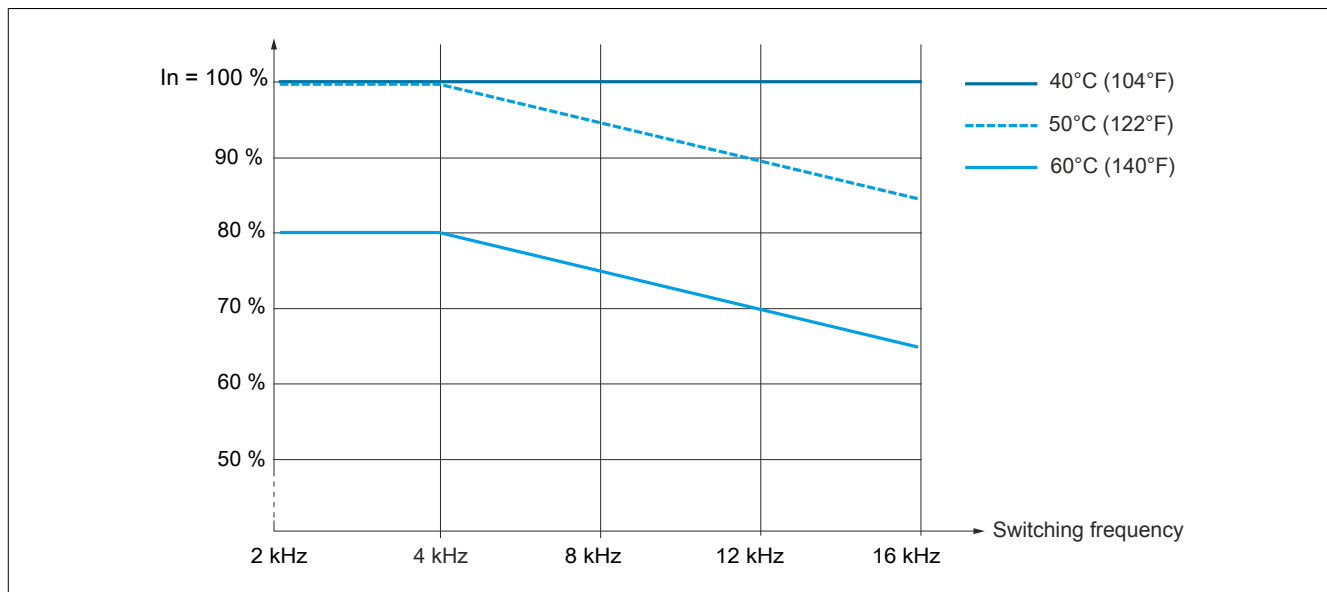
**General mounting instructions**

- Mount the device in a vertical position of  $\pm 10^\circ$ . 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 4.3.6 "Mounting type" on page 50.
- 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 1 and 2 to be installed horizontally without derating (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.

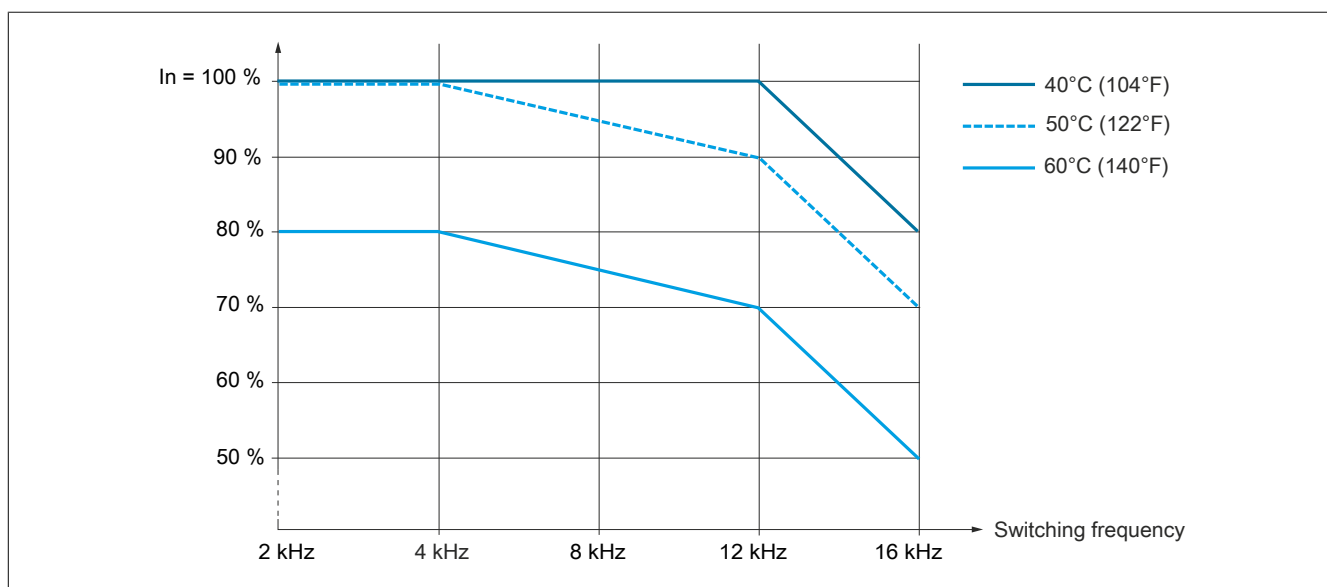
### 4.3.5 Derating characteristic curve

Derating curves for the nominal current of the inverter ( $I_n$ ) as a function of the temperature and switching frequency.

8176S200xxx.00-000



8176T40xxxx.00-000

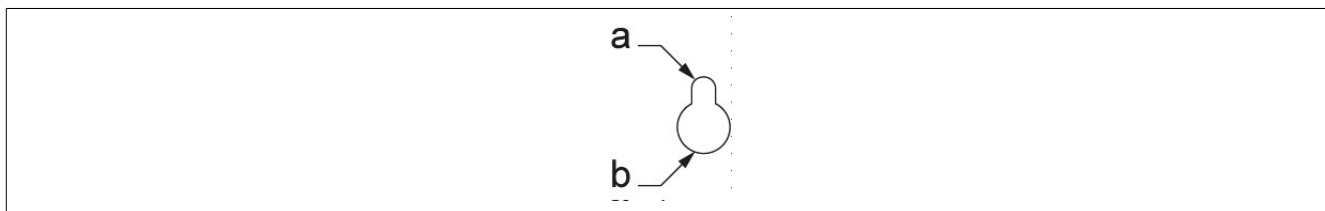


### 4.3.6 Mounting type

#### Mounting holes and screws

All inverters of all sizes must be mounted using screws as follows:

- Number of holes: 4 mounting holes should be used.
- Inverter sizes 1 and 2 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
1	5 (0.2)	-	-	M4
2	5 (0.2)	-	-	M4
3	5 (0.2)	11 (0.43)	5 (0.2)	M4
4	6 (0.24)	14 (0.55)	6 (0.24)	M5

#### Note:

Screws are not included with the delivered product.

## 4.4 Wiring the drive

### 4.4.1 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.

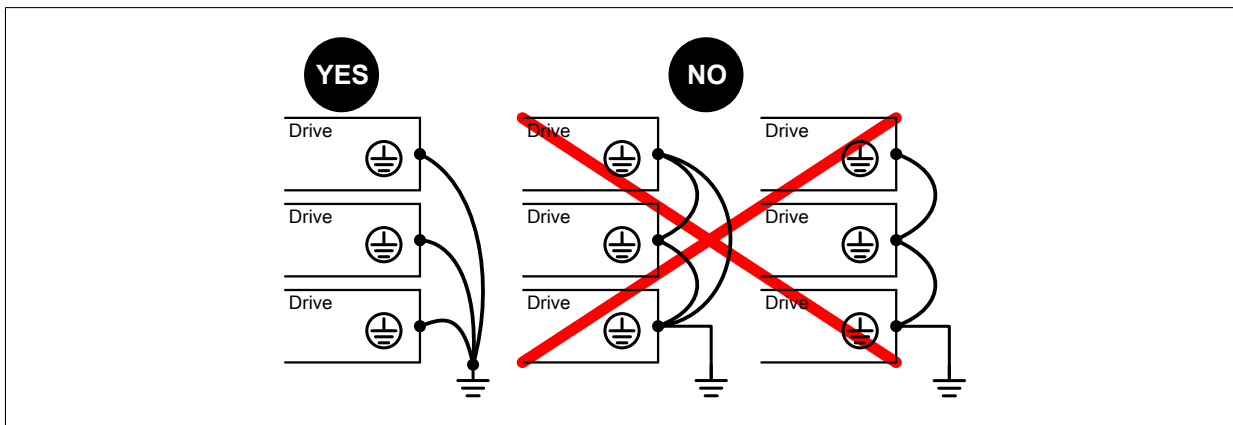
#### **Warning!**

##### **INSUFFICIENT PROTECTION AGAINST OVERCURRENT**

- Overcurrent protective devices with the required power rating must be used.
- Use the fuses listed for this inverter in [Safety data sheet ACPi P66/P76](#).
- 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 [Safety data sheet ACPi P66/P76](#).

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

- Make sure that the ground resistance value is 1  $\Omega$  or less.
- If multiple inverters are grounded, each inverter must be connected directly (see the following figure).
- 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]** (SVL) for limiting overvoltage allows the use of longer cables and reduces the output rate of the motor output **[Switching freq.]** (SFR) (see "The drive" on page 85).

### Residual current protective device

Direct current can be introduced into the protective grounding conductor. 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 must 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 58](#).

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

## Grounding the device

### Note:

#### 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 64](#)).

## 4.4.2 Instructions for cable lengths

### 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 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.

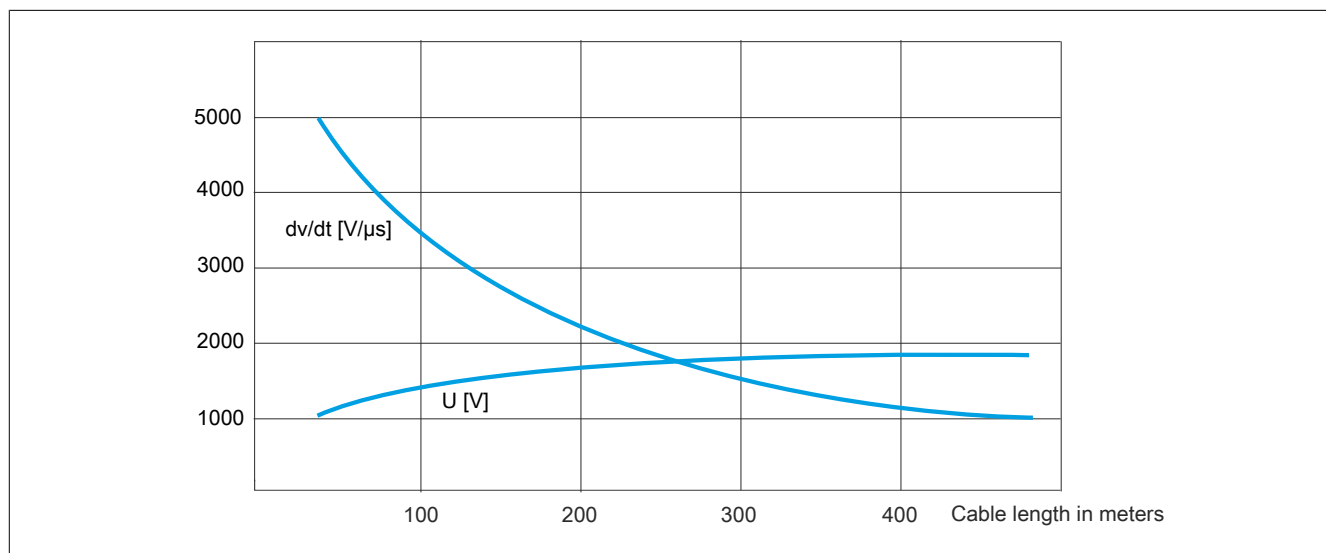
The maximum spacing is largely dependent on the motors used (insulating material), the type of motor cable used (shielded/unshielded), the cable paths (cable channels, underground cabling) as well as the options used.

### Dynamic voltage load of the motor

Overvoltages at the motor terminals result from reflection in the motor cable. If the motor cable length is greater than 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/ $\mu$ s but decreases according to the length of the motor cable.

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



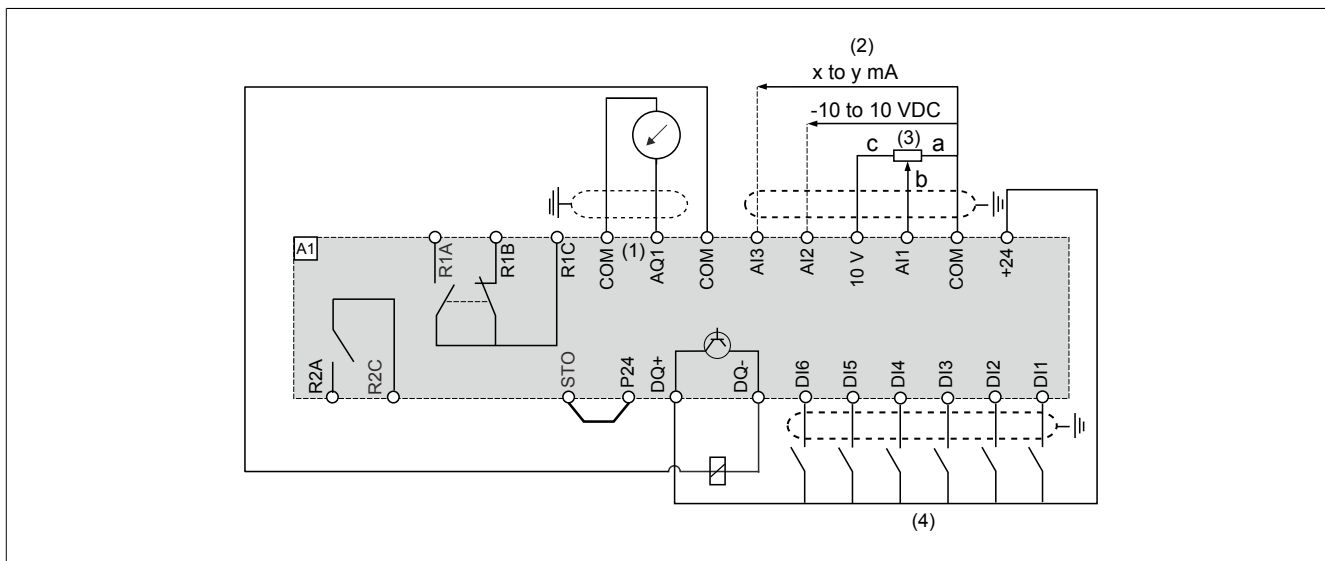
### Overview of workaround solutions

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.)

### 4.4.3 Connection diagram

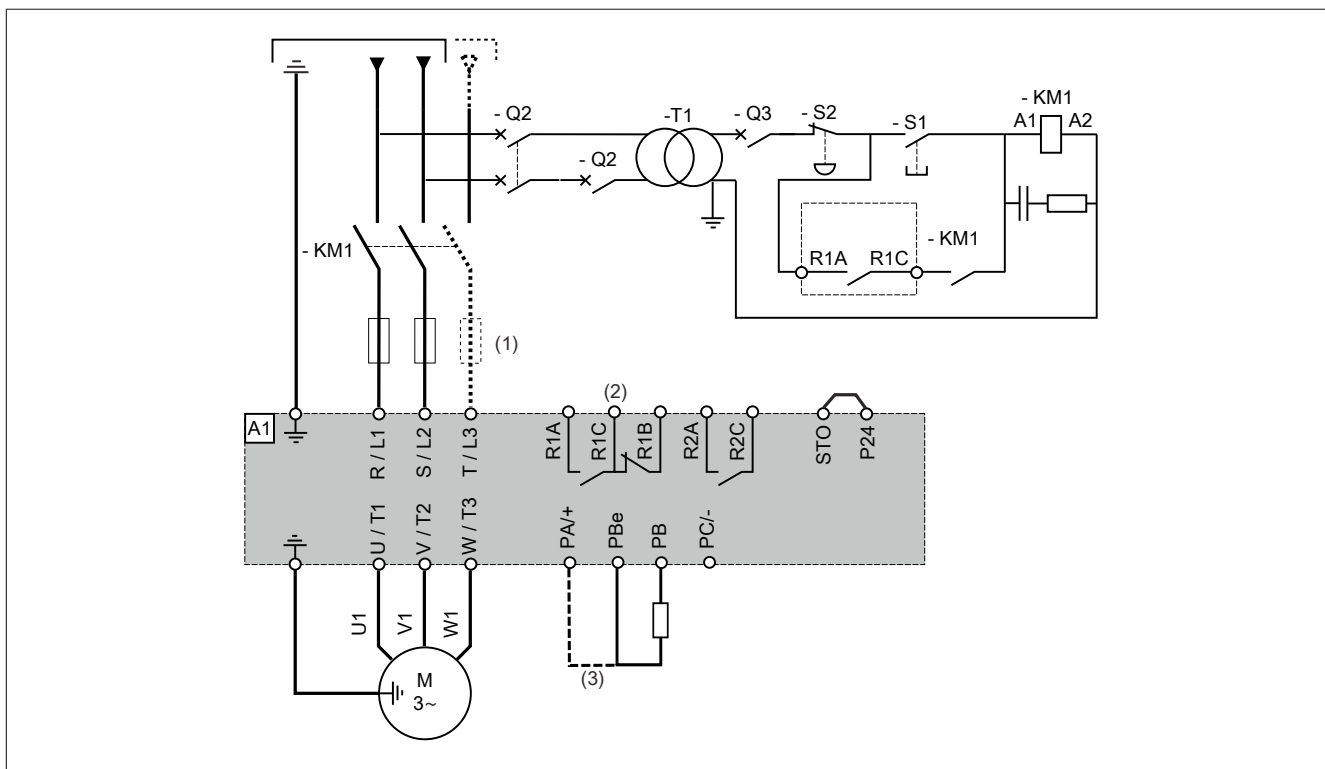
#### Control block connection diagram



- (1) Analog outputs
- (2) Analog inputs
- (3) Potentiometer (max. 10 kΩ)
- (4) Digital inputs

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

Connection diagram conforming to standards ISO13849 Category 1 and IEC/EN 61508 Safety Integrity Level SIL 1, Stop Category 0 in accordance with the standard IEC/EN 60204-1.



- (1) Line choke (if used)
- (2) Use setting "Operating state 'Fault'" of relay output R1 to switch off the product when a fault has been detected.
- (3) ACOPOSinverter P76 devices offer connection pin PBe to connect an additional braking resistor. For drives without pin PBe, the braking resistor must be connected between PB and PA/+.

### 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!

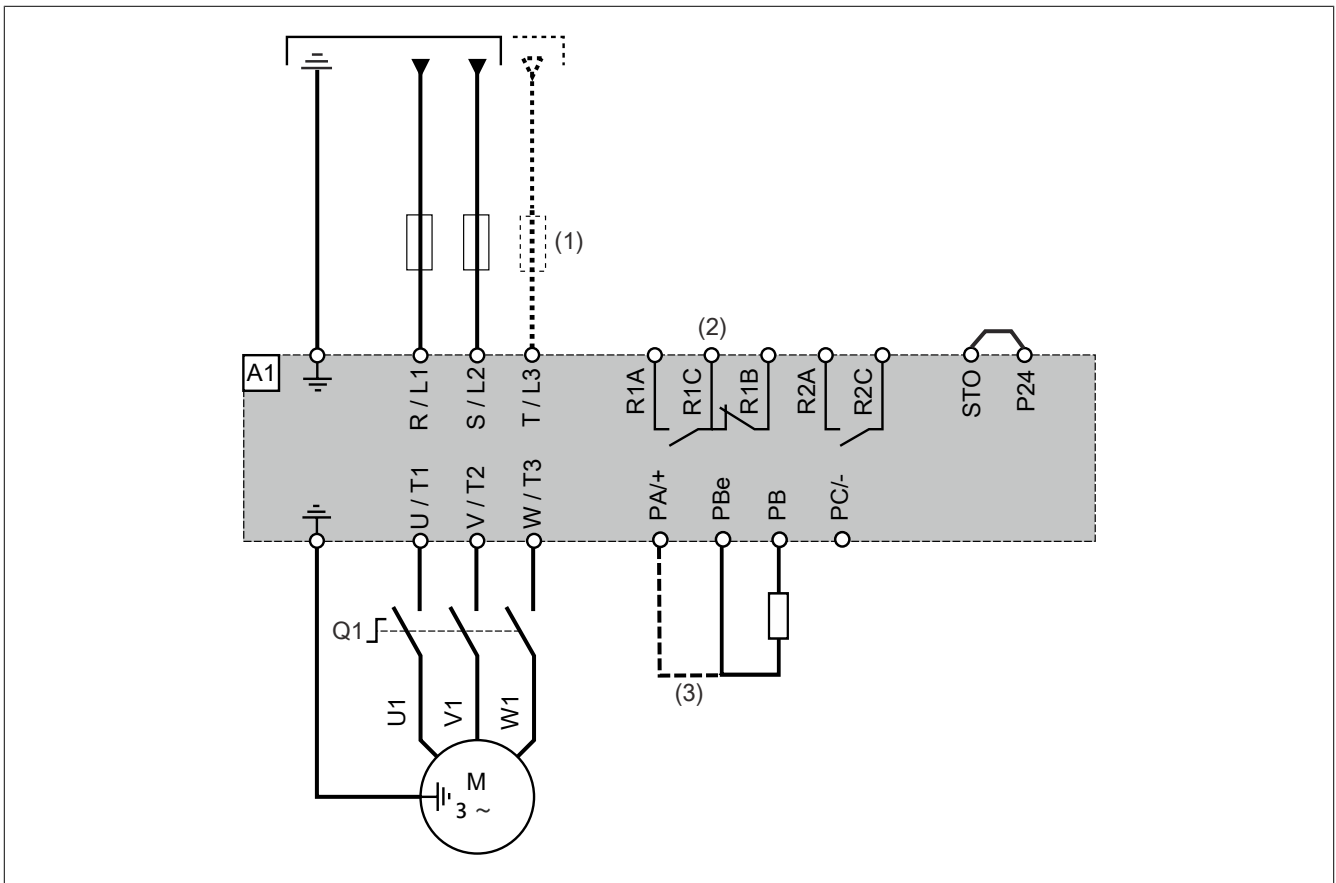
### UNANTICIPATED OPERATION OF THE EQUIPMENT OR DAMAGE TO THE EQUIPMENT

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 diagram conforming to standards EN 954-1 Category 1 and IEC/EN 61508 Safety Integrity Level SIL 1, Stop Category 0 in accordance with the standard 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.

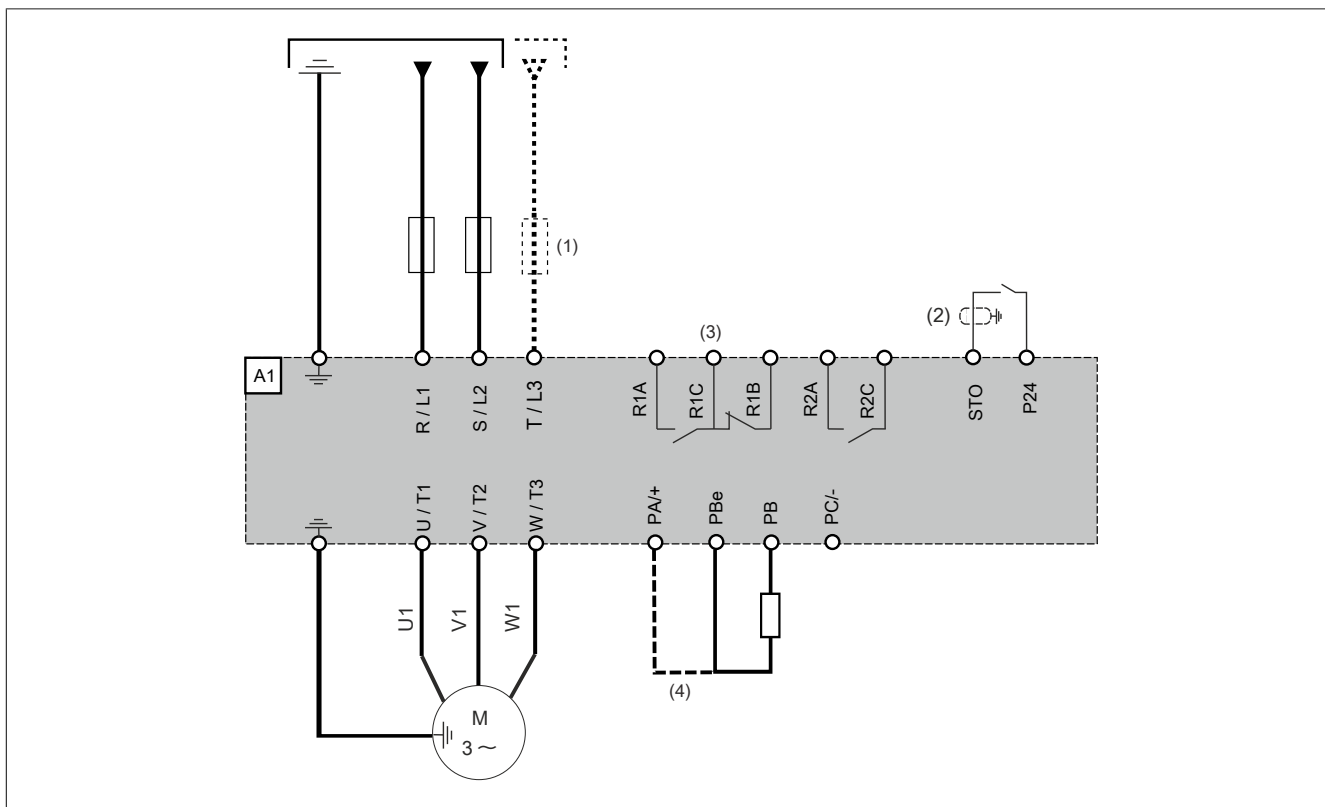
(3) ACOPOSinverter P76 devices offer connection pin PBe to connect an additional braking resistor. For drives without pin PBe, the braking resistor must be connected between PB and PA/+.

### Connection diagram without a safety module

Connection diagram conforming to standards EN 954-1 Category 2 and IEC/EN 61508 Safety Integrity Level SIL 1, Stop Category 0 in accordance with the standard 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 emergency switch-off is enabled, the power supply to the inverter is immediately interrupted and the motor stops in freewheel in compliance with category 0 of standard IEC/EN 60204-1.



(1) Line choke (if used)

(2) The shielding must be grounded at all times

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

(4) ACOPOS inverter P76 devices offer connection pin PBe to connect an additional braking resistor. For drives without pin PBe, the braking resistor must be connected between PB and PA/+.

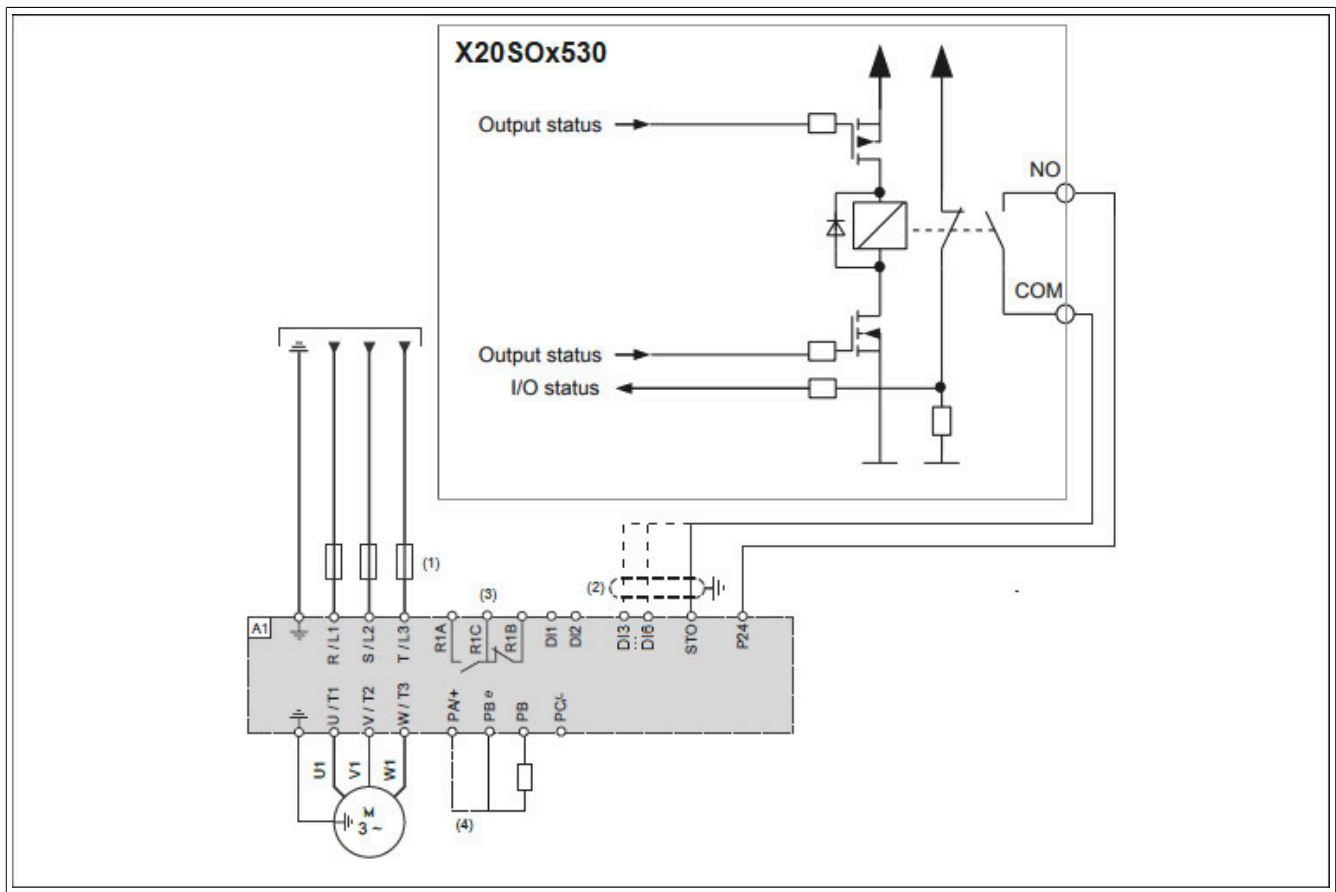
### Connection diagram with safety module

Connection diagram conforming to standards EN 954-1 Category 3 and IEC/EN 61508 Safety Integrity Level SIL 2, Stop Category 0 in accordance with the standard 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 emergency switch-off is enabled, the power supply to the inverter is immediately interrupted and the motor stops in freewheel in compliance with category 0 of standard IEC/EN 60204-1.

The control unit must be equipped with a safe switch-off output (e.g. relay of an X20SOx530). The drive only controls the motor if the input of safety function STO "Safe Torque Off" is supplied with 24 VDC. The drive's factory setting is for safety function STO to be triggered via terminal connection STO. Using ACPi SafeConfigurator, the safety function can also be configured for two-channel operation.



(1) Line choke (if used)

(2) The shielding must be grounded at all times

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

(4) ACOPOS inverter P76 devices offer connection pin PBe to connect an additional braking resistor. For drives without pin PBe, the braking resistor must be connected between PB and PA/+.

#### 4.4.4 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

**Note:****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.

## 4.4.5 Disconnecting the integrated EMC filter

### Disconnecting the 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.

### Setting


For the ACOPOSinverter P76, it is possible to use setting option "IT jumper".

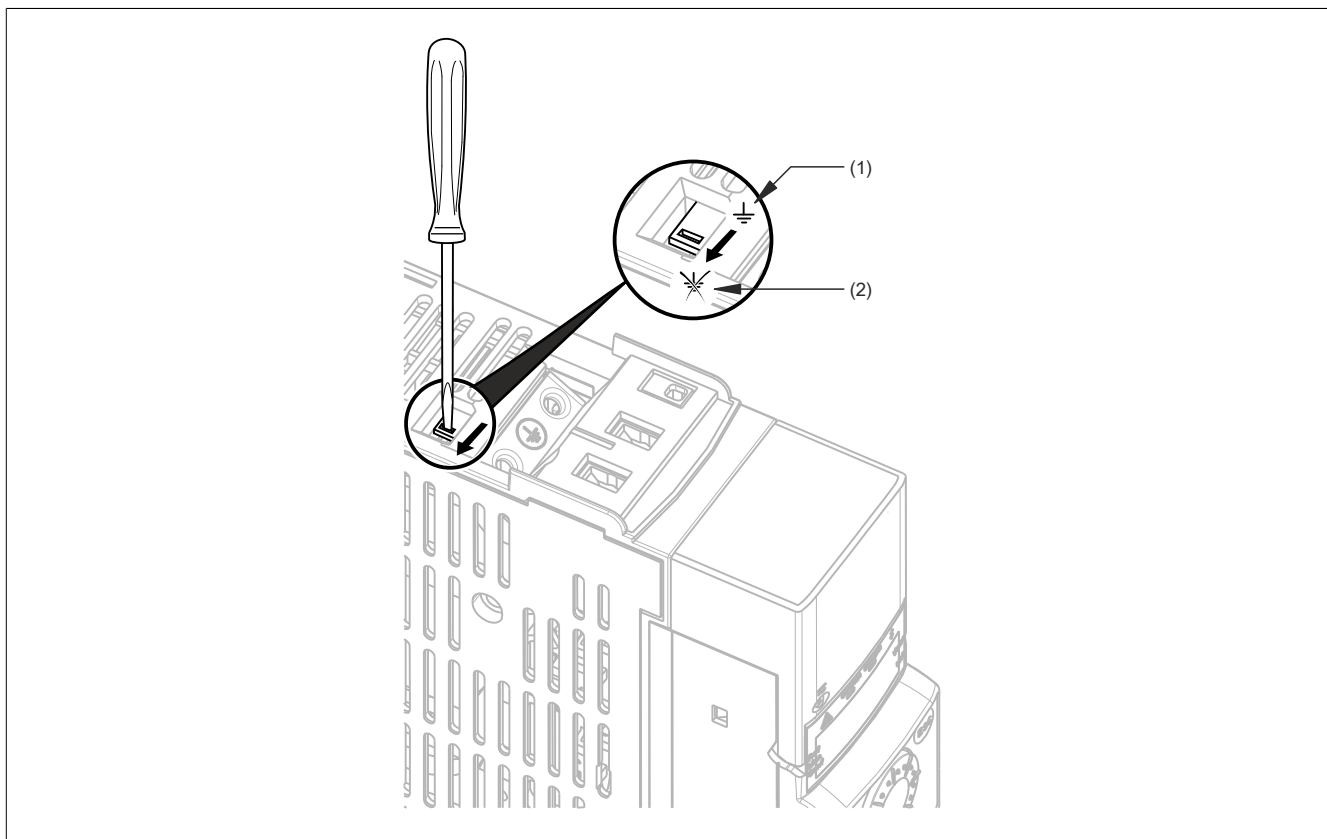
For more information about the IT jumper, see "Leakage current" on page 84.

### Tuning for inverter sizes 1 and 2

For sizes 1 and 2, the IT jumper is located on the top of the product behind the mounting screws on the GV2 circuit breaker adapter.

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


- 1) The switch is factory set to position , as shown in the detailed view (1).
- 2) To disconnect the integrated EMC filter, move the switch to position (2), as shown in the detailed view.

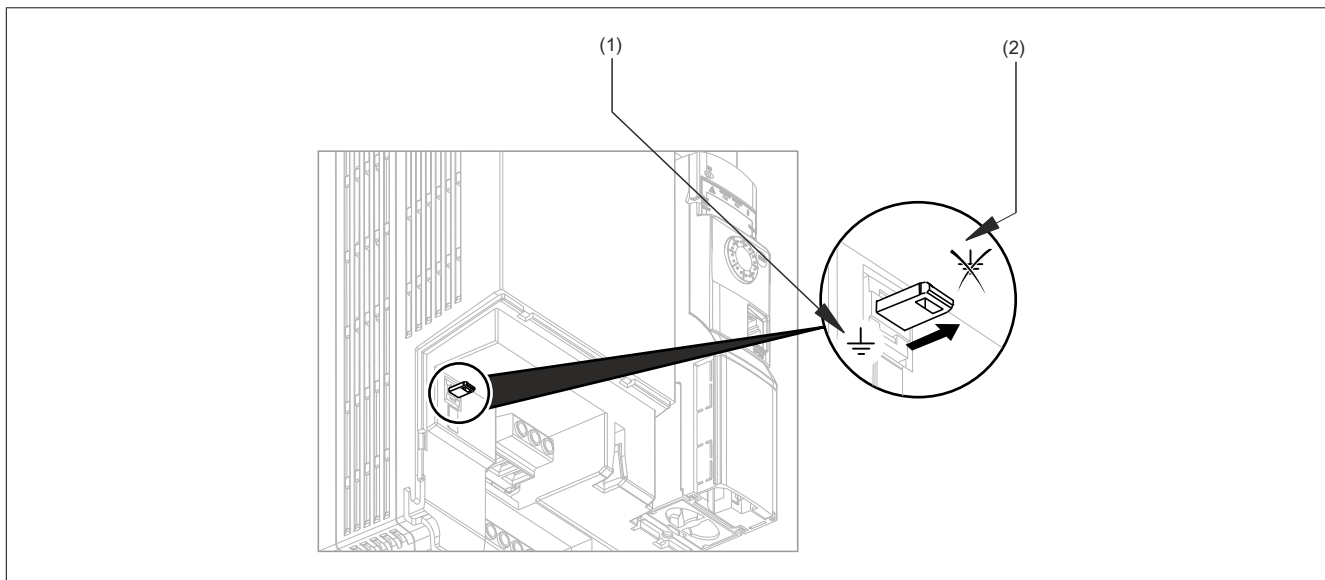


## Tuning for inverter sizes 3 and 4

For sizes 3 and 4, the IT jumper is located on the front side behind the protective cover for the power terminals (on the left, next to the input power terminals).

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

- 1) Remove the cover from the terminals.
- 2) The switch is factory set to 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 cover on the terminals.



### 4.4.6 Switch "SW1" - Configuration of the input circuit

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

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

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

## Warning!

### UNEXPECTED OPERATION OF THE EQUIPMENT

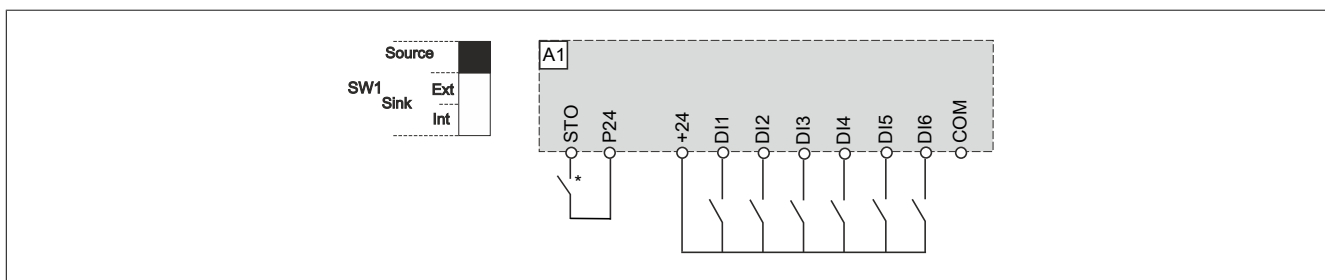
- To ensure the safe grounding of circuits, all applicable standards and regulations such as NFPA 79 and EN 60204 must be observed.

**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.

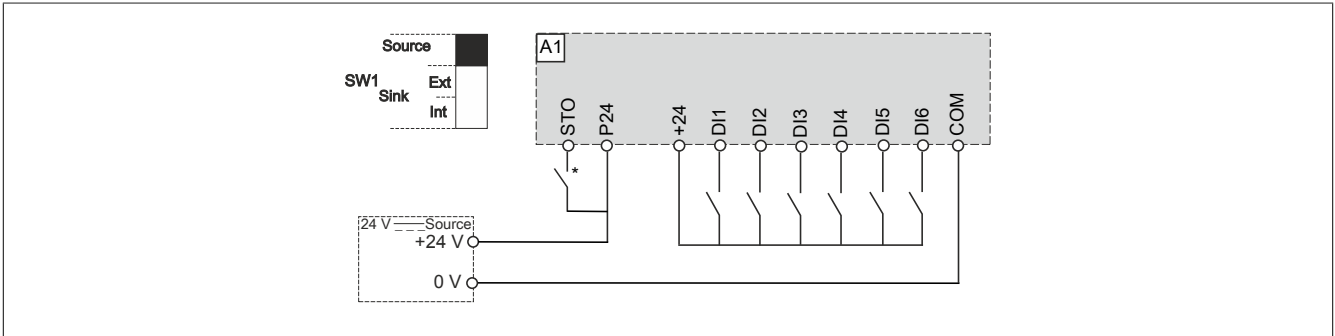
### Switch in position "Source (SRC)"



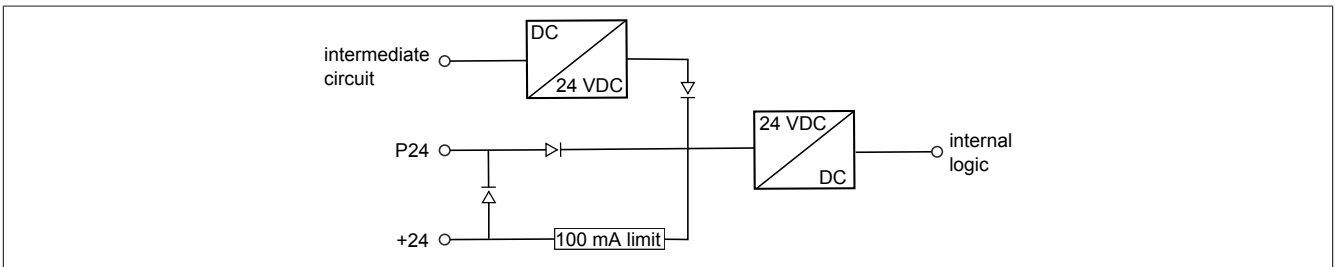
\*) Optional safety logic

## Installation

To ensure that the drive communicates in the POWERLINK network even without a supplied DC bus, the logic of the frequency inverter must be supplied redundantly. With SW1 in switch position "SRC", the following wiring variants can be used for this purpose:



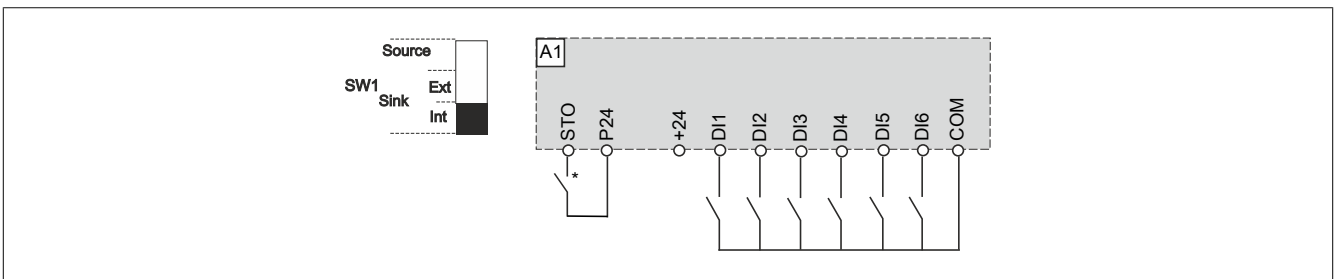
\*) Optional safety logic



### Note:

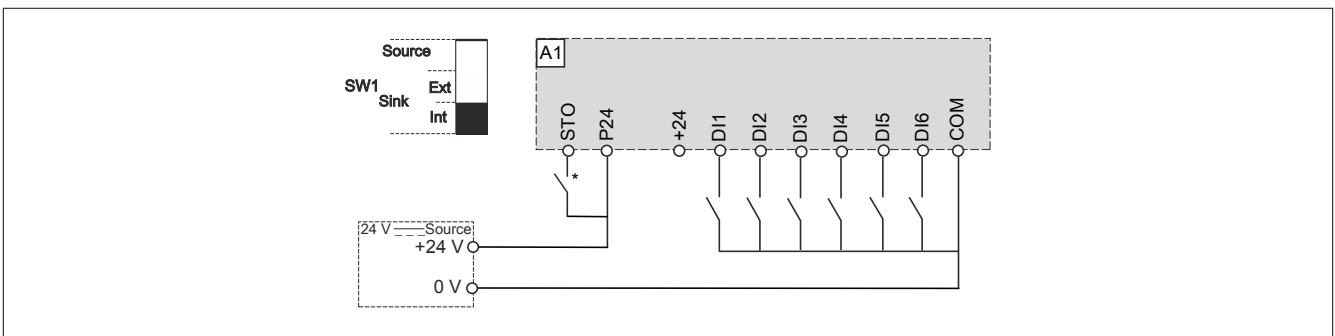
- Terminal connection "P24" should be used for the redundant power supply of the drive logic.
- Terminal connection "+24" is used exclusively to provide the required signal line. The terminal connection is limited to a maximum output current of 100 mA and ensures that the signal I/Os (e.g. DI1, DI2,...) are not overloaded.

### Switch in position "Sink int. (SKi)"



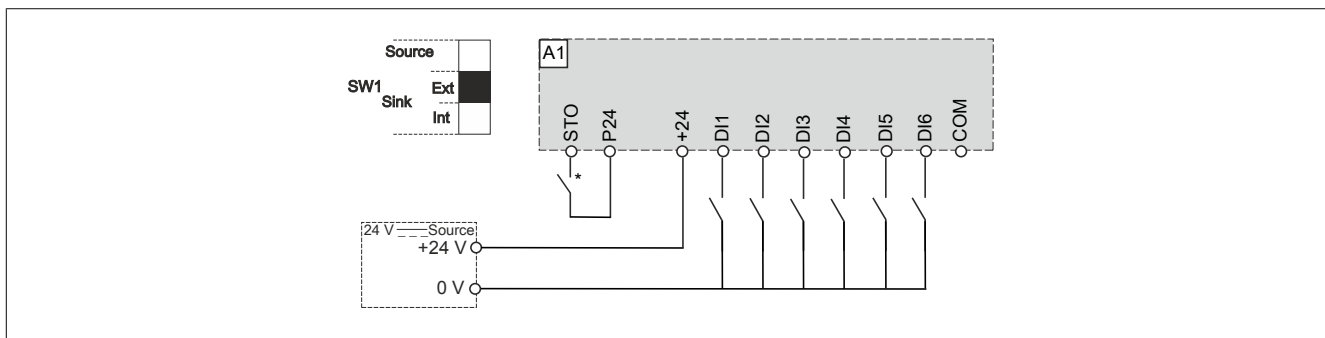
\*) Optional safety logic

To ensure that the drive communicates in the POWERLINK network even without a supplied DC bus, the logic of the frequency inverter must be supplied redundantly. With SW1 in switch position "SKi", the following wiring variants can be used for this purpose.



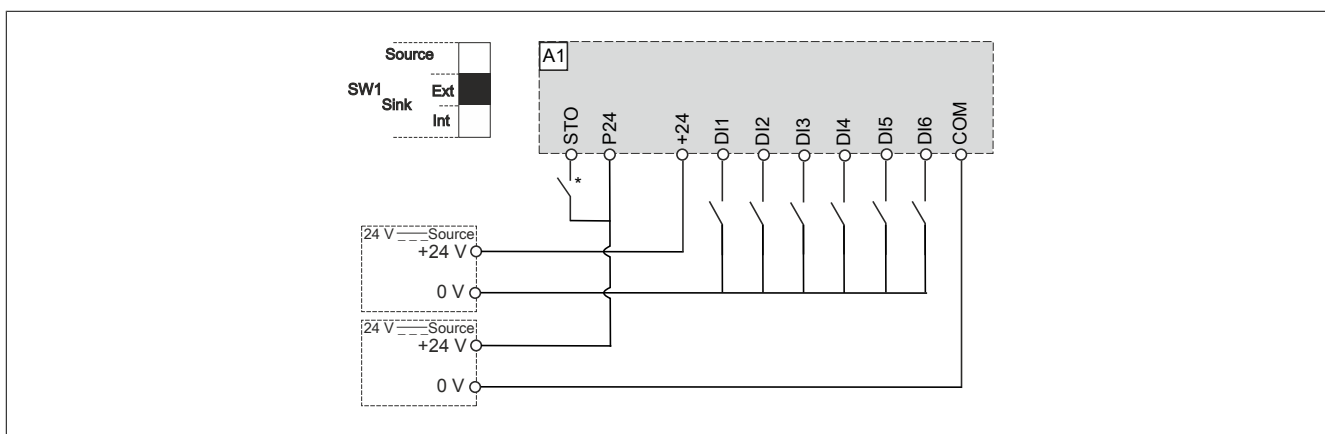
\*) Optional safety logic

### Switch in position "Sink ext. (SKe)"



\*) Optional safety logic

To ensure that the drive communicates in the POWERLINK network even without a supplied DC bus, the logic of the frequency inverter must be supplied redundantly. With SW1 in switch position "SKe", the following wiring variants can be used for this purpose.

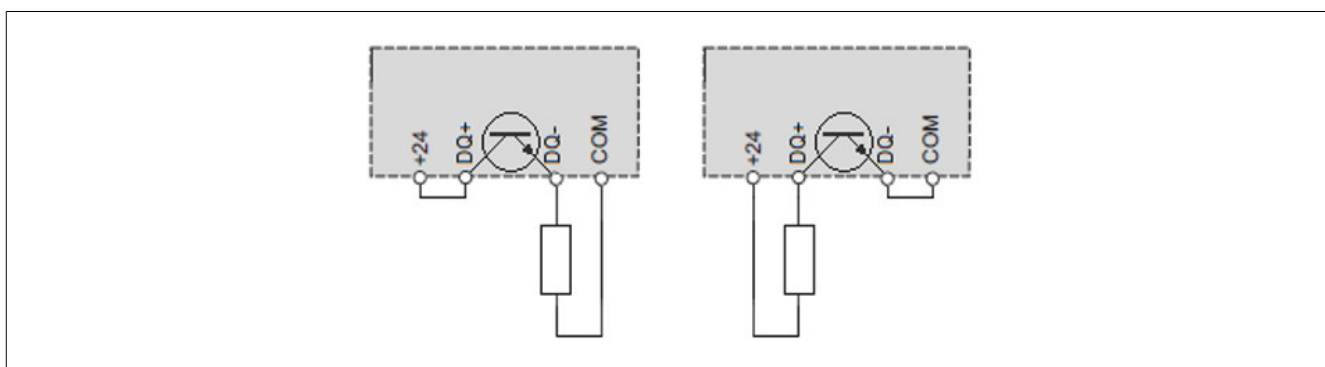


\*) Optional safety logic

### Digital output DQ1

The digital output of the ACOPOSinverter essentially consists of a collector pin "DQ+" and an emitter pin "DQ-". It works independently of the position of switch "SW1". The output wiring (sink or source) of the digital output is determined solely by the wiring of the transistor.

Wiring examples for DQ1:



## 4.4.7 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 mm<sup>2</sup> (8 AWG) for copper cables (CU) and 16 mm<sup>2</sup> (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

The tightening torque is from 0.7 to 0.8 Nm (6.2 to 7.1 lb.in).

### Size 1

Power supply terminals and output terminals

ACOPOSinverter P76	Power supply terminals (L1, L2, L3)			Output terminals (U, V, W)		
	Cable cross section		Tightening torque	Cable cross section		Tightening torque
	Min.	Max. <sup>1)</sup>	Nominal value	Min.	Max. <sup>1)</sup>	Nominal value
	mm <sup>2</sup> (AWG)	mm <sup>2</sup> (AWG)	Nm (lb.in)	mm <sup>2</sup> (AWG)	mm <sup>2</sup> (AWG)	Nm (lb.in)
8176S200018.00-000, 8176S200037.00-000, 8176S200055.00-000, 8176S200075.00-000	1.5 (14)	4 (10)	0.6 (5.3)	1.5 (14)	1.5 (14)	0.7 to 0.8 (6.2 to 7.1)
8176T400037.00-000, 8176T400055.00-000, 8176T400075.00-000, 8176T400110.00-000, 8176T400150.00-000	1.5 (14)	4 (10)	0.6 (5.3)	1.5 (14)	2.5 (12)	0.7 to 0.8 (6.2 to 7.1)

1) Maximum permitted terminal cross section

### Size 2

Power supply terminals and output terminals

ACOPOSinverter P76	Power supply terminals (L1, L2, L3)			Output terminals (U, V, W)		
	Cable cross section		Tightening torque	Cable cross section		Tightening torque
	Min.	Max. <sup>1)</sup>	Nominal value	Min.	Max. <sup>1)</sup>	Nominal value
	mm <sup>2</sup> (AWG)	mm <sup>2</sup> (AWG)	Nm (lb.in)	mm <sup>2</sup> (AWG)	mm <sup>2</sup> (AWG)	Nm (lb.in)
8176S200110.00-000	2.5 (12)	4 (10)	0.6 (5.3)	1.5 (14)	1.5 (14)	0.7 to 0.8 (6.2 to 7.1)
8176S200150.00-000	2.5 (10)	4 (10)	0.6 (5.3)	1.5 (14)	1.5 (14)	0.7 to 0.8 (6.2 to 7.1)
8176S200220.00-000	4 (10)	4 (10)	0.6 (5.3)	1.5 (14)	1.5 (14)	0.7 to 0.8 (6.2 to 7.1)
8176T400220.00-000, 8176T400300.00-000	1.5 (14)	4 (10)	0.6 (5.3)	1.5 (14)	2.5 (12)	0.8 (7.1)
8176T400400.00-000	2.5 (12)	4 (10)	0.6 (5.3)	1.5 (14)	2.5 (12)	0.8 (7.1)

1) Maximum permitted terminal cross section

### Size 3

Power supply terminals and output terminals

ACOPOSinverter P76	Power supply terminals (L1, L2, L3)			Output terminals (U, V, W)		
	Cable cross section		Tightening torque	Cable cross section		Tightening torque
	Min.	Max. <sup>1)</sup>	Nominal value	Min.	Max. <sup>1)</sup>	Nominal value
	mm <sup>2</sup> (AWG)	mm <sup>2</sup> (AWG)	Nm (lb.in)	mm <sup>2</sup> (AWG)	mm <sup>2</sup> (AWG)	Nm (lb.in)
8176T400550.00-000	4 (10)	16 (6)	1.2 to 1.5 (10.6 to 13.3)	2.5 (12)	16 (6)	1.2 to 1.5 (10.6 to 13.3)
8176T400750.00-000	6 (8)	16 (6)	1.2 to 1.5 (10.6 to 13.3)	2.5 (10)	16 (6)	1.2 to 1.5 (10.6 to 13.3)

1) Maximum permitted terminal cross section

### Size 4

Power supply terminals and output terminals

ACOPOSinverter P76	Power supply terminals (L1, L2, L3)			Output terminals (U, V, W)		
	Cable cross section		Tightening torque	Cable cross section		Tightening torque
	Min.	Max. <sup>1)</sup>	Nominal value	Min.	Max. <sup>1)</sup>	Nominal value
	mm <sup>2</sup> (AWG)	mm <sup>2</sup> (AWG)	Nm (lb.in)	mm <sup>2</sup> (AWG)	mm <sup>2</sup> (AWG)	Nm (lb.in)
8176T401100.00-000	10 (8)	16 (6)	1.2 to 1.5 (10.6 to 13.3)	6 (8)	16 (6)	1.2 to 1.5 (10.6 to 13.3)
8176T401500.00-000	16 (6)	16 (6)	1.2 to 1.5 (10.6 to 13.3)	6 (8)	16 (6)	1.2 to 1.5 (10.6 to 13.3)

1) Maximum permitted terminal cross section

#### 4.4.8 Wiring the power unit

### Danger!

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

Check that the cable has been installed correctly!

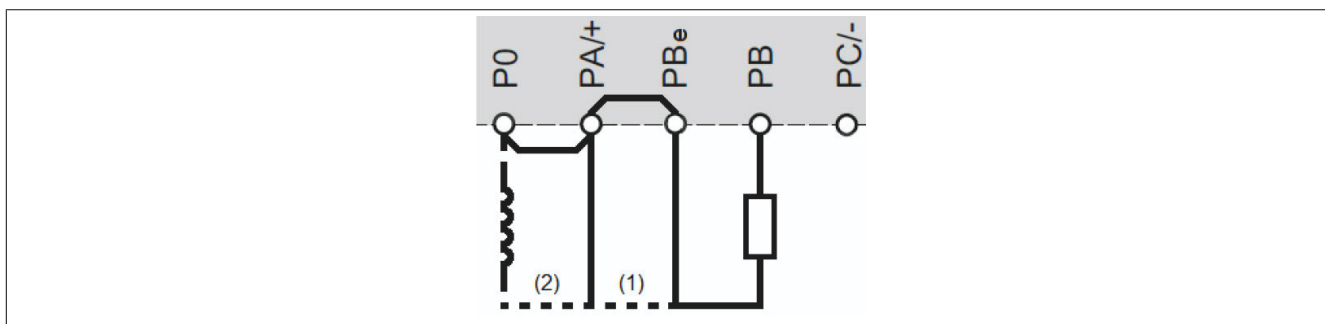
Failure to follow these instructions will result in death or serious injury.

#### Power terminal functions

Terminal	Function	ACOPOSinverter P76
±	Ground terminal	All power ratings and sizes
R/L1 - S/L2/N	Power supply	ACOPOSinverter P76 1-phase
R/L1 - S/L2 - T/L3		ACOPOSinverter P76 3-phase
PB	Additional braking resistor	All power ratings and sizes
PBe	Additional braking resistor	All power ratings and sizes
PA/+	+ pin, DC bus	All power ratings and sizes
PC/-	- pin, DC bus	All power ratings and sizes
U/T1 - V/T2 - W/T3	Motor outlet	All power ratings and sizes

#### Difference between P0 and PBe

ACOPOSinverter devices provide several pins that allow direct access to the DC bus. In addition to standard pins PA/+, PC/- and PB, some inverters provide terminal connection P0 others provide terminal connection PBe.



#### (1) Depending on the design of the drive, pin PBe is offered:

It makes it possible to implement a braking resistor between PB and PBe.

For inverters without pin PBe, the braking resistor must be placed between PB and PA/+.

#### (2) Depending on the design of the drive, pin P0 is offered:

The connection pin P0 makes it possible to install an additional EMC filter. To do so, the jumper between P0 and PA/+ must be removed and replaced, for example, by a PFC choke.

This measure for attenuating harmonics in the supply network is only required in very rare cases. Therefore, the braking resistor is also permitted to be connected between pin PB and pin P0.

### Notice!

If pin P0 is used to connect the braking resistor, make sure that the removable jumper is mounted between pin P0 and pin PA/+. The contact resistance between P0 and PA/+ must be as low as possible.

#### 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 "[Braking resistors](#)" on page 430.

For additional information about the minimum values of the resistors to be connected, see chapter "[Technical data](#)" on page 13.

## Accessing the terminals for sizes 1 and 2

### **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".

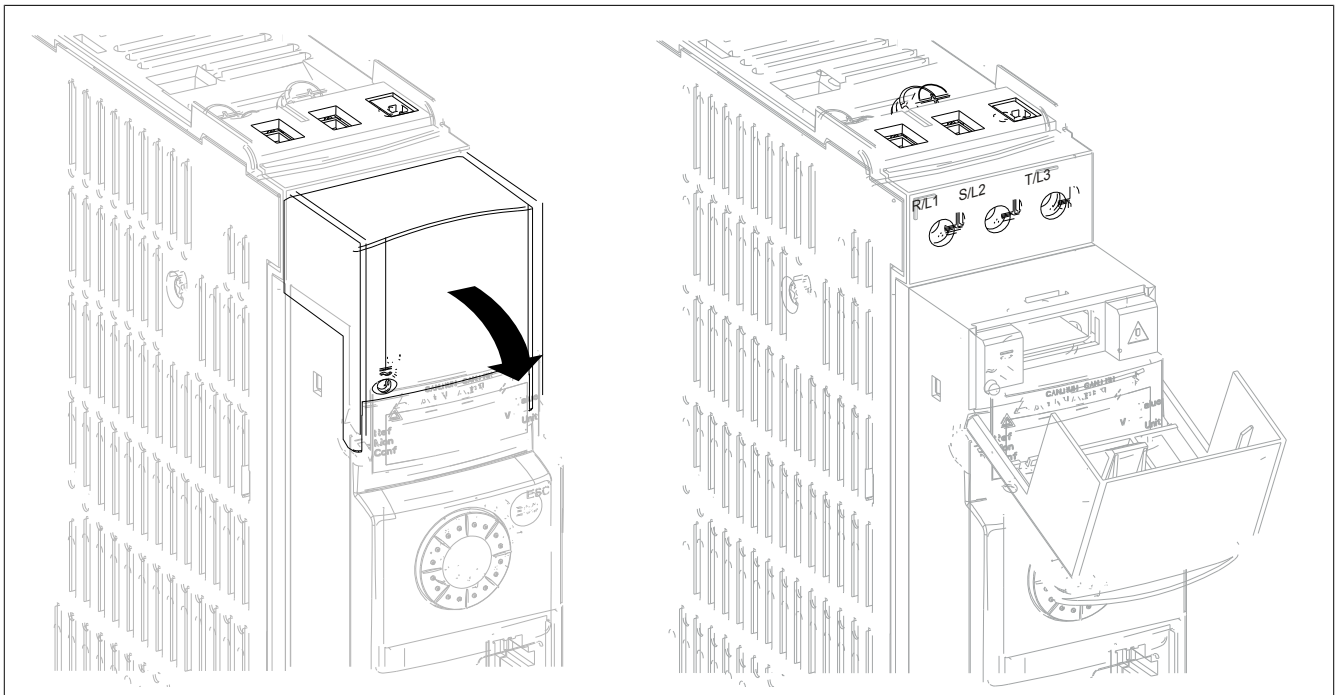
Failure to follow these instructions will result in death or serious injury.

### **Danger!**

#### **HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH**

Once you have wired the power terminals, close the terminal cover.

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



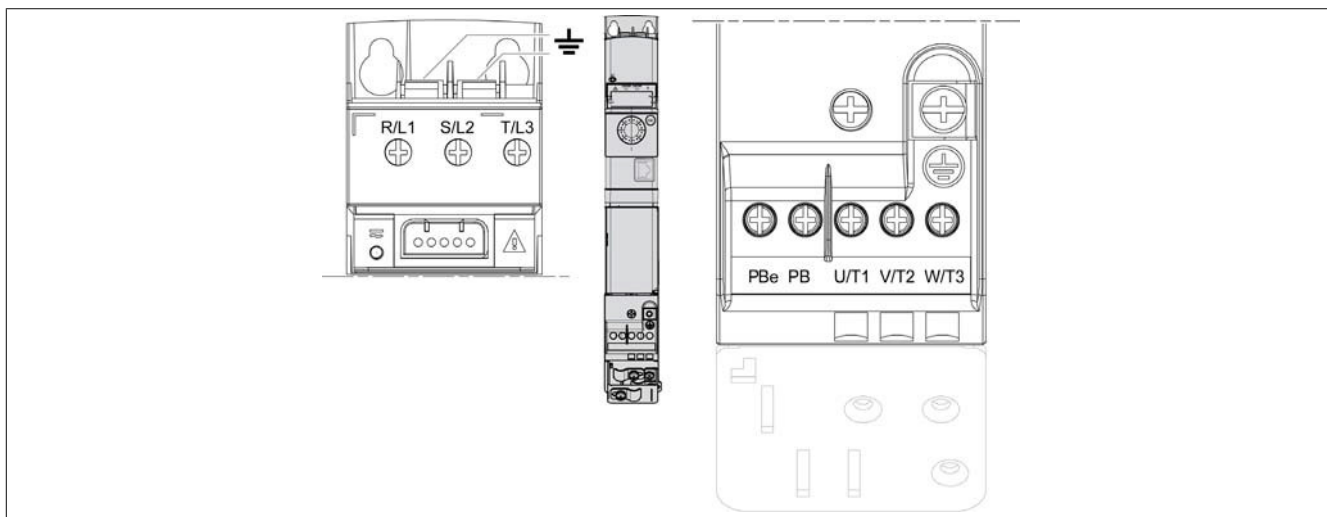
To access the terminals for size 1 and 2 inverters, follow the instructions below.

- 1) Pull out and remove the wiring cover manually.
- 2) The motor and braking resistor terminals are located on the bottom of the inverter.

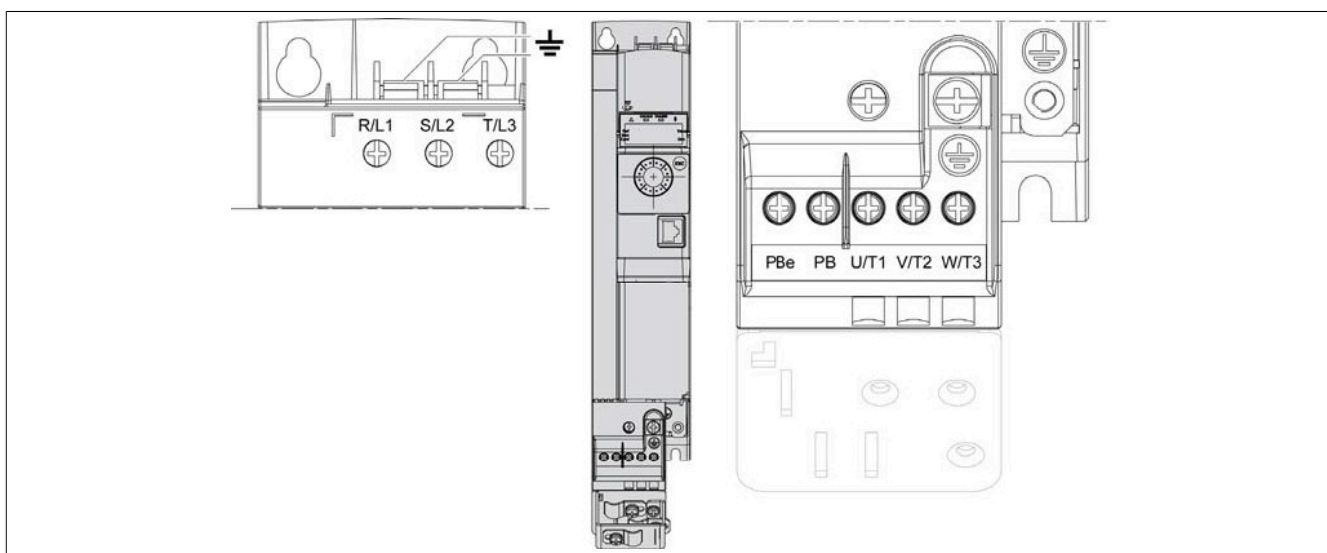
## Accessing the braking resistor terminals for sizes 1 and 2

Access to the braking resistor terminals is protected by means of breakable plastic components. Remove these plastic components using a screwdriver.

### Arrangement of power terminals for size 1



### Arrangement of power terminals for size 2



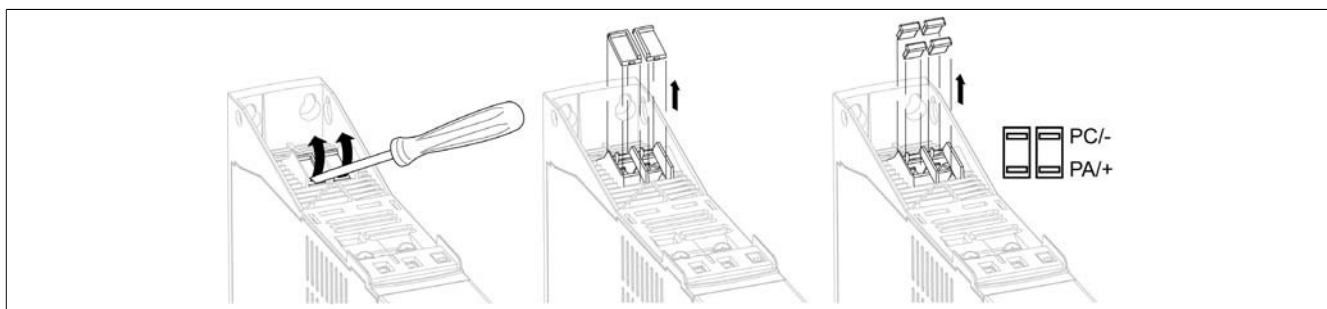
### Accessing the DC bus terminals for sizes 1 and 2

#### **Danger!**

#### **DANGER DUE TO ELECTRIC SHOCK, FLASH ARC OR EXPLOSION**

- To remove the protective covers from the DC male connectors, use a screwdriver instead of a precision measuring instrument or scissors.
- If the DC bus terminals are not used, the plastic protective covers provided with the inverter for the DC buses should be placed back on the inverter.

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



To access the DC bus terminals, proceed as described below:

- 1) Use a screwdriver to break the plastic protectors.
- 2) Remove the protectors.
- 3) Remove the plastic protectors from the terminals.

**Note:**

Plastic protectors should be used to protect unconnected DC bus terminals. This ensures that the inverter's IP20 protection is maintained. If the plastic protectors are lost, replacement parts can be ordered for them.

**Accessing the terminals for sizes 3 and 4**

**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.

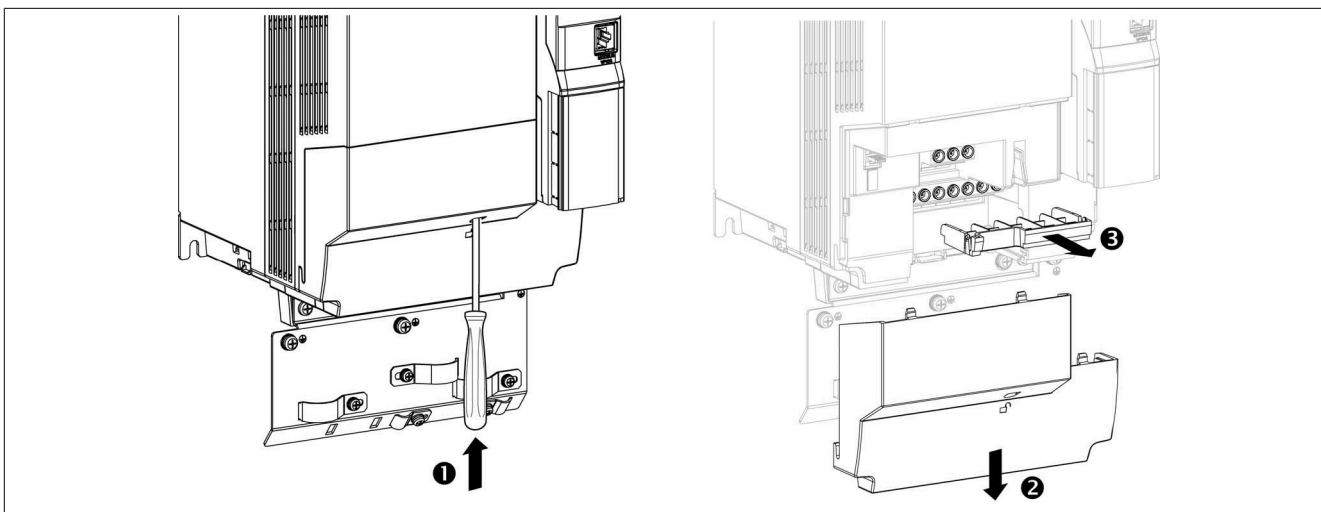
**Danger!**

**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.

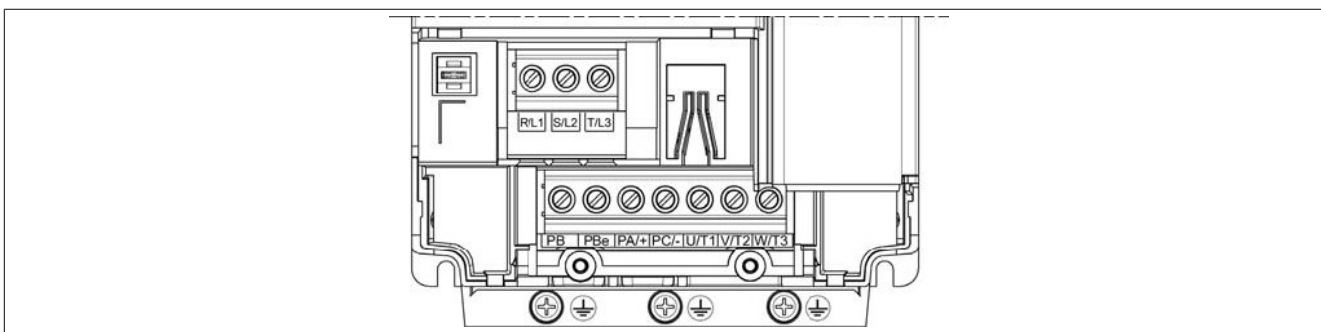
The power, motor and braking resistor terminals are located on the bottom of the inverter.

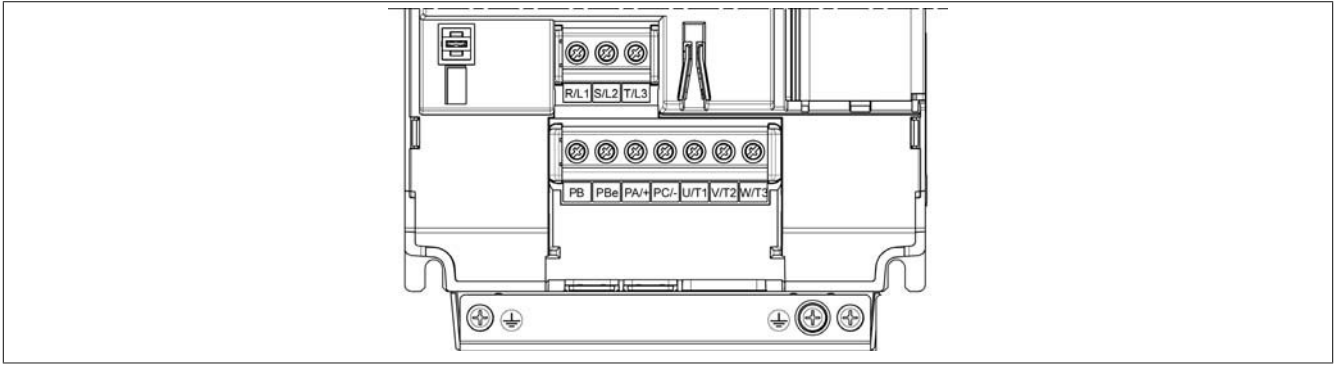


To access the terminals for size 3 and 4 inverters, follow the instructions below:

- 1) Break the safety clip using a screwdriver.
- 2) Remove the wiring cover.
- 3) Remove the cover from the terminals.

**Arrangement of power terminals for size 3**



**Arrangement of power terminals for size 4**

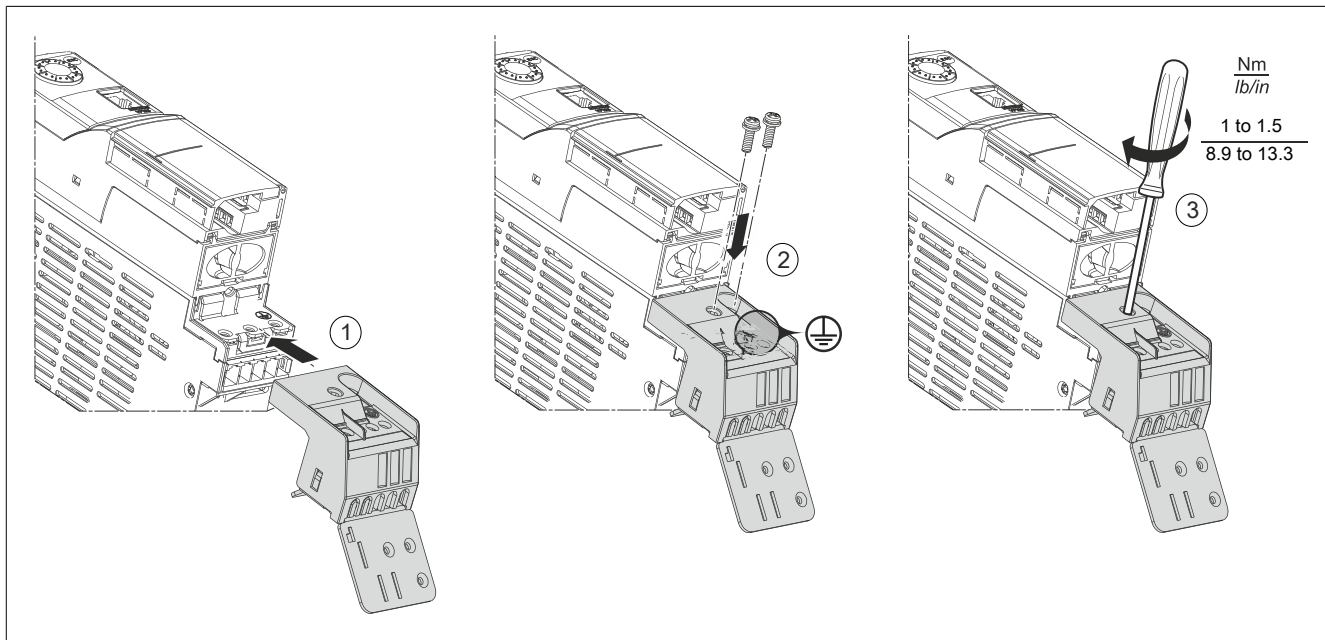
#### 4.4.9 Mounting the EMC plate assembly

##### Installation of the assembly consisting of output connector and EMC plate for sizes 1 and 2

The EMC plate, the plug-in output connection terminal and the brake resistor terminal are all inseparably linked. The input terminals are located on the top of the inverter.

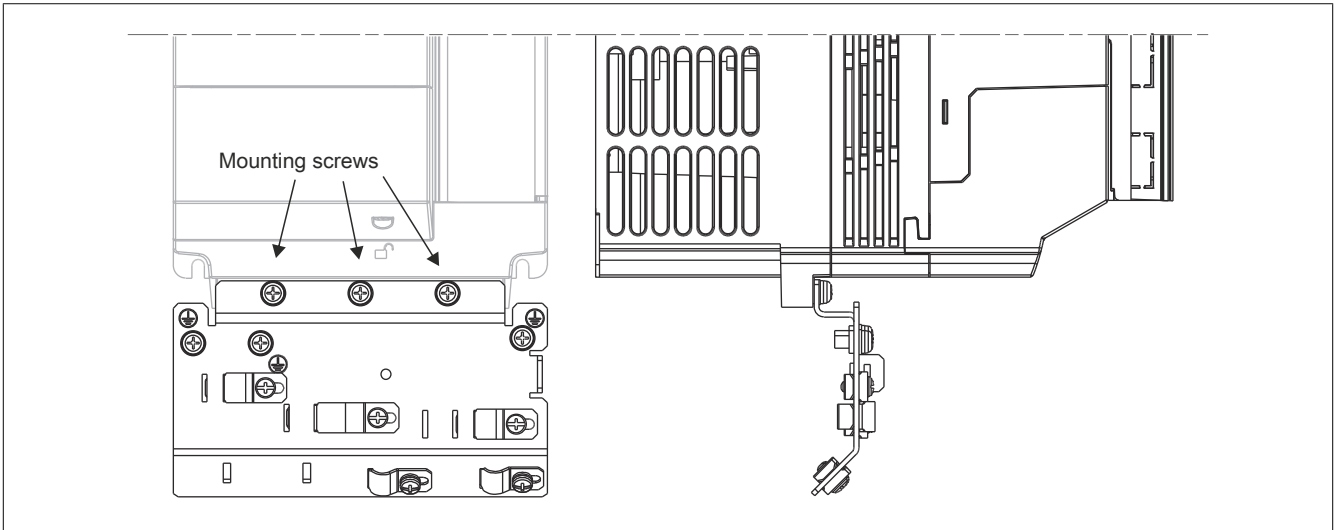
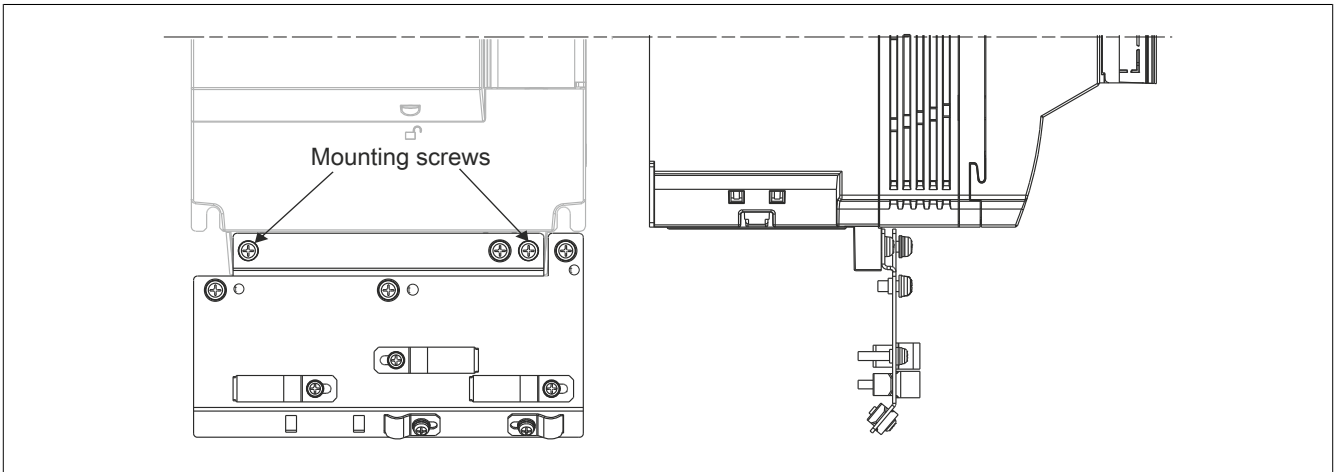
#### Note:

For wiring purposes, it is irrelevant whether the connection is mounted on the inverter or not.

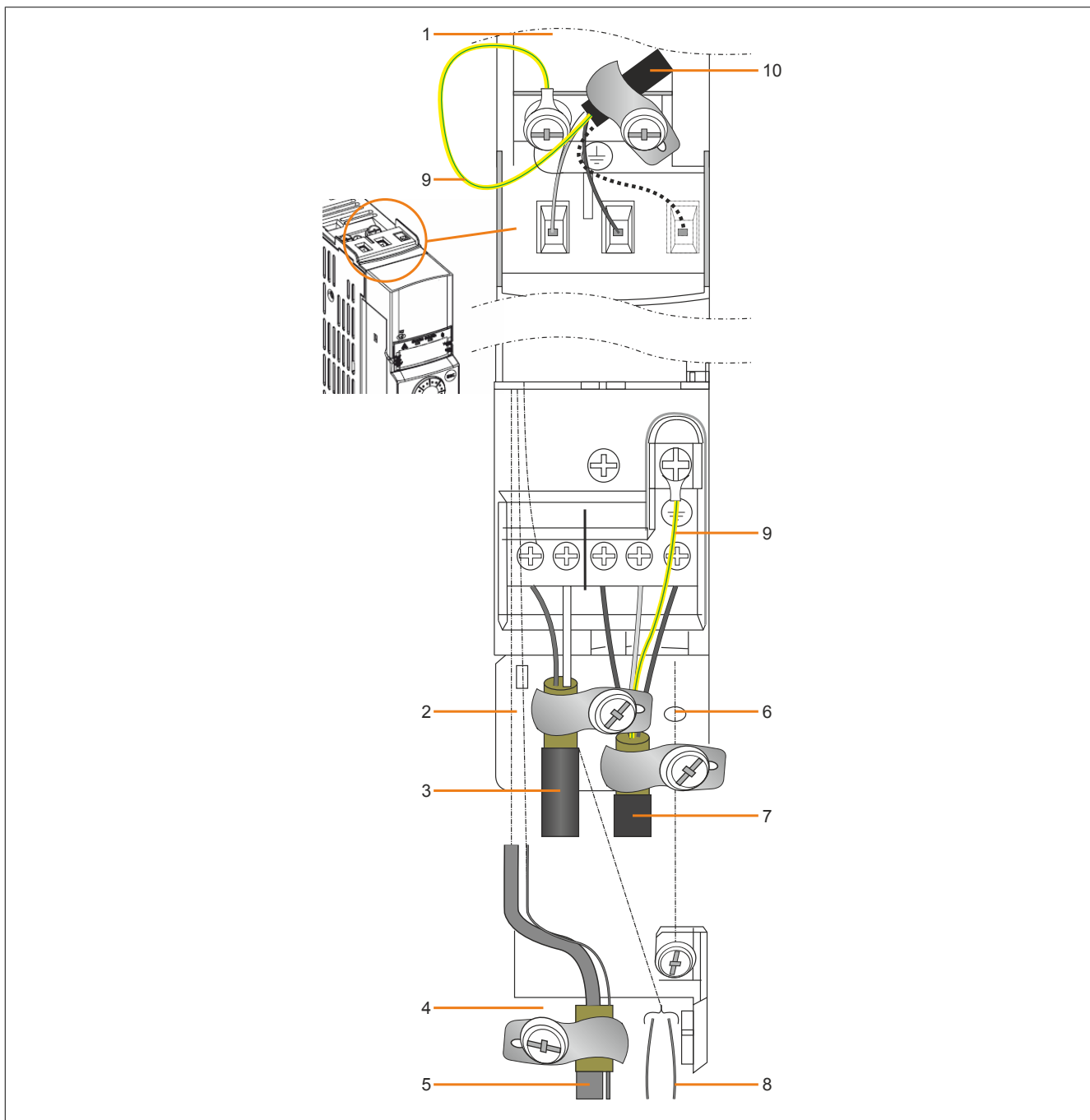


To install the plug-in output connection, following the instructions below:

- 1) Mount the output power terminal.
- 2) Insert the mounting and ground screws (Bit: Type 2 plus or minus SH screwdriver).
- 3) Connect the brake (if used).
- 4) Connect the motor and ground cable.

**Installation of the assembly consisting of output connector and EMC plate for size 3****Installation of the assembly consisting of output connector and EMC plate for size 4**

## Laying the EMC plate cable



- 1) ACOPOSinverter P76
- 2) Grounded, steel-sheet EMC plate
- 3) Shielded cable for connecting the braking resistor (if used). This shield must be uninterrupted, and any intermediate terminal blocks must be installed on the EMC plate.
- 4) EMC plate for the controller.
- 5) Shielded control lines and lines to input-side connection of safety function STO.
- 6) Assembly drill holes for the EMC plate for the controller.
- 7) Shielded motor cable, shield grounded at both ends. This shield must be uninterrupted, and any intermediate terminal blocks must be installed on the EMC plate.
- 8) Non-shielded cables for relay contact output.
- 9) Protection ground connection.
- 10) Unshielded cable for power supply to the inverter.

#### 4.4.10 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 actions 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 ground cables. The line cross section must be at least 10 mm <sup>2</sup> (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 large surface areas of the shield on both sides.	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 lines in the following cases: wide-area installations, different power 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 mm <sup>2</sup> (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.	

**Note:**

**If an additional input filter is used, it must be installed as close as possible to the inverter and connected directly to the mains via an unshielded cable.**

#### 4.4.11 Electrical data for the control terminals

The following tables describe the terminal block connections of the control unit.

## 4.4.11.1 Digital inputs and outputs

Pin	Short description	Key data
+24	Power supply for digital inputs and outputs	Power supply from an internal source (see section "Switch "SW1" - Configuration of the input circuit" on page 61). Power supply: 24 VDC (-15% to +20%) Maximum output current: 100 mA
DI1 DI2 DI3 DI4	Digital input 1, 2, 3, 4 • 24 VDC	Standard inputs that can be switched to sink or source mode via SW1 (see section "Switch "SW1" - Configuration of the input circuit" on page 61).  Switching voltage: 24 VDC ( $\pm 25\%$ )
DI5	Digital input 5 • 24 VDC (high-speed)	Impedance: 3.5 k $\Omega$ Filter time: < 1 ms Response time: < 10 ms (8 ms at stop)
DI6	Digital input 6 • 24 VDC • PTC	<b>Source mode</b> Switching characteristics: • TRUE at > 11 VDC • FALSE at < 5 VDC  <b>Sink mode</b> Switching characteristics: • TRUE at < 10 VDC • FALSE at > 16 VDC  <b>DI5 properties</b> Input can be used as a pulse input. Max. input frequency: 20 000 Hz  <b>DI6 properties</b> Input can be switched to PTC mode by means of SW2 to enable detection of e.g. motor over-heating by means of a PTC sensor (PTC "positive temperature coefficient").  <b>PTC mode</b> Switching characteristics: • TRUE at > 3 k $\Omega$ • FALSE at < 1.8 k $\Omega$  Short-circuit detection: At < 50 $\Omega$
DQ+ DQ-	Digital output 1 • 24 VDC	Digital output (floating) DQ+: Switching voltage (collector) DQ-: Reference potential (emitter)  Refresh rate: 2 ms Permissible switching capacity with resistive load: Max. 100 mA, max. 30 VDC
R1A R1B R1C R2A R2C	Relay 1, 2 • 24 VDC • 230 VAC	Relay (floating) RxA: Normally open contact (NO) RxB: Normally closed contact (NC) RxC: Reference potential (COM "common")  Refresh rate: 2 ms Service life (number of switching operations): • 100,000 at max. load • 1,000,000 at 1 A  Minimum switching capacity: 5 mA at 24 VDC  <b>R1 properties</b> Permissible switching capacity with resistive load: • Max. 3 A • Max. 30 VDC • Max. 250 VAC (OVC II) Permissible switching capacity with inductive load ( $\cos \varphi = 0.4$ and $L/R = 7$ ms): • Max. 2 A • Max. 30 VDC • Max. 250 VAC (OVC II)  <b>R2-properties</b> Permissible switching capacity with resistive load: • Max. 5 A • Max. 30 VDC • Max. 250 VAC (OVC II)  Permissible switching capacity with inductive load ( $\cos \varphi = 0.4$ and $L/R = 7$ ms): • Max. 2 A • Max. 30 VDC • Max. 250 VAC (OVC II)

Pin	Short description	Key data
		<p><b>Notice!</b></p> <p><b>Inductive load:</b></p> <p>When switching inductive loads, an additional contactor may have to be implemented, which can reduce the inductively stored energy and protect the logic from voltage peaks.</p>

#### 4.4.11.2 Analog inputs and outputs

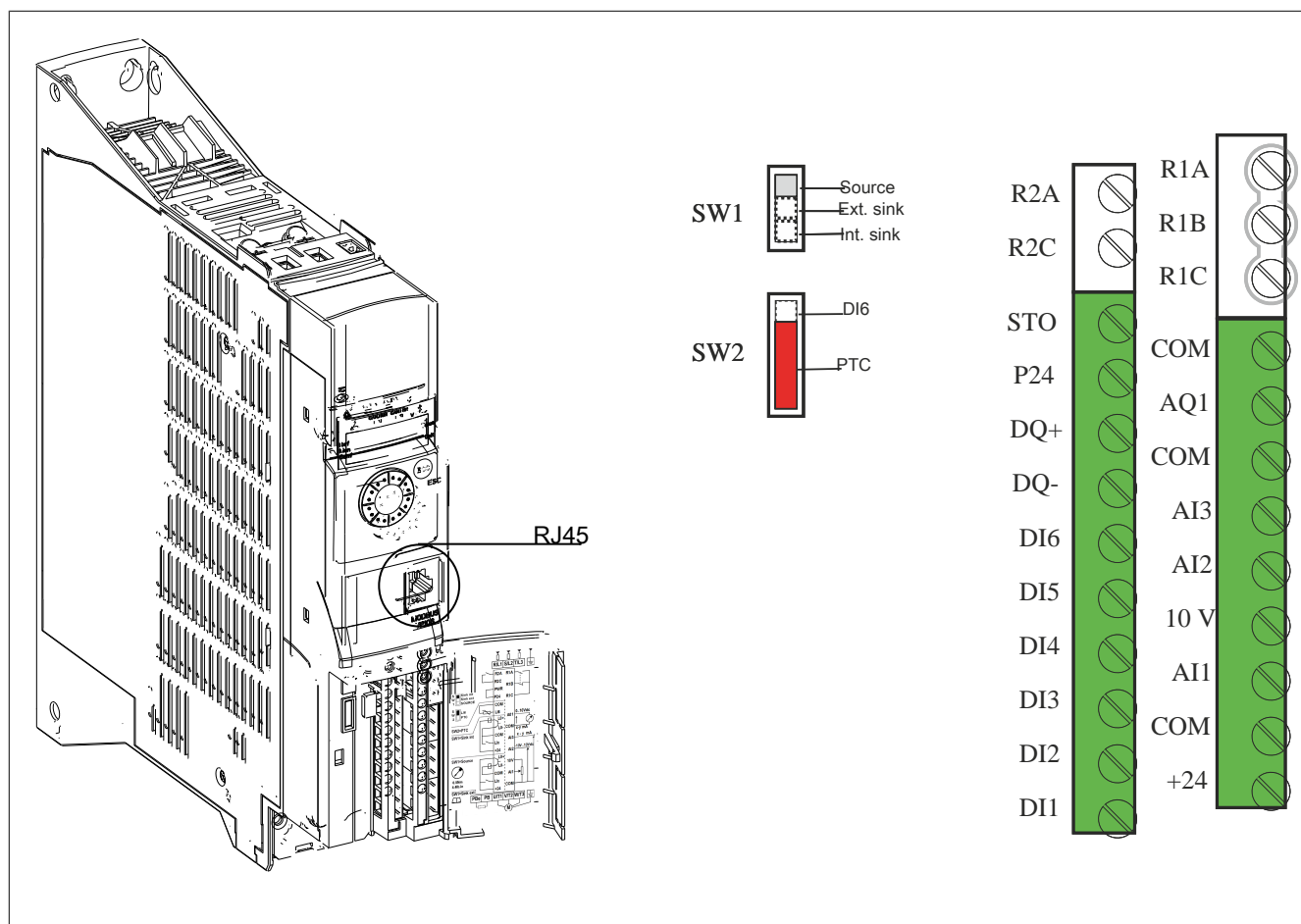
Pin	Short description	Key data
10V	Power supply of the analog inputs	Power supply from internal Power supply: 10 VDC (0% to +10%) Maximum output current: 10 mA
AI1	Analog input 1 - 0 V to +10 V	Analog inputs AI1: Unipolar analog voltage input AI2: Bipolar analog voltage input AI3: Unipolar analog current input  Refresh rate: 2 ms Resolution: 10 bits Accuracy: $\pm 0.5\%$ at 25°C (77°F) $\pm 0.7\%$ at 25°C $\pm 60\text{K}$ (77°F $\pm 108^\circ\text{F}$ ) Linearity: $\pm 0.2\%$ (max.: $\pm 0.5\%$ ) of maximum  <b>AI1 properties</b> Signal range: 0 to 10 V (or lower) Impedance: 30 k $\Omega$ Resolution: 10 bits  <b>AI2 properties</b> Signal range: -10 to 10 V (or lower) Impedance: 30 k $\Omega$ Resolution: 10-bit + sign  <b>AI3 properties</b> Signal range: 0 to 20 mA (or lower; e.g. 4 mA to 20 mA) Impedance: 250 $\Omega$ Resolution: 10 bits
AI2	Analog input 2 - 10 V to +10 V	
AI3	Analog input 3 - 0 to 20 mA	
AQ1	Analog output 1 - 0 to 10 V - 0 to 20 mA	Analog output AQ1: Unipolar analog output that can be configured as a voltage or current output via parameter AO1T.  Refresh rate: 2 ms Accuracy: $\pm 1\%$ at 25°C $\pm 10\text{K}$ (77°F $\pm 18^\circ\text{F}$ ) $\pm 2\%$ at 25°C $\pm 60\text{K}$ (77°F $\pm 108^\circ\text{F}$ ) Linearity: $\pm 0.3\%$ of maximum  <b>AQ1 as voltage output</b> Signal range: 0 V to 10 V (or lower) Min. impedance: 470 $\Omega$ Resolution: 10 bits  <b>AQ1 as current output</b> Signal range: 0 to 20 mA (or lower; e.g. 4 mA to 20 mA) Max. impedance: 800 $\Omega$ Resolution: 10 bits

### 4.4.11.3 General power supply

Pin	Short description	Key data
STO	Torque enable <ul style="list-style-type: none"> <li>24 VDC</li> </ul>	Input for safety function (STO "Safe Torque Off")  Switching voltage: 24 Vdc ( $\pm 25\%$ ) Impedance: 1.5 k $\Omega$ Filter time: < 1 ms Response time: < 10 ms  Torque enable: <ul style="list-style-type: none"> <li>TRUE at &gt; 17 VDC</li> <li>FALSE at &lt; 2 VDC</li> </ul>
P24	Power supply <ul style="list-style-type: none"> <li>24 VDC from internal for STO safety function</li> <li>24 VDC from external for redundant power supply</li> </ul>	Connection for power supply (see section "Switch "SW1" - Configuration of the input circuit" on page 61).  <b>24 VDC from internal (via DC bus)</b> Power supply for STO input: 24 Vdc (-15% to +20%) Maximum output current: 100 mA  <b>24 VDC from external (redundant supply)</b> Permissible supply voltage from external: 24 Vdc ( $\pm 25\%$ ) Maximum input current: 1.1 A (fuse required)
COM	Reference potential <ul style="list-style-type: none"> <li>0 VDC</li> </ul>	Reference potential (COM "common") of the entire control unit (see section "Switch "SW1" - Configuration of the input circuit" on page 61). Connection point "COM" is executed multiple times. All connections with this designation are internally connected.

### 4.4.12 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. <sup>1)</sup>	Max.	Min. <sup>1)</sup>	Max.	
	mm <sup>2</sup> (AWG)	mm <sup>2</sup> (AWG)	mm <sup>2</sup> (AWG)	mm <sup>2</sup> (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.

## RJ45 communication port

Connection options:

- PC with ACPi SafeConfigurator
- External graphic display terminal via Modbus serial cable
- Modbus or CANopen network

### **Note:**

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

#### 4.4.13 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" on page 428](#).

##### Access to the terminals

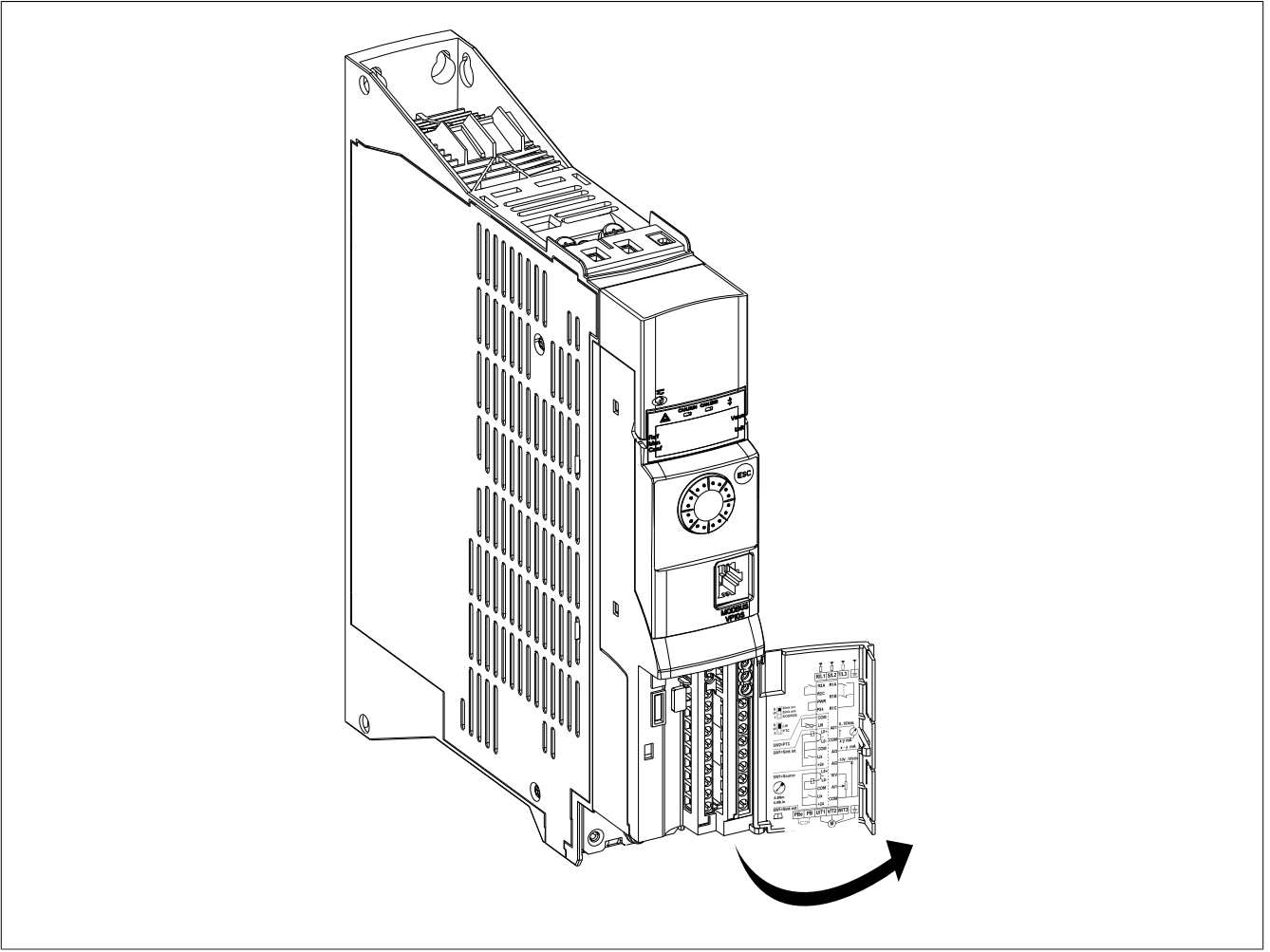
### **Danger!**

#### **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.



## 4.5 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.

## 4.6 Servicing

### Service

#### **Danger!**

#### **RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC**

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.

During operating, the products described in these instructions can reach temperatures above 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.

#### **Note:**

#### **RISK OF DAMAGE TO THE FREQUENCY INVERTER**

Perform the procedures listed below.

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

Environment	Affected components:	Action	Frequency <sup>1)</sup>
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 ambient 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.

### Replacement parts 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.

## 4.7 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.

Phases/Voltage	Material number	IT jumper closed				IT jumper open			
		Input frequency (mains frequency) = 50 Hz		Input frequency (mains frequency) = 60 Hz		Input frequency (mains frequency) = 50 Hz		Input frequency (mains frequency) = 60 Hz	
		Output frequency (motor frequency) = 50 Hz	Output frequency (motor frequency) = 100 Hz	Output frequency (motor frequency) = 60 Hz	Output frequency (motor frequency) = 120 Hz	Output frequency (motor frequency) = 50 Hz	Output frequency (motor frequency) = 100 Hz	Output frequency (motor frequency) = 60 Hz	Output frequency (motor frequency) = 120 Hz
1-phase 200 to 240 V	8I76S200018.00-000	4.25 mA	1.99 mA	5.1 mA	2.39 mA	0.2 mA	1.99 mA	0.24 mA	2.39 mA
	8I76S200037.00-000								
	8I76S200055.00-000								
	8I76S200075.00-000	7.42 mA		8.9 mA		0.43 mA		0.51 mA	
	8I76S200110.00-000								
	8I76S200150.00-000								
8I76S200220.00-000									
3-phase 380 to 500 V	8I76T400037.00-000	5.36 mA	-	6.43 mA	-	<0.5 mA	-	<0.5 mA	-
	8I76T400055.00-000								
	8I76T400075.00-000								
	8I76T400110.00-000								
	8I76T400150.00-000	8.17 mA		9.81 mA					
	8I76T400220.00-000								
	8I76T400300.00-000								
	8I76T400400.00-000	8.23 mA		9.88 mA					
	8I76T400550.00-000								
	8I76T400750.00-000								
8I76T401100.00-000	8.47 mA	10.16 mA							
8I76T401500.00-000									

# 5 The drive

## 5.1 Direct connection

### Installation

- 1) For installation instructions, see section "Installation" on page 37.

### Parameterization

- 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 parameterizing, 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 190.

### Note:

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.

### 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.

### 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.

**Note:****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.

**Switching on****Note:**

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**

The inverter is blocked and displays **[Freewheel] (nSt)** when a move command such as forward run, reverse run or DC braking is still active while the following is happening:

- A reset to the factory settings takes place.
- A manual error reset with **[Fault reset] (RsF)** is being carried out.
- A manual fault reset is being performed by switching the product off and on.
- A stop command is being output from a channel that is not the active channel command (e.g. the stop button on the display terminal in 2/3-wire control).

Before authorizing a new move command, all active move commands must first be disabled.

**Line contactor****Note:****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-)**.

**Note:****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.

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

**Note:**

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.

## 5.1.2 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 37)				■		■
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	■	■	■			
Calculated stopping distance (remote stop) 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 363)	■	■	■	■	■	■
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						■

### 5.1.3 Basic functions

#### Optional graphic display terminal

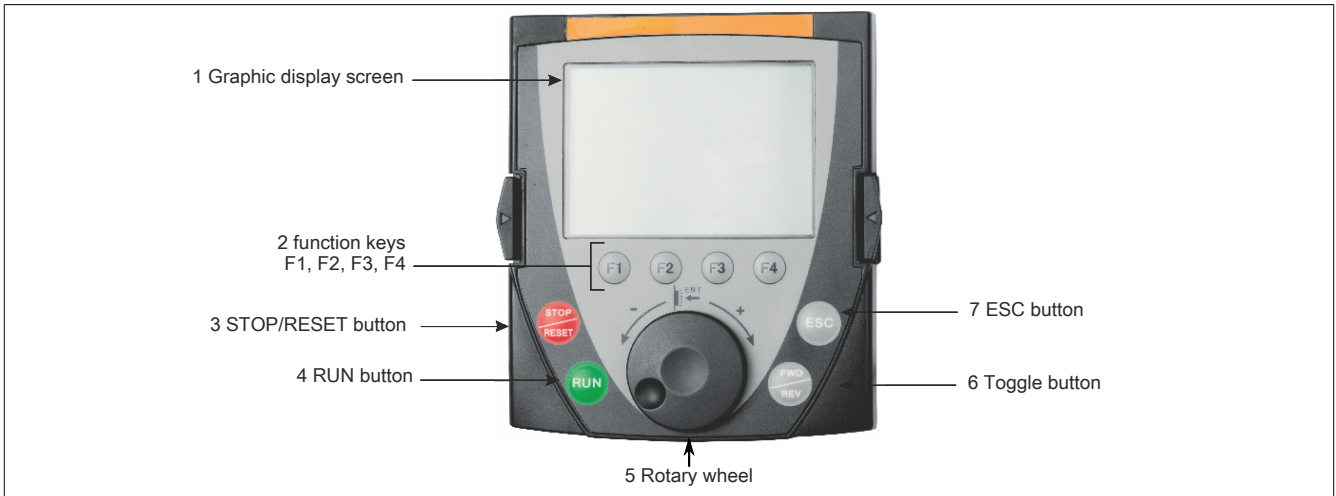
The fan will start automatically once the inverter's thermal state reaches 70% of the maximum value and **[Fan Mode]** (FFM) is set to **[Standard]** (Std).

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

### 5.1.4 Optional graphic display terminal

#### Description of the graphic display terminal

The graphic display terminal displays more detailed information compared to the integrated operator terminal.



5) Dial:

**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

#### Note:

**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).

#### Example of configuration windows

Single selection

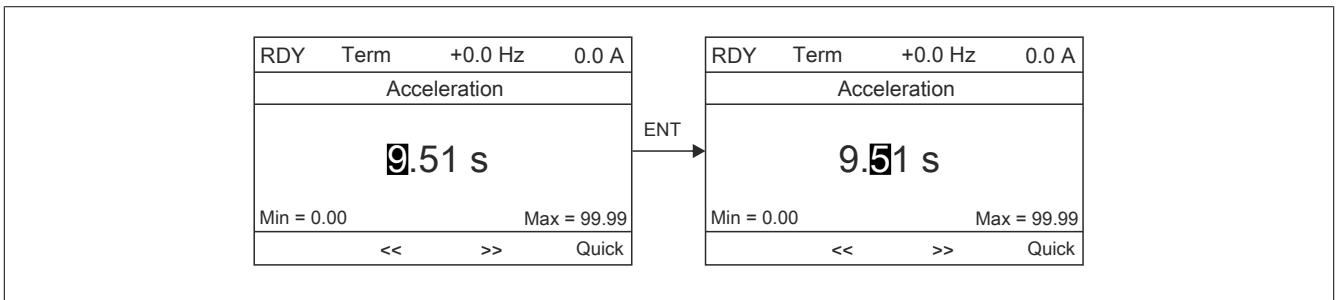
LANGUAGE	
English	
Français	✓
Deutsch	
Italiano	
Español	
Chinese	
Русский	
Türkçe	

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

PARAMETER SELECTION	
SETTINGS	
Ramp increment	<input checked="" type="checkbox"/>
Acceleration	<input checked="" type="checkbox"/>
Deceleration	<input checked="" type="checkbox"/>
Acceleration 2	<input type="checkbox"/>
Deceleration 2	<input type="checkbox"/>
Edit	

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

**Example of a configuration window with one value:**

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.

**Example of how to display a function block state**

RDY	⊗ Term	+0.0 Hz	0.0 A
Acceleration			
9.51 s			
Min = 0.00		Max = 99.99	
<<	>>	Quick	

⊗ 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.


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

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

Display after first switching on the graphic display terminal for the first time. 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

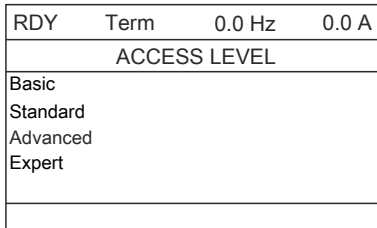
## 5.1.5 Switching on the inverter for the first time

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).



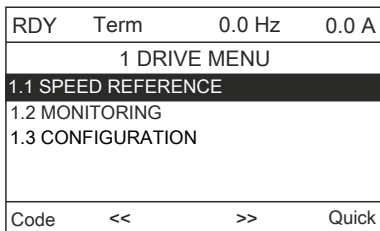
Screen displayed the first time the inverter is switched on.

↓ 3 seconds



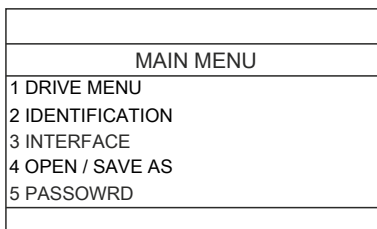
Screen **[ACCESS LEVEL]** is then displayed automatically.

↓ ENT



After three seconds, the screen switches automatically to menu **[1 DRIVE MENU]**. Select the menu and press ENT.

↓ ESC



Press ESC to display the main menu on the graphic display terminal.

### Subsequent power ups

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



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

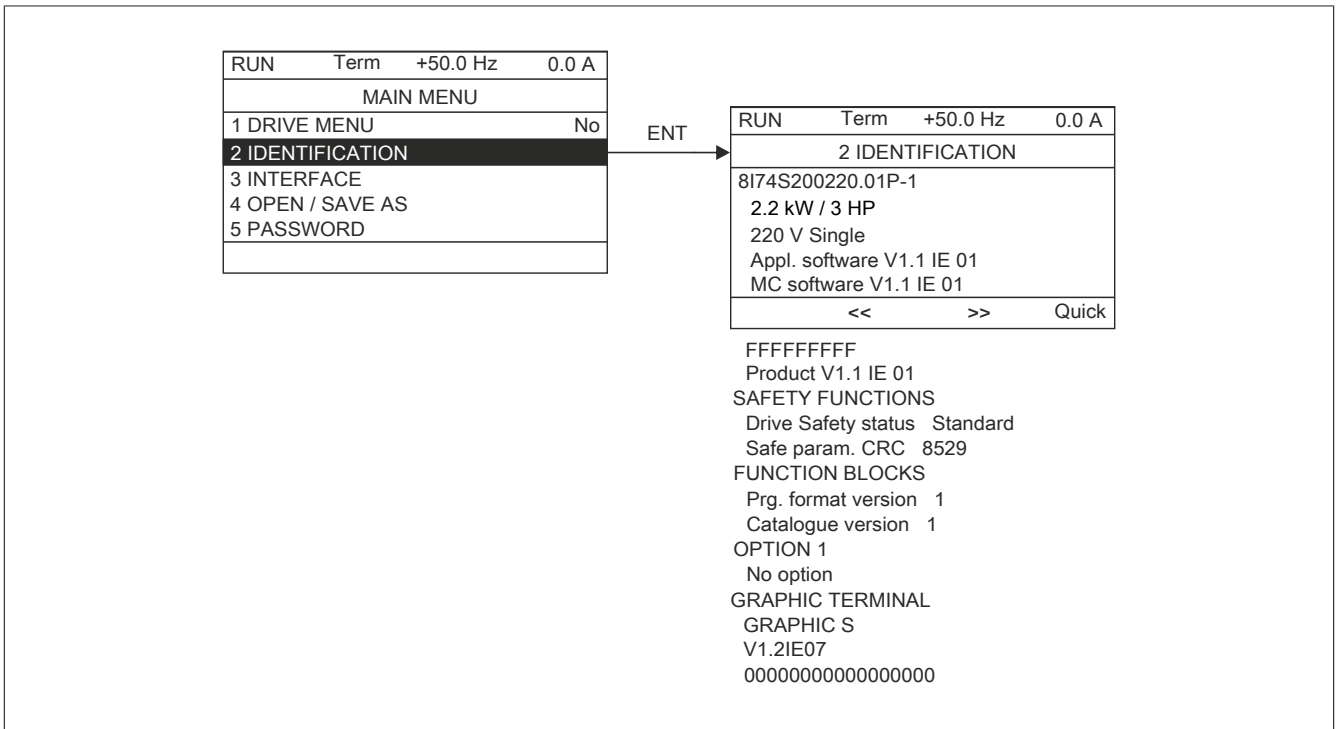
RDY	Term	+0.0 Hz	0.0 A
Frequency ref.			
<b>+1.3 Hz</b>			
Min = -599.0		Max = +599.0	
Quick			

After 10 seconds, the screen automatically changes to the monitoring screen.

## Menu IDENTIFICATION

Menu **[IDENTIFICATION]** (Old-) 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:

- Setpoint, nominal power and nominal voltage of the inverter
- 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



### 5.1.6 Structure of parameter tables

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

Example:

Parameters described in this page can be accessed by: DRI- > COnF > FULL > FUn- > PId-			
Code	Name / Description	Adjustment range	Factory setting
PId-	[PID REGULATOR]		
<b>Note:</b> This function cannot be used with certain other functions.			
PIF	[PID feedback ass.]		[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		
PI	[RP](PI): Pulse input		
AIU1	[AI virtual 1](AIU1): Virtual analog input 1 by the communication bus		
AIU2	[AI virtual 2](AIU2): Virtual analog input 2 by the communication bus		
OA01	[OA01](OA01): Function blocks: Analog output 01		
...			
OA10	[OA10](OA10): Function blocks: Analog output 10		

- 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

#### Note:

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.

## 5.1.7 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]**. As long as the key remains pressed, the code of the parameter is displayed in place of the name. Example: ACC

RDY	Term	+0.0 Hz	0.0 A
SETTINGS			
	Ramp increment		0.1
	Startup time	9.51 s	
	Deceleration	9.67 s	
	Low speed	0.0 Hz	
	High speed	50.0 Hz	
Code	<<	>>	Quick

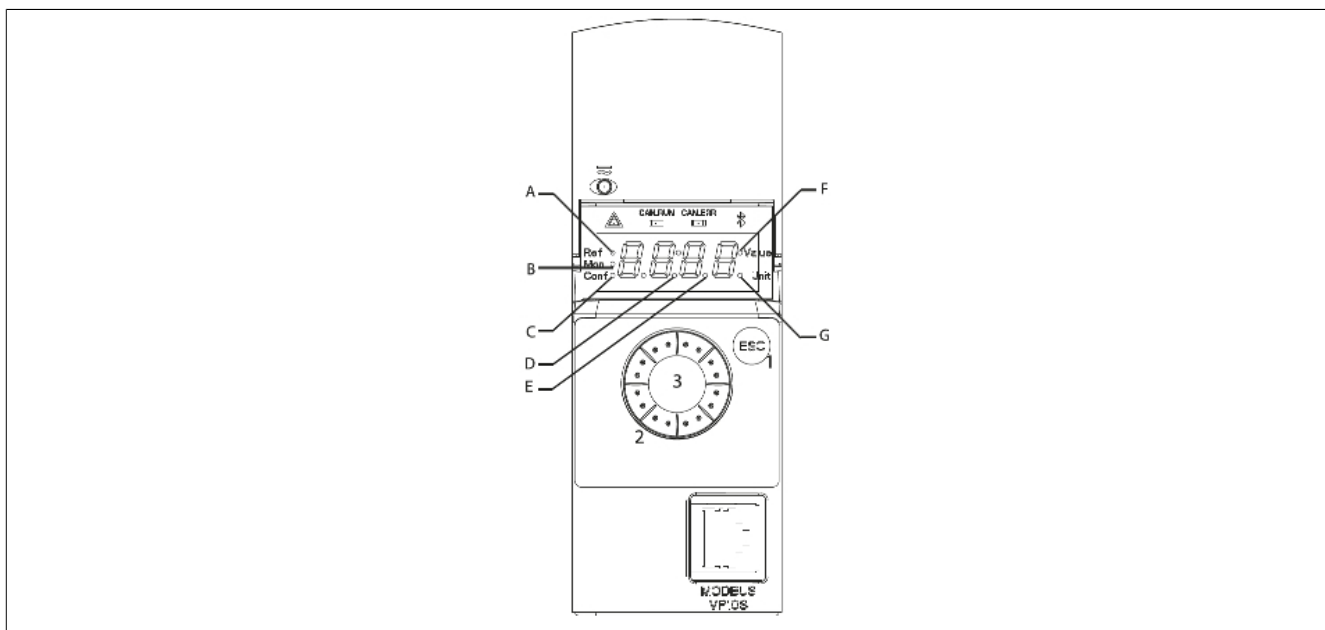
Code →

RDY	Term	+0.0 Hz	0.0 A
SETTINGS			
	Ramp increment		0.1
	ACC:	9.51 s	
	Deceleration	9.67 s	
	Low speed	0.0 Hz	
	High speed	50.0 Hz	
Code	<<	>>	Quick

## 5.1.8 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.

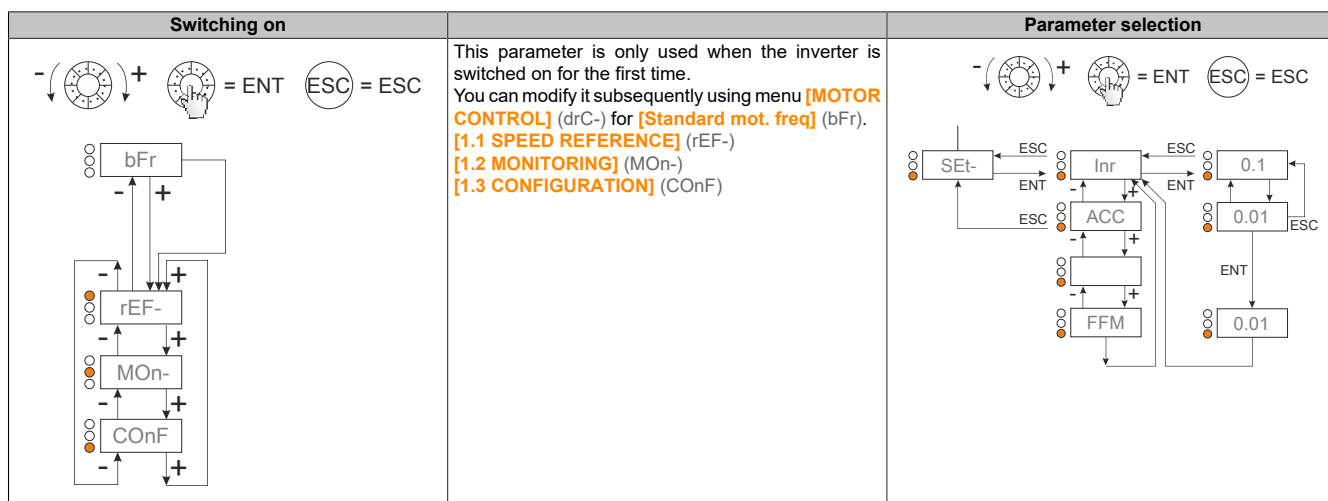
Normal display (no error code and no startup):

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
- CLl: 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.

### 5.1.9 Structure of the menus



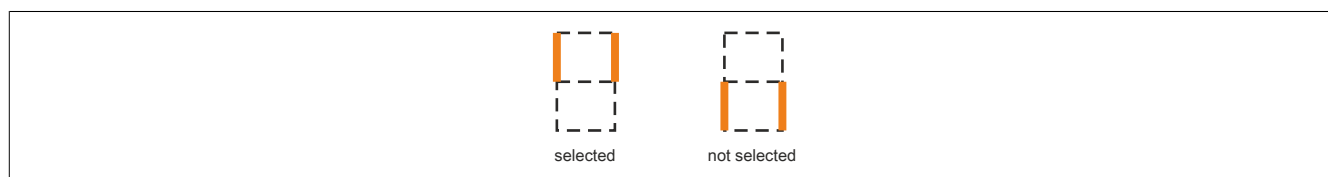
With the 7-segment display format, a dash after a menu and submenu code is used to separate this code from the parameter codes.

Example: Menu **[APPLICATION FUNCT.]** (FU-), 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.

## 5.2 Direct operation

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.

### **Note:**

#### **MOVEMENTS WITHOUT BRAKING EFFECT**

**It should be ensured 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.**

## 5.2.1 Reference mode (rEF)

### 5.2.1.1 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.

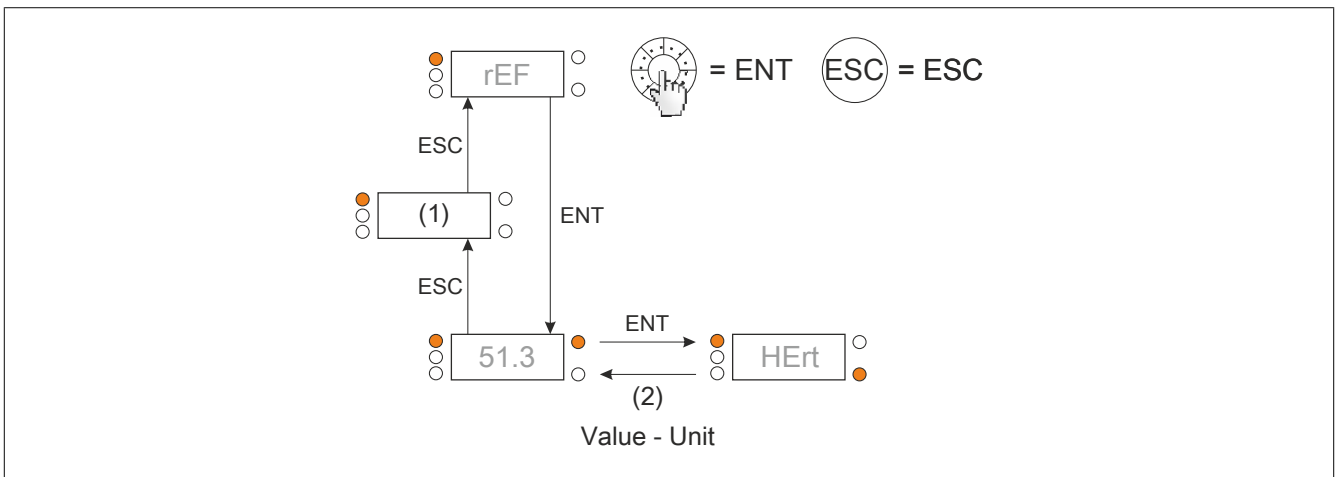
### 5.2.1.2 Tree structure

(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.



## 5.2.1.3 Menu

The parameters described on this page can be accessed by: DRI- > rEF-			
Code	Name/Description	Setting range	Factory settings
rEF-	<b>[1.1 SPEED REFERENCE]</b> The parameters displayed will vary according to the specific inverter settings.		
AIV1   (1)	<b>[Image input AIV1]</b> 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)	<b>[HMI Frequency ref.]</b> 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   (1)	<b>[Multiplying coeff.]</b> Multiplication of the frequency variables. Access to this coefficient is possible if <b>[Multiplier ref. -]</b> (MA2,MA3) has been assigned to the graphic display terminal.	0 to 100%	100%
rPI   (1)	<b>[Internal PID ref.]</b> 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 <b>[PID feedback]</b> (PIF) is not set to <b>[No]</b> (nO).	0 to 32767	150
FrH 	<b>[Frequency ref.]</b> 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 	<b>[PID speed ref.]</b> PID: Setpoint The PID setpoint is visible if <b>[PID feedback]</b> (PIF) is not set to <b>[No]</b> (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.

## 5.2.2 Monitoring mode (MOn)

### 5.2.2.1 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.

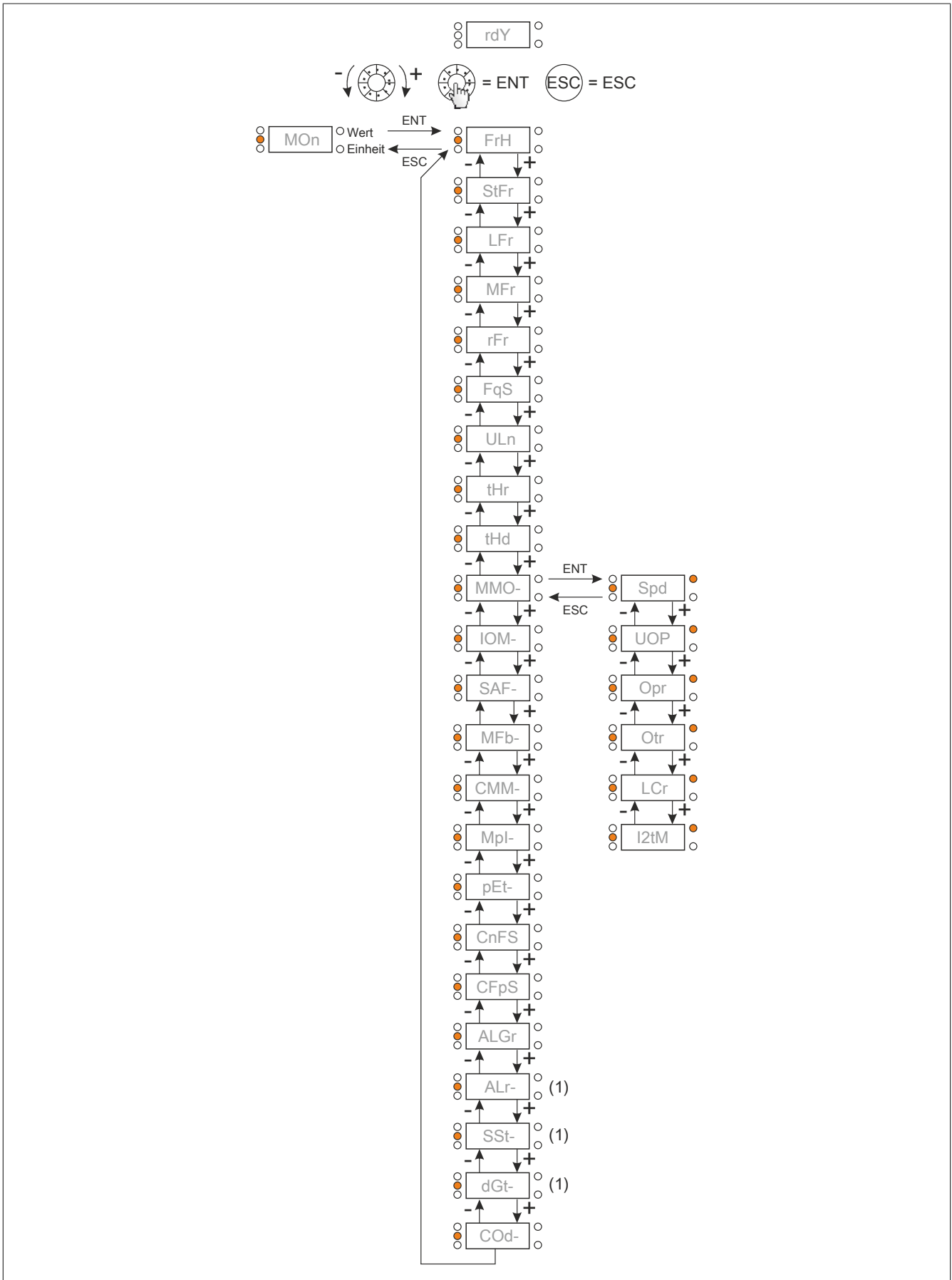
#### **Note:**

**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.**





### 5.2.2.2 Tree structure

The parameters shown on the diagram are provided as examples.

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



## 5.2.2.3 Menu

The parameters described on this page can be accessed by: DRI- > MOn-		
Code	Name/Description	Unit
MOn-	<b>[1.2 MONITORING]</b>	
AIV1 	<b>[Image input AIV1]</b> First virtual AI value. This parameter is read-only. It is used to display the frequency setpoint for the motor.	%
FrH	<b>[Frequency ref.]</b> 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	<b>[Stator Frequency]</b> Displays the estimated stator frequency in Hz (signed value).	Hz
LFr	<b>[HMI Frequency ref.]</b> 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  	<b>[Multiplying coeff.]</b> Multiplication factor. Multiplication coefficient, can be called if <b>[Multiplier ref. -]</b> (MA2,MA3) has been assigned.	%
MMF	<b>[Measured output fr.]</b> Measured motor frequency (signed value). The measured motor speed is displayed if a speed monitoring card is used.	Hz
rFr	<b>[Output frequency]</b> Calculated motor frequency (signed value). The value for rFr [0.1 Hz] and the corresponding value rFrD [rpm] are based on a direct measurement. A filter with a filter time of 100 ms is used to smooth the unfiltered raw value. The unfiltered raw value can be retrieved via parameter SrFr [0.1 Hz].	Hz
FqS 	<b>[Pulse in. work. freq.]</b> Measured frequency of the pulse input.	Hz
ULn	<b>[Mains voltage]</b> Mains voltage (from DC bus). Mains voltage based on the DC bus measurements, with the motor running or stopped. The value for ULn [0.1 V] is based on a direct measurement. A filter with a filter time of 500 ms is used to smooth the unfiltered raw value. The unfiltered raw value can be retrieved via parameter SULn [0.1 V].	V
tHr	<b>[Motor thermal state]</b> Thermal state of the motor. 100% = Rated thermal state, 118% = "OLF threshold value" (motor overload)	%
tHd	<b>[Drv.thermal state]</b> Thermal state of the inverter. 100% = Nominal thermal state, 118% = "Threshold value OLF" (inverter overtemperature).	%



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.

## 5.2.2.3.1 [MONIT. MOTOR] (MMO-)



The parameters described on this page can be accessed by: DRI- > MOn- > MMO-		
Code	Name/Description	Unit
MMO-	<b>[MOTOR MONITORING]</b>	
Spd	<b>[Motor speed]</b> Motor speed in rpm (estimated value).	rpm
UOP	<b>[Motor voltage]</b> Motor voltage (Estimated value).	V

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

Code	Name/Description	Unit
Opr	<b>[Motor power]</b> Monitoring of output power (100% = Rated motor power, estimated value based on current measurement). The value for Opr [%] is based on a direct measurement. A filter with a filter time of 1000 ms is used to smooth the unfiltered raw value. The unfiltered raw value can be retrieved via parameter SOpr [%].	%
Otr	<b>[Motor torque]</b> Output torque (100% = Nominal motor torque, estimated value based on current measurement). The value for Otr [0.1%] is based on a direct measurement. A filter with a filter time of 1000 ms is used to smooth the unfiltered raw value. The unfiltered raw value can be retrieved via parameter 12-bit value SOtr, i.e. SOtr = 4096 corresponds to OTR = 1000 = 100%.	%
LCr	<b>[I motor]</b> Calculated motor current (Measured value). The value for LCr [0.1 A] is based on a direct measurement. A filter with a filter time of 300 ms is used to smooth the unfiltered raw value. The unfiltered raw value can be retrieved via parameter SLCr [0.1 A].	A
I2tM	<b>[I<sup>2</sup>t overload level]</b> Monitoring of the I <sup>2</sup> t overload level. This parameter can be accessed if <b>[I<sup>2</sup>t model activation]</b> (I2tA) = <b>[YES]</b> (YES).	

### 5.2.2.3.2 [I/O MAP] (IOM-)

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

Code	Name/Description
IOM-	<b>[I/O MAP]</b>
LIA-	<b>[LOGIC INPUT CONF.]</b> Logic input functions.
LIA	<b>[Logic input 1 assignment]</b> 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, <b>[No]</b> (nO) is displayed. Use the handwheel to scroll through the functions. The time delay is shown on the graphic display terminal: <b>[LI1 On Delay]</b> (LId). Possible values are the same as those shown for the configuration page.
L2A to L6A LA1A LA2A	<b>[Logic input -- assignment]</b> All of the logic inputs available on the inverter are processed as shown in the LI1 example above.
LIS1	<b>[State of logic inputs LI1 to LI6]</b> 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	<b>[LA1, LA2 and STO state]</b> 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-	<b>[ANALOG INPUTS IMAGE]</b> Analog input functions.	
AI1C	<b>[AI1]</b> Customized AI1 map: Value of analog input 1.	V
AI1A	<b>[AI1 assignment]</b> AI1 function assignment. If no functions have been assigned, <b>[No]</b> (nO) is displayed. The following parameters are displayed on the graphic display terminal when you press the ENT button for the parameter.	
nO	<b>[No]</b> (nO): Not assigned	
Fr1	<b>[Ref.1 channel]</b> (Fr1): Setpoint source 1	
Fr2	<b>[Ref.2 channel]</b> (Fr2): Setpoint source 2	
SA2	<b>[Summing ref. 2]</b> (SA2): Setpoint total 2	
PIF	<b>[PID feedback]</b> (PIF): Actual PI value (PI controller)	
tAA	<b>[Torque limitation]</b> (tAA): Torque limiting: Enabled via analog value	
dA2	<b>[Subtract. ref. 2]</b> (dA2): Subtraction of setpoint 2	
PIM	<b>[Manual PID ref.]</b> (PIM): Manually set frequency setpoint for the PI(D) controller (automatic/manual mode)	
FPI	<b>[PID speed ref.]</b> (FPI): Speed setpoint for the PI(D) controller (preset setpoint)	
SA3	<b>[Summing ref. 3]</b> (SA3): Setpoint total 3	
Fr1b	<b>[ch1B active]</b> (Fr1b): Setpoint source 1B	
dA3	<b>[SubParam3]</b> (dA3): Subtraction of setpoint 3	
FLOC	<b>[Forced local]</b> (FLOC): Setpoint source "Forced local"	
MA2	<b>[Multiplier ref. 2]</b> (MA2): Multiplication factor for setpoint 2	
MA3	<b>[Ref. 3 multiplier]</b> (MA3): Multiplication factor for setpoint 3	

The parameters described on this page can be accessed by: DRI- > MOn- > IOM- > AIA-

Code	Name/Description	Unit
PES	<b>[Weight input]</b> (PES): External function for measuring weight	
UIL1	<b>[AI1 min value]</b> Minimum voltage value (0%).	V
UIH1	<b>[AI1 max value]</b> Maximum voltage value (100%).	V
AI1F	<b>[AI1 filter]</b> Filter time of the low-pass filter for filtering interference.	s
AI2C	<b>[AI2]</b> Customized AI2 map: Value of analog input 2.	V
AI2A	<b>[AI2 assignment]</b> AI2 function assignment. If no functions have been assigned, <b>[No]</b> (nO) is displayed. The following parameters are displayed on the graphic display terminal when you press the ENT button for the parameter. Identical to <b>[AI1 assignment]</b> (AI1A).	
UIL2	<b>[AI2 min value]</b> Minimum voltage value (0%).	V
UIH2	<b>[AI2 max value]</b> Maximum voltage value (100%).	V
AI2F	<b>[AI2 filter]</b> Filter time of the low-pass filter for filtering interference.	s
AI3C	<b>[AI3]</b> Customized AI3 map: Value of analog input 3.	V
AI3A	<b>[AI3 assignment]</b> AI3 function assignment. If no functions have been assigned, <b>[No]</b> (nO) is displayed. The following parameters are displayed on the graphic display terminal when you press the ENT button for the parameter. Identical to <b>[AI1 assignment]</b> (AI1A).	
CrL3	<b>[Min value]</b> Minimum current value (0%).	mA
CrH3	<b>[AI3 max value]</b> Maximum current value (100%).	mA
AI3F	<b>[AI3 filter]</b> 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-	<b>[STAT ANALOG OUTPUT.]</b> Analog output functions. The following parameters are displayed on the graphic display terminal when you press the ENT button for the parameter.	
AO1C	 <b>[AO1C]</b> Customized AO1 map: Value of analog output 1.	
AO1	<b>[AO1 assignment]</b> AO1 function assignment. If no functions have been assigned, <b>[No]</b> (nO) is displayed. Identical to <b>[AO1 assignment]</b> (AO1).	
UOL1	 <b>[AO1 min Output]</b> Minimum voltage value (0%). Can be accessed if <b>[Type AO1]</b> (AO1t) is set to <b>[Voltage]</b> (10U).	V
UOH1	 <b>[AO1 max Output]</b> Maximum voltage value (100%). Can be accessed if <b>[Type AO1]</b> (AO1t) is set to <b>[Voltage]</b> (10U).	V
AOL1	 <b>[AO1 min Output]</b> Minimum current value (0%). Can be accessed if <b>[Type AO1]</b> (AO1t) is set to <b>[0-20mA]</b> (0A).	mA
AOH1	 <b>[AO1 max Output]</b> Maximum current value (100%). Can be accessed if <b>[Type AO1]</b> (AO1t) is set to <b>[0-20mA]</b> (0A).	mA
ASL1	<b>[AO1 min scal]</b> Minimum scaling value for AO1.	%
ASH1	<b>[AO1 max scal]</b> Maximum scaling value for AO1.	%
AO1F	<b>[AO1 Filter]</b> 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-	<b>[STATUS FREQ SIGNAL]</b> Frequency signal state. This menu is only shown on the graphic display terminal.	
PFrC	<b>[RP input]</b> 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	<b>[RP assignment]</b> Pulse input assignment. If no functions have been assigned, <b>[No](nO)</b> is displayed. Identical to <b>[AI1 assignment](AI1A)</b> .	
PIL	<b>[RP min value]</b> Minimum RP value. Minimum pulse input (0%).	kHz
PFr	<b>[RP max value]</b> Maximum pulse input value on maximum speed (100%).	kHz
PFI	<b>[RP filter]</b> Filter time of the low-pass filter for filtering interference (pulse input).	ms

## 5.2.2.3.3 [MONIT. SAFETY] (SAF-)

The parameters described on this page can be accessed by: DRI- > MOn- > SAF-	
Code	Name/Description
SAF-	<b>[MONIT. SAFETY]</b> For more information about the integrated safety functions, refer to the dedicated safety manual.
StOS	<b>[STO status]</b> State of safety function STO (Safe Torque Off).
IdLE	<b>[Idle]</b> (IdLE): STO has not been executed
StO	<b>[Safe stop]</b> (StO): STO has been executed
FLt	<b>[Fault]</b> (FLt): STO error detected
SLSS	<b>[SLS status]</b> SLS (Safe Limit Speed) safety function states.
nO	<b>[Not configured]</b> (nO): SLS not configured
IdLE	<b>[Idle]</b> (IdLE): SLS has not been executed
WAIt	<b>[TBD]</b> (WAIt): SLS waiting to be enabled
Strt	<b>[TBD start]</b> (Strt): SLS in temporary state
SS1	<b>[Safe ramp]</b> (SS1): SLS ramp has been executed
SLS	<b>[Spd limited]</b> (SLS): SLS torque limiting has been executed.
StO	<b>[Safe stop]</b> (StO): SLS "Safe Torque Off" request has been executed
FLt	<b>[Fault]</b> (FLt): SLS error detected
SS1S	<b>[SS1 Status]</b> State of safety function "Safe stop 1"
nO	<b>[Not configured]</b> (nO): SS1 not configured
IdLE	<b>[Idle]</b> (IdLE): SS1 has not been executed
SS1	<b>[Safe ramp]</b> (SS1): SS1 ramp has been executed
StO	<b>[Safe stop]</b> (StO): SS1 "Safe Torque Off" request has been executed
FLt	<b>[Fault]</b> (FLt): SS1 error detected
SMSS	<b>[SMS status]</b> State of safety function SMS (Safe Maximum Speed).
nO	<b>[Not configured]</b> (nO): SMS not configured
SMS	<b>[Active]</b> (SMS): SMS active
FtI	<b>[Internal Err.]</b> (FtI): Internal SMS error
Fto	<b>[Max Speed]</b> (Fto): Maximum speed reached
GdLS	<b>[GDL status]</b> State of safety function Safety door locking (GDL)
nO	<b>[Not configured]</b> (nO): GDL not set
oFF	<b>[Inactive]</b> (oFF): GDL not active
Std	<b>[Short Delay]</b> (Std): Short delay executed
LGd	<b>[Long del.]</b> (LGd): Long delay executed
on	<b>[Active]</b> (on): GDL active
LFT	<b>[Internal Err.]</b> (LFT): Internal GDL error
SFFE	<b>[Safety fault reg.]</b> 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

## 5.2.2.3.4 [COMMUNICATION MAP] (CMM-)

The parameters described on this page can be accessed by: DRI- > MOn- > CMM-		
Code	Name/Description	Unit
CMM-	<b>[COMMUNICATION MAP]</b> This menu is displayed on the graphic display terminal only; with the exception of menus <b>[COM. SCANNER INPUT](ISA-)</b> and <b>[COM SCAN OUTPUT MAP](OSA-)</b> .	
CMdC	<b>[Command channel]</b> Active command channel.	
tErM	<b>[Terminals]</b> (tErM): Terminals	
HMI	<b>[HMI]</b> (HMI): Graphic display terminal or external operator terminal	
Mdb	<b>[Modbus]</b> (Mdb): Integrated Modbus	
CAn	<b>[CANopen com.]</b> (CAn): Integrated CANopen®	
tUd	<b>[+/- speed]</b> (tUd): +/- speed	
nEt	<b>[Com. card]</b> (nEt): Communication card (if used)	
P S	<b>[PC Tool]</b> (P S): PC software	
CMd	<b>[CMD value]</b> Command register. <b>[Profile]</b> (CHCF) is not set to <b>[I/O profile]</b> (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 <b>[Type of stop]</b> (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 <b>[2 wire]</b> (2C) as controlled by state. Bit 0: Command "Forward" (switch on) <ul style="list-style-type: none"> <li>• 0: Command "Reverse"</li> <li>• 1: Command "Forward"</li> </ul> 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 <b>[3 wire]</b> (3C). Bit 0: Stop (Start permission). <ul style="list-style-type: none"> <li>• 0: Stop</li> <li>• 1: Run mode only authorized for commands "Forward" and "Reverse"</li> </ul> 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	<b>[Channel ref. active]</b> HMI setpoint channel.	
tErM	<b>[Terminals]</b> (tErM): Terminals	
LOC	<b>[Local]</b> (LOC): Handwheel	
HMI	<b>[HMI]</b> (HMI): Graphic display terminal or operator terminal	
Mdb	<b>[Modbus]</b> (Mdb): Integrated Modbus	
CAn	<b>[CANopen com.]</b> (CAn): Integrated CANopen®	
tUd	<b>[+/- Speed]</b> (tUd): +/- speed	
nEt	<b>[Com. card]</b> (nEt): Communication card (if used)	
P S	<b>[PC Tool]</b> (P S): PC software	
FrH	<b>[Frequency ref.]</b> Frequency setpoint before ramp	Hz

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

Code	Name/Description	Unit
EtA	<p><b>[ETA state word]</b></p> <p>State word</p> <p>Possible values with profile DS402, separate or combined mode</p> <p>Bit 0: "Ready to be switched on", waiting for mains voltage to be switched on</p> <p>Bit 1: "Switched on", ready</p> <p>Bit 2: "Operation enabled", currently operating</p> <p>Bit 3: "Error"</p> <ul style="list-style-type: none"> <li>• 0: No error</li> <li>• 1: Error</li> </ul> <p>Bit 4: "Voltage enabled", mains voltage present in the power unit</p> <ul style="list-style-type: none"> <li>• 0: No mains voltage present in the power unit</li> <li>• 1: Mains voltage present in the power unit</li> </ul> <p>If the unit is supplied with current through the power unit only, this bit is always preset to 1.</p> <p>Bit 5: Quick stop / emergency switch-off</p> <p>Bit 6: "Switch-on locked", power unit mains voltage is disabled</p> <p>Bit 7: Alarm</p> <ul style="list-style-type: none"> <li>• 0: No alarm</li> <li>• 1: Alarm</li> </ul> <p>Bit 8: Reserved (=0)</p> <p>Bit 9: Remote: Command or setpoint via network</p> <ul style="list-style-type: none"> <li>• 0: Command or setpoint via the graphic display terminal or external operator terminal</li> <li>• 1: Command or setpoint via the network</li> </ul> <p>Bit 10: Target setpoint reached</p> <ul style="list-style-type: none"> <li>• 0: The setpoint was not reached.</li> <li>• 1: The setpoint was reached.</li> </ul> <p>If the inverter is in speed mode, this corresponds to the speed setpoint.</p> <p>Bit 11: "Internal limit active", setpoint outside limits</p> <ul style="list-style-type: none"> <li>• 0: The setpoint is within the limits.</li> <li>• 1: The setpoint is not within the limits.</li> </ul> <p>If the inverter is in speed mode, the limits are defined using parameter <b>[Low speed]</b>(LSP) and <b>[High speed]</b> (HSP).</p> <p>Bit 12 and Bit 13: Reserved (= 0)</p> <p>Bit 14: "Stop key", STOPP via STOP key</p> <ul style="list-style-type: none"> <li>• 0: STOP button not pressed</li> <li>• 1: Stop triggered by pressing the STOP button on the graphic display terminal or external operator terminal</li> </ul> <p>Bit 15: "Direction", direction of rotation</p> <ul style="list-style-type: none"> <li>• 0: Forward on output</li> <li>• 1: Reverse on output</li> </ul> <p>The bit combination 0, 1, 2, 4, 5 and 6 defines the state as per the overview of states in the DSP 402 standard.</p>	

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

Code	Name/Description	Unit
	<p>Possible values in I/O profile</p> <p><b>Note:</b></p> <p>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.</p> <p>Bit 0: Reserved (=0 or 1)            Bit 1: Ready</p> <ul style="list-style-type: none"> <li>0: Not ready</li> <li>1: Ready</li> </ul> <p>Bit 2: Operational</p> <ul style="list-style-type: none"> <li>0: The inverter will not start if the setpoint is set to zero.</li> <li>1: Operational. If a setpoint is equal to a value other than zero, the inverter can start.</li> </ul> <p>Bit 3: Error</p> <ul style="list-style-type: none"> <li>0: No error</li> <li>1: Error</li> </ul> <p>Bit 4: Mains voltage present in power unit</p> <ul style="list-style-type: none"> <li>0: No mains voltage present in power unit</li> <li>1: Mains voltage present in power unit</li> </ul> <p>Bit 5: Reserved (=1)            Bit 6: Reserved (=0 or 1)            Bit 7: Alarm</p> <ul style="list-style-type: none"> <li>0: No alarm</li> <li>1: Alarm</li> </ul> <p>Bit 8: Reserved (=0)            Bit 9: Command via a network</p> <ul style="list-style-type: none"> <li>0: Command via terminal blocks or graphic display terminal</li> <li>1: Command via network</li> </ul> <p>Bit 10: Setpoint reached</p> <ul style="list-style-type: none"> <li>0: The setpoint was not reached.</li> <li>1: The setpoint was reached.</li> </ul> <p>Bit 11: Setpoint outside limits</p> <ul style="list-style-type: none"> <li>0: The setpoint is within the limits.</li> <li>1: The setpoint is not within the limits.</li> </ul> <p>If the inverter is in speed mode, the limits are defined using parameters LSP and HSP.</p> <p>Bit 12 and Bit 13: Reserved (= 0)            Bit 14: Stop via STOP button</p> <ul style="list-style-type: none"> <li>0: STOP button not pressed</li> <li>1: Stop triggered by pressing the STOP button on the graphic display terminal or external operator terminal</li> </ul> <p>Bit 15: Direction of rotation</p> <ul style="list-style-type: none"> <li>0: Forward on output</li> <li>1: Reverse on output</li> </ul>	

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

Code	Name/Description
Mnd-	<b>[MODBUS NETWORK DIAG]</b> Modbus network diagnostics.
Mdb1	<b>[COM LED]</b> Displays the Modbus communication data.
M1Ct	<b>[Mb NET frames nb.]</b> Modbus network frame counter: Number of frames processed.
M1EC	<b>[Mb NET CRC errors]</b> 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-	<b>[COM. SCANNER INPUT]</b> Used for CANopen® and Modbus network.
nM1	<b>[Com Scan In1 val.]</b> Value of the 1st input word
nM2	<b>[Com Scan In2 val.]</b> Value of the input word 2
nM3	<b>[Com Scan In3 val.]</b> Value of the input word 3
nM4	<b>[Com Scan In4 val.]</b> Value of the input word 4
nM5	<b>[Com Scan In5 val.]</b> Value of the input word 5
nM6	<b>[Com Scan In6 val.]</b> Value of the input word 6
nM7	<b>[Com Scan In7 val.]</b> Value of the input word 7
nM8	<b>[Com Scan In8 val.]</b> Value of the input word 8

## The drive

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

Code	Name/Description
OSA-	<b>[COM. SCAN OUTPUT MAP]</b>
nC1	<b>[Com Scan Out1 val.]</b> Value of the 1st output word
nC2	<b>[Com Scan Out2 val.]</b> Value of the output word 2
nC3	<b>[Com Scan Out3 val.]</b> Value of the output word 3
nC4	<b>[Com Scan Out4 val.]</b> Value of the output word 4
nC5	<b>[Com Scan Out5 val.]</b> Value of the output word 5
nC6	<b>[Com Scan Out6 val.]</b> Value of the output word 6
nC7	<b>[Com Scan Out7 val.]</b> Value of the output word 7
nC8	<b>[Com Scan Out8 val.]</b> 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-	<b>[CMD. WORD IMAGE]</b> Map command word: Accessible via the graphic display terminal only.
CMd1	<b>[Modbus CMD]</b> Modbus command word map.
CMd2	<b>[CANopen cmd.]</b> CANopen® command word map.
CMd3	<b>[Com. card CMD]</b> 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-	<b>[FREQ. REF. WORD MAP]</b> Frequency setpoint map: Accessible via the graphic display terminal only.	
LFr1	<b>[Modbus ref.]</b> Modbus frequency setpoint map	Hz
LFr2	<b>[CANopen ref.]</b> CANopen® frequency setpoint map	Hz
LFr3	<b>[Com. card ref.]</b> 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-	<b>[CANopen MAP]</b> CANopen® map: Accessible via the graphic display terminal only.
CO <sub>n</sub>	<b>[RUN LED]</b> Displays the CANopen® RUN LED state.
CAnE	<b>[ERR LED]</b> 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-	<b>[PDO1 IMAGE]</b> Displays the RPDO1 and TPDO1.
rp11	<b>[Received PDO1-1]</b> First frame of the received PDO1.
★ rp12	<b>[Received PDO1-2]</b> Second frame of the received PDO1.
★ rp13	<b>[Received PDO1-3]</b> Third frame of the received PDO1.
★ rp14	<b>[Received PDO1-4]</b> Fourth frame of the received PDO1.
★ tp11	<b>[Transmit PDO1-1]</b> First frame of the transmit PDO1.
★ tp12	<b>[Transmit PDO1-2]</b> Second frame of the transmit PDO1.
★ tp13	<b>[Transmit PDO1-3]</b> Third frame of the transmit PDO1.
★ tp14	<b>[Transmit PDO1-4]</b> 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- > MOOn- > CMM- > CnM- > PO2-

Code	Name/Description
PO2-	<b>[PDO2 IMAGE]</b> Displays RPDO2 and TPDO2 using the same structure as for <b>[PDO1 IMAGE]</b> (PO1-).
rp21 	<b>[Received PDO2-1]</b> First frame of the received PDO2.
rp22 	<b>[Received PDO2-2]</b> Second frame of the received PDO2.
rp23 	<b>[Received PDO2-3]</b> Third frame of the received PDO2.
rp24 	<b>[Received PDO2-4]</b> Fourth frame of the received PDO2.
tp21 	<b>[Transmit PDO2-1]</b> First frame of the transmit PDO2.
tp22 	<b>[Transmit PDO2-2]</b> Second frame of the transmit PDO2.
tp23 	<b>[Transmit PDO2-3]</b> Third frame of the transmit PDO2.
tp24 	<b>[Transmit PDO2-4]</b> 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- > MOOn- > CMM- > CnM- > PO3-

Code	Name/Description
PO3-	<b>[PDO3 IMAGE]</b> Displays RPDO3 and TPDO3 using the same structure as for <b>[PDO1 IMAGE]</b> (PO1-).
rp31 	<b>[Received PDO3-1]</b> First frame of the received PDO3.
rp32 	<b>[Received PDO3-2]</b> Second frame of the received PDO3.
rp33 	<b>[Received PDO3-3]</b> Third frame of the received PDO3.
rp34 	<b>[Received PDO3-4]</b> Fourth frame of the received PDO3.
tp31 	<b>[Transmit PDO3-1]</b> First frame of the transmit PDO3.
tp32 	<b>[Transmit PDO3-2]</b> Second frame of the transmit PDO3.
tp33 	<b>[Transmit PDO3-3]</b> Third frame of the transmit PDO3.
tp34 	<b>[Transmit PDO3-4]</b> 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- > MOOn- > CMM- > CnM- > nMtS






Code	Name/Description
nMtS	<b>[CANopen NMT state]</b> Inverter NMT state of the CANopen® slave.
bOOt	<b>[Boot]</b> (bOOt): Switch on
StOP	<b>[Stopped]</b> (StOP): Stopped
OPE	<b>[Operational]</b> (OPE): In operation
POPE	<b>[Pre-op]</b> (POPE): Ready for operation

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

Code	Name/Description
nbtP	<b>[Number of TX PDO]</b> Number of transmit PDOs.
nbrP	<b>[Number of RX PDO]</b> Number of received PDOs.
ErCO	<b>[Error code]</b> CANopen® error register (from 1 to 5).
rEC1	<b>[RX Error Counter]</b> Rx controller, error counter (not stored when switched off).
tEC1	<b>[TX Error Counter]</b> Tx controller, error counter (not stored when switched off).

### 5.2.2.3.5 [MONIT. PI] (Mpl-)

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

Code	Name/Description	Unit
MPI- 	<b>[MONIT. PI]</b> PID management. Only visible if <b>[PID feedback ass.]</b> (PIF) is not set to <b>[No]</b> (nO).	
rPI 	<b>[Internal PID ref.]</b> Internal PID setpoint: As a process value.	
rpE 	<b>[PID error]</b> PID error value.	
rpF 	<b>[PID feedback]</b> PID feedback.	
rpC 	<b>[PID speed ref.]</b> PID setpoint via graphic display terminal.	
rpO	<b>[PID Output]</b> 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.


## 5.2.2.3.6 [MONIT. POWER TIME] (pEt-)

The parameters described on this page can be accessed by: DRI- > MOn- > pEt-		
Code	Name/Description	Unit
pEt-	<b>[MONIT. POWER TIME]</b>	
UNT	<b>[Unit]</b> This parameter indicates the units of the current values for <b>[Consumption]</b> (ApH), <b>[Elapsed time]</b> (ptH), <b>[Run time]</b> (rtH) and <b>[Operating time motor, internal]</b> (rtHl). 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: RTHl in s Bit 6, 7 = 1: RTHl in min Bit 6, 7 = 2: RTHl in h	0
ApH	<b>[Consumption]</b> Energy consumption in Wh, kWh or MWh (cumulative consumption). The value unit can be determined via parameter <b>[Unit]</b> (UNT): Wh: If (UNT) & 0x03 = 0b 0000 0000 kWh: If (UNT) & 0x03 = 0b 0000 0001 MWh: If (UNT) & 0x03 = 0b 0000 0010	Wh, kWh or MWh
rtH	<b>[Run time]</b> 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 <b>[Unit]</b> (UNT): s: If (UNT) & 0x30 = 0b 0000 0000 min: If (UNT) & 0x30 = 0b 0001 0000 h: If (UNT) & 0x30 = 0b 0010 0000	s, min, h
rtHl	<b>[Operating time motor, internal]</b> 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 <b>[Unit]</b> (UNT): s: If (UNT) & 0x30 = 0b 0000 0000 min: If (UNT) & 0x30 = 0b 0100 0000 h: If (UNT) & 0x30 = 0b 1000 0000 Unlike <b>[Run time]</b> (rtH), this parameter is not reset by <b>[Operating t. reset]</b> (rpr).	s, min, h
ptH	<b>[Elapsed time]</b> 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 <b>[Unit]</b> (UNT): s: If (UNT) & 0x0C = 0b 0000 0000 min: If (UNT) & 0x0C = 0b 0000 0100 h: If (UNT) & 0x0C = 0b 0000 1000	s, min, h
rpr	<b>[Operating t. reset]</b> Resets the operating data.	
	<b>[No](nO):</b> Reset not executed	
APH	<b>[Reset kWh](APH):</b> Clears <b>[Reset kWh](APH)</b>	
rtH	<b>[Rst. runtime](rtH):</b> Clears <b>[Rst. runtime](rtH)</b>	
PtH	<b>[rst. P On t.](PtH):</b> Clears <b>[rst. P On t.](PtH)</b>	



Parameter that can be modified during operation or when stopped.

## 5.2.2.3.7 [Config. active] (CnFS)

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

## 5.2.2.3.8 [ALARMS] (ALr-)

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

## 5.2.2.3.9 [OTHER STATE] (SSt-)

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

## 5.2.2.3.10 [DIAGNOSTICS] (dGt-)

The parameters described on this page can be accessed by: DRI- > MOn- > dGt- > pFH-		
Code	Name/Description	Unit
pFH-	<b>[FAULT HISTORY]</b> Displays the last 8 detected errors.	
dP1	<b>[1st last fault]</b> Error record 1 (1 comes last).	
nOF	<b>[No fault]</b> (nOF): No error stored	
ASF	<b>[Angle error]</b> (ASF): Error in magnet wheel setting detected	
bLF	<b>[Brake control]</b> (bLF): 3-phase loss in brake motor	
brF	<b>[Brake feedback]</b> (brF): Error detected in braking contactor	
CFF	<b>[Incorrect config.]</b> (CFF): Invalid configuration when switching on	
CFI2	<b>[Bad conf.]</b> (CFI2): Error when transferring configuration	
CnF	<b>[Com. card]</b> (CnF): Interruption in network communication	
COF	<b>[CANopen com.]</b> (COF): Interruption in CANopen® communication	
CrF	<b>[Precharge]</b> (CrF): Charging relay error	
CSF	<b>[Ch. Sw. fault]</b> (CSF): Error switching channels	
dLF	<b>[Dynamic load fault]</b> (dLF): Dynamic load error	
EEF1	<b>[Control Eeprom]</b> (EEF1): EEPROM controller error	
EEF2	<b>[Power Eeprom]</b> (EEF2): EEPROM power supply error	
EPF1	<b>[External fault LI/Bit]</b> (EPF1): External error at LI or local connector	
EPF2	<b>[External fault com.]</b> (EPF2): Interruption in external communication card	
FCF1	<b>[Out. contact. stuck]</b> (FCF1): Output contactor closed	
FCF2	<b>[Out. contact. open.]</b> (FCF2): Output contactor open	
HCF	<b>[Cards pairing]</b> (HCF): Error with hardware configuration	
HdF	<b>[IGBT desaturation]</b> (HdF): Hardware error	
ILF	<b>[Internal com. link]</b> (ILF): Interruption in internal communication option	
InF1	<b>[Rating error]</b> (InF1): Unspecified inverter size	
InF2	<b>[Incomp./unspec. power card]</b> (InF2): Unspecified or incompatible power card	
InF3	<b>[Internal serial link]</b> (InF3): Interruption in internal serial communication	
InF4	<b>[Internal-mftg zone]</b> (InF4): Internal manufacturing error	
InF6	<b>[Internal - fault option]</b> (InF6): Unspecified error or incompatible option card	
InF9	<b>[Internal- I measure]</b> (InF9): Error measuring current	
InFA	<b>[Internal-mains circuit]</b> (InFA): Input phase loss error	
InFb	<b>[Internal- th. sensor]</b> (InFb): Temperature sensor error (OC or SC)	
InFE	<b>[internal- CPU]</b> (InFE): CPU error (RAM, flash memory, task, etc.)	
LCF	<b>[Line contactor]</b> (LCF): Line contactor error	
LFF3	<b>[AI3 4-20mA loss]</b> (LFF3): AI3 4 to 20 mA loss	
ObF	<b>[Overbraking]</b> (ObF): Overbraking	
OCF	<b>[Overcurrent]</b> (OCF): Overcurrent	
OHF	<b>[Inverter overheat]</b> (OHF): Inverter overheating	
OLC	<b>[Proc.Overload Fit]</b> (OLC): Torque overload	
OLF	<b>[Motor overload]</b> (OLF): Motor overload	
OPF1	<b>[1 output phase loss]</b> (OPF1): Output phase loss - 1	
OPF2	<b>[3out ph loss]</b> (OPF2): Output phase loss - 3	

The parameters described on this page can be accessed by: DRI- > MOn- > dGt- > pFH-		
Code	Name/Description	Unit
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	
CLl	[Current Limit](CLl): 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](rH)).	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)	
Srb1	[SF01 Reg n-1] SF01 register x (1 in last position)	

The parameters described on this page can be accessed by: DRI- > MOn- > dGt- > pFH-

Code	Name/Description	Unit
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
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)

## The parameters described on this page can be accessed by: DRI- &gt; MOOn- &gt; dGt- &gt; pFL-

Code	Name/Description
InFE	<b>[Internal- CPU]</b> (InFE): CPU error (RAM, flash memory, task, etc.)
LCF	<b>[Line contactor]</b> (LCF): Line contactor error
LFF3	<b>[AI3 4-20mA loss]</b> (LFF3): AI3 4 to 20 mA loss
ObF	<b>[Overbraking]</b> (ObF): Overbraking
OCF	<b>[Overcurrent]</b> (OCF): Overcurrent
OHF	<b>[Inverter overheat]</b> (OHF): Inverter overheating
OLC	<b>[Proc.Overload Fit]</b> (OLC): Torque overload
OLF	<b>[Motor overload]</b> (OLF): Motor overload
OPF1	<b>[1 output phase loss]</b> (OPF1): Output phase loss - 1
OPF2	<b>[3out ph loss]</b> (OPF2): Output phase loss - 3
OSF	<b>[Mains overvoltage]</b> (OSF): Oversupply error
OtFL	<b>[PTC fault]</b> (OtFL): Motor overheating detected by PTCL: Standard product
PHF	<b>[Input phase loss]</b> (PHF): Input phase loss - 1
PtFL	<b>[LI6=PTC overheat]</b> (PtFL): PtFL error (OC or SC)
SAFF	<b>[Safety fault]</b> (SAFF): Triggers safety function
SCF1	<b>[Motor short circuit]</b> (SCF1): Motor short circuit (hardware detection)
SCF3	<b>[Ground short circuit]</b> (SCF3): Direct ground short-circuit (hardware detection)
SCF4	<b>[IGBT short circuit]</b> (SCF4): IGBT short circuit (hardware detection)
SCF5	<b>[Motor short circuit]</b> (SCF5): Load short-circuit during Igon-loading sequence (hardware detection)
SLF1	<b>[Modbus com.]</b> (SLF1): Interruption in local serial Modbus communication
SLF2	<b>[PC com.]</b> (SLF2): Interruption in PC software communication
SLF3	<b>[HMI com.]</b> (SLF3): Interruption in communication with external operator terminal
SOF	<b>[Overspeed]</b> (SOF): Overspeed
SPF	<b>[Speed fdbck loss]</b> (SPF): Missing encoder feedback signal
SSF	<b>[Torque/current lim]</b> (SSF): Torque limiting error
tJF	<b>[IGBT overheat]</b> (tJF): IGBT overheating
tnF	<b>[Auto-tuning]</b> (tnF): Autotuning error
ULF	<b>[Proc. underload Fit]</b> (ULF): Speed underload
USF	<b>[Undervoltage]</b> (USF): Undervoltage

## The parameters described on this page can be accessed by: DRI- &gt; MOOn- &gt; dGt- &gt; AFI-

Code	Name/Description
AFI-	<b>[MORE FAULT INFO]</b> Additional error information
CnF	<b>[Com. network]</b> 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 corrected. The parameter is reset, after the inverter has been disconnected from and then reconnected to the power supply. The values of this parameter depend on the network card. Read the user's manual for the relevant card.
ILF1	<b>[Internal link fault 1]</b> 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 corrected. The parameter is reset, after the inverter has been disconnected from and then reconnected to the power supply.
SFFE	<b>[Safety fault reg.]</b> <sup>(1)</sup> 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	<b>[Safety fault Reg1]</b> <sup>(1)</sup> 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 <b>[SAFF Subcode 4]</b> (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	<p><b>[Safety fault Reg2]</b> <sup>(1)</sup></p> <p>This error register is used for motor control.</p> <p>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</p>
SF00	<p><b>[SAFF Subcode 0]</b> <sup>(1)</sup></p> <p>This error register is used for automated application tests.</p> <p>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</p>
SF01	<p><b>[SAFF Subcode 1]</b> <sup>(1)</sup></p> <p>This diagnostics error register is used for logic inputs.</p> <p>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</p>
SF02	<p><b>[SAFF Subcode 2]</b> <sup>(1)</sup></p> <p>This register is used for detected errors relating to application watchdog management.</p> <p>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</p>
SF03	<p><b>[SAFF Subcode 3]</b> <sup>(1)</sup></p> <p>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</p>
SF04	<p><b>[SAFF Subcode 4]</b> <sup>(1)</sup></p> <p>This register is used for detected errors relating to function <b>[Safe stop]</b> (StO).</p> <p>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</p>

The parameters described on this page can be accessed by: DRI- > MOn- > dGt- > AFi-	
Code	Name/Description
SF05	<b>[SAFF Subcode 5]</b> <sup>(1)</sup> This register is used for detected errors relating to function <b>[Safe ramp]</b> (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	<b>[SAFF Subcode 6]</b> <sup>(1)</sup> This register is used for detected errors relating to function <b>[Spd limited]</b> (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	<b>[SAFF Subcode 7]</b> <sup>(1)</sup> This register is used for detected errors relating to application watchdog management. Bit 0 to 15: Reserved
SF08	<b>[SAFF Subcode 8]</b> <sup>(1)</sup> 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	<b>[SAFF Subcode 9]</b> <sup>(1)</sup> This register is used for detected errors relating to automated motor control 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 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	<b>[SAFF Subcode 10]</b> <sup>(1)</sup> 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	<b>[SAFF Subcode 11]</b> <sup>(1)</sup> 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-	<b>[Diagnostics](continued)</b>
tAC	<b>[IGBT alarm counter]</b> Transistor alarm time counter (time frame in which alarm "IGBT temperature" was active).
tAC2	<b>[Min. freq time]</b> 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	<b>[IGBT alarm Nb]</b> Transistor alarm counter: Numerical value detected during lifecycle Displayed when <b>[3.1 ACCESS LEVEL]</b> (LAC) is set to <b>[Expert]</b> (Epr).
SEr-	<b>[SERVICE MESSAGE]</b>
rFLt	<b>[Reset past faults]</b> Reset all resettable errors detected so far.
nO	<b>[No]</b> (nO): Reset not active
YES	<b>[YES]</b> (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.

## 5.2.2.3.11 [1.2 MONITORING] (COd-)

The parameters described on this page can be accessed by: DRI- > MOn- > COd-	
Code	Name/Description
COd-	<b>[PASSWORD]</b> HMI access code. If you have lost your code, please contact B&R.
CSt	<b>[State]</b> Inverter state (locked/unlocked) Information parameter, cannot be modified.
LC	<b>[Locked]</b> (LC): The inverter is locked and requires a password to unlock.
ULC	<b>[Unlocked]</b> (ULC): The inverter is not locked and does not require a password.
COd	<b>[PIN code 1]</b> 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 <b>[1.2 MONITORING]</b> (MOn-) and <b>[1.1 SPEED REFERENCE]</b> (rEF-) can be accessed. Key MODE can be used to switch between menus.  <b>Note:</b>  <b>Make a note of the code before entering it.</b>
OFF	<b>[OFF]</b> (OFF): No access codes. <ul style="list-style-type: none"><li>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. <b>[ON]</b>(On) will be displayed on the screen, indicating that access is locked.</li></ul>
On	<b>[ON]</b> (On): Access is locked by means of a code (2 to 9,999). <ul style="list-style-type: none"><li>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.</li><li>If an invalid code is entered, the display changes to <b>[ON]</b>(On). Access remains locked.</li></ul> Access is unlocked (the code is shown on the display). <ul style="list-style-type: none"><li>To lock access again using the same code after it has been unlocked, use the handwheel to enter setting <b>[ON]</b>(On) and then press ENT. <b>[ON]</b>(On) will remain on the display, indicating that access is locked.</li><li>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. <b>[ON]</b>(On) will be displayed on the screen, indicating that access is locked.</li><li>To clear the access lock after it has been unlocked, use the handwheel to enter setting <b>[OFF]</b>(OFF) and then press ENT. <b>[OFF]</b>(OFF) will continue to be displayed. Access is unlocked and will still be unlocked after the next restart.</li></ul>
COd2	<b>[PIN code 2]</b> Access code 2. Displayed when <b>[3.1 ACCESS LEVEL]</b> (LAC) is set to <b>[Expert]</b> (Epr).
	
OFF	Value <b>[OFF]</b> (OFF) indicates that no password has been set for <b>[Unlocked]</b> (ULC)
On	Value <b>[ON]</b> (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	<b>[Upload rights]</b>
ULr0	<b>[Permitted]</b> (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	<b>[Not allowed]</b> (ULr1): This indicates that ACPI SafeConfigurator or the graphic display terminal cannot store the configuration.
dLr	<b>[Download rights]</b>
dLr0	<b>[Locked drv]</b> (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	<b>[Unlock. drv]</b> (dLr1): Inverter unlocked: This indicates that the configuration can only be downloaded to a inverter that is not protected by an active password.
dLr2	<b>[Not allowed]</b> (dLr2): Not permitted: The configuration cannot be downloaded.
dLr3	<b>[Lock/unlock]</b> (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.

## 5.2.3 Configuration mode (ConF)

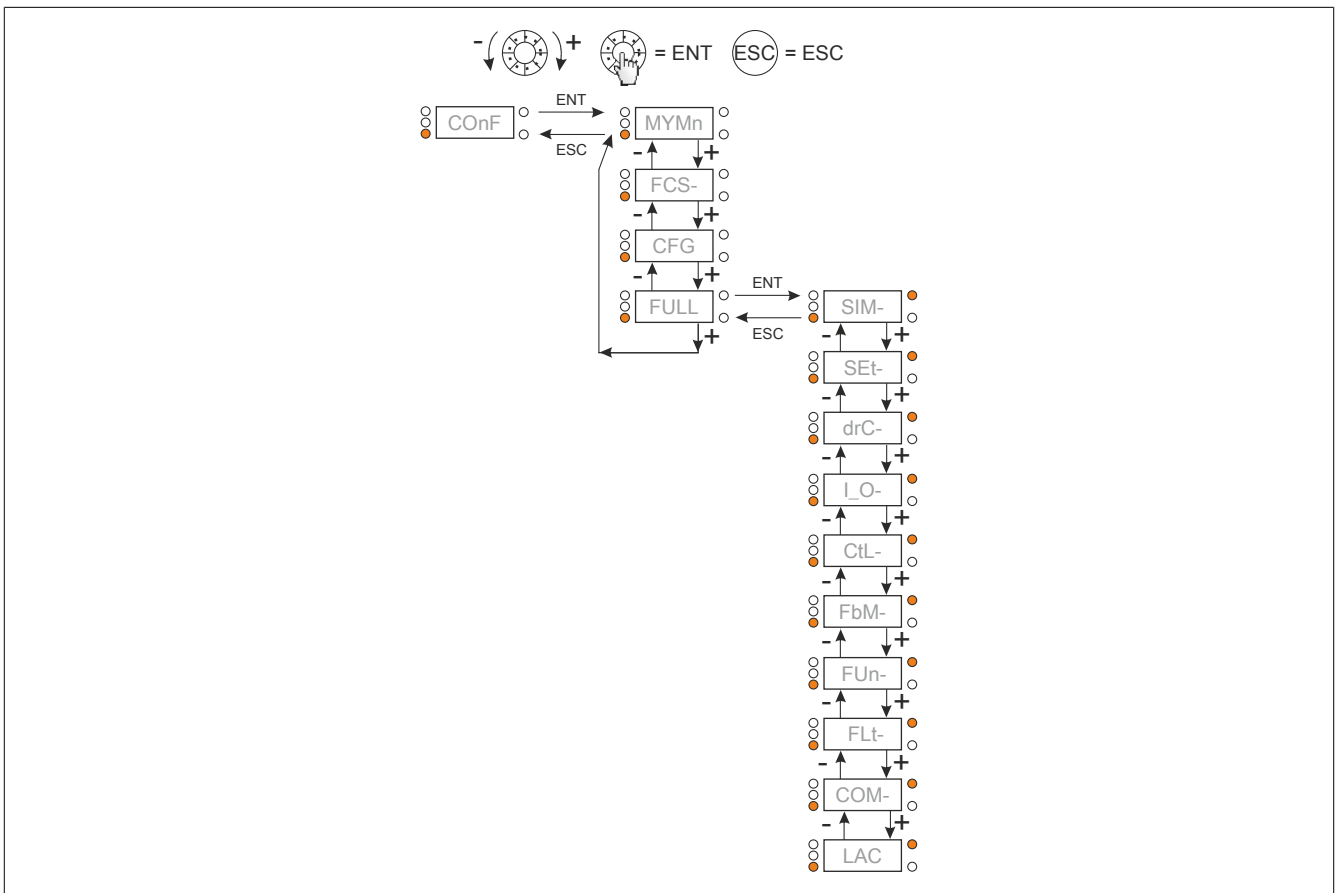
### 5.2.3.1 Introduction

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)**

### 5.2.3.2 Tree structure




The parameters are provided as an example.



### 5.2.3.3 My Menu

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

### 5.2.3.4 Factory settings

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



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

### 5.2.3.5 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	<h2 style="margin: 0;">Danger!</h2> <p style="margin: 0;"><b>UNEXPECTED OPERATION OF THE EQUIPMENT</b></p> <p style="margin: 0;">Make sure that the selected macro configuration is compatible with the type of wiring used.</p> <p style="margin: 0;">Failure to follow these instructions can result in death, serious injury or damage to property.</p>	
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.



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

#### Example of total return to factory settings

- [Selection config.] (FCSI) = [Macro conf] (InI)
- [PARAMETER GROUP](FrY-) = [All](ALL)
- [Goto FACTORY SETTINGS](GFS) = [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) <sup>(1)</sup>
[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.

#### Note:

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:**

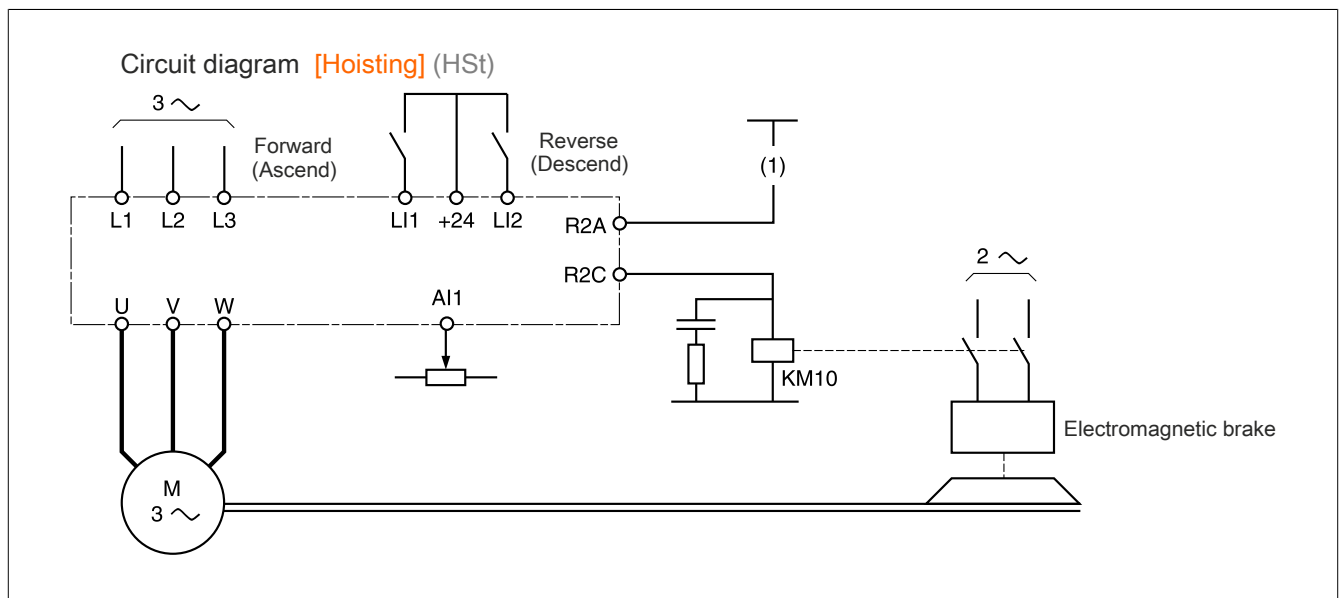
- **[Movement type]**(bSt) = **[Hoisting]**(UEr)
- **[Brake contact]**(bCl) = **[No]**(nO)
- **[Brake impulse]**(bIP) = **[YES]**(YES)
- **[Brake release I FW]**(lbr) = 0 A
- **[Brake Release time]**(brt) = 0 s
- **[Brake release freq.]**(blr) = **[Auto]**(AUtO)
- **[Brake engage freq.]**(bEn) = **[Auto]**(AUtO)
- **[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]**(FCSt) = **[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.

**Note:**


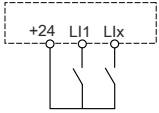
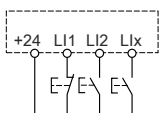



The factory settings correspond to **[Macro configuration]**(CFG) = **[Start/Stop]**(StS), that is, the factory defined macro configuration.

**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 51).

### 5.2.3.6 Full



#### 5.2.3.6.1 [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-	<b>[SIMPLY START]</b>		
tCC	<b>[2/3 wire control]</b>		<b>[2 wire](2C)</b>
 2 s	<p><b>Danger!</b></p> <p><b>UNEXPECTED OPERATION OF THE EQUIPMENT</b></p> <p>Changing this parameter causes parameters <b>[Reverse assign.](rRS)</b> and <b>[2 wire type](tCt)</b> as well as the digital inputs assignments to revert to factory settings.</p> <p>Check that this change is compatible with the wiring used.</p> <p>Failure to follow these instructions can result in death, serious injury or damage to property.</p>		
2C	<p><b>[2 wire](2C)</b></p> <p><b>2-wire control (level-controlled):</b> The input state (0 or 1) or edge (0 to 1 or 1 to 0) controls running or stopping.</p>		
	 <p>L1: forward Lx: reverse</p>		
3C	<p><b>[3 wire](3C)</b></p> <p><b>3-wire control (edge-controlled):</b> A "forward" or "reverse" pulse is sufficient to control motor startup. A "stop" pulse is sufficient to control motor stopping.</p> <p>Source wiring example:</p>		
	 <p>L1: stop L2: forward Lx: reverse</p>		
CFG	<b>[Macro configuration]</b>		<b>[Start/Stop](StS)</b>
  2 s	<p><b>Danger!</b></p> <p><b>UNEXPECTED OPERATION OF THE EQUIPMENT</b></p> <p>Make sure that the selected macro configuration is compatible with the type of wiring used.</p> <p>Failure to follow these instructions can result in death, serious injury or damage to property.</p>		
StS	<b>[Start/Stop] (StS):</b> Start/Stop		
HdG	<b>[M. handling](HdG):</b> Materials handling		
HSt	<b>[Hoisting](HSt):</b> Hoisting gear		
GEn	<b>[Gen. Use](GEn):</b> General applications		
PId	<b>[PID regul.](PId):</b> PID controllers		
nEt	<b>[Network C.](nEt):</b> Communication bus		
CcFG	<b>[Customized macro]</b>		
	Read-only parameter, only visible if at least one macro configuration parameter has been modified.		
nO	<b>[No](nO):</b> No		
YES	<b>[YES](YES):</b> Yes		
bFr	<b>[Standard mot. freq]</b>		<b>[50 Hz IEC](50)</b>
	This parameter changes the default setting of the following parameters: <b>[Rated motor volt.](UnS)</b> , <b>[High speed](HSP)</b> , <b>[Freq. threshold](Ftd)</b> , <b>[Rated motor freq.](FrS)</b> and <b>[Max frequency](tFr)</b> .		
50	<b>[50Hz IEC](50):</b> 50 Hz inverter		
60	<b>[60Hz NEMA](60):</b> 60 Hz inverter		
IPL	<b>[Input phase loss]</b>		Yes or No, depending on the inverter power
	<p>This parameter is available in this menu for 3-phase inverters only.</p> <p>If a phase is lost, the inverter switches to error mode <b>[Input phase loss](PHF)</b>. If two or three phases are lost, however, the inverter resumes operation until an undervoltage error is triggered (the inverter triggers <b>[Input phase loss](PHF)</b> in the case of a mains phase failure that results in power loss).</p>		
nO	<b>[Ignore](nO):</b> Error ignored: To be used when the power to the inverter is supplied via a single-phase supply or by the DC bus.		
YES	<b>[Freewheel](YES):</b> Error when coasting to a stop.		

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

Code	Name/Description	Setting range	Factory settings
nPr	<b>[Rated motor power]</b>	See table.	See table.
★	Rated motor power per the nameplate, in kW, if <b>[Standard mot. freq](bFr)</b> = <b>[50 Hz IEC](50)</b> or in PS, if <b>[Standard mot. freq](bFr)</b> = <b>[60 Hz NEMA](60)</b> . For induction motors with (BFR) = 50 Hz, the following table applies:		
	<b>ACOPOSinverter P76</b>	<b>Setting range</b>	<b>Default [10 W]</b>
		<b>Min. value [10 W]</b>	<b>Max. value [10 W]</b>
	8I76S200018.00-000	9	55
	8I76S200037.00-000	9	75
	8I76S200055.00-000	9	110
	8I76S200075.00-000	9	150
	8I76S200110.00-000	9	220
	8I76S200150.00-000	18	300
	8I76S200220.00-000	37	400
	8I76T400037.00-000	9	75
	8I76T400055.00-000	9	110
	8I76T400075.00-000	9	150
	8I76T400110.00-000	9	220
	8I76T400150.00-000	18	300
	8I76T400220.00-000	37	400
	8I76T400300.00-000	55	550
	8I76T400400.00-000	75	750
	8I76T400550.00-000	110	1100
	8I76T400750.00-000	150	1500
	8I76T401100.00-000	220	1850
	8I76T401500.00-000	300	2200
	For induction motors with (BFR) = 60 Hz, the following table applies:		
	<b>ACOPOSinverter P76</b>	<b>Setting range</b>	<b>Default [0.1 HP]</b>
		<b>Min. value [0.1 HP]</b>	<b>Max. value [0.1 HP]</b>
	8I76S200018.00-000	1	8
	8I76S200037.00-000	1	10
	8I76S200055.00-000	1	15
	8I76S200075.00-000	1	20
	8I76S200110.00-000	1	30
	8I76S200150.00-000	3	40
	8I76S200220.00-000	5	50
	8I76T400037.00-000	1	10
	8I76T400055.00-000	1	15
	8I76T400075.00-000	1	20
	8I76T400110.00-000	1	30
	8I76T400150.00-000	3	40
	8I76T400220.00-000	5	50
	8I76T400300.00-000	8	70
	8I76T400400.00-000	10	100
	8I76T400550.00-000	15	150
	8I76T400750.00-000	20	200
	8I76T401100.00-000	30	250
	8I76T401500.00-000	40	300
UnS	<b>[Rated motor volt.]</b>	100 to 480 V	According to inverter performance
★	Nominal voltage of the motor specified on the nameplate. 8I76S200xxx.00-000: 100 to 240 V - 8I76T40xxxx.00-000: 200 to 480 V		
nCr	<b>[Rated mot. current]</b>	See table <sup>(1)</sup> .	See table.
★	Nominal current per the nameplate.		
	<b>ACOPOSinverter P76</b>	<b>Setting range</b>	<b>Default [0.1 A]</b>
		<b>Min. value [0.1 A]</b>	<b>Max. value [0.1 A]</b>
	8I76S200018.00-000	3	23
	8I76S200037.00-000	8	50
	8I76S200055.00-000	9	56
	8I76S200075.00-000	12	72
	8I76S200110.00-000	17	104
	8I76S200150.00-000	20	120
	8I76S200220.00-000	27	165
	8I76T400037.00-000	3	23
	8I76T400055.00-000	4	29
	8I76T400075.00-000	5	35
	8I76T400110.00-000	7	45
	8I76T400150.00-000	10	62
	8I76T400220.00-000	13	83
	8I76T400300.00-000	17	107
	8I76T400400.00-000	23	143
	8I76T400550.00-000	35	215
	8I76T400750.00-000	42	255
	8I76T401100.00-000	69	416
	8I76T401500.00-000	82	495
FrS	<b>[Rated motor freq.]</b>	10 to 800 Hz	50 Hz
★	Rated motor frequency given on the nameplate. The factory setting is 50 Hz and is replaced by a default setting of 60 Hz if <b>[Standard mot. freq](bFr)</b> is set to 60 Hz. This parameter is not available if <b>[Motor control type](Ctt)</b> = <b>[Sync. mot.](SYn)</b> .		

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

Code	Name/Description	Setting range	Factory settings																																																																																																
nSP 	<p><b>[Rated motor speed]</b></p> <p>Rated motor speed given on the nameplate.                      This parameter is not available if <b>[Motor control type](Ctt)</b> is set to <b>[Sync. mot.](SYn)</b>.                      0 to 9999 rpm then 10.00 to 65.535 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:</p> $\text{Nominal speed} = \text{Synchronous speed} \times \frac{100 - \text{slip as a \%}}{100}$ <p>or</p> $\text{Nominal speed} = \text{Synchronous speed} \times \frac{50 - \text{slip in Hz}}{50} \text{ (50 Hz motors)}$ <p>or</p> $\text{Nominal speed} = \text{Synchronous speed} \times \frac{60 - \text{slip in Hz}}{60} \text{ (60 Hz motors)}$ <p>If (BFR) = 50:</p> <table border="1"> <thead> <tr> <th colspan="2">ACOPOSinverter P76</th> <th colspan="2">Setting range</th> </tr> <tr> <th></th> <th>Min. value [rpm]</th> <th>Max. value [rpm]</th> <th>Default [rpm]</th> </tr> </thead> <tbody> <tr><td>8I76S200018.00-000</td><td rowspan="20">0 rpm</td><td rowspan="20">65,535 rpm</td><td>1410</td></tr> <tr><td>8I76S200037.00-000</td><td>1425</td></tr> <tr><td>8I76S200055.00-000</td><td>1400</td></tr> <tr><td>8I76S200075.00-000</td><td>1400</td></tr> <tr><td>8I76S200110.00-000</td><td>1410</td></tr> <tr><td>8I76S200150.00-000</td><td>1420</td></tr> <tr><td>8I76S200220.00-000</td><td>1430</td></tr> <tr><td>8I76T400037.00-000</td><td>1425</td></tr> <tr><td>8I76T400055.00-000</td><td>1400</td></tr> <tr><td>8I76T400075.00-000</td><td>1400</td></tr> <tr><td>8I76T400110.00-000</td><td>1410</td></tr> <tr><td>8I76T400150.00-000</td><td>1420</td></tr> <tr><td>8I76T400220.00-000</td><td>1430</td></tr> <tr><td>8I76T400300.00-000</td><td>1420</td></tr> <tr><td>8I76T400400.00-000</td><td>1425</td></tr> <tr><td>8I76T400550.00-000</td><td>1430</td></tr> <tr><td>8I76T400750.00-000</td><td>1450</td></tr> <tr><td>8I76T401100.00-000</td><td>1450</td></tr> <tr><td>8I76T401500.00-000</td><td>1455</td></tr> </tbody> </table> <p>If (BFR) = 60</p> <table border="1"> <thead> <tr> <th colspan="2">ACOPOSinverter P76</th> <th colspan="2">Setting range</th> </tr> <tr> <th></th> <th>Min. value [rpm]</th> <th>Max. value [rpm]</th> <th>Default [rpm]</th> </tr> </thead> <tbody> <tr><td>8I76S200018.00-000</td><td rowspan="20">0 rpm</td><td rowspan="20">65,535 rpm</td><td>1680</td></tr> <tr><td>8I76S200037.00-000</td><td>1720</td></tr> <tr><td>8I76S200055.00-000</td><td>1700</td></tr> <tr><td>8I76S200075.00-000</td><td>1700</td></tr> <tr><td>8I76S200110.00-000</td><td>1680</td></tr> <tr><td>8I76S200150.00-000</td><td>1715</td></tr> <tr><td>8I76S200220.00-000</td><td>1715</td></tr> <tr><td>8I76T400037.00-000</td><td>1720</td></tr> <tr><td>8I76T400055.00-000</td><td>1700</td></tr> <tr><td>8I76T400075.00-000</td><td>1700</td></tr> <tr><td>8I76T400110.00-000</td><td>1680</td></tr> <tr><td>8I76T400150.00-000</td><td>1715</td></tr> <tr><td>8I76T400220.00-000</td><td>1715</td></tr> <tr><td>8I76T400300.00-000</td><td>1760</td></tr> <tr><td>8I76T400400.00-000</td><td>1769</td></tr> <tr><td>8I76T400550.00-000</td><td>1780</td></tr> <tr><td>8I76T400750.00-000</td><td>1780</td></tr> <tr><td>8I76T401100.00-000</td><td>1766</td></tr> <tr><td>8I76T401500.00-000</td><td>1771</td></tr> </tbody> </table>	ACOPOSinverter P76		Setting range			Min. value [rpm]	Max. value [rpm]	Default [rpm]	8I76S200018.00-000	0 rpm	65,535 rpm	1410	8I76S200037.00-000	1425	8I76S200055.00-000	1400	8I76S200075.00-000	1400	8I76S200110.00-000	1410	8I76S200150.00-000	1420	8I76S200220.00-000	1430	8I76T400037.00-000	1425	8I76T400055.00-000	1400	8I76T400075.00-000	1400	8I76T400110.00-000	1410	8I76T400150.00-000	1420	8I76T400220.00-000	1430	8I76T400300.00-000	1420	8I76T400400.00-000	1425	8I76T400550.00-000	1430	8I76T400750.00-000	1450	8I76T401100.00-000	1450	8I76T401500.00-000	1455	ACOPOSinverter P76		Setting range			Min. value [rpm]	Max. value [rpm]	Default [rpm]	8I76S200018.00-000	0 rpm	65,535 rpm	1680	8I76S200037.00-000	1720	8I76S200055.00-000	1700	8I76S200075.00-000	1700	8I76S200110.00-000	1680	8I76S200150.00-000	1715	8I76S200220.00-000	1715	8I76T400037.00-000	1720	8I76T400055.00-000	1700	8I76T400075.00-000	1700	8I76T400110.00-000	1680	8I76T400150.00-000	1715	8I76T400220.00-000	1715	8I76T400300.00-000	1760	8I76T400400.00-000	1769	8I76T400550.00-000	1780	8I76T400750.00-000	1780	8I76T401100.00-000	1766	8I76T401500.00-000	1771	See table.	See table for induction motors.
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tFr			<p><b>[Max frequency]</b></p> <p>The factory setting is 60 Hz and is replaced by a default setting of 72 Hz if <b>[Standard mot. freq](bFr)</b> is set to 60 Hz.                      The maximum value is limited by the following conditions:                      It must not exceed 10 times the value of <b>[Rated motor freq.](FrS)</b>.</p>	10 to 599 Hz or 1*FrS(S)	60 Hz (if (BFR) = 50 Hz) or 72 Hz (if (BFR) = 60 Hz)																																																																																														
tUn 	<b>[Auto-tuning]</b>		<b>[No](nO)</b>																																																																																																
tUS	<b>[Auto tuning status]</b>		<b>[Not done](tAb)</b>																																																																																																
tAb	<b>[Not done](tAb)</b> : Autotuning has not been executed.																																																																																																		
PEnd	<b>[Idle](PEnd)</b> : Autotuning has been requested but has not been executed yet.																																																																																																		
PrOG	<b>[Active](PrOG)</b> : Autotuning is being performed.																																																																																																		
FAIL	<b>[Failed](FAIL)</b> : Autotuning failed.																																																																																																		
dOnE	<b>[Done](dOnE)</b> : The stator resistance measured by the autotuning function is used to control the motor.																																																																																																		
StUn	<b>[Tune selection]</b>		<b>[Default](tAb)</b>																																																																																																
tAb	<b>[Default](tAb)</b> : The default value of the stator resistance is used to control the motor.																																																																																																		
MEAS	<b>[Measure](MEAS)</b> : The stator resistance measured by the autotuning function is used to control the motor.																																																																																																		
CUS	<b>[Customized](CUS)</b> : 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	<b>[Mot. therm. current]</b> 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: <b>[Motor control type](Ctt) = [Sync. mot.](SYn)</b>	See table <sup>(1)</sup> .	See table.
	<b>ACOPOSinverter P76</b>	<b>Setting range</b>	
		<b>Min. value [0.1 A]</b>	<b>Max. value [0.1 A]</b>
		<b>Default [0.1 A]</b>	
	8I76S200018.00-000	3	23
	8I76S200037.00-000	6	50
	8I76S200055.00-000	7	56
	8I76S200075.00-000	9	72
	8I76S200110.00-000	13	104
	8I76S200150.00-000	16	120
	8I76S200220.00-000	22	165
	8I76T400037.00-000	3	23
	8I76T400055.00-000	3	29
	8I76T400075.00-000	4	35
	8I76T400110.00-000	6	45
	8I76T400150.00-000	8	62
	8I76T400220.00-000	11	83
	8I76T400300.00-000	14	107
	8I76T400400.00-000	19	143
	8I76T400550.00-000	28	215
	8I76T400750.00-000	34	255
	8I76T401100.00-000	55	416
	8I76T401500.00-000	66	495
	<b>ACOPOSinverter P76</b>	<b>Setting range</b>	
		<b>Min. value [0.1 A]</b>	<b>Max. value [0.1 A]</b>
		<b>Default [0.1 A]</b>	
	8I76S200018.00-000	3	23
	8I76S200037.00-000	6	50
	8I76S200055.00-000	7	56
	8I76S200075.00-000	9	72
	8I76S200110.00-000	13	104
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	8I76T400400.00-000	19	143
	8I76T400550.00-000	28	215
	8I76T400750.00-000	34	255
	8I76T401100.00-000	55	416
	8I76T401500.00-000	66	495
ACC	<b>[Acceleration]</b> Time taken to accelerate from 0 to <b>[Rated motor freq.](FrS)</b> . 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 <sup>(2)</sup>	3.0 s
dEC	<b>[Deceleration]</b> Time taken to decelerate from <b>[Rated motor freq.](FrS)</b> 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 <sup>(2)</sup>	3.0 s
LSP	<b>[Low speed]</b> Motor speed with minimum setpoint, setting from 0 to <b>[High speed](HSP)</b> .	0 to 599 Hz or (HSP)	0
HSP	<b>[High speed]</b> Motor speed with maximum setpoint, setting from <b>[Low speed](LSP)</b> to <b>[Max frequency](tFr)</b> . The factory setting changes to 60 Hz if <b>[Standard mot. freq.](bFr) = [60 Hz NEMA] (60)</b> .	0 to 599 Hz	50 Hz

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



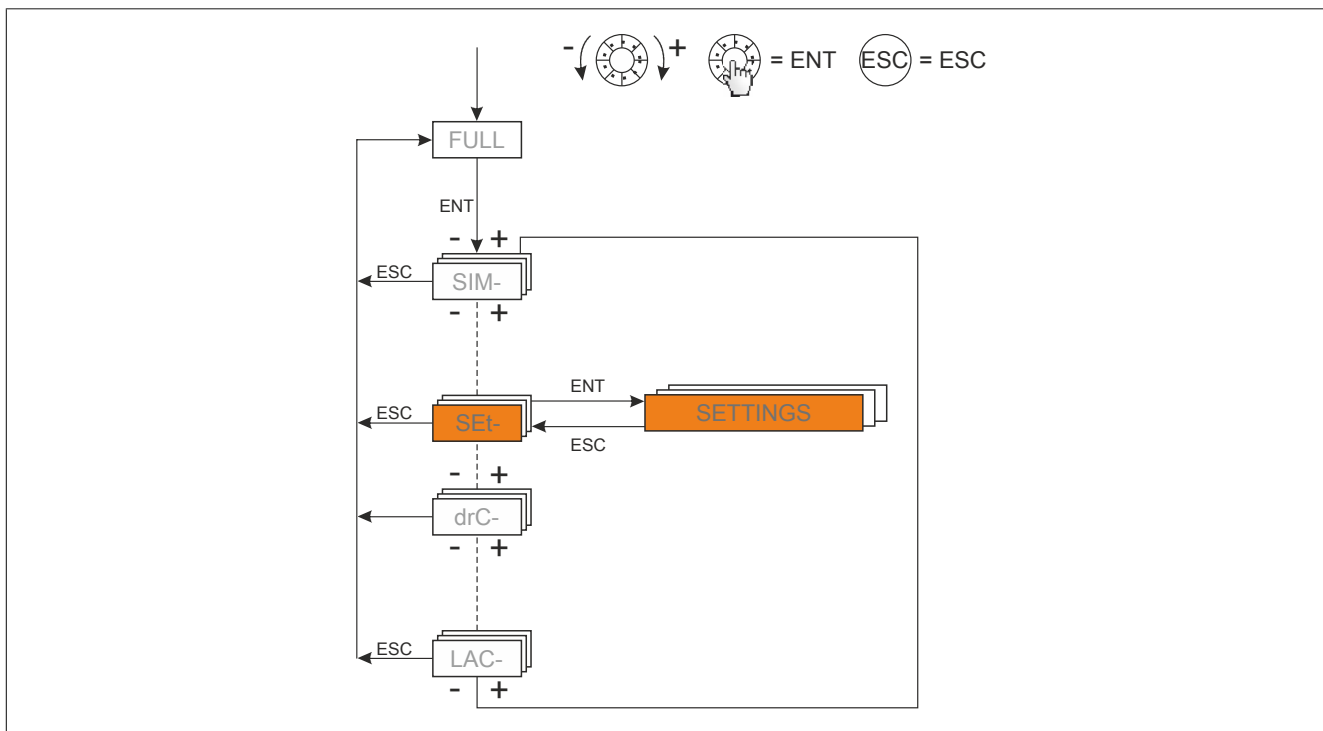
To change the assignment of this parameter, press the ENT key for 2 seconds.

### 5.2.3.6.2 [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 > SEt-			
Code	Name/Description	Setting range	Factory settings
SEt-	[SETTINGS]		
Inr 	[Ramp increment] This parameter applies to [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
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 <sup>(1)</sup>	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 <sup>(1)</sup>	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 <sup>(1)</sup>	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 <sup>(1)</sup>	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%

The parameters described on this page are accessed by: DRI- > COnF > FULL > SET-			
Code	Name/Description	Setting range	Factory settings
tA3 ★ ↻	<b>[Begin Dec round]</b> Rounding of the deceleration ramp start as a % of ramp time <b>[Deceleration]</b> (dEC) or <b>[Deceleration 2]</b> (dE2). Available if <b>[Ramp type]</b> (rPt) = <b>[Customized]</b> (CUS).	0 to 100%	10%
tA4 ★ ↻	<b>[End Dec round]</b> Rounding of the deceleration ramp end as a % of ramp time <b>[Deceleration]</b> (dEC) or <b>[Deceleration 2]</b> (dE2). Can be set to between 0% and 100% - <b>[Begin Dec round]</b> (tA3). Available if <b>[Ramp type]</b> (rPt) = <b>[Customized]</b> (CUS).	0 to 100%	10%
LSP ↻	<b>[Low speed]</b> Motor speed with minimum setpoint, setting from 0 to <b>[High speed]</b> (HSP).	0 to 599 Hz or (HSP)	0 Hz
HSP ↻	<b>[High speed]</b> Motor speed with maximum setpoint, setting from <b>[Low speed]</b> (LSP) to <b>[Max frequency]</b> (tFr). The factory setting changes to 60 Hz if <b>[Standard mot. freq]</b> (bFr) = <b>[60 Hz NEMA]</b> (60).	0 or (LSP) to 599 Hz or (TFR)	50 Hz (if (BFR) = 50 Hz) or 60 Hz (if (BFR) = 60 Hz)
HSP2 ★ ↻	<b>[High speed 2]</b> Available if <b>[2 High speed]</b> (SH2) has not been set to <b>[No]</b> (nO).	0 to 599 Hz	50 Hz
HSP3 ★ ↻	<b>[High speed 3]</b> Available if <b>[4 High speed]</b> (SH4) has not been set to <b>[No]</b> (nO).	0 to 599 Hz	50 Hz
HSP4 ★ ↻	<b>[High speed 4]</b> Available if <b>[4 High speed]</b> (SH4) has not been set to <b>[No]</b> (nO).	0 to 599 Hz	50 Hz

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

Code	Name/Description	Setting range	Factory settings																																																																																			
ItH 	<b>[Mot. therm. current]</b> 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: <b>[Motor control type](Ctt) = [Sync. mot.](SYn)</b>	See table <sup>(2)</sup> .	See table.																																																																																			
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UFr 	<b>[IR compensation]</b> IR compensation.	0 to 200%	100%																																																																																			
SLP  	<b>[Slip compensation]</b> Slip compensation.	0 to 300%	100%																																																																																			
SFC  	<b>[K speed loop filter]</b> Speed filter coefficient.	0 to 100	65																																																																																			
SIt  	<b>[Speed time integral]</b> Integral time constant for speed control.	1 to 65,535 ms	63 ms																																																																																			
VOLT  	<b>[Speed prop. gain]</b> Proportional gain for speed control.	0 to 1,000%	40%																																																																																			
SPGU  	<b>[UF inertia comp.]</b> 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) 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.

### 5.2.3.6.2.1 Parameter settings

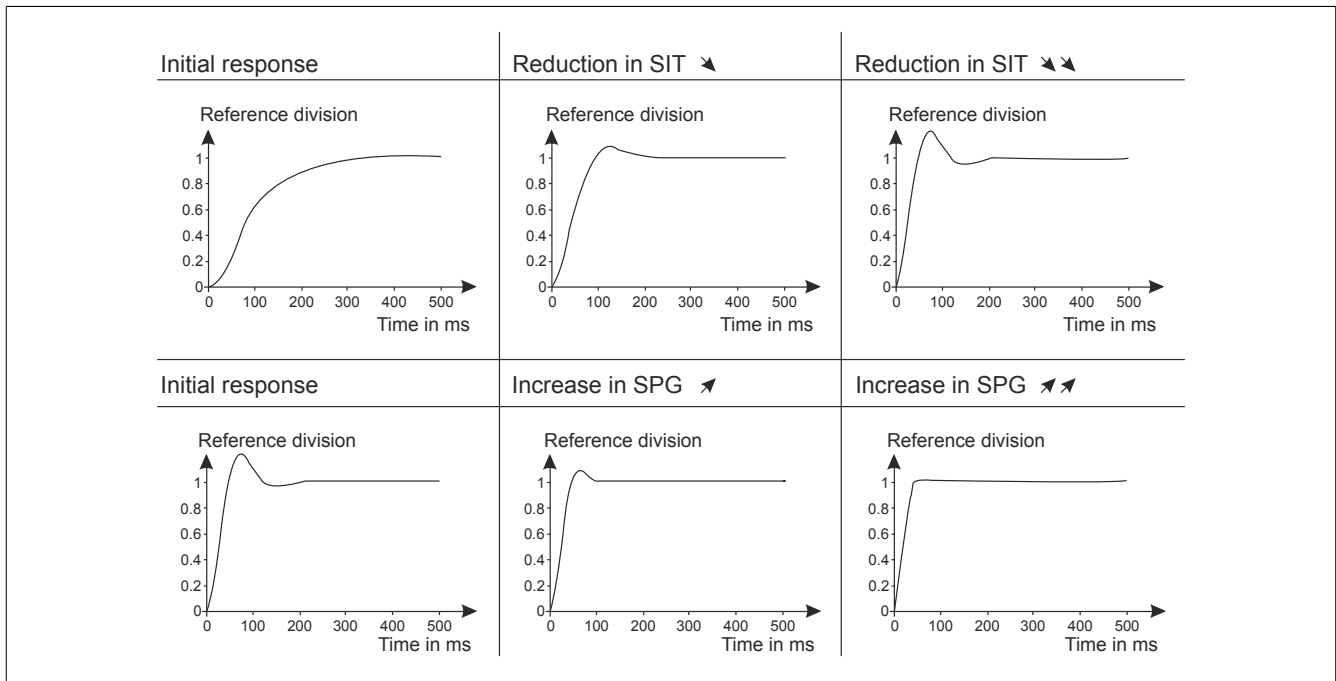
#### Parameter settings for [K speed loop filter] (SFC), [Speed prop. gain] (SPG) and [Speed time integral] (SIt)

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.



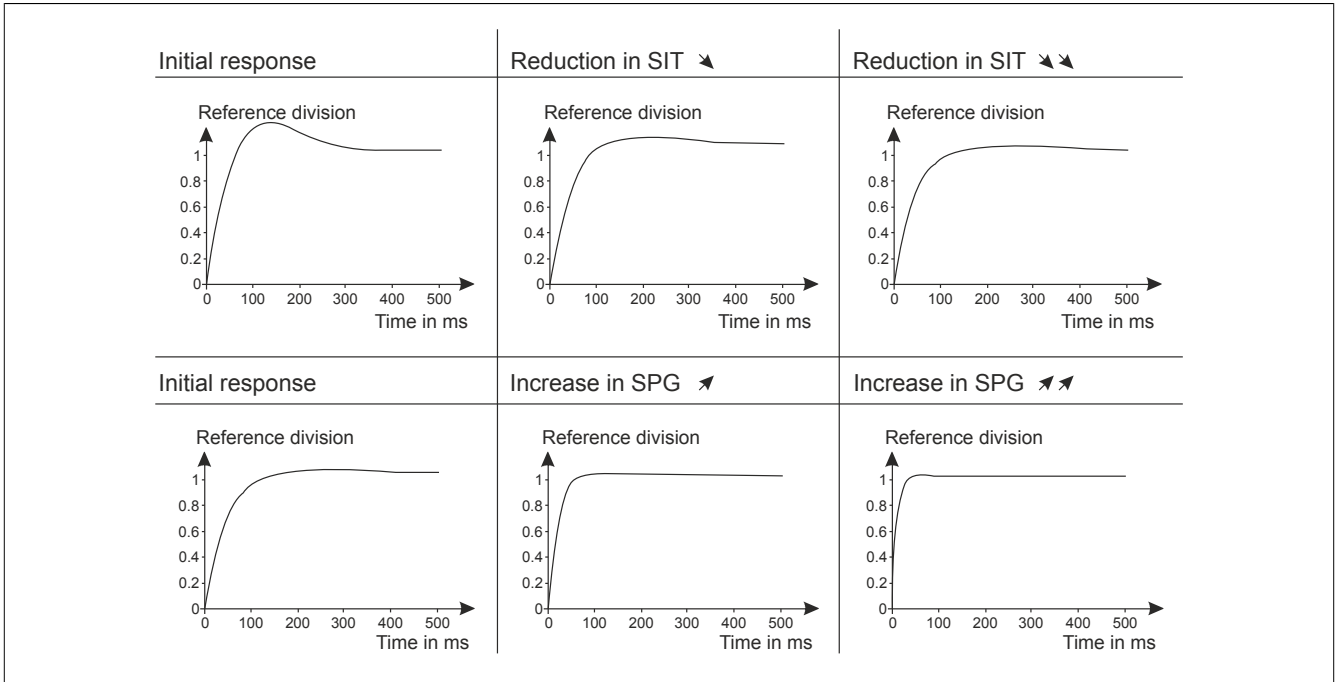
#### Special case: Parameter [K speed loop filter](SFC) not equal to 0

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 > SET-

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 <sup>(1)</sup>	0.64*INV <sup>(1)</sup>
tdI ★ ↻	[DC injection time 1] 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 ★ ↻	[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 <sup>(1)</sup>	0.5*INV <sup>(1)</sup>
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] <b>Note:</b> <b>MOTOR OVERHEATING AND DAMAGE</b> 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 <sup>(1)</sup>	0.7*INV <sup>(1)</sup>
tdC1 ★ ↻	[Auto DC inj. time 1] <b>Note:</b> <b>MOTOR OVERHEATING AND DAMAGE</b> 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

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

Code	Name/Description	Setting range	Factory settings
SdC2  	<b>[Auto DC inj. level 2]</b>  <b>Note:</b> <b>MOTOR OVERHEATING AND DAMAGE</b> 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.  2nd level of standstill DC injection current. This parameter can be activated if <b>[Auto DC injection]</b> (AdC) is not set to <b>[No]</b> (nO).	0 to 1.2*INV <sup>(1)</sup>	0.5*INV <sup>(1)</sup>
tdC2  	<b>[Auto DC inj. time 2]</b>  <b>Note:</b> <b>MOTOR OVERHEATING AND DAMAGE</b> 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.  2nd standstill injection time. This parameter can be accessed if <b>[Auto DC injection]</b> (AdC) is set to <b>[YES]</b> (YES).	0 to 30 s	0 s
SFr 	<b>[Switching freq.]</b>  <b>Note:</b> <b>MOTOR DAMAGE</b> 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. <b>Setting range:</b> The maximum value is limited to 4 kHz if parameter <b>[Motor surge limit]</b> (SVL) has been configured.  <b>Note:</b> In the event of an excessive temperature increase, the inverter will automatically reduce the clock frequency and then reset it again as soon as the temperature has reverted to within the normal range.	2 to 16 kHz or 4kHz (if (SVL) is enabled)	4 kHz
CLI  	<b>[CURRENT LIMIT.]</b>  <b>Note:</b> <b>MOTOR OVERHEATING AND DAMAGE</b> <ul style="list-style-type: none"> <li>Make sure that the motor has the required power rating for the applied maximum current.</li> <li>In order to calculate the maximum current, take the motor work cycle and all the factors involved in using the motor into account, including derating requirements.</li> </ul> Failure to observe these instructions can result in damage to the equipment.  Used to limit the motor current.  <b>Note:</b> If the setting is less than 0.25 In, the inverter can be locked in error mode <b>[Output Phase Loss]</b> (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 <sup>(1)</sup>	1.5*INV <sup>(1)</sup>
CL2  	<b>[I Limit. 2 value]</b>  <b>Note:</b> <b>MOTOR OVERHEATING AND DAMAGE</b> <ul style="list-style-type: none"> <li>Make sure that the motor has the required power rating for the applied maximum current.</li> <li>In order to calculate the maximum current, take the motor work cycle and all the factors involved in using the motor into account, including derating requirements.</li> </ul> Failure to observe these instructions can result in damage to the equipment.  <b>Note:</b> If the setting is less than 0.25 In, the inverter can be locked in error mode <b>[Output Phase Loss]</b> (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 <sup>(1)</sup>	1.5*INV <sup>(1)</sup>

The parameters described on this page are accessed by: DRI- > COnF > FULL > SET-			
Code	Name/Description	Setting range	Factory settings
FLU    2 s	<p><b>[Motor fluxing]</b></p> <p><b>Danger!</b></p> <p>RISK OF ELECTRIC SHOCK, ARC FLASH OR EXPLOSION</p> <p>If parameter <b>[Motor fluxing](FLU)</b> is set to <b>[continuous](Fct)</b> fluxing will always occur, even when the motor is not running.</p> <p>Make sure that this setting does not result in unsafe states.</p> <p>Failure to follow these instructions can result in death or serious injury.</p> <p><b>Note:</b></p> <p><b>MOTOR OVERHEATING AND DAMAGE</b></p> <p>To prevent motor overheating and damage, check whether the connected motor has the correct sizing for the magnetizing current.</p> <p>Failure to observe these instructions can result in damage to the equipment.</p> <p>The parameter is available if <b>[Motor control type](Ctt)</b> is not set to <b>[Sync. mot.](SYn)</b>. In order to obtain rapid high torque on startup, magnetic flux needs to already have been established in the motor. In mode <b>[continuous](Fct)</b>, the inverter automatically creates the magnetic flux at startup. In mode <b>[Not cont.](FnC)</b>, fluxing occurs when the motor has been started up. The value of the magnetizing current is greater than <b>[Rated mot. current](nCr)</b> during the creation of the magnetic flux and is then regulated by the value of the magnetizing current of the motor.</p> <p><b>[Not cont.](FnC)</b>: Non-continuous mode</p> <p><b>[continuous](Fct)</b>: Continuous mode. This option is not possible if <b>[Auto DC injection](AdC)</b> is set to <b>[YES](YES)</b>, or if <b>[Type of stop](Stt)</b> was set to <b>[Freewheel](nSt)</b>.</p> <p><b>[No](FnO)</b>: Function inactive. This option is not possible if <b>[Brake assignment](bLC)</b> is not set to <b>[No](nO)</b>.</p>		<b>[No](FnO)</b>
tLS 	<p><b>[Low speed time out]</b></p> <p>Maximum operating time with <b>[Low speed](LSP)</b>. 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.</p> <p><b>Note:</b></p> <p>A value of 0 indicates an unlimited period of time.</p> <p><b>Note:</b></p> <p>If <b>[Low speed time out](tLS)</b> is not equal to 0, parameter <b>[Type of stop](Stt)</b> is forced to <b>[Ramp stop](rMP)</b> (only if "stop via ramp" can be configured).</p>	0 to 999.9 s	0 s
JGF  	<p><b>[Setpoint step mode]</b></p> <p>Reference in jog operation.</p>	0 to 10 Hz	10 Hz
JGt  	<p><b>[Jog delay]</b></p> <p>Debounce delay between two consecutive step modes.</p>	0 to 2 s	0.5 s

(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.



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 > SET-			
Code	Name/Description	Setting range	Factory settings
SET-	<b>[SETTINGS] (Continued)</b>		
SP2  	<p><b>[Preset speed 2]</b></p> <p>2nd preset speed.</p>	0 to 599 Hz	10 Hz
SP3  	<p><b>[Preset speed 3]</b></p> <p>3rd preset speed.</p>	0 to 599 Hz	15 Hz

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

The parameters described on this page are accessed by: DRI- > COnF > FULL > SEt-			
Code	Name/Description	Setting range	Factory settings
rPG  	<b>[PID prop. gain]</b> Proportional gain.	0.01 to 100	1
rIG  	<b>[PID integral gain]</b> Integral gain.	0.01 to 100	1
rdG  	<b>[PID derivative gain]</b> D component PID controller.	0.00 to 100	0
PrP  	<b>[PID ramp]</b> Ramp-up/down ramp of the PID, which is set for a range of <b>[Min PID reference]</b> (PIP1) to <b>[Max PID reference]</b> (PIP2) or vice versa.	0 to 99.9 s	0 s
POL  	<b>[Min PID output]</b> Minimum value of regulator output in hertz.	-599 to 599 Hz	0 Hz
POH  	<b>[Max PID output]</b> Maximum value of regulator output in hertz.	0 to 599 Hz	60 Hz
PAL  	<b>[Min fbk alarm]</b> Minimum monitoring threshold for regulator feedback.	(2)	100
PAH  	<b>[Max fbk alarm]</b> Maximum monitoring threshold for regulator feedback.	(2)	1.000
PEr  	<b>[PID error Alarm]</b> Regulator error monitoring threshold.	0 to 65535 (2)	100
PSr  	<b>[Speed input %]</b> Multiplying coefficient for predictive speed input.	1 to 100%	100%
rP2  	<b>[Preset ref. PID 2]</b> Preset PID value.	(2)	300
rP3  	<b>[Preset ref. PID 3]</b> Preset PID value.	(2)	600
rP4  	<b>[Preset ref. PID 4]</b> 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- > COntrol > FULL > SET-			
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 <sup>(1)</sup>	0
lrd ★ ↻	[Brake release I Rev] Brake release current threshold for descending or counterclockwise rotation.	0 to 1.36*INV <sup>(1)</sup>	0
brt ★ ↻	[Brake Release time] Brake release time delay.	0 to 5.00 s	0 s
blr ★ ↻ AUtO	[Brake release freq.] [Auto](AUtO): Nominal value	[Auto](AUtO) 0 to 10 Hz	[Auto](AUtO)
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 ★ ↻ AUtO	[Jump at reversal] [Auto](AUtO): Nominal value	[Auto](AUtO) 0 to 10 Hz	[Auto](AUtO)
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 > SET-																																						
Code	Name/Description	Setting range	Factory settings																																			
Ctd 	<b>[Current threshold]</b> Current threshold value of function <b>[I attained]</b> (CtA); assigned to a relay or a logic output.	0 to 65535 or 1.5*INV <sup>(1)</sup>	INV <sup>(1)</sup>																																			
ttH 	<b>[High torque thd.]</b> Higher torque threshold value of function <b>[High torque alarm]</b> (ttHA); assigned to a relay or logic output (as a percentage of the nominal torque).	-300% to +300%	100%																																			
ttL 	<b>[Low torque thd.]</b> Lower torque threshold value of function <b>[Low torque alarm]</b> (ttLA); assigned to a relay or logic output, as a percentage of the nominal torque.	-300% to +300%	50%																																			
FqL 	<b>[Pulse warning thd.]</b> Frequency threshold value of function <b>[FREQUENCY METER]</b> (FqF-); assigned to a relay or a logic output.	0 Hz to 20,000 kHz	0 Hz																																			
Ftd 	<b>[Freq. threshold]</b> Frequency threshold value of function <b>[Freq. Th. attained]</b> (FtA); assigned to a relay or a logic output or used by function <b>[PARAM. SET SWITCHING]</b> (MLP-).	0 to 599 Hz	HSP																																			
F2d 	<b>[Freq. threshold 2]</b> Frequency threshold value of function <b>[Freq. Th. 2 attained]</b> (F2A); assigned to a relay or a logic output or used by function <b>[PARAM. SET SWITCHING]</b> (MLP-).	0 to 599 Hz	HSP																																			
FFt  	<b>[Freewheel stop Thd.]</b> 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 <b>[Type of stop]</b> (Stt) is set to <b>[Fast stop]</b> (FSt) or <b>[Ramp stop]</b> (rMP) and if <b>[Brake assignment]</b> (bLC) and <b>[Auto DC injection]</b> (AdC) are not configured.  <b>Problem</b> If a stop ramp (deceleration ramp to standstill) is requested on the drive, overshooting may occur in the control process for induction motors. In doing so, the default value for the speed overshoots the target and the motor turns uncontrolled in the opposite direction. If this behavior is observed, the value for parameter <b>[Freewheel stop Thd.]</b> (FFt) is probably configured too low.  <b>Recommendation</b> The "slip frequency" can be used as a guide value for parameter <b>[Freewheel stop Thd.]</b> (FFt). It can be determined using the configured values for <b>[Rated motor speed]</b> (nSP) and <b>[Rated motor freq.]</b> (FrS). <ul style="list-style-type: none"> <li><b>[Rated motor speed]</b> (nSP): Nominal speed of the motor</li> <li><b>[Rated motor freq.]</b> (FrS): Nominal frequency of the motor</li> </ul> <b>Step 1:</b> Calculate the "synchronous speed". The synchronous speed is a theoretical value derived from the nominal frequency and number of motor pole pairs. It corresponds to the speed of a synchronous motor. $n_{sync} [rpm] = 6 \text{ FRS } [0.1 \text{ Hz}] / n_{Polepairs}$ <b>Step 2:</b> Calculate the "slip frequency". The recommended value for parameter <b>[Freewheel stop Thd.]</b> (FFt) is then calculated according to the following formula: $\text{FFt } [0.1 \text{ Hz}] = (n_{sync} [rpm] - \text{NSP } [rpm]) / n_{sync} [rpm] * \text{FRS } [0.1 \text{ Hz}]$ <b>Example calculation</b> NSP = 1380 [rpm] FRS = 500 [0.1 Hz] $n_{sync} [rpm] = 6 * \text{FRS } [0.1 \text{ Hz}] / n_{Polepairs}$ $n_{sync} [rpm] = 6 * 500 / 2$ $n_{sync} [rpm] = 1500$ $\text{FFt } [0.1 \text{ Hz}] = (n_{sync} [rpm] - \text{NSP } [rpm]) / n_{sync} [rpm] * \text{FRS } [0.1 \text{ Hz}]$ $\text{FFt } [0.1 \text{ Hz}] = (1500 - 1380) / 1500 * 500$ $\text{FFt } [0.1 \text{ Hz}] = 40$ <b>Determining the "synchronous speed"</b> If the number of motor pole pairs is unknown, the synchronous speed (step 1) can also be determined using a logical series. The following table shows four different logical series that result for nominal frequencies 10 Hz, 50 Hz, 60 Hz and 800 Hz. <table border="1"> <thead> <tr> <th>Formula</th> <th colspan="4"><math>n_{sync} [rpm] = 6 * \text{FRS } [0.1 \text{ Hz}] / n_{Polepairs}</math></th> </tr> <tr> <th><math>n_{Polepairs}</math></th> <th>Series 1 (FRS = 100)</th> <th>Series 2 (FRS = 500)</th> <th>Series 3 (FRS = 600)</th> <th>Series 3 (FRS = 600)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><math>n_{sync} [rpm] = 600</math></td> <td><math>n_{sync} [rpm] = 3000</math></td> <td><math>n_{sync} [rpm] = 3600</math></td> <td><math>n_{sync} [rpm] = 48000</math></td> </tr> <tr> <td>2</td> <td><math>n_{sync} [rpm] = 300</math></td> <td><math>n_{sync} [rpm] = 1500</math></td> <td><math>n_{sync} [rpm] = 1800</math></td> <td><math>n_{sync} [rpm] = 24000</math></td> </tr> <tr> <td>3</td> <td><math>n_{sync} [rpm] = 200</math></td> <td><math>n_{sync} [rpm] = 1000</math></td> <td><math>n_{sync} [rpm] = 1200</math></td> <td><math>n_{sync} [rpm] = 1600</math></td> </tr> <tr> <td>4</td> <td><math>n_{sync} [rpm] = 150</math></td> <td><math>n_{sync} [rpm] = 750</math></td> <td><math>n_{sync} [rpm] = 900</math></td> <td><math>n_{sync} [rpm] = 1200</math></td> </tr> <tr> <td>...</td> <td>...</td> <td>...</td> <td>...</td> <td>...</td> </tr> </tbody> </table> The values of the logical series become smaller as the number of pole pairs increases. To determine the synchronous speed of the motor, the value for NSP [rpm] must be placed in the logical sequence. The next larger value corresponds to the synchronous speed.	Formula	$n_{sync} [rpm] = 6 * \text{FRS } [0.1 \text{ Hz}] / n_{Polepairs}$				$n_{Polepairs}$	Series 1 (FRS = 100)	Series 2 (FRS = 500)	Series 3 (FRS = 600)	Series 3 (FRS = 600)	1	$n_{sync} [rpm] = 600$	$n_{sync} [rpm] = 3000$	$n_{sync} [rpm] = 3600$	$n_{sync} [rpm] = 48000$	2	$n_{sync} [rpm] = 300$	$n_{sync} [rpm] = 1500$	$n_{sync} [rpm] = 1800$	$n_{sync} [rpm] = 24000$	3	$n_{sync} [rpm] = 200$	$n_{sync} [rpm] = 1000$	$n_{sync} [rpm] = 1200$	$n_{sync} [rpm] = 1600$	4	$n_{sync} [rpm] = 150$	$n_{sync} [rpm] = 750$	$n_{sync} [rpm] = 900$	$n_{sync} [rpm] = 1200$	...	...	...	...	...	0.2 to 599 Hz	0.2 Hz
Formula	$n_{sync} [rpm] = 6 * \text{FRS } [0.1 \text{ Hz}] / n_{Polepairs}$																																					
$n_{Polepairs}$	Series 1 (FRS = 100)	Series 2 (FRS = 500)	Series 3 (FRS = 600)	Series 3 (FRS = 600)																																		
1	$n_{sync} [rpm] = 600$	$n_{sync} [rpm] = 3000$	$n_{sync} [rpm] = 3600$	$n_{sync} [rpm] = 48000$																																		
2	$n_{sync} [rpm] = 300$	$n_{sync} [rpm] = 1500$	$n_{sync} [rpm] = 1800$	$n_{sync} [rpm] = 24000$																																		
3	$n_{sync} [rpm] = 200$	$n_{sync} [rpm] = 1000$	$n_{sync} [rpm] = 1200$	$n_{sync} [rpm] = 1600$																																		
4	$n_{sync} [rpm] = 150$	$n_{sync} [rpm] = 750$	$n_{sync} [rpm] = 900$	$n_{sync} [rpm] = 1200$																																		
...	...	...	...	...																																		
ttd 	<b>[Motor therm. level]</b> Trip threshold for motor thermal alarm (logic output or relay).	0 to 118%	100%																																			
JPF 	<b>[Skip Frequency]</b> 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																																			

The parameters described on this page are accessed by: DRI- > CO nF > FULL > SET-			
Code	Name/Description	Setting range	Factory settings
JF2 	<b>[Skip Frequency 2]</b> 2nd 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 	<b>[3rd Skip Frequency]</b> 3rd 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  	<b>[Skip Frequency Hyst.]</b> The parameter is visible if at least one of the skip frequencies <b>[Skip Frequency]</b> (JPF), <b>[Skip Frequency 2]</b> (JF2) or <b>[3rd Skip Frequency]</b> (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  	<b>[Unld. Thr. Nom. Speed.]</b> Threshold value for underload when the motor is at nominal frequency ( <b>[Nominal Motor Freq]</b> (FrS)) as a percentage of the nominal torque. Only visible if <b>[Unld T. Del. Detect]</b> (ULt) is not set to 0.	20 to 100% of <b>[Rated mot. current]</b> (nCr)	60%
LUL  	<b>[Underload freq.=0]</b> Threshold value for underload for a frequency of zero, as a percentage of nominal torque. Only visible if <b>[Unld T. Del. Detect]</b> (ULt) is not set to 0.	0 to <b>[Nom. freq. overload]</b> (LUn)	0%
rMUd  	<b>[Underl. det. freq. thresh.val]</b> Underload detection frequency threshold value.	0 to 599 Hz	0 Hz
Srb  	<b>[Hysteresis Freq.Att.]</b> Maximum difference between frequency setpoint and motor frequency; defines operation in steady state.	0.3 to 599 Hz	0.3 Hz
FiU  	<b>[Underload T.B.Rest.]</b> Permissible minimum time frame between underload detection and automatic restart. For an automatic restart to take place, the value for <b>[Max. restart time]</b> (tAr) must exceed the value for this parameter for at least one minute.	0 to 6 min	0 min
LOC  	<b>[Ovld Detection Thr.]</b> Overload detection threshold value, as a percentage of the motor nominal current <b>[Rated mot. current]</b> (nCr). For the function to be executed, this value must be lower than the threshold current. Only visible if <b>[Ovld Time Detect.]</b> (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 <b>[Rated mot. current]</b> (nCr)	110%
FiO  	<b>[Overload T.B.Rest.]</b> Permissible minimum time frame between overload detection and automatic restart. For an automatic restart to take place, the value for <b>[Max. restart time]</b> (tAr) must exceed the value for this parameter for at least one minute.	0 to 6 min	0 min
LbC  	<b>[Load sharing correction]</b> Nominal compensation in Hz.	0 to 599 Hz	0 Hz

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

Code	Name/Description	Setting range	Factory settings
FFM 	<p><b>[Fan mode]</b></p> <p>If <b>[Fan mode]</b>(FFM) is set to <b>[Never]</b>(Stp), the frequency inverter fan is deactivated.</p> <p><b>Note:</b></p> <p><b>OVERHEATING</b></p> <p>Make sure that the ambient temperature does not exceed 40°C (104°F) when the fan is switched off. Otherwise, the service life of the electronic components is greatly reduced.</p> <p>Failure to observe these instructions can result in damage to the equipment.</p>		<b>[Standard]</b> (Std)
Std rUn StP	<p><b>[Standard]</b>(Std): The fan starts automatically when the inverter reaches 70% of its maximum thermal reference rating (THD = 70).</p> <p><b>[Always]</b>(rUn): The fan is always active.</p> <p><b>[Never]</b>(Stp): The fan is disabled (not recommended).</p>		
SdS 	<p><b>[Scale factor display]</b></p> <p>Used to display a value in relation to output frequency <b>[Output frequency]</b>(rFr): Machine speed, motor speed, etc. The display shows the following:</p> $\left[ Kd.sp\_Anzeigewert \right] (SPd3) = \frac{[Skal.Faktor\_HM](SdS) \times [Motorfrequenz](rFr)}{1000} \dots bis \dots zwei \dots Dezimalstellen$ <ul style="list-style-type: none"> <li>If <b>[Scale factor display]</b>(SdS) ≤ 1, <b>[Cust. output value]</b>(SPd1) will display (possible resolution = 0.01)</li> <li>If 1 &lt; <b>[Scale factor display]</b>(SdS) ≤ 10, <b>[Cust. output value]</b>(SPd2) will display (possible resolution = 0.1)</li> <li>If <b>[Scale factor display]</b>(SdS) &gt; 10, <b>[Cust. output value]</b>(SPd3) will display (possible resolution = 1)</li> <li>If <b>[Scale factor display]</b>(SdS) &gt; 10 and <b>[Scale factor display]</b>(SdS) x <b>[Output frequency]</b>(rFr) &gt; 9.999</li> </ul> <p><b>Example:</b> For 24.223, 24,22 appears on the display. If for <b>[Scale factor display]</b>(SdS) &gt; 10 and <b>[Scale factor display]</b>(SdS) x <b>[Output frequency]</b>(rFr) &gt; 65,535, the display is locked at 65,54.</p> <p><b>Example:</b> Display motor speed for 4-pin motor, 1,500 rpm at 50 Hz (synchronous speed): <b>[Scale factor display]</b>(SdS) = 30 <b>[Cust. output value]</b>(SPd3) = 1.500 at <b>[Output frequency]</b>(rFr) = 50 Hz</p>	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.

### 5.2.3.6.3 [MOTOR CONTROL] (drC-)

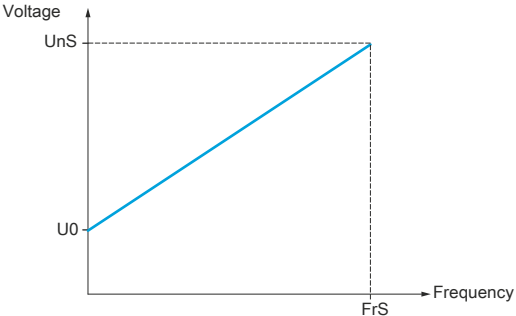
The parameters in the **[DRIVE DATA]** (drC-) menu can only be changed if the inverter is stopped and no run command is present, with the following limitations:

- **[Auto-tuning]**(tUn) can cause the motor to start.
- A parameter whose code contains the arrow sign, can be modified with the motor running or stopped.

#### Note:



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-	<b>[MOTOR CONTROL]</b>		
bFr	<b>[Standard mot. freq]</b> This parameter is used to change the default setting of the following parameters: <b>[High speed]</b> (HSP), <b>[Freq. threshold]</b> (FTd), <b>[Rated motor volt.]</b> (UnS), <b>[Rated motor freq.]</b> (FrS) and <b>[Max frequency]</b> (tFr). 50 <b>[50 Hz IEC]</b> (50): IEC 60 <b>[60 Hz NEMA]</b> (60): NEMA		<b>[50 Hz IEC]</b> (50)
tFr	<b>[Max frequency]</b>  The default factory setting is 60 Hz or 72 Hz if <b>[Standard mot. freq]</b> (bFr) is set to 60 Hz. The maximum value is limited by the following conditions: It is not permitted to exceed 10 times the value of <b>[Rated motor freq.]</b> (FrS).	10 to 599 Hz or 1*FrS(S)	60 Hz (if (BFR) = 50 Hz) or 72 Hz (if (BFR) = 60 Hz)
Ctt	<b>[Motor control type]</b>		<b>[Standard]</b> (Std)
UUC	<b>[SVC U]</b> (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	<b>[Standard]</b> (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 <b>[SVC U]</b> (UUC).		
UF5	<b>V/F 5pts</b> (UF5): 5-segment V/F profile: Functions as a <b>[Standard]</b> (Std) profile, but also supports resonance (saturation) prevention.   <div style="float: right; border-left: 2px solid black; padding-left: 10px; margin-left: 20px;"> <p><b>Note:</b></p> <p>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.</p> </div>		
SYn	<b>[Sync. mot.]</b> (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	<b>[V/F Quad.]</b> (UFq): Variable torque. Can be used for pump and fan applications.		
nLD	<b>[Energy Sav.]</b> (nLD): Energy saving. For straightforward applications without a high-dynamic requirement.		

5.2.3.6.3.1 [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-	<b>[ASYNC. MOTOR]</b> Only visible if <b>[Motor control type](Ctt)</b> is not set to <b>[Sync. mot.](SYn)</b> .																																																																																					
nPr 	<b>[Rated motor power]</b> This parameter cannot be accessed if <b>[Motor control type] (Ctt)</b> is set to <b>[Sync. mot.] (SYn)</b> . The nominal motor power specified on the nameplate is displayed in kW if <b>[Standard mot. freq](bFr) = [50 Hz IEC](50)</b> , and in PS, if <b>[Standard mot. freq](bFr) = [60 Hz NEMA](60)</b> . For induction motors with (BFR) = 50 Hz, the following table applies:	See table.	See table.																																																																																			
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UnS ★	<b>[Rated motor volt.]</b>  This parameter cannot be accessed if <b>[Motor control type]</b> (Ctt) is set to <b>[Sync. mot.]</b> (SYn). Nominal voltage of the motor specified on the nameplate.	100 to 500 V	In accordance with inverter power and <b>[Standard mot. freq.]</b> (bFr)																																																																																			
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The parameters described on this page are accessed as follows: DRI- > COnf > FULL > drC- > ASY-

Code	Name/Description	Setting range	Factory settings																																																																																												
nSP 	<p><b>[Rated motor speed]</b></p> <p>Rated motor speed given on the nameplate.                      This parameter is not available if <b>[Motor control type](Ctt)</b> is set to <b>[Sync. mot.](SYn)</b>.                      0 to 9999 rpm then 10.00 to 65.535 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:</p> <p><math>Nominal\ speed = Synchronous\ speed \times \frac{100 - slip\ as\ a\ \%}{100}</math>                      or  <math>Nominal\ speed = Synchronous\ speed \times \frac{50 - slip\ in\ Hz}{50}</math> (50 Hz motors)                      or  <math>Nominal\ speed = Synchronous\ speed \times \frac{60 - slip\ in\ Hz}{60}</math> (60 Hz motors)</p> <p>If (BFR) = 50:</p> <table border="1"> <thead> <tr> <th rowspan="2">ACOPOSinverter P76</th> <th colspan="2">Setting range</th> <th rowspan="2">Default [rpm]</th> </tr> <tr> <th>Min. value [rpm]</th> <th>Max. value [rpm]</th> </tr> </thead> <tbody> <tr><td>8I76S200018.00-000</td><td rowspan="20">0 rpm</td><td rowspan="20">65,535 rpm</td><td>1410</td></tr> <tr><td>8I76S200037.00-000</td><td>1425</td></tr> <tr><td>8I76S200055.00-000</td><td>1400</td></tr> <tr><td>8I76S200075.00-000</td><td>1400</td></tr> <tr><td>8I76S200110.00-000</td><td>1410</td></tr> <tr><td>8I76S200150.00-000</td><td>1420</td></tr> <tr><td>8I76S200220.00-000</td><td>1430</td></tr> <tr><td>8I76T400037.00-000</td><td>1425</td></tr> <tr><td>8I76T400055.00-000</td><td>1400</td></tr> <tr><td>8I76T400075.00-000</td><td>1400</td></tr> <tr><td>8I76T400110.00-000</td><td>1410</td></tr> <tr><td>8I76T400150.00-000</td><td>1420</td></tr> <tr><td>8I76T400220.00-000</td><td>1430</td></tr> <tr><td>8I76T400300.00-000</td><td>1420</td></tr> <tr><td>8I76T400400.00-000</td><td>1425</td></tr> <tr><td>8I76T400550.00-000</td><td>1430</td></tr> <tr><td>8I76T400750.00-000</td><td>1450</td></tr> <tr><td>8I76T401100.00-000</td><td>1450</td></tr> <tr><td>8I76T401500.00-000</td><td>1455</td></tr> </tbody> </table> <p>If (BFR) = 60:</p> <table border="1"> <thead> <tr> <th rowspan="2">ACOPOSinverter P76</th> <th colspan="2">Setting range</th> <th rowspan="2">Default [rpm]</th> </tr> <tr> <th>Min. value [rpm]</th> <th>Max. value [rpm]</th> </tr> </thead> <tbody> <tr><td>8I76S200018.00-000</td><td rowspan="20">0 rpm</td><td rowspan="20">65,535 rpm</td><td>1680</td></tr> <tr><td>8I76S200037.00-000</td><td>1720</td></tr> <tr><td>8I76S200055.00-000</td><td>1700</td></tr> <tr><td>8I76S200075.00-000</td><td>1700</td></tr> <tr><td>8I76S200110.00-000</td><td>1680</td></tr> <tr><td>8I76S200150.00-000</td><td>1715</td></tr> <tr><td>8I76S200220.00-000</td><td>1715</td></tr> <tr><td>8I76T400037.00-000</td><td>1720</td></tr> <tr><td>8I76T400055.00-000</td><td>1700</td></tr> <tr><td>8I76T400075.00-000</td><td>1700</td></tr> <tr><td>8I76T400110.00-000</td><td>1680</td></tr> <tr><td>8I76T400150.00-000</td><td>1715</td></tr> <tr><td>8I76T400220.00-000</td><td>1715</td></tr> <tr><td>8I76T400300.00-000</td><td>1760</td></tr> <tr><td>8I76T400400.00-000</td><td>1769</td></tr> <tr><td>8I76T400550.00-000</td><td>1780</td></tr> <tr><td>8I76T400750.00-000</td><td>1780</td></tr> <tr><td>8I76T401100.00-000</td><td>1766</td></tr> <tr><td>8I76T401500.00-000</td><td>1771</td></tr> </tbody> </table>	ACOPOSinverter P76	Setting range		Default [rpm]	Min. value [rpm]	Max. value [rpm]	8I76S200018.00-000	0 rpm	65,535 rpm	1410	8I76S200037.00-000	1425	8I76S200055.00-000	1400	8I76S200075.00-000	1400	8I76S200110.00-000	1410	8I76S200150.00-000	1420	8I76S200220.00-000	1430	8I76T400037.00-000	1425	8I76T400055.00-000	1400	8I76T400075.00-000	1400	8I76T400110.00-000	1410	8I76T400150.00-000	1420	8I76T400220.00-000	1430	8I76T400300.00-000	1420	8I76T400400.00-000	1425	8I76T400550.00-000	1430	8I76T400750.00-000	1450	8I76T401100.00-000	1450	8I76T401500.00-000	1455	ACOPOSinverter P76	Setting range		Default [rpm]	Min. value [rpm]	Max. value [rpm]	8I76S200018.00-000	0 rpm	65,535 rpm	1680	8I76S200037.00-000	1720	8I76S200055.00-000	1700	8I76S200075.00-000	1700	8I76S200110.00-000	1680	8I76S200150.00-000	1715	8I76S200220.00-000	1715	8I76T400037.00-000	1720	8I76T400055.00-000	1700	8I76T400075.00-000	1700	8I76T400110.00-000	1680	8I76T400150.00-000	1715	8I76T400220.00-000	1715	8I76T400300.00-000	1760	8I76T400400.00-000	1769	8I76T400550.00-000	1780	8I76T400750.00-000	1780	8I76T401100.00-000	1766	8I76T401500.00-000	1771	See table.	See table.
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The parameters described on this page are accessed as follows: DRI- > COnF > FULL > drC- > ASY-			
Code	Name/Description	Setting range	Factory settings
tUn  	<p><b>[Auto-tuning]</b></p> <p><b>Warning!</b></p> <p><b>UNEXPECTED MOVEMENT</b></p> <p>The motor is moved during autotuning in order to fine-adjust the control loop.</p> <ul style="list-style-type: none"> <li>Do not switch on the system until it has been verified that there is no one in the operating area and that it is free from obstacles.</li> </ul> <p>Failure to follow these instructions can result in serious injury and death or damage to the equipment.</p> <p>The motor is executes small movements during autotuning. It is normal for the system to vibrate and produce some noise.</p> <ul style="list-style-type: none"> <li>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).</li> <li>Autotuning has priority over any movement or premagnetization commands. These will not be taken into account until after autotuning.</li> <li>If autotuning reports an error, the inverter displays <b>[No action](nO)</b> and, depending on the configuration of <b>[Autotune fault mgt](tnL)</b>, it then switches to error mode <b>[Auto-tuning](tnF)</b>.</li> <li>Autotuning may last for 1 to 2 seconds. Do not interrupt the process. Wait until the display changes to <b>[No action](nO)</b>.</li> </ul> <p><b>Note:</b></p> <p>The thermal state of the motor greatly affects the tuning result. Perform tuning when the motor is stopped and when it is cold.</p> <p>In order to perform autotuning again, wait until the motor has stopped and cooled down completely. First set <b>[Auto-tuning](tnF)</b> to <b>[Erase tune](CLr)</b>, then repeat the autotuning process.</p> <p>To calculate the thermal state of the motor, autotuning can be performed without enabling <b>[Erase tune](CLr)</b> first.</p> <p>In all cases, the motor must be stopped before any tuning procedure is performed.</p> <p>Cable length also affects tuning results. If the wiring is changed, the tuning procedure must be repeated.</p>		<b>[No](nO)</b>
nO YES CLr	<p><b>[No action](nO)</b>: Autotuning not running</p> <p><b>[Do tune](YES)</b>: Autotuning is performed immediately if possible, at which point the parameter automatically changes to <b>[No action](nO)</b>. If the inverter state does not permit immediate tuning, the parameter changes to <b>[No](nO)</b> and the procedure must be repeated.</p> <p><b>[Erase tune](CLr)</b>: The motor parameters recorded by autotuning are reset. The standard motor parameter values are used to control the motor. <b>[Auto tuning status](tUS) = [Not done](tAb)</b>.</p>		
tUS  tAb PEnd PrOG FAIL dOnE	<p><b>[Auto tuning status]</b></p> <p>(For information only, cannot be modified)</p> <p>This parameter is not stored when the inverter is switched off. It shows the autotuning state since the last time the device was commissioned.</p> <p><b>[Not done](tAb)</b>: Autotuning has not been executed.</p> <p><b>[Idle](PEnd)</b>: Autotuning has been requested but has not been performed yet.</p> <p><b>[Active](PrOG)</b>: Autotuning is being performed.</p> <p><b>[Failed](FAIL)</b>: Autotuning has failed.</p> <p><b>[Done](dOnE)</b>: The motor parameters calculated during autotuning are used to control the motor.</p>		<b>[Not done](tAb)</b>
StUn  tAb MEAS CUS	<p><b>[Tune selection]</b></p> <p>(For information only, cannot be modified)</p> <p><b>[Default](tAb)</b>: The standard motor parameter values are used to control the motor.</p> <p><b>[Measure](MEAS)</b>: The values calculated during autotuning are used to control the motor.</p> <p><b>[Customized](CUS)</b>: The manually set values are used to control the motor.</p> <p><b>Note:</b></p> <p>Autotuning can increase motor performance considerably.</p>		<b>[Default](tAb)</b>
tUnU  nO tM Ct	<p><b>[Auto tuning usage]</b></p> <p>This parameter indicates the methods that were used to change the motor parameters in accordance with the calculated thermal state of the motor.</p> <p><b>[No](nO)</b>: Thermal state not calculated.</p> <p><b>[Therm Mot](tM)</b>: Calculation of the stator thermal state, based on the motor's nominal current and current consumption.</p> <p><b>[Cold tun](Ct)</b>: 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.</p> <p><b>Note:</b></p> <p>Before <b>[Auto tuning usage] (TUNU)</b> is set to <b>[Cold tun] (CT)</b>, autotuning must be performed to obtain reference values for a cold motor.</p>		<b>[Therm Mot](tM)</b>

The parameters described on this page are accessed as follows: DRI- > COnF > FULL > drC- > ASY-			
Code	Name/Description	Setting range	Factory settings
AUt   2 s	<b>[Automatic autotune]</b> <h2>Warning!</h2> <p><b>UNEXPECTED MOVEMENT</b></p> <p>If this function is enabled, autotuning is performed every time the inverter is switched on.</p> <ul style="list-style-type: none"> <li>Make sure that enabling this function does not result in unsafe states.</li> </ul> <p><b>Failure to follow these instructions can result in death, serious injury or damage to property.</b></p> <p>The motor must be switched off when the inverter is switched on.  <b>[Automatic autotune](AUt) = [YES](YES)</b> if <b>[Auto tuning usage](tUnU) = [Cold tun](Ct)</b>. The motor stator resistance value calculated during the tuning process is used to calculate the motor thermal state when the device is switched on.</p> <p>nO            YES            onE  <b>[No](nO)</b>: Function disabled.  <b>[YES](YES)</b>: Tuning is performed automatically on each startup.  <b>[One](onE)</b>: Tuning is performed on the first move command.</p>		<b>[No](nO)</b>
FLU   (1)  2 s	<b>[Motor fluxing]</b> <h2>Danger!</h2> <p><b>RISK OF ELECTRIC SHOCK, ARC FLASH OR EXPLOSION</b></p> <p>If parameter <b>[Motor fluxing](FLU)</b> is set to <b>[continuous](FCt)</b> fluxing will always occur, even when the motor is not running.</p> <p><b>Make sure that this setting does not result in unsafe states.</b></p> <p><b>Failure to follow these instructions can result in death or serious injury.</b></p> <p><b>Note:</b></p> <p><b>MOTOR OVERHEATING AND DAMAGE</b></p> <p>To prevent motor overheating and damage, check whether the connected motor has the correct sizing for the magnetizing current.</p> <p><b>Failure to observe these instructions can result in damage to the equipment.</b></p> <p>If <b>[Motor control type](Ctt) = [Sync. mot.](SYn)</b>, <b>[Not cont.](FnC)</b> 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 <b>[continuous](FCt)</b>, the inverter automatically creates the magnetic flux at startup.            In mode <b>[Not cont.](FnC)</b>, fluxing occurs when the motor has been started up.            The magnetic flux current is greater than <b>[Rated mot. current](nCr)</b> (configured nominal motor current) if magnetization has been established. After this, the flux current will be adjusted to the motor's magnetizing current.</p> <p>FnC            FCt            FnO  <b>[Not cont.](FnC)</b>: Non-continuous mode  <b>[continuous](FCt)</b>: Continuous mode. This option is not possible if <b>[Auto DC injection](AdC)</b> is set to <b>[YES](YES)</b>, or if <b>[Type of stop](Stt)</b> was set to <b>[Freewheel](nSt)</b>.  <b>[No](FnO)</b>: Function inactive. This option is not possible if <b>[Brake assignment](bLC)</b> is not set to <b>[No](nO)</b>.            If <b>[Motor control type](Ctt)</b> is set to <b>[Sync. mot.](SYn)</b>, parameter <b>[Motor fluxing](FLU)</b> results in the assignment of the rotor and not of the magnetization.            If <b>[Brake assignment](bLC)</b> is not <b>[No](nO)</b>, parameter <b>[Motor fluxing](FLU)</b> has no effect.</p>		<b>[No](FnO)</b>
MPC  nPr COS	<b>[Motor param choice]</b> <b>[Motor power](nPr)</b> <b>[Mot Cos](COS)</b>		<b>[Motor power](nPr)</b>

(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.



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

### 5.2.3.6.3.2 [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-	<b>[ASYNC. MOTOR]</b>		
rSA ★ (1)	<b>[Cust stator resist.]</b> 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 ★	<b>[Lfw]</b> 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 ★	<b>[ldw]</b> 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 ★	<b>[Cust. rotor t const.]</b> 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.

#### 5.2.3.6.3.3 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 choosing the inverter, do the following:

#### 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 the measurement results**.
- Perform the steps under **4. Adjust PHS**.

If **[Saliency mot. state](SMOt)** displays **[Low salient](LLS)**:

- Perform the steps under **4. Adjust PHS**.

### 3. Improve tuning results.

#### Note:

##### MOTOR OVERHEATING AND DAMAGE

- It must be ensured that the motor has the required nominal power for the maximum current applied.
- In order to calculate the maximum current, take the motor work cycle and all the factors involved in using the motor into account, including derating 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).

#### Note:



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).

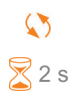
### 5.2.3.6.3.4 [SYNCHRONOUS MOTOR] (SYn-)

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.] Nominal current of the synchronous motor as provided on the nameplate.	See table <sup>(1)</sup> .	See table.
	<b>ACOPOSinverter P76</b>	<b>Setting range</b>	
		<b>Min. value [0.1 A]</b>	<b>Max. value [0.1 A]</b>
		<b>Default [0.1 A]</b>	
	8I76S200018.00-000	3	23
	8I76S200037.00-000	8	50
	8I76S200055.00-000	9	56
	8I76S200075.00-000	12	72
	8I76S200110.00-000	17	104
	8I76S200150.00-000	20	120
	8I76S200220.00-000	27	165
	8I76T400037.00-000	3	23
	8I76T400055.00-000	4	29
	8I76T400075.00-000	5	35
	8I76T400110.00-000	7	45
	8I76T400150.00-000	10	62
	8I76T400220.00-000	13	83
	8I76T400300.00-000	17	107
	8I76T400400.00-000	23	143
	8I76T400550.00-000	35	215
	8I76T400750.00-000	42	255
	8I76T401100.00-000	69	416
	8I76T401500.00-000	82	495
PPnS 	[Pole pairs] Number of pole pairs on the synchronous motor	See table.	See table.
	<b>ACOPOSinverter P76</b>	<b>Setting range</b>	
		<b>Min. value</b>	<b>Max. value</b>
			<b>Default</b>
	8I76S200018.00-000		3
	8I76S200037.00-000		3
	8I76S200055.00-000		3
	8I76S200075.00-000		4
	8I76S200110.00-000		4
	8I76S200150.00-000		4
	8I76S200220.00-000		4
	8I76T400037.00-000		3
	8I76T400055.00-000		3
	8I76T400075.00-000	1	3
	8I76T400110.00-000		4
	8I76T400150.00-000		4
	8I76T400220.00-000		4
	8I76T400300.00-000		5
	8I76T400400.00-000		5
	8I76T400550.00-000		5
	8I76T400750.00-000		5
	8I76T401100.00-000		5
	8I76T401500.00-000		5






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

Code	Name/Description	Setting range	Factory settings		
nSPS	<b>[Nom motor spdsync]</b>	See table.	See table.		
 (1)	Rated motor speed specified on the nameplate.				
	<b>ACOPOSinverter P76</b>	<b>Setting range</b>			
		<b>Min. value [rpm]</b>	<b>Max. value [rpm]</b>	<b>Default [rpm]</b>	
	8I76S200018.00-000	0	48000	3200	
	8I76S200037.00-000			2960	
	8I76S200055.00-000			3120	
	8I76S200075.00-000			2580	
	8I76S200110.00-000			1920	
	8I76S200150.00-000			2100	
	8I76S200220.00-000			1560	
	8I76T400037.00-000			3200	
	8I76T400055.00-000			3360	
	8I76T400075.00-000			2400	
	8I76T400110.00-000			2000	
	8I76T400150.00-000			2040	
	8I76T400220.00-000			1620	
	8I76T400300.00-000			1200	
	8I76T400400.00-000			1160	
	8I76T400550.00-000			1000	
	8I76T400750.00-000			1000	
	8I76T401100.00-000			2000	
8I76T401500.00-000	2000				
tqS	<b>[Motor torque]</b>			See table.	See table.
 (1)	Nominal torque of the motor as provided on the nameplate.				
	<b>ACOPOSinverter P76</b>	<b>Setting range</b>			
		<b>Min. value [0.1 Nm]</b>	<b>Max. value [0.1 Nm]</b>	<b>Default [0.1 Nm]</b>	
	8I76S200018.00-000	1	65535	5	
	8I76S200037.00-000			13	
	8I76S200055.00-000			19	
	8I76S200075.00-000			27	
	8I76S200110.00-000			46	
	8I76S200150.00-000			57	
	8I76S200220.00-000			79	
	8I76T400037.00-000			8	
	8I76T400055.00-000			11	
	8I76T400075.00-000			21	
	8I76T400110.00-000			52	
	8I76T400150.00-000			70	
	8I76T400220.00-000			95	
	8I76T400300.00-000			171	
	8I76T400400.00-000			263	
	8I76T400550.00-000			517	
	8I76T400750.00-000			705	
	8I76T401100.00-000			450	
8I76T401500.00-000	587				

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

Code	Name/Description	Setting range	Factory settings
tUn 	<p><b>[Auto-tuning]</b></p> <p><b>Warning!</b></p> <p><b>UNEXPECTED MOVEMENT</b></p> <p>The motor is moved during autotuning in order to fine-adjust the control loop.</p> <ul style="list-style-type: none"> <li>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.</li> </ul> <p>Failure to follow these instructions can result in serious injury and death or damage to the equipment.</p> <p>The motor is executes small movements during autotuning. It is normal for the system to vibrate and produce some noise.</p> <ul style="list-style-type: none"> <li>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).</li> <li>Autotuning has priority over any movement or premagnetization commands. These will not be taken into account until after autotuning.</li> <li>If autotuning reports an error, the inverter displays <b>[No action](nO)</b> and, depending on the configuration of <b>[Autotune fault mgt](tnL)</b>, it then switches to error mode <b>[Auto-tuning](tnF)</b>.</li> <li>Autotuning may last for 1 to 2 seconds. Do not interrupt this procedure. Wait until the display changes to <b>[No action](nO)</b>.</li> </ul> <p><b>Note:</b></p> <p>The thermal state of the motor greatly affects the tuning result. Perform tuning when the motor is stopped and when it is cold.</p> <p>In order to perform autotuning again, wait until the motor has stopped and cooled down completely. First set <b>[Auto-tuning](tnF)</b> to <b>[Erase tune](CLr)</b> and then repeat the autotuning process.</p> <p>To calculate the thermal state of the motor, autotuning can be performed without enabling <b>[Erase tune](CLr)</b> first.</p> <p>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.</p>		<b>[No](nO)</b>
nO YES CLr	<p><b>[No action](nO)</b>: Autotuning is not running.</p> <p><b>[Do tune](YES)</b>: Autotuning is performed immediately if possible, at which point the parameter automatically changes to <b>[No action](nO)</b>. If the inverter state does not permit immediate tuning, the parameter changes to <b>[No](nO)</b> and the procedure must be repeated.</p> <p><b>[Erase tune](CLr)</b>: The motor parameters recorded by autotuning are reset. The standard motor parameter values are used to control the motor. <b>[Auto tuning status](tUS) = [Not done](tAb)</b>.</p>		
tUS  tAb PEnd PrOG FAIL dOnE	<p><b>[Auto tuning status]</b></p> <p>(For information only, cannot be modified)</p> <p>This parameter is not stored when the inverter is switched off. It shows the autotuning state since the last time the device was commissioned.</p> <p><b>[Not done](tAb)</b>: Autotuning has not been executed.</p> <p><b>[Idle](PEnd)</b>: Autotuning has been requested but has not been performed yet.</p> <p><b>[Active](PrOG)</b>: Autotuning is being performed.</p> <p><b>[Failed](FAIL)</b>: Autotuning has failed.</p> <p><b>[Done](dOnE)</b>: The motor parameters calculated during autotuning are used to control the motor.</p>		<b>[Not done](tAb)</b>
StUn  tAb MEAS CUS	<p><b>[Tune selection]</b></p> <p>(For information only, cannot be modified)</p> <p><b>Note:</b></p> <p>Autotuning can increase motor performance considerably.</p> <p><b>[Default](tAb)</b>: The standard motor parameter values are used to control the motor.</p> <p><b>[Measure](MEAS)</b>: The values calculated during autotuning are used to control the motor.</p> <p><b>[Customized](CUS)</b>: The manually set values are used to control the motor.</p>		<b>[Default](tAb)</b>
tUnU  nO tM Ct	<p><b>[Auto tuning usage]</b></p> <p>This parameter indicates the methods that were used to change the motor parameters in accordance with the calculated thermal state of the motor.</p> <p><b>[No](nO)</b>: Thermal state not calculated.</p> <p><b>[Therm Mot](tM)</b>: Calculation of the stator thermal state, based on the motor's nominal current and current consumption.</p> <p><b>[Cold tun](Ct)</b>: 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.</p> <p><b>Note:</b></p> <p>Before <b>[Auto tuning usage](TUNU)</b> is set to <b>[Cold tun](CT)</b>, autotuning must be performed to obtain reference values for a cold motor.</p>		<b>[Therm Mot](tM)</b>

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	<b>[Automatic autotune]</b>  <b>Warning!</b> <b>UNEXPECTED MOVEMENT</b> <b>If this function is enabled, autotuning is performed every time the inverter is switched on.</b> <b>Make sure that enabling this function does not result in unsafe states.</b> <b>Failure to follow these instructions can result in death, serious injury or damage to property.</b>  The motor must be switched off when the inverter is switched on. <b>[Automatic autotune] (AUt) = [YES] (YES) if [Auto tuning usage] (tUnU) = [Cold tun] (Ct).</b> 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 YES onE	<b>[No](nO):</b> Function disabled. <b>[YES](YES):</b> Tuning is performed automatically on each startup. <b>[One](onE):</b> Tuning is performed on the first move command.		
SMOt 	<b>[Saliency mot. state]</b> (For information only, cannot be modified.) Information magn. reluctance information for synchronous motors. This parameter can be accessed if <b>[Tune selection](StUN) = [Measure](MEAS)</b>  <b>Note:</b> <b>For a motor with lower magnetic reluctance, the standard control process is recommended.</b>		
nO LLS MLS HLS	<b>[No](nO):</b> Measurement not executed. <b>[Low salient](LLS):</b> Low magnetic reluctance (recommended configuration: <b>[Angle setting type](ASt) = [PSI align](PSI) or [PSIO align](PSIO) and [HF inj. activation](HFI) = [No](nO).</b> <b>[Med salient](MLS):</b> Medium magnetic reluctance ( <b>[Angle setting type](ASt) = [SPM align](SPMA)</b> is possible. <b>[HF inj. activation](HFI) = [YES](YES)</b> is possible). <b>[High salient](HLS):</b> High magnetic reluctance ( <b>[Angle setting type](ASt) = [IPM align](IPMA)</b> is possible. <b>[HF inj. activation](HFI) = [Yes](YES)</b> is possible).		
ASt 	<b>[Set angle type]</b>  Mode for measuring phase shift angle. Only visible if <b>[Motor control type](Ctt) = [Sync. mot.](SYn).</b> <b>[PSI align](PSI) and [PSIO align](PSIO)</b> work for all types of synchronous motor. <b>[SPM align](SPMA) and [Assign IPM](IPMA)</b> increase performance, depending on the type of synchronous motor.		[PSIO align](PSIO)
IPMA SPMA PSI PSIO nO	<b>[IPM align](IPMA):</b> 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 than standard assignment mode. <b>[SPM align](SPMA):</b> 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 than standard assignment mode. <b>[PSI align](PSI):</b> Pulse signal application. Standard assignment mode after pulse signal injection. <b>[PSIO align](PSIO):</b> 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. <b>[No action](nO):</b> No assignment.		
HFI 	<b>[HF inj. activation]</b>  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.  <b>Note:</b> <b>The higher the cogging, the more efficient function [HF inj. activation](HFI).</b>  To ensure the power values, it may be required to adjust the speed control parameters ( <b>[K speed loop filter](SFC), [Speed time integral](Stt) and [Speed prop. gain](SPG)</b> ) and the phase control loop (Expert parameters <b>[HF PLL bandwidth](SPb) and [Speed fdbck loss](SPF)</b> ). The high-frequency application is not efficient in motors with low cogging. A 4-Hz PWM frequency is suitable ( <b>[Switching freq.](SFr)</b> ). In cases of instability without load, reducing <b>[Speed prop. gain](SPG) and [HF PLL bandwidth](SPb)</b> is recommended. 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 <b>[Angle error Comp.](PEC)</b> (especially for SPM motors).		[No](nO)
nO YES	<b>[No](nO):</b> Function disabled. <b>[YES](YES):</b> 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.



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

## 5.2.3.6.3.5 [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 result from motor measurement if motor measurement was 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](PPnS) / 60
SPb ★	[HF PLL bandwidth] Bandwidth of PLL stator frequency.	0 to 100 Hz	25 Hz
SPF ★	[Speed fdbck 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 takes a value equal to the nominal slip of the motor, calculated using the inverter parameters.		
Frl ★	[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
Hlr ★	[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%
Slr ★	[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 [% error EMF sync](rdAE) to adjust [Syn. EMF constant](PHS); [% error EMF sync](rdAE) should 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.





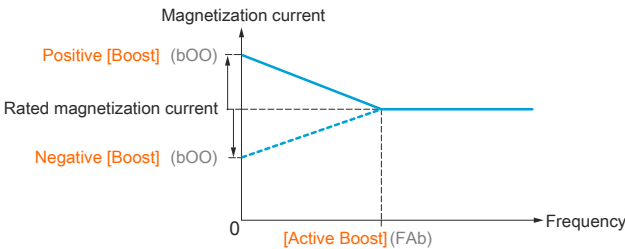



Parameter that can be modified during operation or when stopped.

## 5.2.3.6.3.6 [MOTOR CONTROL] (drC-) (continued)

The parameters described on this page can be accessed by: DRI- > COntrol > FULL > drC-			
Code	Name/Description	Setting range	Factory settings
drC-	<b>[MOTOR CONTROL]</b>		
VOLT ★ ↻	<b>[Speed prop. gain]</b> Speed control proportional gain Visible if <b>[Motor control type](Ctt)</b> is not set to <b>[Standard](Std)</b> , <b>[V/F 5pts](UF5)</b> or <b>[V/F Quad.](UFq)</b> .	0 to 1,000%	40%
SPGU ★ ↻	<b>[UF inertia comp.]</b> Factor of inertia for the following motor control curves: Visible if <b>[Motor control type](Ctt)</b> = <b>[Standard](Std)</b> , <b>[V/F 5pts](UF5)</b> or <b>[V/F Quad.](UFq)</b> .	0 to 1,000%	40%
Sit ★ ↻	<b>[Speed time integral]</b> Integral time constant for speed control Visible if <b>[Motor control type](Ctt)</b> is not set to <b>[Standard](Std)</b> , <b>[V/F 5pts](UF5)</b> or <b>[V/F Quad.](UFq)</b> .	1 to 65,535 ms	63 ms
SFC ★ ↻	<b>[K speed loop filter]</b> Speed filter coefficient (0 (IP) to 100 (PI)).	0 to 100	65
FFH ★	<b>[Spd est. filter time]</b> Only available in Expert mode. Frequency used to filter the calculated speed	0 to 100 ms	6.4 ms
CrtF ★	<b>[Cur. ref. filter time]</b> Only available in Expert mode. Filter time for the current setpoint filter [of the control curve (if <b>[No](nO)</b> : Stator natural frequency)].	0 to 100 ms	3.2 ms
UFR ★ ↻	<b>[IR compensation]</b> Used to optimize torque at very low speed or for adjustment in special cases (Example: To reduce <b>[IR compensation](UFR)</b> for motors connected in parallel. If torque is not sufficient at low speed, increase <b>[IR compensation](UFR)</b> . 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 ★ ↻	<b>[Slip compensation]</b> This parameter cannot be accessed if <b>[Motor control type](Ctt)</b> = <b>[Sync. mot.](SYn)</b> . This parameter is set to 0% if <b>[Motor control type](Ctt)</b> = <b>[V/F Quad.](UFq)</b> . 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 ★	<b>[U1]</b> V/f profile setting This parameter can be accessed if <b>[Motor control type](Ctt)</b> = <b>[V/F 5pts](UF5)</b> .	0 to 800 V depending on size	0 V
F1 ★	<b>[F1]</b> V/f profile setting This parameter can be accessed if <b>[Motor control type](Ctt)</b> = <b>[V/F 5pts](UF5)</b> .	0 to 599 Hz	0 Hz
U2 ★	<b>[U2]</b> V/f profile setting This parameter can be accessed if <b>[Motor control type](Ctt)</b> = <b>[V/F 5pts](UF5)</b> .	0 to 800 V depending on size	0 V
F2 ★	<b>[F2]</b> V/f profile setting This parameter can be accessed if <b>[Motor control type](Ctt)</b> = <b>[V/F 5pts](UF5)</b> .	0 to 599 Hz	0 Hz
U3 ★	<b>[U3]</b> V/f profile setting This parameter can be accessed if <b>[Motor control type](Ctt)</b> = <b>[V/F 5pts](UF5)</b> .	0 to 800 V depending on size	0 V
F3 ★	<b>[F3]</b> V/f profile setting This parameter can be accessed if <b>[Motor control type](Ctt)</b> = <b>[V/F 5pts](UF5)</b> .	0 to 599 Hz	0 Hz
U4 ★	<b>[U4]</b> V/f profile setting This parameter can be accessed if <b>[Motor control type](Ctt)</b> = <b>[V/F 5pts](UF5)</b> .	0 to 800 V depending on size	0 V
F4 ★	<b>[F4]</b> V/f profile setting This parameter can be accessed if <b>[Motor control type](Ctt)</b> = <b>[V/F 5pts](UF5)</b> .	0 to 599 Hz	0 Hz
U5 ★	<b>[U5]</b> V/f profile setting This parameter can be accessed if <b>[Motor control type](Ctt)</b> = <b>[V/F 5pts](UF5)</b> .	0 to 800 V depending on size	0 V
F5 ★	<b>[F5]</b> V/f profile setting This parameter can be accessed if <b>[Motor control type](Ctt)</b> = <b>[V/F 5pts](UF5)</b> .	0 to 599 Hz	0 Hz

The parameters described on this page can be accessed by: DRI- > CO nF > FULL > drC-

Code	Name/Description	Setting range	Factory settings
CLI  	<b>[CURRENT LIMIT.]</b> <h2>Caution!</h2> <p><b>MOTOR OVERHEATING AND DAMAGE</b></p> <ul style="list-style-type: none"> <li>Make sure that the motor has the required power rating for the applied maximum current.</li> <li>In order to calculate the maximum current, take the motor work cycle and all the factors involved in using the motor into account, including derating requirements.</li> </ul> <p>Failure to observe these instructions can result in damage to the equipment.</p> <p>First current limitation.</p> <h2>Note:</h2> <p>If the setting is less than 0.25 in, the inverter can lock in error mode <b>[Output Phase Loss](OPL)</b>, if this has been enabled). If it is less than the motor no-load current, the motor cannot run.</p>	0 to 1.5*INV	1.5*INV
SFt	<b>[Switch. freq type]</b> The motor clock frequency is always changed (reduced) if the inverter's internal temperature is too high.		<b>[SFR type 1](HF1)</b>
HF1	<b>[SFR type 1](HF1):</b> Optimized for heating Used by the system to adjust the clock frequency to the motor frequency.		
HF2	<b>[SFR type 2](HF2):</b> Motor noise optimization (for high clock frequency) Allows the system to maintain a selected clock frequency <b>[Switching freq.](SFr)</b> , independently of the motor frequency <b>[Output frequency](rFr)</b> . 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 	<b>[Switching freq.]</b> <h2>Caution!</h2> <p><b>MOTOR DAMAGE</b></p> <p>If the EMC filter is separated in an IT power system, make sure that the inverter clock frequency does not exceed 4 kHz.</p> <p>Failure to observe these instructions can result in damage to the equipment.</p> <p>Switching frequency setting.                      Setting range: The maximum value is limited to 4 kHz if parameter <b>[Motor surge limit](SVL)</b> has been configured.</p> <h2>Note:</h2> <p>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.</p> <p>At high motor speeds, it is advisable to increase PWM frequency <b>[Switching freq.](SFr)</b> to 8, 12 or 16 kHz.</p>	2 to 16 kHz or 4 kHz (if (SVL) enabled)	4 kHz
nrd	<b>[Noise reduction]</b> Random frequency modulation prevents any resonance that may occur at a fixed frequency.		<b>[No](nO)</b>
nO	<b>[No](nO):</b> Fixed frequency		
YES	<b>[YES](YES):</b> Frequency with random modulation		
bOA	<b>[Boost activation]</b>		<b>[Dynamic](dYnA)</b>
nO	<b>[Inactive](nO):</b> No boost		
dYnA	<b>[Dynamic](dYnA):</b> Dynamic boost		
StAt	<b>[Static](StAt):</b> Static boost		
bOO 	<b>[Boost]</b> This parameter can be accessed if <b>[Boost activation](bOA)</b> is not set to <b>[No](nO)</b> . 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 <b>[Action Boost](FAb)</b> . For motors with conical rotors, negative values are particularly common.	-100 to 100%	0%
			
FAb 	<b>[Action Boost]</b> This parameter can be accessed if <b>[Boost activation](bOA)</b> is not set to <b>[No](nO)</b> . A frequency that is no longer affected by <b>[Boost](bOO)</b> once it exceeds the magnetizing current.	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						
SVL	<p><b>[Motor surge limit.]</b></p> <p>This function limits motor overvoltage and can be used for the following types of application:</p> <ul style="list-style-type: none"> <li>• NEMA motors</li> <li>• Japanese motors</li> <li>• Spindle motors</li> <li>• Rewound motors</li> </ul> <p>This parameter can be left set to <b>[No](nO)</b> 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:</p> <ul style="list-style-type: none"> <li>• 4 m for unshielded cables</li> <li>• 10 m for shielded cables</li> </ul> <p><b>Note:</b></p> <p>If <b>[Motor surge limit](SVL) = [YES](YES)</b>, the maximum clock frequency <b>[Switching freq.](SFr)</b> is changed.</p>		<b>[No](nO)</b>						
nO YES	<p><b>[No](nO)</b>: Function not active</p> <p><b>[YES](YES)</b>: Function active</p>								
SOP	<p><b>[Volt surge limit. opt]</b></p> <p>Optimization parameter for transient overvoltages at the motor terminals. This parameter can be accessed if <b>[Motor surge limit](SVL) = [YES](YES)</b>.</p> <p>Set to 6, 8 or 10 <math>\mu</math>s, as per the following table.</p> <table> <tr> <td>6</td> <td><b>[6 <math>\mu</math>s](6)</b></td> </tr> <tr> <td>8</td> <td><b>[8 <math>\mu</math>s](8)</b></td> </tr> <tr> <td>10</td> <td><b>[10 <math>\mu</math>s](10)</b></td> </tr> </table> <p><b>Note:</b></p> <p>This parameter can be used for 8I76T40xxxx.00-000 inverters.</p>	6	<b>[6 <math>\mu</math>s](6)</b>	8	<b>[8 <math>\mu</math>s](8)</b>	10	<b>[10 <math>\mu</math>s](10)</b>		10 $\mu$ s
6	<b>[6 <math>\mu</math>s](6)</b>								
8	<b>[8 <math>\mu</math>s](8)</b>								
10	<b>[10 <math>\mu</math>s](10)</b>								



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, different motor powers in parallel, different cable lengths in parallel, etc.), we recommend using an oscilloscope to check the overvoltage values obtained at the motor terminals.





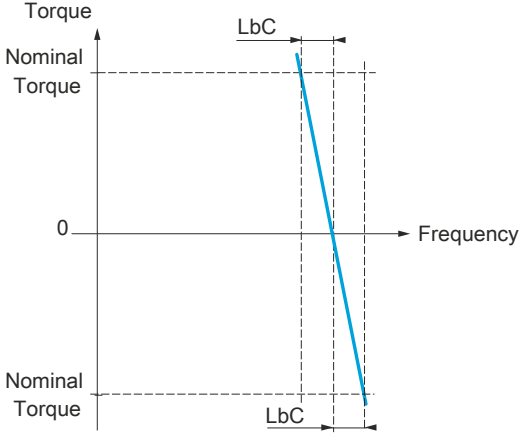
To retain the overall inverter performance, the SOP value is not permitted to be increased unnecessarily.

Overview of the correlation between the SOP parameter and the cable length for a 400 V power supply

## The drive

P76 Setpoint	Motor		Cable cross section (min)		Maximum cable length in meters								
	Power				Unshielded "GORSE" H07 RN-F 4Gxx cable			Shielded "GORSE" GVCSTV-LS/LH cable			Shielded "BELDEN" 2950x cable		
	kW	HP	In mm <sup>2</sup>	AWG	SOP = 10	SOP = 8	SOP = 6	SOP = 10	SOP = 8	SOP = 6	SOP = 10	SOP = 8	SOP = 6
8I76S200018.00-000	0.18	0.25	1.5	14	100 m	70 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
8I76xx00037.00-000	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
8I76xx00055.00-000	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
8I76xx00075.00-000	0.75	1	1.5	14	100 m	70 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
8I76xx00110.00-000	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
8I76xx00150.00-000	1.5	2	1.5	14	100 m	70 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
8I76xx00220.00-000	2.2	3	1.5	14	110 m	65 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
8I76T400300.00-000	3	-	1.5	14	110 m	65 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
8I76T400400.00-000	4	5	2.5	12	110 m	65 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
8I76T400550.00-000	5.5	7.5	4	10	120 m	65 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
8I76T400750.00-000	7.5	10	6	8	120 m	65 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
8I76T401100.00-000	11	15	10	8	115 m	60 m	45 m	100 m	75 m	55 m	50 m	40 m	30 m
8I76T401500.00-000	15	20	16	6	105 m	60 m	40 m	100 m	70 m	50 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- > COF > FULL > drC-			
Code	Name/Description	Setting range	Factory settings
drC-	<b>[MOTOR CONTROL](continued)</b>		
Vbr 	<b>[Braking level]</b>  Braking transistor power-on voltage (see "[DC BUS] (dCC-)" on page 272).	8I76S2: 335 to 395 VDC 8I76T4: 698 to 820 VDC	In accordance with nominal inverter voltage
LbA 	<b>[Load sharing]</b>  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 <b>[Motor control type](Ctt) = [SVC U](UUC)</b> .		<b>[No](nO)</b>
nO YES	<b>[No](nO)</b> : Function not active <b>[YES](YES)</b> : Function active		
LbC  	<b>[Load sharing correction]</b>  Nominal compensation in Hz This parameter can be accessed if <b>[Load sharing](LbA) = [YES](YES)</b> .	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.

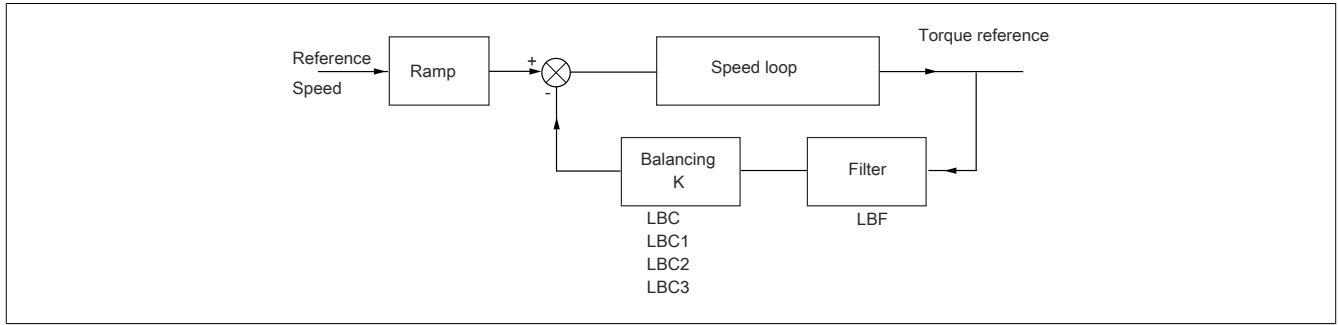


Parameter that can be modified during operation or when stopped.

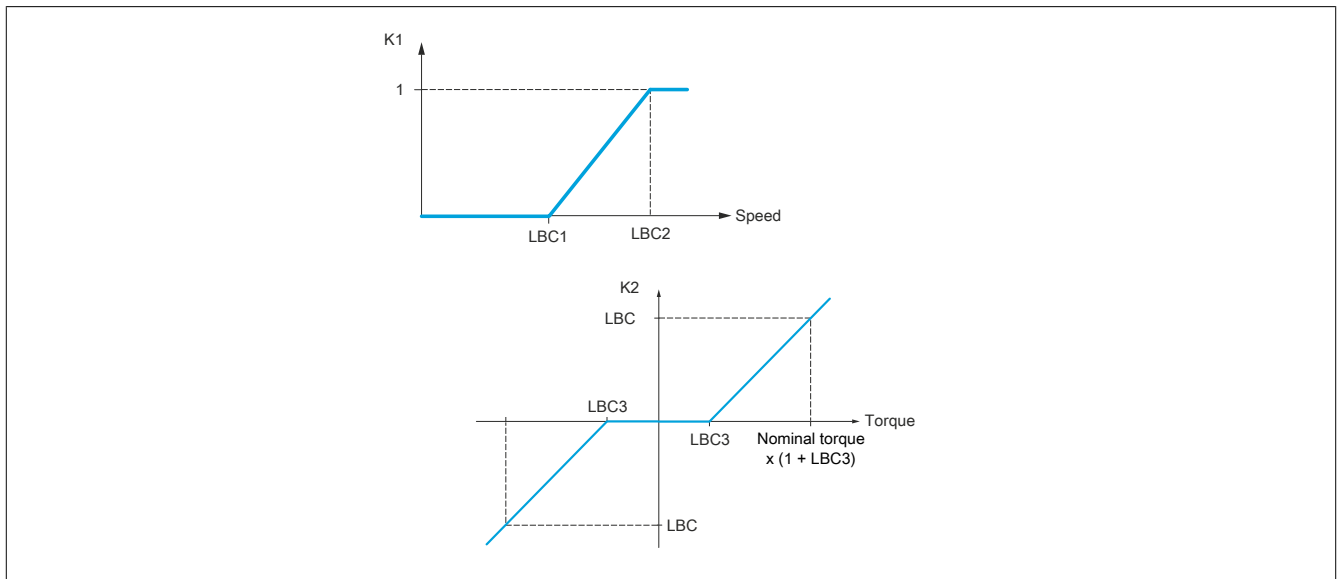
### 5.2.3.6.3.7 [MOTOR CONTROL] (drC-) Load balancing parameters

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 ( $K = K1 \times K2$ ).



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



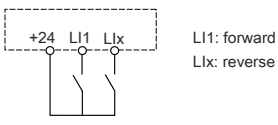
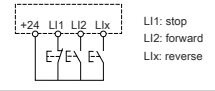
These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.



Parameter that can be modified during operation or when stopped.

### 5.2.3.6.4 [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-	<b>[INPUTS/ OUTPUTS]</b>	
tCC ⌚ 2 s	<b>[2/3 wire control]</b>  <b>Warning!</b> <b>UNEXPECTED OPERATION OF THE EQUIPMENT</b> Changing this parameter causes parameters <b>[Reverse assign.](rrS)</b> and <b>[2 wire type](tCt)</b> 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.	<b>[2 wire](2C)</b>
2C	<b>[2 wire](2C) 2-wire control (level-controlled):</b> 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	<b>[3 wire](3C) 3-wire control (edge-controlled):</b> Impulse "Forward" or "Reverse" is sufficient to control motor startup. Impulse "Stop" is sufficient to control motor stopping. Source wiring example:  	
tCt ★ ⌚ 2 s	<b>[2 wire type]</b>  <b>Warning!</b> <b>UNEXPECTED OPERATION OF THE EQUIPMENT</b> 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.	<b>[Transition](trn)</b>
LEL	<b>[Level](LEL):</b> State 0 or 1 determines whether operation (1) or a stop (0) takes place.	
trn	<b>[Transition](trn):</b> A state change (edge or transition) is required to initiate operation and to prevent an inadvertent restart after power failure.	
PFO	<b>[Fwd priority](PFO):</b> State 0 or 1 is taken into account for operation or stopping, but input signal "Forward" takes priority over input signal "Reverse".	
rUn ★	<b>[Run]</b> Stop command assignment Only visible if <b>[2/3 wire control](tCC)</b> is set to <b>[3 wire](3C)</b> .	<b>[No](nO)</b>
L11 Cd00	<b>[L11](L11):</b> Logic input L11, if not in <b>[I/O profile](IO)</b> <b>[Cd00](Cd00):</b> In <b>[I/O profile](IO)</b> , logic input switchover is possible	
Frd	<b>[Forward]</b> Forward command assignment.	<b>[L11](L11)</b>
L11 Cd00	<b>[L11](L11):</b> Logic input L11, if not in <b>[I/O profile](IO)</b> <b>[Cd00](Cd00):</b> In <b>[I/O profile](IO)</b> , logic input switchover is possible	
rrS	<b>[Reverse assign.]</b> Assignment of the reverse direction command.	<b>[L12](L12)</b>
nO L11 ...	<b>[No](nO):</b> Not assigned <b>[L11](L11):</b> Logic input L11 <b>[...](...)</b> If <b>[Profile](CHCF)</b> is set to <b>[Not separ.] (SIM)</b> or <b>[Separate] (SEP)</b> , then parameters <b>[CD11] (Cd11)</b> to <b>[CD15] (Cd15)</b> , <b>[C111] (C111)</b> to <b>[C115] (C115)</b> , <b>[C211] (C211)</b> to <b>[C215] (C215)</b> as well as <b>[C311] (C311)</b> to <b>[C315] (C315)</b> will not be available.	



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.



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

## 5.2.3.6.4.1 [L11 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-	<b>[L11 CONFIGURATION]</b>		
L1A	<b>[Logic input 1 assignment]</b> Read-only parameter, cannot be configured. It displays all the functions that are assigned to input L11 in order to check for multiple assignments.		
nO	<b>[No]</b> (nO): Not assigned		
rUn	<b>[Run]</b> (rUn): Enabled to start		
Frd	<b>[Forward]</b> (Frd): Operation in forward direction		
rrS	<b>[Reverse assign.]</b> (rrS): Operation in reverse direction		
rPS	<b>[Ramp type]</b> (rPS): Switch ramp		
JOG	<b>[Frequency Jog]</b> (JOG): Step mode		
USP	<b>[+speed around ref.]</b> (USP): Increase speed		
dSP	<b>[-speed around ref.]</b> (dSP): Decrease speed		
PS2	<b>[2 preset speeds]</b> (PS2): 2 preset speeds		
PS4	<b>[4 preset speeds]</b> (PS4): 4 preset speeds		
PS8	<b>[8 preset speeds]</b> (PS8): 8 preset speeds		
rFC	<b>[Ref. 2 switching]</b> (rFC): Setpoint switching		
nSt	<b>[Freewheel]</b> (nSt): Freewheel stop		
dCl	<b>[DC Injection]</b> (dCl): Stop via DC injection braking		
FSt	<b>[Fast stop]</b> (FSt): Fast stop		
FLO	<b>[Forced local]</b> (FLO): Mode "Forced local"		
rSF	<b>[Fault reset]</b> (rSF): Error reset		
tUL	<b>[Auto-tuning]</b> (tUL): Autotuning		
SPM	<b>[Save setpoint]</b> (SPM): Setpoint storage		
FLI	<b>[Pre Fluxing]</b> (FLI): Motor magnetization		
PAU	<b>[Auto / manual]</b> (PAU): Auto / manual PI(D)		
PIS	<b>[PID integral reset]</b> (PIS): PI(D) integral shunt		
Pr2	<b>[2 preset PID ref.]</b> (Pr2): 2 PI(D) preset setpoints		
Pr4	<b>[4 preset PID ref.]</b> (Pr4): 4 PI(D) preset setpoints		
tLA	<b>[Torque limitation]</b> (tLA): Permanent torque limitation		
EtF	<b>[External fault]</b> (EtF): External error		
rCA	<b>Output contact. fdbk</b> (rCA): Downstream contactor feedback		
CnF1	<b>[2 config. switching]</b> (CnF1): Configuration switchover 1		
CnF2	<b>[3 config. switching]</b> (CnF2): Configuration switchover 2		
CHA1	<b>[2 parameter sets]</b> (CHA1): Parameter switchover 1		
CHA2	<b>[3 parameter sets]</b> (CHA2): Parameter switchover 2		
tLC	<b>[Analog limit. act.]</b> (tLC): Torque limiting: Enabled (analog input) via logic input		
CCS	<b>[Cmd switching]</b> (CCS): Command channel switchover		
InH	<b>[Fault inhibition]</b> (InH): Error inhibition		
PS16	<b>[16 preset speeds]</b> (PS16): 16 preset speeds		
LC2	<b>[Current limit 2]</b> (LC2): Current-limiting switchover		
rCb	<b>[Ref 1B switching]</b> (rCb): Setpoint channel switchover (1 after 1B)		
trC	<b>[Traverse control]</b> (trC): Traverse control		
bCl	<b>[Brake feedback]</b> (bCl): Logic input brake feedback		
SAF	<b>[Stop FW limit sw.]</b> (SAF): Forward stop switch		
SAr	<b>[Stop RV limit sw.]</b> (SAr): Reverse stop switch		
dAF	<b>[Slowdown forward]</b> (dAF): Forward deceleration achieved		
dAr	<b>[Slowdown reverse]</b> (dAr): Reverse deceleration achieved		
CLS	<b>[Disable limit sw.]</b> (CLS): Clear limit switch		
LES	<b>[Drive lock]</b> (LES): Emergency switch-off		
rtr	<b>[Init. traverse ctrl.]</b> (rtr): Reload traverse control		
SnC	<b>[Counter wobble]</b> (SnC): Counter wobble synchronization		
rPA	<b>[Prod. reset]</b> (rPA): Reset product		
SH2	<b>[2 HSP]</b> (SH2): High speed 2		
SH4	<b>[4 HSP]</b> (SH4): High speed 4		
FPS1	<b>[Preset spd2]</b> (FPS1): Preset speed 1 function key assignment		
FPS2	<b>[Preset spd3]</b> (FPS2): Preset speed 2 function key assignment		
FPr1	<b>[PID ref. 2]</b> (FPr1): Preset PI 1 function key assignment		
FPr2	<b>[PID ref. 3]</b> (FPr2): Preset PI 2 function key assignment		
FUSP	<b>[+speed around ref.]</b> (FUSP): Speed increase function key		
FdSP	<b>[-speed around ref.]</b> (FdSP): Speed decrease function key		
Ft	<b>[T/K]</b> (Ft): Bumpless function key assignment		
USI	<b>[+speed around ref.]</b> (USI): Increase speed around setpoint		
dSI	<b>[-speed around ref.]</b> (dSI): Decrease speed around setpoint		
SLS1	<b>[SLS ch.1]</b> (SLS1): Safety function SLS channel 1		
SLS2	<b>[SLS ch.2]</b> (SLS2): Safety function SLS channel 2		
SS11	<b>[SS1 ch.1]</b> (SS11): Safety function SS1 channel 1		
SS12	<b>[SS1 ch.2]</b> (SS12): Safety function SS1 channel 2		
StO1	<b>[STO ch.1]</b> (StO1): Safety function STO channel 1		
StO2	<b>[STO ch.2]</b> (StO2): Safety function STO channel 2		
SMS1	<b>[SMS ch.1]</b> (SMS1): Safety function SMS channel 1		
SMS2	<b>[SMS ch.2]</b> (SMS2): Safety function SMS channel 2		
L1d	<b>[L11 On Delay]</b> 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 change 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-

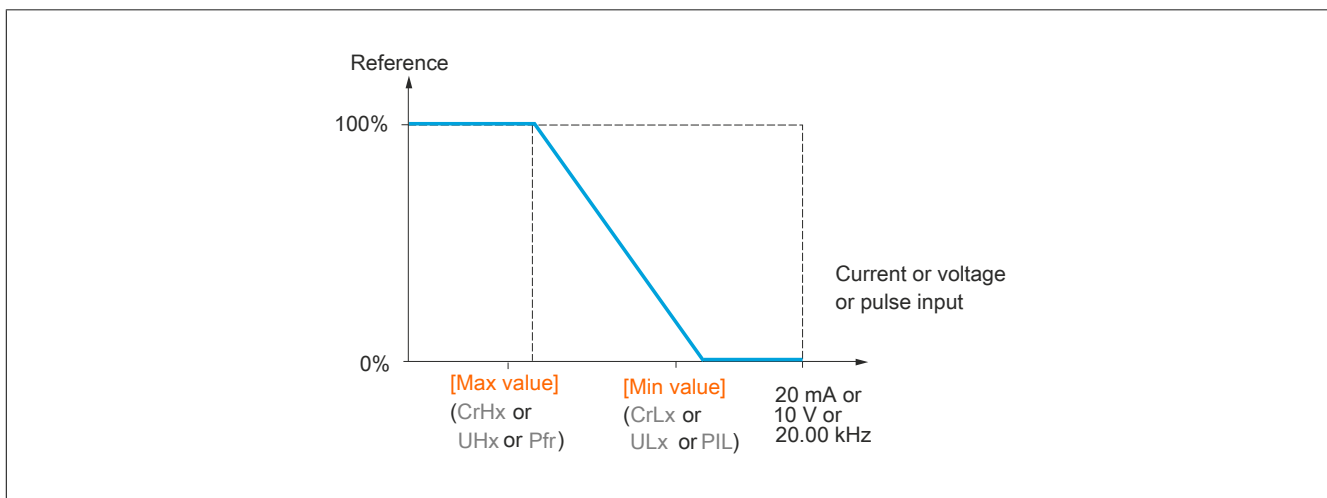
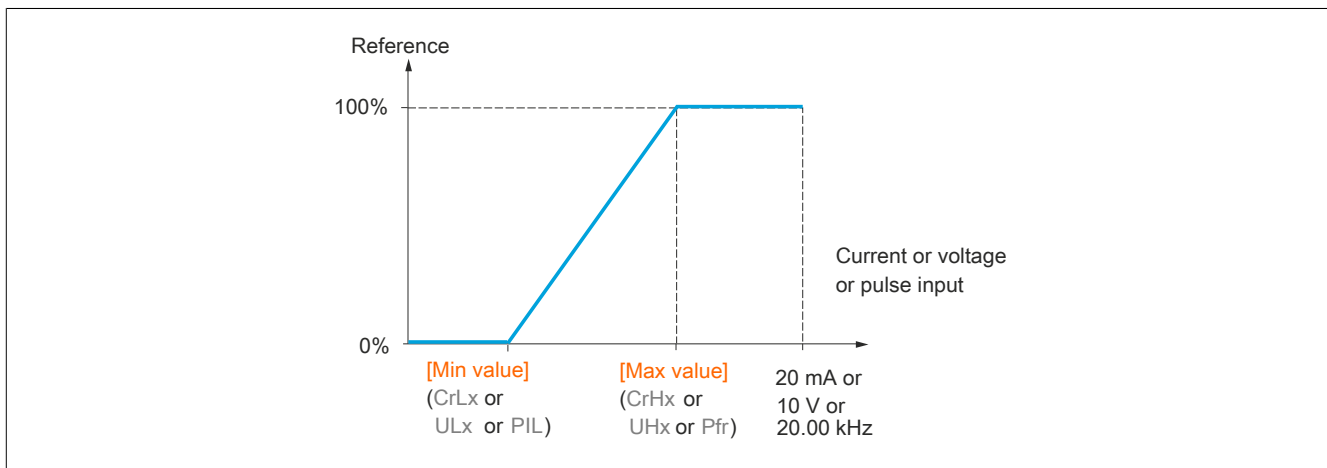
Code	Name/Description	Setting range	Factory settings
I_O-	[INPUTS/OUTPUTS](continued)		
L2- Up to L6-	[Lix CONFIGURATION] All available logic inputs of the inverter are processed as shown in example LI1 above (up to LI6).		
L5-	[LI5 CONFIGURATION] The parameters determined for LI5 are used as an pulse 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:

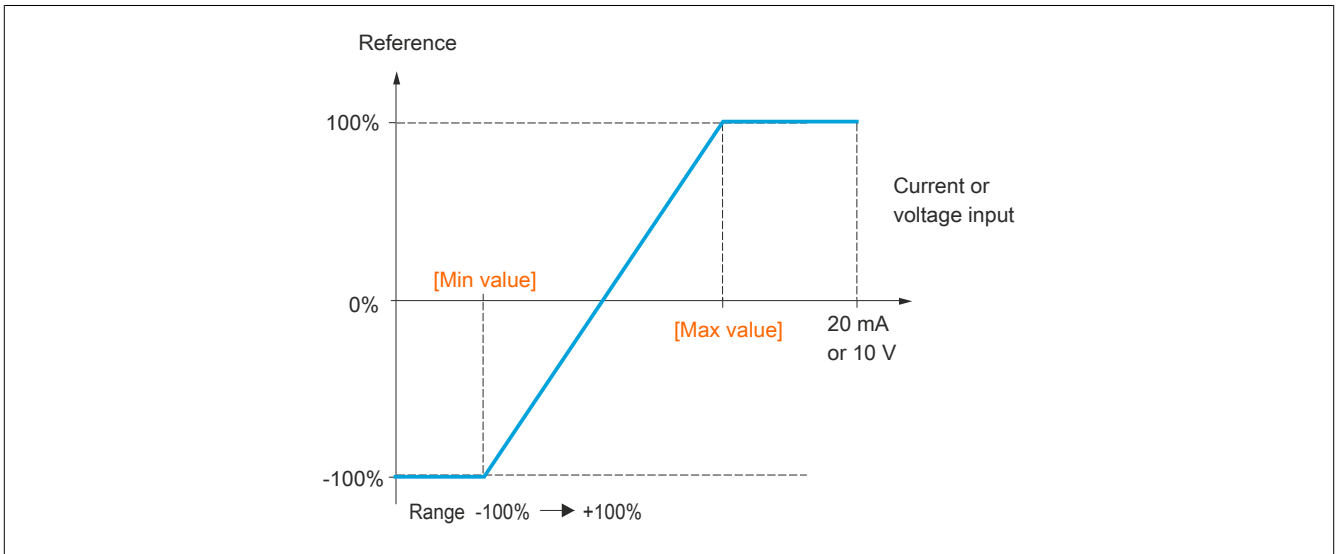
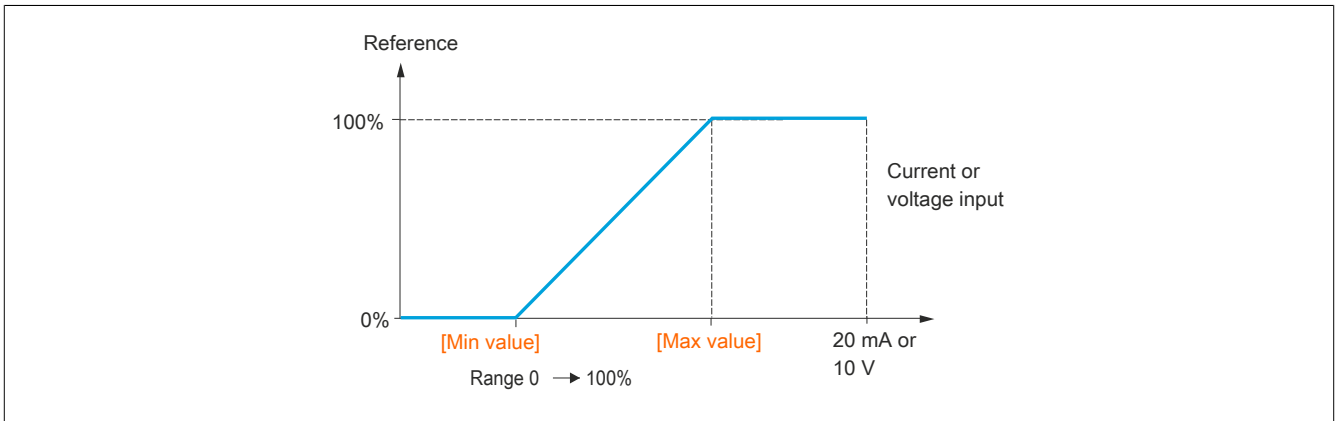
The minimum value corresponds to a 0% setpoint and the maximum value to a 100% setpoint. The minimum value can be greater than the maximum value:







For bidirectional inputs ( $\pm$ ), the minimum and maximum values are relative to the absolute value, for example,  $\pm 2$  related to 8 V.

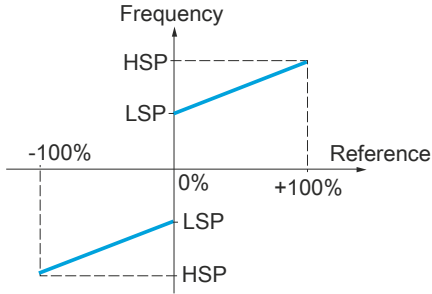
**Area (output values): Only for analog inputs:**

With this parameter, the reference range is set to  $[0\% \rightarrow 100\%]$  or  $[-100\% \rightarrow +100\%]$ . This will result in bidirectional output from unidirectional input.

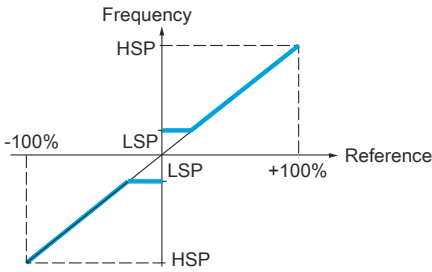


The parameters described on this page can be accessed by: DRI->CO nF > FULL > I\_O-> bSP

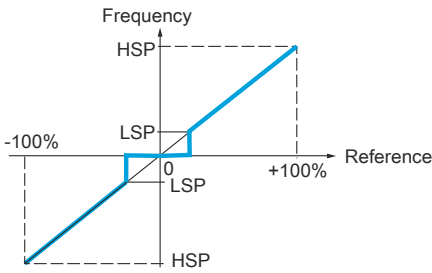
Code	Name/Description	Setting range	Factory settings
bSP	[Reference template] <b>Note:</b> [Type of ref.] (bSP) is forced to [Deadband](bnS) and cannot be changed if setpoint [Ref Frequency] (LFr) or (LFRD) is specified by a controller.		[Standard] (bSd)
bSd	[Standard] (bSd) 		
bLS	[Pedestal](bLS) 		
bnS	[LSP inhibition](bnS) 		
bnS0	[Deadband 0](bnS0) 		



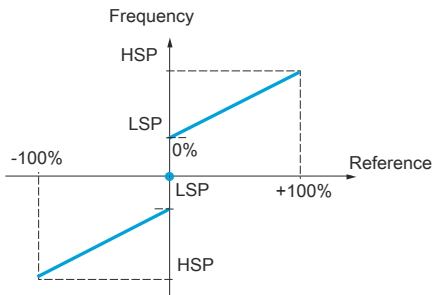
When setpoint = 0, frequency = LSP



When setpoint = 0 to LSP, frequency = LSP



When setpoint = 0 to LSP, frequency = 0



This process is identical to [Default] (bSd), but in the following cases the frequency at reference = 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" has been set for the input field, the process is identical to [Default] (bSd).  
This parameter defines how the speed reference is taken into account, for analog inputs and Pulse input only. In the case of the PID regulator, this is the PID output reference.  
The limit values are defined by parameters [Low speed](LSP) and [High speed](HSP).

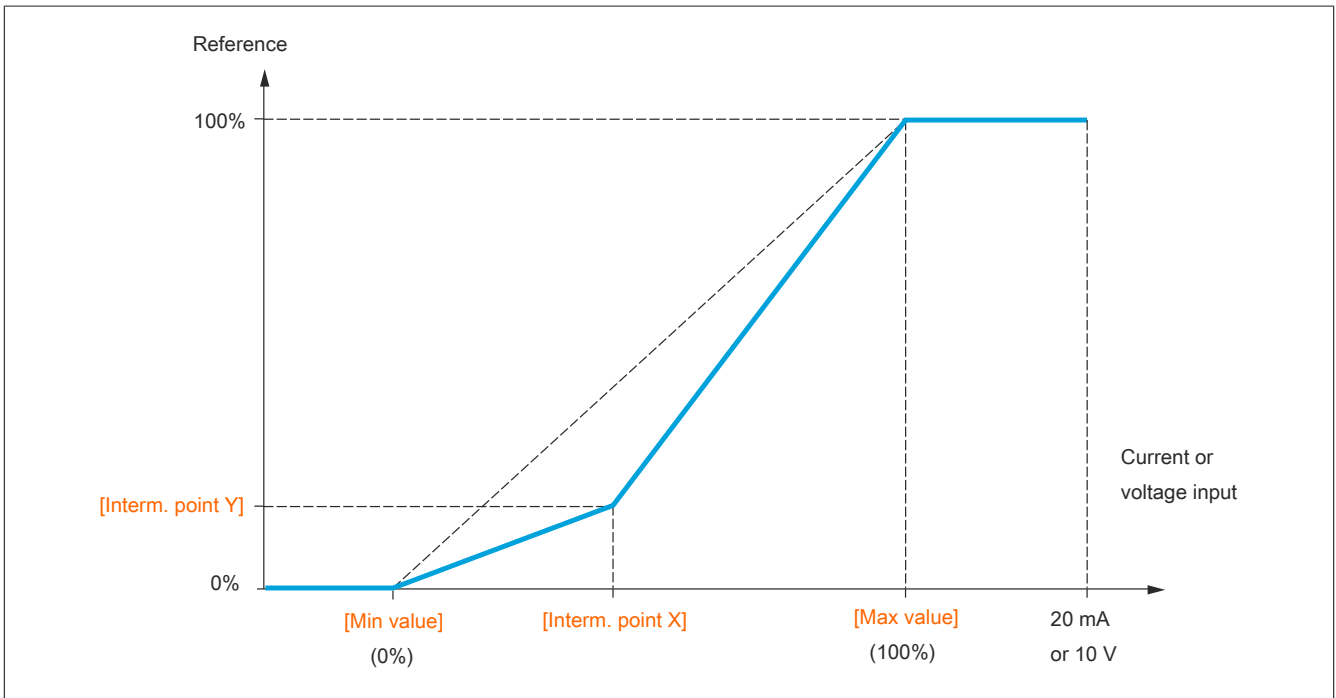


Parameter that can be modified during operation or when stopped.

### Delinearization: Only for analog inputs

To delinearize the input, determine an intermediate point on the input/output curve of this input:

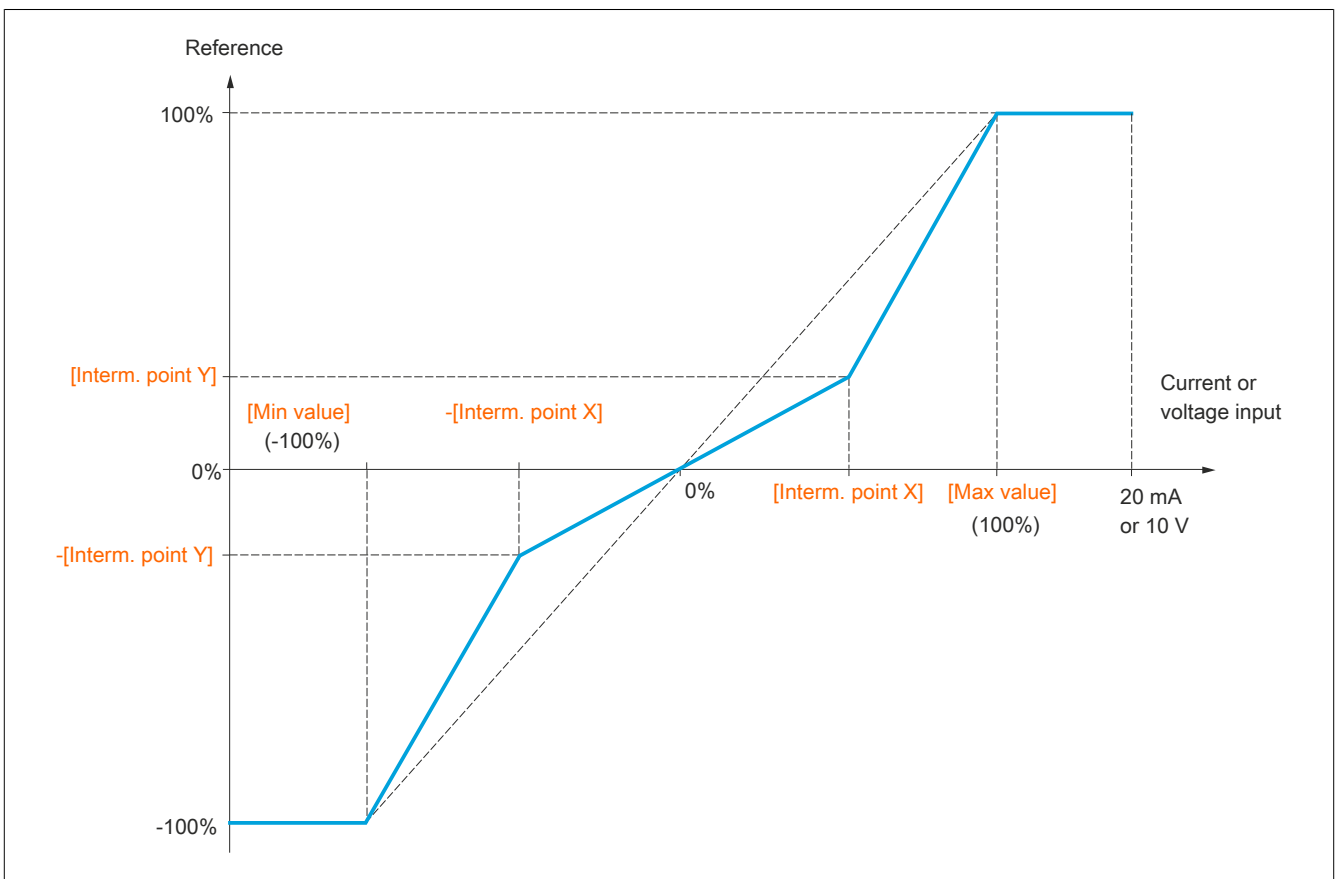
Range 0 → 100%



#### Note:

For **[AI1 Interm. point]** 0% corresponds to the **[Min value]** and 100% to the **[Max value]**.

Range -100% → 100%



## 5.2.3.6.4.2 [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-	<b>[AI1 CONFIGURATION]</b>		
AI1A	<b>[AI1 assignment]</b> 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	<b>[No](nO):</b> Not assigned		
AO1	<b>[AO1 assignment](AO1):</b> Analog output AO1		
Fr1	<b>[Ref.1 channel](Fr1):</b> Setpoint source 1		
Fr2	<b>[Ref.2 channel](Fr2):</b> Setpoint source 2		
SA2	<b>[Summing ref. 2](SA2):</b> Setpoint total 2		
PIF	<b>[PID feedback](PIF):</b> PI actual value (PI control)		
tAA	<b>[Torque limitation](tAA):</b> Torque limiting: Enabled via analog value		
dA2	<b>[Subtract. ref. 2](dA2):</b> Subtraction setpoint 2		
PIM	<b>[Manual PID ref.](PIM):</b> Manual setpoint frequency for the PI(D) controller (auto-man)		
FPI	<b>[PID speed ref.](FPI):</b> Speed setpoint for the PI(D) controller (predictive setpoint)		
SA3	<b>[Summing ref. 3](SA3):</b> Setpoint total 3		
Fr1b	<b>[ch1B active](Fr1b):</b> Setpoint source 1B		
dA3	<b>[SubParam3](dA3):</b> Subtraction setpoint 3		
FLOC	<b>[Forced local](FLOC):</b> Setpoint source "Forced local"		
MA2	<b>[Multiplier ref. 2](MA2):</b> Multiplication setpoint 2		
MA3	<b>[Multiplication ref 3](MA3):</b> Multiplication setpoint 3		
PES	<b>[Weight input](PES):</b> Hoisting: External weight measurement function		
AI1t	<b>[Type AI1]</b>		<b>[Voltage](10U)</b>
10U	<b>[Voltage](10U):</b> Positive voltage input 0 to 10 V (negative values are interpreted as zero:		
UIL1	<b>[AI1 min value]</b> Parameter value for voltage scaling AI1 = 0%	0 to 10.0 V	0 V
UIH1	<b>[AI1 max value]</b> Parameter value for voltage scaling AI1 = 100%	0 to 10.0 V	10.0 V
AI1F	<b>[AI1 filter]</b> Interference filtering.	0 to 10.00 s	0 s
AI1L	<b>[AI1 range]</b>		<b>[0 - 100%](POS)</b>
POS	<b>[0 - 100%](POS):</b> Positive logic		
nEG	<b>[+/- 100%](nEG):</b> Positive and negative logic		
AI1E	<b>[AI1 Interm. point X]</b> Input delinearization point coordinate. Signal at physical input as a percentage. 0% corresponds to <b>[AI1 min value](UIL1)</b> . 100% corresponds to <b>[AI1 max value](UIH1)</b> .	0 to 100%	0%
AI1S	<b>[AI1 Interm. point Y]</b> Output delinearization point coordinate (frequency reference). Percentage of internal frequency setpoint that corresponds to percentage <b>[AI1 Interm. point X](AI1E)</b> 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-	<b>[AI2 CONFIGURATION]</b>		
AI2A	<b>[AI2 assignment]</b> Identical to <b>[AI1 assignment](AI1A)</b>		
AI2t	<b>[Type AI2]</b>		<b>[Voltage +/-](n10U)</b>
10U	<b>[0-10V](10U):</b> Positive voltage input 0 to 10 V (negative values are interpreted as zero: the input is unidirectional).		
n10U	<b>[Voltage +/-](n10U):</b> Positive and negative voltage input +/- 10 V (input is bidirectional).		
UIL2	<b>[AI2 min value]</b> Parameter value for voltage scaling AI2 = 0%	0 to 10.0 V	0 V
UIH2	<b>[AI2 max value]</b> Parameter value for voltage scaling AI2 = 100%	0 to 10.0 V	10.0 V
AI2F	<b>[AI2 filter]</b> Disturbance filtering.	0 to 10.00 s	0 s
AI2L	<b>[AI2 range]</b> This parameter can be accessed if <b>[Type AI2](AI2t) = [Voltage +/-](n10U)</b> .		<b>[0 - 100%](POS)</b>
POS	<b>[0 - 100%](POS):</b> Positive logic		
nEG	<b>[+/- 100%](nEG):</b> Positive and negative logic		
AI2E	<b>[AI2 Interm. point X]</b> Input delinearization point coordinate. Signal at physical input as a percentage. 0% corresponds to <b>[Min value]</b> if the range = 0 → 100%. 0% corresponds to $\frac{[Max\_value] + [Min\_value]}{2}$ if the range = -100% → + 100%. 100% corresponds to <b>[Max value]</b> .	0 to 100%	0%
AI2S	<b>[AI2 Interm. point Y]</b> Output delinearization point coordinate (frequency reference). Percentage of the internal frequency setpoint that corresponds to percentage <b>[AI2 Interm. point X](AI2E)</b> 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-	<b>[AI3 CONFIGURATION]</b>		
AI3A	<b>[AI3 assignment]</b> Identical to <b>[AI1 assignment]</b> (AI1A).		
AI3t 0 A	<b>[AI3 Type]</b> <b>[0-20mA]</b> (0A): Current input 0 to 20 mA		<b>[0-20mA]</b> (0A)
CrL3	<b>[Min value]</b> Parameter value for current scaling AI3 = 0%	0 to 20.0 mA	0 mA
CrH3	<b>[AI3 max value]</b> Parameter value for current scaling AI3 = 100%	0 to 20.0 mA	20.0 mA
AI3F	<b>[AI3 filter]</b> Disturbance filtering.	0 to 10.00 s	0 s
AI3L POS nEG	<b>[Range AI3]</b> <b>[0 - 100%]</b> (POS): Unidirectional input <b>[+/- 100%]</b> (nEG): Bidirectional input Example: At an input of 4 to 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 <b>[+/- 100%]</b> (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.		<b>[0 - 100%]</b> (POS)
AI3E	<b>[AI3 Interm. point X]</b> Input delinearization point coordinate. Signal at physical input as a percentage. 0% corresponds to <b>[Min value]</b> (CrL3) if the range = 0 → 100%. 0% corresponds to $\frac{[AI3\_max\_value](CrH3) - [AI3\_min\_value](CrL3)}{(CrH3)}$ if the range = -100% → +100%. 100% corresponds to <b>[AI3 max value]</b> (CrH3).	0 to 100%	0%
AI3S	<b>[AI3 Interm. point Y]</b> Output delinearization point coordinate (frequency reference). Percentage of the internal frequency setpoint that corresponds to percentage <b>[AI3 Interm. point X]</b> (AI3E) of the signal at the physical input.	0 to 100%	0%

#### 5.2.3.6.4.3 [Virtual AI1 ](AU1-)

The parameters described on this page can be accessed by: DRI->COnF>FULL>I_O->AU1-			
Code	Name/Description		
AU1-	<b>[VIRTUAL AI1]</b>		
AU1A	<b>[AIV1 assignment]</b> Virtual analog input 1 using the handwheel on the front of the product. Identical to <b>[AI1 assignment]</b> (AI1A).		

The parameters described on this page can be accessed by: DRI->COnF>FULL>I_O->AU2-			
Code	Name/Description		Factory settings
AU2-	<b>[VIRTUAL AI2]</b>		
AU2A	<b>[AIV2 assign.]</b> Possible assignment for <b>[AI virtual 2]</b> (AIU2): Virtual analog input 2 via the communication channel, configured via <b>[AI2 net. channel]</b> (AIC2). Identical to <b>[AIV1 assignment]</b> (AU1A).		
AIC2 ★	<b>[AI2 net. channel]</b> <b>[VIRTUAL AI2]</b> (AU2A) Source channel. This parameter is also accessible via submenu <b>[PID REGULATOR]</b> (Pid-). Scale: The value 8192 transmitted by this input corresponds to 10 V on a 10-V input.		<b>[No]</b> (nO)
nO Mdb CAn nEt	<b>[No]</b> (nO): Not assigned <b>[Modbus]</b> (Mdb): Integrated Modbus <b>[CANopen com.]</b> (CAn): Integrated CANopen® <b>[Com. card]</b> (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.

## 5.2.3.6.4.4 [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-	<b>[R1 CONFIGURATION]</b>	
r1	<b>[R1 assignment]</b>	<b>[No fault](FLt)</b>
nO	<b>[No](nO):</b> Not assigned	
FLt	<b>[No fault](FLt):</b> Inverter error detection state (relay is normally enabled and will be disabled in the event of an error)	
rUn	<b>[Run](rUn):</b> Inverter in operation	
FtA	<b>[Freq. Th. attained](FtA):</b> Frequency threshold value reached ( <b>[Freq. Th. attained](Ftd)</b> )	
FLA	<b>[HSP attain.] (FLA):</b> High speed reached	
CtA	<b>[I attained] (CtA):</b> Current threshold value reached ( <b>[Current threshold] (Ctd)</b> )	
SrA	<b>[Freq.ref.att](SrA):</b> Frequency setpoint reached	
tSA	<b>[Th.mot.att.](tSA):</b> Motor thermal state 1 reached	
PEE	<b>[PID error al.](PEE):</b> PID controller error alarm	
PFA	<b>[PID fdbk al.](PFA):</b> PID controller error alarm	
F2A	<b>[Freq. Th. 2 attained](F2A):</b> Frequency threshold value 2 reached ( <b>[Freq. threshold 2](F2d)</b> )	
tAd	<b>[Th. drv. att.](tAd):</b> Inverter thermal state reached	
ULA	<b>[Underload. Proc. Al.](ULA):</b> Underload alarm	
OLA	<b>[Overload alarm](OLA):</b> Overload alarm	
rSdA	<b>[Rope slack](rSdA):</b> Slack rope (see parameter <b>[Rope slack config.](rSd)</b> ).	
ttHA	<b>[High torque alarm](ttHA):</b> Motor torque exceeds upper threshold value <b>[High torque thd.](ttH)</b> .	
ttLA	<b>[Low torque alarm](ttLA):</b> Motor torque below lower threshold value <b>[Low torque thd.](ttL)</b> .	
MFrd	<b>[Forward](MFrd):</b> Motor rotating to the right	
MrrS	<b>[Reverse assign.](MrrS):</b> Motor rotating to the left	
tS2	<b>[Th. mot2. att.](tS2):</b> Motor thermal threshold value 2 (TTD2) reached	
tS3	<b>[Th. mot3. att.](tS3):</b> Motor thermal threshold value 3 (TTD3) reached	
AtS	<b>[Neg Torque](AtS):</b> Negative torque (brakes)	
CnF0	<b>[Cnfg.0 act.](CnF0):</b> Configuration 0 is active	
CnF1	<b>[Config 1](CnF1):</b> Configuration 1 is active	
CnF2	<b>[CONFIGURATION 2 state](CnF2):</b> 2 config. switching is active	
CFP1	<b>[Set 1 active](CFP1):</b> Parameter set 1 is active	
CFP2	<b>[Set 2 active](CFP2):</b> Parameter set 2 is active	
CFP3	<b>[Set 3 active](CFP3):</b> Parameter set 3 is active.	
dbL	<b>[DC bus load](dbL):</b> DC bus load	
brS	<b>[In braking](brS):</b> Inverter is braking	
PrM	<b>[P. removed](PrM):</b> Drive locked by input "Safe Torque Off"	
FqLA	<b>[Fr.met. alar.](FqLA):</b> Measured speed setpoint reaches <b>[Pulse warning thd.](FqL)</b>	
MCP	<b>[I present](MCP):</b> Motor current present	
LSA	<b>[Limit sw. att](LSA):</b> Limit switch reached	
dLdA	<b>[Dynamic load alarm](dLdA):</b> Load variation detection	
AG1	<b>[Alarm group 1](AG1):</b> Alarm group 1	
AG2	<b>[Alarm group 2](AG2):</b> Alarm group 2	
AG3	<b>[Alarm group 3](AG3):</b> Alarm group 3	
PMC	<b>[LI6=PTC al.](PLA):</b> LI6 = PtCL alarm	
EFA	<b>[Ext. fault al.](EFA):</b> Alarm external error	
USA	<b>[Undervoltage Alarm](USA):</b> Undervoltage alarm	
UPA	<b>[Undervoltage Pre-alarm](UPA):</b> Undervoltage threshold value	
tHA	<b>[FI °C alarm](tHA):</b> Inverter overheating	
SSA	<b>[Torque/current lim att.](SSA):</b> Torque limiting alarm	
tJA	<b>[IGBT al.](tJA):</b> Thermal transition alarm	
AP3	<b>[AI3 Al. 4-20](AP3):</b> 4-20 mA AI3 failure alarm	
rdY	<b>[Brake R. al.](rdY):</b> Ready for operation	
r1d 1)	<b>[R1 Delay time]</b> The state change takes place after the defined time elapses if the information becomes true. In assignment <b>[No fault](FLt)</b> , the deceleration cannot be defined and therefore remains at 0.	0 to 60,000 ms 0 ms
r1S  POS nEG	<b>[R1 Active at]</b> Operating logic configuration: <b>[1](POS):</b> State 1 if the information is true. <b>[0](nEG):</b> State 0 if the information is true. Configuration <b>[1](POS)</b> cannot be changed at assignment <b>[No fault](FLt)</b> .	<b>[1](POS)</b>
r1H	<b>[R1 holding time]</b> The state change takes place after the defined time elapses if the information becomes false. For assignment <b>[No fault](FLt)</b> , switch-off delay cannot be defined and therefore remains at 0.	Up to 9,999 ms 0 ms
r1F  nO YES	<b>[Fallback R1 activation]</b> This parameter can be accessed if <b>[R1 configuration](r1) = [No](nO)</b> . <b>[No](nO):</b> Relay controlled via OL1R. Relay is disconnected if the inverter is in operating state "Error". <b>[YES](YES):</b> Relay controlled via OL1R.	<b>[No](nO)</b>

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->CO nF > FULL > I_O-> r2-			
Code	Name/Description	Setting range	Factory settings
r2-	<b>[R2 CONFIGURATION]</b>		
r2	<b>[R2 assignment]</b> Identical to <b>[R1 assignment](r1)</b> with the following addition: bLC <b>[Brk control](bLC)</b> : Braking contactor control LLC <b>[Line contactor](LLC)</b> : Line contactor control OCC <b>[Out. contact.](OCC)</b> : Motor contactor control EbO <b>[End reel] (EbO)</b> : End of winding (function "Traverse control") tSY <b>[Sync. wobble](tSY)</b> : Counter wobble synchronization		<b>[No](nO)</b>
r2d (1)	<b>[R2 Delay time]</b> For assignments <b>[No fault](FLt)</b> , <b>[Brk control](bLC)</b> , <b>[Out. contact.](OCC)</b> and <b>[Line contactor](LLC)</b> , 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	<b>[R2 Active at]</b> Operating logic configuration: <b>[1](POS)</b> : State 1 if the information is true <b>[0] (nEG)</b> : State 0 if the information is true For configuration <b>[1](POS)</b> , assignments <b>[No fault](FLt)</b> , <b>[Brk control] (bLC)</b> , <b>[DC charging] (dCo)</b> and <b>[Line contactor] (LLC)</b> cannot be changed.		<b>[1](POS)</b>
r2H	<b>[R2 Holding time]</b> For assignments <b>[Brk control](FLt)</b> , <b>[Brk control](bLC)</b> , and <b>[Line contactor](LLC)</b> 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	<b>[Enable Relay2 fallback]</b> This parameter can be accessed if <b>[R2 assignment](r2) = [No](nO)</b> . <b>[No] (nO)</b> : Relay controlled via OL1R. Relay is disconnected if the inverter is in operating state "Error" <b>[YES](YES)</b> : Relay controlled via OL1R		<b>[No](nO)</b>

(1) 0 to 9,999 ms, then 10.00 to 60.00 s on the integrated display terminal.

## 5.2.3.6.4.5 [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-	<b>[LO1 CONFIGURATION]</b>		
LO1	<b>[LO1 assignment]</b> Identical to <b>[R1 assignment](r1)</b> with the following addition (display only for information purposes, as this selection can only be configured from menu <b>[APPLICATION FUNCT.](FUN-)</b> ): <b>[Brk control](bLC)</b> : Braking contactor control <b>[Line contactor](LLC)</b> : Line contactor control <b>[Out. contact.](OCC)</b> : Motor contactor control <b>[End reel](EbO)</b> : End of winding (function "Traverse control") <b>[Sync. wobble](tSY)</b> : Counter wobble synchronization <b>[GDL](GdL)</b> : Safety function GDL		<b>[No](nO)</b>
LO1d	<b>[LO1 Delay time]</b> For assignments <b>[No fault](FLt)</b> , <b>[Brk control](bLC)</b> , <b>[Out. contact.](OCC)</b> and <b>[Line contactor](LLC)</b> 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 <sup>(1)</sup>	0 ms
LO1S	<b>[LO1 active at]</b> Operating logic configuration: <b>[1](POS)</b> : State 1 if the information is true. <b>[0](nEG)</b> : State 0 if the information is true. Configuration <b>[1](POS)</b> cannot be changed for assignments <b>[No fault](FLt)</b> , <b>[Brk control](bLC)</b> and <b>[Line contactor](LLC)</b> .		<b>[1](POS)</b>
LO1H	<b>[LO1 holding time]</b> For assignments <b>[No fault](FLt)</b> , <b>[Brk control](bLC)</b> and <b>[Line contactor](LLC)</b> , 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
LO1F	<b>[Enable DQ1 fallback]</b> Available if <b>[LO1 assignment] LO1</b> is set to <b>[No](nO)</b> : Not assigned <b>[Yes](YES)</b> : Logic output regulated by (OL1R). The logic output is disabled if the inverter is in operating state "Fault". <b>[No](nO)</b> : Logic output regulated by (OL1R).		<b>[No](nO)</b>

(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.

## 5.2.3.6.4.6 [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-	<b>[DO1 CONFIGURATION]</b>		
dO1	<b>[DO1 assignment]</b> Identical to <b>[R1 assignment](r1)</b> with the following addition (display only for information purposes, as this selection can only be configured from menu <b>[APPLICATION FUNCT.](FUn-)</b> ): <b>[Brk control](bLC)</b> : Braking contactor control <b>[Line contactor](LLC)</b> : Line contactor control <b>[Out. contact.](OCC)</b> : Motor contactor control <b>[End reel] (EbO)</b> : End of winding (function "Traverse control") <b>[Sync. wobble](tSY)</b> : Counter wobble synchronization		<b>[No](nO)</b>
dO1d	<b>[DO1 delay time]</b> For assignments <b>[No fault](FLt)</b> , <b>[Brk control](bLC)</b> , <b>[Out. contact.](OCC)</b> and <b>[Line contactor](LLC)</b> , 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 <sup>(1)</sup>	0 ms
dO1S	<b>[DO1 active at]</b> Operating logic configuration: <b>[1](POS)</b> : State 1 if the information is true <b>[0] (nEG)</b> : State 0 if the information is true Configuration <b>[1](POS)</b> cannot be changed for assignments <b>[No fault](FLt)</b> , <b>[Brk control](bLC)</b> and <b>[Line contactor](LLC)</b> .		<b>[1](POS)</b>
dO1H	<b>[DO1 holding time]</b> For assignments <b>[No fault](FLt)</b> , <b>[Brk control](bLC)</b> and <b>[Line contactor](LLC)</b> , 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

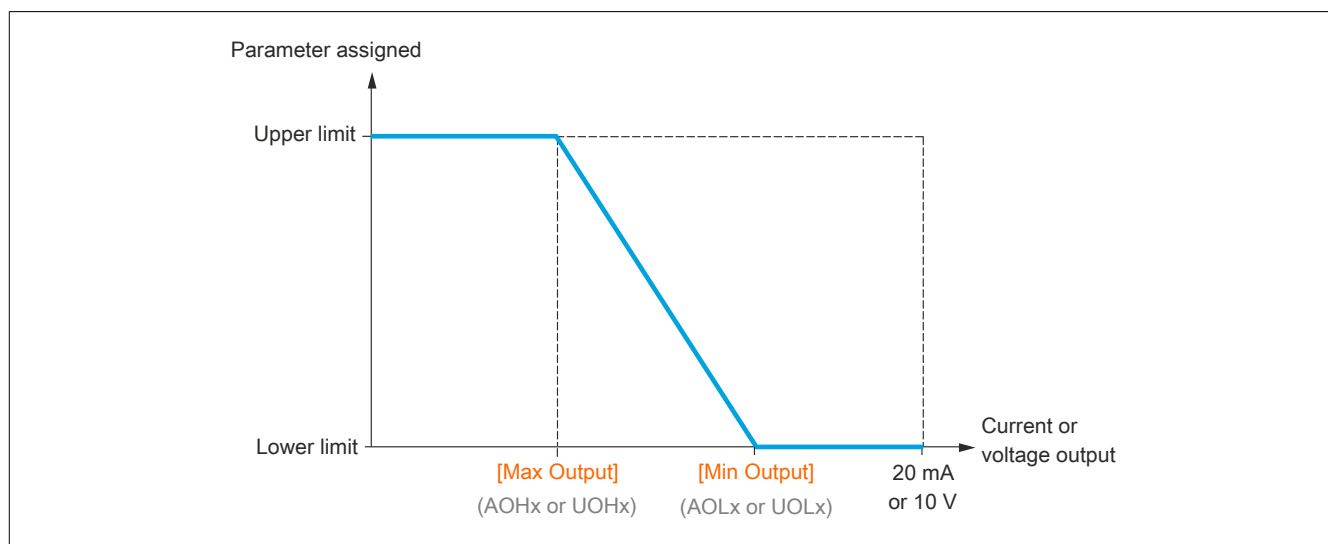
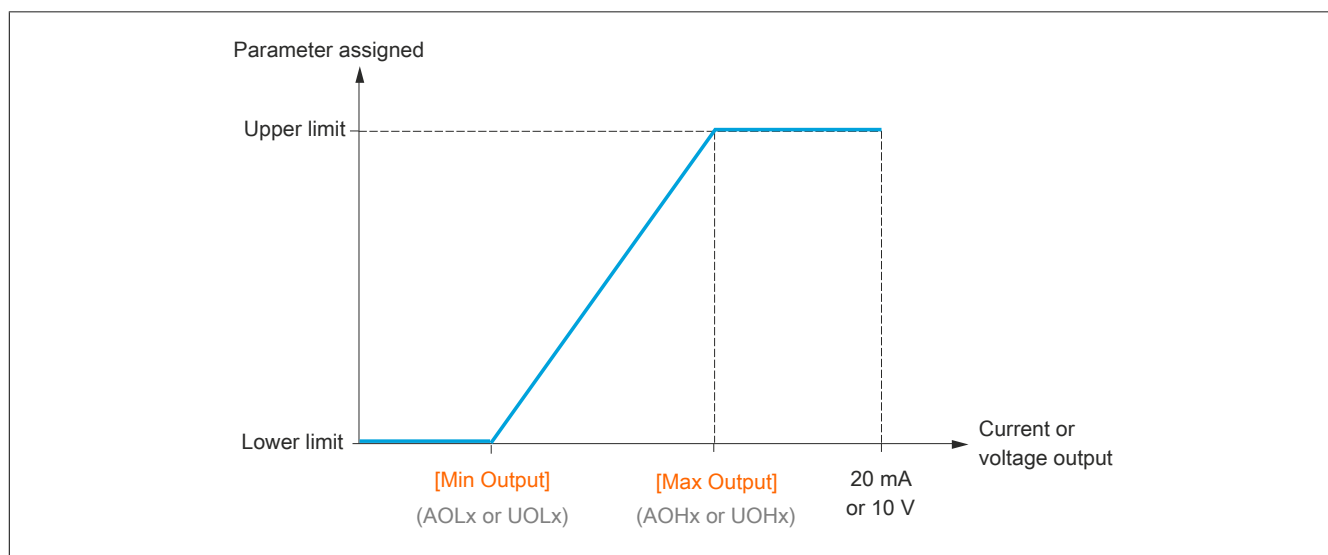
(1) 0 to 9,999 ms, then 10.00 to 60.00 s on the integrated display terminal.

### 5.2.3.6.4.7 [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.



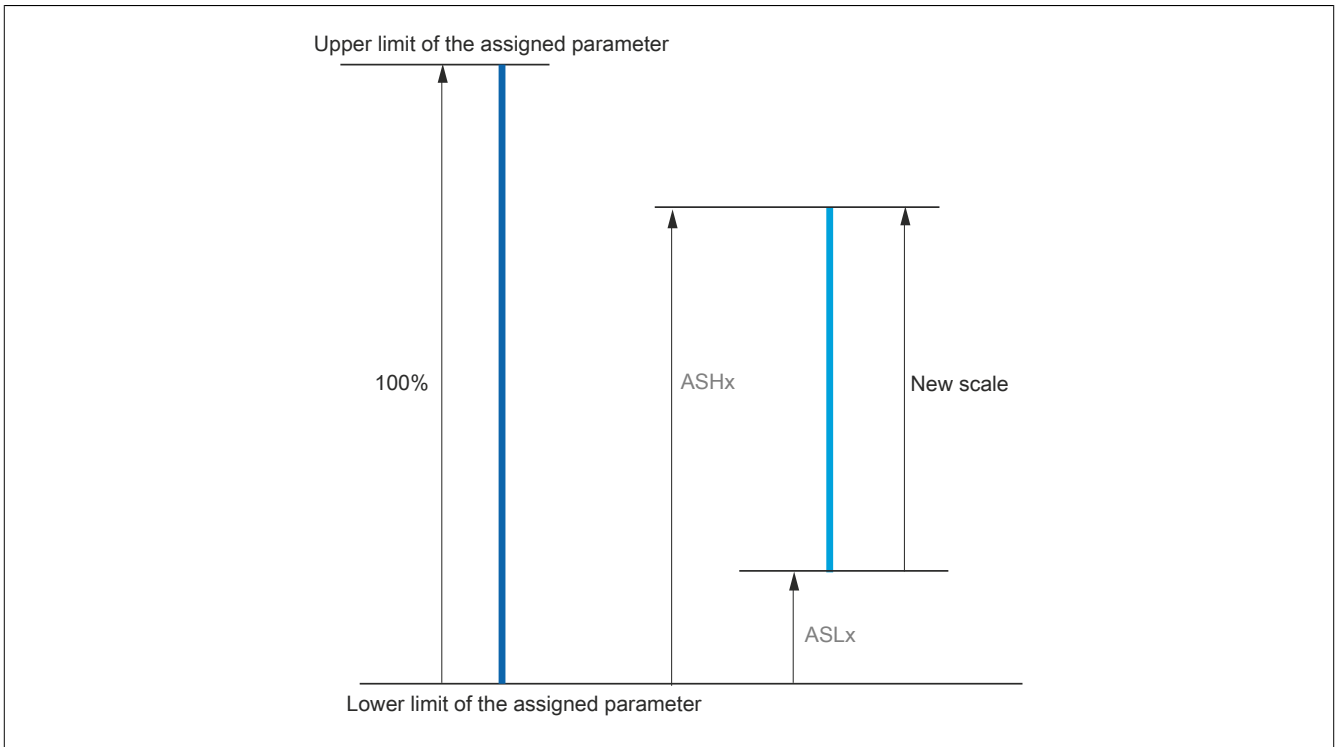
#### Scaling of the assigned parameter

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 I<sub>n</sub> motor). In this case, I<sub>n</sub> motor is equivalent to 0.8 times the value of I<sub>n</sub> 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- > CO nF > FULL > I_O- > AO1-			
Code	Name/Description	Setting range	Factory settings
AO1-	<b>[AO1 CONFIGURATION]</b>		
AO1	<b>[AO1 assignment]</b>		<b>[No](nO)</b>
nO	<b>[No](nO):</b> Not assigned.		
OCr	<b>[I motor](OCr):</b> Current in the motor, between 0 and 2 In (In = rated current of inverter indicated on the inverter nameplate).		
OFr	<b>[Motor freq](OFr):</b> Frequency output from 0 to <b>[Max frequency](tFr)</b> .		
OFS	<b>[Output ramp](OFS):</b> Signed motor frequency between <b>-[Max frequency](tFr)</b> and <b>+[Max frequency](tFr)</b> .		
OrP	<b>[Motor torq.](OrP):</b> From 0 to <b>[Max frequency](tFr)</b> .		
trq	<b>[Sign torque](trq):</b> Motor torque, between 0 and 3 times the nominal motor torque.		
Stq	<b>[M Motor +/-](Stq):</b> Signed motor torque, between -3 and +3 times the motor torque. Sign "+" corresponds to motor operation; sign "-" corresponds to generator operation (braking).		
OrS	<b>[Ramp +/-](OrS):</b> Signed ramp output, between <b>-[Max frequency](tFr)</b> and <b>+[Max frequency](tFr)</b> .		
OPS	<b>[PID ref.](OPS):</b> PID controller setpoint, between <b>[Min PID reference](PIP1)</b> and <b>[Max PID reference](PIP2)</b> .		
OPF	<b>[PID feedback](OPF):</b> PID controller feedback, between <b>[Min PID feedback](PIF1)</b> and <b>[Max PID feedback](PIF2)</b> .		
OPE	<b>[PID error](OPE):</b> PID controller error, between -5% and +5% of <b>([Max PID feedback](PIF2) - [Min PID feedback](PIF1))</b> .		
OPI	<b>[PID Output](OPI):</b> PID controller output, between <b>[Low speed](LSP)</b> and <b>[High speed](HSP)</b> .		
OPr	<b>[Motor power](OPr):</b> Motor power, between 0 and 2.5 times the <b>[Rated motor power](nPr)</b> .		
UOP	<b>[Motor voltage](UOP):</b> Voltage applied to motor, between 0 and <b>[Rated motor volt.](UnS)</b> .		
tHr	<b>[Mot thermal](tHr):</b> Thermal motor state, between 0 and 200% of the thermal rated state.		
tHr2	<b>[Mot therm2](tHr2):</b> Thermal motor state 2, between 0 and 200% of the thermal rated state.		
tHr3	<b>[Mot therm3](tHr3):</b> Thermal motor state 3, between 0 and 200% of the thermal rated state.		
tHd	<b>[Drv thermal](tHd):</b> Thermal inverter state, between 0 and 200% of the thermal rated state.		
tqL	<b>[Torque lim.](tqL):</b> Torque limiting, between 0 and 3 times the nominal motor torque.		
dO1	<b>[DO1](dO1):</b> Assignment to a logic output. This assignment can only occur if <b>[DO1 assignment](dO1)</b> has been assigned. This is the only possible selection in this case. It is displayed for information purposes only.		
tqMS	<b>[Torque 4Q](tqMS):</b> Signed motor torque, between -3 and +3 times the motor torque. Signs "+" and "-" correspond to the physical torque direction regardless of the operating mode (motor or generator).		
AO1t	<b>[Type AO1]</b>		<b>[0-20mA](0A)</b>
10U	<b>[Voltage](10U):</b> Voltage output		
0 A	<b>[0-20mA](0A):</b> Current output		
AOL1	<b>[AO1 min Output]</b>	0 to 20.0 mA	0 mA
★	To access this parameter, <b>[Type AO1](AO1t)</b> must be set to <b>[0-20mA](0A)</b> .		
AOH1	<b>[AO1 max Output]</b>	0 to 20.0 mA	20.0 mA
★	To access this parameter, <b>[Type AO1](AO1t)</b> must be set to <b>[0-20mA](0A)</b> .		
UOL1	<b>[AO1 min Output]</b>	0 to 10.0 V	0 V
★	To access this parameter, <b>[Type AO1](AO1t)</b> must be set to <b>[Voltage](10U)</b> .		
UOH1	<b>[AO1 max Output]</b>	0 to 10.0 V	10.0 V
★	To access this parameter, <b>[Type AO1](AO1t)</b> must be set to <b>[Voltage](10U)</b> .		
ASL1	<b>[AO1 max scal]</b>	0 to 100.0%	0%
	Scaling of the lower limit of the assigned parameter as a % of the maximum possible variation.		
ASH1	<b>[AO1 min scal]</b>	0 to 100.0%	100.0%
	Scaling for the upper limit value of the assigned parameter, as a % of the maximum possible variation.		
AO1F	<b>[AO1 Filter]</b>	0 to 10.00 s	0 s
	Interference filtering. This parameter is forced to 0 if <b>[AO1 assignment](AO1)</b> is set to <b>[DO1](dO1)</b> .		
AOF1	<b>[Enable Relay1 fallback]</b>		<b>[No](nO)</b>
	Available if <b>[AO1 assignment](AO1)</b> is set to <b>[No](nO):</b> Not assigned		
YES	<b>[Yes](YES):</b> (AO1) is used as a logic output and controlled by (AO1C). This output is disabled if the inverter is in operating state "Fault".		
nO	<b>[No](nO):</b> (AO1) is used as a logic output and controlled by (AO1C).		



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.

### 5.2.3.6.4.8 [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->COntF>FULL>I_O->A01-	
Code	Name/Description
A1C-	<b>[ALARM GRP1 DEFINITION]</b> Selections must be made on the basis of the following list:
PMC	<b>[LI6=PTC al.]</b> (PLA): LI6 = PtCL alarm
EFA	<b>[Ext. fault al.]</b> (EFA): Alarm external error
USA	<b>[Undervoltage Alarm]</b> (USA): Undervoltage alarm
CtA	<b>[I attained]</b> (CtA): Current threshold value reached ( <b>[Current threshold]</b> (Ctd))
FtA	<b>[Freq. Th. attained]</b> (FtA): Frequency threshold value reached ( <b>[Freq. threshold]</b> (Ftd))
F2A	<b>[Freq. Th. 2 attained]</b> (F2A): Frequency threshold value 2 reached ( <b>[Freq. Th. 2 attain]</b> (F2d))
SrA	<b>[Freq.ref.att]</b> (SrA): Frequency setpoint reached
tSA	<b>[Th.mot. att.]</b> (tSA): Motor thermal state 1 reached
tS2	<b>[Th. mot2. att.]</b> (tS2): Motor thermal state 2 reached
tS3	<b>[Th. mot3. att.]</b> (tS3): Motor thermal state 3 reached
UPA	<b>[Undervoltage Pre-alarm]</b> (UPA): Undervoltage threshold value
FLA	<b>[HSP attain.]</b> (FLA): High speed reached
tHA	<b>[FI °C alarm]</b> (tHA): Inverter overheating
PEE	<b>[PID error al]</b> (PEE): PID controller error alarm
PFA	<b>[PID fdbk al]</b> (PFA): PID feedback alarm
AP3	<b>[AI3 AI. 4-20]</b> (AP3): Alarm for the display of a missing 4-20-mA signal at input AI3
SSA	<b>[Torque/current lim att.]</b> (SSA): Torque limiting alarm
tAd	<b>[Th. drv. att.]</b> (tAd): Inverter thermal state reached
tJA	<b>[IGBT al.]</b> (tJA): IGBT alarm
ULA	<b>[Underload. Proc. Al.]</b> (ULA): Underload alarm
OLA	<b>[Overload process alarm]</b> (OLA): Overload alarm
rSdA	<b>[Rope slack alarm]</b> (rSdA): Slack rope (see parameter <b>[Rope slack config.]</b> (rSd))
ttHA	<b>[High torque alarm]</b> (ttHA): Motor torque exceeds upper threshold value <b>[High torque thd.]</b> (ttH)
ttLA	<b>[Low torque alarm]</b> (ttLA): Motor torque below lower threshold value <b>[Low torque thd.]</b> (ttL)
FqLA	<b>[Fr.met. alar.]</b> (FqLA): Measured speed setpoint reached: <b>[Pulse warning thd.]</b> (FqL)
dLdA	<b>[Dynamic load alarm]</b> (dLdA): Load variation detection (see <b>[DYNAMIC LOAD DETECT.]</b> (dLd-))
A2C-	<b>[ALARM GRP2 DEFINITION]</b> Identical to <b>[ERROR ALARM GR. 1]</b> (A1C-)
A3C-	<b>[ALARM GRP3 DEFINITION]</b> Identical to <b>[ERROR ALARM GR. 1]</b> (A1C-)

### 5.2.3.6.5 [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 External operator terminal Graphic display terminal Integrated Modbus Integrated CANopen® Communication card	Terminals: Analog inputs AI, pulse input 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.

## Note:

**[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

## Note:

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.

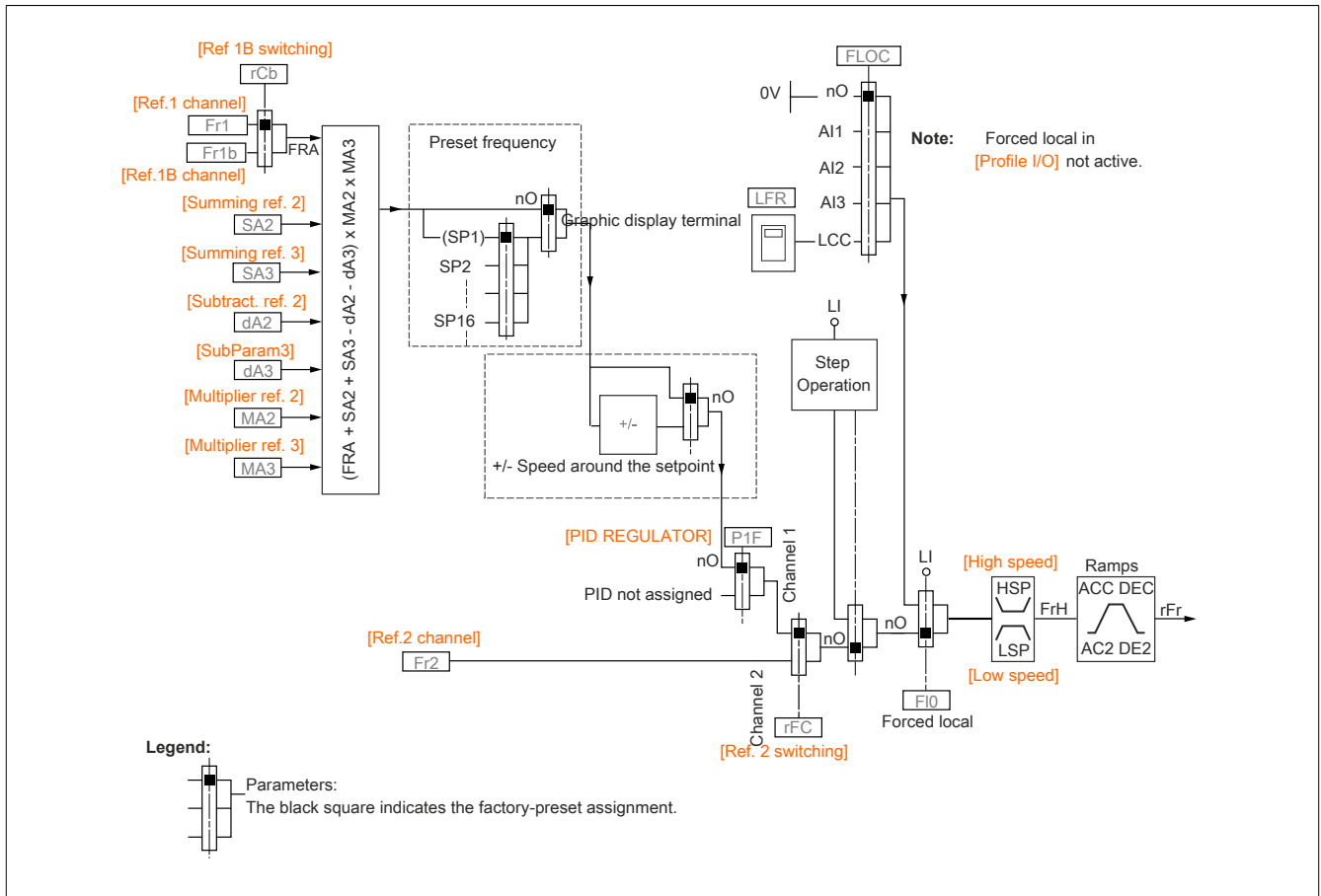
In these configurations, control is via the communication bus in accordance with the standard (only 5 freely assignable bits). Access to the application functions is not possible via the communication interface.

- **[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.

## Note:

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

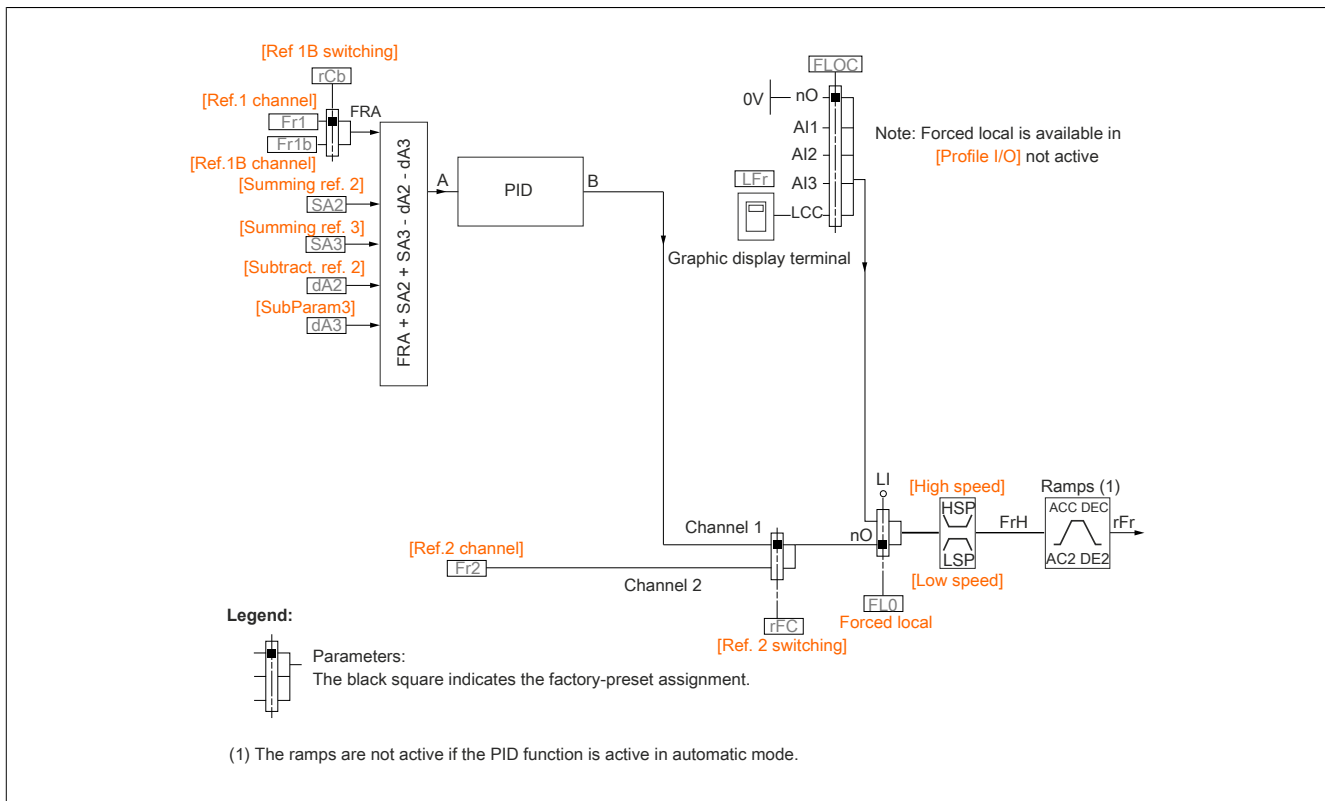
Fr2:

- Terminals, graphic display terminal, integrated Modbus, integrated CANOpen®, communication card and +/- speed

### Note:

[Ref.1B channel] (Fr1b) and [Ref 1B switching] (rCb) must be configured in menu [APPLICATION FUNCT.] (Fun-).

**Not separ. 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**

**Note:**

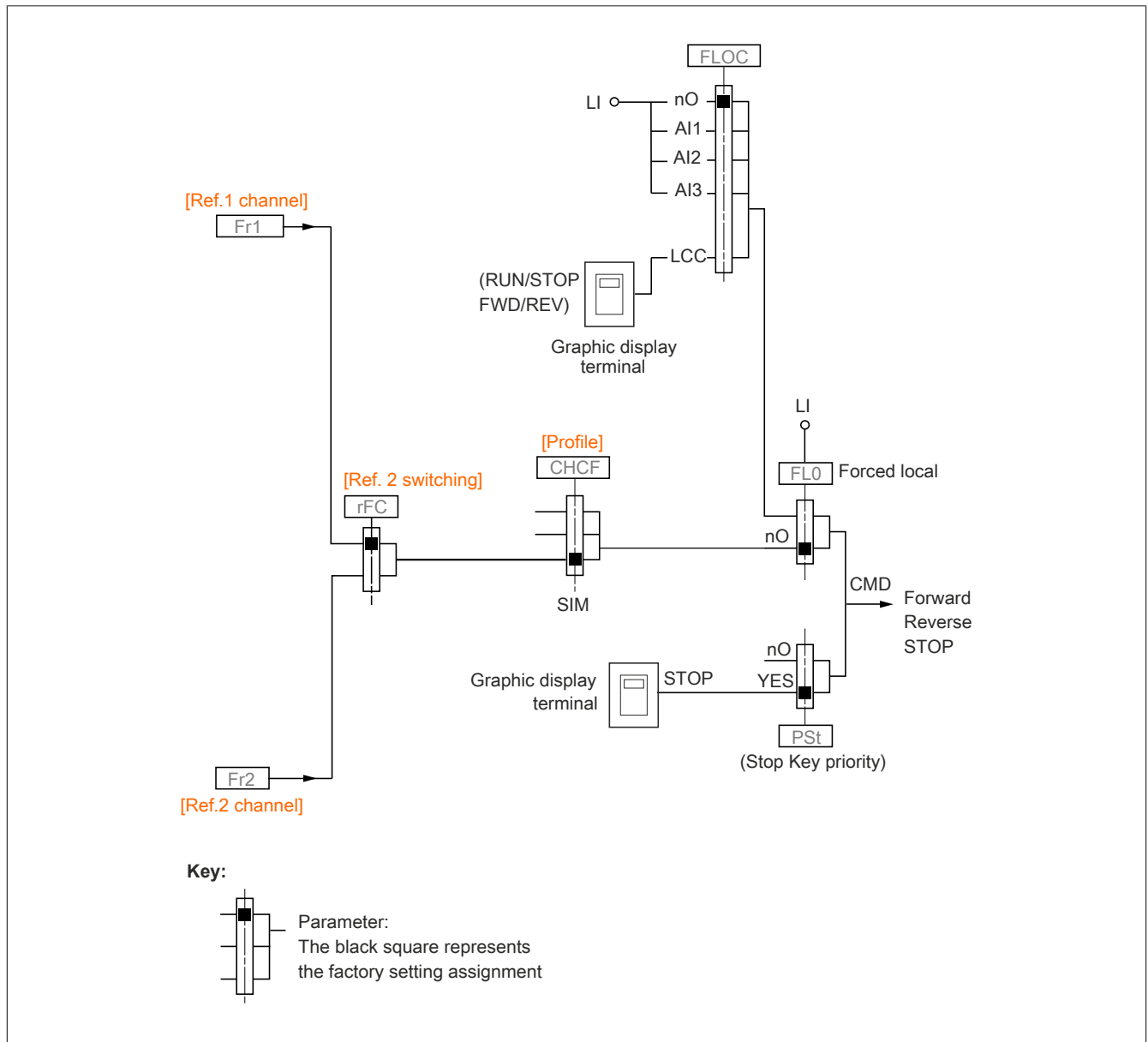
**[Ref.1B channel] (Fr1b) and [Ref 1B switching] (rCb) must be configured in menu [APPLICATION FUNCT.] (Fun-).**

### 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).



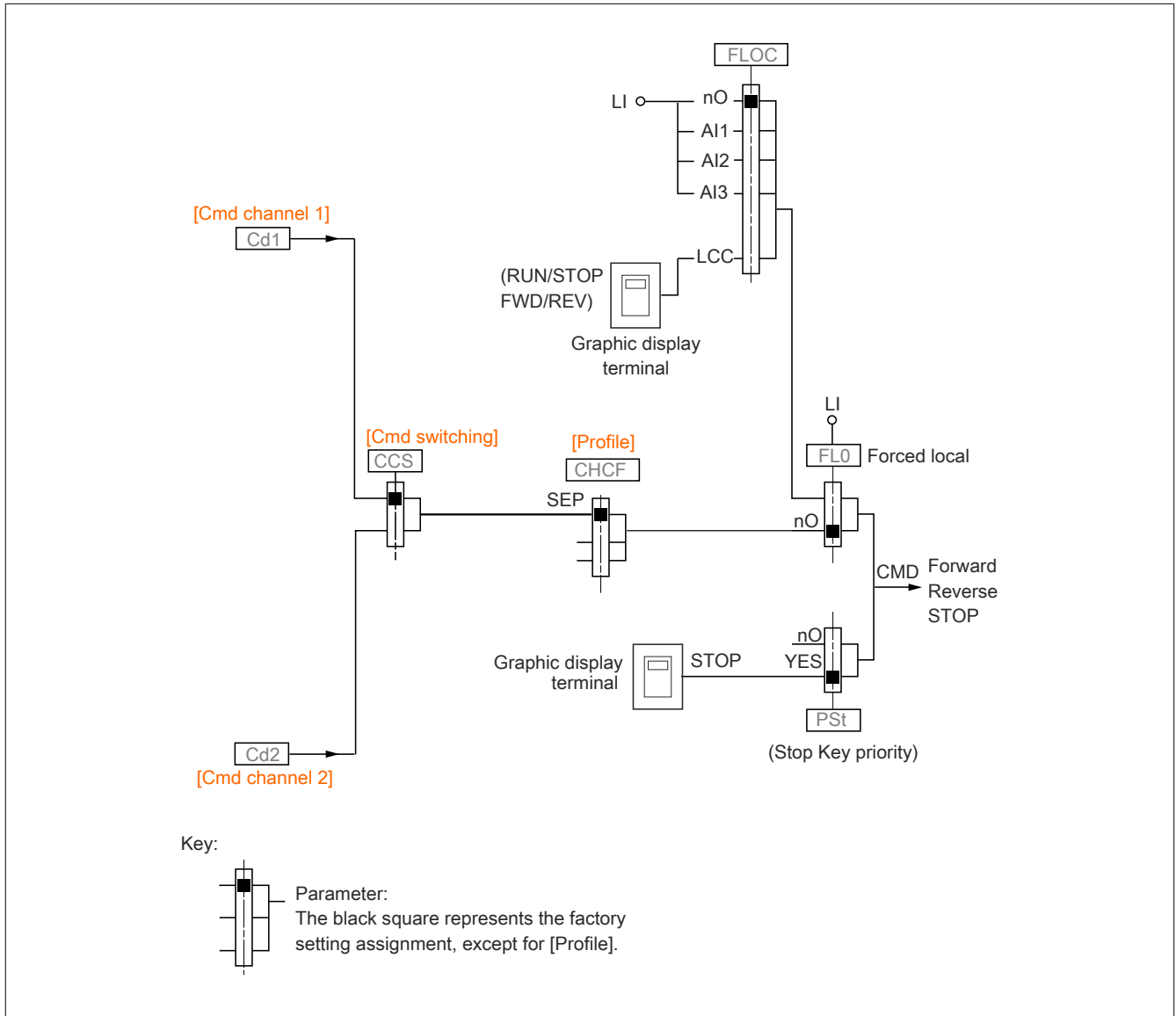
### Command channel for the configuration [separated] (SEP)

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.



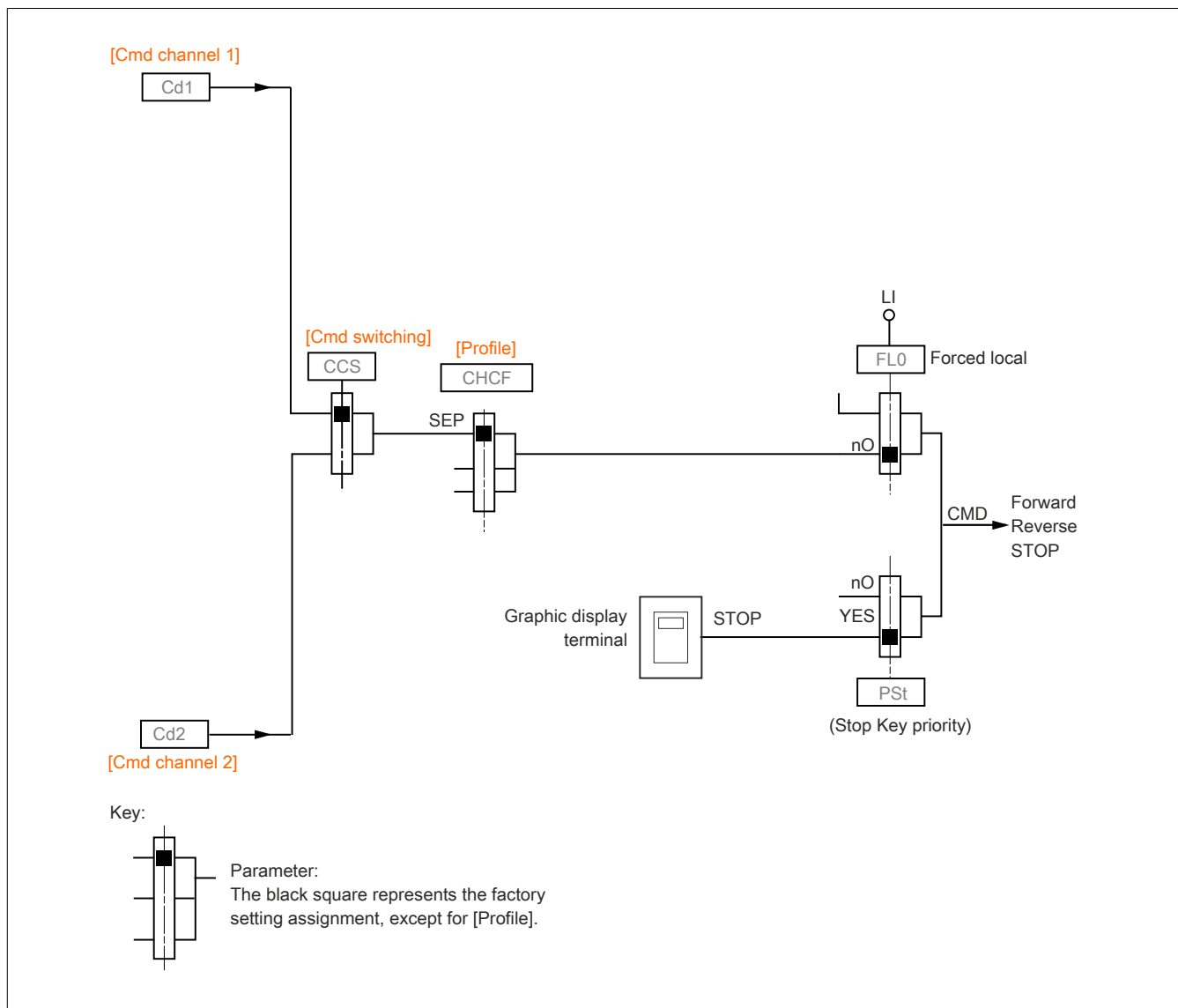
Cd1, Cd2:

- 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.

**Note:**

**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 <sup>(1)</sup>	C101 <sup>(1)</sup>	C201 <sup>(1)</sup>	C301 <sup>(1)</sup>	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 the 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)	Analog inputs as 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

**Note:**






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-	<b>[COMMAND]</b>	
Fr1 AI1 AI2 AI3 LCC Mdb CAn nEt PI AIU1	<b>[Ref.1 channel]</b> <b>[AI1]</b> (AI1): Analog input A1 <b>[AI2]</b> (AI2): Analog input A2 <b>[AI3]</b> (AI3): Analog input A3 <b>[HMI]</b> (LCC): Graphic display terminal or external operator terminal source <b>[Modbus]</b> (Mdb): Integrated Modbus <b>[CANopen com.]</b> (CAn): Integrated CANopen® <b>[Com. card]</b> (nEt): Communication card (if used) <b>[RP]</b> (PI): Pulse input <b>[AI virtual 1]</b> (AIU1): Virtual analog input 1 with dial (only available if <b>[Profile]</b> (CHCF) is not set to <b>[Not separ.]</b> (SIM)).	<b>[AI1]</b> (AI1)
rin  nO YES	<b>[RV Inhibition]</b>  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).  <b>[No]</b> (nO) <b>[YES]</b> (YES)	<b>[No]</b> (nO)
PSt  2 s  nO YES	<b>[Stop Key priority]</b>  <b>Warning!</b> <b>LOSS OF CONTROL</b> <b>This function disables the stop buttons of the external operator terminal if parameter [Command channel](CMdC) is not set to [HMI](HMI).</b> <b>Only set this parameter to [No](nO) if suitable alternative stop functions are available.</b> <b>Failure to follow these instructions can result in death, serious injury or damage to property.</b>  This is a freewheel stop. If the active command channel is the graphic display terminal, then this stop is done in accordance with <b>[Type of stop]</b> (Stt) regardless of the configuration for <b>[Stop Key priority]</b> (PSt).  <b>[No]</b> (nO) <b>[YES]</b> (YES): Gives priority to STOP on the graphic display terminal when the graphic display terminal is not enabled as the command channel.	<b>[YES]</b> (YES)
CHCF  2 s  SIM SEP I/O	<b>[Profile]</b>  <b>Warning!</b> <b>UNEXPECTED OPERATION OF THE EQUIPMENT</b> <b>Disabling [I/O profile](IO) restores the frequency inverter to factory settings.</b> <b>It is important that the factory setting restoration is compatible with the wiring used.</b> <b>Failure to follow these instructions can result in death, serious injury or damage to property.</b>  <b>[Not separ.]</b> (SIM): Setpoint and command not separate. <b>[Separate]</b> (SEP): Setpoint and command separate. The access to this assignment is not possible in the <b>[I/O profile]</b> (IO). <b>[I/O profile]</b> (IO): I/O profile	<b>[Together]</b> (SIM)
CCS   Cd1 Cd2 LI1 ...	<b>[Cmd switching]</b>  To access this parameter, <b>[Profile]</b> (CHCF) must be set to <b>[Separate]</b> (SEP) or <b>[I/O profile]</b> (IO). In state 0 of the assigned input or bit, channel <b>[Cmd channel 1]</b> (Cd1) is active. In state 1 of the assigned input or bit, channel <b>[Cmd channel 2]</b> (Cd2) is active. If <b>[Profile]</b> (CHCF) is set to <b>[Not separ.]</b> (SIM), the parameter can only be configured on <b>[ch1 active]</b> (Cd1).  <b>[ch1 active]</b> (Cd1): <b>[Cmd channel 1]</b> (Cd1) active (no switchover) <b>[Channel 2 active]</b> (Cd2): <b>[Cmd channel 2]</b> (Cd2) active (no switchover) <b>[LI1]</b> (LI1): Logic input LI1 <b>[...]</b> (...): See the assignment conditions (not Cd00 to Cd15).	<b>[ch1 active]</b> (Cd1)
Cd1  tEr LCC Mdb CAn nEt	<b>[Cmd channel 1]</b>  To access this parameter, <b>[Profile]</b> (CHCF) must be set to <b>[Separate]</b> (SEP) or <b>[I/O profile]</b> (IO).  <b>[Terminals]</b> (tEr): Terminals <b>[HMI]</b> (LCC): Graphic display terminal or external operator terminal <b>[Modbus]</b> (Mdb): Integrated Modbus <b>[CANopen com.]</b> (CAn): Integrated CANopen® <b>[Com. card]</b> (nEt): Communication card (if used)	<b>[Terminals]</b> (tEr)
Cd2  tEr LCC Mdb CAn nEt	<b>[Cmd channel 2]</b>  To access this parameter, <b>[Profile]</b> (CHCF) must be set to <b>[Separate]</b> (SEP) or <b>[I/O profile]</b> (IO).  <b>[Terminals]</b> (tEr): Terminals <b>[HMI]</b> (LCC): Graphic display terminal or external operator terminal <b>[Modbus]</b> (Mdb): Integrated Modbus <b>[CANopen com.]</b> (CAn): Integrated CANopen® <b>[Com. card]</b> (nEt): Communication card (if used)	<b>[Modbus]</b> (Mdb)

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

Code	Name/Description	Factory settings
rFC	<b>[Ref. 2 switching]</b> In state 0 of the assigned input or bit, channel <b>[Cmd channel 1]</b> (Cd1) is active. In state 1 of the assigned input or bit, channel <b>[Cmd channel 2]</b> (Cd2) is active.	<b>[Ref.1 channel]</b> (Fr1)
Fr1	<b>[Ref.1 channel]</b> (Fr1): <b>[Cmd channel 1]</b> (Cd1) active (no switchover)	
Fr2	<b>[Ref.2 channel]</b> (Fr2): <b>[Cmd channel 2]</b> (Cd2) active (no switchover)	
LI1	<b>[LI1]</b> (LI1): Logic input LI1	
...	<b>[...]</b> (...): See the assignment conditions (not Cd00 to Cd15).	
Fr2	<b>[Ref.2 channel]</b>	<b>[No]</b> (nO)
nO	<b>[No]</b> (nO): Not assigned. If <b>[Profile]</b> (CHCF) is set to <b>[Together]</b> (SIM), the command via the terminals has the setpoint zero. If <b>[Profile]</b> (CHCF) is set to <b>[Separate]</b> (SEP) or <b>[I/O profile]</b> (IO) is set, the setpoint is zero.	
AI1	<b>[AI1]</b> (AI1): Analog input A1	
AI2	<b>[AI2]</b> (AI2): Analog input A2	
AI3	<b>[AI3]</b> (AI3): Analog input A3	
Updt	<b>[+/- speed]</b> (Updt): Command +/- speed	
LCC	<b>[HMI]</b> (LCC): Graphic display terminal or external operator terminal	
Mdb	<b>[Modbus]</b> (Mdb): Integrated Modbus	
CAn	<b>[CANopen com.]</b> (CAn): Integrated CANopen®	
nEt	<b>[Com. card]</b> (nEt): Communication card (if used)	
PI	<b>[RP]</b> (PI): Pulse input	
AIU1	<b>[AI virtual 1]</b> (AIU1): Virtual analog input 1 with handwheel	
COP	<b>[Copy channel 1 &lt;-&gt; 2]</b>	<b>[No]</b> (nO)
 2 s	<p><b>Danger!</b></p> <p><b>UNEXPECTED OPERATION OF THE EQUIPMENT</b></p> <p>This parameter may cause unexpected movements such as change in direction of rotation of the motor, sudden acceleration or stopping.</p> <ul style="list-style-type: none"> <li>It is important that the setting for this parameter does not lead to unexpected movements.</li> <li>It is important that the setting for this parameter does not lead to unstable states.</li> </ul> <p>Failure to follow these instructions can result in death, serious injury or damage to property.</p> <p>Enables the copying of the setpoint and/or the current command by switchover, for example to avoid fluctuations in speed. If <b>[Profile]</b>(CHCF) is set to <b>[Not separ.]</b>(SIM) or <b>[Separate]</b>(SEP), only copying from channel 1 to channel 2 is possible. If <b>[Profile]</b>(CHCF) is set to <b>[I/O profile]</b>(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 <b>[Frequency ref.]</b>(FrH) (before ramp), except if the setpoint of the target channel is given via the +/- speed. In this case, setpoint <b>[Output frequency]</b>(rFr) (after ramp) will be copied.</p>	
nO	<b>[No]</b> (nO): No copy	
SP	<b>[Reference]</b> (SP): Copy of the setpoint	
Cd	<b>[Command]</b> (Cd): Copy of the command	
ALL	<b>[Cmd and ref]</b> (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.



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-	<b>[COMMAND]</b>	
Fn1	<b>[F1 key assignment]</b>	<b>[No](nO)</b>
nO	<b>[No](nO)</b> : Not assigned	
FJOG	<b>[Jog](FJOG)</b> : JOG step mode	
FPS1	<b>[Preset spd2](FPS1)</b> : Via keystroke, the inverter is preset with second speed <b>[Preset speed 2](SP2)</b> . Press STOP to stop the frequency inverter.	
FPS2	<b>[Preset spd3](FPS2)</b> : Via keystroke, the inverter is preset with third speed <b>[Preset speed 3](SP3)</b> . Press STOP to stop the frequency inverter.	
FPr1	<b>[PID ref. 2](FPr1)</b> : Defines a PID setpoint that is equal to second preselected PID setpoint <b>[Preset ref. PID 2](rP2)</b> . A move command will not be sent. Only executable if <b>[Ref.1 channel](Fr1)</b> is set to <b>[HMI](LCC)</b> . Not compatible with function <b>[T/K](Ft)</b> .	
FPr2	<b>[PID ref. 3](FPr2)</b> : Defines a PID setpoint that is equal to the third preselected PID setpoint <b>[Preset ref. PID 3](rP3)</b> . A move command will not be sent. Only executable if <b>[Ref.1 channel](Fr1)</b> is set to <b>[HMI](LCC)</b> . Not compatible with function <b>[T/K](Ft)</b> .	
FUSP	<b>[+speed around ref.](FUSP)</b> : + speed; only executable if <b>[Ref.2 channel](Fr2)</b> is set to <b>[HMI](LCC)</b> . Press the key to control the inverter and increase the speed. Press STOP to stop the frequency inverter.	
FdSP	<b>[-speed around ref.](FdSP)</b> : - speed; only executable if <b>[Ref.2 channel](Fr2)</b> is set to <b>[HMI](LCC)</b> and if <b>[+speed around ref.](FUSP)</b> is assigned to another key. Press a key to control the inverter and decrease the speed. Press STOP to stop the frequency inverter.	
Ft	<b>[T/K](Ft)</b> : Command via the operator terminal; takes priority over <b>[Cmd switching](CCS)</b> and <b>[Ref. 2 switching](rFC)</b> .	
Fn2	<b>[F2 key assignment]</b> Identical to <b>[F1 key assignment](Fn1)</b> .	<b>[No](nO)</b>
Fn3	<b>[F3 key assignment]</b> Identical to <b>[F1 key assignment](Fn1)</b> .	<b>[No](nO)</b>
Fn4	<b>[F4 key assignment]</b> Identical to <b>[F1 key assignment](Fn1)</b> .	<b>[No](nO)</b>
bMp	<b>[HMI cmd.]</b> If function <b>[T/K](Ft)</b> 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.	<b>[Stop](StOP)</b>
StOP	<b>[Stop](StOP)</b> : 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	<b>[Bumpless](bUMF)</b> : 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.

### 5.2.3.6.6 [APPLICATION FUNCT.] (FUn-)

Summary of 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.

#### Note:

##### 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 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.

**Note:**



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:

RDY	Term	0.0 Hz	0 A
APPLICATION FUNCT.			
REFERENCE SWITCH.			
REF. OPERATIONS			
RAMP			
STOP CONFIGURATION			
Auto DC injection			
Code	<<	>>	Quick

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:

RDY	Term	+0.0 Hz	0.0 A
INCOMPATIBILITY			
The function cannot be assigned since an incompatible function is selected. See programming manual. Press ENT or ESC to continue.			

- 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:

RUN	Term	0.0 Hz	0.0 A
WARNING - ASSIGNED TO			
Forward			
ENT - Confirm		ESC - Exit	

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:

RUN	Term	0.0 Hz	0.0 A
FORBIDDEN ASSIGNMENT			
Remove the existing functions from the configuration or select access level "Advanced".			

- 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.

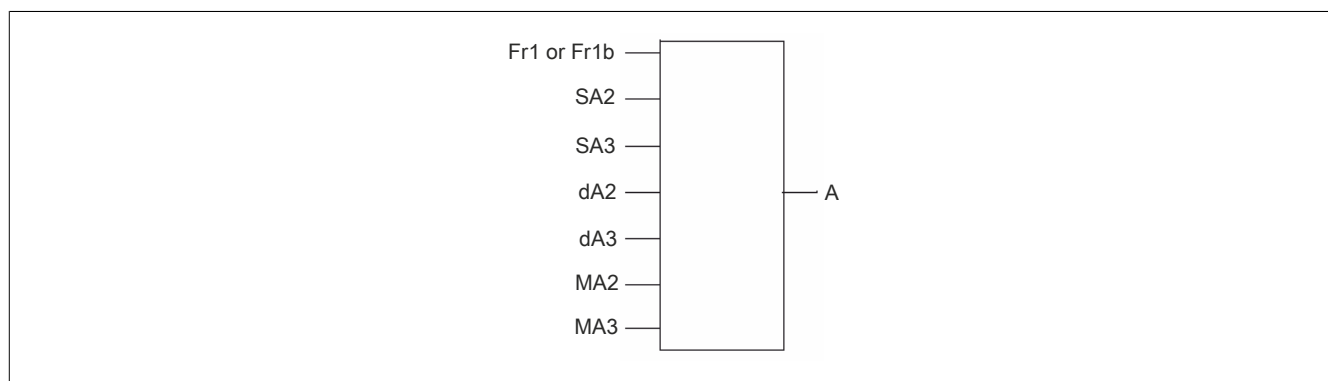
If the access level does not permit this new assignment, pressing ENT has no effect and the message continues to flash. It is only possible to exit by pressing ESC.

### 5.2.3.6.6.1 [REFERENCE SWITCH.] (rEF-)

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > rEF-		
Code	Name/Description	Factory settings
rEF-	<b>[REFERENCE SWITCH.]</b>	
rCb	<b>[Ref 1B switching]</b> In state 0 of the assigned input or bit, <b>[Ref.1 channel](Fr1)</b> is active. In state 1 of the assigned input or bit, <b>[Ref.1B channel](Fr1b)</b> is active. <b>[Ref 1B switching](rCb)</b> is forced to <b>[ch1 active](Fr1)</b> if <b>[Profile](CHCF)</b> is set to <b>[Not separ.](SIM)</b> and <b>[Ref.1 channel](Fr1)</b> is assigned via the terminals (analog inputs, pulse input).	<b>[ch1 active](Fr1)</b>
Fr1	<b>[ch1 active](Fr1)</b> : No switchover, <b>[Ref.1 channel](Fr1)</b> active.	
Fr1b	<b>[ch1B active](Fr1b)</b> : No switchover, <b>[Ref.1B channel](Fr1b)</b> active.	
LI1	<b>[LI1](LI1)</b> : Logic input LI1	
...	<b>[...](...)</b> : See the assignment conditions (excluding <b>[Cd00](Cd00)</b> to <b>[Cd15](Cd15)</b> ).	
Fr1b	<b>[Ref.1B channel]</b>	<b>[No](nO)</b>
nO	<b>[No](nO)</b> : Not assigned	
AI1	<b>[AI1](AI1)</b> : Analog input A1	
AI2	<b>[AI2](AI2)</b> : Analog input A2	
AI3	<b>[AI3](AI3)</b> : Analog input A3	
LCC	<b>[HMI](LCC)</b> : Graphic display terminal or external operator terminal source	
Mdb	<b>[Modbus](Mdb)</b> : Integrated Modbus	
CAn	<b>[CANopen com.](CAn)</b> : Integrated CANopen®	
nEt	<b>[Com. card](nEt)</b> : Optional communication card source	
PI	<b>[RP](PI)</b> : Pulse input	
AIU1	<b>[AI virtual 1](AIU1)</b> : Virtual analog input 1 with dial (only available if <b>[Profile](CHCF)</b> is not set to <b>[Not separ.](SIM)</b> ).	

### 5.2.3.6.6.2 [REF. OPERATIONS] (OAI-)

#### Input addition/ Input subtraction / Multiplier











$$A = (Fr1 \text{ or } Fr1b + SA2 + SA3 - dA2 - dA3) \times MA2 \times MA3$$

- 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 > FUu- > OAI-		
Code	Name/Description	Factory settings
OAI-	<p><b>[REF. OPERATIONS]</b> Reference = (Fr1 or Fr1b + SA2 + SA3 - dA2 - dA3) x MA2 x MA3.</p> <p><b>Note:</b> This function cannot be used with certain other functions.</p>	
SA2	<p><b>[Summing ref. 2]</b> Selection of a setpoint to be added to <b>[Ref.1 channel]</b>(Fr1) or <b>[Ref.1B channel]</b>(Fr1b).</p>	<b>[No]</b> (nO)
nO	<b>[No]</b> (nO): Not assigned	
AI1	<b>[AI1]</b> (AI1): Analog input A1	
AI2	<b>[AI2]</b> (AI2): Analog input A2	
AI3	<b>[AI3]</b> (AI3): Analog input A3	
LCC	<b>[HMI]</b> (LCC): Graphic display terminal or external operator terminal source	
Mdb	<b>[Modbus]</b> (Mdb): Integrated Modbus	
CAn	<b>[CANopen com.]</b> (CAn): Integrated CANopen®	
nEt	<b>[Com. card]</b> (nEt): Optional communication card source	
PI	<b>[RP]</b> (PI): Pulse input	
AIU1	<b>[AI virtual 1]</b> (AIU1): Virtual analog input 1 with handwheel	
AIU2	<b>[AI virtual 2]</b> (AIU2): Virtual analog input 2 via communication bus	
SA3	<p><b>[Summing ref. 3]</b> Selection of a setpoint to be added to <b>[Ref.1 channel]</b>(Fr1) or <b>[Ref.1B channel]</b>(Fr1b). Identical to <b>[Summing ref. 2]</b>(SA2).</p>	<b>[No]</b> (nO)
dA2	<p><b>[Subtract. ref. 2]</b> Selection of a setpoint to be subtracted from <b>[Ref.1 channel]</b>(Fr1) or <b>[Ref.1B channel]</b>(Fr1b). Identical to <b>[Summing ref. 2]</b>(SA2).</p>	<b>[No]</b> (nO)
dA3	<p><b>[SubParam3]</b> Selection of a setpoint to be subtracted from <b>[Ref.1 channel]</b>(Fr1) or <b>[Ref.1B channel]</b>(Fr1b). Identical to <b>[Summing ref. 2]</b>(SA2).</p>	<b>[No]</b> (nO)
MA2	<p><b>[Multiplier ref. 2]</b> Selection of a setpoint to be multiplied by <b>[Ref.1 channel]</b>(Fr1) or <b>[Ref.1B channel]</b>(Fr1b). Identical to <b>[Summing ref. 2]</b>(SA2). This parameter is incompatible with the PID controller. <b>[No]</b> (nO) is the only value that can be set.</p>	<b>[No]</b> (nO)
MA3	<p><b>[Multiplier ref. 3]</b> Selection of a setpoint to be multiplied by <b>[Ref.1 channel]</b>(Fr1) or <b>[Ref.1B channel]</b>(Fr1b). Identical to <b>[Summing ref. 2]</b>(SA2). This parameter is incompatible with the PID controller. <b>[No]</b> (nO) is the only value that can be set.</p>	<b>[No]</b> (nO)

5.2.3.6.6.3 [RAMP] (rPt-)

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > rPt-			
Code	Name/Description	Setting range	Factory settings
rPt-	<b>[RAMP]</b>		
rPt	<b>[Ramp type]</b>		<b>[Linear](LIn)</b>
LIn	<b>[Linear](LIn)</b>		
S	<b>[S ramp](S)</b>		
U	<b>[U ramp](U)</b>		
CUS	<b>[Customized](CUS)</b>		
	S-shaped ramps		
			The rounding coefficient is unchangeable: 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 is unchangeable: 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)
	$t_{12} = ACC * (tA1(\%) / 100 + tA2(\%) / 100 + 1)$ $t_{34} = DEC * (tA3(\%) / 100 + tA4(\%) / 100 + 1)$		
Inr	<b>[Ramp increment]</b>		<b>[0.1](0.1)</b>
	This parameter is used for <b>[Acceleration](ACC)</b> , <b>[Deceleration](dEC)</b> , <b>[Acceleration 2](AC2)</b> and <b>[Deceleration 2](dE2)</b> .		
(i)			
0.01	<b>[0,01]</b> : 99.99-second ramp		
0.1	<b>[0,1]</b> : 999.9-second ramp		
1	<b>[1]</b> : 6,000-second ramp		
ACC	<b>[Acceleration]</b>	0.00 to 6000 s <sup>2</sup>	3.0 s
	Time taken to accelerate from 0 to <b>[Rated motor freq.](FrS)</b> . To ensure ramp repeatability, the value of this parameter must be defined in accordance with what is possible for the application.		
(i)			
dEC	<b>[Deceleration]</b>	0.00 to 6000 s <sup>2</sup>	3.0 s
	Time taken to decelerate from <b>[Rated motor freq.](FrS)</b> to 0. To ensure ramp repeatability, the value of this parameter must be defined in accordance with what is possible for the application.		
(i)			
tA1	<b>[Begin Acc round]</b>	0 to 100%	10%
	Rounding of the acceleration ramp start as a % of ramp time <b>[Acceleration](ACC)</b> or <b>[Acceleration 2](AC2)</b> . Can be set between 0 and 100%.		
	The parameter is accessible if <b>[Ramp type](rPt)</b> is of type <b>[Customized](CUS)</b> .		
(i)			
tA2	<b>[End Acc round]</b>	0 to 100%	10%
	Rounding of the acceleration ramp end as a % of acceleration time <b>[Acceleration](ACC)</b> or <b>[Acceleration 2](AC2)</b> . Can be set from 0 to (100% - <b>[Begin Acc round](tA1)</b> ).		
	The parameter is accessible if <b>[Ramp type](rPt)</b> is of type <b>[Customized](CUS)</b> .		
(i)			

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUu- > rPt-																		
Code	Name/Description	Setting range	Factory settings															
tA3   (1)	<b>[Begin Dec round]</b> Rounding of the deceleration ramp start as a % of ramp time <b>[Deceleration](dEC)</b> or <b>[Deceleration 2](dE2)</b> . Can be set between 0 and 100% The parameter is accessible if <b>[Ramp type](rPt)</b> is of type <b>[Customized](CUS)</b> .	0 to 100%	10%															
tA4   (1)	<b>[End Dec round]</b> Rounding of the deceleration ramp end as a % of ramp time <b>[Deceleration](dEC)</b> or <b>[Deceleration 2](dE2)</b> . Can be set from 0 to (100% - <b>[Begin Dec round](tA3)</b> ). The parameter is accessible if <b>[Ramp type](rPt)</b> is of type <b>[Customized](CUS)</b> .	0 to 100%	10%															
Frt	<b>[Ramp 2 threshold]</b> Ramp switching threshold. Switching the 2nd Ramp if <b>[Ramp 2 threshold](Frt)</b> is not equal to 0 (the value 0 disables the function) and motor frequency exceeds <b>[Ramp 2 threshold](Frt)</b> . The switchover of the ramp using the threshold value and switchover <b>[Ramp switching](rPS)</b> can be used together as follows: <table border="1"> <thead> <tr> <th>LI or bit</th> <th>Frequency</th> <th>Ramp</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>&lt;Frt</td> <td>ACC, dEC</td> </tr> <tr> <td>0</td> <td>&gt;Frt</td> <td>AC2, dE2</td> </tr> <tr> <td>1</td> <td>&lt;Frt</td> <td>AC2, dE2</td> </tr> <tr> <td>1</td> <td>&gt;Frt</td> <td>AC2, dE2</td> </tr> </tbody> </table>	LI or bit	Frequency	Ramp	0	<Frt	ACC, dEC	0	>Frt	AC2, dE2	1	<Frt	AC2, dE2	1	>Frt	AC2, dE2	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																
rPS	<b>[Ramp switching]</b> At state 0 of the assigned input or bit, the acceleration ramp defined by parameter <b>[Acceleration](ACC)</b> and the deceleration ramp defined by parameter <b>[Deceleration](dEC)</b> are active. At state 1 of the assigned input or bit, the acceleration ramp defined by parameter <b>[Acceleration 2](AC2)</b> and the deceleration ramp defined by parameter <b>[Deceleration 2](dE2)</b> are active.		<b>[No](nO)</b>															
AC2   (1)	<b>[Acceleration 2]</b> Time taken to accelerate from 0 to <b>[Rated motor freq.](FrS)</b> . 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 <b>[Ramp 2 threshold](Frt)</b> is greater than 0 or if <b>[Ramp switching](rPS)</b> is assigned.	0.00 to 6000 s <sup>(2)</sup>	5.0 s															
dE2   (1)	<b>[Deceleration 2]</b> Time taken to decelerate from <b>[Rated motor freq.](FrS)</b> 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 <b>[Ramp 2 threshold](Frt)</b> is greater than 0 or if <b>[Ramp switching](rPS)</b> is assigned.	0.00 to 6000 s <sup>(2)</sup>	5.0 s															
brA	<b>[Dec ramp adapt.]</b>  <b>Note:</b> <b>MOTOR DAMAGE</b> This parameter is only permitted to be set to <b>[YES](YES)</b> or <b>[No](nO)</b> 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. <b>[Dec ramp adapt.](brA)</b> is forced to <b>[No](nO)</b> if brake logic control <b>[Brake assignment](bLC)</b> has been assigned. The function is incompatible with applications requiring: <ul style="list-style-type: none"> <li>Positioning on a ramp</li> <li>Use of a braking resistor (this would not preserve its function)</li> </ul>		<b>[YES](YES)</b>															
nO	<b>[No](nO)</b> : Function not active																	
YES	<b>[YES](YES)</b> : Function active, for applications that do not require high deceleration time. Depending on the size of the inverter and <b>[Motor control type](Ctt)</b> , the following parameters are displayed. A higher deceleration time can be achieved with these parameters than with parameter <b>[YES](YES)</b> . The selection must be defined by comparative tests.																	
dYnA	<b>[brake mot A](dYnA)</b> (dYnA): Addition of a constant current flow component If <b>[adj. decel ramp](brA)</b> is configured to <b>[brake mot x](dYnx)</b> , the dynamic powers 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.



5.2.3.6.6.4 [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-	<p><b>[STOP CONFIGURATION]</b></p> <p><b>Note:</b> Some types of stop cannot be used with all other functions.</p>																																					
Stt	<p><b>[Type of stop]</b></p> <p>Stop mode when the move command disappears or when a stop command is issued.</p> <p><b>Note:</b> If function "Brake logic" is released or if <b>[Low speed time out](tLS)</b> is not equal to 0, only "Stop via ramp" can be configured.</p>		<b>[Ramp stop](rMP)</b>																																			
rMP	<b>[Ramp stop](rMP):</b> Stopping via ramp																																					
FSt	<b>[Fast stop](FSt):</b> Fast stop																																					
nSt	<b>[Freewheel](nSt):</b> Freewheel stop																																					
dCl	<b>[DC injection](dCl):</b> Stop by DC injection braking. Only available if <b>[Motor control type](Ct)</b> is not set to <b>[Sync. mot.](SYn)</b> .																																					
FFt	<b>[Freewheel stop Thd.]</b>	0.2 to 599 Hz	0.2 Hz																																			
★ ↻ (1)	<p>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 <b>[Brake assignment](bLC)</b> and <b>[Auto DC supply](AdC)</b> are not configured.</p> <p><b>Problem</b> If a stop ramp (deceleration ramp to standstill) is requested on the drive, overshooting may occur in the control process for induction motors. In doing so, the default value for the speed overshoots the target and the motor turns uncontrolled in the opposite direction. If this behavior is observed, the value for parameter <b>[Freewheel stop Thd.] (FFt)</b> is probably configured too low.</p> <p><b>Recommendation</b> The "slip frequency" can be used as a guide value for parameter <b>[Freewheel stop Thd.] (FFt)</b>. It can be determined using the configured values for <b>[Rated motor speed] (nSP)</b> and <b>[Rated motor freq.] (FrS)</b>.</p> <ul style="list-style-type: none"> <li><b>[Rated motor speed] (nSP):</b> Nominal speed of the motor</li> <li><b>[Rated motor freq.] (FrS):</b> Nominal frequency of the motor</li> </ul> <p><b>Step 1: Calculate the "synchronous speed".</b> The synchronous speed is a theoretical value derived from the nominal frequency and number of motor pole pairs. It corresponds to the speed of a synchronous motor. <math>n_{sync} [rpm] = 6 \text{ FRS} [0.1 \text{ Hz}] / n_{Polpairs}</math></p> <p><b>Step 2: Calculate the "slip frequency".</b> The recommended value for parameter <b>[Freewheel stop Thd.] (FFt)</b> is then calculated according to the following formula: <math>FFt [0.1 \text{ Hz}] = (n_{sync} [rpm] - NSP [rpm]) / n_{sync} [rpm] * FRS [0.1 \text{ Hz}]</math></p> <p><b>Example calculation</b> NSP = 1380 [rpm] FRS = 500 [0.1 Hz] <math>n_{sync} [rpm] = 6 * FRS [0.1 \text{ Hz}] / n_{Polpairs}</math> <math>n_{sync} [rpm] = 6 * 500 / 2</math> <math>n_{sync} [rpm] = 1500</math> <math>FFt [0.1 \text{ Hz}] = (n_{sync} [rpm] - NSP [rpm]) / n_{sync} [rpm] * FRS [0.1 \text{ Hz}]</math> <math>FFt [0.1 \text{ Hz}] = (1500 - 1380) / 1500 * 500</math> <math>FFt [0.1 \text{ Hz}] = 40</math></p> <p><b>Determining the "synchronous speed"</b> If the number of motor pole pairs is unknown, the synchronous speed (step 1) can also be determined using a logical series. The following table shows four different logical series that result for nominal frequencies 10 Hz, 50 Hz, 60 Hz and 800 Hz.</p> <table border="1"> <thead> <tr> <th>Formula</th> <th colspan="4"><math>n_{sync} [rpm] = 6 * FRS [0.1 \text{ Hz}] / n_{Polpairs}</math></th> </tr> <tr> <th><math>n_{Polpairs}</math></th> <th>Series 1 (FRS = 100)</th> <th>Series 2 (FRS = 500)</th> <th>Series 3 (FRS = 600)</th> <th>Series 3 (FRS = 600)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><math>n_{sync} [rpm] = 600</math></td> <td><math>n_{sync} [rpm] = 3000</math></td> <td><math>n_{sync} [rpm] = 3600</math></td> <td><math>n_{sync} [rpm] = 48000</math></td> </tr> <tr> <td>2</td> <td><math>n_{sync} [rpm] = 300</math></td> <td><math>n_{sync} [rpm] = 1500</math></td> <td><math>n_{sync} [rpm] = 1800</math></td> <td><math>n_{sync} [rpm] = 24000</math></td> </tr> <tr> <td>3</td> <td><math>n_{sync} [rpm] = 200</math></td> <td><math>n_{sync} [rpm] = 1000</math></td> <td><math>n_{sync} [rpm] = 1200</math></td> <td><math>n_{sync} [rpm] = 1600</math></td> </tr> <tr> <td>4</td> <td><math>n_{sync} [rpm] = 150</math></td> <td><math>n_{sync} [rpm] = 750</math></td> <td><math>n_{sync} [rpm] = 900</math></td> <td><math>n_{sync} [rpm] = 1200</math></td> </tr> <tr> <td>...</td> <td>...</td> <td>...</td> <td>...</td> <td>...</td> </tr> </tbody> </table> <p>The values of the logical series become smaller as the number of pole pairs increases. To determine the synchronous speed of the motor, the value for NSP [rpm] must be placed in the logical sequence. The next larger value corresponds to the synchronous speed.</p>			Formula	$n_{sync} [rpm] = 6 * FRS [0.1 \text{ Hz}] / n_{Polpairs}$				$n_{Polpairs}$	Series 1 (FRS = 100)	Series 2 (FRS = 500)	Series 3 (FRS = 600)	Series 3 (FRS = 600)	1	$n_{sync} [rpm] = 600$	$n_{sync} [rpm] = 3000$	$n_{sync} [rpm] = 3600$	$n_{sync} [rpm] = 48000$	2	$n_{sync} [rpm] = 300$	$n_{sync} [rpm] = 1500$	$n_{sync} [rpm] = 1800$	$n_{sync} [rpm] = 24000$	3	$n_{sync} [rpm] = 200$	$n_{sync} [rpm] = 1000$	$n_{sync} [rpm] = 1200$	$n_{sync} [rpm] = 1600$	4	$n_{sync} [rpm] = 150$	$n_{sync} [rpm] = 750$	$n_{sync} [rpm] = 900$	$n_{sync} [rpm] = 1200$	...	...	...	...	...
Formula	$n_{sync} [rpm] = 6 * FRS [0.1 \text{ Hz}] / n_{Polpairs}$																																					
$n_{Polpairs}$	Series 1 (FRS = 100)	Series 2 (FRS = 500)	Series 3 (FRS = 600)	Series 3 (FRS = 600)																																		
1	$n_{sync} [rpm] = 600$	$n_{sync} [rpm] = 3000$	$n_{sync} [rpm] = 3600$	$n_{sync} [rpm] = 48000$																																		
2	$n_{sync} [rpm] = 300$	$n_{sync} [rpm] = 1500$	$n_{sync} [rpm] = 1800$	$n_{sync} [rpm] = 24000$																																		
3	$n_{sync} [rpm] = 200$	$n_{sync} [rpm] = 1000$	$n_{sync} [rpm] = 1200$	$n_{sync} [rpm] = 1600$																																		
4	$n_{sync} [rpm] = 150$	$n_{sync} [rpm] = 750$	$n_{sync} [rpm] = 900$	$n_{sync} [rpm] = 1200$																																		
...	...	...	...	...																																		
nSt	<p><b>[Freewheel]</b></p> <p>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 <b>[2/3 wire control](tCC) = [2 wire](2C)</b> and <b>[2 wire type](tCt) = [Level!](LEL)</b> or <b>[Fwd priority](PFO)</b>. Otherwise, a new move command is required.</p>		<b>[No](nO)</b>																																			
nO	<b>[No](nO):</b> Not assigned																																					
L11	<b>[L11](L11):</b> Logic input L11																																					
...	<b>[...](...):</b> See the assignment conditions.																																					

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

Code	Name/Description	Setting range	Factory settings
FSt	<p><b>[Fast stop assignment]</b></p> <p>The stop is activated if the input is set to 0 or the bit changes to 1 (state 0 of the bit in <b>[I/O profile]</b>(IO)). If the input switches back to state 1 and the move command is still active, the motor starts running again only if <b>[2/3 wire control]</b>(tCC) = <b>[2 wire]</b>(2C) and <b>[2 wire type]</b>(tCt) = <b>[Level]</b>(LEL) or <b>[Fwd priority]</b>(PFO). Otherwise, a new move command is required.</p> <p><b>Note:</b></p> <p>This function cannot be used with certain other functions.</p>		<b>[No]</b> (nO)
nO LI1 ...	<p><b>[No]</b>(nO): Not assigned <b>[LI1]</b>(LI1): Logic input LI1 <b>[...]</b>(...): See the assignment conditions. If <b>[Profile]</b>(CHCF) is set to <b>[Not separate]</b>(SIM) or <b>[Separate]</b>(SEP), then <b>[CD11]</b>(Cd11) to <b>[CD15]</b>(Cd15), <b>[C111]</b>(C111) to <b>[C115]</b>(C115), <b>[C211]</b>(C211) to <b>[C215]</b>(C215), <b>[C311]</b>(C311) to <b>[C315]</b>(C315) are not available.</p>		
dCF   (1)	<p><b>[Ramp divider]</b></p> <p>This parameter is accessible if <b>[Type of stop]</b>(Stt) = <b>[Fast stop]</b>(FSt) and <b>[Fast stop assign.]</b>(FSt) is not equal to <b>[No]</b>(nO) and <b>[Stop type]</b>(PAS) is not equal to <b>[Fast stop]</b>(FSt). The enabled ramp (<b>[Deceleration]</b>(dEC) or <b>[Deceleration 2]</b>(dE2)) is subsequently divided by this coefficient during the stop commands. Value 0 corresponds to a minimum ramp time.</p>	0 to 10	4
dCI	<p><b>[DC injection assign.]</b></p> <p><b>Warning!</b></p> <p><b>UNINTENTIONAL MOVEMENT</b></p> <ul style="list-style-type: none"> <li>Do not use DC injection braking in order to generate a holding torque if the motor is not running.</li> <li>Instead, use a holding brake in order to hold the motor in a standstill position.</li> </ul> <p>Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.</p> <p>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 <b>[2/3 wire control]</b>(tCC) = <b>[2 wire]</b>(2C) and <b>[2 wire type]</b>(tCt) = <b>[Level]</b>(LEL) or <b>[Fwd priority]</b>(PFO). Otherwise, a new move command is required.</p> <p><b>Note:</b></p> <p>This function cannot be used with certain other functions.</p>		<b>[No]</b> (nO)
IdC   (1)(3)	<p><b>[DC inject. level 1]</b></p> <p><b>Note:</b></p> <p><b>MOTOR OVERHEATING AND DAMAGE</b></p> <p>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.</p> <p>Level of DC injection braking current activated via logic input or selected as stop mode. This parameter is accessible if <b>[Type of stop]</b>(Stt) = <b>[DC Injection]</b>(dCI) or if <b>[DC injection assign.]</b>(dCI) is not equal to <b>[No]</b>(nO).</p>	0.1*INV to 1.41*INV <sup>(2)</sup>	0.64*INV <sup>(2)</sup>
tdI   (1)(3)	<p><b>[DC injection time 1]</b></p> <p><b>Note:</b></p> <p><b>MOTOR OVERHEATING AND DAMAGE</b></p> <p>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.</p> <p>Maximum duration of current injection <b>[DC inject. level 1]</b>(IdC). After this time has expired, the braking current changes to level <b>[DC inject. level 2]</b>(IdC2). This parameter is accessible if <b>[Type of stop]</b>(Stt) = <b>[DC Injection]</b>(dCI) or if <b>[DC injection assign.]</b>(dCI) is not equal to <b>[No]</b>(nO).</p>	0.1 to 30 s	0.5 s
IdC2   (1)(3)	<p><b>[DC inject. level 2]</b></p> <p><b>Note:</b></p> <p><b>MOTOR OVERHEATING AND DAMAGE</b></p> <p>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.</p> <p>The braking current is activated by the logic input or selected as a stop mode once time span <b>[DC injection time 1]</b>(tdI) has expired. This parameter is accessible if <b>[Type of stop]</b>(Stt) = <b>[DC Injection]</b>(dCI) or if <b>[DC injection assign.]</b>(dCI) is not equal to <b>[No]</b>(nO).</p>	0.1*INV to IdC <sup>(2)</sup>	0.5*INV <sup>(2)</sup>

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

Code	Name/Description	Setting range	Factory settings
tdC   (1)(3)	<p><b>[DC injection time 2]</b></p> <p><b>Caution!</b></p> <p><b>MOTOR OVERHEATING AND DAMAGE</b></p> <p>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.</p> <p>Failure to observe these instructions can result in damage to the equipment.</p> <p>Maximum braking time <b>[DC inject. level 2]</b>(ldC2) for the DC injection braking, only selected as stop configuration. This parameter is accessible if <b>[Stop type]</b>(Stt) is set to <b>[DC Injection]</b>(dCl).</p>	0.1 to 30 s	0.5 s
dOtd  nSt rMp	<p><b>[Disable Output Trigger Definition]</b></p> <p>Disabling stop configuration.</p> <p><b>[Freewheel]</b>(nSt): Disabling inverter function</p> <p><b>[Ramp stop]</b>(rMp): Stops ramp, then disables inverter function.</p>		<b>[Ramp stop]</b> (rMp)

- (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.

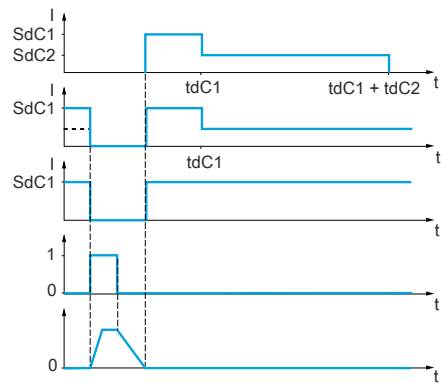
### 5.2.3.6.6.5 [Auto DC injection] (AdC-)

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]		[YES](YES)
AdC	[Auto DC injection]		[YES](YES)
			
 2 s			
	<p><b>Danger!</b></p> <p>RISK OF ELECTRIC SHOCK, ARC FLASH OR EXPLOSION</p> <p>If parameter [Auto DC injection](AdC) is set to [continuous](Ct), the DC brake is always active, even if the motor is not running.</p> <p>Make sure that this setting does not result in unsafe states.</p> <p>Failure to follow these instructions can result in death or serious injury.</p>		
	<p><b>Warning!</b></p> <p>UNINTENTIONAL MOVEMENT</p> <ul style="list-style-type: none"> <li>Do not use DC injection braking in order to generate a holding torque if the motor is not running.</li> <li>Instead, use a holding brake in order to hold the motor in a standstill position.</li> </ul> <p>Failure to follow these instructions can result in death, serious injury or damage to property.</p>		
	Automatic current injection on stopping (at the end of the ramp)		
	<p><b>Note:</b></p> <p>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).</p>		
	<p><b>Note:</b></p> <p>[Auto DC injection](AdC) is set to [No](nO) if [Motor control type](Ctt) is set to [Sync. mot.](SYn).</p> <p>[Auto DC injection](AdC) is forced to [No](nO) if [Brake assignment](bLC) is not set to [No](nO).</p> <p>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.</p>		
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 > FUu- > AdC-

Code	Name/Description	Setting range	Factory settings
SdC1   (1)	<b>[Auto DC inj. level 1]</b>  <b>Caution!</b> <b>MOTOR OVERHEATING AND DAMAGE</b> 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. <b>[Auto DC injection](AdC)</b> is not set to <b>[No](nO)</b> .	0 to 1.2*INV <sup>(2)</sup>	0.7*INV <sup>(2)</sup>
tdC1   (1)	<b>[Auto DC inj. time 1]</b>  <b>Note:</b> <b>MOTOR OVERHEATING AND DAMAGE</b> 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 <b>[Auto DC injection](AdC)</b> is not set to <b>[No](nO)</b> . If <b>[Motor control type](Ct)</b> is set to <b>[Sync. mot.](SYn)</b> , this time corresponds to the hold time at speed zero.	0.1 to 30 s	0.5 s
SdC2   (1)	<b>[Auto DC inj. level 2]</b>  <b>Note:</b> <b>MOTOR OVERHEATING AND DAMAGE</b> 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 <b>[Auto DC injection](AdC)</b> is not set to <b>[No](nO)</b> .	0 to 1.2*INV <sup>(2)</sup>	0.5*INV <sup>(2)</sup>
tdC2   (1)	<b>[Auto DC inj. time 2]</b>  <b>Caution!</b> <b>MOTOR OVERHEATING AND DAMAGE</b> 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 <b>[Auto DC injection](AdC)</b> is set to <b>[YES](YES)</b> .	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.



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

### 5.2.3.6.6.6 [JOG] (JOG-)

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > JOG-			
Code	Name/Description	Setting range	Factory settings
JOG-	<p><b>[JOG]</b></p> <p><b>Note:</b> This function cannot be used with certain other functions.</p>		
JOG	<p><b>[JOG]</b></p> <p>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).</p> <p>nO [No](nO): Not assigned                      LI1 [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.</p>		[LI3](LI3)
JGF	<p><b>[Setpoint step mode]</b></p> <p>Reference in jog operation This parameter can be accessed if [JOG](JOG) is not set to [No](nO).</p>	0 to 10 Hz	10 Hz
JGt	<p><b>[Jog delay]</b></p> <p>Anti-repeat delay between 2 consecutive jog operations. This parameter can be accessed if [JOG](JOG) is not set to [No](nO).</p>	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.

### 5.2.3.6.6.7 [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.

#### Note:

**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	Reference (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->CO nF > FULL > FU n-> PSS-

Code	Name/Description	Setting range	Factory settings
PSS-	<p><b>[PRESET SPEEDS]</b></p> <p><b>Note:</b> This function cannot be used with certain other functions.</p>		
PS2 nO L1 ...	<p><b>[2 preset speeds]</b></p> <p><b>[No](nO):</b> Not assigned <b>[L1](L1):</b> Logic input L1 <b>[...](...):</b> See the assignment conditions.</p>		<b>[No](nO)</b>
PS4	<p><b>[4 preset speeds]</b></p> <p>Identical to <b>[2 preset speeds](PS2)</b>. In order to obtain 4 speeds, 2 speeds must also be configured.</p>		<b>[No](nO)</b>
PS8	<p><b>[8 preset speeds]</b></p> <p>Identical to <b>[2 preset speeds](PS2)</b>. In order to obtain 8 speeds, 2 and 4 speeds must also be configured.</p>		<b>[No](nO)</b>
PS16	<p><b>[16 preset speeds]</b></p> <p>Identical to <b>[2 preset speeds](PS2)</b>. In order to obtain 16 speeds, 2, 4 and 8 speeds must also be configured.</p>		<b>[No](nO)</b>
SP2   (1)	<p><b>[Preset speed 2]</b></p> <p>2nd preset frequency</p>	0 to 599 Hz	10 Hz
SP3   (1)	<p><b>[Preset speed 3]</b></p> <p>3rd preset speed</p>	0 to 599 Hz	15 Hz
SP4   (1)	<p><b>[Preset speed 4]</b></p> <p>4th preset speed</p>	0 to 599 Hz	20 Hz
SP5   (1)	<p><b>[Preset speed 5]</b></p> <p>5th preset frequency</p>	0 to 599 Hz	25 Hz
SP6   (1)	<p><b>[Preset speed 6]</b></p> <p>6th preset speed</p>	0 to 599 Hz	30 Hz
SP7   (1)	<p><b>[Preset speed 7]</b></p> <p>7th preset frequency</p>	0 to 599 Hz	35 Hz
SP8   (1)	<p><b>[Preset speed 8]</b></p> <p>8th preset frequency</p>	0 to 599 Hz	40 Hz
SP9   (1)	<p><b>[Preset speed 9]</b></p> <p>9th preset speed</p>	0 to 599 Hz	45 Hz
SP10   (1)	<p><b>[Preset speed 10]</b></p> <p>10th preset speed</p>	0 to 599 Hz	50 Hz

The parameters described on this page are accessed by: DRI->CO nF > FULL > FU n-> PSS-			
Code	Name/Description	Setting range	Factory settings
SP11   (1)	<b>[Preset speed 11]</b> 11th preset speed	0 to 599 Hz	55 Hz
SP12   (1)	<b>[Preset speed 12]</b> 12th preset speed	0 to 599 Hz	60 Hz
SP13   (1)	<b>[Preset speed 13]</b> 13th preset speed	0 to 599 Hz	70 Hz
SP14   (1)	<b>[Preset speed 14]</b> 14th preset speed	0 to 599 Hz	80 Hz
SP15   (1)	<b>[Preset speed 15]</b> 15th preset frequency	0 to 599 Hz	90 Hz
SP16   (1)	<b>[Preset speed 16]</b> 16th preset speed The display of parameter <b>[Preset speed x](SPx)</b> is based on the number of configured speeds. See combination table for preset PID references.	0 to 599 Hz	100 Hz
JPF 	<b>[Skip Frequency]</b> 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 	<b>[Skip Frequency 2]</b> 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 	<b>[3rd Skip Frequency]</b> 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  	<b>[Skip Frequency Hyst.]</b> This parameter is visible if at least one skip frequency <b>[Skip Frequency](JPF)</b> , <b>[Skip Frequency 2](JF2)</b> or <b>[3rd Skip Frequency](JF3)</b> 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](SE-)**.



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.

### 5.2.3.6.6.8 [+/- speed ] (UPd-)

Two types of operation are available:

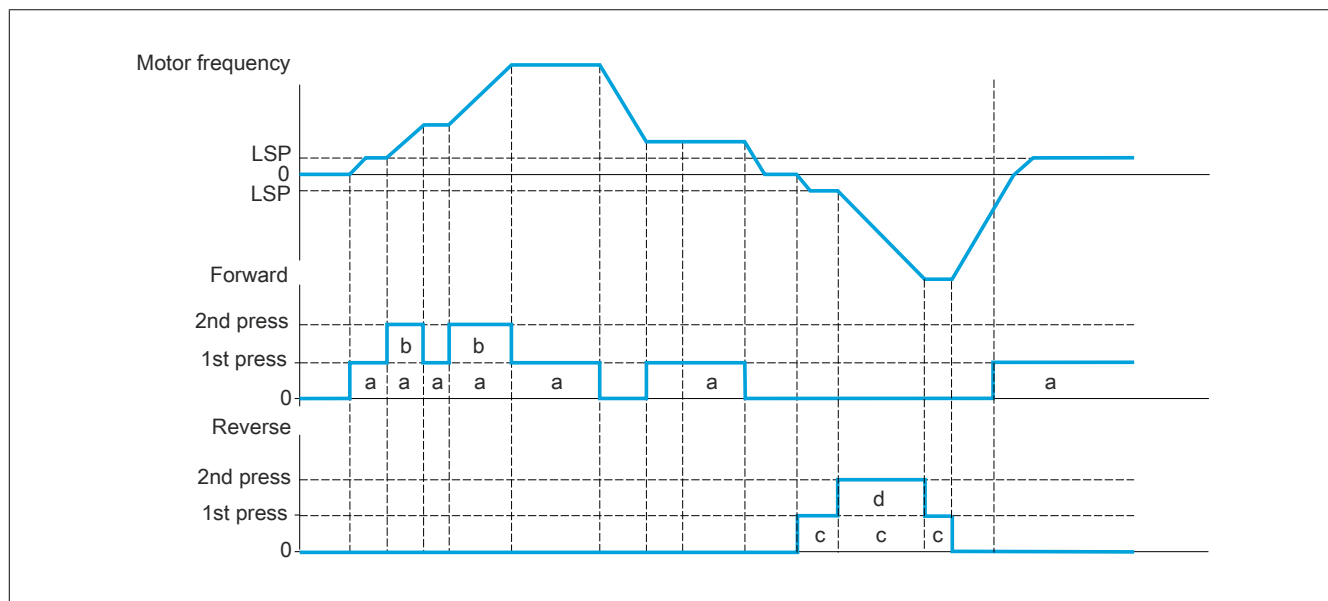
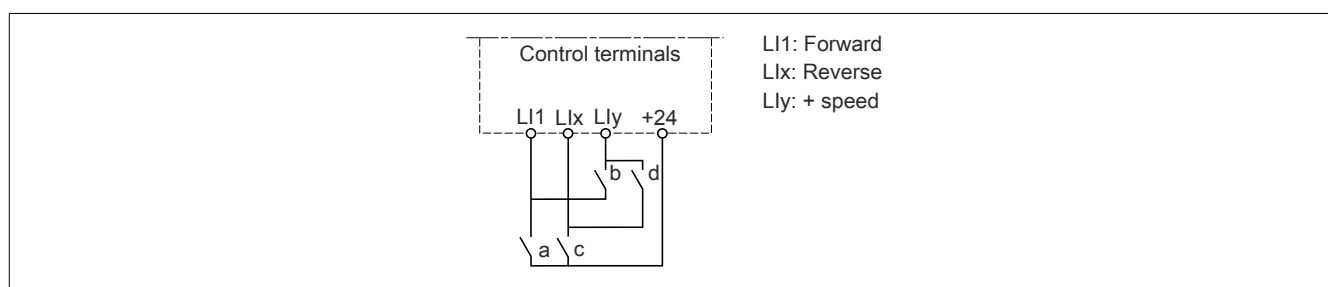
- **Use of single-step buttons:** Two logic inputs are required in addition to rotational direction(s). If the input is set to "+ speed", the speed increases. If the input is set to "- speed", the speed reduces.
- **Use of double-step buttons:** Only one logic input assigned to "+ speed" is required.

+/- 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)**.

#### Note:

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 > FUUn- > UPd-		
Code	Name/Description	Factory settings
UPd-	<p><b>[+/- speed]</b></p> <p>This function is accessible if the reference channel <b>[Ref.2 channel]</b>(Fr2) is set to <b>[+/- speed]</b>(UPdt).</p> <p><b>Note:</b></p> <p>This function cannot be used with certain other functions.</p>	
USP	<p><b>[Assign. + SPEED]</b></p> <p>Function active if the assigned input or bit is at 1.</p>	<b>[No]</b> (nO)
nO LI1 ...	<p><b>[No]</b>(nO): Not assigned</p> <p><b>[LI1]</b>(LI1): Logic input LI1</p> <p><b>[...]</b>(...): See the assignment conditions.</p> <p>If <b>[Profile]</b> (CHCF) is set to <b>[Not separ.]</b>(SIM) or <b>[Separate]</b> (SEP), parameters <b>[CD11]</b> (Cd11) to <b>[CD15]</b> (Cd15), <b>[C111]</b> (C111) to <b>[C115]</b> (C115), <b>[C211]</b> (C211) to <b>[C215]</b> (C215) and <b>[C311]</b> (C311) to <b>[C315]</b> (C315) are not available.</p>	
dSP	<p><b>[-Speed assignment]</b></p> <p>The function is active if the assigned input or bit is at 1.</p> <p>The assignment is identical to <b>[+ speed assignment]</b> (USP).</p>	<b>[No]</b> (nO)
Str 	<p><b>[Reference saved]</b></p> <p>This parameter, which is assigned to function "+/- speed", can be used to save the setpoint in the following cases:</p> <ul style="list-style-type: none"> <li>• If the move commands disappear (saved to RAM).</li> <li>• If the mains supply is severed or the move commands disappear (saved to EEPROM).</li> </ul> <p>As a consequence, the next time the frequency inverter starts up, the speed setpoint is the last setpoint saved.</p>	<b>[No]</b> (nO)
nO rAM EEP	<p><b>[No]</b>(nO): No saving (at the next start-up, the speed setpoint is <b>[Low speed]</b>(LSP))</p> <p><b>[RAM]</b>(rAM): Saving to RAM</p> <p><b>[EEPROM]</b>(EEP): Saving to EEPROM</p>	



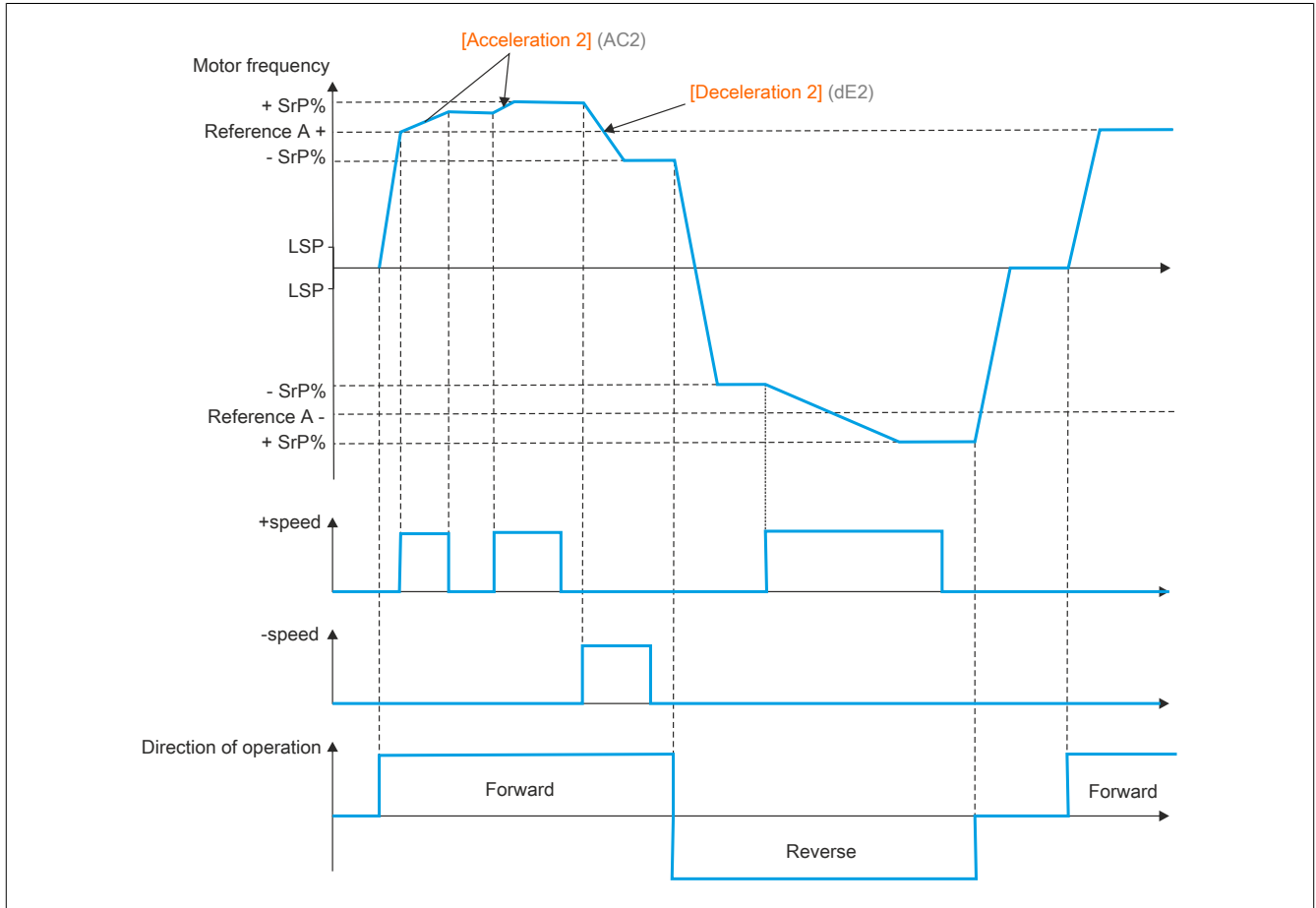
These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.







### 5.2.3.6.6.9 [+ 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 > FUUn- > SrE-			
Code	Name/Description	Setting range	Factory settings
SrE-	<p><b>[+- SPEED AROUND REF]</b></p> <p>This function is accessible for the reference channel <b>[ref1 channel]</b> (Fr1).</p> <p><b>Note:</b></p> <p>This function cannot be used with certain other functions.</p>		
USI nO LI1 ...	<p><b>[Assign. + SPEED]</b></p> <p><b>[No]</b>(nO): Not assigned <b>[LI1]</b>(LI1): Logic input LI1 <b>[...]</b>(...): See the assignment conditions.</p>		<b>[No]</b> (nO)
dSI	<p><b>[-Speed assignment]</b></p> <p>Function active if the assigned input or bit is at 1. The assignment is identical to <b>[+ Speed assignment]</b>(uSi).</p>		<b>[No]</b> (nO)
SrP  	<p><b>[+-Speed limitation]</b></p> <p>This parameter limits the variation range with +/- speed and is expressed as a % of the setpoint. The ramps used with this function are <b>[Acceleration 2]</b>(AC2) and <b>[Deceleration 2]</b>(dE2). This parameter is accessible if "± speed" is assigned.</p>	0 to 50%	10%
AC2   (1)	<p><b>[Acceleration 2]</b></p> <p>Time taken to accelerate from 0 to <b>[Rated motor freq.]</b>(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 <b>[+- speed]</b>(tUd) is assigned.</p>	0.00 to 6000 s <sup>(2)</sup>	5.00 s
dE2   (1)	<p><b>[Deceleration 2]</b></p> <p>Time taken to decelerate from <b>[Rated motor freq.]</b>(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 <b>[+- speed]</b>(tUd) is assigned.</p>	0.00 to 6000 s <sup>(2)</sup>	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.

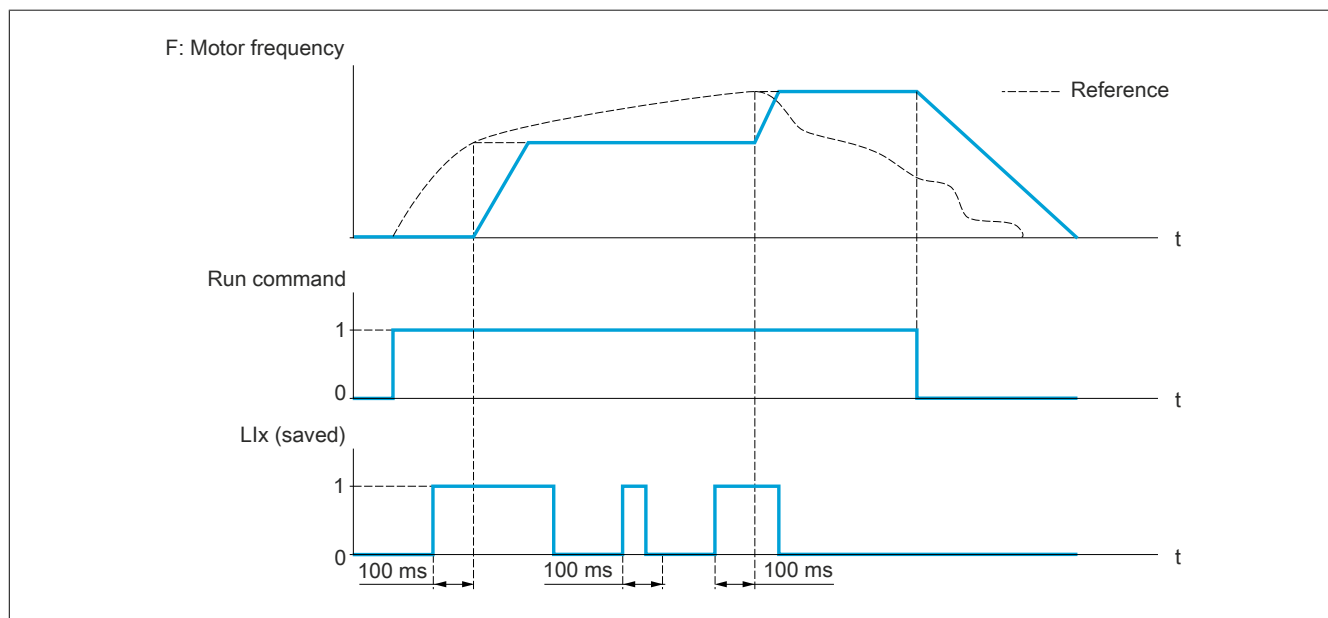


Parameter that can be modified during operation or when stopped.

### 5.2.3.6.6.10 [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-	<b>[MEMO REFERENCE]</b>	
SPM	<b>[Ref. memo ass.]</b> Assignment to a logic input The function is active if the assigned input is active.	<b>[No](nO)</b>
nO	<b>[No](nO):</b> Not assigned	
LI1	<b>[LI1](LI1):</b> Logic input LI1	
...	<b>[...](...):</b> See the assignment conditions.	
LI6	<b>[LI6](LI1):</b> Logic input LI6	
LAI1	<b>[LA1](LA1):</b> Logic input LA1	
LAI2	<b>[LA2](LA2):</b> Logic input LA2	

### 5.2.3.6.6.11 [FLUXING BY LI] (FLI-)

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

Code	Name/Description	Factory settings
FLI-	<b>[FLUXING BY LI]</b>	
FLU	<b>[Motor fluxing]</b>	<b>[No](FnO)</b>
	<b>Danger!</b> <b>RISK OF ELECTRIC SHOCK, ARC FLASH OR EXPLOSION</b> If parameter <b>[Motor fluxing](FLU)</b> is set to <b>[continuous](FCt)</b> 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.	
 2 s	<b>Note:</b> <b>MOTOR OVERHEATING AND DAMAGE</b> 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.	
FnC	<b>[Not cont.](FnC):</b> Non-continuous mode	
FCt	<b>[continuous](FCt):</b> Permanent mode This option is not possible if <b>[Auto DC injection](AdC)</b> is set to <b>[YES](YES)</b> or if <b>[Type of stop](Stt)</b> has been set to <b>[Freewheel](nSt)</b> .	

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUu- > FLI-		
Code	Name/Description	Factory settings
FnO	<p><b>[No](FnO):</b> Function inactive</p> <p>In order to obtain rapid high torque on startup, magnetic flux needs to already have been established in the motor.</p> <p>In mode <b>[continuous](Fct)</b>, the inverter automatically creates the fluxing when starting up.</p> <p>In mode <b>[Not cont.](FnC)</b>, fluxing occurs when the motor has been started up.</p> <p>The magnetic flux current is greater than <b>[Rated mot. current](nCr)</b> (configured nominal motor current) if magnetization has been established. After this, the flux current will be adjusted to the motor's magnetizing current.</p> <p>If <b>[Motor control type](Ctt)</b> is set to <b>[Sync. mot.](SYn)</b>, parameter <b>[Motor fluxing](FLU)</b> results in the assignment of the rotor and not of the magnetization.</p> <p>If <b>[Brake assignment](bLC)</b> is not <b>[No](nO)</b>, parameter <b>[Motor fluxing](FLU)</b> has no effect.</p>	
FLI	<p><b>[Fluxing assignment]</b></p> <p><b>Caution!</b></p> <p><b>MOTOR OVERHEATING AND DAMAGE</b></p> <p>To prevent motor overheating and damage, check whether the connected motor has the correct sizing for the magnetizing current.</p> <p>Failure to observe these instructions can result in damage to the equipment.</p> <p>The assignment is only possible if <b>[Motor fluxing](FLU)</b> = <b>[Not cont.](FnC)</b>.</p> <p>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.</p>	<b>[No](nO)</b>
nO	<b>[No](nO):</b> Not assigned	
LI1	<b>[LI1](LI1):</b> Logic input LI1	
...	<b>[...](...):</b> See the assignment conditions.	
ASt	<p><b>[Angle setting type]</b></p> <p>Mode for measuring phase shift angle. Only visible if <b>[Motor control type](Ctt)</b> is set to <b>[Sync. mot.](SYn)</b>.</p> <p><b>[PSI align](PSI)</b> and <b>[PSIO align](PSIO)</b> work for all types of synchronous motor. <b>[SPM align](SPMA)</b> and <b>[Assign IPM](IPMA)</b> increase performance, depending on the type of synchronous motor.</p>	<b>[PSIO align](PSIO)</b>
IPMA	<b>[IPM align](IPMA):</b> 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 than standard assignment mode.	
SPMA	<b>[SPM align](SPMA):</b> 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 than standard assignment mode.	
PSI	<b>[PSI align](PSI):</b> Pulse signal application. Standard assignment mode after pulse signal applied.	
PSIO	<b>[PSIO align](PSIO):</b> 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	<b>[No action](nO):</b> 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.



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

### 5.2.3.6.6.12 [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.

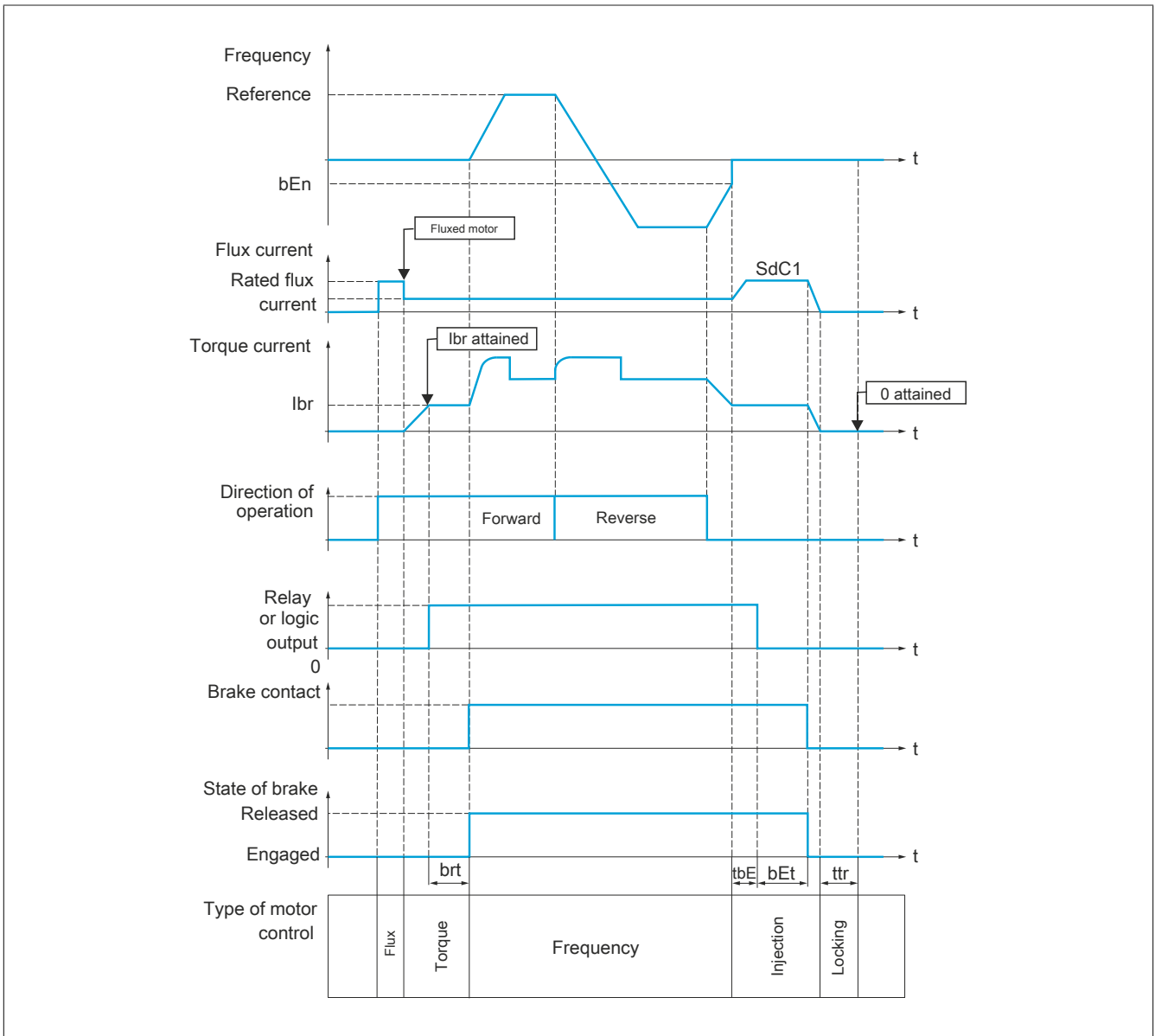
Failure to follow these instructions can result in serious injury and death or damage to the equipment.

- **[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  $bIP = 2 \text{ lbr}$  (Example: Always lift with a load and lower when load is empty).
- **Brake release current ([Brake release I FW](lbr) and [Brake release I Rev](lrd) if [Brake impulse](bIP) = 2 lbr)**: 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.](blr)** 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](lbr)**: 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.

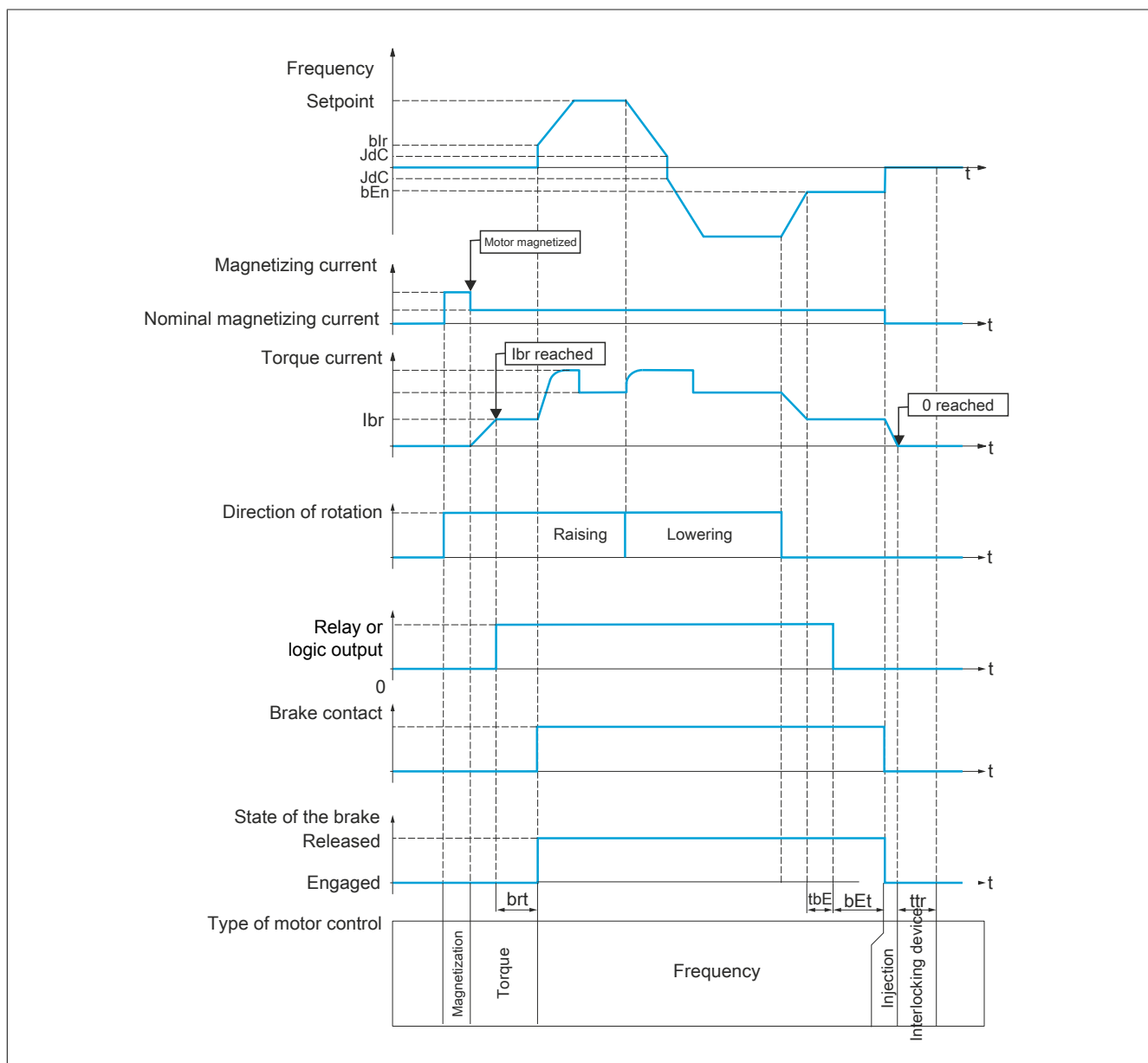
## Brake logic control, horizontal movement in open control loop



## Legend:

- (bEn): **[Brake engage freq.]**
- (bEt): **[Brake engage time]**
- (brt): **[Brake Release time]**
- (lbr): **[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]**
- (bEr): **[Brake release freq.]**
- (brt): **[Brake Release time]**
- (lbr): **[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- > CO nF > FULL > FU n- > bLC-			
Code	Name/Description	Setting range	Factory settings
bLC-	<b>[BRAKE LOGIC CONTROL]</b>  <b>Note:</b> This function cannot be used with certain other functions.		
bLC	<b>[Brake assignment]</b> Logic output or control relay.  <b>Note:</b> If the brake is assigned, only a ramp stop is possible. Check parameter <b>[Type of stop](Stt)</b> . The brake logic control can only be assigned if <b>[Motor control type](Ctt)</b> is not equal to <b>[Standard](Std)</b> , <b>[V/F 5pts](UF5)</b> , <b>[V/F Quad.](UFq)</b> or <b>[Sync. mot.](SYn)</b> .		<b>[No](nO)</b>
nO r2 LO1 dO1	<b>[No](nO)</b> : Function not assigned (in this case, none of the functions can be accessed). <b>[R2](r2)</b> : Relay <b>[LO1](LO1)</b> : Logic output <b>[DO1](dO1)</b> : Analog output AO, which can be used as a logic output. Selection is possible if <b>[AO1 assignment](AO1)</b> is set to <b>[No](nO)</b> .		
bSt	<b>[Movement type]</b>		<b>[Hoisting](UEr)</b>
 HO r	<b>[Traveling](HO r)</b> : Resistive-load movement (translational motion of overhead traveling cranes, for example).  <b>Note:</b> If <b>[Motor control type](Ctt)</b> is set to <b>[Standard](Std)</b> or <b>[V/F 5pts](UF5)</b> , <b>[Movement type](bSt)</b> is forced to <b>[Traveling](HO r)</b> .		
UE r	<b>[Hoisting](UE r)</b> : Driving-load movement (hoisting winch, for example)  <b>Note:</b> If <b>[Weight sensor ass.](PES)</b> is not equal <b>[No](nO)</b> , <b>[Movement type](bSt)</b> is forced to <b>[Hoisting](UE r)</b> .		
bCI	<b>[Brake contact]</b> If the brake has a monitoring contact (closed for released brake).		<b>[No](nO)</b>
 nO LI1 ...	<b>[No](nO)</b> : Not assigned <b>[LI1](LI1)</b> : Logic input LI1 <b>[...](...)</b> : See the assignment conditions.		
bIP	<b>[Brake impulse]</b> Brake start pulse. This parameter can be accessed if <b>[Weight sensor ass.](PES)</b> is set to <b>[No](nO)</b> . The parameter is set to <b>[Yes](YES)</b> if <b>[Movement type](bSt)</b> is set to <b>[Hoisting](UE r)</b> .		<b>[YES](YES)</b>
  nO YES 2lbr	<b>[No](nO)</b> : The motor torque is specified in the required direction using <b>[Brake release I FW](lbr)</b> . <b>[Yes](YES)</b> : The motor torque direction is "forward" (make sure that this direction of rotation corresponds to the lifting operation), using <b>[Brake release I FW](lbr)</b> . <b>[2 I BR](2lbr)</b> : The torque has the required direction of rotation, with current <b>[Brake release I FW](lbr)</b> for forward and <b>[Brake release I Rev](lrd)</b> for reverse; for certain specific applications.		
lbr	<b>[Brake release I FW]</b> Brake release current threshold for ascending or forward movement. This parameter is accessible if <b>[Weight sensor ass.](PES)</b> is set to <b>[No](nO)</b> .	0 to 1.36*INV <sup>(2)</sup>	0
  (1)			
lrd	<b>[Brake release I Rev]</b> Brake release current threshold for descending or counterclockwise rotation. This parameter is accessible if <b>[Brake impulse](bIP)</b> is set to <b>[2 I BR](2lbr)</b> .	0 to 1.36*INV <sup>(2)</sup>	0
  (1)			
brt	<b>[Brake Release time]</b> Brake release time delay.	0 to 5.00 s	0 s
  (1)			
blr	<b>[Brake release freq.]</b> Brake release frequency threshold (initialization of acceleration ramp). This parameter is accessible if <b>[Movement type](bSt)</b> is set to <b>[Hoisting](UE r)</b> .	<b>[Auto](AUtO)</b> to 10 Hz	<b>[Auto](AUtO)</b>
  (1) AUtO	<b>[Auto](AUtO)</b> : The inverter is assigned a value that is equal to the motor nominal slip and calculated using the drive parameters. <b>0 to 10 Hz</b> : Manual adjustment		

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUu- > bLC-			
Code	Name/Description	Setting range	Factory settings
bEn   (1)	<b>[Brake engage freq.]</b>  Threshold of the braking torque frequency.  <b>Note:</b> <b>[Brake engage freq.](bEn) cannot be greater than [Low speed](LSP).</b>	<b>[Auto](AUtO)</b> 0 to 10 Hz	<b>[Auto](AUtO)</b>
AUtO	<b>[Auto](AUtO):</b> The inverter is assigned a value that is equal to the motor nominal slip and calculated using the drive parameters. <b>0 to 10 Hz:</b> Manual adjustment		
tbE   (1)	<b>[Brake engage delay]</b>  Time delay before request to engage brake.	0 to 5.00 s	0 s
bEt   (1)	<b>[Brake engage time]</b>  Brake engage time (brake response time).	0 to 5.00 s	0 s
SdC1   (1)	<b>[Auto DC inj. level 1]</b>  <b>Note:</b> <b>MOTOR OVERHEATING AND DAMAGE</b> <b>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.</b> <b>Failure to observe these instructions can result in damage to the equipment.</b>  Level of standstill DC injection current.  <b>Note:</b> <b>This parameter is accessible if [Movement type](bSt) is set to [Traveling](HOr).</b>	0 to 1.2*INV <sup>(2)</sup>	0.7*INV <sup>(2)</sup>
bEd   nO YES	<b>[Engage at reversal]</b>  This parameter can be used to select whether or not the brake engages on transition to zero speed when the operating direction is reversed.  <b>[No](nO):</b> The brake does not release. <b>[Yes](YES):</b> The brake releases.		<b>[No](nO)</b>
JdC   (1) AUtO -	<b>[Jump at reversal]</b>  This parameter is accessible if <b>[Movement type](bSt)</b> is set to <b>[Hoisting](UEr)</b> .  <b>[Auto](AUtO):</b> The inverter is assigned a value that is equal to the motor nominal slip and calculated using the drive parameters. <b>0 to 10 Hz:</b> 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 <b>[Engage at reversal](bEd) = [Yes](YES)</b> .	<b>[Auto](AUtO)</b> to 10 Hz	<b>[Auto](AUtO)</b>
ttr   (1)	<b>[Time to restart]</b>  Time between the end of a brake release sequence and the start of a brake engage sequence.	0.00 to 15.00 s	0 s

(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-	<b>[BRAKE LOGIC CONTROL]</b>		
	<p><b>Note:</b> This function cannot be used with certain other functions.</p>		
brH0	<b>[BRH b0]</b>		0
★ 0 1	<p>Selection of the brake restart sequence if a run command is repeated while the brake is engaging.</p> <p><b>[0]</b>(0): The release/engage sequence has been fully executed. <b>[1]</b>(1): The brake is immediately reopened.</p> <p>A run command may be requested during the brake release phase. The <b>[BRH b0]</b>(brH0) setting determines whether or the sequence for re-releasing the brake is executed.</p> <p><b>Note:</b> If a move command is requested during phase "trr", the full brake controller sequence is initialized.</p>		
brH1	<b>[BRH b1]</b>		0
★ 0 1	<p>Deactivation of the brake contact fault in steady state.</p> <p><b>[0]</b>(0): Error "Brake feedback" in steady state is active (error state if the contact is open during operation). Error <b>[Brake feedback]</b>(brF) is monitored during all operating phases. <b>[1]</b>(1): Error "Brake feedback" in steady state is not active. Error <b>[Brake feedback]</b>(brF) is only monitored during brake release and brake engage phases.</p>		

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

Code	Name/Description	Setting range	Factory settings
brH2 ★ 0 1	<p><b>[BRH b2]</b></p> <p>Taking into account brake feedback for the brake controller sequence.</p> <p><b>[0]</b>(0): Brake feedback is not taken into account.  <b>[1]</b>(1): Brake feedback is taken into account.</p> <p>If a logic input is assigned to the brake feedback, the following applies:</p> <ul style="list-style-type: none"> <li><b>[BRH b2](brH2) = 0:</b> During the brake release sequence, the setpoint is enabled after <b>[Brake Release time](brt)</b> has elapsed. During the brake release sequence, the current switches to 0 in accordance with ramp <b>[Current ramp time](brr)</b> after <b>[Brake engage time](bEt)</b> has elapsed.</li> <li><b>[BRH b2](brH2)= 1:</b> When the brakes are released, the setpoint is enabled when the logic input changes to 1. When the brakes are engaged, in accordance with <b>[Current ramp time](brr)</b>, the current switches to 0 if the logic input changes to 0.</li> </ul>		0
brr ★ ↻	<p><b>[Current ramp time]</b></p> <p>Time of the ramp for the torque current (increase and decrease) for a current change that corresponds to the value <b>[Brake release I FW](lbr)</b>.</p>	0 to 5.00 s	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.



Parameter that can be modified during operation or when stopped.

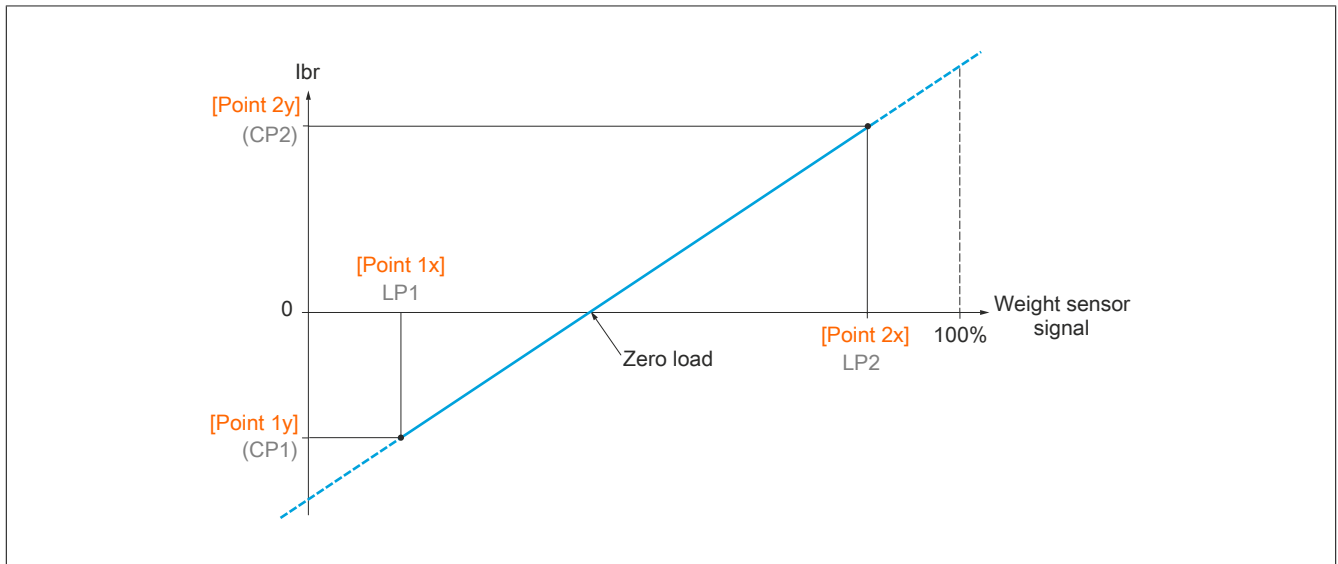
### 5.2.3.6.6.13 [EXTERNAL LOAD MEAS.] (ELM-)

#### 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->COntF>FULL>FUu->ELM-			
Code	Name/Description	Setting range	Factory settings
ELM-	[EXTERNAL LOAD MEAS.]		
PES	[Weight sensor ass.]		[No](nO)
	<p><b>Warning!</b></p> <p><b>LOSS OF CONTROL</b></p> <p>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.</p> <p>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).</p> <p>Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.</p> <p>This parameter can be configured if [BRAKE LOGIC CONTROL](bLC-) is not set to [No](nO).</p>		
nO	[No](nO): Not assigned		
AI1	[AI1](AI1): Analog input A1		
AI2	[AI2](AI2): Analog input A2		
AI3	[AI3](AI3): Analog input A3		
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		
LP1	[Load measure. Pt 1X]	0 to LP2-0.01%	0%
★	<p>0 to 99.99% of signal on assigned input.</p> <p>[Point 1x](LP1) must be less than [Point 2x](LP2).</p> <p>This parameter is accessible if [Weight sensor ass.](PES) is assigned.</p>		

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > ELM-			
Code	Name/Description	Setting range	Factory settings
CP1 	<b>[Point 1Y]</b>  Current corresponding to load <b>[Point 1x]</b> (LP1); in A. This parameter is accessible if <b>[Weight sensor ass.]</b> (PES) is assigned.	-32767 or -1.36*INV to 32767 or 1.36*INV <sup>(1)</sup>	-INV <sup>(1)</sup>
LP2 	<b>[Point 2x]</b>  0.01 to 100% of signal on assigned input. <b>[Point 2x]</b> (LP2) must be greater than <b>[Point 1x]</b> (LP1). This parameter is accessible if <b>[Weight sensor ass.]</b> (PES) is assigned.	1 or LP1+0.01% to 100%	50%
CP2 	<b>[Load sensor point 2Y]</b>  Current corresponding to load <b>[Point 2x]</b> (LP2); in A. This parameter is accessible if <b>[Weight sensor ass.]</b> (PES) is assigned.	-32767 or -1.36*INV to 32767 or 1.36*INV <sup>(1)</sup>	0
lbrA  	<b>[lbr 4-20 mA loss]</b>  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 <sup>(1)</sup>	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.

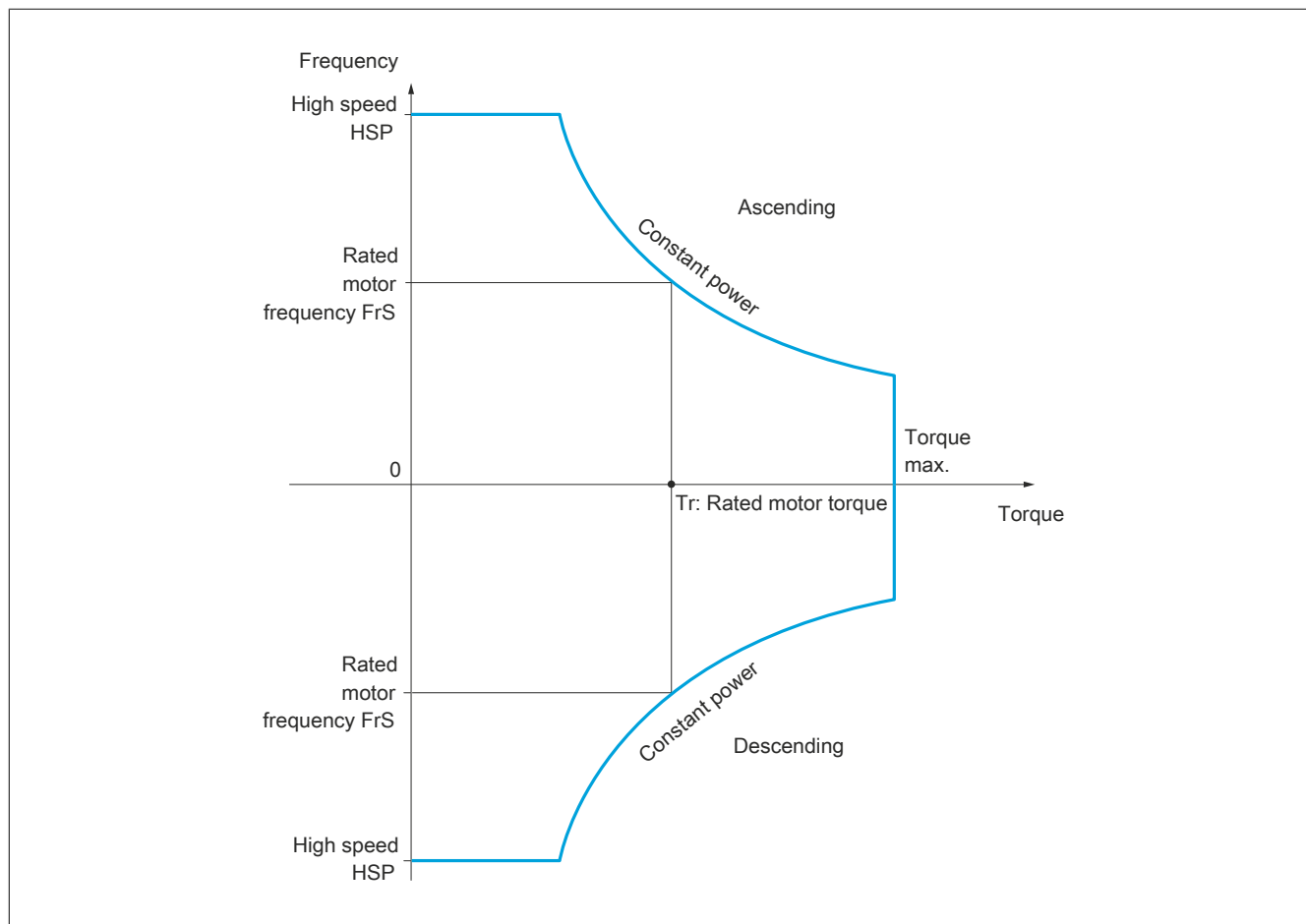
### 5.2.3.6.6.14 [HIGH SPEED HOISTING] (HSH-)

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.

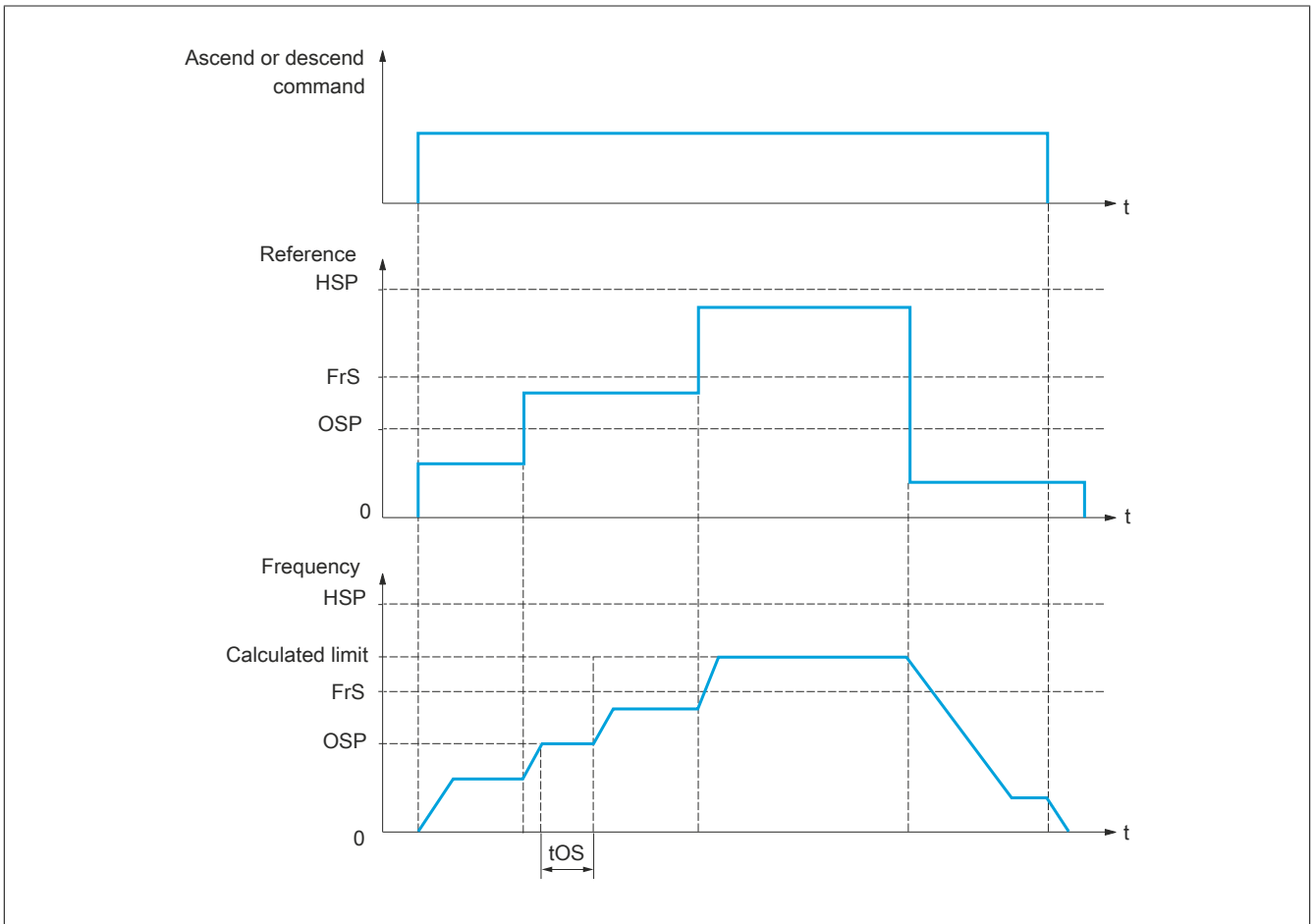
Principle:



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.

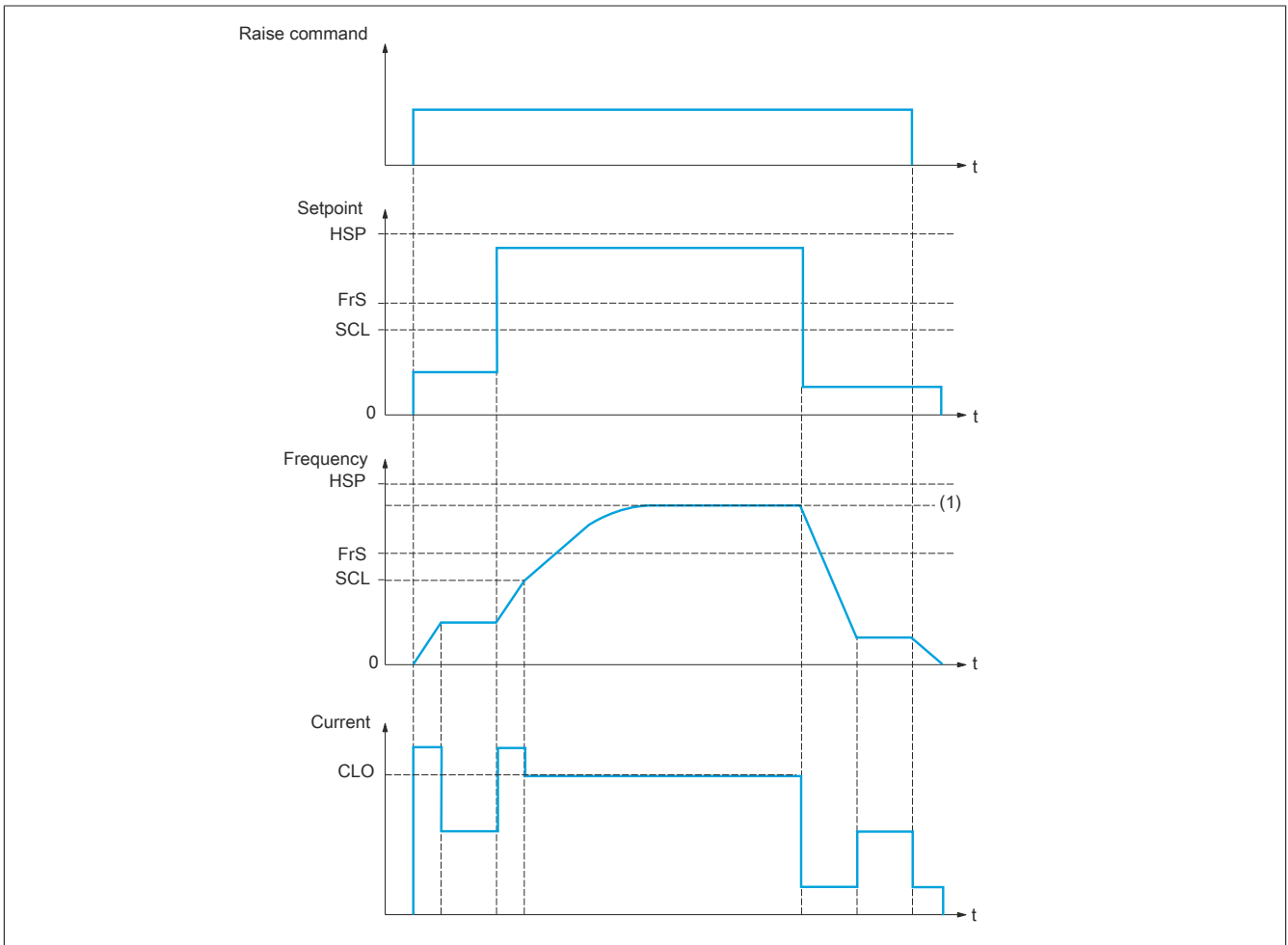
**"Frequency reference" mode:**



OSP: Adjustable frequency step for load measurement

$t_{OS}$ : Load measuring time

Two parameters are used to reduce the frequency calculated by the inverter for the ascending and descending direction.

**"Current limiting" mode:**

(1) Based on the limit value required by the current limit

SCL: Adjustable frequency threshold, above which current limiting is active.

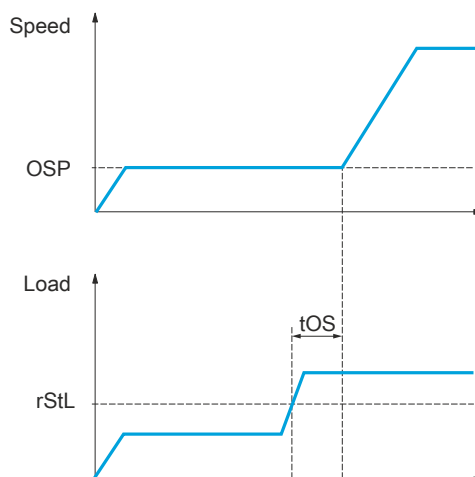
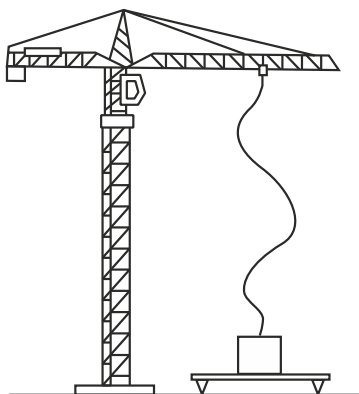
CLO: Current limiting for HSP function, large frequency.

**Note:**

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 step (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".

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUN- > HSH-			
Code	Name/Description	Setting range	Factory settings
HSH-	<b>[HIGH SPEED HOISTING]</b>  <b>Note:</b> This function cannot be used with certain other functions.		
HSO nO SSO CSO	<b>[High speed hoisting optim]</b> [No](nO): Function not active <b>[Speed ref](SSO)</b> : Mode "Frequency reference" <b>[Current Limit](CSO)</b> : Mode "Current limiting"		[No](nO)
COF ★ ↻	<b>[Motor speed coeff.]</b> Frequency reduction coefficient calculated by the inverter for the lifting direction. The parameter can be accessed if <b>[High speed hoisting optim](HSO)</b> is set to <b>[Speed ref](SSO)</b> .	0 to 100%	100%
COr ★ ↻	<b>[Gen. speed coeff]</b> Frequency reduction coefficient calculated by the inverter for descending direction. This parameter is accessible if <b>[High speed hoisting optim](HSO)</b> is not set to <b>[No](nO)</b> .	0 to 100%	50%
tOS ★ ↻	<b>[Load measuring tm.]</b> Duration of frequency step for measurement. This parameter is accessible if <b>[High speed hoisting optim](HSO)</b> is not set to <b>[No](nO)</b> .	0.1 s to 65 s	0.5 s
OSP ★ ↻	<b>[Measurement spd]</b> Speed stabilized for measurement. This parameter is accessible if <b>[High speed hoisting optim](HSO)</b> is not set to <b>[No](nO)</b> .	0 to <b>[Rated motor freq.](FrS)</b>	40 Hz

The parameters described on this page are accessed by: DRI->CO nF > FULL > FU n-> HSH-

Code	Name/Description	Setting range	Factory settings																																																																	
CLO  	<p><b>[High speed I Limit]</b></p> <p>HSP limitation current. The parameter can be accessed if <b>[High speed hoisting optim](HSO)</b> is set to <b>[Current Limit](CSO)</b>.</p> <p><b>Note:</b></p> <p>If the setting is less than 0.25 In, the inverter can be locked in error mode <b>[Output Phase Loss] (OPL)</b> if this has been enabled.</p> <table border="1"> <thead> <tr> <th rowspan="2">ACOPOSinverter P76</th> <th colspan="3">Setting range</th> </tr> <tr> <th>Min. value [0.1 A]</th> <th>Max. value [0.1 A]</th> <th>Default [0.1 A]</th> </tr> </thead> <tbody> <tr><td>8I76S200018.00-000</td><td rowspan="20">0</td><td>23</td><td>15</td></tr> <tr><td>8I76S200037.00-000</td><td>50</td><td>33</td></tr> <tr><td>8I76S200055.00-000</td><td>56</td><td>37</td></tr> <tr><td>8I76S200075.00-000</td><td>72</td><td>48</td></tr> <tr><td>8I76S200110.00-000</td><td>104</td><td>69</td></tr> <tr><td>8I76S200150.00-000</td><td>120</td><td>80</td></tr> <tr><td>8I76S200220.00-000</td><td>165</td><td>110</td></tr> <tr><td>8I76T400037.00-000</td><td>23</td><td>15</td></tr> <tr><td>8I76T400055.00-000</td><td>29</td><td>19</td></tr> <tr><td>8I76T400075.00-000</td><td>35</td><td>23</td></tr> <tr><td>8I76T400110.00-000</td><td>45</td><td>30</td></tr> <tr><td>8I76T400150.00-000</td><td>62</td><td>41</td></tr> <tr><td>8I76T400220.00-000</td><td>83</td><td>55</td></tr> <tr><td>8I76T400300.00-000</td><td>107</td><td>71</td></tr> <tr><td>8I76T400400.00-000</td><td>143</td><td>95</td></tr> <tr><td>8I76T400550.00-000</td><td>215</td><td>143</td></tr> <tr><td>8I76T400750.00-000</td><td>255</td><td>170</td></tr> <tr><td>8I76T401100.00-000</td><td>416</td><td>277</td></tr> <tr><td>8I76T401500.00-000</td><td>495</td><td>330</td></tr> </tbody> </table>	ACOPOSinverter P76	Setting range			Min. value [0.1 A]	Max. value [0.1 A]	Default [0.1 A]	8I76S200018.00-000	0	23	15	8I76S200037.00-000	50	33	8I76S200055.00-000	56	37	8I76S200075.00-000	72	48	8I76S200110.00-000	104	69	8I76S200150.00-000	120	80	8I76S200220.00-000	165	110	8I76T400037.00-000	23	15	8I76T400055.00-000	29	19	8I76T400075.00-000	35	23	8I76T400110.00-000	45	30	8I76T400150.00-000	62	41	8I76T400220.00-000	83	55	8I76T400300.00-000	107	71	8I76T400400.00-000	143	95	8I76T400550.00-000	215	143	8I76T400750.00-000	255	170	8I76T401100.00-000	416	277	8I76T401500.00-000	495	330	See table <sup>(1)</sup> .	See table.
ACOPOSinverter P76	Setting range																																																																			
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8I76S200018.00-000	0	23	15																																																																	
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8I76T401100.00-000		416	277																																																																	
8I76T401500.00-000		495	330																																																																	
SCL  		<p><b>[I Limit. frequency]</b></p> <p>Frequency threshold, above which the high-speed limitation current is active. The parameter can be accessed if <b>[High speed hoisting optim](HSO)</b> is set to <b>[Current Limit](CSO)</b>.</p>	0 to 599 Hz, depending on size	40 Hz																																																																
rSd 	<p><b>[Rope slack config.]</b></p> <p>Function "Rope slack". This parameter is accessible if <b>[High speed hoisting optim](HSO)</b> is not set to <b>[No](nO)</b>.</p>		<b>[No](nO)</b>																																																																	
nO drl PES	<p><b>[No](nO)</b>: Function not active</p> <p><b>[Drive estim.](drl)</b>: Load measurement by estimating the inverter torque.</p> <p><b>[Ext. Sensor](PES)</b>: Load measurement via sensor; assignment only possible if <b>[Weight sensor ass.](PES)</b> is not set to <b>[No](nO)</b>.</p>																																																																			
rStL 	<p><b>[Rope slack trq level]</b></p> <p>Threshold value of the setting that corresponds to a load that is slightly less than the weight of the empty load hook, in % of the rated load. This parameter is accessible if <b>[Rope slack trq level](rSd)</b> has been assigned.</p>	0 to 100%	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.

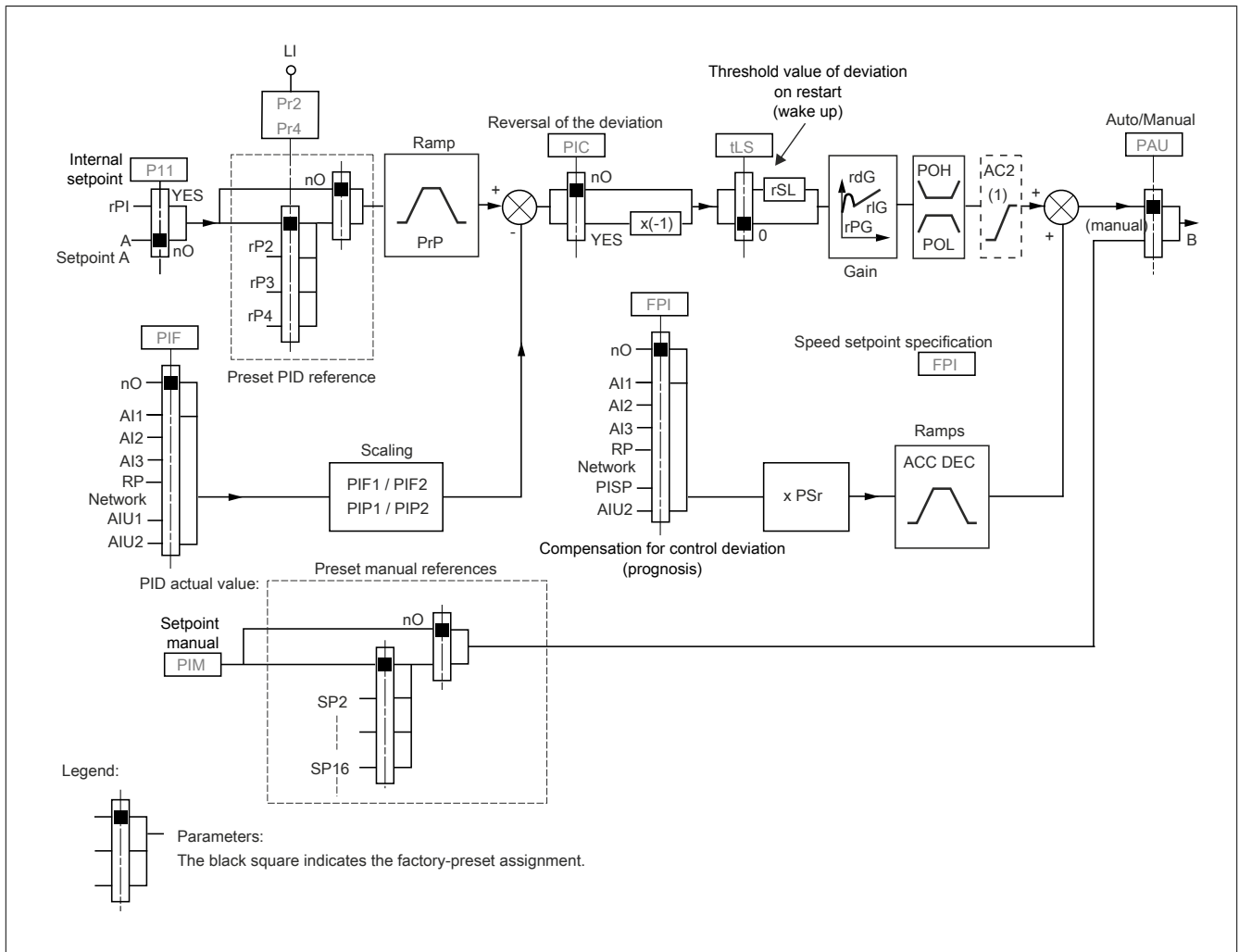


Parameter that can be modified during operation or when stopped.

### 5.2.3.6.6.15 [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).

In accordance with the configuration of [PID initial 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
			rPl or A
0	0		rPl 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:**

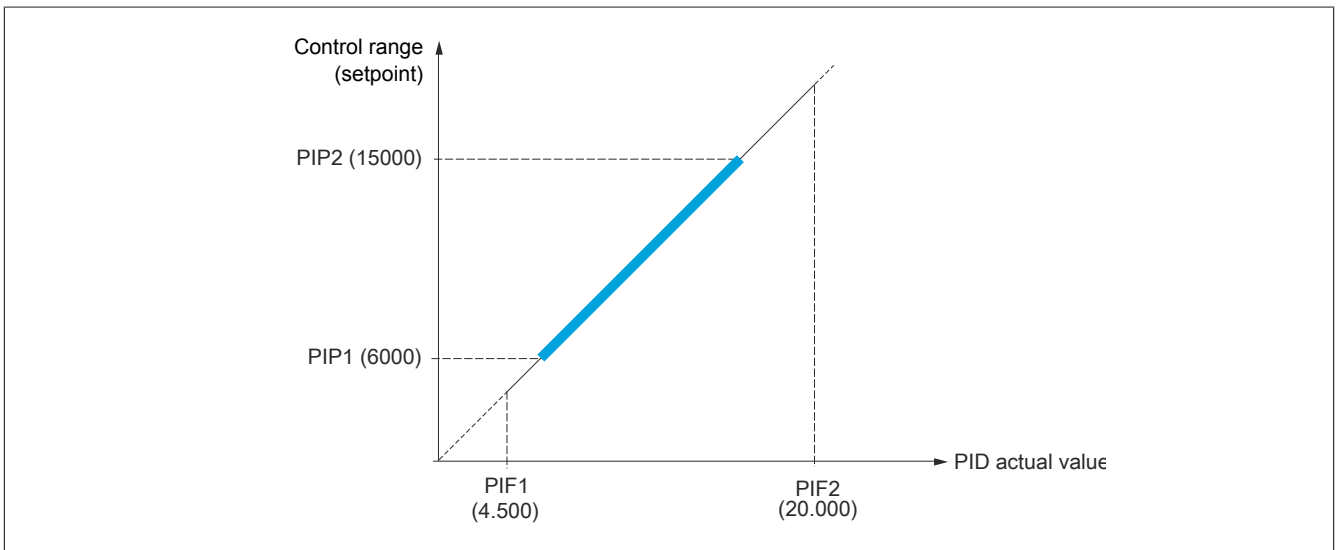
- Parameters **[Min PID feedback]**(PIF1) and **[Max PID feedback]**(PIF2) can be used to scale the PID actual value (encoder range). **This scaling absolutely must be retained for all further parameters.**
- Parameters **[Min PID reference]**(PIP1) and **[Max PID reference]**(PIP2) to scale the control range, i.e. the setpoint. **The control range must be within the sensor range.**

The maximum value of the scaling parameters is 32767. To simplify commissioning, it is recommended to 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<sup>3</sup> and 15 m<sup>3</sup>.

- Used 4-20 mA encoder, 4.5 m<sup>3</sup> for 4 mA and 20 m<sup>3</sup> for 20 mA, where PIF1 = 4500 and PIF2 = 20000.
- Control range 6 to 15 m<sup>3</sup>, where PIP1 = 6000 (min. reference) and PIP2 = 15000 (max. reference).
- Example references:
  - rP1 (internal setpoint) = 9500
  - rP2 (preset setpoint) = 6500
  - rP3 (preset setpoint) = 8000
  - rP4

Menu **[3.4 DISPLAY CONFIG.]** 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 frequencies and a manual reference. Depending on the state of the logic input, the frequency reference is given by the preset frequencies or by a manual reference input via the PID function.

**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

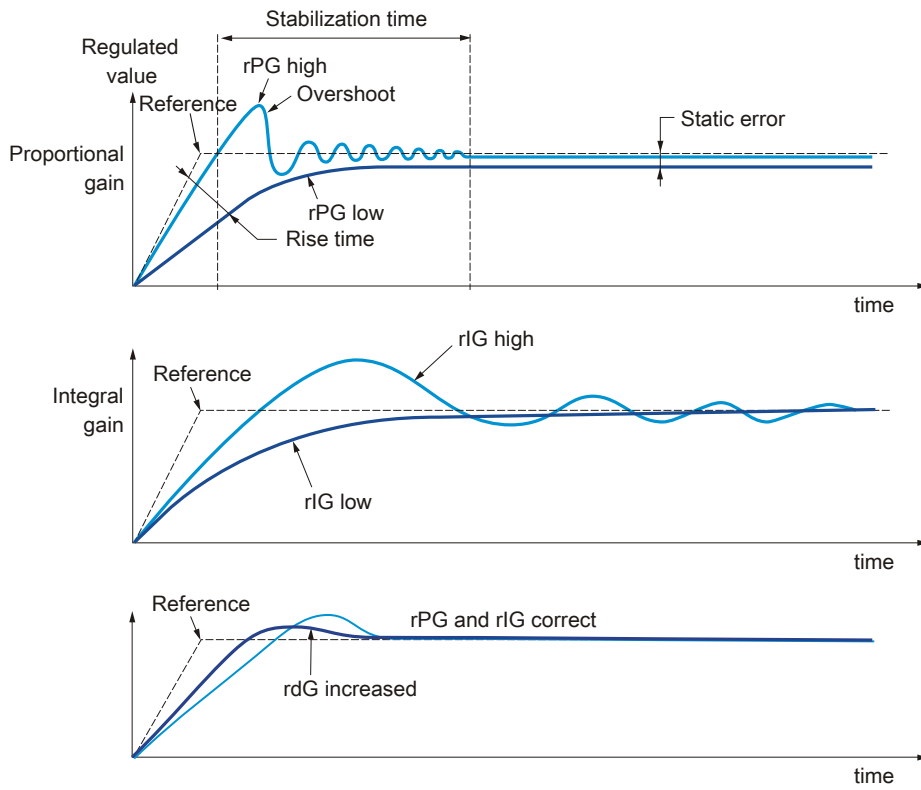
### 1. Configuration in mode PID

### 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 reference; the PID feedback value must remain stable.
  - In temporary operation, the speed must follow the ramp and stabilize quickly; the PID actual value must follow the speed. Otherwise, check the inverter settings and/or encoder signals and the wiring.
- Switch to PID mode.
- 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).
- Finally, with the D component, overshoot can be reduced and response time improved, with a stability compromise as compensation that is not easy to achieve because it depends on three gain factors.
- 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->CO nF > FULL > FU n-> PId-			
Code	Name/Description	Setting range	Factory settings
PId-	<b>[PID REGULATOR]</b>  <b>Note:</b> This function cannot be used with certain other functions.		
PIF nO AI1 AI2 AI3 PI AIU1 AIU2	<b>[PID feedback ass.]</b> [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 the communication bus [AI virtual 2](AIU2): Virtual analog input 2 via the communication bus		[No](nO)
AIC2  ★  nO Mdb CA n nEt	<b>[AI2 net. channel]</b> This parameter is accessible if <b>[PID feedback ass.]</b> (PIF) is set to <b>[AI virtual 2]</b> (AIU2). The parameter can also be accessed via menu <b>[INPUTS / OUTPUTS CFG]</b> (L_O-).  [No](nO): Not assigned [Modbus](Mdb): Integrated Modbus [CANopen com.](CA n): Integrated CANopen® [Com. card](nEt): Communication card (if used)		[No](nO)
PIF1  ★  ↻ (1)	<b>[Min PID feedback]</b>  Value for minimum feedback.	0 to <b>[Max PID feedback]</b> (PIF2) <sup>(2)</sup>	100
PIF2  ★  ↻ (1)	<b>[Max PID feedback]</b>  Value for maximum feedback.	<b>[Min PID feedback]</b> (PIF1) to 32767 <sup>(2)</sup>	1.000
PIP1  ★  ↻ (1)	<b>[Min PID reference]</b>  Minimum process value.	<b>[Min PID reference]</b> (PIP1) to <b>[Max PID reference]</b> (PIP2) <sup>(2)</sup>	150
PIP2  ★  ↻ (1)	<b>[Max PID reference]</b>  Maximum process value.	<b>[Min PID reference]</b> (PIP1) to <b>[Max PID feedback]</b> (PIF2) <sup>(2)</sup>	900
PII  ★  nO YES	<b>[Act. internal PID ref.]</b> Internal PID regulator reference.  [No](nO): The setpoint of the PID controller is returned by <b>[Ref.1 channel]</b> (Fr1) or <b>[Ref.1B channel]</b> (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 <b>[Internal PID ref.]</b> (rPI).		[No](nO)
rPI  ★  ↻	<b>[Internal PID ref.]</b>  Internal PID regulator reference. The parameter can also be accessed via menu <b>[1.2 MONITORING]</b> (MON-).	<b>[Min PID reference]</b> (PIP1) to <b>[Max PID reference]</b> (PIP2)	150
rPG  ★  ↻	<b>[PID prop. gain]</b> Proportional gain.	0.01 to 100	1
rIG  ★  ↻	<b>[PID integral gain]</b> Integral gain.	0.01 to 100	1
rdG  ★  ↻	<b>[PID derivative gain]</b> Derivative gain.	0.00 to 100	0

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUu- > PId-			
Code	Name/Description	Setting range	Factory settings
PrP ★ ↻ (1)	<b>[PID ramp]</b> Acceleration/Deceleration ramp of the PID, which is defined for a range of <b>[Min PID reference]</b> (PIP1) to <b>[Max PID reference]</b> (PIP2) or vice versa.	0 to 99.9 s	0 s
PIC ★ nO YES	<b>[PID correct. reverse]</b> Inverted correction direction <b>[PID correct. reverse]</b> (PIC): If <b>[PID correct. reverse]</b> (PIC) is set to <b>[No]</b> (nO), motor speed increases if the deviation is positive. Example: Pressure control via compressor. If <b>[PID correct. reverse]</b> (PIC) is set to <b>[Yes]</b> (YES), the motor speed decreases if the deviation is positive. Example: Temperature control via cooling fan.		<b>[No]</b> (nO)
POL ★ ↻ (1)	<b>[Min PID output]</b> Minimum value of regulator output in hertz.	- 599 to 599 Hz	0 Hz
POH ★ ↻ (1)	<b>[Max PID output]</b> Maximum value of regulator output in hertz.	0 to 599 Hz	60 Hz
PAL ★ ↻ (1)	<b>[Min fbk alarm]</b> Minimum monitoring threshold for regulator feedback.	<b>[Min PID feedback]</b> (PIF1) to <b>[Max PID feedback]</b> (PIF2) <sup>(2)</sup>	100
PAH ★ ↻ (1)	<b>[Max fbk alarm]</b> Maximum monitoring threshold for regulator feedback.	<b>[Min PID feedback]</b> (PIF1) to <b>[Max PID feedback]</b> (PIF2) <sup>(2)</sup>	1.000
PEr ★ ↻ (1)	<b>[PID error Alarm]</b> Regulator error monitoring threshold.	0 to 65535 <sup>(2)</sup>	100
PIS ★ nO LI1 ...	<b>[PID integral reset]</b> If the assigned input or bit is in state 0, the function is inactive (I component of the PID is valid). If the assigned input or bit is in state 1, the function is active (I component of the PID is locked). <b>[No]</b> (nO): Not assigned <b>[LI1]</b> (LI1): Logic input LI1 <b>[...]</b> (...): See the assignment conditions.		<b>[No]</b> (nO)
FPI ★ nO AI1 AI2 AI3 LCC Mdb CAn nEt PI AIU1	<b>[Speed ref. assign.]</b> Specified frequency input of the PID controller. <b>[No]</b> (nO): Not assigned <b>[AI1]</b> (AI1): Analog input A1 <b>[AI2]</b> (AI2): Analog input A2 <b>[AI3]</b> (AI3): Analog input A3 <b>[HMI]</b> (LCC): Graphic display terminal or external operator terminal source <b>[Modbus]</b> (Mdb): Integrated Modbus <b>[CANopen com.]</b> (CAn): Integrated CANopen® <b>[Com. card]</b> (nEt): Optional communication card source <b>[RP]</b> (PI): Pulse input <b>[AI virtual 1]</b> (AIU1): Virtual analog input 1 with handwheel		<b>[No]</b> (nO)
PSr ★ ↻ (1)	<b>[Speed input %]</b> Multiplying coefficient for predictive speed input. This parameter is not accessible if <b>[Speed ref. assign.]</b> (FPI) is set to <b>[No]</b> (nO).	0 to 100%	100%

The parameters described on this page are accessed by: DRI- > CO nF > FULL > FU n- > PId-			
Code	Name/Description	Setting range	Factory settings
PAU 	<b>[Auto/Manual assign]</b> If the assigned input or bit is in state 0, the PID controller is active. If the assigned input or bit is in state 1, manual operation is active.		<b>[No](nO)</b>
nO LI1 ...	<b>[No](nO)</b> : Not assigned <b>[LI1](LI1)</b> : Logic input LI1 <b>[...](...)</b> : See the assignment conditions.		
AC2   (1)	<b>[Acceleration 2]</b> Time taken to accelerate from 0 to <b>[Rated motor freq.](FrS)</b> . 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.	0.00 to 6000 s <sup>(3)</sup>	5 s
PIM 	<b>[Manual reference]</b> Frequency input in manual operation. This parameter can be accessed if <b>[Auto/Manual assign](PAU)</b> is not equal to <b>[No](nO)</b> . The preset speeds are active on the manual reference if they have been configured.		<b>[No](nO)</b>
nO AI1 AI2 AI3 PI AIU1	<b>[No](nO)</b> : Not assigned <b>[AI1](AI1)</b> : Analog input A1 <b>[AI2](AI2)</b> : Analog input A2 <b>[AI3](AI3)</b> : Analog input A3 <b>[RP](PI)</b> : Pulse input <b>[AI virtual 1](AIU1)</b> : Virtual analog input 1 with handwheel		
tLS  (1)	<b>[Low speed time out]</b> Maximum operating time with <b>[Low speed](LSP)</b> . Following an operation with <b>[Low speed](LSP)</b> for a defined period, a motor stop is requested automatically. The motor restarts when the frequency setpoint is greater than <b>[Low speed](LSP)</b> and if a move command is still present.	0 to 999.9 s	0 s
	<b>Note:</b> A value of 0 indicates an unlimited period of time. If <b>[Low speed time out](tLS)</b> is not equal to 0, parameter <b>[Type of stop](Stt)</b> is forced to <b>[Ramp stop](rMP)</b> (only if "Stop via ramp" can be configured).		
rSL   2 s	<b>[PID wake up thresh.]</b> <b>Danger!</b> <b>UNEXPECTED OPERATION OF THE EQUIPMENT</b> Make sure that enabling this function does not result in unsafe states. Failure to follow these instructions can result in death or serious injury.	0.0 to 100.0	0
	If functions "PID" and "Duration of operation at low speed" <b>[Low speed time out](tLS)</b> are configured at the same time, the PID controller may attempt to set a lower speed than <b>[Low speed](LSP)</b> . This results in unsatisfactory operation, such as startup, rotation at low frequency, standstill, etc. With parameter <b>[PID wake up thresh.](rSL)</b> (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 <b>[Low speed](LSP)</b> . <b>[PID wake up thresh.](rSL)</b> is a percentage of the PID deviation (the value depends on parameters <b>[Min PID feedback](PIF1)</b> and <b>[Max PID feedback](PIF2)</b> ). The function is inactive if <b>[Low speed time out](tLS) = 0</b> or if <b>[PID wake up thresh.](rSL) = 0</b> .		

- (1) The parameter can also be accessed via menu **[SETTINGS](SE-)**.  
(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.



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.**

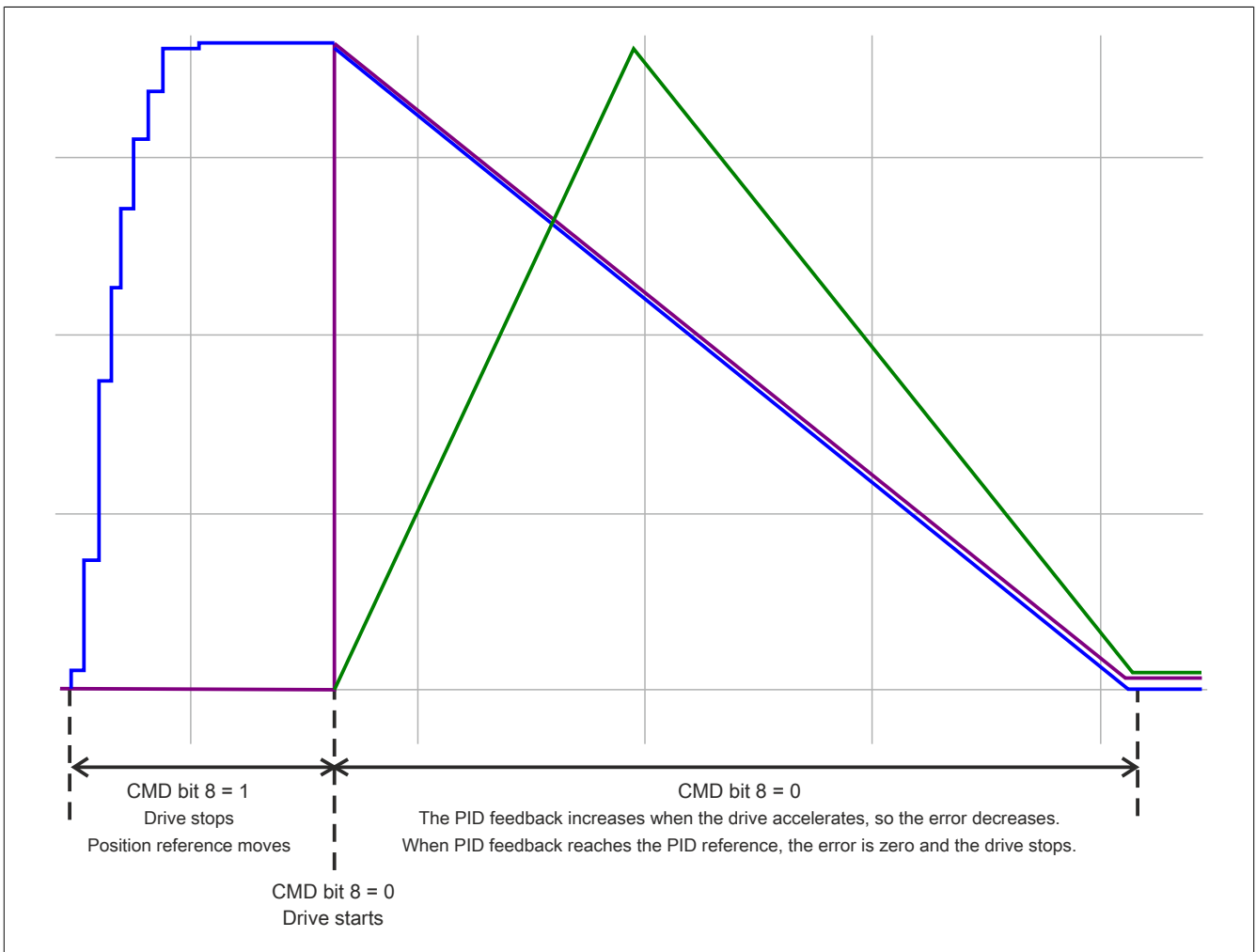
**ACOPOSinverter PID configuration:**

ACC: 1	PIF1: 0	RPG: 1.00	POL: -500
DEC: 1	PIF2: 8192	RIG: 0.01	POH: 500
HSP: 50.0 Hz	PIP1: 0	RDG: 0.00	AC2: 30
LSP: 0.0 Hz	PIP2: 8192	PRP: 0.0 s	DE2: 30

**Test results:**

<input checked="" type="checkbox"/> siRPEInternal Signed Dec Scaling Zero	<input checked="" type="checkbox"/> siSpdEstEnt Signed Dec Scaling Zero	<input checked="" type="checkbox"/> siPIDQ13_ref Signed Dec Scaling Zero
--	--	---

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	PIF2: 8192	RIG: 0.01	POH: 500
HSP: 50.0 Hz	PIP1: 0	RDG: 0.00	AC2: 30
LSP: 0.0 Hz	PIP2: 8192	PRP: 0.0 s	DE2: 30

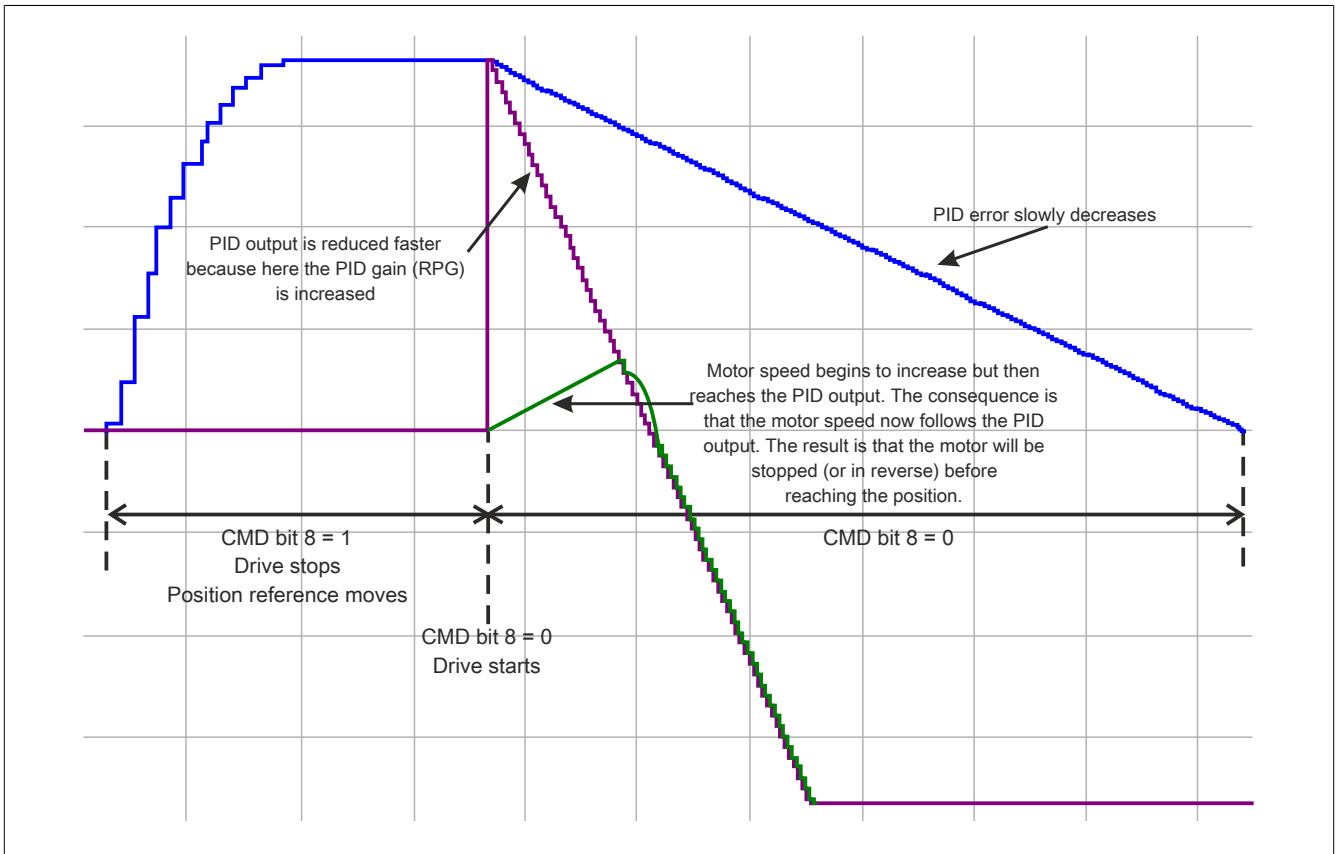
**Test results:**

siRPEInternal  
Signed  
 Dec   
 Scaling  Zero

siSpdEstEnt  
Signed  
 Dec   
 Scaling  Zero

siPIDQ13\_ref  
Signed  
 Dec   
 Scaling  Zero

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 STOPP with stop bit.**

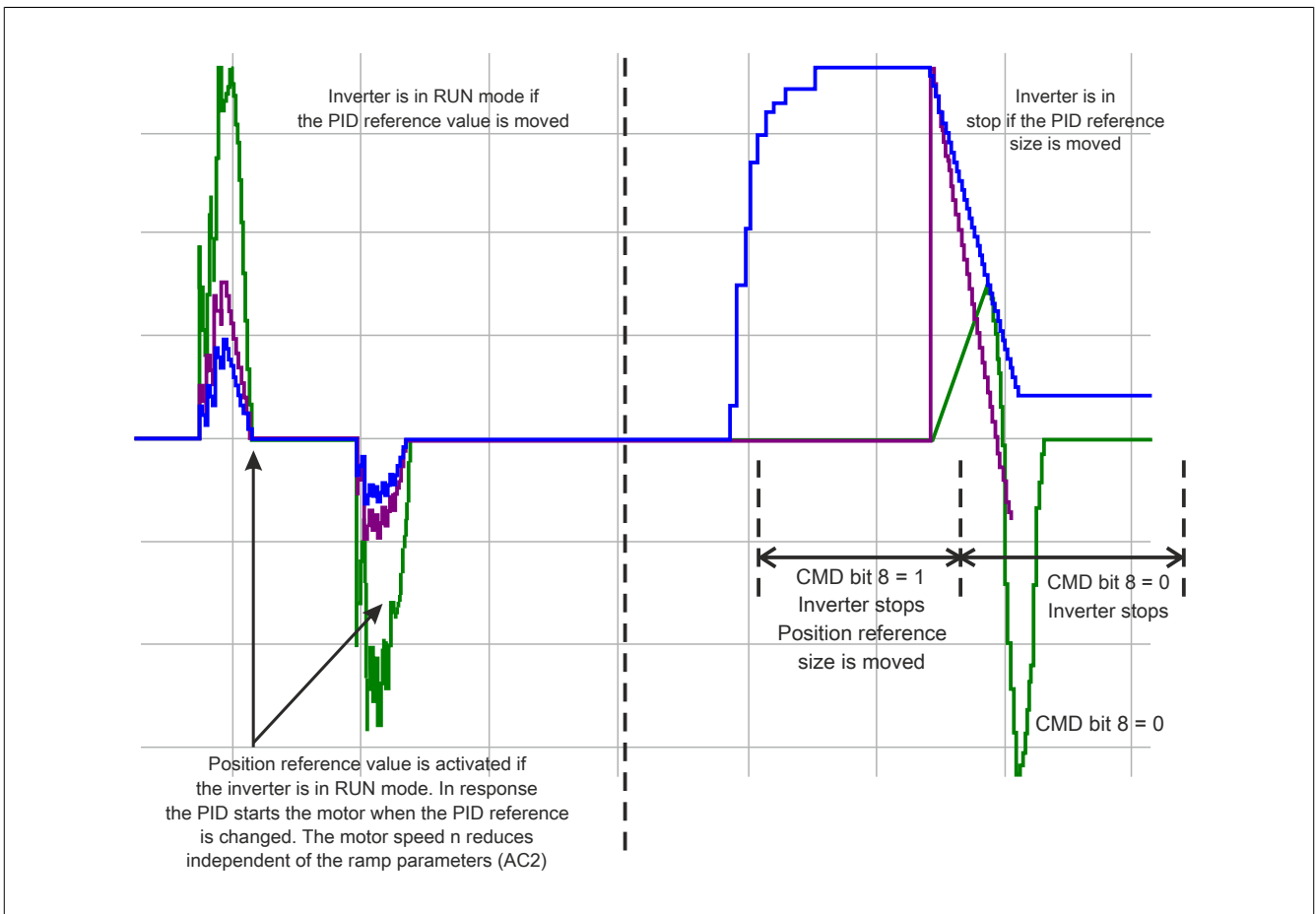
**ACOPOSinverter PID configuration:**

ACC: 1	PIF1: 0	RPG: 7.00	POL: -500
DEC: 1	PIF2: 8192	RIG: 0.01	POH: 500
HSP: 50.0 Hz	PIP1: 0	RDG: 0.00	AC2: 30
LSP: 0.0 Hz	PIP2: 8192	PRP: 0.0 s	DE2: 30

**Test results:**

<input checked="" type="checkbox"/> siRPEInternal	<input checked="" type="checkbox"/> siSpdEstEnt	<input checked="" type="checkbox"/> siPIDQ13_ref
Signed	Signed	Signed
Dec	Dec	Dec
Scaling Zero	Scaling Zero	Scaling Zero

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.

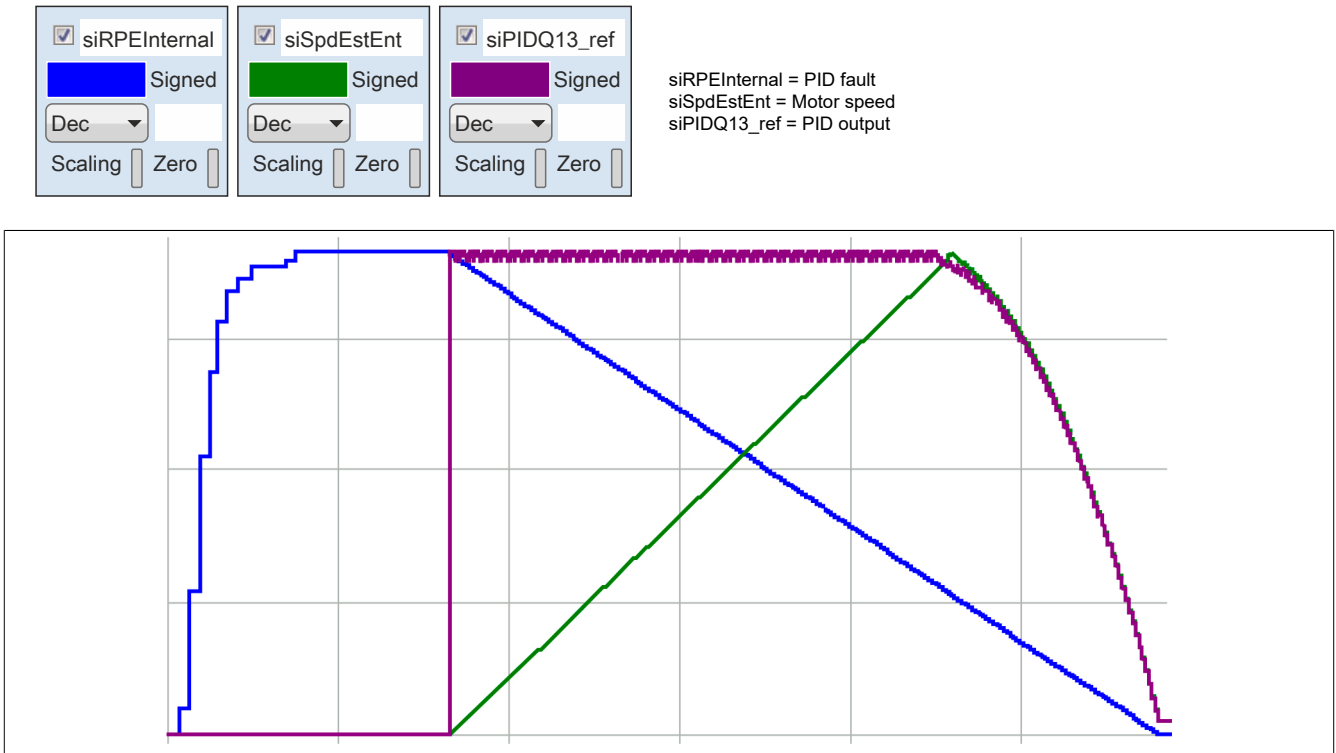
If the inverter stops (e.g. by CMD-bit 8), the motor responds, but accelerates on the basis of the AC2 parameter. The result would be that the motor physically reaches the PID output via the tracking of the AC2 ramp and loses time during this. This results in a positioning error compared to the start without AC2 tracking.

**Test case 4: Reset time**

**ACOPOSinverter PID configuration:**

ACC: 1	PIF1: 0	RPG: 7.00	POL: -500
DEC: 1	PIF2: 8192	RIG: 5.00	POH: 500
HSP: 50.0 Hz	PIP1: 0	RDG: 0.00	AC2: 30
LSP: 0.0 Hz	PIP2: 8192	PRP: 0.0 s	DE2: 30

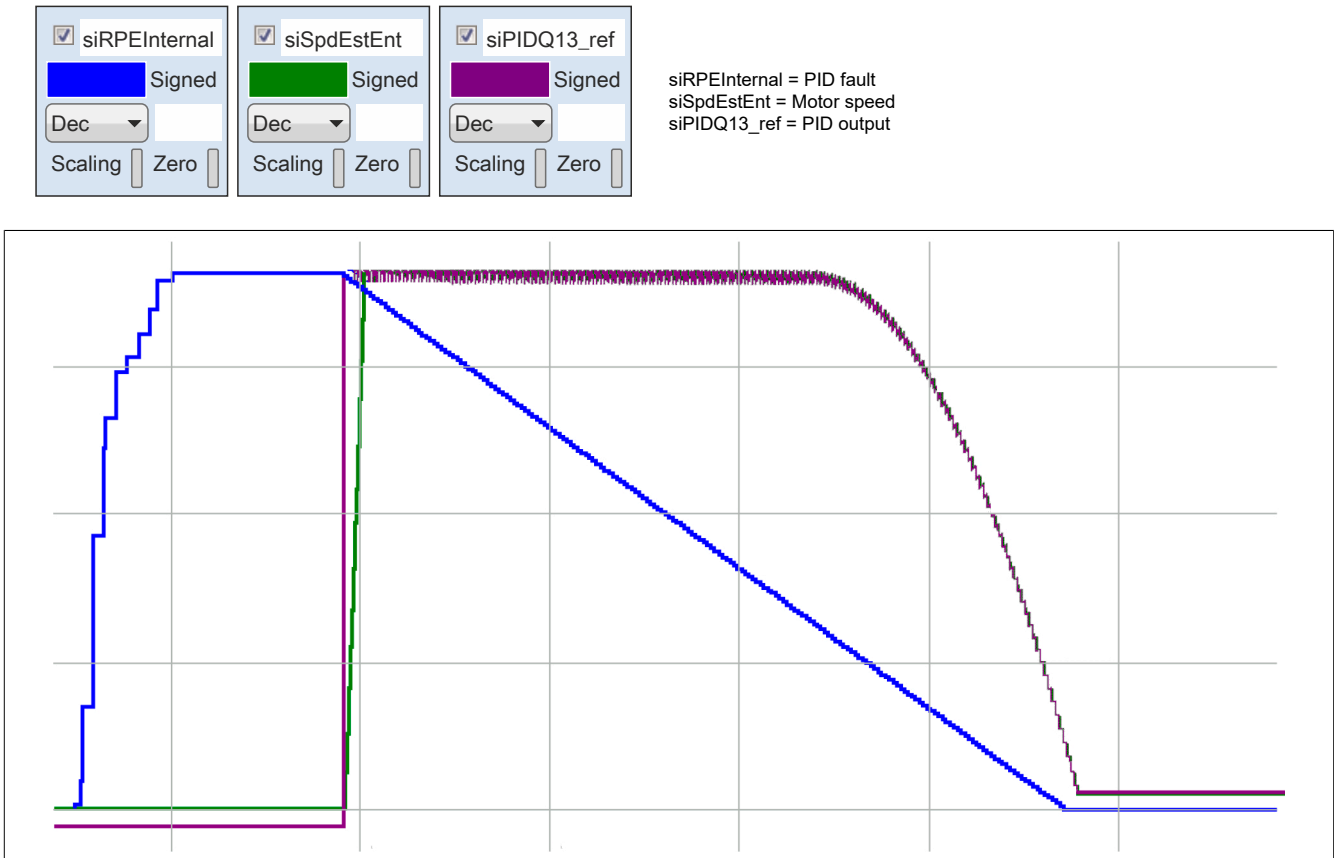
**Test results:**



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	PIF2:	8192	RIG:	5.00	POH:	500
HSP:	50.0 Hz	PIP1:	0	RDG:	0.00	AC2:	1
LSP:	0.0 Hz	PIP2:	8192	PRP:	0.0 s	DE2:	30
		PIF:	AIV1				
		AIC1:	CAN				
		AIV1:	0				

**Test results:**

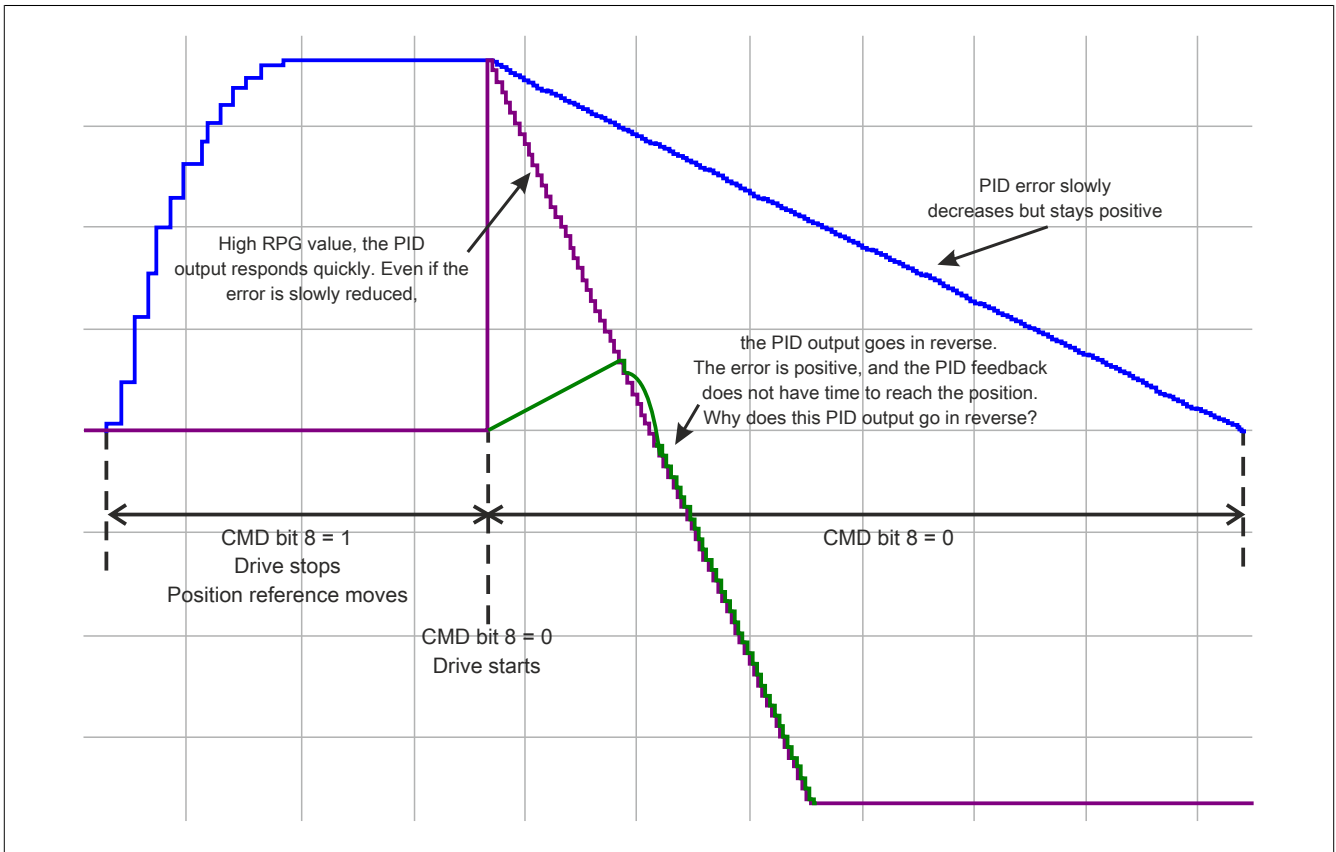
If the PID reference variable has been moved, the inverter is stopped (CMD bit 8 = 1). The AC2 parameter has the same effect as previously when starting in this example. With AC2 = 0.1 s, the PID output is reached more quickly. This reset time allows the generation of the average value for the PID fault 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.

<input checked="" type="checkbox"/> siRPEInternal Signed Dec Scaling Zero	<input checked="" type="checkbox"/> siSpdEstEnt Signed Dec Scaling Zero	<input checked="" type="checkbox"/> siPIDQ13_ref Signed Dec Scaling Zero
--	--	---

siRPEInternal = PID fault  
siSpdEstEnt = Motor speed  
siPIDQ13\_ref = PID output



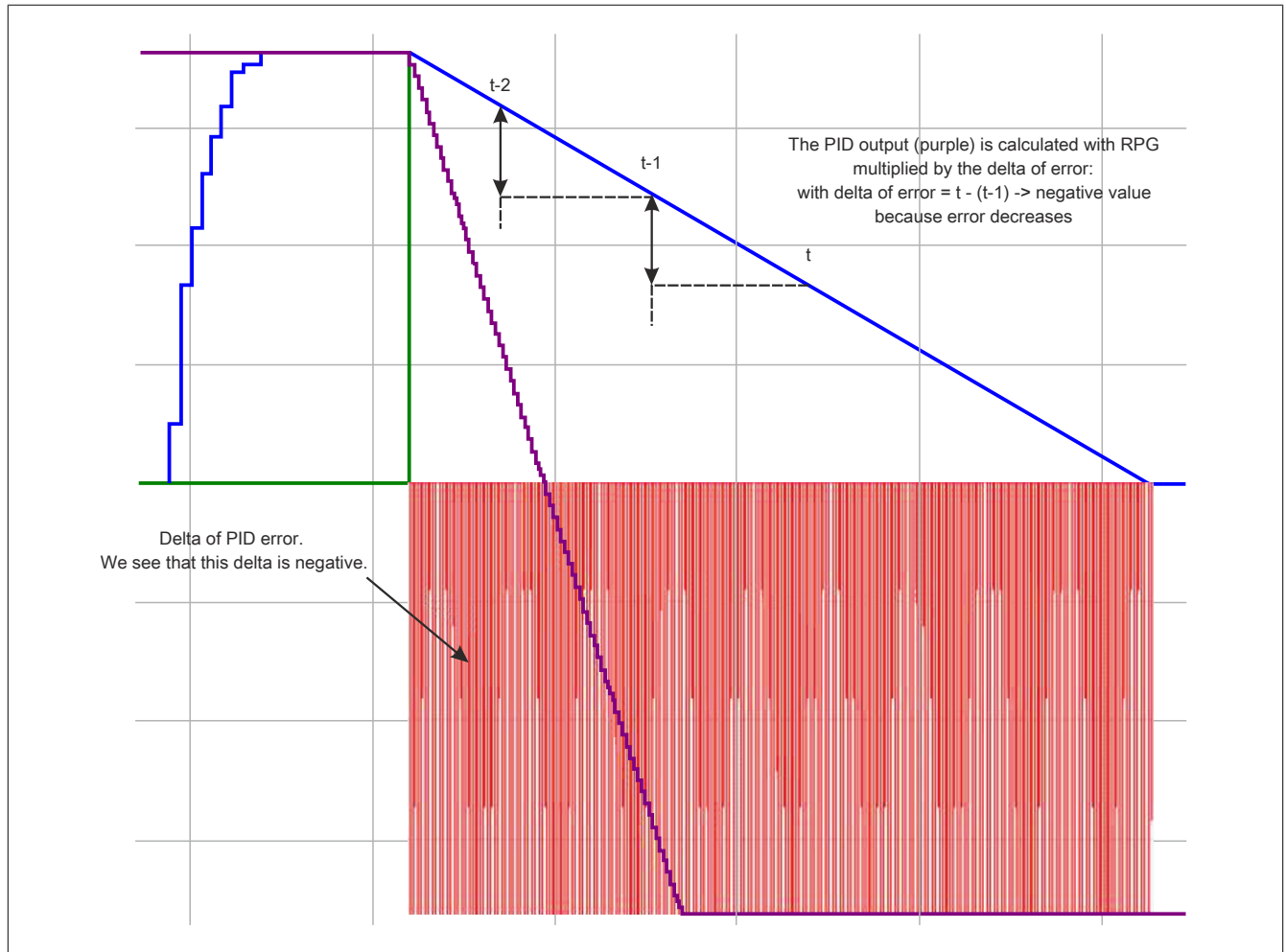
In the case of a high RPG-value the PID output responds more rapidly. This PID output is even reversed in the case of a positive fault. The PID Feedback does not have enough time to reach the PID reference variable, but the inverter turns round. In practical use, this means that this position is never 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	PIF:	AIV1	PIF1:	0	RPG:	7.00	POL:	-500
DEC:	1	AIC1:	CAN	PIF2:	8192	RIG:	0.01	POH:	500
HSP:	50.0 Hz	AIV1:	0	PIP1:	0	RDG:	0.00	AC2:	1
LSP:	0.0 Hz			PIP2:	8192	PRP:	0.0 s	DE2:	30

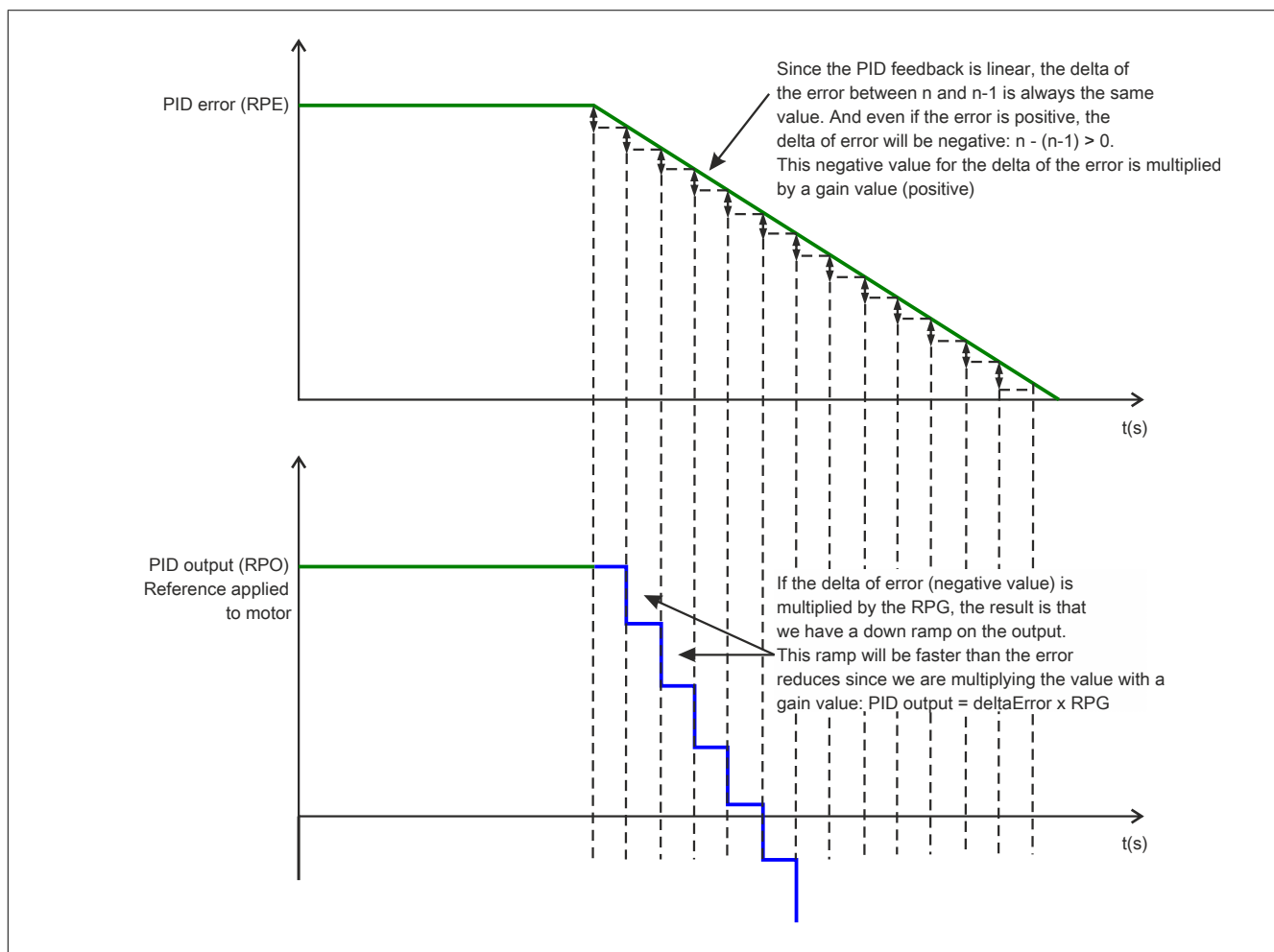


**In our inverters PID output is calculated by multiplying the RPG-value (gain) with the delta of the error.** Since the PID feedback is linear, the delta value for the fault between  $t$  and  $t-1$  will always be the same value. And even in the case of a positive error, the delta value of the error 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.

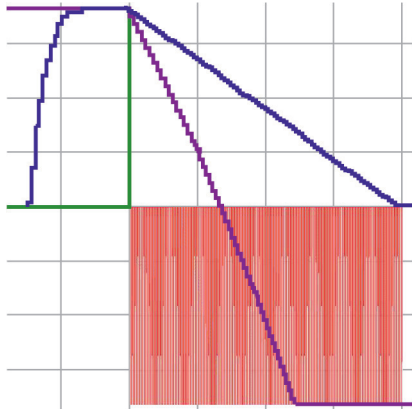
The points 1 and/or 2 may be the result of a poor positioning at the customer site.

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.

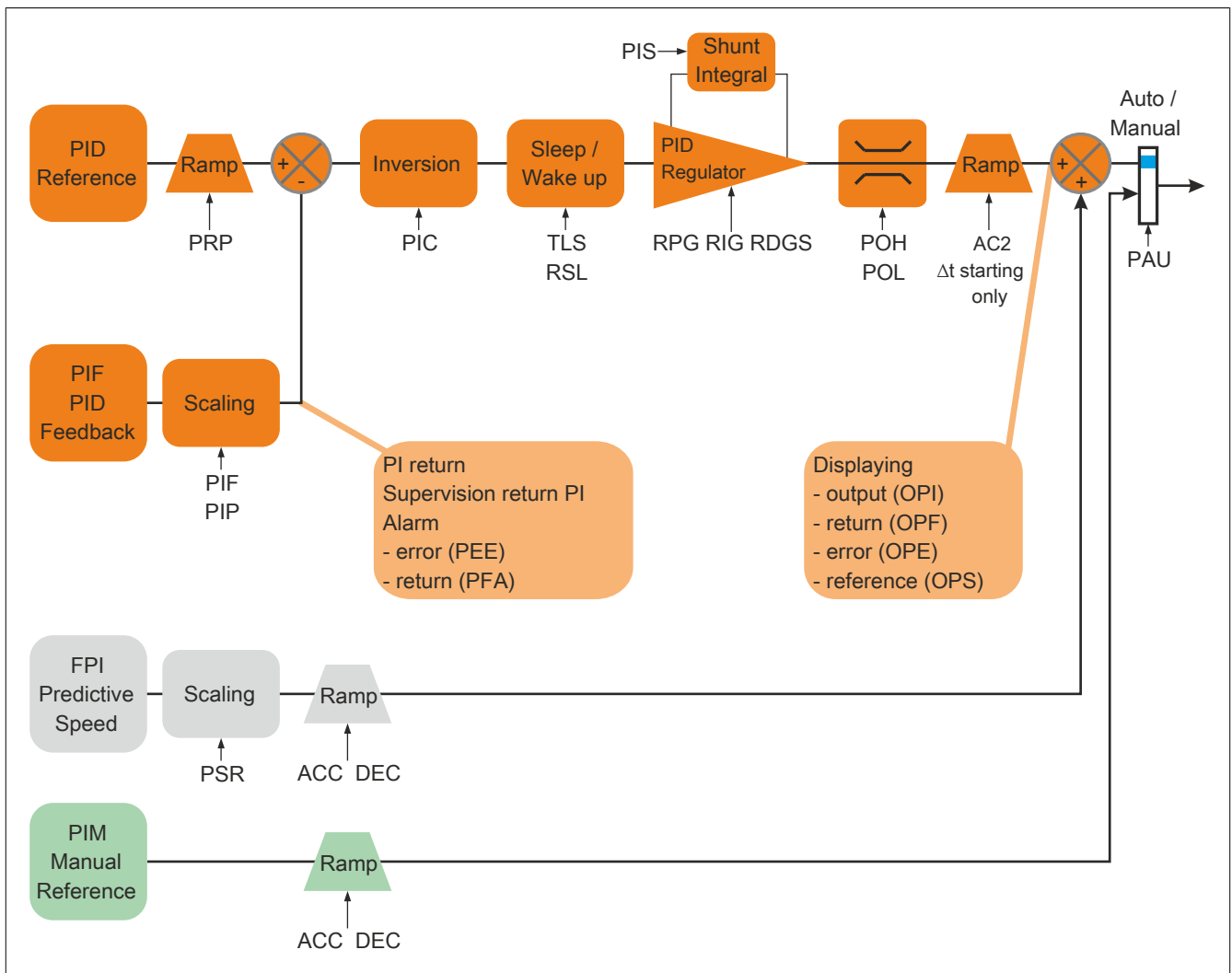
The parameters described below are accessed as follows: DRI- > COnF > FULL > FUn- > PId-			
Code	Description	Setting range	Factory settings
PId-	<b>[PID REGULATOR]</b>		
FPI	<b>[Speed ref. assign.]</b> Specified frequency input of the PID controller.		
nO	Not assigned (function not active)		
AI1	Analog 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	<b>[Speed input %]</b> Multiplication factor for the specified frequency input. The parameter is not accessible when <b>[Speed ref. assign.]</b> (FPI) = <b>[No]</b> (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.

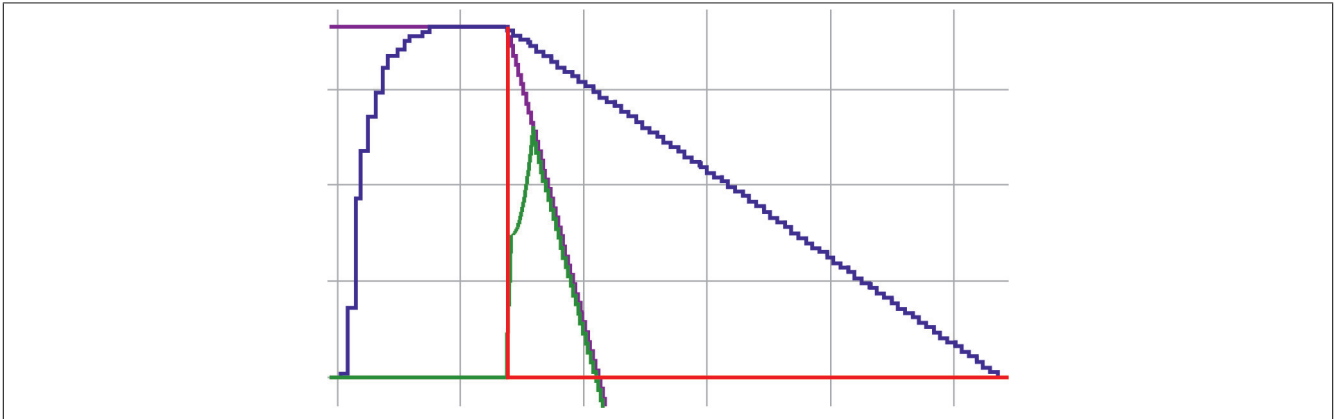
<input checked="" type="checkbox"/> siRPEInternal <span style="background-color: blue; color: white; padding: 2px;">Signed</span> Dec <input type="text"/> Scaling <input type="text"/> Zero <input type="text"/>	<input checked="" type="checkbox"/> siSpdEstEnt <span style="background-color: green; color: white; padding: 2px;">Signed</span> Dec <input type="text"/> Scaling <input type="text"/> Zero <input type="text"/>	<input checked="" type="checkbox"/> siPIDQ13_ref <span style="background-color: purple; color: white; padding: 2px;">Signed</span> Dec <input type="text"/> Scaling <input type="text"/> Zero <input type="text"/>
--	---	---

siRPEInternal = PID fault  
 siSpdEstEnt = Motor speed  
 siPIDQ13\_ref = PID output

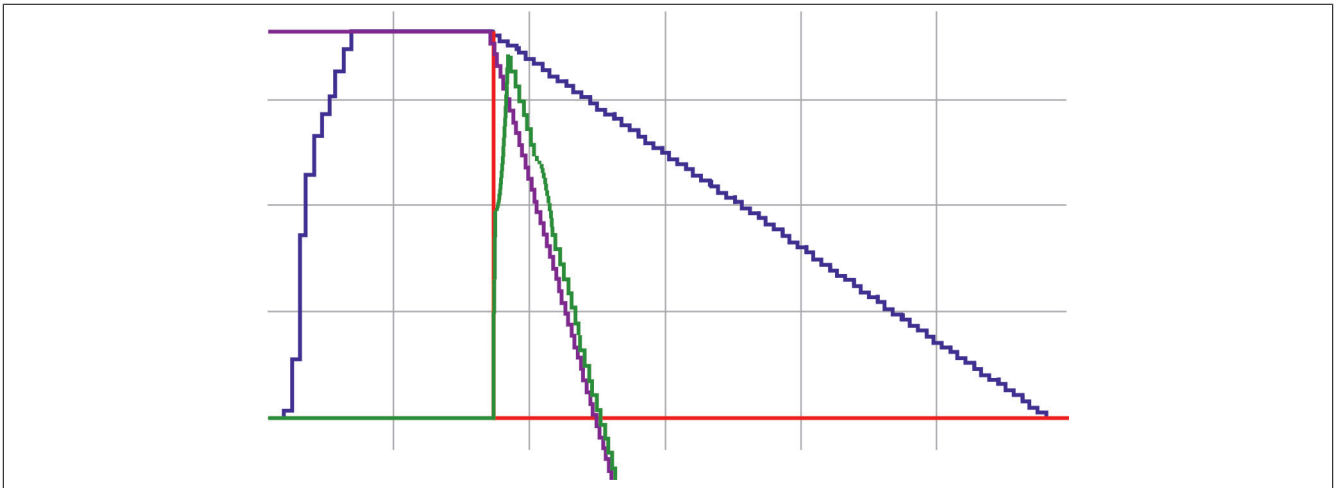
Drive configuration

ACC: 1	PIF1: 0	RPG: 7.00	POL: -500
DEC: 1	PIF2: 8192	<b>RIG: 0.01</b>	POH: 500
HSP: 50.0 Hz	PIP1: 0	RDG: 0.00	<b>AC2: 1</b>
LSP: 0.0 Hz	PIP2: 8192	PRP: 0.0 s	DE2: 30

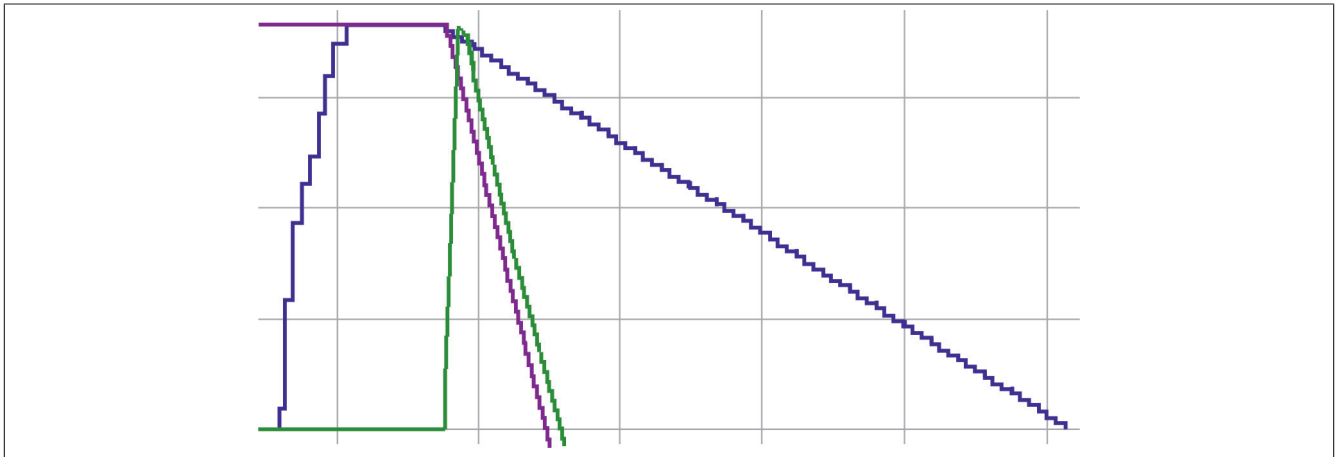
PSR = 1% - Target speed 0 rpm



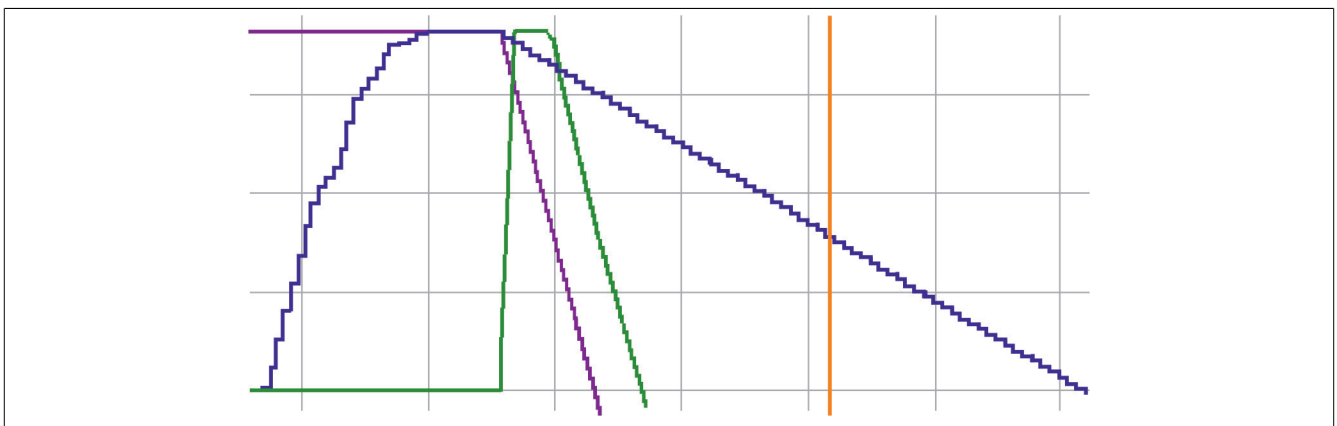
PSR = 1% - Target speed 1500 rpm









**PSR = 10% - Target speed 1500 rpm**



**PSR = 50% - Target speed 1500 rpm**



## 5.2.3.6.6.16 [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-	<b>[PRESET PID REF]</b> The function is accessible if <b>[PID feedback ass.]</b> (PIF) is assigned.		
Pr2	<b>[2 preset PID ref.]</b> 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.		<b>[No]</b> (nO)
nO LI1 ...	<b>[No]</b> (nO): Not assigned <b>[LI1]</b> (LI1): Logic input LI1 <b>[...]</b> (...): See the assignment conditions.		
Pr4	<b>[4 preset PID ref.]</b> Make sure that <b>[2 preset PID ref.]</b> (Pr2) has been assigned before you assign this function. Identical to <b>[2 preset PID ref.]</b> (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.		<b>[No]</b> (nO)
rP2   (1)	<b>[Preset ref. PID 2]</b> This parameter is accessible if <b>[2 preset PID ref.]</b> (Pr2) is assigned.	<b>[Min PID reference]</b> (PIP1) to <b>[Max PID reference]</b> (PIP2) <sup>(2)</sup>	300
rP3   (1)	<b>[Preset ref. PID 3]</b> This parameter is accessible if <b>[3 preset PID ref.]</b> (Pr3) is assigned.	<b>[Min PID reference]</b> (PIP1) to <b>[Max PID reference]</b> (PIP2) <sup>(2)</sup>	600
rP4   (1)	<b>[Preset ref. PID 4]</b> This parameter is accessible if <b>[4 preset PID ref.]</b> (Pr4) is assigned.	<b>[Min PID reference]</b> (PIP1) to <b>[Max PID reference]</b> (PIP2) <sup>(2)</sup>	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.



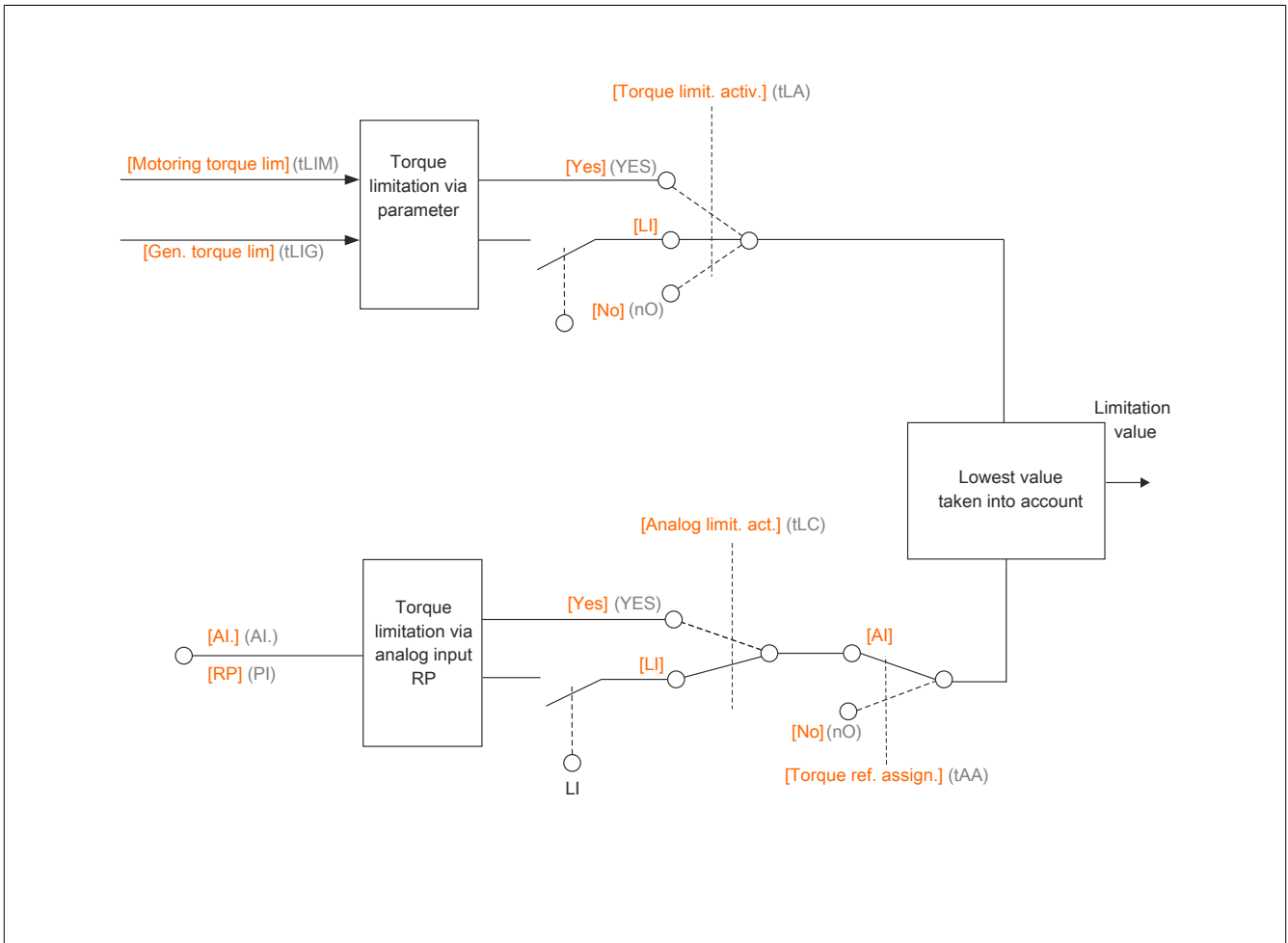
Parameter that can be modified during operation or when stopped.

### 5.2.3.6.6.17 [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-	<b>[TORQUE LIMITATION]</b>		
tLA	<b>[Torque limit. activ.]</b> 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	[No](nO): Function not active		
YES	[YES](YES): Function always active		
LI1	[LI1](LI1): Logic input LI1		
...	[...](...): See the assignment conditions.		
IntP	<b>[Torque increment]</b> 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	[0.1%](0.1): Unit 0.1%		
1	[1%](1): Unit 1%		
tLIM	<b>[Motoring torque lim]</b> 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%
(1)			

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUu- > tOL-			
Code	Name/Description	Setting range	Factory settings
tLIG	<b>[Gen. torque lim]</b>	0 to 300%	100%
	This parameter is accessible if <b>[Torque limit. activ.]</b> (tLA) is set to <b>[No]</b> (nO). Torque limiting for generator operation in percent or 0.1% of the nominal torque in accordance with parameter <b>[Torque increment]</b> (IntP).		
			
(1)			
tAA	<b>[Torque ref. assign.]</b>		<b>[No]</b> (nO)
	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	<b>[No]</b> (nO): Not assigned (function not active)		
AI1	<b>[AI1]</b> (AI1): Analog input		
AI2	<b>[AI2]</b> (AI2): Analog input		
AI3	<b>[AI3]</b> (AI3): Analog input		
PI	<b>[RP]</b> (PI): Pulse input		
AIU1	<b>[AI virtual 1]</b> (AIU1): Virtual analog input 1 with handwheel		
AIU2	<b>[AI virtual 2]</b> (AIU2): Virtual input via communication bus, which is configured via <b>[AI2 net. channel]</b> (AIC2).		
tLC	<b>[Analog limit. act.]</b>		<b>[YES]</b> (YES)
	This parameter is accessible if <b>[Torque limit. activ.]</b> (tLA) is set to <b>[No]</b> (nO).  Identical to <b>[Torque limit. activ.]</b> (tLA).  Assigned input or bit changes to state 0: The limit is provided by parameters <b>[Motoring torque lim]</b> (tLIM) and <b>[Gen. torque lim]</b> (tLIG) if <b>[Torque limit. activ.]</b> (tLA) is not equal to <b>[No]</b> (nO). No limit if <b>[Torque limit. activ.]</b> (tLA) is set to <b>[No]</b> (nO). Assigned input or bit changes to state 1: The limit depends on the input assigned to <b>[Torque ref. assign.]</b> (tAA).		
	<b>Note:</b> If <b>[Torque limitation]</b> (tLA) and <b>[Torque ref. assign.]</b> (tAA) are enabled at the same time, the lowest value is taken into account.		

(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.

## 5.2.3.6.6.18 [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-	<b>[CURRENT LIMIT.]</b>		
LC2	<b>[Current limit 2]</b> 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.		<b>[No](nO)</b>
nO	<b>[No](nO)</b> : Function not active		
LI1	<b>[LI1](LI1)</b> : Logic input LI1		
...	<b>[...](...)</b> : See the assignment conditions.		
CL2	<b>[I Limit. 2 value]</b>	0 to 1.5*INV <sup>(1)</sup>	1.5*INV <sup>(1)</sup>
 	<p><b>Note:</b></p> <p><b>MOTOR OVERHEATING AND DAMAGE</b></p> <ul style="list-style-type: none"> <li>Make sure that the motor has the required power rating for the applied maximum current.</li> <li>In order to calculate the maximum current, take the motor work cycle and all the factors involved in using the motor into account, including derating requirements.</li> </ul> <p>Failure to observe these instructions can result in damage to the equipment.</p> <p>Second current limitation This parameter is accessible if <b>[Current limit 2](LC2)</b> is not equal to <b>[No](nO)</b>. The configuration mode is limited to 1.5 In.</p> <p><b>Note:</b></p> <p>If the setting is less than 0.25 in, the inverter can lock in error mode <b>[Output Phase Loss](OPL)</b>, if this has been enabled. If it is less than the motor no-load current, the motor cannot run.</p>		
CLI	<b>[CURRENT LIMIT.]</b>	0 to 1.5*INV <sup>(1)</sup>	1.5*INV <sup>(1)</sup>
 	<p><b>Caution!</b></p> <p><b>MOTOR OVERHEATING AND DAMAGE</b></p> <ul style="list-style-type: none"> <li>Make sure that the motor has the required power rating for the applied maximum current.</li> <li>In order to calculate the maximum current, take the motor work cycle and all the factors involved in using the motor into account, including derating requirements.</li> </ul> <p>Failure to observe these instructions can result in damage to the equipment.</p> <p>First current limitation. This parameter is accessible if <b>[Current limit 2](LC2)</b> is not equal to <b>[No](nO)</b>. The configuration mode is limited to 1.5 In.</p> <p><b>Note:</b></p> <p>If the setting is less than 0.25 in, the inverter can lock in error mode <b>[Output Phase Loss](OPL)</b>, if this has been enabled. If it is less than the motor no-load current, the motor cannot run.</p>		

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



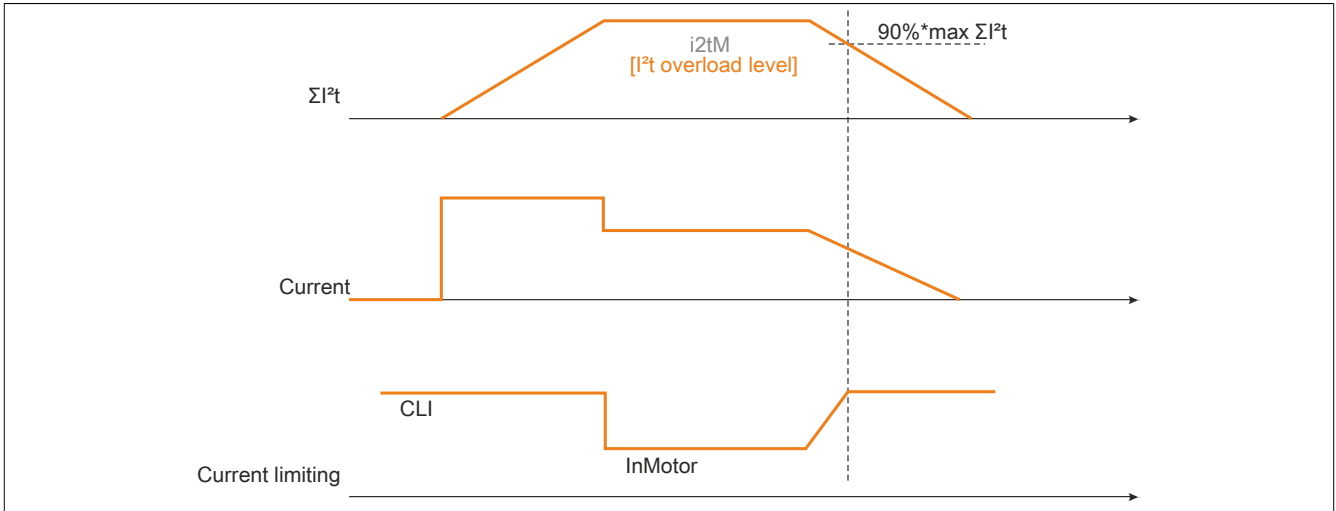
These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.



Parameter that can be modified during operation or when stopped.

## 5.2.3.6.6.19 [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-	<b>[DYN CURRENT LIMIT]</b>																																																	
I2tA  nO YES	<b>[I²t model activation]</b> I²t model activation for current limiting  [No](nO): Function not active [YES](...): Function always active  If $i^{2t} \geq \text{Max.}\Sigma i^{2t}$ , <b>[I²t overload level]</b> (I2tM) = 100 and current limiting = InMotor. If $i^{2t} \leq \text{Max.}\Sigma i^{2t} * 90\%$ , <b>[I²t overload level]</b> (I2tM) $\leq 90$ and current limiting = CLI. This parameter can be accessed if <b>[max time of I²t]</b> (I2tt) does not equal <b>[0.00]</b> (0.00).		<b>[No](nO)</b>																																															
I2tl	<b>[max current of I²t]</b> Maximum current of I²t model		See table <sup>(1)</sup> .																																															
	<table border="1"> <thead> <tr> <th rowspan="2">ACOPOSinverter P76</th> <th colspan="3">Setting range</th> </tr> <tr> <th>Min. value [0.1 A]</th> <th>Max. value [0.1 A]</th> <th>Default [0.1 A]</th> </tr> </thead> <tbody> <tr><td>8I76S200018.00-000</td><td rowspan="20">The I2tl value must be at least 1 greater than the specified nominal value for the motor current, i.e. I2tl &gt; nCr (for induction motors) or I2tl &gt; nCrS (for synchronous motors)</td><td rowspan="20">65535</td><td>24</td></tr> <tr><td>8I76S200037.00-000</td><td>51</td></tr> <tr><td>8I76S200055.00-000</td><td>57</td></tr> <tr><td>8I76S200075.00-000</td><td>73</td></tr> <tr><td>8I76S200110.00-000</td><td>105</td></tr> <tr><td>8I76S200150.00-000</td><td>121</td></tr> <tr><td>8I76S200220.00-000</td><td>166</td></tr> <tr><td>8I76T400037.00-000</td><td>24</td></tr> <tr><td>8I76T400055.00-000</td><td>30</td></tr> <tr><td>8I76T400075.00-000</td><td>36</td></tr> <tr><td>8I76T400110.00-000</td><td>46</td></tr> <tr><td>8I76T400150.00-000</td><td>63</td></tr> <tr><td>8I76T400220.00-000</td><td>84</td></tr> <tr><td>8I76T400300.00-000</td><td>108</td></tr> <tr><td>8I76T400400.00-000</td><td>144</td></tr> <tr><td>8I76T400550.00-000</td><td>216</td></tr> <tr><td>8I76T400750.00-000</td><td>256</td></tr> <tr><td>8I76T401100.00-000</td><td>417</td></tr> <tr><td>8I76T401500.00-000</td><td>496</td></tr> </tbody> </table>	ACOPOSinverter P76	Setting range			Min. value [0.1 A]	Max. value [0.1 A]	Default [0.1 A]	8I76S200018.00-000	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	8I76S200037.00-000	51	8I76S200055.00-000	57	8I76S200075.00-000	73	8I76S200110.00-000	105	8I76S200150.00-000	121	8I76S200220.00-000	166	8I76T400037.00-000	24	8I76T400055.00-000	30	8I76T400075.00-000	36	8I76T400110.00-000	46	8I76T400150.00-000	63	8I76T400220.00-000	84	8I76T400300.00-000	108	8I76T400400.00-000	144	8I76T400550.00-000	216	8I76T400750.00-000	256	8I76T401100.00-000	417	8I76T401500.00-000	496		
ACOPOSinverter P76	Setting range																																																	
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8I76T401500.00-000			496																																															
I2tt			<b>[max time of I²t]</b> Maximum time of I²t model	0.00 to 655.35	<b>[0.00]</b> (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.

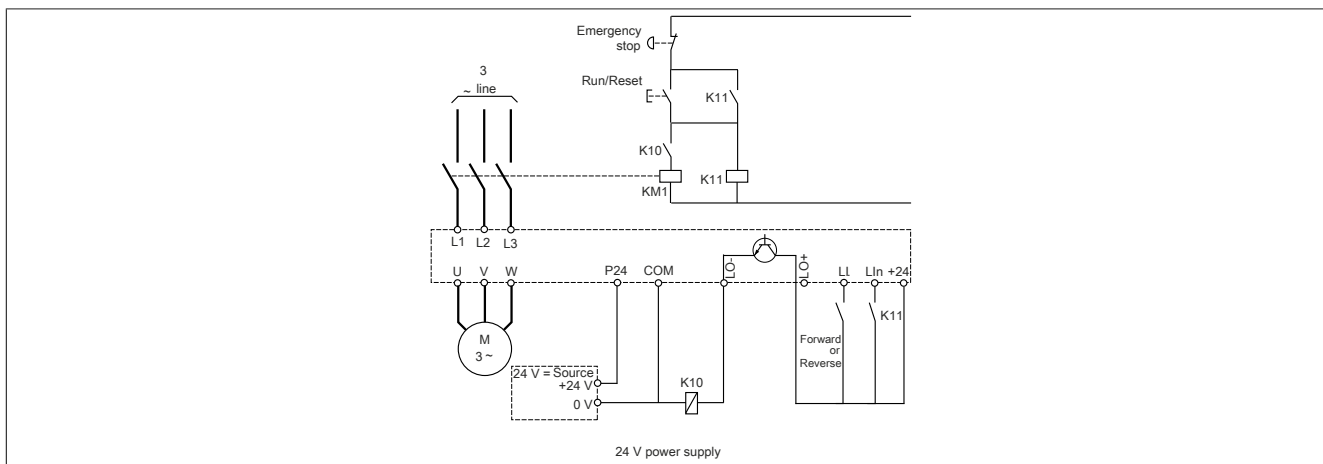
### 5.2.3.6.6.20 [INPUT CONTACTOR CONTROL] (LLC-)

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.

#### Note:

The inverter control must be supplied by an external 24 V power source.

Cabling example:



#### Note:

After enabling "Emergency switch-off", it is necessary to enable "Run/reset".

Llx = Move command **[Forward]**(Frd) or **[Reverse assign.]**(rrS)

LO-/LO+ = **[Input contactor assign]**(LLC)

LIn = **[Drive lock]**(LES)

#### Note:

#### 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-	<b>[INPUT CONTACTOR CONTROL]</b>		
LLC	<b>[Input contactor assign]</b> Logic output or control relay		<b>[No]</b> (nO)
nO	<b>[No]</b> (nO): Function not assigned (in this case, none of the functions can be accessed).		
LO1	<b>[LO1]</b> (LO1): Logic output LO1		
r2	<b>[R2]</b> (r2): Relay R2		
dO1	<b>[D01]</b> (dO1): Analog output AO, which can be used as a logic output. Selection is possible if <b>[AO1 assignment]</b> (AO1) is set to <b>[No]</b> (nO).		
LES	<b>[Drive lock]</b> This parameter can be accessed if <b>[Input contactor assign]</b> (LLC) is not equal to <b>[No]</b> (nO). The inverter is locked when the assigned input or bit changes to state 0.		<b>[No]</b> (nO)
nO	<b>[No]</b> (nO): Function not active		
L11	<b>[L11]</b> (L11): Logic input L11		
...	<b>[...]</b> (...): See the assignment conditions.		
LCt	<b>[Mains V. time out]</b> 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 <b>[Line contactor]</b> (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.

### 5.2.3.6.6.21 [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.

#### Note:

If braking with direct current supply is used, the output contactor will not close as long as braking with direct current supply is active.

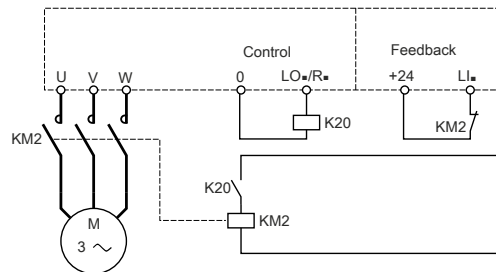
The corresponding logic input must be at 1 if there is no move command and at 0 during operation.

In the event of an inconsistency, the inverter triggers error FCF2 if the output contactor does not close (Llx at 1) and error FCF1 if it is stuck (Llx 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.

#### Note:

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- > COF > FULL > FU- > OCC-			
Code	Name/Description	Setting range	Factory settings
OCC-	<b>[OUTPUT CONTACTOR CONTROL]</b>		
OCC	<b>[Out. contactor ass.]</b> Logic output or control relay		<b>[No]</b> (nO)
nO	<b>[No]</b> (nO): Function not assigned (in this case, none of the functions can be accessed).		
LO1	<b>[LO1]</b> (LO1): Logic output LO1		
r2	<b>[R2]</b> (r2): Relay R2		
dO1	<b>[DO1]</b> (dO1): Analog output AO, which can be used as a logic output. Selection is possible if <b>[AO1 assignment]</b> (AO1) is set to <b>[No]</b> (nO).		
rCA	<b>[Output contact. fdbk]</b> The motor starts up when the assigned input or bit changes to 0.		<b>[No]</b> (nO)
nO	<b>[No]</b> (nO): Function not active		
L11	<b>[L11]</b> (L11): Logic input L11		
...	<b>[...]</b> (...): See the assignment conditions.		
dbS	<b>[Delay start out. contact.]</b> 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 <b>[Out. contactor ass.]</b> (OCC) or <b>[Output contact. fdbk]</b> (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	<b>[Delay to open cont.]</b> Time delay for monitoring motor contactor opening after the motor has stopped. This parameter is accessible if <b>[Output contact. fdbk]</b> (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.



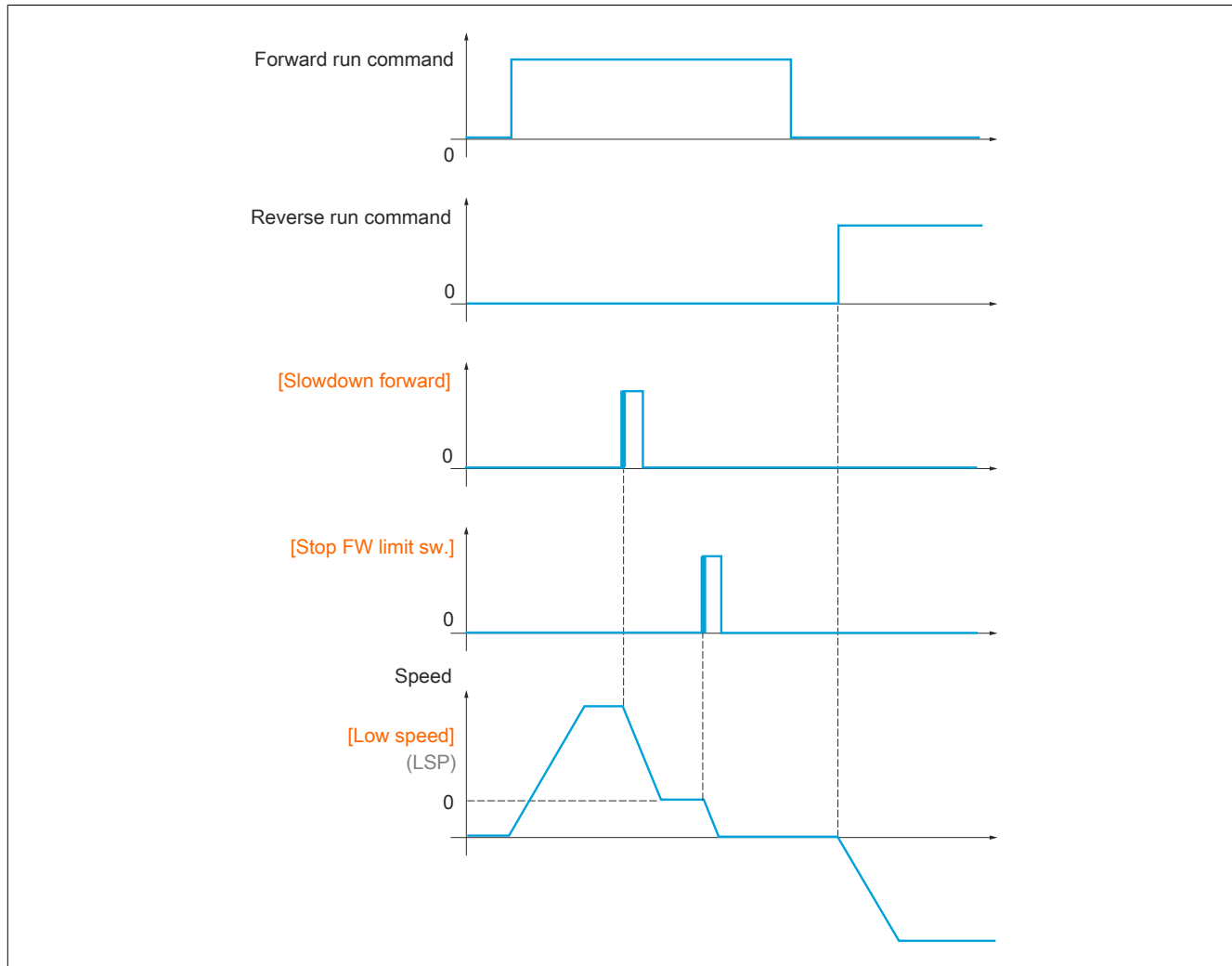
Parameter that can be modified during operation or when stopped.

### 5.2.3.6.6.22 [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:



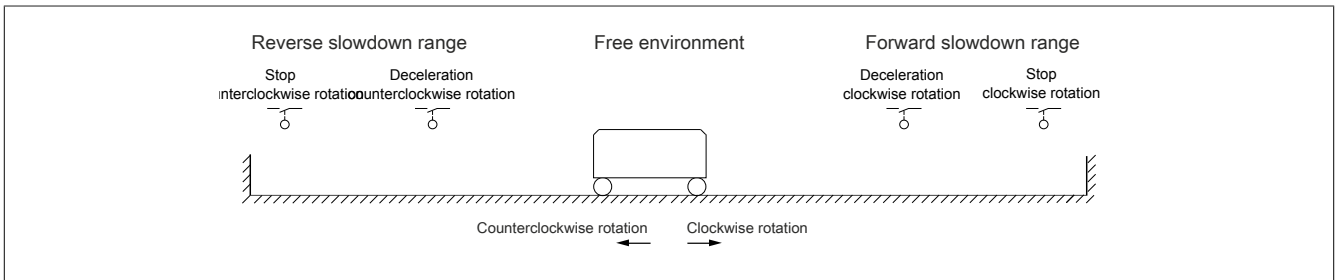
The slowdown mode and stop mode can be configured.

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!

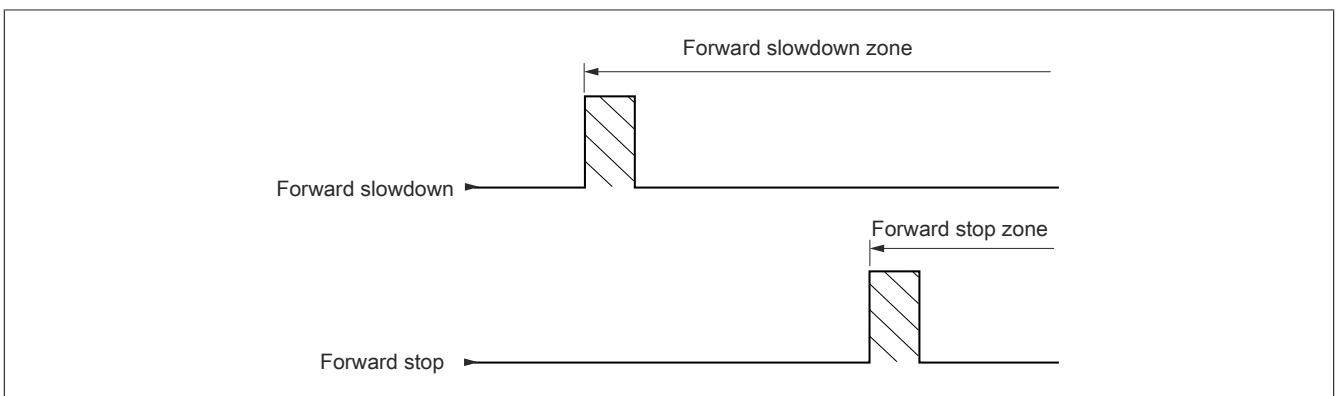
### LOSS OF CONTROL

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.

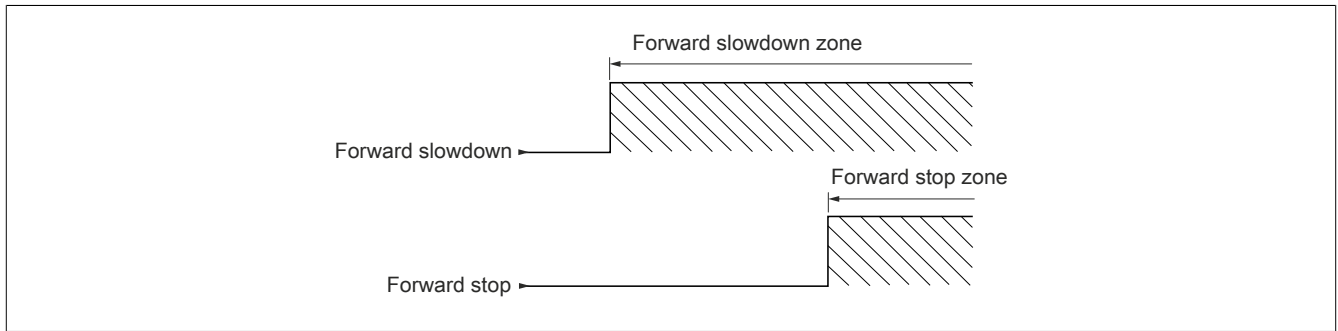
Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.

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.



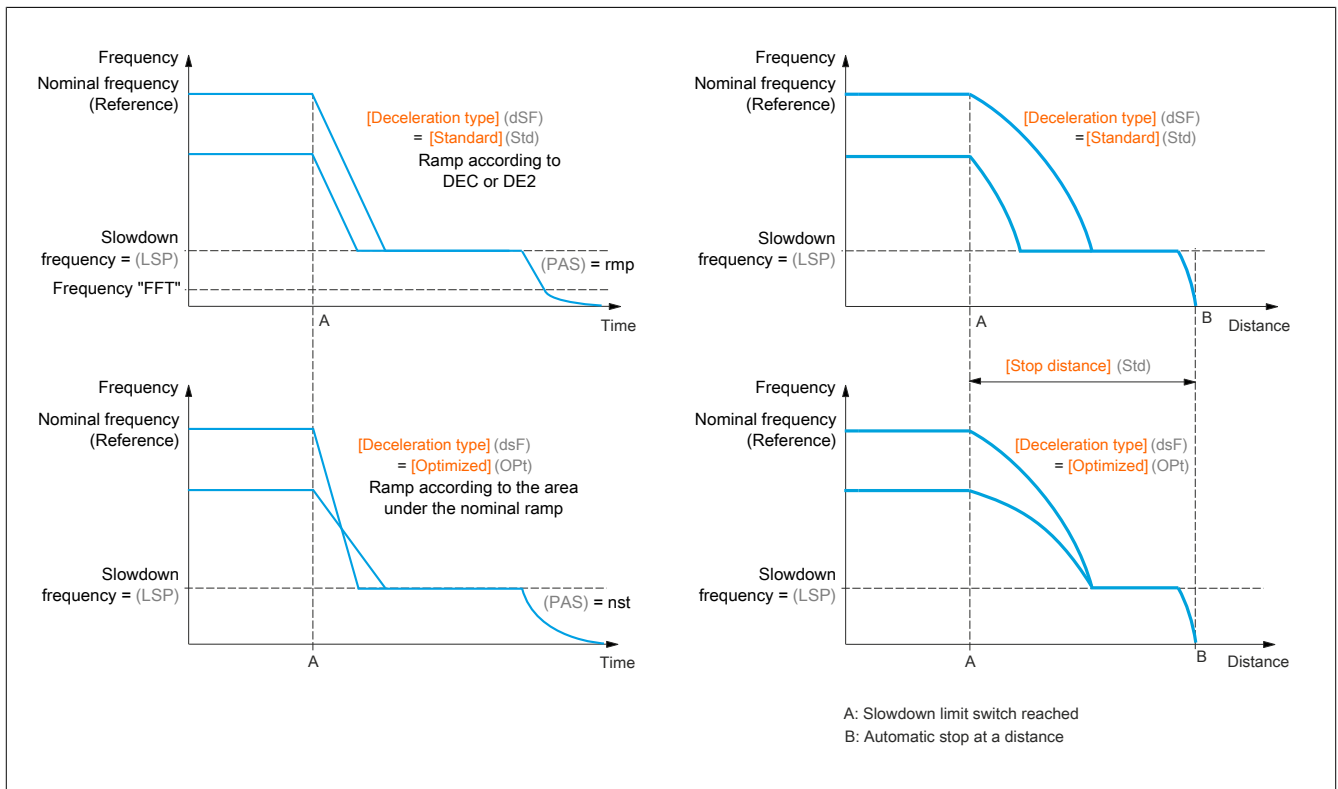
**Calculated stopping distance (remote stop) after deceleration limit switch**

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:



**Note:**

- 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-	<p><b>[POSITIONING BY SENSORS]</b></p> <p><b>Note:</b></p> <p>This function cannot be used with certain other functions.</p>		
SAF	<p><b>[Stop FW limit sw.]</b></p> <p>Forward stop switch.</p>		<b>[No](nO)</b>
nO LI1 ...	<p><b>[No](nO):</b> Not assigned  <b>[LI1](LI1):</b> Logic input LI1  <b>[...](...):</b> See the assignment conditions.            If <b>[Profile]</b> (CHCF) is set to <b>[Not separ.]</b> (SIM) or <b>[Separate]</b> (SEP), parameters <b>[CD11]</b> (Cd11) to <b>[CD15]</b> (Cd15), <b>[C111]</b> (C111) to <b>[C115]</b> (C115), <b>[C211]</b> (C211) to <b>[C215]</b> (C215) and <b>[C311]</b> (C311) to <b>[C315]</b> (C315) are not available.</p>		
SAr	<p><b>[Stop RV limit sw.]</b></p> <p>Reverse stop switch.            Identical to <b>[Stop FW limit sw.]</b>(SAF).</p>		<b>[No](nO)</b>
SAL ★	<p><b>[Stop limit config.]</b></p> <p><b>Warning!</b></p> <p><b>LOSS OF CONTROL</b></p> <p>If <b>[Stop limit config.]</b>(SAL) is set to <b>[Active high]</b>(HIG), the stop command is active while the signal is active and is not applied if the connection is interrupted.</p> <p>Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.</p> <p>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.</p>		<b>[Active low](LO)</b>
LO HIG	<p><b>[Active low](LO):</b> Stop command on a falling edge (change from 1 to 0) of the bits or the assigned inputs.  <b>[Active high](HIG):</b> Stop command on a rising edge (change from 0 to 1) of the bits or the assigned inputs.</p>		
dAF	<p><b>[Slowdown forward]</b></p> <p>Slowdown achieved on forward movement.            Identical to <b>[Stop FW limit sw.]</b>(SAF).</p>		<b>[No](nO)</b>
dAr	<p><b>[Slowdown reverse]</b></p> <p>Slowdown achieved on reverse movement.            Identical to <b>[Stop FW limit sw.]</b>(SAF).</p>		<b>[No](nO)</b>
dAL ★	<p><b>[Slowdown limit cfg.]</b></p> <p><b>Warning!</b></p> <p><b>DANGER OF DAMAGE TO THE DEVICE</b></p> <p>If <b>[Slowdown limit cfg.]</b>(dAL) is set to <b>[Active high]</b>(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).</p> <p>Make sure that this setting will not result in unsafe states.</p> <p>Failure to observe these instructions can result in damage to the equipment.</p> <p>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.</p>		<b>[Active low](LO)</b>
LO HIG	<p><b>[Active low](LO):</b> Slowdown command on a falling edge (change from 1 to 0) of the bits or assigned inputs.  <b>[Active high](HIG):</b> Slowdown command on a rising edge (change from 0 to 1) of the bits or assigned inputs.</p>		

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUn- > LPO-			
Code	Name/Description	Setting range	Factory settings
CLS 	<p><b>[Disable limit sw.]</b></p> <p><b>Warning!</b></p> <p><b>LOSS OF CONTROL</b></p> <p>If <b>[Disable limit sw.](CLS)</b> is set to an input and is enabled, the limit switch control is locked.</p> <p><b>Make sure that enabling this function does not result in unsafe states.</b></p> <p><b>Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.</b></p> <p>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.</p>		<b>[No](nO)</b>
nO LI1 ...	<p><b>[No](nO)</b>: Function not active</p> <p><b>[LI1](LI1)</b>: Logic input LI1</p> <p><b>[...](...)</b>: See the assignment conditions.</p>		
PAS 	<p><b>[Stop type]</b></p> <p>This parameter can be accessed if at least one limit switch or one sensor has been assigned.</p>		<b>[Ramp stop](rMP)</b>
rMP FSt nSt	<p><b>[Ramp stop](rMP)</b>: Via ramp</p> <p><b>[Fast stop](FSt)</b>: Fast stop (ramp reduced by <b>[Ramp divider](dCF)</b> )</p> <p><b>[Freewheel](nSt)</b>: Freewheel stop</p>		
dSF 	<p><b>[Deceleration type]</b></p> <p>This parameter can be accessed if at least one limit switch or one sensor has been assigned.</p>		<b>[Standard](Std)</b>
Std Opt	<p><b>[Standard](Std)</b>: Uses the valid ramp <b>[Deceleration](dEC)</b> or <b>[Deceleration 2](dE2)</b></p> <p><b>[Optimized](OPT)</b>: 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).</p>		
Std 	<p><b>[Stop distance]</b></p> <p>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".</p>		<b>[No](nO)</b>
nO -	<p><b>[No](nO)</b>: Function not active (as a consequence, the next two parameters will be inaccessible).</p> <p><b>0.01 to 10.00</b>: Setting the stopping distance in meters.</p>		
nLS 	<p><b>[Rated linear speed]</b></p> <p>The parameter can be accessed if at least one limit switch or one sensor has been assigned and <b>[Stop distance](Std)</b> is not set to <b>[No](nO)</b>.</p> <p>Rated linear speed in meters/second.</p>	0.20 to 5.00 m/s	1.00 m/s
SFd 	<p><b>[Stop corrector]</b></p> <p>The parameter can be accessed if at least one limit switch or one sensor has been assigned and <b>[Stop distance](Std)</b> is not set to <b>[No](nO)</b>.</p> <p>Scaling factor applied to the stop distance to compensate, for example, a nonlinear ramp.</p>	50 to 200%	100%
MStP 	<p><b>[Memo Stop]</b></p> <p>This parameter can be accessed if a limit switch or sensor has been assigned to function "POSITIONING ABOVE ENCODER OR LIMIT SWITCH".</p> <p>With or without storing the system position.</p>		<b>[No](nO)</b>
nO YES	<p><b>[No](nO)</b>: Without system position storing</p> <p><b>[YES](YES)</b>: With system position storing</p>		
PrSt 	<p><b>[Priority restart]</b></p> <p>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.</p>		<b>[No](nO)</b>
nO YES	<p><b>[No](nO)</b>: No priority for restart if stop switch has been enabled</p> <p><b>[YES](YES)</b>: Priority for restart even if stop switch has been enabled</p> <p>This parameter is forced to be set to <b>[No](nO)</b> if <b>[Memo Stop](MStP)</b> = <b>[YES](YES)</b>.</p>		



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.

### 5.2.3.6.6.23 [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 1	Parameter 1	Parameter 1
Parameter 2	Parameter 2	Parameter 2	Parameter 2
Parameter 3	Parameter 3	Parameter 3	Parameter 3
Parameter 4	Parameter 4	Parameter 4	Parameter 4
Parameter 5	Parameter 5	Parameter 5	Parameter 5
Parameter 6	Parameter 6	Parameter 6	Parameter 6
Parameter 7	Parameter 7	Parameter 7	Parameter 7
Parameter 8	Parameter 8	Parameter 8	Parameter 8
Parameter 9	Parameter 9	Parameter 9	Parameter 9
Parameter 10	Parameter 10	Parameter 10	Parameter 10
Parameter 11	Parameter 11	Parameter 11	Parameter 11
Parameter 12	Parameter 12	Parameter 12	Parameter 12
Parameter 13	Parameter 13	Parameter 13	Parameter 13
Parameter 14	Parameter 14	Parameter 14	Parameter 14
Parameter 15	Parameter 15	Parameter 15	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

#### Note:







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.

#### Note:

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>FUUn->MLP-		
Code	Name/Description	Factory settings
MLP-	<b>[PARAM. SET SWITCHING]</b>	
CHA1	<b>[2 parameter sets]</b> Switching 2 parameter sets.	<b>[No](nO)</b>
nO	<b>[No](nO)</b> : Not assigned	
FtA	<b>[Freq. Th. attained](FtA)</b> : Switching via <b>[Freq. threshold](Ftd)</b>	
F2A	<b>[Freq. Th. 2 attained](F2A)</b> : Switching via <b>[Freq. threshold 2](F2d)</b>	
LI1	<b>[LI1](LI1)</b> : Logic input LI1	
...	<b>[...](...)</b> : See the assignment conditions.	
CHA2	<b>[3 parameter sets]</b> Identical to <b>[2 parameter sets](CHA1)</b> . Switching 3 parameter sets.	<b>[No](nO)</b>
	<b>Note:</b> To obtain 3 parameter sets, <b>[2 parameter sets](CHA1)</b> must also be configured.	

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUUn- > MLP-																																																										
Code	Name/Description	Factory settings																																																								
SPS	<p><b>[PARAMETER SELECTION]</b></p> <p>This parameter is only accessible on the graphic display terminal if <b>[2 parameter sets](CHA1)</b> is not set to <b>[No](nO)</b>. 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:</p> <div style="text-align: center;"> <table border="1"> <tr><th colspan="2">PARAMETER SELECTION</th></tr> <tr><th colspan="2">SETTINGS</th></tr> <tr><td>Ramp increment</td><td><input checked="" type="checkbox"/></td></tr> <tr><td>-----</td><td><input type="checkbox"/></td></tr> <tr><td>-----</td><td><input type="checkbox"/></td></tr> <tr><td>-----</td><td><input checked="" type="checkbox"/></td></tr> </table> </div>	PARAMETER SELECTION		SETTINGS		Ramp increment	<input checked="" type="checkbox"/>	-----	<input type="checkbox"/>	-----	<input type="checkbox"/>	-----	<input checked="" type="checkbox"/>																																													
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-----	<input checked="" type="checkbox"/>																																																									
PS1-   S101 ... S115	<p><b>[Set N°1]</b></p> <p>Parameter is accessible if at least 1 parameter in <b>[PARAMETER SELECTION]</b> 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:</p> <div style="display: flex; align-items: center; justify-content: center;"> <table border="1" style="margin-right: 10px;"> <tr><td>RDY</td><td>Term</td><td>+0.0 Hz</td><td>0.0 A</td></tr> <tr><td colspan="4" style="text-align: center;">Set N°1</td></tr> <tr><td colspan="2">Acceleration:</td><td colspan="2">9.51 s</td></tr> <tr><td colspan="2">Deceleration:</td><td colspan="2">9.67 s</td></tr> <tr><td colspan="2">Acceleration 2:</td><td colspan="2">12.58 s</td></tr> <tr><td colspan="2">Deceleration 2:</td><td colspan="2">13.45 s</td></tr> <tr><td colspan="2">Begin Acc round:</td><td colspan="2">2.3 s</td></tr> <tr><td colspan="2">Code</td><td colspan="2">Quick</td></tr> </table> <div style="margin: 0 10px;">ENT →</div> <table border="1" style="margin-left: 10px;"> <tr><td>RDY</td><td>Term</td><td>+0.0 Hz</td><td>0.0 A</td></tr> <tr><td colspan="4" style="text-align: center;">Startup time</td></tr> <tr><td colspan="4" style="text-align: center; font-size: 24px;">9.51 s</td></tr> <tr><td colspan="2">Min = 0.1</td><td colspan="2">Max = 999.9</td></tr> <tr><td colspan="2" style="text-align: center;">&lt;&lt;</td><td colspan="2" style="text-align: center;">&gt;&gt;</td></tr> <tr><td colspan="4" style="text-align: right;">Quick</td></tr> </table> </div> <p>With the integrated operator terminal: Proceed as in the Settings menu using the parameters that appear.</p>	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		RDY	Term	+0.0 Hz	0.0 A	Startup time				9.51 s				Min = 0.1		Max = 999.9		<<		>>		Quick				
RDY	Term	+0.0 Hz	0.0 A																																																							
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9.51 s																																																										
Min = 0.1		Max = 999.9																																																								
<<		>>																																																								
Quick																																																										
PS2-   S201 ... S215	<p><b>[Set N°2]</b></p> <p>Parameter is accessible if at least 1 parameter in <b>[PARAMETER SELECTION]</b> has been selected. Identical to <b>[Set N°1](PS1-)</b>.</p>																																																									
PS3-   S301 ... S315	<p><b>[Set N°3]</b></p> <p>This parameter is accessible if <b>[3 parameter sets](CHA2)</b> is not equal to <b>[No](nO)</b> and if at least 1 parameter has been selected in <b>[PARAMETER SELECTION]</b>. Identical to <b>[Set N°1](PS1-)</b>.</p>																																																									



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.

## Note:

**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)**.

### 5.2.3.6.6.24 [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.

#### Note:

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

#### Note:

**No other menus or parameters can be switched.**

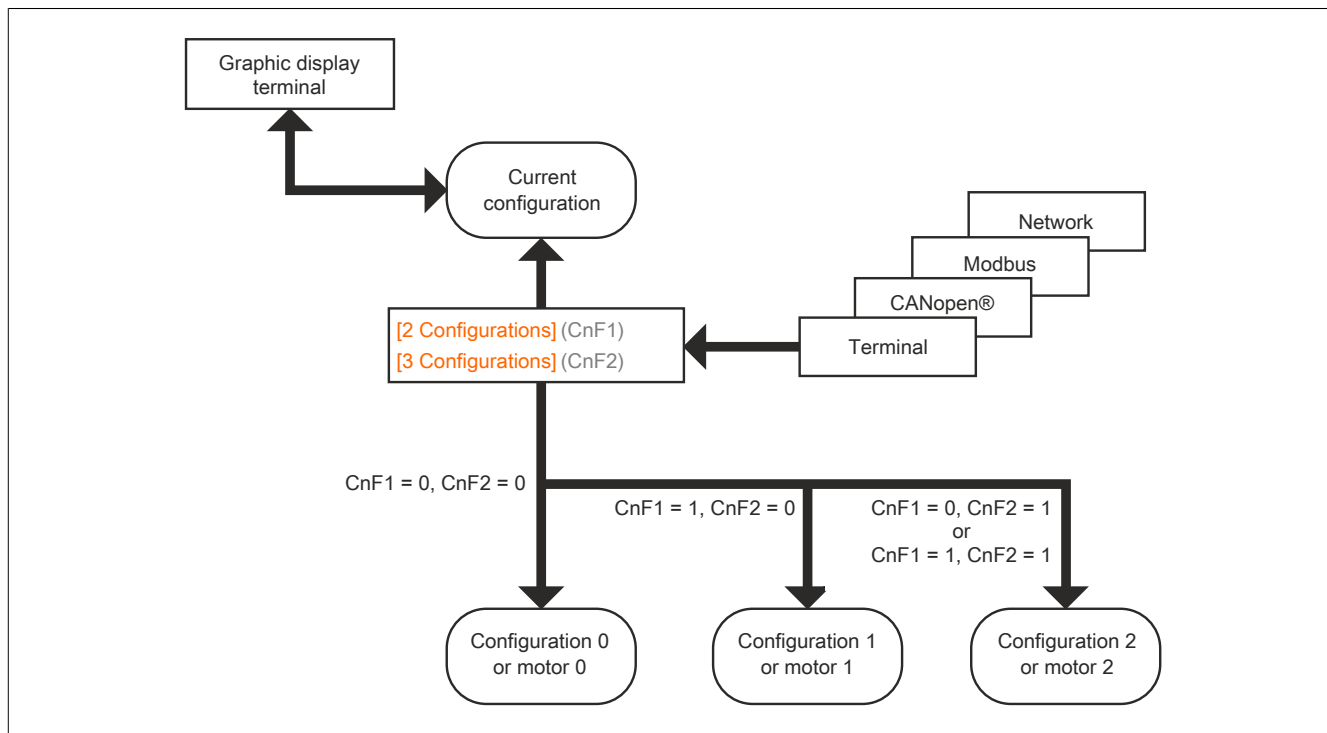
## Transferring configurations to other inverters with the graphic display terminal when using function [MULTIMOTORS/CONFIG.](MMC-)

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).

### Note:

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"

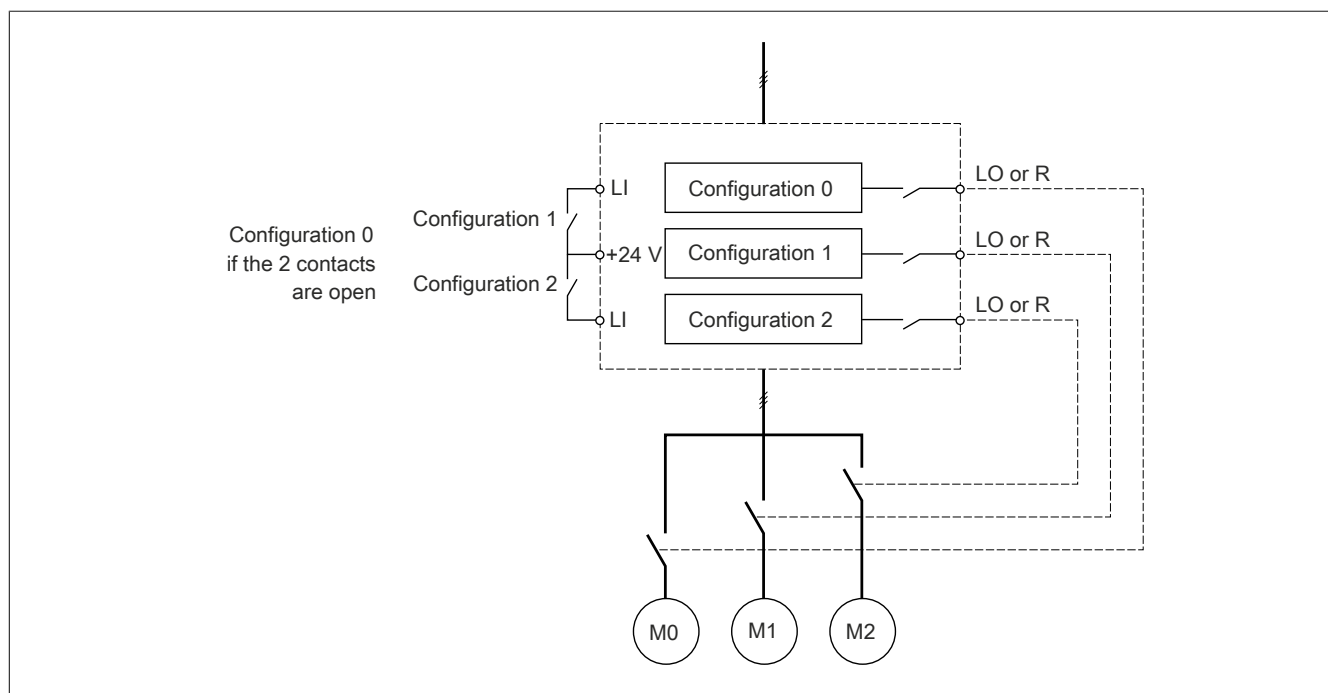
### Note:

#### 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 1st enabling 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.

### Note:

Due to the changeover of menu **[INPUTS/OUTPUTS](I-O-)**, these outputs must be assigned in all configurations if the information is necessary.

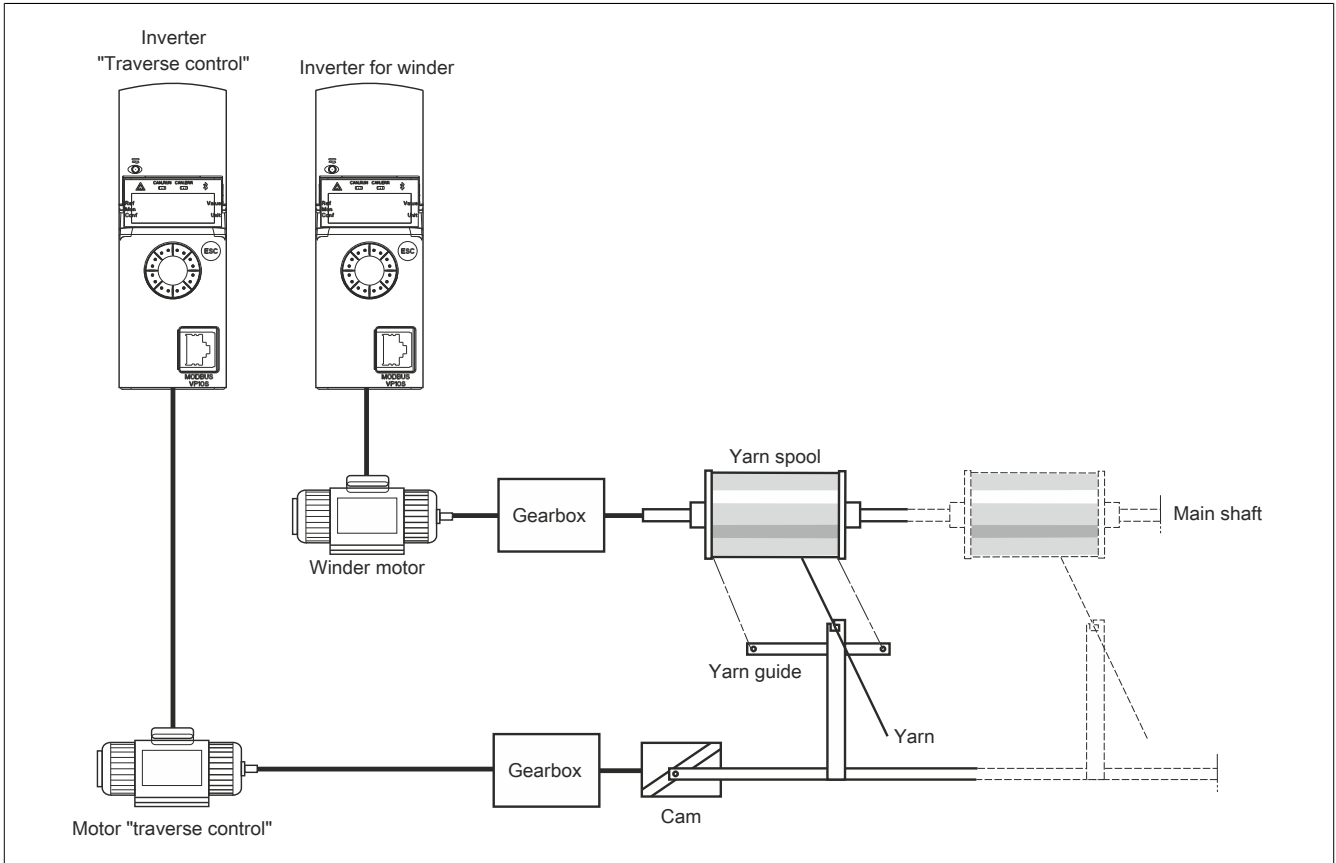
The parameters described on this page are accessed by: DRI- > COnF > FULL > FUN- > MMC-		
Code	Name/Description	Factory settings
MMC-	<b>[MULTIMOTORS/CONFIG.]</b>	
CHM	<b>[Multimotors]</b>	<b>[No](nO)</b>
nO YES	<p><b>Note:</b></p> <p><b>MOTOR OVERHEATING</b></p> <p>If the inverter is switched off, the thermal states of the connected motors are not stored.</p> <p>When the inverter is switched back on, the inverter does not know the thermal state of the connected motors.</p> <ul style="list-style-type: none"> <li>In order to ensure that the temperature of each connected motor is monitored correctly, separate temperature sensors must be used.</li> </ul> <p>Failure to observe these instructions can result in damage to the equipment.</p>	
CnF1	<b>[2 Configurations]</b>	<b>[No](nO)</b>
nO LI1 ...	<p>Switching between two motors or two configurations.</p> <p><b>[No](nO):</b> No switchover  <b>[LI1](LI1):</b> Logic input LI1  <b>[...](...):</b> See the assignment conditions.            If <b>[Profile]</b> (CHCF) is set to <b>[Not separ.]</b> (SIM) or <b>[Separate]</b> (SEP), parameters <b>[CD11]</b> (Cd11) to <b>[CD15]</b> (Cd15), <b>[C111]</b> (C111) to <b>[C115]</b> (C115), <b>[C211]</b> (C211) to <b>[C215]</b> (C215) and <b>[C311]</b> (C311) to <b>[C315]</b> (C315) are not available.</p>	
CnF2	<b>[Configuration 3]</b>	<b>[No](nO)</b>
nO LI1 ...	<p>Switching of 3 motors or 3 configurations</p> <p>Identical to <b>[2 Configurations](CnF1)</b>.</p> <p><b>Note:</b></p> <p>To obtain 3 motors or 3 configurations, <b>[2 Configurations](CnF1)</b> must also be configured.</p>	

### 5.2.3.6.6.25 [AUTO-TUNING BY LI] (tnL-)

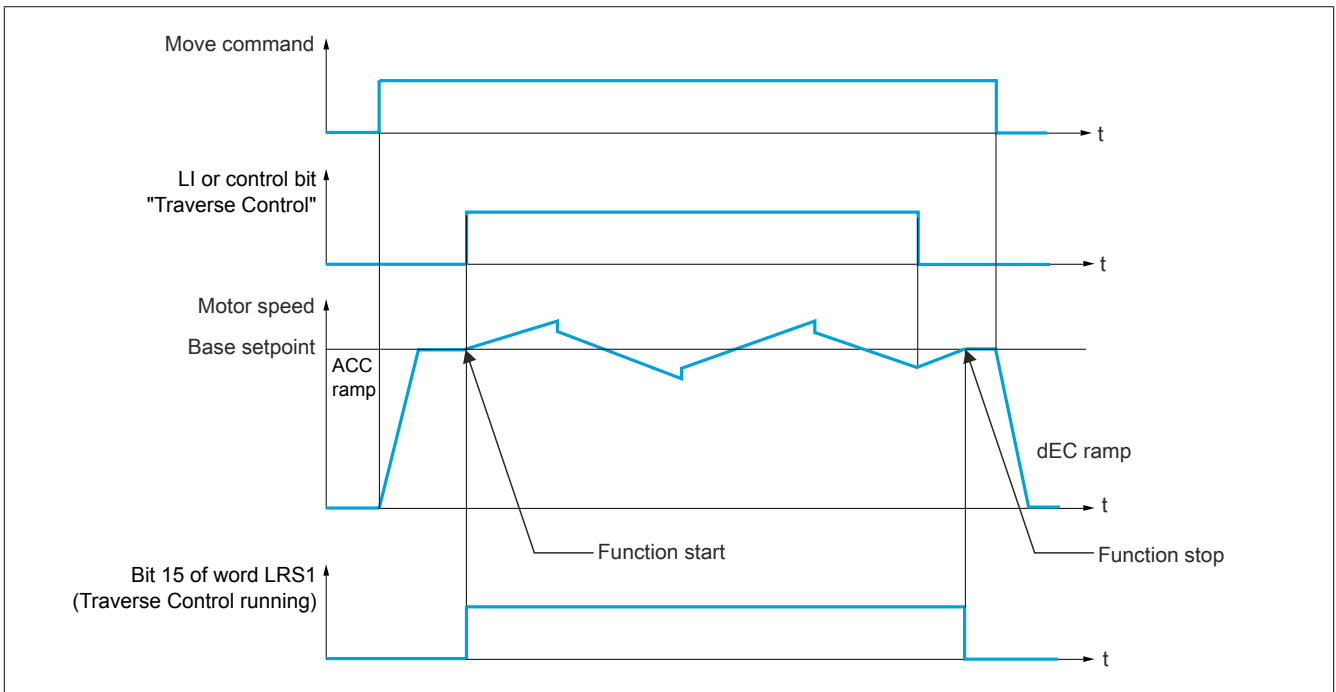
The parameters described on this page are accessed by: DRI- > COnF > FULL > FUN- > tnL-		
Code	Name/Description	Factory settings
tnL-	<b>[AUTO-TUNING VIA LI]</b>	
tUL	<b>[Auto-tune assign.]</b>	<b>[No](nO)</b>
nO LI1 ...	<p>Autotuning is performed when the assigned input or bit changes to 1.</p> <p><b>Note:</b></p> <p>The motor is placed under voltage by the autotuning.</p> <p><b>[No](nO):</b> Not assigned  <b>[LI1](LI1):</b> Logic input LI1  <b>[...](...):</b> See the assignment conditions.</p>	

### 5.2.3.6.6.26 [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.

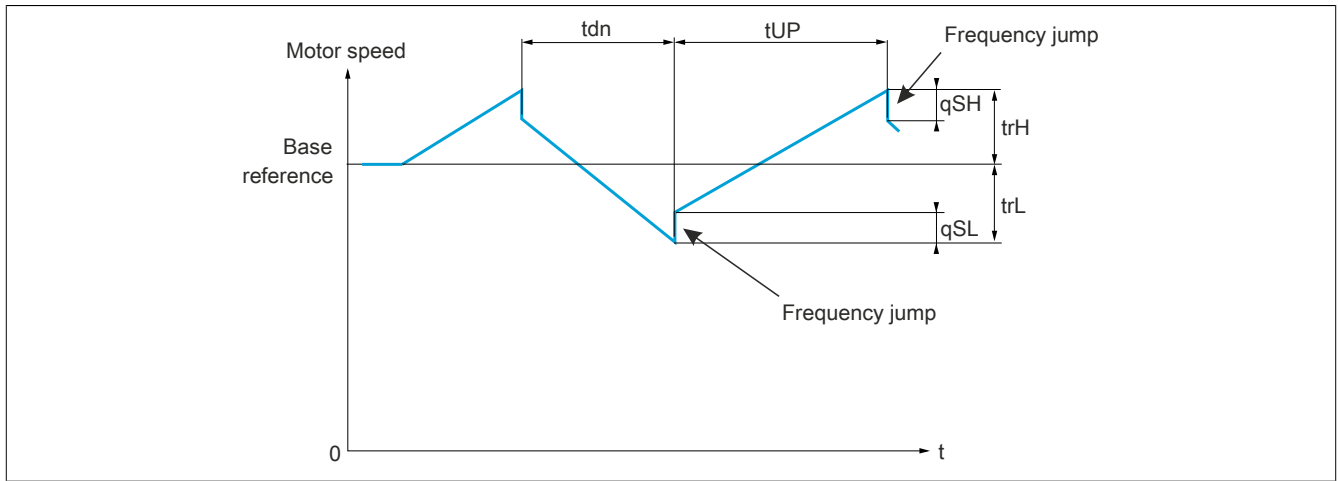


The function starts if the inverter has reached its base setpoint and command "Traverse control" has been enabled. When command "Traverse control" is disabled, the inverter returns to its base setpoint, following the ramp determined by function "Traverse control". The function then stops, as soon as it has returned to this reference.

Bit 15 of word LRS1 is at 1 while the function is active.

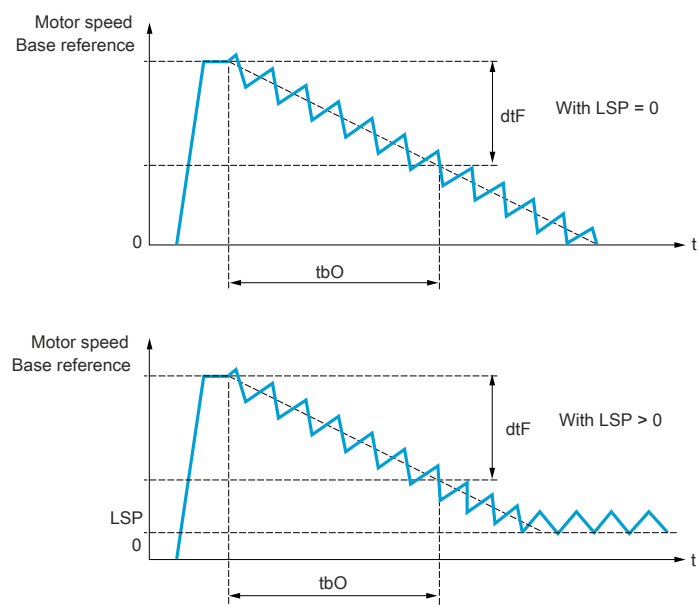
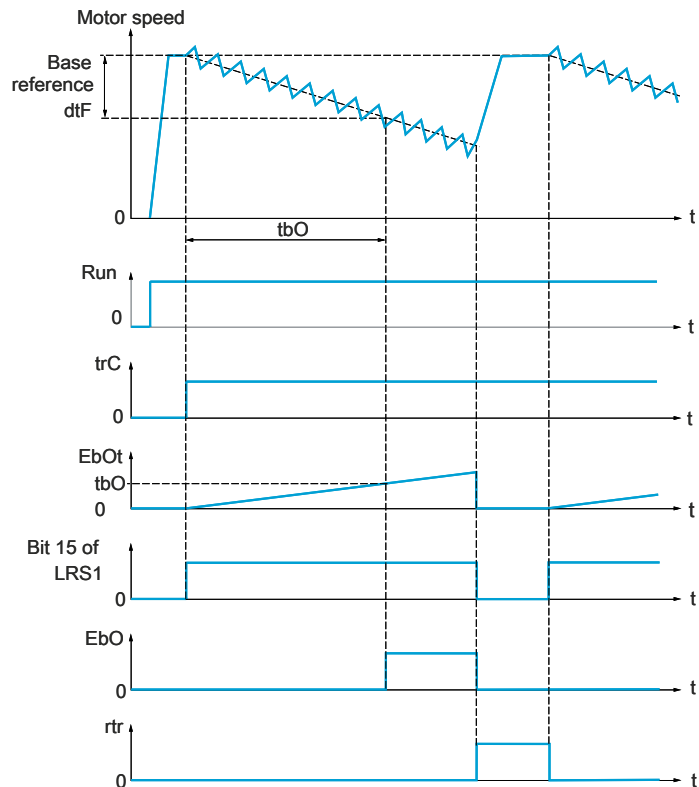
#### Function parameters

These define the cycle of frequency variations around the base reference, as shown in the figure below:

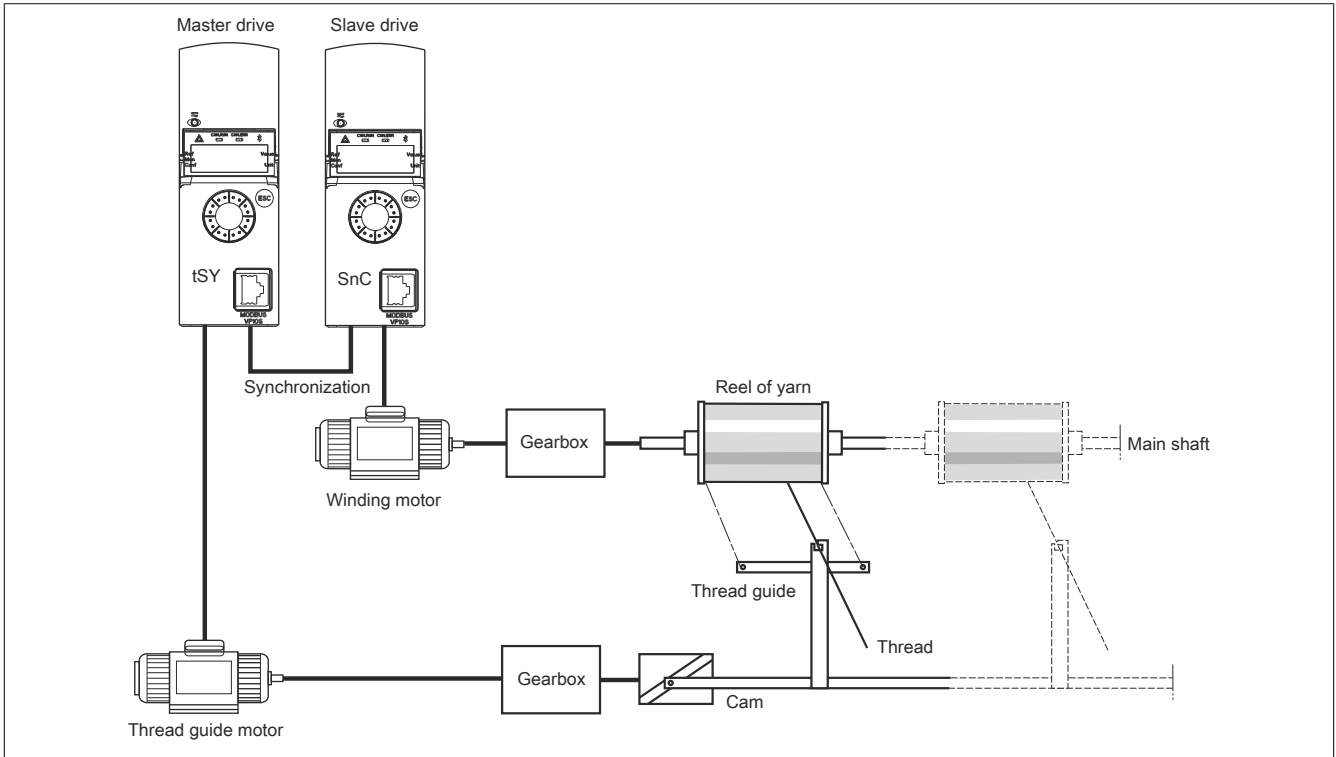


trC	<b>[Yarn control]</b> (trC): Assignment of command "Traverse control" to a logic input or to a communication bus control word bit.
trH	<b>[Traverse freq. high]</b> (trH): In hertz
trL	<b>[Traverse freq. low]</b> (trL): In hertz
qSH	<b>[Quick step High]</b> (qSH): In hertz
qSL	<b>[Quick step Low]</b> (qSL): In hertz
tUP	<b>[Traverse ctrl. accel.]</b> (tUP): In seconds
tdn	<b>[Traverse ctrl. decel.]</b> (tdn): In seconds

Reel parameters:

The parameters described on this page are accessed by: DRI->COntF>FULL>FUUn->tr0-	
Code	Name/Description
tr0-	<b>[TRAVERSE CONTROL]</b>
tbO	<p><b>[Reel time](tbO):</b> Time to rewind a reel in minutes.</p> <p>This parameter displays the end of the rewinding. If the operating time in mode "Traverse control" via control command <b>[Yarn control](trC)</b> reaches the value of <b>[Reel time](tbO)</b>, the logic output or one of the relays changes to state 1 if the corresponding function has been assigned to <b>[End reel](EbO)</b>.</p> <p>Operating time <b>EbOt</b> in mode "Traverse control" can be monitored online via a communication bus.</p>
dtF	<p><b>[Decrease ref. speed](dtF):</b> Reduction of the basic setpoint.</p> <p>In certain cases, the base reference must be reduced as the reel increases in size. Value <b>[Decrease ref. speed](dtF)</b> corresponds to time <b>[Reel time](tbO)</b>. Once this time has elapsed, the reference continues to fall, following the same ramp. If low speed <b>[Low speed](LSP)</b> 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 <b>[Low speed](LSP)</b> is not equal to 0, function "Traverse control" continues to execute at above <b>[Low speed](LSP)</b>.</p> 
rtr	<p><b>[Init. traverse ctrl]:</b> Reinitialization of "Traverse control".</p> <p>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 <b>EbO</b> and the operating time <b>EbOt</b> back to zero and initializes the reference again with the basic reference. As long as <b>rtr</b> remains set to 1, 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.</p> 

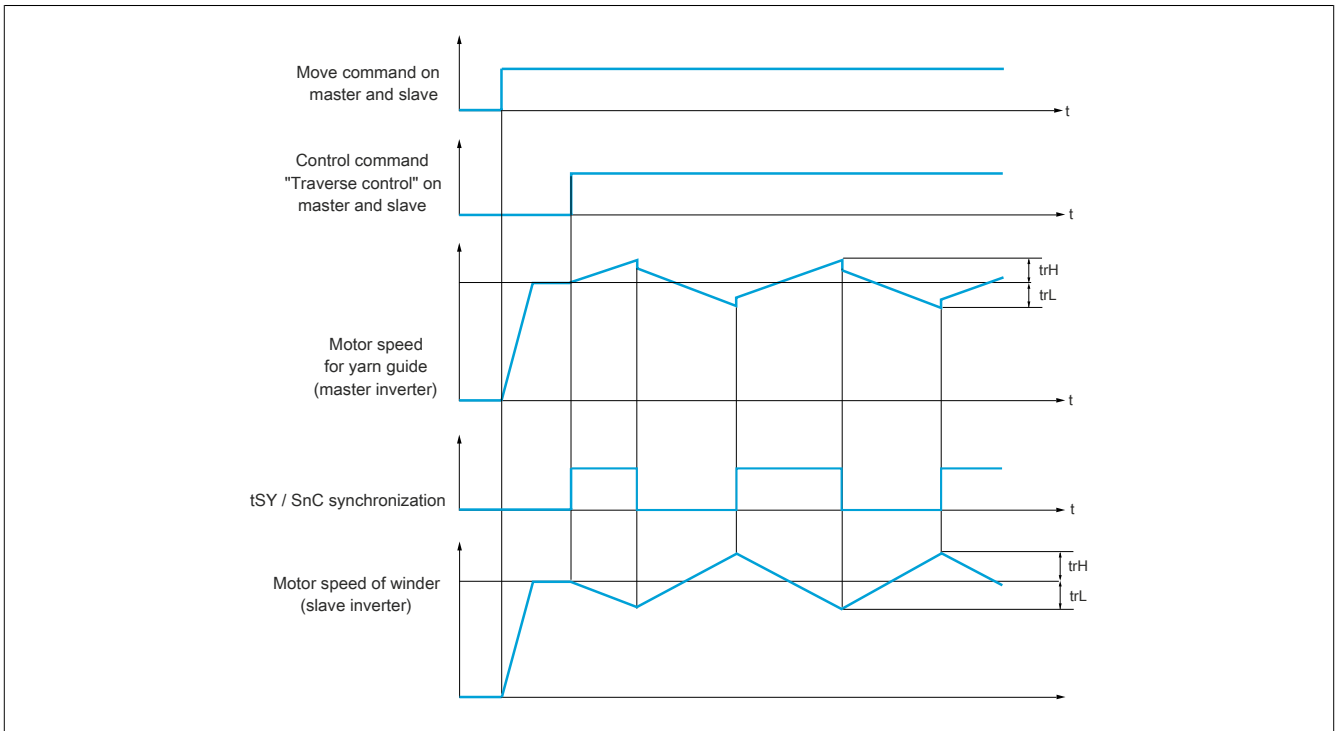
Counter wobble



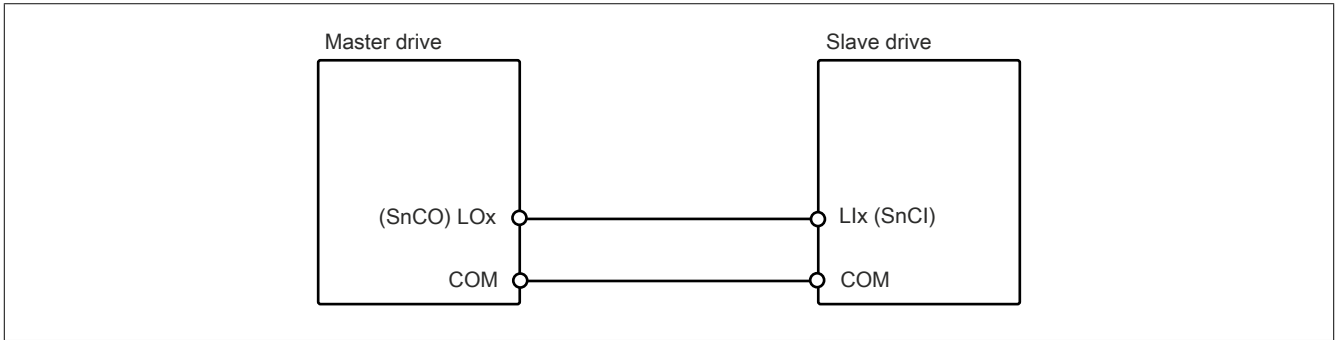
Function "Counter wobble" is used in some applications to attain a constant voltage of the yarn since function "Traverse control" causes strong frequency fluctuations in the motor of the thread guide (**[Traverse freq. high](trH)** and **[Traverse freq. low](trL)**).

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

### Note:

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-	<b>[TRAVERSE CONTROL]</b>  <b>Note:</b> This function cannot be used with certain other functions.		
trC	<b>[Yarn control]</b> The "traverse control" cycle starts in state 1 of the assigned input or bit and stops in state 0.		<b>[No](nO)</b>
nO LI1 ...	<b>[No](nO)</b> : Function not active. The other parameters are then not accessible. <b>[LI1](LI1)</b> : Logic input LI1 <b>[...](...)</b> : See the assignment conditions.		
trH ★ ↻ (1)	<b>[Traverse freq. high]</b> Traverse frequency high.	0 to 10 Hz	4 Hz
trL ★ ↻ (1)	<b>[Traverse freq. low]</b> Traverse frequency low.	0 to 10 Hz	4 Hz
qSH ★ ↻ (1)	<b>[Quick step High]</b> High quick step.	0 to <b>[Traverse freq. high](trH)</b>	0 Hz
qSL ★ ↻ (1)	<b>[Quick step Low]</b> Low quick step.	0 to <b>[Traverse freq. low](trL)</b>	0 Hz
tUP ★ ↻	<b>[Traverse ctrl. accel.]</b> Traverse control startup time.	0.1 to 999.9 s	4 s

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUu- > tr0-			
Code	Name/Description	Setting range	Factory settings
tdn  	<b>[Traverse ctrl. decel]</b> Traverse control deceleration.	0.1 to 999.9 s	4 s
tbO  	<b>[Reel time]</b> Time needed to process a reel.	0 to 9,999 min	0 min
EbO  nO LO1 r2 dO1	<b>[End reel]</b> The assigned output or relay changes to state 1 if the operating time in mode "Traverse control" has reached <b>[Reel time]</b> (tbO). <b>[No]</b> (nO): Not assigned <b>[LO1]</b> (LO1): Logic output LO1 <b>[R2]</b> (r2): Relay R2 <b>[DO1]</b> (dO1): Analog output AO, which can be used as a logic output. Selection is possible if <b>[AO1 assignment]</b> (AO1) is set to <b>[No]</b> (nO).		<b>[No]</b> (nO)
SnC  nO LI1 ...	<b>[Counter wobble]</b> Synchronization input. Only to be configured on the inverter for the winder (slave). <b>[No]</b> (nO): Function not active. The other parameters are then not accessible. <b>[LI1]</b> (LI1): Logic input LI1 <b>[...]</b> (...): See the assignment conditions.		<b>[No]</b> (nO)
tSY  nO LO1 r2 dO1	<b>[Sync. wobble]</b> Synchronization output. To be configured on the yarn guide inverter (master) only. <b>[No]</b> (nO): Function not assigned <b>[LO1]</b> (LO1) <b>[R2]</b> (r2) <b>[DO1]</b> (dO1): Analog output AO, which can be used as a logic output. Selection is possible if <b>[AO1 assignment]</b> (AO1) is set to <b>[No]</b> (nO).		<b>[No]</b> (nO)
dtF  	<b>[Decrease ref. speed]</b> Decrease in the base reference during the traverse control cycle.	0 to 599 Hz	0 Hz
rtr  nO LI1 ...	<b>[Init. traverse ctrl]</b> If the state of the assigned input or bit changes to 1, the operating time in mode "Traverse control" as well as <b>[Decrease ref. speed]</b> (dtF) are both set to zero. <b>[No]</b> (nO): Function not assigned <b>[LI1]</b> (LI1): Logic input LI1 <b>[...]</b> (...): See the assignment conditions.		<b>[No]</b> (nO)

(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.

## 5.2.3.6.6.27 [HSP SWITCHING] (CHS-)

The parameters described on this page are accessed by: DRI- > COnF > FULL > FUu- > CHS-			
Code	Name/Description	Setting range	Factory settings
CHS-	<b>[HSP SWITCHING]</b>		
SH2	<b>[2 High speed]</b> HSP switchover.		<b>[No](nO)</b>
nO	<b>[No](nO)</b> : Function not assigned		
FtA	<b>[Freq. Th. attained](FtA)</b> : Frequency threshold reached		
F2A	<b>[Freq. Th. 2 attain](F2A)</b> : Frequency threshold 2 reached		
Ll1	<b>[Ll1](Ll1)</b> : Logic input Ll1		
...	<b>[...](...)</b> : See the assignment conditions.		
SH4	<b>[4 High speed]</b> HSP switchover.  <b>Note:</b> In order to obtain 4 HSP values, <b>[2 High speed](SH2)</b> must also be configured. Identical to <b>[2 High speed](SH2)</b> .		<b>[No](nO)</b>
HSP 	<b>[High speed]</b>  Motor speed with maximum setpoint, setting from <b>[Low speed](LSP)</b> to <b>[Max frequency](tFr)</b> . The factory setting changes to 60 Hz if <b>[Standard mot. freq](bFr)</b> is set to <b>[60 Hz NEMA](60)</b> .	0 or (LSP) to 599 Hz or (TFR)	50 Hz (if (BFR) = 50 Hz) or 60 Hz (if (BFR) = 60 Hz)
HSP2  	<b>[High speed 2]</b> Available if <b>[2 High speed](SH2)</b> has not been set to <b>[No](nO)</b> .  Identical to <b>[High speed](HSP)</b> .	0 to 599 Hz	50 Hz
HSP3  	<b>[High speed 3]</b> Available if <b>[4 High speed](SH4)</b> has not been set to <b>[No](nO)</b> .  Identical to <b>[High speed](HSP)</b> .	0 to 599 Hz	50 Hz
HSP4  	<b>[High speed 4]</b> Available if <b>[4 High speed](SH4)</b> has not been set to <b>[No](nO)</b> .  Identical to <b>[High speed](HSP)</b> .	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.

## 5.2.3.6.6.28 [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-	<b>[DC BUS]</b>		
dCCM	<b>[DC bus coupling]</b> Configuration of the DC bus coupling		<b>[No](nO)</b>
nO MAIn bUS	<b>[No](nO)</b> : Not assigned <b>[Bus &amp; Main](MAIn)</b> : The inverter is supplied by the DC bus and via the mains. <b>[Only Bus](bUS)</b> : The inverter is supplied by the Only Bus. Mains supply not wired.		
	<p><b>Danger!</b></p> <p><b>MONITORING OF GROUND SHORT CIRCUIT DISABLED, NO ERROR DETECTION</b></p> <p>If setting <b>[Bus &amp; Main](MAIn)</b> is selected for this parameter, ground short-circuit monitoring will be disabled.</p> <ul style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>The system must be started up and tested with ground short-circuit monitoring enabled.</li> <li>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.</li> </ul> <p>Failure to follow these instructions will result in death or serious injury.</p>		
dCCC	<b>[DC-Bus compat.]</b> Not applicable.		Inverter
IPL ★	<b>[Input phase loss]</b> Inverter behavior when an input phase failure error is detected. This parameter is not available for inverter sizes 8176S200xxx.00-000. Visible if <b>[3.1 ACCESS LEVEL](LAC)</b> is set to <b>[Expert](Epr)</b> and <b>[DC bus coupling](dCCM)</b> (see above) is set to <b>[No](nO)</b> .		According to inverter performance
nO YES	<b>[Fault ignored](nO)</b> : Detected error is ignored <b>[Freewheel](YES)</b> : Detected error with freewheel stop		
	<b>[Input phase loss](IPL)</b> is forced to <b>[Fault ignored](nO)</b> if <b>[DC-Bus chaining](dCCM)</b> is set to <b>[Only Bus](bUS)</b> . See <b>[Input phase loss](IPL)</b> in section "Programming" (DRI- > CONF > FULL > FLT- > IPL-).		
SCL3	<b>[Ground short-circuit error]</b> Behavior in the event of a direct ground short-circuit being detected. Access for inverter sizes 8176T400550.00-000 to 8176T401500.00-000. Visible if <b>[3.1 ACCESS LEVEL](LAC)</b> is set to <b>[Expert](Epr)</b> and <b>[DC bus coupling](dCCM)</b> (see above) is set to <b>[No](nO)</b> .		<b>[Freewheel](YES)</b>
nO YES ★	<b>[Fault ignored](nO)</b> : Detected error is ignored <b>[Freewheel](YES)</b> : Detected error with freewheel stop		
	<b>[Ground short circuit](SCL3)</b> for inverters 8176T400550.00-000 to 8176T401500.00-000 is forced to <b>[Ignore](nO)</b> if <b>[DC-Bus chaining](dCCM)</b> above is set to <b>[Bus &amp; Main](MAIn)</b> .		
	<p><b>Danger!</b></p> <p><b>MONITORING OF GROUND SHORT CIRCUIT DISABLED, NO ERROR DETECTION</b></p> <p>If setting <b>[Ignore](No)</b> is set to <b>[No](No)</b> for this parameter, ground short-circuit monitoring is disabled.</p> <ul style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>The system must be started up and tested with ground short-circuit monitoring enabled.</li> <li>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.</li> </ul> <p>Failure to follow these instructions can result in death or serious injury.</p>		

The parameters described on this page are accessed by: DRI- > COnf > FULL > FUu- > dCC-

Code	Name/Description	Setting range	Factory settings																																																				
UrES 	<p><b>[Mains voltage]</b></p> <p>Visible if <b>[3.1 ACCESS LEVEL]</b>(LAC) is set to <b>[Expert]</b>(Epr) and <b>[DC bus coupling]</b>(dCCM) (see above) is set to <b>[No]</b>(nO). Rated voltage of the line supply in V.</p> <p>For 8176S200xxx.00-000:  <b>[200V ac]</b>(200): 200 volts AC  <b>[220V ac]</b>(220): 220 volts AC  <b>[230V ac]</b>(230): 230 volts AC  <b>[240Vac]</b>(240): 240 volts AC (factory setting)</p> <p>For 8176T40xxxx.00-000:  <b>[380V ac]</b>(380): 380 volts AC  <b>[400V ac]</b>(400): 400 volts AC  <b>[440V ac]</b>(440): 440 volts AC  <b>[460V ac]</b>(460): 460 volts AC  <b>[500V ac]</b>(500): 500 volts AC (factory setting)</p>	In accordance with the nominal inverter voltage	In accordance with the nominal inverter voltage																																																				
USL 	<p><b>[Undervoltage level]</b></p> <p>Setting the trigger level for the undervoltage error in V.            Displayed when <b>[3.1 ACCESS LEVEL]</b>(LAC) is set to <b>[Expert]</b>(Epr).            The setting range is defined in the following table:            If DC chaining has been enabled: <b>[DC-Bus chaining]</b>(dCCM) = <b>[Bus &amp; Main]</b> (MAIn) or <b>[Only Bus]</b> (bUS)</p> <table border="1"> <thead> <tr> <th colspan="2">ACOPOSinverter P76</th> <th colspan="3">Setting range</th> </tr> <tr> <th></th> <th></th> <th>Min. value [VDC]</th> <th>Max. value [VDC]</th> <th>Default [VDC]</th> </tr> </thead> <tbody> <tr> <td>8176S2xxxx.00-000</td> <td></td> <td>100</td> <td>141</td> <td>141</td> </tr> <tr> <td>8176T4xxxx.00-000</td> <td></td> <td>190</td> <td>276</td> <td>276</td> </tr> </tbody> </table> <p>If DC chaining has not been enabled: <b>[DC bus coupling]</b>(dCCM) = <b>[No]</b> (nO)</p> <table border="1"> <thead> <tr> <th rowspan="2">ACOPOSinverter P76</th> <th rowspan="2">[Mains voltage] (UrES)</th> <th colspan="3">Setting range</th> </tr> <tr> <th>Min. value [VDC]</th> <th>Max. value [VDC]</th> <th>Default [VDC]</th> </tr> </thead> <tbody> <tr> <td rowspan="4">8176S2xxxx.00-000</td> <td><b>[200V ac]</b> (200)</td> <td>100</td> <td rowspan="4">141</td> <td rowspan="4">141</td> </tr> <tr> <td><b>[220V ac]</b> (220)</td> <td>120</td> </tr> <tr> <td><b>[230V ac]</b> (230)</td> <td>131</td> </tr> <tr> <td><b>[240V ac]</b> (240)</td> <td>141</td> </tr> <tr> <td rowspan="5">8176T4xxxx.00-000</td> <td><b>[380V ac]</b> (380)</td> <td>190</td> <td rowspan="5">276</td> <td rowspan="5">276</td> </tr> <tr> <td><b>[400V ac]</b> (400)</td> <td>204</td> </tr> <tr> <td><b>[440V ac]</b> (440)</td> <td>233</td> </tr> <tr> <td><b>[460V ac]</b> (460)</td> <td>247</td> </tr> <tr> <td><b>[500V ac]</b> (500)</td> <td>276</td> </tr> </tbody> </table>	ACOPOSinverter P76		Setting range					Min. value [VDC]	Max. value [VDC]	Default [VDC]	8176S2xxxx.00-000		100	141	141	8176T4xxxx.00-000		190	276	276	ACOPOSinverter P76	[Mains voltage] (UrES)	Setting range			Min. value [VDC]	Max. value [VDC]	Default [VDC]	8176S2xxxx.00-000	<b>[200V ac]</b> (200)	100	141	141	<b>[220V ac]</b> (220)	120	<b>[230V ac]</b> (230)	131	<b>[240V ac]</b> (240)	141	8176T4xxxx.00-000	<b>[380V ac]</b> (380)	190	276	276	<b>[400V ac]</b> (400)	204	<b>[440V ac]</b> (440)	233	<b>[460V ac]</b> (460)	247	<b>[500V ac]</b> (500)	276	See table.	See table.
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Vbr  	<p><b>[Braking level]</b></p> <p>Braking transistor command level. Visible if <b>[3.1 ACCESS LEVEL]</b>(LAC) is set to <b>[Expert]</b>(Epr).            If DC chaining has been enabled: <b>[DC-Bus chaining]</b>(dCCM) = <b>[Bus &amp; Main]</b> (MAIn) or <b>[Only Bus]</b> (bUS):</p> <table border="1"> <thead> <tr> <th colspan="2">ACOPOSinverter P76</th> <th colspan="3">Setting range</th> </tr> <tr> <th></th> <th></th> <th>Min. value [VDC]</th> <th>Max. value [VDC]</th> <th>Default [VDC]</th> </tr> </thead> <tbody> <tr> <td>8176S2xxxx.00-000</td> <td></td> <td>395</td> <td>395</td> <td>395</td> </tr> <tr> <td>8176T4xxxx.00-000</td> <td></td> <td>820</td> <td>820</td> <td>820</td> </tr> </tbody> </table> <p>If DC chaining has not been enabled: <b>[DC bus coupling]</b>(dCCM) = <b>[No]</b> (nO):</p> <table border="1"> <thead> <tr> <th rowspan="2">ACOPOSinverter P76</th> <th rowspan="2">[Mains voltage] (UrES)</th> <th colspan="3">Setting range</th> </tr> <tr> <th>Min. value [VDC]</th> <th>Max. value [VDC]</th> <th>Default [VDC]</th> </tr> </thead> <tbody> <tr> <td rowspan="4">8176S2xxxx.00-000</td> <td><b>[200V ac]</b> (200)</td> <td>335</td> <td rowspan="4">395</td> <td rowspan="4">395</td> </tr> <tr> <td><b>[220V ac]</b> (220)</td> <td>365</td> </tr> <tr> <td><b>[230V ac]</b> (230)</td> <td>380</td> </tr> <tr> <td><b>[240V ac]</b> (240)</td> <td>395</td> </tr> <tr> <td rowspan="5">8176T4xxxx.00-000</td> <td><b>[380V ac]</b> (380)</td> <td>698</td> <td rowspan="5">820</td> <td rowspan="5">820</td> </tr> <tr> <td><b>[400V ac]</b> (400)</td> <td>718</td> </tr> <tr> <td><b>[440V ac]</b> (440)</td> <td>759</td> </tr> <tr> <td><b>[460V ac]</b> (460)</td> <td>779</td> </tr> <tr> <td><b>[500V ac]</b> (500)</td> <td>820</td> </tr> </tbody> </table>	ACOPOSinverter P76		Setting range					Min. value [VDC]	Max. value [VDC]	Default [VDC]	8176S2xxxx.00-000		395	395	395	8176T4xxxx.00-000		820	820	820	ACOPOSinverter P76	[Mains voltage] (UrES)	Setting range			Min. value [VDC]	Max. value [VDC]	Default [VDC]	8176S2xxxx.00-000	<b>[200V ac]</b> (200)	335	395	395	<b>[220V ac]</b> (220)	365	<b>[230V ac]</b> (230)	380	<b>[240V ac]</b> (240)	395	8176T4xxxx.00-000	<b>[380V ac]</b> (380)	698	820	820	<b>[400V ac]</b> (400)	718	<b>[440V ac]</b> (440)	759	<b>[460V ac]</b> (460)	779	<b>[500V ac]</b> (500)	820	See table.	See table.
ACOPOSinverter P76		Setting range																																																					
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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.

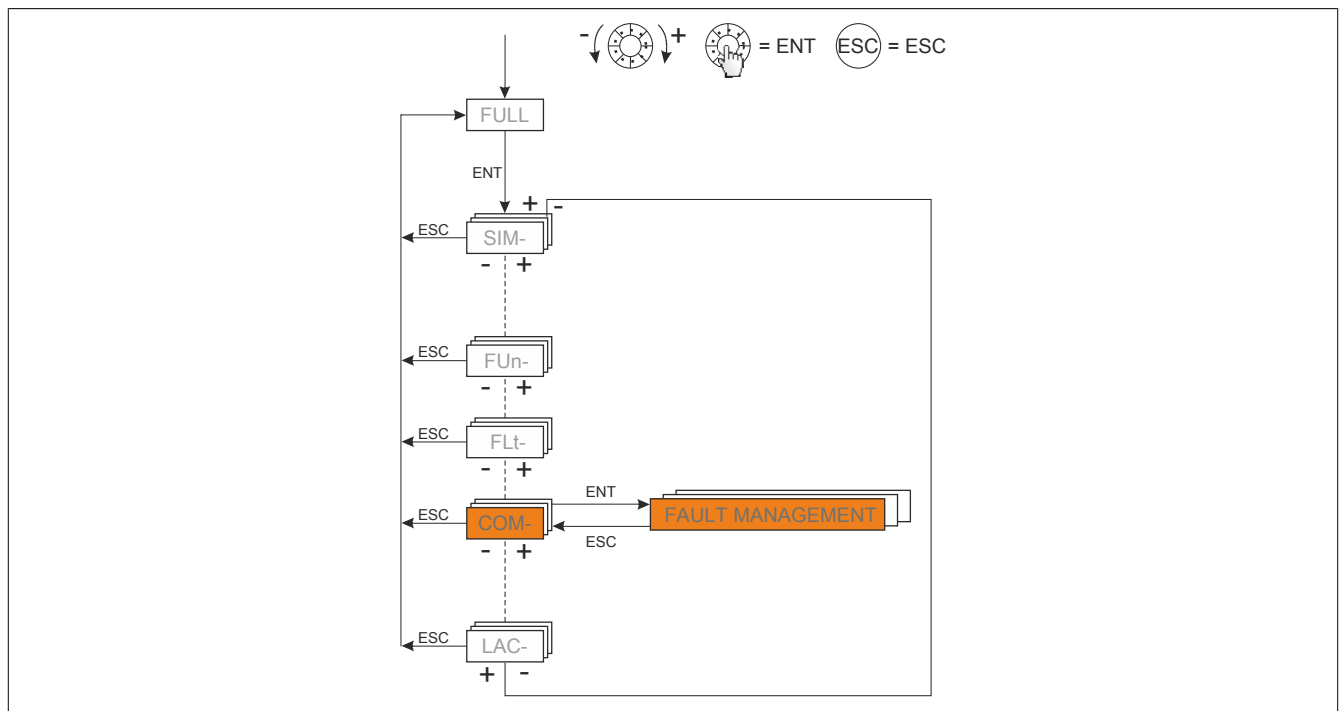
### 5.2.3.6.7 [FAULT MANAGEMENT] FLt-

With integrated display terminal:

Overview of functions:

Code	Name
PtC	[PTC MANAGEMENT]
rSt	[FAULT RESET]
Atr	[AUTOMATIC RESTART]
AlS	[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]
tlt	[IGBT test]
LFL	[4-20 mA LOSS]
InH	[FAULT INHIBITION]
CLL	[COM. FAULT MANAGEMENT]
Sdd	[ENCODER FAULT]
tlD	[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.

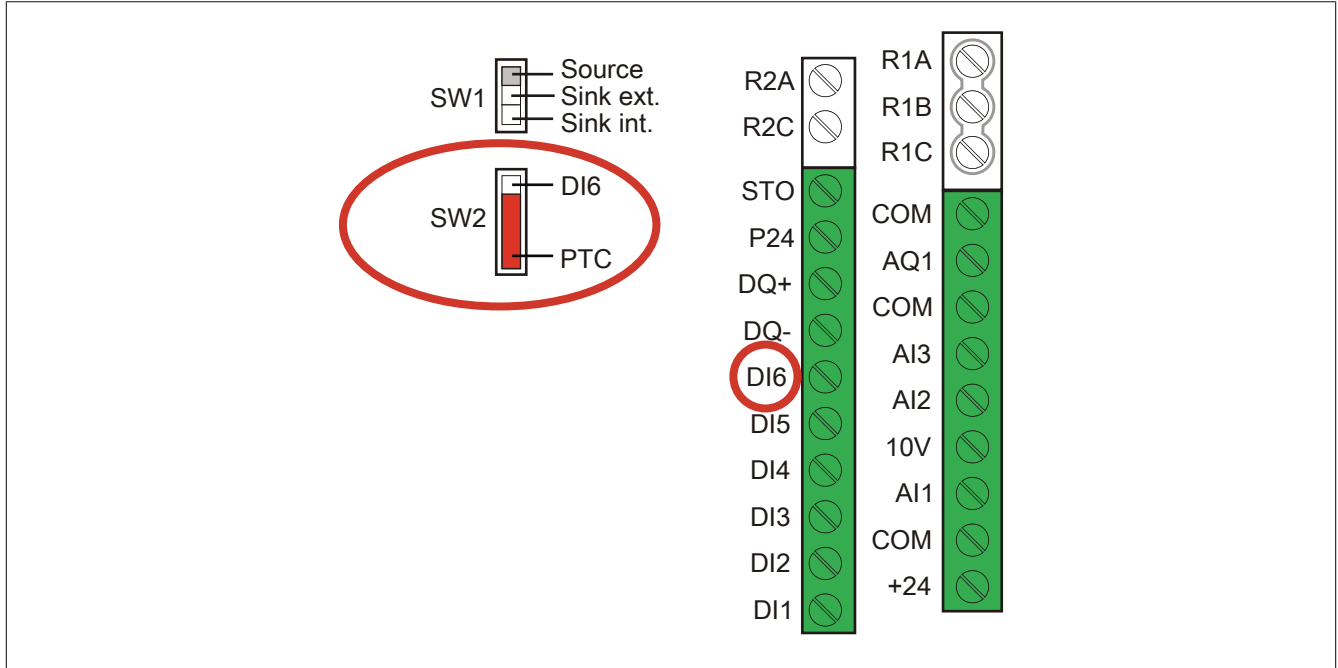
### 5.2.3.6.7.1 [PTC MANAGEMENT] (PtC-)

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 I<sup>2</sup>t 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 digital inputs need a voltage sink, i.e. the current flows out of the inputs and outputs.

Source: The digital inputs 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-	<b>[PTC MANAGEMENT]</b>	
PtCL	<b>[LI6 = PTC probe]</b> PTC sensor configuration is active only when switch SW2 is set to PTC.	<b>[No](nO)</b>
nO	<b>[No](nO):</b> Not used	
AS	<b>[Always](AS):</b> 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	<b>[Boot](rdS):</b> The PTC sensors are monitored while the inverter power unit is connected.	
rS	<b>[Motor on](rS):</b> The PTC sensors are monitored while the motor is switched on.	

### 5.2.3.6.7.2 [FAULT RESET] (rSt-)

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

Code	Name/Description	Factory settings
rSt-	<b>[FAULT RESET]</b>	
rSF	<b>[FAULT RESET]</b> 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, OtiL, PHF, PtiL, SCF4, SCF5, SLF1, SLF2, SLF3, SOF, SPF, SSF, tJF, tnF and ULF.	<b>[No](nO)</b>
nO	<b>Note:</b> <b>If [Extended Fault reset](HrFC) is set to [Yes](YES), the following detected errors can also be acknowledged manually: OCF, SCF1 and SCF3.</b>  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. <b>[No](nO):</b> Function not active	



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

Code	Name/Description	Factory settings
L11 ...	<b>[L11]</b> (L11): Logic input L11 <b>[...]</b> (...): See Assignment conditions.	
rPA 	<b>[Product reset assig.]</b>  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.  <b>Danger!</b> <b>UNEXPECTED OPERATION OF THE EQUIPMENT</b> <b>The restart function executes an error reset and restarts the inverter.</b> <b>Make sure that enabling this function does not result in unsafe states.</b> <b>Failure to follow these instructions can result in death or serious injury.</b>  This parameter can only be changed if <b>[3.1 ACCESS LEVEL]</b> (LAC) is set to <b>[Expert]</b> (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.	<b>[No]</b> (nO)
nO L11 ... LI6 LAI1 LAI2	<b>[No]</b> (nO): Function not active <b>[L11]</b> (L11): Logic input L11 ... <b>[LI6]</b> (LI6): Logic input LI6 <b>[LAI1]</b> (LAI1): Logic input AI1 <b>[LAI2]</b> (LAI2): Logic input AI2	
rP 	<b>[Product reset]</b>  The restart function performs a fault 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, the restart can also be triggered via a digital input (see <b>[Product reset assig.]</b> (rPA) 276).  <b>Danger!</b> <b>UNEXPECTED OPERATION OF THE EQUIPMENT</b> <b>The restart function executes an error reset and restarts the inverter.</b> <b>Make sure that enabling this function does not result in unsafe states.</b> <b>Failure to follow these instructions can result in death or serious injury.</b>  This parameter is only accessible if <b>[3.1 ACCESS LEVEL]</b> (LAC) is set to <b>[Expert]</b> (EPr). Inverter reinitialization. Can be used to reset all faults without having to disconnect the inverter from the power supply.	<b>[No]</b> (nO)
nO YES	<b>[No]</b> (nO): Function not active <b>[YES]</b> (YES): Reinitialization. The ENT button must be pressed for two seconds. The parameter changes automatically to <b>[No]</b> (nO) as soon as the process is complete. The inverter can only be reinitialized when locked.	
HrFC   nO YES	<b>[Extended Fault reset]</b>  This parameter is only accessible if <b>[3.1 ACCESS LEVEL]</b> (LAC) is set to <b>[Expert]</b> (EPr).  Can be used in order to select access level <b>[Fault reset]</b> (rSF). It allows detected errors to be reset without switching off the inverter. <b>[No]</b> (nO): Function not active <b>[YES]</b> (YES): Function active  <b>Note:</b> <b>If <b>[Extended Fault reset]</b>(HrFC) is set to <b>[Yes]</b>(YES), the following detected errors can also be acknowledged manually: OCF, SCF1 and SCF3.</b>	<b>[No]</b> (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.

## 5.2.3.6.7.3 [AUTOMATIC RESTART] (Atr-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > Atr-			
Code	Name/Description	Setting range	Factory settings
Atr-	<b>[AUTOMATIC RESTART]</b>		
Atr  2 s	<p><b>[Automatic restart]</b></p> <p>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.</p> <p><b>Danger!</b></p> <p><b>UNEXPECTED OPERATION OF THE EQUIPMENT</b></p> <ul style="list-style-type: none"> <li>• <b>Make sure that enabling this function does not result in unsafe states.</b></li> <li>• <b>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.</b></li> </ul> <p><b>Failure to follow these instructions can result in death or serious injury.</b></p> <p>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.</p> <p>Use the 2 wire control ([2/3 wire control](tCC) = [2 wire control](2C) and [Type 2 wire](tCt) = [Level](LEL)).</p> <p>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.</p>		[No](nO)
nO YES	<p>[No](nO): Function not active</p> <p>[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.</p>		
tAr  5 10 30 1h 2h 3h Ct	<p><b>[Max. restart time]</b></p> <p>This parameter is accessible if [Automatic restart](Atr) is set to [Yes](YES). This parameter can be used to limit the number of consecutive restarts in the event of a recurring fault.</p> <p>[5 min](5): 5 minutes</p> <p>[10 min](10): 10 minutes</p> <p>[30 min](30): 30 minutes</p> <p>[1 hour](1h): 1 hour</p> <p>[2 hours](2h): 2 hours</p> <p>[3 hours](3h): 3 hours</p> <p>[continuous](Ct): Continuous</p>		[5 min](5)









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.



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

## 5.2.3.6.7.4 [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-	<b>[AUTOMATIC RESTART]</b>		
Ctd  (1)	<p><b>[Current threshold]</b></p> <p>Threshold value of the motor current.</p>	0 to 65535 or 1.5*INV <sup>(1)</sup>	INV
Ftd 	<p><b>[Freq. threshold]</b></p> <p>Threshold value of the output frequency.</p>	0 to 599 Hz	50 Hz
F2d 	<p><b>[Freq. threshold 2]</b></p> <p>Threshold value of the output frequency.</p>	0 to 599 Hz	50 Hz
ttH 	<p><b>[High torque thd.]</b></p> <p>Frequency threshold value for high torque.</p>	-300 to 300%	100%
ttL 	<p><b>[Low torque thd.]</b></p> <p>Frequency threshold value for low torque.</p>	-300 to 300%	50%
FqL 	<p><b>[Pulse warning thd.]</b></p> <p>Frequency level.</p> <p>Available if [Frequency meter](FqF) is not equal to [No](nO).</p>	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.

### 5.2.3.6.7.5 [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-	<b>[CATCH ON THE FLY]</b>  <b>Note:</b> This function cannot be used with certain other functions.	
FLr	<b>[Catch on the fly]</b> Used to enable a smooth restart if the run command is maintained after the following events: <ul style="list-style-type: none"> <li>• Mains supply failure or disconnection.</li> <li>• Reset of current fault or automatic restart</li> <li>• Freewheel stop</li> </ul> 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	[No](nO): Function not active	
YES	[YES](YES): Function active	

### 5.2.3.6.7.6 [MOTOR THERMAL PROT.] (tHt-)

#### Functionality

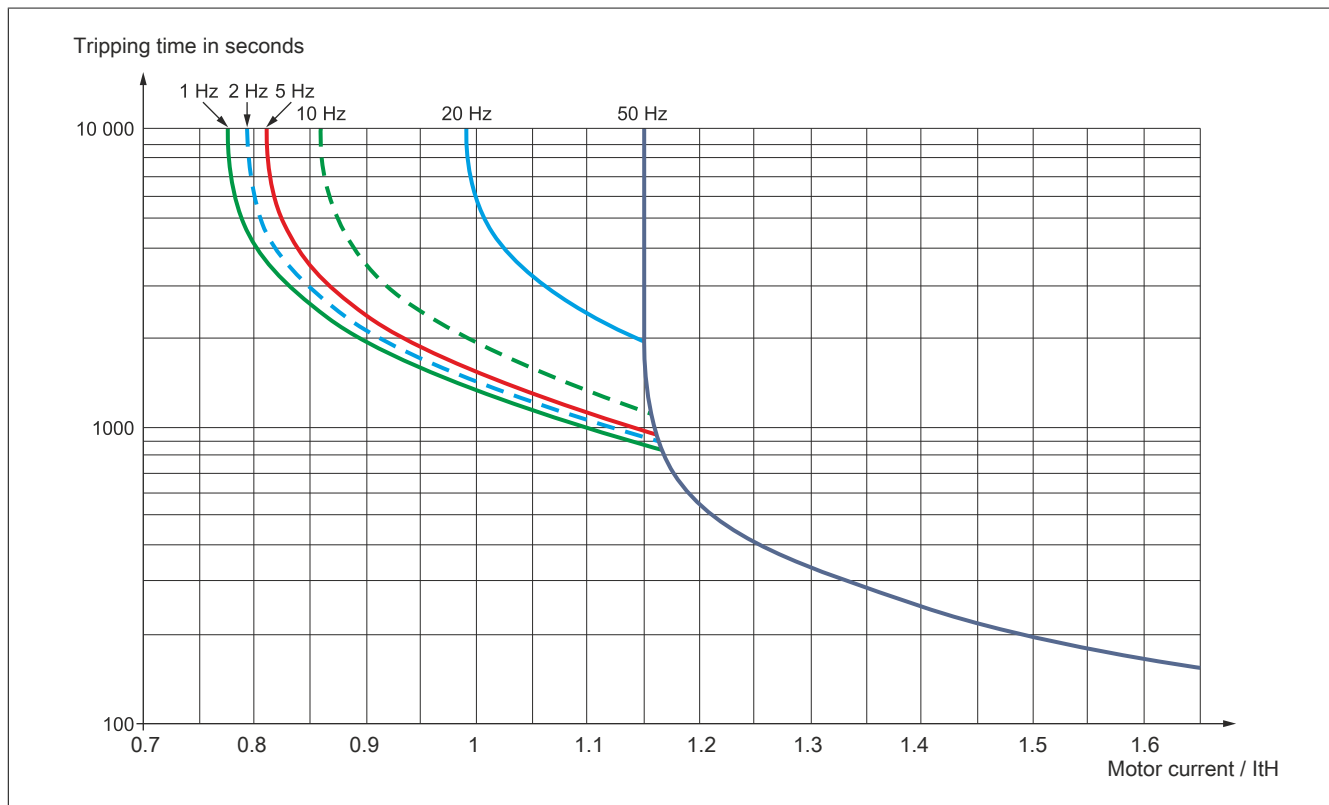
Thermal motor protection based on I<sup>2</sup>t calculation.

#### Note:

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-	<b>[MOTOR THERMAL PROT.]</b>		
tHt	<b>[Motor protect. type]</b>		<b>[Self cooled](ACL)</b>
	<p><b>Note:</b></p> <p>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%.</p>		
nO ACL FCL	<b>[No](nO)</b> : No protection <b>[Self cooled](ACL)</b> : For self-cooling motors <b>[Force-cool](FCL)</b> : For forced-cooled motors		
ttd  (1)	<b>[Motor therm. level]</b> Trip threshold for motor thermal alarm (logic output or relay)	0 to 118%	100%
ttd2 	<b>[Motor2 therm. level]</b> Trip threshold for motor 2 thermal alarm (logic output or relay)	0 to 118%	100%
ttd3 	<b>[Motor3 therm. level]</b> Trip threshold for motor 3 thermal alarm (logic output or relay)	0 to 118%	100%
OLL	<b>[Overload fault mgt]</b>		<b>[Freewheel](YES)</b>
	<p><b>Caution!</b></p> <p><b>MOTOR OVERHEATING AND DAMAGE</b></p> <p>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.</p> <ul style="list-style-type: none"> <li>• Make sure that the setting defined for this parameter does not result in damage to the device.</li> <li>• Implement alternative solutions for the disabled monitoring functions.</li> </ul> <p>Failure to observe these instructions can result in damage to the equipment.</p> <p>Type of stop in the event of a motor thermal fault.</p>		
nO YES Stt	<b>[Ignore](nO)</b> : The detected error is ignored. <b>[Freewheel](YES)</b> : Freewheel <b>[Type of stop](Stt)</b> : Stop in accordance with configuration of <b>[Type of stop](Stt)</b> 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 <b>[2/3 wire control](tCC)</b> and <b>[2 wire type](tCt)</b> , 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	<b>[fallback spd](LFF)</b> : Change to fallback speed, which is maintained for as long as the fault persists and the move command has not been canceled. (2)		
rLS	<b>[Spd maint.](rLS)</b> : 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)		
rMP	<b>[Ramp stop](rMP)</b> : Stopping via ramp		
FSt	<b>[Fast stop](FSt)</b> : Fast stop		
dCl	<b>[DC injection](dCl)</b> : Stop by DC injection braking. This function type cannot be used in combination with certain other functions.		
MtM	<b>[Mot THR memo]</b> The thermal motor state is stored.		<b>[No](nO)</b>
nO YES	<b>[No](nO)</b> : On switch-off, the thermal motor state is not stored. <b>[YES](YES)</b> : On switch-off, the thermal motor state is stored.		

(1) This parameter can also be accessed via menu **[SETTINGS](SET-)**.

(2) The detected error triggers a motor stop in any case in accordance with B&R ACOPOS management.



Parameter that can be modified during operation or when stopped.

## 5.2.3.6.7.7 [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	<p><b>Danger!</b></p> <p><b>RISK OF ELECTRIC SHOCK, ARC FLASH OR EXPLOSION</b></p> <p>If output phase monitoring is disabled, phase loss and therefore the inadvertent disconnection of cables will not be detected.</p> <p>Make sure that the parameter settings do not result in unsafe states.</p> <p>Failure to follow these instructions can result in death or serious injury.</p> <p><b>Note:</b></p> <p>[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.</p>		[YES](YES)
nO YES OAC	<p>[No](nO): Function not active</p> <p>[Yes](YES): Triggered if [Output Phase Loss](OPL) with freewheel stop</p> <p>[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).</p>		
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.



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

## 5.2.3.6.7.8 [Input phase loss] (IPL-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > IPL-			
Code	Name/Description	Setting range	Factory settings
IPL-	[Input phase loss]		
IPL ★ ⌚ 2 s	<p>This parameter is not available for inverter sizes 8lx6S200xxx.00-000. In this case, there are no factory-preset values available.</p> <p>Factory setting: [Freewheel](YES) for 3-phase inverters 380 to 500 V.</p> <p>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).</p>		According to inverter performance
nO YES	<p>[Fault ignored](nO): Detected error is ignored</p> <p>[Freewheel](YES): Error with freewheel stop.</p>		





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.



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

## 5.2.3.6.7.9 [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 	<p><b>Danger!</b></p> <p><b>RISK OF ELECTRIC SHOCK, ARC FLASH OR EXPLOSION</b></p> <p>If output phase monitoring is disabled, phase loss and therefore the inadvertent disconnection of cables will not be detected.</p> <p>Make sure that the parameter settings do not result in unsafe states.</p> <p>Failure to follow these instructions can result in death or serious injury.</p> <p><b>Note:</b></p> <p>[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.</p> <p>[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).</p>		[YES](YES)
nO YES OAC			
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.







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

## 5.2.3.6.7.10 [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.

## 5.2.3.6.7.11 [EXTERNAL FAULT] (EtF-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > EtF-			
Code	Name/Description	Setting range	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		
L11	[L11](L11): Logic input L11		
...	[...](...): 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. <sup>(1)</sup>		
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. <sup>(1)</sup>		
rMP	[Ramp stop](rMP): Stopping via ramp		
FSt	[Fast stop](FSt): Fast stop		
dCI	[DC injection](dCI): Stop by DC injection braking. 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.

## 5.2.3.6.7.12 [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]		[Fit&R1 open](0)
0	Behavior of the inverter in the event of an undervoltage [Fit&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	[Fit&R1 close](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 8I76S200xxx.00-000:		According to nominal voltage According to nominal voltage
200	[200V ac](200): 200 volts AC		
220	[220V ac](220): 220 volts AC		
230	[230V ac](230): 230 volts AC		
240	[240Vac](240): 240 volts AC (factory setting)		
	For 8I76T40xxxx.00-000:		
380	[380V ac](380): 380 volts AC		
400	[400V ac](400): 400 volts AC		
440	[440V ac](440): 440 volts AC		
460	[460V ac](460): 460 volts AC		
500	[500V ac](500): 500 volts AC (factory setting)		

The parameters described on this page can be accessed by: DRI -> COnF > FULL > FLT- > USB-																																																					
Code	Name/Description	Setting range	Factory settings																																																		
USL	<p><b>[Undervoltage level]</b></p> <p>Setting the trigger level for the undervoltage error in V. Displayed when <b>[3.1 ACCESS LEVEL]</b>(LAC) is set to <b>[Expert]</b>(Epr). The setting range is defined in the following table: If DC chaining has been enabled: <b>[DC-Bus chaining]</b>(dCCM) = <b>[Bus &amp; Main]</b> (MAIn) or <b>[Only Bus]</b> (bUS)</p> <table border="1"> <thead> <tr> <th colspan="4">Setting range</th> </tr> <tr> <th>ACOPOSinverter P76</th> <th>Min. value [VDC]</th> <th>Max. value [VDC]</th> <th>Default [VDC]</th> </tr> </thead> <tbody> <tr> <td>8I76S2xxxxx.00-000</td> <td>100</td> <td>141</td> <td>141</td> </tr> <tr> <td>8I76T4xxxxx.00-000</td> <td>190</td> <td>276</td> <td>276</td> </tr> </tbody> </table> <p>If DC chaining has not been enabled: <b>[DC bus coupling]</b>(dCCM) = <b>[No]</b> (nO)</p> <table border="1"> <thead> <tr> <th colspan="4">Setting range</th> </tr> <tr> <th>ACOPOSinverter P76</th> <th>[Mains voltage] (UrES)</th> <th>Min. value [VDC]</th> <th>Max. value [VDC]</th> <th>Default [VDC]</th> </tr> </thead> <tbody> <tr> <td rowspan="4">8I76S2xxxxx.00-000</td> <td><b>[200V ac]</b> (200)</td> <td>100</td> <td rowspan="4">141</td> <td rowspan="4">141</td> </tr> <tr> <td><b>[220V ac]</b> (220)</td> <td>120</td> </tr> <tr> <td><b>[230V ac]</b> (230)</td> <td>131</td> </tr> <tr> <td><b>[240V ac]</b> (240)</td> <td>141</td> </tr> <tr> <td rowspan="5">8I76T4xxxxx.00-000</td> <td><b>[380V ac]</b> (380)</td> <td>190</td> <td rowspan="5">276</td> <td rowspan="5">276</td> </tr> <tr> <td><b>[400V ac]</b> (400)</td> <td>204</td> </tr> <tr> <td><b>[440V ac]</b> (440)</td> <td>233</td> </tr> <tr> <td><b>[460V ac]</b> (460)</td> <td>247</td> </tr> <tr> <td><b>[500V ac]</b> (500)</td> <td>276</td> </tr> </tbody> </table>	Setting range				ACOPOSinverter P76	Min. value [VDC]	Max. value [VDC]	Default [VDC]	8I76S2xxxxx.00-000	100	141	141	8I76T4xxxxx.00-000	190	276	276	Setting range				ACOPOSinverter P76	[Mains voltage] (UrES)	Min. value [VDC]	Max. value [VDC]	Default [VDC]	8I76S2xxxxx.00-000	<b>[200V ac]</b> (200)	100	141	141	<b>[220V ac]</b> (220)	120	<b>[230V ac]</b> (230)	131	<b>[240V ac]</b> (240)	141	8I76T4xxxxx.00-000	<b>[380V ac]</b> (380)	190	276	276	<b>[400V ac]</b> (400)	204	<b>[440V ac]</b> (440)	233	<b>[460V ac]</b> (460)	247	<b>[500V ac]</b> (500)	276	See table.	See table.	
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USt	<p><b>[Undervolt. time out]</b></p> <p>Time delay for taking undervoltage fault into account</p>	0.2 s to 999.9 s	0.2 s																																																		
StP	<p><b>[UnderV. prevention]</b></p> <p>Behavior when the undervoltage prevention level is reached.</p>		<b>[No]</b> (nO)																																																		
nO	<b>[No]</b> (nO): No action																																																				
MMS	<b>[DC Maintain]</b> (MMS): This stop mode uses the inertia to maintain the DC bus voltage as long as possible.																																																				
rMP	<b>[Ramp stop]</b> (rMP): Stop according to a configurable ramp <b>[Max stop time]</b> (StM)																																																				
LnF	<b>[Drive lock]</b> (LnF): Locking (freewheel stop) without error																																																				
tSM	<p><b>[UnderV. restart tm]</b></p> <p>Time delay before a restart is permitted after a complete standstill for <b>[UnderV. prevention]</b>(StP) = <b>[Ramp stop]</b>(rMP), if the voltage has reached the normal value.</p>	1.0 s to 999.9 s	1.0 s																																																		
★																																																					
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UPL	<p><b>[Prevention level]</b></p> <p>Setting of the level for undervoltage prevention in V. Access is possible if <b>[UnderV. prevention]</b>(StP) is not equal to <b>[No]</b>(nO). The adjustment range and the factory setting are dependent on the nominal voltage of the inverter as well as on the value of <b>[Mains voltage]</b>(UrES).</p> <table border="1"> <thead> <tr> <th colspan="4">Setting range</th> </tr> <tr> <th>ACOPOSinverter P76</th> <th>[Mains voltage] (UrES)</th> <th>Min. value [VDC]</th> <th>Max. value [VDC]</th> <th>Default [VDC]</th> </tr> </thead> <tbody> <tr> <td rowspan="4">8I76S2xxxxx.00-000</td> <td><b>[200V ac]</b> (200)</td> <td rowspan="4">141</td> <td rowspan="4">163</td> <td rowspan="4">163</td> </tr> <tr> <td><b>[220V ac]</b> (220)</td> </tr> <tr> <td><b>[230V ac]</b> (230)</td> </tr> <tr> <td><b>[240V ac]</b> (240)</td> </tr> <tr> <td rowspan="5">8I76T4xxxxx.00-000</td> <td><b>[380V ac]</b> (380)</td> <td rowspan="5">276</td> <td rowspan="5">318</td> <td rowspan="5">318</td> </tr> <tr> <td><b>[400V ac]</b> (400)</td> </tr> <tr> <td><b>[440V ac]</b> (440)</td> </tr> <tr> <td><b>[460V ac]</b> (460)</td> </tr> <tr> <td><b>[500V ac]</b> (500)</td> </tr> </tbody> </table>	Setting range				ACOPOSinverter P76	[Mains voltage] (UrES)	Min. value [VDC]	Max. value [VDC]	Default [VDC]	8I76S2xxxxx.00-000	<b>[200V ac]</b> (200)	141	163	163	<b>[220V ac]</b> (220)	<b>[230V ac]</b> (230)	<b>[240V ac]</b> (240)	8I76T4xxxxx.00-000	<b>[380V ac]</b> (380)	276	318	318	<b>[400V ac]</b> (400)	<b>[440V ac]</b> (440)	<b>[460V ac]</b> (460)	<b>[500V ac]</b> (500)	See table.	See table.																								
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StM	<p><b>[Max stop time]</b></p> <p>Ramp-up time if <b>[UnderV. prevention]</b>(StP) is set to <b>[Ramp stop]</b>(rMP).</p>	0.01 to 60.00 s	1.00 s																																																		
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tbS	<p><b>[DC bus maintain tm]</b></p> <p>Stopping time of the DC bus if <b>[UnderV. prevention]</b>(StP) is set to <b>[DC Maintain]</b>(MMS).</p>	1 to 9,999 s	9,999 s																																																		
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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.

## 5.2.3.6.7.13 [IGBT test] (tlt-)

The parameters described on this page can be accessed by: DRI- > COnF > FULL > FLt- > tlt-		
Code	Name/Description	Factory settings
tlt-	<b>[IGBT test]</b>	
Strt	<b>[IGBT test]</b>	<b>[No](nO)</b>
nO	<b>[No](nO)</b> : No test	
YES	<b>[Yes](YES)</b> : 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: <ul style="list-style-type: none"> <li>• Inverter output short circuit (terminals U-V-W): SCF displayed.</li> <li>• IGBT error: xtF, where x indicates the number of the affected IGBT.</li> <li>• IGBT short circuit: x2F, where x indicates the number of the affected IGBT</li> </ul>	



## 5.2.3.6.7.14 [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-	<b>[4-20 mA LOSS]</b>	
LFL3	<b>[AI3 4-20mA loss]</b>	<b>[Fault ignored](nO)</b>
nO	<b>[Fault ignored](nO)</b> : Detected error ignored. This is the only possible configuration if <b>[AI3 min value](CrL3)</b> is less than 3 mA.	
YES	<b>[Freewheel](YES)</b> : Freewheel	
Stt	<b>[In accordance with STT](Stt)</b> : Stop in accordance with the configuration of <b>[Type of stop](Stt)</b> , 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 <b>[2/3 wire control](tCC)</b> and <b>[2 wire type](tCt)</b> , 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	<b>[fallback spd](LFF)</b> : Change to fallback speed, which is maintained for as long as the fault persists and the move command has not been canceled. <sup>(1)</sup>	
rLS	<b>[Spd maint.](rLS)</b> : 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. <sup>(1)</sup>	
rMP	<b>[Ramp stop](rMP)</b> : Stopping via ramp	
FSt	<b>[Fast stop](FSt)</b> : Fast stop	
dCI	<b>[DC injection](dCI)</b> : Stop by DC injection braking. 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.

### 5.2.3.6.7.15 [FAULT INHIBITION] (InH-)

The parameter is accessible in mode **[Expert]**.

The parameters described below are accessed as follows: DRI- > COnF > FULL > FLt- > InH-		
Code	Name/Description	Factory settings
InH-	<b>[FAULT INHIBITION]</b>	
InH	<b>[Fault inhibit assign.]</b>	<b>[No](nO)</b>
  2 s	<p>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.</p> <p>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.</p> <p>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.</p> <p><b>Danger!</b></p> <p><b>MONITORING FUNCTIONS DISABLED, NO ERROR DETECTION</b></p> <ul style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>Start the system with monitoring functions enabled and then test it.</li> <li>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.</li> </ul> <p>Failure to follow these instructions can result in death or serious injury.</p> <p>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.</p> <p><b>Note:</b></p> <p>This function does not affect function "Safe Torque Off" or detected errors that would lead to a complete failure.</p> <p>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</p>	
nO	<b>[No](nO):</b> Function not active	
L11	<b>[L11](L11):</b> Logic input L11	
...	<b>[...](...):</b> See the assignment conditions.	



Parameter that can be modified during operation or when stopped.



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

## 5.2.3.6.7.16 [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)
nO YES Stt	<p><b>Warning!</b></p> <p><b>LOSS OF CONTROL</b></p> <p>If this parameter is set to [Fault ignored](nO), monitoring of fieldbus module communication is disabled.</p> <ul style="list-style-type: none"> <li>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.</li> <li>Only use this setting for tests during commissioning.</li> <li>Make sure that communication monitoring has been re-enabled before completing the commissioning process and performing the final commissioning test.</li> </ul> <p><b>Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.</b></p> <p>Behavior of the inverter in the event of a communication fault with a communication card</p>	
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. <sup>1)</sup>	
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. <sup>1)</sup>	
rMP	[Ramp stop](rMP): Stopping via ramp	
FSt	[Fast stop](FSt): Fast stop	
dCl	[DC injection] (dCl): Stop by DC injection braking. This function type cannot be used in combination with certain other functions.	
COL	[CANopen fault mgt]	[Freewheel](YES)
nO YES Stt	<p><b>Warning!</b></p> <p><b>LOSS OF CONTROL</b></p> <p>If this parameter is set to [Fault ign.](nO), monitoring of CANopen com. module communication is disabled.</p> <ul style="list-style-type: none"> <li>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.</li> <li>Only use this setting for tests during commissioning.</li> <li>Make sure that communication monitoring has been re-enabled before completing the commissioning process and performing the final commissioning test.</li> </ul> <p><b>Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.</b></p> <p>Behavior of the inverter in the event of a communication interruption with the integrated CANopen® module</p>	
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. <sup>1)</sup>	
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. <sup>1)</sup>	
rMP	[Ramp stop](rMP): Stopping via ramp	
FSt	[Fast stop](FSt): Fast stop	
dCl	[DC injection] (dCl): Stop by DC injection braking. 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	<b>[Modbus fault mgt]</b>	<b>[Freewheel](YES)</b>
	<p><b>Warning!</b></p> <p><b>LOSS OF CONTROL</b></p> <p>If this parameter is set to <b>[Fault ign.](nO)</b>, monitoring of Modbus module communication is disabled.</p> <ul style="list-style-type: none"> <li>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.</li> <li>Only use this setting for tests during commissioning.</li> <li>Make sure that communication monitoring has been re-enabled before completing the commissioning process and performing the final commissioning test.</li> </ul> <p><b>Failure to follow these instructions can result in serious injury or death as well as damage to the equipment.</b></p> <p>Behavior of the inverter in the event of a communication interruption with the integrated Modbus.</p>	
nO	<b>[Fault ignored](nO)</b> : Detected error is ignored	
YES	<b>[Freewheel](YES)</b> : Freewheel	
Stt	<b>[In accordance with STT](Stt)</b> : Stop in accordance with the configuration of <b>[Type of stop](Stt)</b> , 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 <b>[2/3 wire control](tCC)</b> and <b>[2 wire type](tCt)</b> , 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	<b>[fallback spd](LFF)</b> : Change to fallback speed, which is maintained for as long as the fault persists and the move command has not been canceled. <sup>1)</sup>	
rLS	<b>[Spd maint.](rLS)</b> : 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. <sup>1)</sup>	
rMP	<b>[Ramp stop](rMP)</b> : Stopping via ramp	
FSt	<b>[Fast stop](FSt)</b> : Fast stop	
dCI	<b>[DC injection](dCI)</b> : Stop by DC injection braking. 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.

### 5.2.3.6.7.17 [ENCODER FAULT] (Sdd-)

The parameters described below are accessed as follows: DRI- > COnF > FULL > FLt- > Sdd-

Code	Name/Description	Setting range	Factory settings
Sdd-	<b>[ENCODER FAULT]</b>		
Sdd	<b>[Load slip detection]</b>		<b>[YES](YES)</b>
	Enabling load slip detection.		
nO	<b>[No](nO)</b> : Detected error is ignored.		
YES	<b>[YES](YES)</b> : 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	<b>[ANF Frequency Thd.]</b>		-
	Displayed if <b>[Encoder usage](EnU) = [Fdbk monet.](SEC)</b> .		
LAnF	<b>[Thresh. load slip]</b>		-
	Displayed if <b>[Encoder usage](EnU) = [Fdbk monet.](SEC)</b> .		
dAnF	<b>[ANF Direction check]</b>		-
	Displayed if <b>[Encoder usage](EnU) = [Fdbk monet.](SEC)</b> .		
tAnF	<b>[ANF Frequency Thd.]</b>		-
	Displayed if <b>[Encoder usage](EnU) = [Fdbk monet.](SEC)</b> .		



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.

## 5.2.3.6.7.18 [TORQUE/CURRENT LIM.] (tId-)

The parameters described below are accessed as follows: DRI- &gt; COOnF &gt; FULL &gt; FLt- &gt; tId-

Code	Name/Description	Factory settings
tId-	<b>[TORQUE/CURRENT LIM.]</b>	
SSb	<b>[Trq/l limit. stop]</b> Behavior when switching to torque mode or current limiting	<b>[Fault ignored](nO)</b>
nO	<b>[Fault ignored](nO)</b> : Detected error is ignored	
YES	<b>[Freewheel](YES)</b> : Freewheel stop	
Stt	<b>[In accordance with STT](Stt)</b> : Stop in accordance with the configuration of <b>[Type of stop](Stt)</b> , 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 <b>[2/3 wire control](tCC)</b> and <b>[2 wire type](tCT)</b> , 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	<b>[fallback spd](LFF)</b> : Change to fallback speed, which is maintained for as long as the fault persists and the move command has not been canceled. <sup>(1)</sup>	
rLS	<b>[Spd maint.](rLS)</b> : 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. <sup>(1)</sup>	
rMP	<b>[Ramp stop](rMP)</b> : Stopping via ramp	
FSt	<b>[Fast stop](FSt)</b> : Fast stop	
dCI	<b>[DC injection](dCI)</b> : Stop by DC injection braking. This function type cannot be used in combination with certain other functions.	
StO	<b>[Trq/l limit. time out]</b> (If <b>[Trq/l limit. stop](SSb)</b> 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.

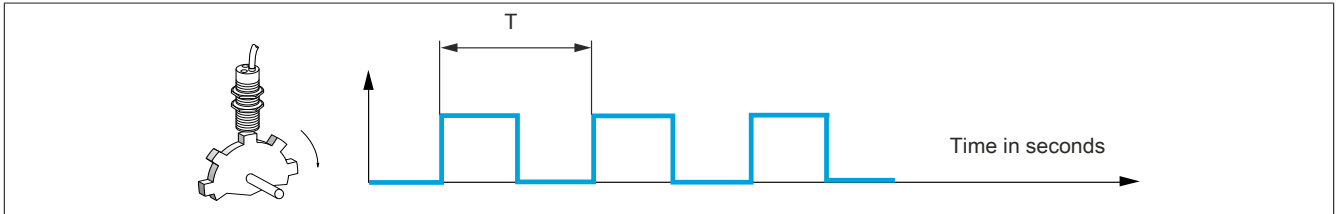
### 5.2.3.6.7.19 [FREQUENCY METER] (FqF-)

#### 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-	<b>[FREQUENCY METER]</b>		
FqF	<b>[Frequency meter]</b> Enabling the speed measurement function		<b>[No](nO)</b>
nO YES	<b>[No](nO)</b> : Function inactive. All parameters of this function are inaccessible. <b>[YES](YES)</b> : Function active. Assignment only possible if input "Pulse input" has not been assigned to another function.		
FqC	<b>[Pulse fdbk divisor]</b> Scaling factor of the "pulse input" input (divisor). The achieved frequency is displayed using parameter <b>[Pulse in. work. freq.](FqS)</b> .	1.0 to 100.0	1.0
FqA	<b>[Overspeed pulse thresh.]</b> Enabling and setting overspeed monitoring: <b>[Overspeed](SOF)</b> .		<b>[No](nO)</b>
nO -	<b>[No](nO)</b> : No overspeed monitoring. <b>1 Hz to 20.00 kHz</b> : Setting the threshold value for triggering the frequency at the "pulse input" input divided by <b>[Pulse fdbk divisor](FqC)</b> .		
tdS	<b>[Pulse overspd delay]</b> Delay for taking into account a detected overvoltage error.	0.0 s to 10.0 s	0.0 s
Fdt	<b>[Level fr. pulse ctrl]</b> Enabling and setting "pulse input" input monitoring (speed feedback): <b>[Speed fdbk loss](SPF)</b> .		<b>[No](nO)</b>
nO -	<b>[No](nO)</b> : No speed feedback monitoring <b>0.1 Hz to 599 Hz</b> : Setting the frequency threshold value of the motor for triggering the speed feedback error (deviation between the estimated frequency and the measured speed).		
Fqt	<b>[Pulse thd. wo Run]</b> Enabling and setting brake monitoring: <b>[Brake feedback](brF)</b> . If brake logic <b>[Brake assignment](bLC)</b> is not configured, this parameter is forced to <b>[No](nO)</b> .		<b>[No](nO)</b>
nO -	<b>[No](nO)</b> : No brake monitoring <b>1 Hz to 1,000 Hz</b> : Setting of the motor frequency threshold value.		
tqb	<b>[Pulse wo Run delay]</b> 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.

### 5.2.3.6.7.20 [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-	<b>[DYNAMIC LOAD DETECT.]</b> Load variation detection. This parameter is accessible if <b>[High speed hoisting optim](HSO)</b> is not equal to <b>[No](nO)</b> .		
tLd	<b>[Dynamic load time]</b> Enabling detection of load variations and setting the delay for taking into account detected error <b>[Dynamic load fault](dLF)</b> .		<b>[No](nO)</b>
nO -	<b>[No](nO)</b> : No detection of variations in load <b>0.00 s to 10.00 s</b> : Setting the delay for taking into account the detected error.		
dLd	<b>[Dynamic load threshold]</b> 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	<b>[Dyn. load Mgt.]</b> Behavior of the inverter in the event of a load variation fault.		<b>[Freewheel](YES)</b>
nO YES Stt	<b>[Fault ignored](nO)</b> : Detected error is ignored <b>[Freewheel](YES)</b> : Freewheel <b>[In accordance with STT](Stt)</b> : Stop in accordance with the configuration of <b>[Type of stop](Stt)</b> , 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 <b>[2/3 wire control](tCC)</b> and <b>[2 wire type](tCT)</b> 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	<b>[fallback spd](LFF)</b> : Change to fallback speed, which is maintained for as long as the fault persists and the move command has not been canceled. <sup>(1)</sup>		
rLS	<b>[Spd maint.](rLS)</b> : 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. <sup>(1)</sup>		
rMP	<b>[Ramp stop](rMP)</b> : Stopping via ramp		
FSt	<b>[Fast stop](FSt)</b> : 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.

### 5.2.3.6.7.21 [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	[Autotune fault mgt]	[Freewheel](YES)
nO	[Fault ignored](nO): Detected error is ignored	
YES	[Freewheel](YES): Freewheel	

### 5.2.3.6.7.22 [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 -	<p>The value [OFF](OFF) indicates that the card pairing function is not active.</p> <p>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.</p> <p>Once the code has been entered, the inverter is unlocked and the code changes to [ON](On).</p> <p>The PPI code is an unlock code known only to B&amp;R customer support.</p>		



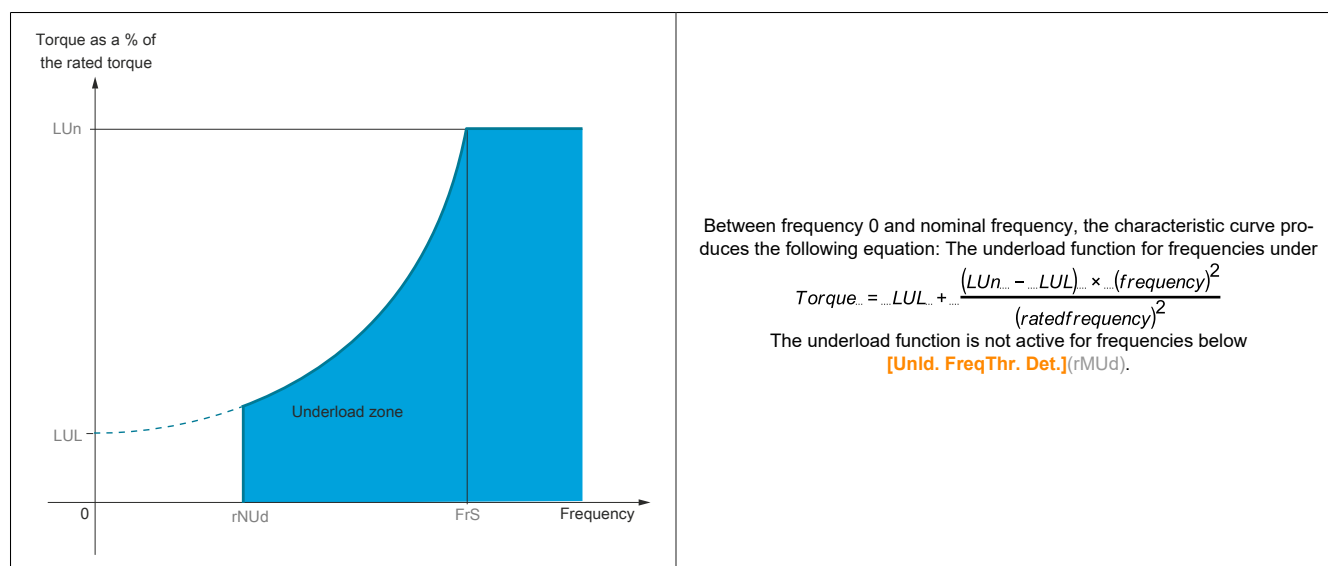
These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

### 5.2.3.6.7.23 [Process underload] (ULd-)

#### Underload process fault



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 the steady state and the torque is below the underload limit value of parameters ([Unld.Thr.0.Speed](LUL), [Unld.Thr.Nom.Speed](LUn) and [Unld. FreqThr. Det.](rMUd)).
- The motor is in the steady state if the difference between the frequency setpoint and motor frequency falls below configurable threshold value [Hysteresis Freq](Srb).



In menu [Input/Output](I\_O-), a relay or logic output can be assigned to the signal for this fault.

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

Code	Name/Description	Setting range	Factory setting
ULd-	<b>[Process underload]</b>		
ULt	<b>[Unld T. Del. Detect]</b> 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  	<b>[Unld.Thr.Nom.Speed]</b> Threshold value for underload when the motor is at nominal frequency ( <b>[Nominal Motor Freq]</b> (FrS)) as a percentage of the nominal torque.	20 to 100%	60%
LUL  	<b>[Unld.Thr.0.Speed]</b> Threshold value for underload for a frequency of zero, as a percentage of nominal torque.	0 to <b>[Unld.Thr.Nom.Speed]</b> (LUn)	0%
rMUd  	<b>[Unld. FreqThr. Det.]</b> Minimum frequency threshold value for underload detection.	0 to 599 Hz	0 Hz
Srb  	<b>[Hysteresis Freq]</b> Maximum deviation between frequency setpoint and motor frequency, defines persistence state.	0.3 to 599 Hz	0.3 Hz
UdL  nO YES rMP FSt	<b>[Underload Mangmt.]</b> Behavior when switching to underload detection. <b>[Ignore]</b> (nO): Ignores the detected fault <b>[Freewheel]</b> (YES): Freewheel <b>[Ramp stop]</b> (rMP): Stopping via ramp <b>[Fast stop]</b> (FSt): Fast stop		<b>[Freewheel]</b> (YES)
FiU  	<b>[UnderV. Restart Tm]</b> This parameter is not available if <b>[Underload Mangmt.]</b> (UdL) is set to <b>[Ignore]</b> (nO). Permissible minimum time frame between underload detection and automatic restart. To enable automatic restart, the value of <b>[Fault Reset Time]</b> (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.

### 5.2.3.6.7.24 [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-	<b>[PROCESS OVERLOAD]</b>		
tOL	<b>[Ovld Time Detect.]</b> 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)	<b>[Ovld Detection Thr.]</b> Overload detection threshold value, as a percentage of the motor nominal current <b>[Rated mot. current]</b> (nCr). For the function to be executed, this value must be lower than the threshold current.	70 to 150%	110%
Srb   (1)	<b>[Hysteresis Freq.Att.]</b> Maximum deviation between frequency setpoint and motor frequency, defines persistence state.	0 to 599 Hz	0.3 Hz
OdL  nO YES rMP FSt	<b>[Ovld.Proces.Mngmt]</b> Behavior on switching to overload detection. <b>[Fault ignored]</b> (nO): Detected error is ignored <b>[Freewheel]</b> (YES): Freewheel <b>[Ramp stop]</b> (rMP): Stopping via ramp <b>[Fast stop]</b> (FSt): Fast stop		<b>[Freewheel]</b> (YES)
FiO   (1)	<b>[Overload T.B.Rest.]</b> This parameter is not available if <b>[Ovld.Proces.Mngmt]</b> (OdL) is set to <b>[Fault ignored]</b> (nO). Permissible minimum timeframe between overload detection and automatic restart. To enable automatic restart, the value of <b>[Max. restart time]</b> (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.]**(FU-).



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.

### 5.2.3.6.7.25 [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-	<b>[FALLBACK SPEED]</b>		
LFF	<b>[Fallback speed]</b> Selection of the fallback speed.	0 to 599 Hz	0 Hz

## 5.2.3.6.7.26 [FAST STOP] (FSt-)

The parameters described on this page are accessed as follows: DRI- > COF > FULL > FLt- > Fst-			
Code	Name/Description	Setting range	Factory settings
FSt-	[FAST STOP]		
dCF <sup>(1)</sup>  	[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) This parameter can also be accessed via menus [SETTINGS](SEt-) and [APPLICATION FUNCT.](FUUn-).











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.

## 5.2.3.6.7.27 [DC BRAKE] (dCI-)

The parameters described on this page are accessed as follows: DRI- > COF > FULL > FLt- > dCI-			
Code	Name/Description	Setting range	Factory settings
dCI-	[DC Injection]		
IdC   (1)(3)	[DC inject. level 1] <b>Note:</b> <b>MOTOR OVERHEATING AND DAMAGE</b> 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 <sup>(2)</sup>	0.64*INV <sup>(2)</sup>
tdI   (1)(3)	[DC injection time 1] <b>Note:</b> <b>MOTOR OVERHEATING AND DAMAGE</b> 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] <b>Note:</b> <b>MOTOR OVERHEATING AND DAMAGE</b> 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 <sup>(2)</sup>	0.5*INV <sup>(2)</sup>
tdC   (1)(3)	[DC injection time 2] <b>Caution!</b> <b>RISK OF DAMAGE TO THE MOTOR</b> <ul style="list-style-type: none"> <li>Lengthy DC braking can cause overheating and damage to the motor.</li> <li>To protect the motor, lengthy DC braking operations must be avoided.</li> </ul> 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.](FUUn-).

(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.



## 5.2.3.6.8.2 [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-	<b>[COM SCAN OUTPUT MAP]</b> [Scan. IN1 address](nCA1) to [Scan. Out4 address](nCA4) can be used for communication scanner fast tasks.		
nCA1	<b>[Scan. Out1 address]</b> Address of output word 1		8.501
nCA2	<b>[Scan.Out2 address]</b> Address of output word 2		8.602
nCA3	<b>[Scan.Out3 address]</b> Address of output word 3		0
nCA4	<b>[Scan.Out4 address]</b> Address of output word 4		0
nCA5	<b>[Scan.Out5 address]</b> Address of output word 5		0
nCA6	<b>[Scan.Out6 address]</b> Address of output word 6		0
nCA7	<b>[Scan.Out7 address]</b> Address of output word 7		0
nCA8	<b>[Scan.Out8 address]</b> Address of output word 8		0

## 5.2.3.6.8.3 [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-	<b>[MODBUS NETWORK]</b>		
Add OFF -	<b>[Modbus Address]</b> [OFF](OFF) 1 to 247	[OFF](OFF) to 247	[OFF](OFF)
AMOC  OFF -	<b>[Modbus add Com. C.]</b> [OFF](OFF) 1 to 247	[OFF](OFF) to 247	[OFF](OFF)
tbr	<b>[Modbus baud rate]</b> 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	<b>[Modbus format]</b> 1 - 8E1 - 8n1, 8n2		[8-E-1](8E1)
ttO	<b>[Time Out]</b> 0.1 to 30 s	0.1 to 30 s	10.0 s
COM1 r0t0 r0t1 r1t0 r1t1	<b>[Mdb com stat]</b> [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.

## 5.2.3.6.8.4 [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-	<b>[CANopen com.]</b>		
AdCO OFF -	<b>[CANopen address]</b> [OFF](OFF): OFF 1 to 127	[OFF](OFF) to 127	[OFF](OFF)
bdCO 50 125 250 500 1M	<b>[CANopen bit rate]</b> [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	<b>[Error code]</b> Read-only parameter, cannot be modified.	0 to 5	-

### 5.2.3.6.8.5 [COMMUNICATION CARD] (Cbd-)

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

Code	Name/Description
Cbd-	<b>[COMMUNICATION CARD]</b> For specific documentation on the card used, see section "Interfaces".

### 5.2.3.6.8.6 [Forced local] (LCF-)

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

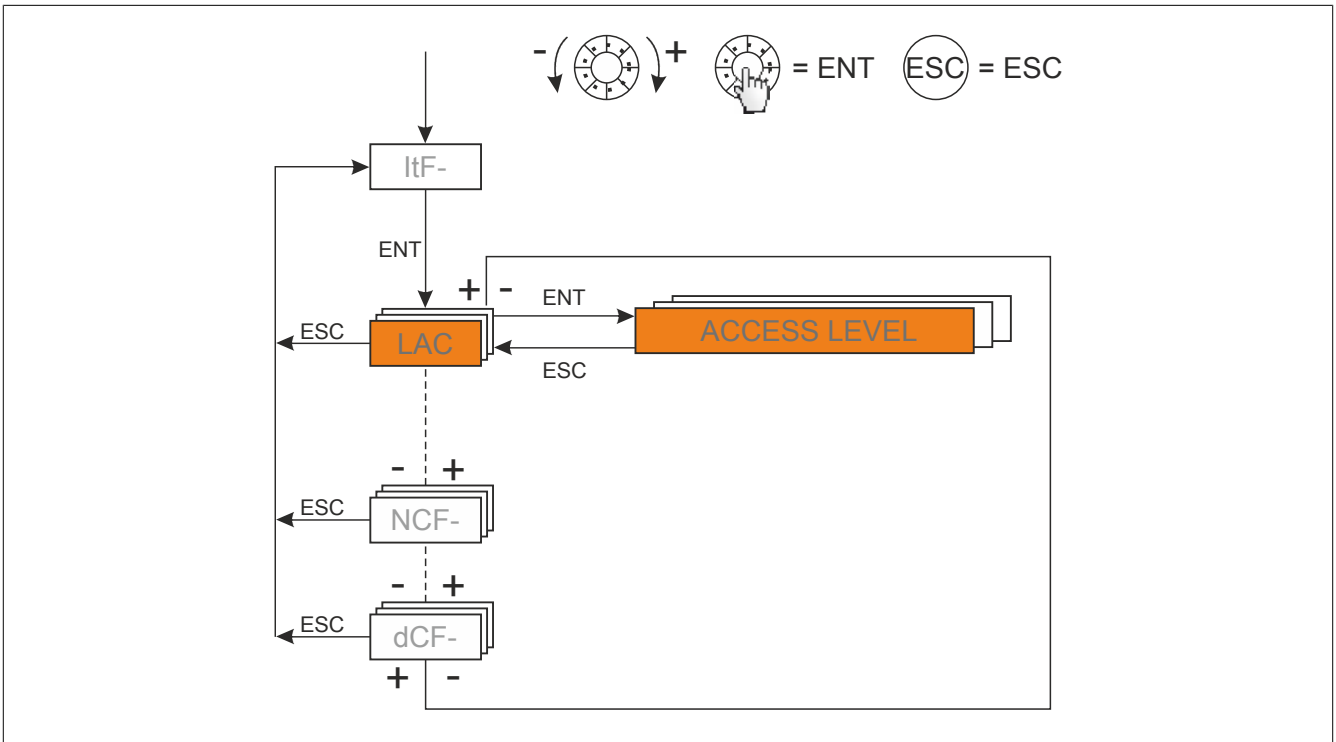
Code	Name/Description	Setting range	Factory settings
LCF-	<b>[Forced local]</b>		
FLO	<b>[Forced local assign.]</b> "Forced local" assignment. Mode "Forced local" is active if the input state is 1. <b>[Forced local assign.]</b> (FLO)is forced to <b>[No]</b> (nO), if <b>[Profile]</b> (CHCF) = <b>[I/O profile]</b> (IO) is set.		<b>[No]</b> (nO)
nO	<b>[No]</b> (nO): Function not active		
LI1	<b>[LI1]</b> (LI1): Logic input LI1		
...	...		
LI6	<b>[LI6]</b> (LI6): Logic input LI6		
LAI1	<b>[LAI1]</b> (LAI1): Logic input AI1		
LAI2	<b>[LAI2]</b> (LAI2): Logic input AI2		
FLOC	<b>[Forced local Ref.]</b> "Forced local" setpoint source assignment.		<b>[No]</b> (nO)
nO	<b>[No]</b> (nO): Not assigned (control via terminals with setpoint of zero).		
AI1	<b>[AI1]</b> (AI1): Analog input		
AI2	<b>[AI2]</b> (AI2): Analog input		
AI3	<b>[AI3]</b> (AI3): Analog input		
LCC	<b>[HMI]</b> (LCC): Assignment of setpoint and control to the graphic display terminal or external operator terminal. Setpoint: <b>[HMI Frequency ref.]</b> (LFr) Control: Buttons RUN/STOP/FWD/REV.		
PI	<b>[RP]</b> (PI): Pulse input		
FLOt	<b>[Time-out forc. local]</b> 0.1 to 30 s. This parameter is accessible if <b>[Forced local assign.]</b> (FLO) is not equal to <b>[No]</b> (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.

## 5.2.4 Interface (ItF)

### 5.2.4.1 [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-). Only one function can be assigned to each input.	
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


		Access level	
[1 DRIVE MENU] (drl-)		Basic bAS	
[1.1 SPEED REFERENCE] (rEF-)			
[1.2 MONITORING] (Mon-)			
	MMO - (Motor monitoring)		
	IOM - (I/O MAP)		
	SAF - (Safety monitoring)		
	CMM - (Communication map)		
	MPI - (PI monitoring)		
	Pet - (Consumption monitoring)		
	Alr - (Alarms) (1)		
	Sst - (Other states) (1)		
	Cod - (Access code) (2)		
[1.3 CONFIGURATION] (COnF)			
	MYMn - [My menu]		
	FCS- (Factory settings)		
	FULL - (All parameters)		
	SIM- (Simple start)		
	Set - (Settings)		
[2 IDENTIFICATION] (Old-) (1)			Standard Std
[3 INTERFACE] (ItF-) (1)			
[3.1 ACCESS LEVEL] (LAC)		Advanced AdU	
[3.2 LANGUAGE] (LnG)			
[4 LOAD/SAVE AS] (trA-) (1)		Expert Epr	
[PASSWORD] (Cod-) (1)			
A single function can be assigned to each input.			
[1 DRIVE MENU] (drl-)	[1.2 MONITORING] (Mon-)	dGt - (Diagnostics)	
	[1.3 CONFIGURATION] (COnF)	FULL - (All parameters)	
		drC - (Drive data)	
		I_O - (Configuration I/O)	
		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)		
A single function can be assigned to each input.			
Expert parameters			
A single function can be assigned to each input.			

- (1) Access only possible with graphic display
- (2) Access only possible with handheld (7 segment display)

### 5.2.4.2 [3.2 LANGUAGE] (LnG)

LANGUAGE
English
Français ✓
Deutsch
Italiano
Español
Chinese
Русский
Türkçe

When only one selection is possible, the selected item is indicated by the ✓.  
Example: Only one language can be chosen.

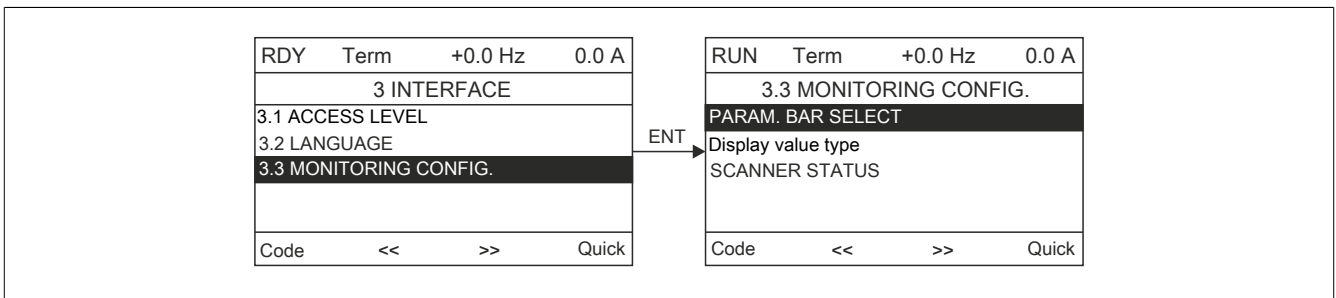
The parameters described on this page are accessed as follows: DRI- > ITF > LnG		
Code	Name/Description	Clear all
LnG	<b>[3.2 LANGUAGE]</b>	<b>[Language 0](LnG0)</b>
	Languages currently available.	
LnG0	<b>[Language 0] (LnG0)</b>	
...	...	
LnG9	<b>[Language 9](LnG9)</b>	



Parameter that can be modified during operation or when stopped.

### 5.2.4.3 [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.

<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>RUN</th> <th>Term</th> <th>+0.0 Hz</th> <th>0.0 A</th> </tr> </thead> <tbody> <tr> <td colspan="4" style="text-align: center;">3.3 MONITORING CONFIG.</td> </tr> <tr> <td colspan="4" style="text-align: center;"><b>PARAM. BAR SELECT</b></td> </tr> <tr> <td colspan="4" style="text-align: center;">Display value type</td> </tr> <tr> <td colspan="4" style="text-align: center;">CONFIG. STATUS COM</td> </tr> <tr> <td>Code</td> <td>&lt;&lt;</td> <td>&gt;&gt;</td> <td>Quick</td> </tr> </tbody> </table>	RUN	Term	+0.0 Hz	0.0 A	3.3 MONITORING CONFIG.				<b>PARAM. BAR SELECT</b>				Display value type				CONFIG. STATUS COM				Code	<<	>>	Quick
RUN	Term	+0.0 Hz	0.0 A																					
3.3 MONITORING CONFIG.																								
<b>PARAM. BAR SELECT</b>																								
Display value type																								
CONFIG. STATUS COM																								
Code	<<	>>	Quick																					

**[PARAM. BAR SELECT]**  
Selection of 1 to 2 parameters in the upper row (the first two parameters cannot be changed).

**[Display value type]**  
Selection of the parameters displayed in the center 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-	<b>[3.3 MONITORING CONFIG.]</b>												
PbS-	<p><b>[PARAM. BAR SELECT]</b></p> <p>[Al1Ref] in V                      [Al2Ref] in V                      [Al3Ref] 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</p> <p>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.</p> <p>Example:</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="text-align: center; padding: 2px;">PARAM. BAR SELECTED</td> </tr> <tr> <td colspan="2" style="text-align: center; padding: 2px;">MONITORING</td> </tr> <tr> <td style="padding: 2px;">-----</td> <td style="text-align: right; padding: 2px;"><input checked="" type="checkbox"/></td> </tr> <tr> <td style="padding: 2px;">-----</td> <td style="text-align: right; padding: 2px;"><input type="checkbox"/></td> </tr> <tr> <td style="padding: 2px;">-----</td> <td style="text-align: right; padding: 2px;"><input type="checkbox"/></td> </tr> <tr> <td style="padding: 2px;">-----</td> <td style="text-align: right; padding: 2px;"><input checked="" type="checkbox"/></td> </tr> </table> </div>	PARAM. BAR SELECTED		MONITORING		-----	<input checked="" type="checkbox"/>	-----	<input type="checkbox"/>	-----	<input type="checkbox"/>	-----	<input checked="" type="checkbox"/>
PARAM. BAR SELECTED													
MONITORING													
-----	<input checked="" type="checkbox"/>												
-----	<input type="checkbox"/>												
-----	<input type="checkbox"/>												
-----	<input checked="" type="checkbox"/>												

## 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	<p>[PARAMETER SELECTION]</p> <p>[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 (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</p> <p>Parameters are selected or deselected using ENT (a ✓ appears next to the parameter when it is selected).</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;">PARAM. BAR SELECTED</p> <p style="text-align: center;">MONITORING</p> <table style="width: 100%; border-collapse: collapse;"> <tr><td style="border-bottom: 1px dashed black; width: 80%;"></td><td style="text-align: center; width: 10%;"><input checked="" type="checkbox"/></td></tr> <tr><td style="border-bottom: 1px dashed black;"></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td style="border-bottom: 1px dashed black;"></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td style="border-bottom: 1px dashed black;"></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td style="border-bottom: 1px dashed black;"></td><td style="text-align: center;"><input checked="" type="checkbox"/></td></tr> </table> </div> <p>Examples:</p> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <p>Display of two digital values</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: left;">RUN</td><td style="text-align: left;">Term</td><td style="text-align: left;">+35.0 Hz</td><td style="text-align: left;">80.0 A</td></tr> <tr><td colspan="4" style="text-align: center;">Motor speed</td></tr> <tr><td colspan="4" style="text-align: center; font-size: 1.2em;">1250 rpm</td></tr> <tr><td colspan="4" style="text-align: center;">Motor current</td></tr> <tr><td colspan="4" style="text-align: center; font-size: 1.2em;">80 A</td></tr> <tr><td colspan="4" style="text-align: right;">Quick</td></tr> </table> </div> <div style="text-align: center;"> <p>Display of two bar graphs</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: left;">RUN</td><td style="text-align: left;">Term</td><td style="text-align: left;">+35.0 Hz</td><td style="text-align: left;">80.0 A</td></tr> <tr><td colspan="4" style="text-align: center;">Min Motor speed Max</td></tr> <tr><td colspan="4" style="text-align: center;">0 1250 rpm 1500</td></tr> <tr><td colspan="4" style="text-align: center;">[Bar graph showing 1250 rpm]</td></tr> <tr><td colspan="4" style="text-align: center;">Min Motor current Max</td></tr> <tr><td colspan="4" style="text-align: center;">0 80 A 150</td></tr> <tr><td colspan="4" style="text-align: center;">[Bar graph showing 80 A]</td></tr> <tr><td colspan="4" style="text-align: right;">Quick</td></tr> </table> </div> <div style="text-align: center;"> <p>Display of a list of five values</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: left;">RUN</td><td style="text-align: left;">Term</td><td style="text-align: left;">+35.0 Hz</td><td style="text-align: left;">80.0 A</td></tr> <tr><td colspan="4" style="text-align: center;">1.2 MONITORING</td></tr> <tr><td colspan="2">Frequency ref.:</td><td colspan="2" style="text-align: right;">50.1 Hz</td></tr> <tr><td colspan="2">Motor current:</td><td colspan="2" style="text-align: right;">80 A</td></tr> <tr><td colspan="2">Motor speed:</td><td colspan="2" style="text-align: right;">1250 rpm</td></tr> <tr><td colspan="2">Motor thermal state:</td><td colspan="2" style="text-align: right;">80%</td></tr> <tr><td colspan="2">Drv thermal state</td><td colspan="2" style="text-align: right;">80%</td></tr> <tr><td colspan="4" style="text-align: right;">Quick</td></tr> </table> </div> </div>		<input checked="" type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>	RUN	Term	+35.0 Hz	80.0 A	Motor speed				1250 rpm				Motor current				80 A				Quick				RUN	Term	+35.0 Hz	80.0 A	Min Motor speed Max				0 1250 rpm 1500				[Bar graph showing 1250 rpm]				Min Motor current Max				0 80 A 150				[Bar graph showing 80 A]				Quick				RUN	Term	+35.0 Hz	80.0 A	1.2 MONITORING				Frequency ref.:		50.1 Hz		Motor current:		80 A		Motor speed:		1250 rpm		Motor thermal state:		80%		Drv thermal state		80%		Quick				
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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-

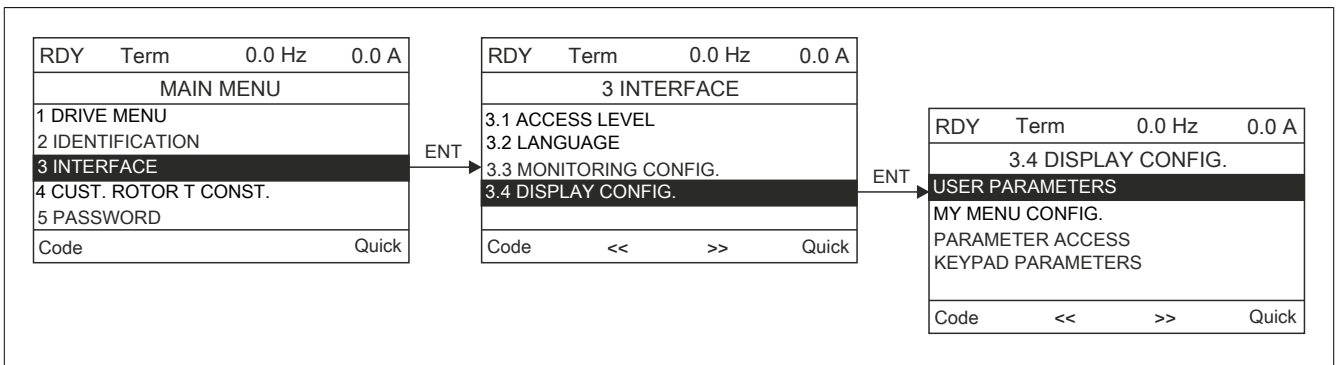
Code	Name/Description	Factory settings																												
AdL-	<b>[COM. MAP CONFIG.]</b>																													
IAd1	<b>[Word IAd1 1 add. select.]</b> Select the address of the word to be displayed when you press the << and >> keys (F2 and F3) or turn the handwheel.	0																												
FAd1	<b>[Format word 1]</b> Format of word 1.	<b>[Hex](HE )</b>																												
HE	<b>[Hex](HE )</b>																													
SIG	<b>[Signed](SIG)</b>																													
nSG	<b>[Unsigned](nSG)</b>																													
IAd2	<b>[Word 2 add. select.]</b> Select the address of the word to be displayed when you press the << and >> keys (F2 and F3) or turn the handwheel.	0																												
FAd2	<b>[Format word 2]</b> Format of word 2.	<b>[Hex](HE )</b>																												
HE	<b>[Hex](HE )</b>																													
SIG	<b>[Signed](SIG)</b>																													
nSG	<b>[Unsigned](nSG)</b>																													
IAd3	<b>[Word 3 add. select.]</b> Select the address of the word to be displayed when you press the << and >> keys (F2 and F3) or turn the handwheel.	0																												
FAd3	<b>[Format word 3]</b> Format of word 3.	<b>[Hex](HE )</b>																												
HE	<b>[Hex](HE )</b>																													
SIG	<b>[Signed](SIG)</b>																													
nSG	<b>[Unsigned](nSG)</b>																													
IAd4	<b>[Word 4 add. select.]</b> Select the address of the word to be displayed when you press the << and >> keys (F2 and F3) or turn the handwheel.	0																												
FAd4	<b>[Format word 4]</b> Format of word 4.	<b>[Hex](HE )</b>																												
HE	<b>[Hex](HE )</b>																													
SIG	<b>[Signed](SIG)</b>																													
nSG	<b>[Unsigned](nSG)</b>																													
	The selected words can then be displayed in sub-menu <b>[COMMUNICATION MAP]</b> of menu <b>[1.2 MONITORING]</b> . Example:																													
	<table border="1"> <tr> <td>RUN</td> <td>Term</td> <td>+35.0 Hz</td> <td>80.0 A</td> </tr> <tr> <td colspan="4" style="text-align: center;">COMMUNICATION MAP</td> </tr> <tr> <td colspan="4" style="text-align: center;">-----</td> </tr> <tr> <td colspan="4" style="text-align: center;">-----</td> </tr> <tr> <td colspan="2">W3141:</td> <td colspan="2">F230 Hex</td> </tr> <tr> <td colspan="2" style="text-align: center;">&lt;&lt;</td> <td colspan="2" style="text-align: center;">&gt;&gt;</td> </tr> <tr> <td colspan="2"></td> <td colspan="2" style="text-align: right;">Quick</td> </tr> </table>	RUN	Term	+35.0 Hz	80.0 A	COMMUNICATION MAP				-----				-----				W3141:		F230 Hex		<<		>>				Quick		
RUN	Term	+35.0 Hz	80.0 A																											
COMMUNICATION MAP																														
-----																														
-----																														
W3141:		F230 Hex																												
<<		>>																												
		Quick																												



Parameter that can be modified during operation or when stopped.

### 5.2.4.4 [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.

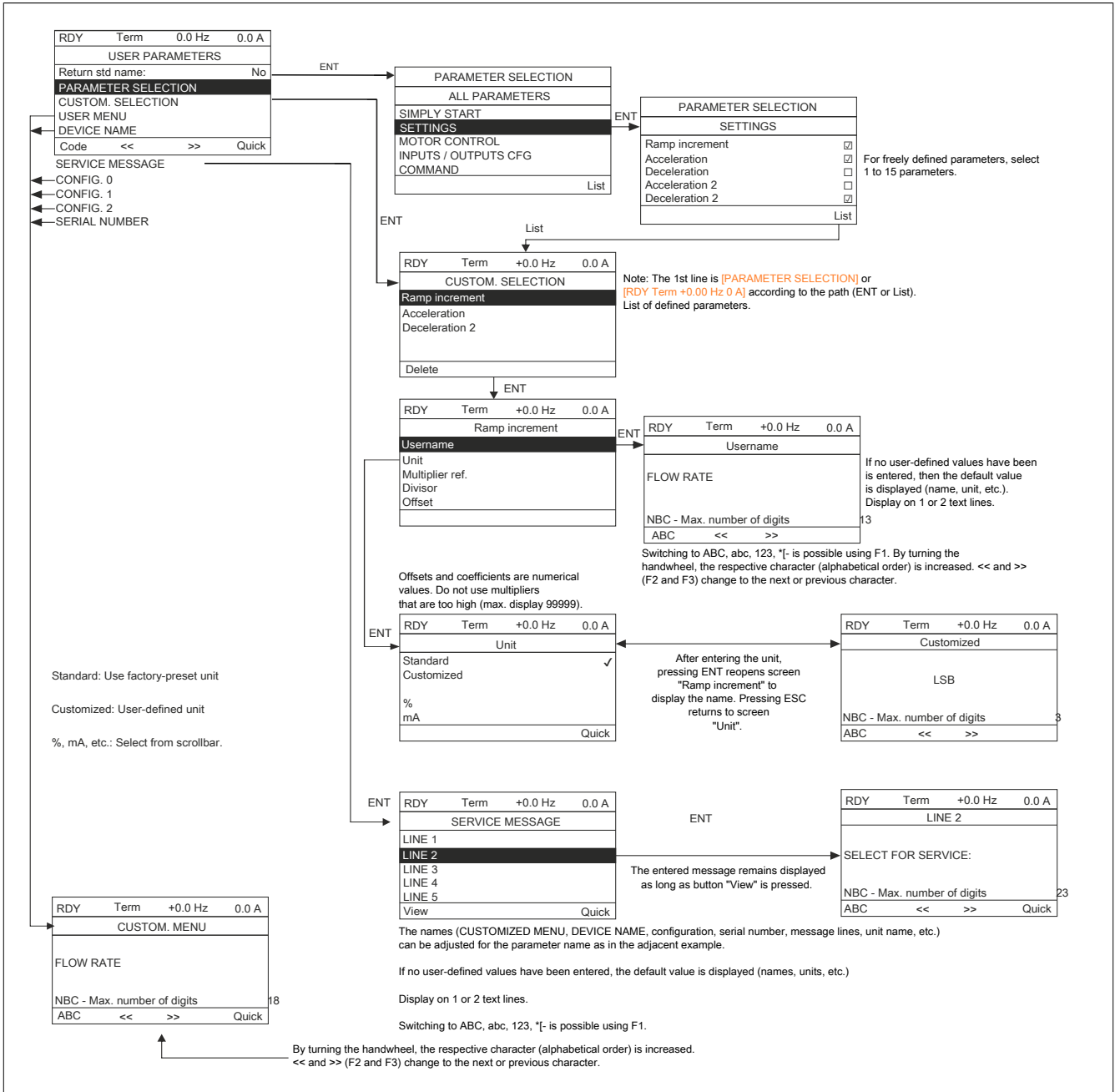


- USER PARAMETERS: Customization of 1 to 15 parameters.
- USER MENU: Creation of a user-defined menu.
- PARAMETER ACCESS: Customization of the visibility and protection mechanisms of menus and parameters.
- KEYPAD PARAMETERS: Adjustment of the contrast and stand-by mode of the graphic display terminal (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.



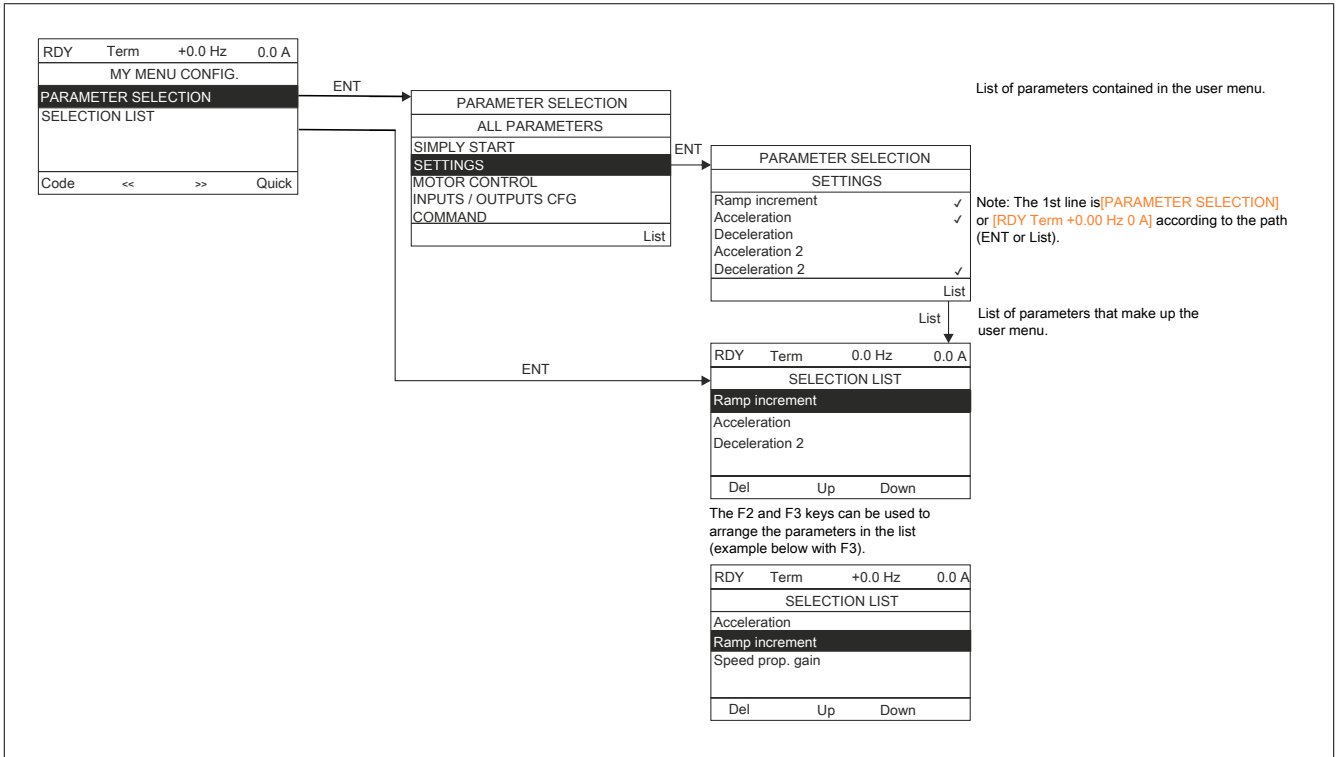
**The parameters described on this page are accessed as follows: DRI- > ITF > dCF- > CUP-**

Code	Name/Description	Factory settings
CUP-	<b>[USER PARAMETERS]</b>	
GSP	<b>[Return std name]</b>	[No](nO)
	Displaying standard parameters instead of user-defined parameters.	
nO	[No](nO)	
YES	[YES](YES)	
MYMN	<b>[USER MENU]</b>	
PAn	<b>[DEVICE NAME]</b>	
SEr-	<b>[SERVICE MESSAGE]</b>	
SML01	<b>[LINE 1]</b>	
SML02	<b>[LINE 2]</b>	
SML03	<b>[LINE 3]</b>	
SML04	<b>[LINE 4]</b>	
SML05	<b>[LINE 5]</b>	
CFN01	<b>[CONFIG. 0]</b>	
CFN02	<b>[CONFIG. 1]</b>	
CFN03	<b>[CONFIG. 2]</b>	
PSn	<b>[SERIAL NUMBER]</b>	



Parameter that can be modified during operation or when stopped.

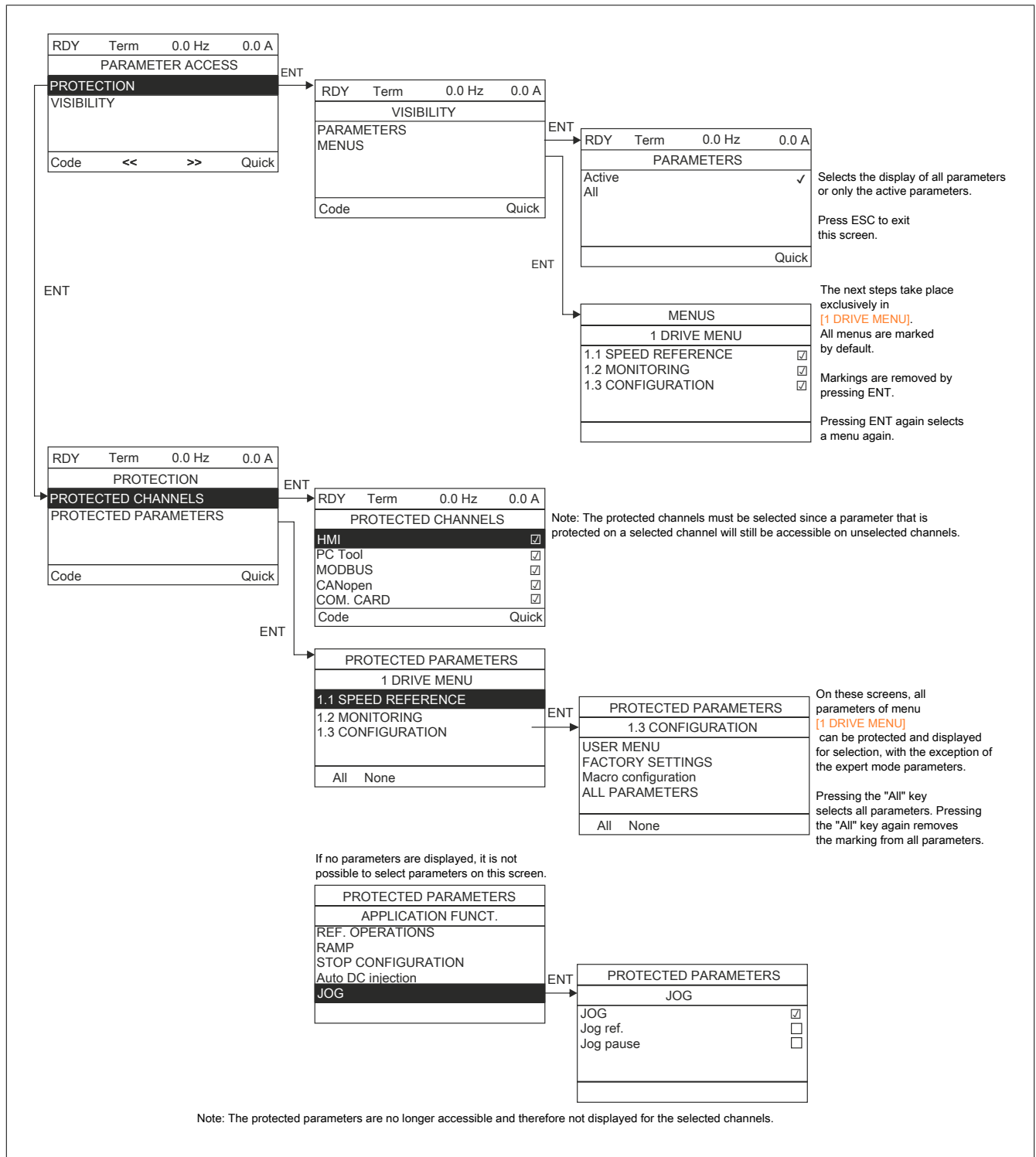
### My menu config.



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]
CO n	[HMI](CO n): Graphic display terminal or external operator terminal
P S	[PC Tool](P S): PC software
Mdb	[Modbus](Mdb): Integrated Modbus
CAn	[CANopen com.](CAn): Integrated CANopen®
nEt	[Com. card](nEt): Communication card (if used)

## The drive

The parameters described on this page are accessed as follows: DRI- > ITF > dCF- > pAC- > VIS-

Code	Name/Description	Factory settings
VIS-	<b>[VISIBILITY]</b>	
PVIS	<b>[PARAMETERS]</b>	<b>[Active](ACT)</b>
	Parameter display: Active parameters only, or all parameters.	
ACt	<b>[Active](ACT)</b>	
ALL	<b>[ALL](ALL)</b>	



Parameter that can be modified during operation or when stopped.

## Terminal parameters

<table border="1"> <tr> <td>RDY</td> <td>Term</td> <td>0.0 Hz</td> <td>0.0 A</td> </tr> <tr> <td colspan="4" style="text-align: center;">KEYPAD PARAMETERS</td> </tr> <tr> <td colspan="2">Keypad contrast:</td> <td colspan="2" style="text-align: right;">50%</td> </tr> <tr> <td colspan="2">Keypad stand-by:</td> <td colspan="2" style="text-align: right;">5 min</td> </tr> <tr> <td>Code</td> <td>&lt;&lt;</td> <td>&gt;&gt;</td> <td>Quick</td> </tr> </table>	RDY	Term	0.0 Hz	0.0 A	KEYPAD PARAMETERS				Keypad contrast:		50%		Keypad stand-by:		5 min		Code	<<	>>	Quick
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-

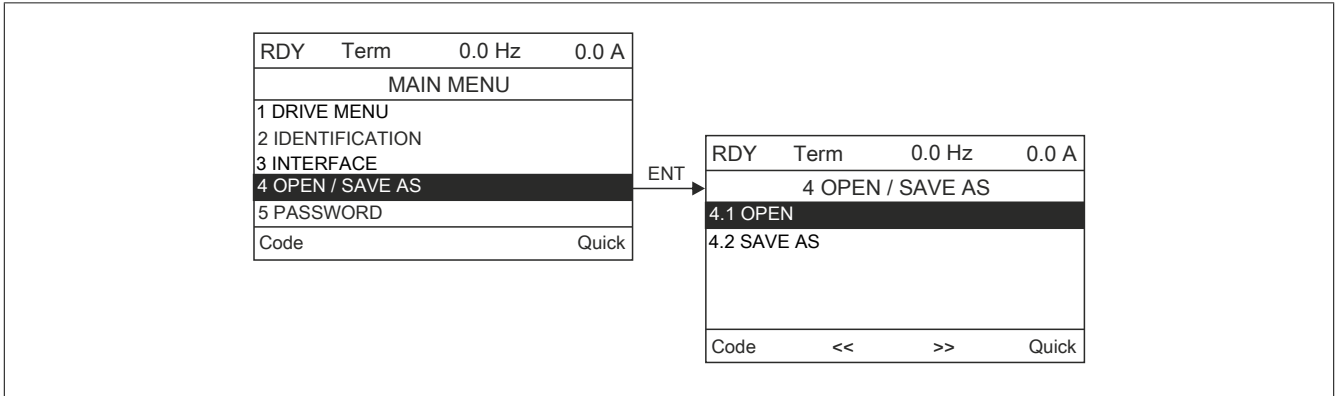
Code	Name/Description	Setting range	Factory settings
CnL-	<b>[KEYPAD PARAMETERS]</b>		
CrSt	<b>[Keypad contrast]</b>	0 to 100%	50%
	Contrast setting for the keyboard.		
CSbY	<b>[Keypad stand-by]</b>	<b>[No](nO)</b> up to 10 min	5 min
	Delay setting for keyboard standby.		
nO	<b>[No](nO): No</b>		



Parameter that can be modified during operation or when stopped.

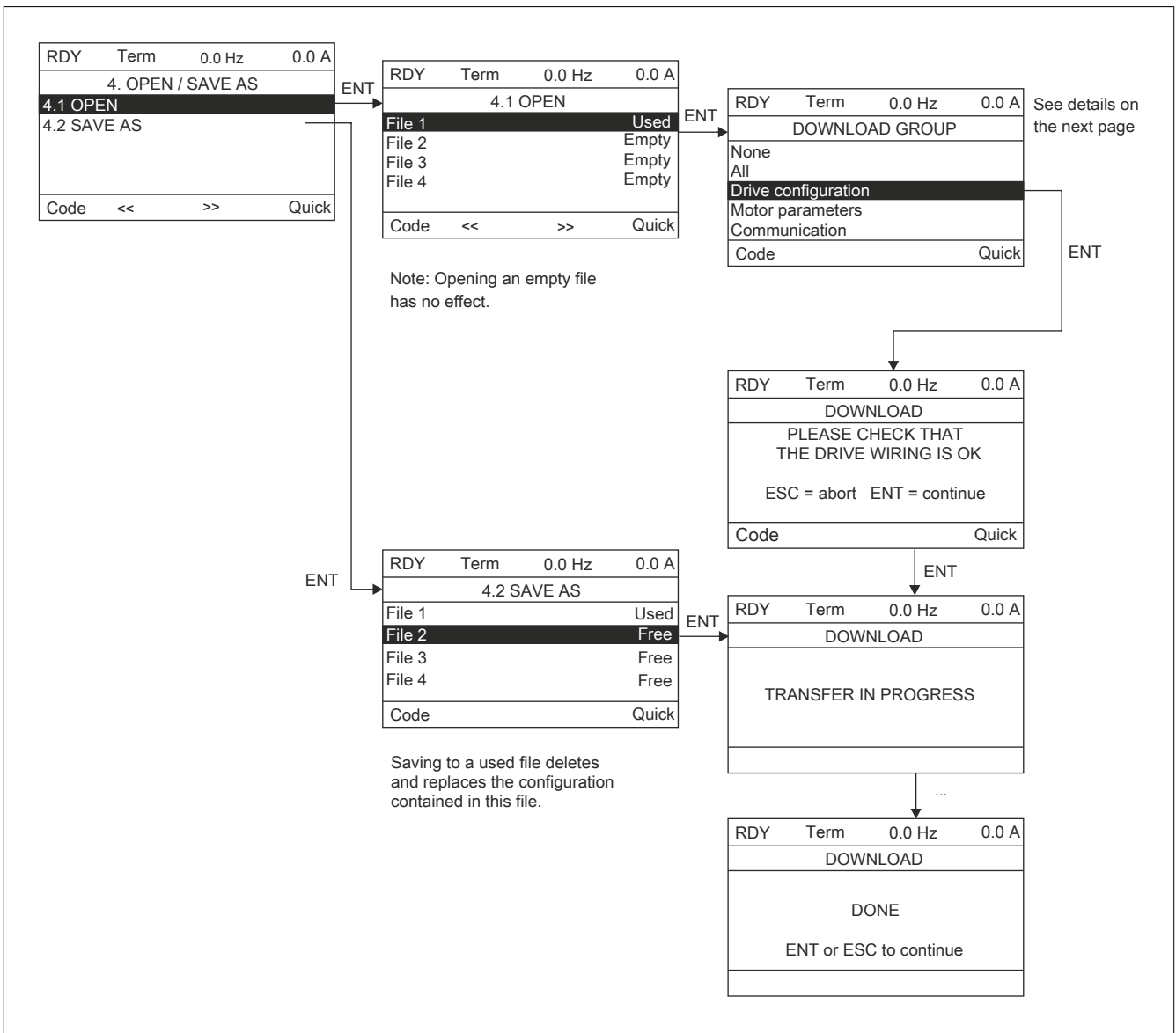
### 5.2.5 Load / Save as (trA)

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:

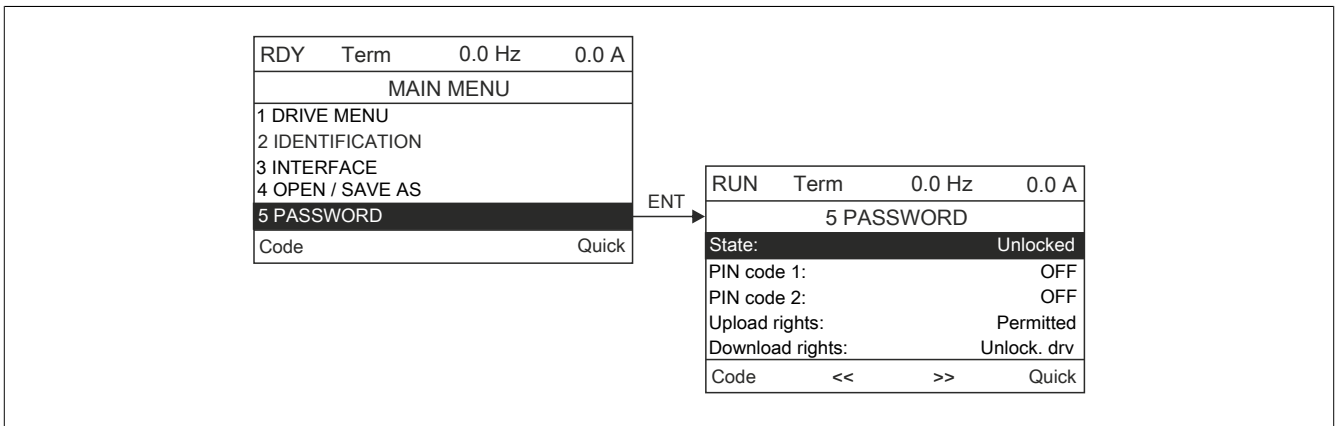
- **[DOWNLOAD IS ACTIVE]**
- **[DOWNLOAD COMPLETE]**
- Error messages if download not possible
- **[Motor parameters are NOT COMPATIBLE. Proceed?]**: In this case the download is possible, but the parameters will be restricted.

**DOWNLOAD GROUP**

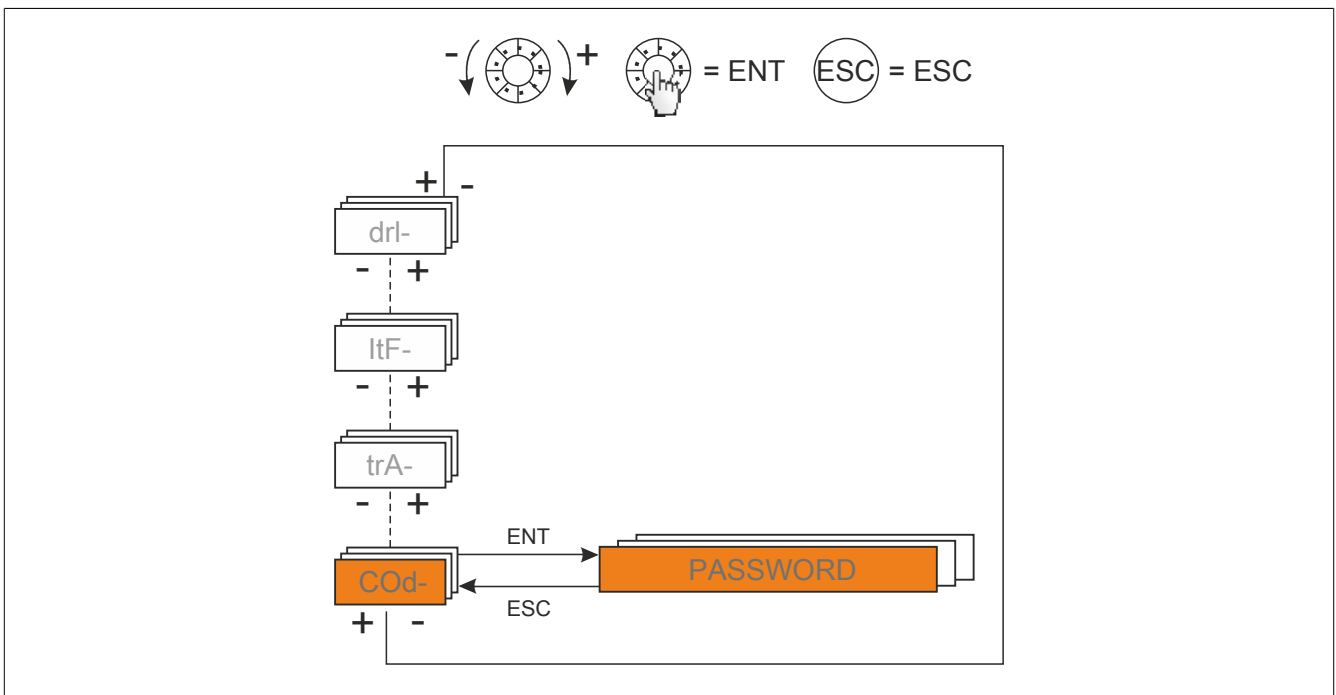
<b>[No]:</b>		No parameters
<b>[ALL]:</b>		All parameters in all menus
<b>[Drive configuration]</b>		The entire menu <b>[1 INVERTER MENU]</b> without <b>[COMMUNICATION]</b>
<b>[Motor param]:</b>	<b>[Rated motor volt.]</b> (UnS)	In menu <b>[MOTOR CONTROL]</b> (drC-)
	<b>[Rated motor freq.]</b> (FrS)	
	<b>[PSI align curr. max.]</b> (NCr)	
	<b>[Rated motor speed]</b> (nSP)	
	<b>[Motor 1 Cosinus Phi]</b> (COS)	
	<b>[Rated motor power]</b> (nPr)	
	<b>[Motor param choice]</b> (MPC)	
	<b>[Tune selection]</b> (StUn)	
	<b>[Mot. therm. current]</b> (ItH)	
	<b>[IR compensation]</b> (UFr)	
	<b>[Slip compensation]</b> (SLP)	
	<b>[Cust stator resist.]</b> (rSA)	
	<b>[Lfw]</b> (LFA)	
	<b>[Cust. rotor t const.]</b> (trA)	
	<b>[Nominal I sync.]</b> (nCrS)	
	<b>[Nom motor spdsync]</b> (nSPS)	
	<b>[Pole pairs]</b> (PPnS)	
	<b>[Syn. EMF constant]</b> (PHS)	
	<b>[Autotune L d-axis]</b> (LdS)	
	<b>[INDUCT: Lq axis]</b> (LqS)	
	<b>[Nominal freq sync.]</b> (FrSS)	
	<b>[Cust. stator R syn]</b> (rSAS)	
	<b>[Motor torque]</b> (tqS)	
	<b>[Freq. Pkt 1 5Pt UF]</b> (U1)	
	<b>[F1]</b> (F1)	
	<b>[Volt. Pt 2 5Pt UF]</b> (U2)	
	<b>[Freq Pt 2 5Pt UF]</b> (F2)	
	<b>[Volt. Pt 3 5Pt UF]</b> (U3)	
	<b>[Freq Pt 3 5Pt UF]</b> (F3)	
	<b>[Volt. Pt 4 5Pt UF]</b> (U4)	
	<b>[Freq Pt 4 5Pt UF]</b> (F4)	
	<b>[Volt. Pt 5 5Pt UF]</b> (U5)	
	<b>[Freq Pt 5 5Pt UF]</b> (F5)	
	<b>[Expert]</b> (EPr)	
	<b>[Mot. therm. current]</b> (ItH)	Menu <b>[SETTINGS]</b> (SEt-)
<b>[Communication]:</b>		All parameters of menu <b>[COMMUNICATION]</b>

### 5.2.6 Access code (COd)

With graphic display terminal:

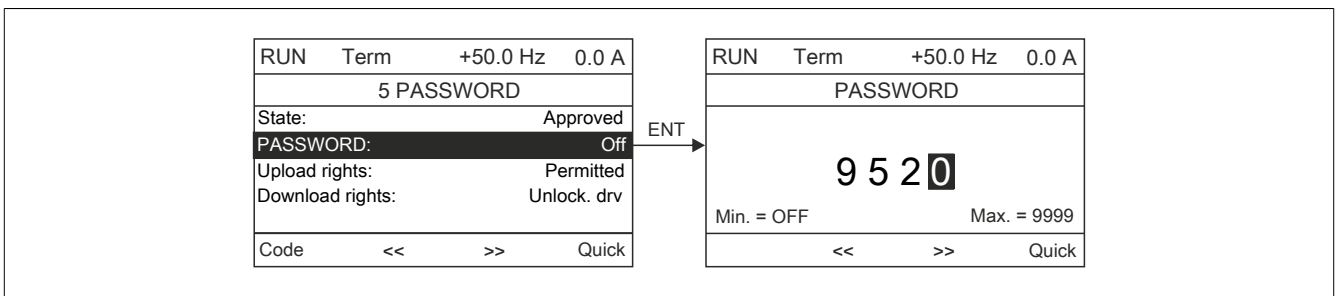


With integrated display terminal



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).

## Note:

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-	<b>[PASSWORD]</b>		
CSt	<b>[State]</b> Information parameter, cannot be modified.		<b>[Unlocked]</b> (ULC)
LC	<b>[Locked]</b> (LC): The inverter is locked by an access code.		
ULC	<b>[Unlocked]</b> (ULC): The inverter is not locked by an access code.		
COd	<b>[PASSWORD]</b> 1st access code. The value <b>[OFF]</b> (OFF) indicates that no access code has been set to <b>[Unlocked]</b> (ULC). The value <b>[ON]</b> (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.	<b>[OFF]</b> (OFF) to 9,999	<b>[OFF]</b> (OFF)
COd2	<b>[PIN code 2]</b> This parameter can only be activated in mode <b>[Expert]</b> (EPr). 2nd access code. The value <b>[OFF]</b> (OFF) indicates that no access code has been set to <b>[Unlocked]</b> (ULC). The value <b>[ON]</b> (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 <b>[PIN code 2]</b> (COd2) is not set to <b>[OFF]</b> (OFF), only menu <b>[1.2 MONITORING]</b> (MOn-) is displayed. If <b>[PIN code 2]</b> (COd2) is set to <b>[OFF]</b> (OFF), all menus are displayed.  If the display settings in menu <b>[3.4 DISPLAY CONFIG.]</b> (dCF-) are changed and <b>[PIN code 2]</b> (COd2) is not set to <b>[OFF]</b> (OFF), the configured display is retained. If <b>[PIN code 2]</b> (COd2) is set to "Off" (inverter unlocked), the display configured in menu <b>[3.4 DISPLAY CONFIG.]</b> (dCF-) is retained.	<b>[OFF]</b> (OFF) to 9,999	<b>[OFF]</b> (OFF)
ULr	<b>[Upload rights]</b> Read or copy the current configuration in the inverter.		<b>[Permitted]</b> (ULr0)
ULr0	<b>[Permitted]</b> (ULr0): The current configuration of the inverter can be loaded into the graphic terminal or the PC software.		
ULr1	<b>[Not allowed]</b> (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	<b>[Download rights]</b> Writes the current configuration to the inverter or downloads a configuration to the inverter.		<b>[Unlock. drv]</b> (dLr1)
dLr0	<b>[Locked drv]</b> (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	<b>[Unlock. drv]</b> (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	<b>[Not allowed]</b> (dLr2): Download not allowed.		
dLr3	<b>[Lock/unlock]</b> (dLr3): Combination of <b>[Locked drv]</b> (dLr0) and <b>[Unlock. drv]</b> (dLr1).		

## 5.3 Maintenance and diagnostics

### 5.3.1 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

### Note:

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](http://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.

### Note:

#### 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.

### Note:

For additional information, see chapter 4.3.3 "Forming DC bus capacitors" on page 44.

### 5.3.2 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.

#### 5.3.2.1 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-	<b>[DIAGNOSTICS]</b> 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.

#### 5.3.2.2 Clearing the fault

In the event of an error being detected, perform the following:

- 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 inverter LEDs cannot indicate whether there is no more DC bus voltage).
- 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.
- Reinststate 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 as follows:

- 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)).

### 5.3.2.3 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	<b>[Load slipping]</b>	<ul style="list-style-type: none"> <li>The difference between the output frequency and the speed feedback is not correct.</li> </ul>	<ul style="list-style-type: none"> <li>Check motor, gain and stability parameters.</li> <li>Add a braking resistor.</li> <li>Check the sizing of the motor/inverter/load.</li> <li>Check the mechanical connection and wiring of the encoder.</li> <li>Check the parameter setting.</li> </ul>
ASF	<b>[Angle Error]</b>	<ul style="list-style-type: none"> <li>This error occurs during measurement of the phase shift angle if the motor phase has failed or motor induction is too high.</li> </ul>	<ul style="list-style-type: none"> <li>Check the speed control parameters.</li> <li>Check the motor phases and the maximum permissible current for the inverter.</li> </ul>
brF	<b>[Brake feedback]</b>	<ul style="list-style-type: none"> <li>The brake feedback contact does not match the brake logic.</li> <li>The brake does not stop the motor fast enough (detected by measuring the speed on the pulse input).</li> </ul>	<ul style="list-style-type: none"> <li>Check the feedback circuit path and the brake control circuit.</li> <li>Check the mechanical state of the brake.</li> <li>Check the condition of the brake lining.</li> </ul>
CrF1	<b>[Precharge]</b>	<ul style="list-style-type: none"> <li>Charging relay control error or charging resistor damaged.</li> </ul>	<ul style="list-style-type: none"> <li>Turn the inverter off and then on again.</li> <li>Check internal connections.</li> <li>Contact B&amp;R Product Support.</li> </ul>
EEF1	<b>[Control Eeprom]</b>	<ul style="list-style-type: none"> <li>Internal memory error, control block.</li> </ul>	<ul style="list-style-type: none"> <li>Check the environment (electromagnetic compatibility).</li> <li>Switch the inverter off, then switch back on again, restore factory settings.</li> <li>Contact B&amp;R Product Support.</li> </ul>
EEF2	<b>[Power Eeprom]</b>	<ul style="list-style-type: none"> <li>Internal memory fault, power card</li> </ul>	
FCF1	<b>[Output contactor closed]</b>	<ul style="list-style-type: none"> <li>The output contactor remains closed, even though the conditions for opening the contactor are met.</li> </ul>	<ul style="list-style-type: none"> <li>Check the contactor and its wiring.</li> <li>Check the feedback circuit path.</li> </ul>
HdF	<b>[IGBT desaturation]</b>	<ul style="list-style-type: none"> <li>Short circuit or grounding at the inverter output.</li> </ul>	<ul style="list-style-type: none"> <li>Check the connection cables from the inverter to the motor and the motor insulation.</li> </ul>
ILF	<b>[Internal com. link]</b>	<ul style="list-style-type: none"> <li>Communication between option card and inverter interrupted.</li> </ul>	<ul style="list-style-type: none"> <li>Check the environment (electromagnetic compatibility).</li> <li>Check the connections.</li> <li>Replace the option card.</li> <li>Contact B&amp;R Product Support.</li> </ul>
InF1	<b>[FI size error]</b>	<ul style="list-style-type: none"> <li>The power card is different from the saved power card.</li> </ul>	<ul style="list-style-type: none"> <li>Check the power card reference type.</li> </ul>
InF2	<b>[Incompatible PB]</b>	<ul style="list-style-type: none"> <li>The power card is incompatible with the control block.</li> </ul>	<ul style="list-style-type: none"> <li>Check the reference of the power card and its compatibility.</li> </ul>
InF3	<b>[Internal serial link]</b>	<ul style="list-style-type: none"> <li>Communication between the internal cards interrupted.</li> </ul>	<ul style="list-style-type: none"> <li>Check internal connections.</li> <li>Contact B&amp;R Product Support.</li> </ul>
InF4	<b>[Internal-mftg zone]</b>	<ul style="list-style-type: none"> <li>Internal data inconsistent.</li> </ul>	<ul style="list-style-type: none"> <li>Recalibrate the inverter (through B&amp;R customer service).</li> </ul>
InF6	<b>[Internal - fault option]</b>	<ul style="list-style-type: none"> <li>The option installed in the inverter is not recognized.</li> </ul>	<ul style="list-style-type: none"> <li>Check the option type and compatibility.</li> </ul>
InF9	<b>[Internal- I measure]</b>	<ul style="list-style-type: none"> <li>The current measurements are not correct.</li> </ul>	<ul style="list-style-type: none"> <li>Replace the current transmitter or power card.</li> <li>Contact B&amp;R Product Support.</li> </ul>
InFA	<b>[Internal-mains circuit]</b>	<ul style="list-style-type: none"> <li>The input stage is not operating correctly.</li> </ul>	<ul style="list-style-type: none"> <li>Contact B&amp;R Product Support.</li> </ul>
InFb	<b>[Internal- th. sensor]</b>	<ul style="list-style-type: none"> <li>The inverter's temperature sensor is not operating correctly.</li> </ul>	<ul style="list-style-type: none"> <li>Replace the inverter's temperature sensor.</li> <li>Contact B&amp;R Product Support.</li> </ul>
InFE	<b>[internal- CPU]</b>	<ul style="list-style-type: none"> <li>Internal microprocessor error.</li> </ul>	<ul style="list-style-type: none"> <li>Switch off and reset.</li> <li>Contact B&amp;R Product Support.</li> </ul>
OCF	<b>[Overcurrent]</b>	<ul style="list-style-type: none"> <li>Parameters in menu <b>[SETTINGS]</b> (SEt-) and <b>[MOTOR CONTROL]</b> (drC-) are not correct.</li> <li>Inertia or load too high.</li> <li>Mechanical block.</li> </ul>	<ul style="list-style-type: none"> <li>Check the parameters.</li> <li>Check the sizing of the motor/inverter/load.</li> <li>Check the state of the mechanism.</li> <li>Lower the value set in <b>[Overcurrent]</b> (CLI).</li> <li>Increase the clock frequency.</li> </ul>
SAFF	<b>[Safety fault]</b>	<ul style="list-style-type: none"> <li>Debounce time exceeded.</li> <li>SS1 trigger threshold value exceed.</li> <li>Incorrect configuration:</li> <li>SLS overspeed triggering detected.</li> </ul>	<ul style="list-style-type: none"> <li>Check the configuration of the safety functions.</li> <li>Check the information provided in chapter "Safety functions" of the ACOPOSinverter manual.</li> <li>Contact B&amp;R Product Support.</li> </ul>
SCF1	<b>[Motor short circuit]</b>	<ul style="list-style-type: none"> <li>Short circuit or grounding at the inverter output.</li> </ul>	<ul style="list-style-type: none"> <li>Check the connection cables from the inverter to the motor and the motor insulation.</li> <li>Reduce the clock frequency.</li> <li>Connect the motor throttles in series.</li> <li>Check speed control and brake setting.</li> <li>Increase the <b>[Time to restart]</b> (ttr).</li> <li>Increase the clock frequency.</li> </ul>

## The drive

Error	Name	Probable cause	Correcting errors
SCF3	<b>[Ground short circuit]</b>	<ul style="list-style-type: none"> <li>Significant discharge current if several motors are connected in parallel.</li> </ul>	<ul style="list-style-type: none"> <li>Check the connection cables from the inverter to the motor and the motor insulation.</li> <li>Reduce the clock frequency.</li> <li>Connect the motor throttles in series.</li> <li>Check speed control and brake setting.</li> <li>Increase the <b>[Time to restart]</b> (ttr).</li> <li>Reduce the clock frequency.</li> </ul>
SOF	<b>[Overspeed]</b>	<ul style="list-style-type: none"> <li>Instability or driving load too high.</li> </ul>	<ul style="list-style-type: none"> <li>Check the parameters for motor, gain and stability.</li> <li>Add braking resistor.</li> <li>Check the sizing of the motor/inverter/load.</li> <li>Check the parameter settings for function <b>[FREQUENCY ME-TER]</b> (FqF-) if these are configured.</li> </ul>
SPF	<b>[Speed fdback loss]</b>	<ul style="list-style-type: none"> <li>There is no signal at input "Pulse input" if this is used for speed measurement.</li> <li>Encoder feedback signal is missing.</li> </ul>	<ul style="list-style-type: none"> <li>Check the encoder's configuration parameters.</li> <li>Check the wiring between the encoder and the inverter.</li> <li>Check the encoder.</li> <li>Check the cabling on the input and the sensors used.</li> </ul>
tnF	<b>[Auto-tuning]</b>	<ul style="list-style-type: none"> <li>Special motor or motor whose power is not suitable for the inverter.</li> <li>Motor not connected to the inverter.</li> <li>Motor not stopped.</li> </ul>	<ul style="list-style-type: none"> <li>Check that the motor and inverter are compatible.</li> <li>Check that the motor is detected during autotuning.</li> <li>If using an output motor contactor, close this during autotuning.</li> <li>Check that the motor is stopped during autotuning.</li> </ul>

### 5.3.2.4 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	<b>[Brake control]</b>	<ul style="list-style-type: none"> <li>Braking stroke current not attained.</li> <li>Threshold of brake engagement frequency <b>[Brake engage freq.]</b> (bEn) only regulated when the brake logic is assigned.</li> </ul>	<ul style="list-style-type: none"> <li>Check the inverter/motor connection.</li> <li>Check the motor windings.</li> <li>Check settings <b>[Brake release I FW]</b> (lbr) and <b>[Brake release I Rev]</b> (lrd).</li> <li>Use the recommended settings for <b>[Brake engage freq.]</b> (bEn).</li> </ul>
CnF	<b>[Com. card]</b>	<ul style="list-style-type: none"> <li>Communication interruption at communication card</li> </ul>	<ul style="list-style-type: none"> <li>Check the environment (electromagnetic compatibility).</li> <li>Check the wiring.</li> <li>Check timeout.</li> <li>Replace the option card.</li> <li>Contact B&amp;R Product Support.</li> </ul>
COF	<b>[CANopen com.]</b>	<ul style="list-style-type: none"> <li>Communication interruption on the CANopen® bus.</li> </ul>	<ul style="list-style-type: none"> <li>Check the communication bus.</li> <li>Check timeout.</li> </ul>
EPF1	<b>[extFit LI/Bit]</b>	<ul style="list-style-type: none"> <li>Error triggered by an external device, depending on the user.</li> </ul>	<ul style="list-style-type: none"> <li>Check the device that caused the error and switch it on again.</li> </ul>
EPF2	<b>[External fault com.]</b>	<ul style="list-style-type: none"> <li>Fault triggered by a communication network</li> </ul>	<ul style="list-style-type: none"> <li>Check the device that caused the error and switch it on again.</li> </ul>
FCF2	<b>[Out. contact. open.]</b>	<ul style="list-style-type: none"> <li>The output contactor remains open although the closing conditions have been met.</li> </ul>	<ul style="list-style-type: none"> <li>Check the contactor and its wiring.</li> <li>Check the feedback circuit path.</li> </ul>
LCF	<b>[Line contactor]</b>	<ul style="list-style-type: none"> <li>The inverter is not switched on, although the <b>[Mains V. time out]</b> (LCt) has expired.</li> </ul>	<ul style="list-style-type: none"> <li>Check the contactor and its wiring.</li> <li>Check timeout.</li> <li>Check the connection to power supply/contactor/inverter.</li> </ul>
LFF3	<b>[AI3 4-20mA loss]</b>	<ul style="list-style-type: none"> <li>Loss of the 4-20 mA reference on analog input AI3.</li> </ul>	<ul style="list-style-type: none"> <li>Check the connection on the analog inputs.</li> </ul>
ObF	<b>[Overbraking]</b>	<ul style="list-style-type: none"> <li>Excessive braking or driving load.</li> <li>Mains voltage too high.</li> </ul>	<ul style="list-style-type: none"> <li>Increase deceleration.</li> <li>If necessary install a braking resistor.</li> <li>Activate function <b>[Dec ramp adapt.]</b> (brA) if it is compatible with the application.</li> <li>Check the mains voltage.</li> </ul>
OCF	<b>[Overcurrent]</b>	<ul style="list-style-type: none"> <li>Parameters in menu <b>[SETTINGS]</b> (SEt-) and <b>[MOTOR CONTROL]</b> (drC-) are incorrect.</li> <li>Inertia or load too high.</li> <li>Mechanical locking mechanism.</li> </ul>	<ul style="list-style-type: none"> <li>Check the parameters.</li> <li>Check the size of the motor/drive/load.</li> <li>Check the state of the mechanism.</li> <li>Reduce the <b>[Current Limit]</b> (CLI).</li> <li>Increase the switching frequency.</li> </ul>
OHF	<b>[Drive overheat]</b>	<ul style="list-style-type: none"> <li>Inverter temperature too high.</li> </ul>	<ul style="list-style-type: none"> <li>Check the motor load, inverter ventilation and ambient temperature. Allow the inverter to cool before switching it on again.</li> </ul>
OLC	<b>[Process overload error]</b>	<ul style="list-style-type: none"> <li>Process overload</li> </ul>	<ul style="list-style-type: none"> <li>Check and eliminate the cause of the overload.</li> <li>Check the parameters of function <b>[PROCESS OVERLOAD]</b> (OLd-).</li> </ul>
OLF	<b>[Motor overload]</b>	<ul style="list-style-type: none"> <li>Triggered by excessive motor current.</li> </ul>	<ul style="list-style-type: none"> <li>Check the setting of the motor thermal protection, check the motor load. Allow the motor to cool before switching it on again.</li> </ul>
OPF1	<b>[1 output phase loss]</b>	<ul style="list-style-type: none"> <li>Loss of one phase at inverter output.</li> </ul>	<ul style="list-style-type: none"> <li>Check the connections between the inverter and the motor.</li> </ul>
OPF2	<b>[3out ph loss]</b>	<ul style="list-style-type: none"> <li>Motor not connected or motor power too low.</li> <li>Motor contactor open.</li> <li>Instantaneous instability in the motor current.</li> </ul>	<ul style="list-style-type: none"> <li>Check the connections between the inverter and the motor.</li> <li>If using a motor contactor, set parameter <b>[Output Phase Loss]</b> (OPL) to <b>[Output cut]</b> (OAC).</li> <li>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 <b>[Output Phase Loss]</b> (OPL) = <b>[YES]</b> (YES). If the inverter should be tested or maintenance tasks performed without using a motor suitable for the inverter model (especially for high-power drives), the function for detecting the motor phase must be disabled: <b>[Output Phase Loss]</b> (OPL) = <b>[No]</b> (nO).</li> <li>Check and optimize the following parameters: <b>[IR compensation]</b> (UFR), <b>[Rated motor volt.]</b> (UnS) and <b>[Rated motor volt.]</b> (nCr) and execute <b>[Auto-tuning]</b> (tUn).</li> </ul>
OSF	<b>[Mains overvoltage]</b>	<ul style="list-style-type: none"> <li>Mains voltage too high.</li> <li>Fault in the mains.</li> </ul>	<ul style="list-style-type: none"> <li>Check the mains voltage.</li> </ul>
OtFL	<b>[LI6=PTC overhead fault]</b>	<ul style="list-style-type: none"> <li>Overheating of PTC probes detected on input LI6.</li> </ul>	<ul style="list-style-type: none"> <li>Check load and rating of the motor.</li> <li>Check the ventilation of the motor.</li> <li>Allow the motor to cool before switching it on again.</li> <li>Check the type and state of the PTC probe.</li> </ul>
PtFL	<b>[LI6=PTC overheat]</b>	<ul style="list-style-type: none"> <li>PTC probes on input LI6 open or short-circuited.</li> </ul>	<ul style="list-style-type: none"> <li>Check PTC probes and their motor/inverter/wiring</li> </ul>

Error	Name	Probable cause	Correcting errors
SCF1	[Motor short circuit]	<ul style="list-style-type: none"> <li>Short circuit or grounding at the inverter output.</li> </ul>	<ul style="list-style-type: none"> <li>Check the cables that connect the inverter to the motor. Check the motor insulation.</li> <li>Reduce the switching frequency.</li> <li>Connect the chokes in series with the motor.</li> <li>Check the settings for the speed control circuit and the brake.</li> <li>Increase the [Time to restart] (ttr).</li> <li>Increase the switching frequency.</li> </ul>
SCF3	[Ground short circuit]	<ul style="list-style-type: none"> <li>Significant ground leakage current at the inverter output when multiple motors are connected in parallel.</li> </ul>	<ul style="list-style-type: none"> <li>Check the cables that connect the inverter to the motor. Check the motor insulation.</li> <li>Reduce the switching frequency.</li> <li>Connect the chokes in series with the motor.</li> <li>Check the settings for the speed control circuit and the brake.</li> <li>Increase the [Time to restart] (ttr).</li> <li>Increase the switching frequency.</li> </ul>
SCF4	[IGBT short circuit]	<ul style="list-style-type: none"> <li>Power component fault.</li> </ul>	<ul style="list-style-type: none"> <li>Contact B&amp;R Product Support.</li> </ul>
SCF5	[Motor short circuit]	<ul style="list-style-type: none"> <li>Short circuit on the inverter output.</li> </ul>	<ul style="list-style-type: none"> <li>Check the connection cables from the inverter to the motor and the motor insulation.</li> <li>Contact B&amp;R Product Support.</li> </ul>
SLF1	[Modbus com.]	<ul style="list-style-type: none"> <li>Communication interruption on Modbus.</li> </ul>	<ul style="list-style-type: none"> <li>Check the communication bus.</li> <li>Check timeout.</li> </ul>
SLF2	[PC com.]	<ul style="list-style-type: none"> <li>Communication interruption with PC software.</li> </ul>	<ul style="list-style-type: none"> <li>Check the PC software connection cable.</li> <li>Check timeout.</li> </ul>
SLF3	[HMI com.]	<ul style="list-style-type: none"> <li>Communication error with the graphic display terminal.</li> </ul>	<ul style="list-style-type: none"> <li>Check the terminal connection.</li> <li>Check timeout.</li> </ul>
SSF	[Torque/current lim]	<ul style="list-style-type: none"> <li>Change to torque limiting.</li> </ul>	<ul style="list-style-type: none"> <li>Check for the possible presence of a mechanical problem.</li> <li>Check the parameters of [TORQUE LIMITATION] (tOL-) and the parameters of [TORQUE OR I LIM. DETECT] (tld-).</li> </ul>
tJF	[IGBT overheat]	<ul style="list-style-type: none"> <li>Overheating of the inverter.</li> </ul>	<ul style="list-style-type: none"> <li>Check the load/motor/inverter sizing.</li> <li>Reduce the clock frequency.</li> <li>Allow the motor to cool before switching it on again.</li> </ul>
tnF	[Auto-tuning]	<ul style="list-style-type: none"> <li>Special motor or motor whose power is not suitable for the inverter.</li> <li>Motor is not connected to the inverter.</li> <li>Motor not stopped.</li> </ul>	<ul style="list-style-type: none"> <li>Check the compatibility of motor/inverter.</li> <li>Check the availability of the motor during autotuning.</li> <li>If you are using an output contactor, close this during autotuning.</li> <li>Check if the motor is stopped during the tuning operation.</li> </ul>
ULF	[Proc. underload Flt]	<ul style="list-style-type: none"> <li>Process underload</li> </ul>	<ul style="list-style-type: none"> <li>Check and eliminate the cause of the underload.</li> <li>The parameters of function [PROCESS UNDERLOAD] (Uld-).</li> </ul>

### 5.3.2.5 Errors that are acknowledged immediately once the cause of the error has been eliminated

Error	Name	Probable cause	Correcting errors
CFF	[Incorrect config.]	<ul style="list-style-type: none"> <li>Option card was changed or removed.</li> <li>Control block was replaced by a control block that was configured for a different inverter type.</li> <li>The current configuration is not inconsistent.</li> </ul>	<ul style="list-style-type: none"> <li>Check that there are no card errors.</li> <li>In the event of the option card being changed/removed deliberately, see the remarks below.</li> <li>Check that there are no card errors.</li> <li>In the event of the control block being changed deliberately, see the remarks below.</li> <li>Restore the factory settings or the backup configuration (if valid).</li> </ul>
CF1	[Invalid config.]	<ul style="list-style-type: none"> <li>Invalid configuration. The configuration loaded via the bus or the communication network is inconsistent.</li> </ul>	<ul style="list-style-type: none"> <li>Check the last loaded configuration.</li> <li>Load a compatible configuration.</li> </ul>
CFI2			
CSF	[Ch. Sw. fault]	<ul style="list-style-type: none"> <li>Switchover to invalid channels.</li> </ul>	<ul style="list-style-type: none"> <li>Check the function parameters.</li> </ul>
dLF	[Dynamic load fault]	<ul style="list-style-type: none"> <li>Abnormal load variation.</li> </ul>	<ul style="list-style-type: none"> <li>Check that the load is not blocked by an obstacle.</li> <li>Restart by resetting the move command.</li> </ul>
HCF	[Cards pairing]	<ul style="list-style-type: none"> <li>Function [CARDS PAIRING] (PPI-) was configured and an inverter card was changed.</li> </ul>	<ul style="list-style-type: none"> <li>In the event of a card error, reinsert the original card.</li> <li>Confirm the configuration by entering [Pairing password] (PPI) if the card has been intentionally changed.</li> </ul>
PHF	[Input phase loss]	<ul style="list-style-type: none"> <li>Inverter incorrectly supplied or a fuse blown.</li> <li>Phase failure.</li> <li>Use of a three-phase ACOPOS inverter with single-phase mains.</li> <li>Unbalanced load. This protective function is effective only under load.</li> </ul>	<ul style="list-style-type: none"> <li>Check the power connection and the fuses.</li> <li>Use a 3-phase line supply.</li> <li>Use [Input phase loss] (IPL) = [No] (nO) to disable the error.</li> </ul>
USF	[Undervoltage]	<ul style="list-style-type: none"> <li>Mains voltage too low.</li> <li>Temporary voltage drop.</li> </ul>	<ul style="list-style-type: none"> <li>Check the voltage and the parameters of [UNDERVOLTAGE MGT] (USb-).</li> </ul>

### 5.3.2.6 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

### 5.3.2.7 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**.

### 5.3.2.8 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.E <sup>1)</sup>	[Communication error]	Timeout error (50 ms). This message is displayed after 20 communication attempts.
A-17 <sup>1)</sup>	[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.
CLr <sup>1)</sup>	[Acknowl. confirmation error]	This error is displayed when you press STOP once when the active command channel is the external operator terminal.
dEU.E <sup>1)</sup>	[Drive disparity]	The brand of the inverter does not match the external operator terminal.
rOM.E <sup>1)</sup>	[RAM anomaly]	A deviation in the ROM of the external operator terminal was detected during checksum calculation.
rAM.E <sup>1)</sup>	[RAM anomaly]	A RAM deviation of the external operator terminal was detected.
CPU.E <sup>1)</sup>	[Other detected faults]	Other errors.

1) Flashes

## 6 The drive in Automation Studio

Each ACOPOSinverter consists of a frequency inverter equipped with a communication card. Depending on the type of network, a hardware upgrade is available that contains information about the respective network type as well as the data of all available drives. The desired power output class of the drive can be selected in the module configuration so that only compatible values for the motor parameters can be preset in Automation Studio.

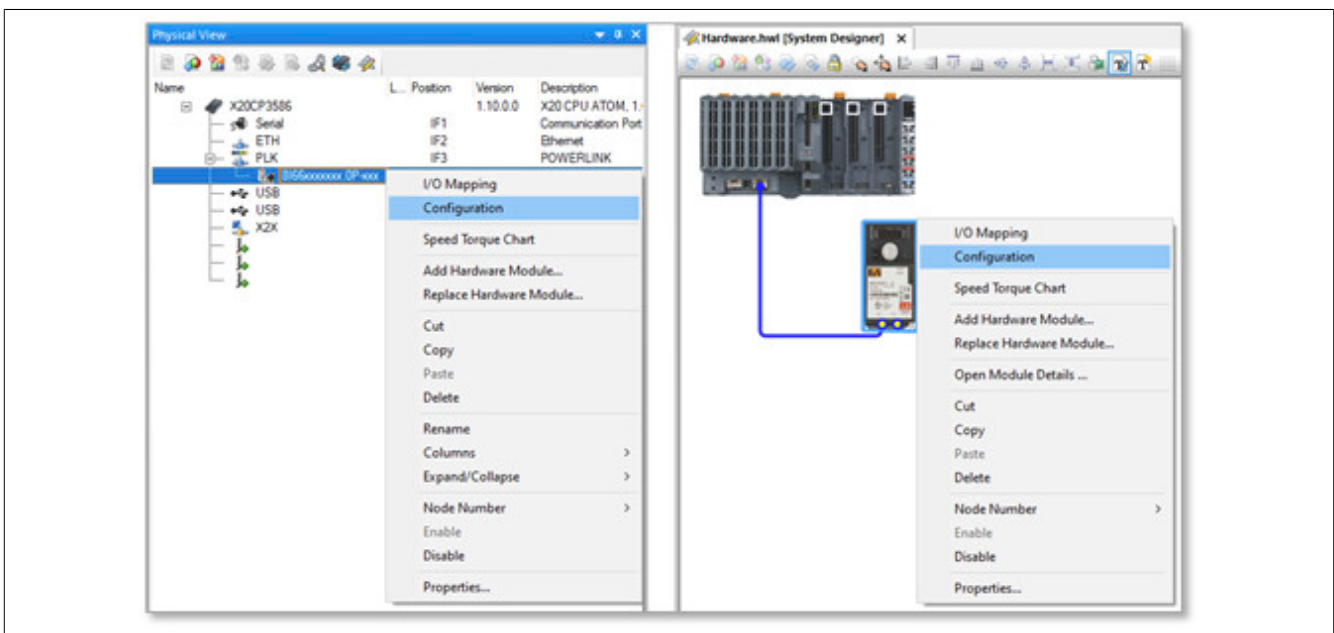
### 6.1 The module configuration

The configuration parameters have been restructured for the "Px6" generation of ACOPOSinverter devices. This allowed related functions to be arranged in the same way for all representatives of this product group. Access to different drives has been standardized and switching between different devices has been made easier.

#### Information:

The frequency inverter validates the currently configured parameter set at startup. To ensure that the project download is error-free, the module configuration of the Automation Studio project must meet the requirements of the internal consistency check. In the newly structured module configuration for the Px6 product generation, all known dependencies between the configuration parameters are taken into account, making it much easier to handle the devices.

The module configuration can be used to set all parameters that are relevant for use on the PLC. Right-clicking on the device in Physical View or System Designer brings up a selection window that can be used to open the module configuration.



The module configuration of the ACOPOSinverter is structured logically. The following overview shows excerpts of the most important parts of the user interface:

- Configuration of the POWERLINK properties
  - ...
  - Multiplexed station
  - Dynamic node allocation
- **Function model of the ACOPOSinverter (selection mandatory)**
  - Optional monitoring data points
  - **Hardware installer (selection mandatory)**
    - Local process logic
      - Configuring local I/Os
      - Alarms or alarm groups
      - Analog value monitoring
    - **Power unit (selection obligatory)**
      - **Motor data (entry mandatory)**
      - Temperature monitoring
      - Current/speed limiting
  - Drive
    - Motor management
    - Axis management
    - Load management

### 6.1.1 The communication interface

The settings for the communication card are arranged in the first section of the module configuration. If the ACOPOSinverter is used in a POWERLINK network, the following standard functions are often enabled:

1. Dynamic node allocation (in short: "DNA")
 

The DNA function can be used to automatically assign the POWERLINK node number, which normally must be entered manually on the drive in advance.
2. Multiplexed station (in short: "Multiplexing")
 

The multiplexing function can be used to reduce the bus load on POWERLINK without affecting the control of the motor.

### 6.1.2 Function models of the drive

The second section of the module configuration contains the settings for the frequency inverter. Two function models have been implemented for the ACOPOSinverter:

1. "Motion configuration"
 

Function model "Motion configuration" is used to integrate the ACOPOSinverter into a mapp Motion project.
2. "Direct control"
 

Function model "Direct control" is used for direct control of the ACOPOSinverter via the I/O mapping.

## 6.2 Commissioning

The following step sequence describes the recommended procedure for commissioning an ACOPOSinverter. This procedure is not mandatory. Experienced users often omit individual steps or use alternative ways to put the drive into operation. The use of Automation Studio library "AsEpl" or "AsIoAcc" is still permissible, but is not considered in detail in this description.

For each step listed, a corresponding subchapter has been written that explains the procedure in more detail. Step 1 is explained in subchapter 1, step 2 in subchapter 2, etc.

#### Recommended step sequence:

1. Configure your PLC and drive in the System Designer/Physical View of Automation Studio.  
Check the Automation Studio project that has been created.

2. Change to the module configuration of the drive.  
Make a preliminary selection for the function model and enter the current motor type (IM or SYN without additional function) under "Hardware installer".
3. Enter the nominal values of the motor in the module configuration of the drive.  
Check the drive data entered.
4. Carry out the "Tuning".  
Check the behavior of the drive. It is recommended to read out the results of the measurement and transfer them to the module configuration of the drive.
5. Finally, adjust the settings for configuration items "Function model" and "Hardware installer".  
Make sure that the motor data entered previously has been retained in the module configuration of the drive.

### 6.2.1 Selection of the correct hardware upgrade

Create an Automation Studio project with your PLC and the desired drive in the System Designer/Physical View. The following table assigns the required hardware upgrade to all drives in the "ACOPOSinverter Px6" product family.

Type of ACOPOSinverter	Name of the required hardware upgrade
ACOPOSinverter P76	8176xxxxxxxx.0P-xxx

If you are using a POWERLINK communication card, make sure that the configured node number matches the node number set on the drive.

- The default settings in Automation Studio require that node numbers of POWERLINK-CN's are configured manually in advance.  
The node number can be specified manually on the ACOPOSinverter in the following submenu:  
Path: DRI → CONF → FULL → COM → CBD → ADRC  
The new value must be confirmed with "Enter" to store it in the memory. The ACOPOSinverter must then be restarted. To do so, the device can be switched off and on again.
- The default settings on the device specify that the node number "0" is set for ACOPOSinverter devices in POWERLINK networks. This configuration can be retained if the POWERLINK standard function "Dynamic node allocation" (DNA for short) is enabled in the module configuration in Automation Studio.  
Path: POWERLINK properties → Dynamic node allocation

Then transfer the compiled project to the PLC and wait for the connection to be established again. Change to the "I/O mapping" of the drive and switch on "Monitor mode".

If "ModuleOk" is reported back as "TRUE", continue with the next step of the step sequence. If "ModuleOk" remains FALSE, perform the countermeasures listed below.

#### Countermeasures:

Make sure that the network settings of the master are compatible with the drive. The set bus cycle of the master interface should not undershoot 400 µs.

### 6.2.2 Function model and hardware installer

Make a preliminary selection for the function model. This document describes the procedures for both function models.

#### Note:

**Function model "Direct control" has proven to be more convenient for the subsequent measurement procedure. It is still possible to change to function model "Motion configuration" at a later time.**

Choose the current motor type (induction motor "IM", synchronous motor "SYN") without any accessories (holding brake "BRK", encoder "ENC") as the hardware installer.

### 6.2.3 Entering the nominal values of the motor (motor nameplate)

To be able to control a motor, the nominal values of the connected motor (motor nameplate) must be communicated to the ACOPOSinverter. To do this, change to the module configuration of the drive and proceed as follows:

1. Enter your power unit.  
Choose the purchase order number of your drive.
2. Enter the nominal data of your motor.  
Nominal current, nominal voltage, nominal speed, etc.

Depending on the motor type, the following parameters must be entered in the module configuration:

Induction motor (IM)		Synchronous motor (SYN)	
FRS	Frequency	TQS	Torque
NSP	Speed	PPNS	Number of pole pairs
UNS	Voltage	NSPS	Speed
NCR	Current	NCRS	Current
COS	Cosine( $\varphi$ )		
NPR	Power		

### Information:

**When using induction motors of lower efficiency (e.g. motors of efficiency class IE 1 or motors running out of round), it is recommended to enter the motor power (NPR) and define the value of the Cosine( $\varphi$ ) parameter to 100.**

Then transfer the compiled project to the PLC and wait for the connection to be established again. Change to the "I/O mapping" of the drive and switch on "Monitor mode".

If "ModuleOk" is reported back as "TRUE", continue with the next step of the step sequence. If "ModuleOk" remains FALSE, perform the countermeasures listed below.

#### Countermeasures

- Make sure that the nominal power specifications of the motor and drive are approximately the same.
- Make sure that the decimal place was correctly observed when entering the motor data (pay attention to the specifications in the "Unit" column in the module configuration).

## 6.2.4 "Tuning"

The ACOPOSinverter uses an internal calculation model to control the connected motor. This model uses the characteristic values of the motor nameplate. To realistically represent the complete system comprising the drive, motor cable and motor, other influencing factors must be taken into account. Therefore, a measurement procedure must be gone through before actual use. Automation Studio offers the possibility of saving the measurement results in the project.

With the default settings, a new measurement is requested each time the drive parameters are downloaded. The measurement is executed the next time the status transitions to "Operation enabled". This setting allows the drive to be commissioned quickly and conveniently. However, it results in the axis behavior being adjusted after each restart. To specify the axis behavior uniquely, the result parameters must be read out after the measurement and then entered directly into the module configuration.

### Information:

**To obtain adequate values during the measurement, the characteristic values of the motor nameplate must have been entered in the ACOPOSinverter beforehand.**

#### 6.2.4.1 Procedure with default settings in function model "Direct control"

The I/O mapping can be used to change to state "Operation enabled" when using function model "Direct control" and thus initiate the measurement procedure. To do so, proceed as follows:

#### Checking the current configuration in advance

- Make sure that function model "Direct control" is selected.
- Make sure that the nominal values of the motor (motor nameplate) are entered correctly.
- Make sure that the "Tuning" settings have not been adjusted.

If individual configuration items do not meet the requirements, adjust them and transfer the Automation Studio project again.

#### Triggering the measurement procedure

Supply the DC bus of the ACOPOSinverter, change to the "I/O mapping" of the drive and switch on "Monitor mode".

- Make sure that bit 4 of the DS402 status word reports TRUE (DC bus supplied).
- Force the output data point (0x6042) for the DS402 setpoint to value 0.

Trigger the measurement using the DS402 command word.

- To do so, force the corresponding data point (0x6040) in the output direction to the following values in succession: 6, 7, 127.
- Make sure that the DS402 status word is correctly reported back after submitting each command. In addition, check whether you have come closer to state "Operations enabled" (see overview of the DS402 state machine).

## Information:

**There is a distinctive noise during the measurement. This is correct.**

Continue by reading out the measurement results from the drive memory (see chapter "[Reading out the measurement results](#)" on page 325).

### 6.2.4.2 Procedure with default settings in function model "Motion configuration"

When using function model "Motion configuration", mapp Cockpit can be used to change to state "Operation enabled" and thus initiate the measurement procedure. Alternatively, the function blocks of the mapp Motion library can be used.

#### Checking the current configuration in advance

- Make sure that function model "Motion configuration" is selected.
- Make sure that the nominal values of the motor (motor nameplate) are entered correctly.
- Make sure that the "Tuning" settings have not been adjusted.
- Make sure that an axis object (gAxis\_x) has been created and entered as "Axis reference" in the module configuration of the drive.  
For a step-by-step instruction guide on creating an axis object for mapp Motion or mapp Cockpit see the corresponding "Getting started" tutorial.

Change to dialog box "Change runtime".

Path (en): Project → Change runtime versions

All selected components of the Automation Runtime are displayed in tab "Runtime versions".

- Make sure that a version is defined for mapp Motion.
- Make sure that a version is defined for mapp Cockpit.
- Make sure that a version is defined for McDS402Ax.  
The version for McDS402Ax is displayed as setting "Advanced" in mapp Motion. These can be shown or hidden via a checkbox in the lower right area.

If individual configuration items do not meet the requirements, adjust them and transfer the Automation Studio project again.

#### Triggering the measurement procedure

Supply the DC bus of the ACOPOSinverter and open the web interface for mapp Cockpit.

Path (en): Tools → mapp Cockpit

Or open it in the browser via [http://\[IP address of the controller\]:8084/mappCockpit/index.html?clear](http://[IP address of the controller]:8084/mappCockpit/index.html?clear)

- Choose the axis that was entered in the configuration of the inverter and check whether "Communication ready" is "true" in mapp Cockpit.
- Start the measurement by clicking the green PowerOn button.

## Information:

**There is a distinctive noise during the measurement. This is correct.**

**An error message may appear in the mapp Cockpit Logger during the measurement. This only occurs during measurement and can therefore be ignored.**

Continue by reading out the measurement results from the drive memory.

### 6.2.4.3 Reading out the measurement results

Depending on the motor type, values are determined for the following drive parameters:

Induction motor (IM)		Synchronous motor (SYN)	
RSA	Stator resistance	RSAS	Stator resistance
LFA	Leakage inductance	LDS	Leakage inductance d part
IDA	Magnetizing current	LQS	Leakage inductance q part
TRA	Rotor time const.	PHS	Permanent magnet flux
		SMOT	Saliency motor state

The use of the optional display is recommended to read out the measurement results. If the display is not available, Automation Studio library "AsEpl"/"AsIoAcc" can also be used.

#### Reading back the measurement results using the additional display:

If you have an adequate additional display at hand, you can read out the results of the last measurement as follows:

Path:

Induction motor: DRI → CONF → FULL → DRC → IM

Synchronous motor: DRI → CONF → FULL → DRC → SYN

#### Reading back the measurement results using Automation Studio libraries:

Alternatively, you can also read out the results of the last measurement using function Read of the corresponding library via Automation Studio. In X2X networks, this requires Automation Studio library "AsIoAcc" and in POWER-LINK networks Automation Studio library "AsEpl".

Induction motor (IM)			Synchronous motor (SYN)		
X2X	POWERLINK		X2X	POWERLINK	
Channel name	Index	Subindex	Channel name	Index	Subindex
RSA_Input	0x2042	0x2B	RSAS_Input	0x2042	0x53
LFA_Input	0x2042	0x3F	LDS_Input	0x2042	0x4B
IDA_Input	0x2042	0x35	LQS_Input	0x2042	0x4C
TRA_Input	0x2042	0x44	PHS_Input	0x2042	0x4A
			SMOT_Input	0x2042	0x2E

### 6.2.4.4 Evaluating measurement results and storing them in the project

The measurement of the additional parameters is influenced by various environmental factors. Each measurement gives individual results. To determine the additional parameters, it is recommended to perform the measurement several times (5 to 10 times) and to calculate average values in each case.

Different measuring methods are offered in the module configuration of the drive. If you vary the measuring methods for the repeat measurements, the value ranges of the individual parameters can be better estimated.

#### Notice!

Observe the detailed description of the individual configuration parameters.

Individual methods can cause the motor to rotate during the measurement process. If such a measuring method is selected, the axis may have to be isolated from the rest of the application.

To carry out the measurement with motors that have an integrated holding brake, it must be ensured that the brake has been released before the measurement. If the application conditions do not permit the brake to be released permanently, only measuring methods that are not expected to rotate the motor may be used.

Change to the module configuration of the drive.

Change the "Tuning" settings from measured to predefined values and enter the determined characteristic values.

#### Correlation between configuration parameter "AST" and measurement result "SMOT"

If the measurement procedure for synchronous motors is used, the value for configuration parameter "AST" can be determined using the measurement result for "SMOT".

"SMOT"	Saliency motor state		"AST"	Angle setting type
1 "LLS"	Low salient	→	5 "PSI" 6 "PSIO"	PSI align PSIO align
2 "MLS"	Medium salient	→	4 "SPMA"	SPM align
3 "HLS"	High salient	→	3 "IPMA"	IPM align

## 6.2.5 Function model and hardware installer II

Finally, define the required values for the configuration items "Function model" and "Hardware installer".

### 6.2.5.1 Function model

Two function models have been implemented for the ACOPOSinverter.

#### Motion configuration

In function model "Motion configuration", the ACOPOSinverter is used as a mapp object of axis type "mappAxis", i.e. the frequency inverter is managed from mapp Motion. The data required to control the motor (DS402 control word and speed setpoint) are generated by the PLC and transmitted directly to the drive. The user has no possibility to access these output data points directly.

Function model "Motion configuration" and the use of mapp Motion offers the following:

- Uniform setting of the velocity profile for all manufacturers (e.g. defining min/max speed, acceleration/braking behavior)
- Uniform operation for all manufacturers (e.g. switching the drive on/off, specifying the speed setpoint) with PLCopen function blocks
- It enables PLC-based interaction with other drives in the Automation Studio project.

By cleverly integrating the frequency inverter into a mapp Motion project, the transition from programming to configuration can be made successfully. I/O mapping plays a subordinate role in function model "Motion configuration". It offers, for example, the possibility of monitoring the frequency inverter beyond the typical mapp Motion functions. In addition to the standardized DS402 input data points (error code, status word and actual speed value), manufacturer-specific information can also be retrieved to analyze the current situation on the drive in even greater detail.

#### Direct control

In function model "Direct control", the ACOPOSinverter is managed via the module configuration and the I/O mapping. The required settings (including DS402 velocity profile) can be entered via the module configuration. Then the I/O mapping is used to interact with the frequency inverter; i.e. the DS402 input data (error code, status word and actual speed value) can be received and the DS402 output data (control word and speed setpoint) can be sent.

Function model "Direct control":

- It does not require a license for the mapp Motion development environment.
- The model assumes that the user can program a PLC task that manages the required command interface.
- It is only recommended if the frequency inverter should interact little with other devices in the Automation Studio project.

When using function model "Direct control", the control of the motor must be programmed in Automation Studio. The DS402 state machine must be taken into account (see chapter ["The DS402 state machine" on page 333](#)).

### 6.2.5.2 Hardware installer

The drive provides different hardware installers. Choose the one that suits your situation. Make sure that the previously selected motor type (induction motor "IM", synchronous motor "SYN") is not modified.

#### Notice!

**Since different parameters are used to describe induction motors "IM" and synchronous motors "SYN", the motor data (motor nameplate and result parameters of the measurement procedure) must be entered again after switching the motor type.**

#### Holding brake

If you are putting a motor into service with an integrated holding brake, make sure that the function for controlling the brake is linked to the required logic output.

Path: Hardware installer → Local process logic → Configuration of local I/Os

#### Notice!

**Multiple linkages are not supported by the drive. Make sure that only one logic output (relay, digital output) is linked to the function for controlling the holding brake.**

Then adjust the operation of the brake function.

Path: Hardware installer → Power unit → Motor data

## Encoder

Some drives offer hardware installers with encoder. If the drive is equipped with an encoder card, the drive can process the corresponding signal. The actual speed value determined in this way can then be used for speed control.

To do so, choose the corresponding hardware installer and change to section "Feedback logic". Enter the purchase order number of the installed encoder card and set the required configuration parameters.

## 6.3 I/Os of the ACOPOSinverter

In addition to the high-voltage motor output, the drive provides a number of other inputs and outputs that can be used to interact with the device. For the configuration parameters available for this purpose, see section "Local process logic" .

### Inputs

The inputs can be used to receive appropriate signals from the field. Additional input data points can be used to report the results to the application via I/O mapping.

### Outputs

The outputs can be linked to corresponding drive parameters. A corresponding signal is then generated depending on the state of the parameter.

In addition, ACOPOSinverter devices offer the possibility of controlling the outputs via the I/O mapping.

### Alarm groups

The drive generates various alarms internally. These can be combined into alarm groups and reported to the application via the I/O mapping.

### 6.3.1 Additional data points in the I/O mapping

Additional data points can be registered in the I/O mapping of the ACOPOSinverter. This option enables cyclic transfer of device-specific information that is not described in the DS402 standard.

#### Additional input data points

Device-specific input data points that should be read out cyclically can be chosen in the section "Optional monitoring data points". They can be used, for example, to provide detailed diagnostics for the drive.

#### Additional output data points

The module configuration allows access to various device-specific special functions of the drive. In some cases, an additional dynamic default value is required for this. Depending on the execution of the device-specific function, such a default value must be specified via the I/Os of the "local process logic" or can be linked to a cyclic output data point in the I/O mapping.

Another example of additional output data points is the direct setpoint specification for the relays, digital or analog outputs. The method of operation of each output can be set correspondingly in section "Local process logic".

#### Information:

The module configuration must be saved for the I/O mapping to display additionally enabled data points.

## 6.4 Control behavior

The control behavior of the drive can be adjusted to the requirements of the respective application. For the configuration parameters available for this purpose, see sections "Motor management" and "Axis management".

### 6.4.1 Motor management

The motor management ensures that the kinetic setpoint is converted into an electrical setpoint. The default settings specify that the difference between the setpoint and actual speed is formed and converted into a setpoint for torque with the aid of a PI controller.

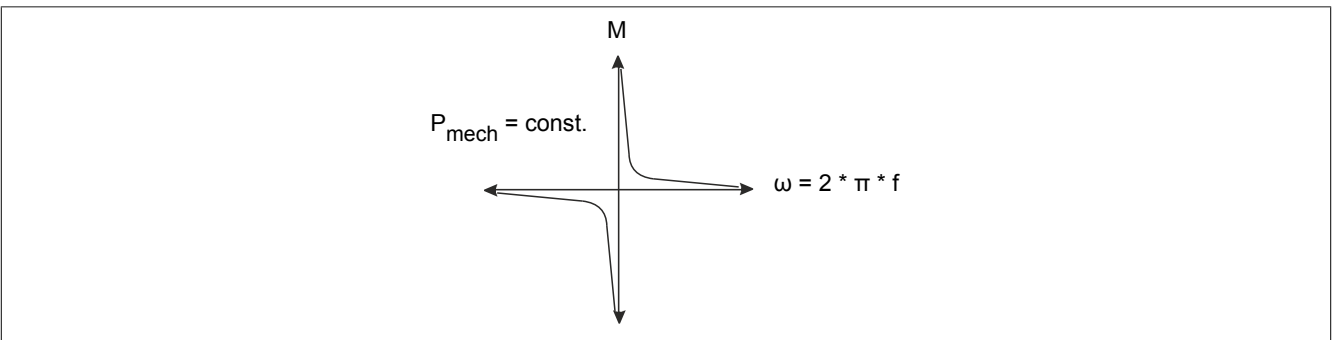
#### Motor management - Part 2

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:

- $P_{el, 3ph} = \sqrt{3} * U * I * \cos(\varphi)$
- $P_{mech} = M * 2 * \pi * f = M * \omega$

On closer inspection of mechanical power ( $P_{mech}$ ), the particular interaction between torque ( $M$ ) and angular velocity ( $\omega$ ) at constant power yields a hyperbolic distribution between these sizes.



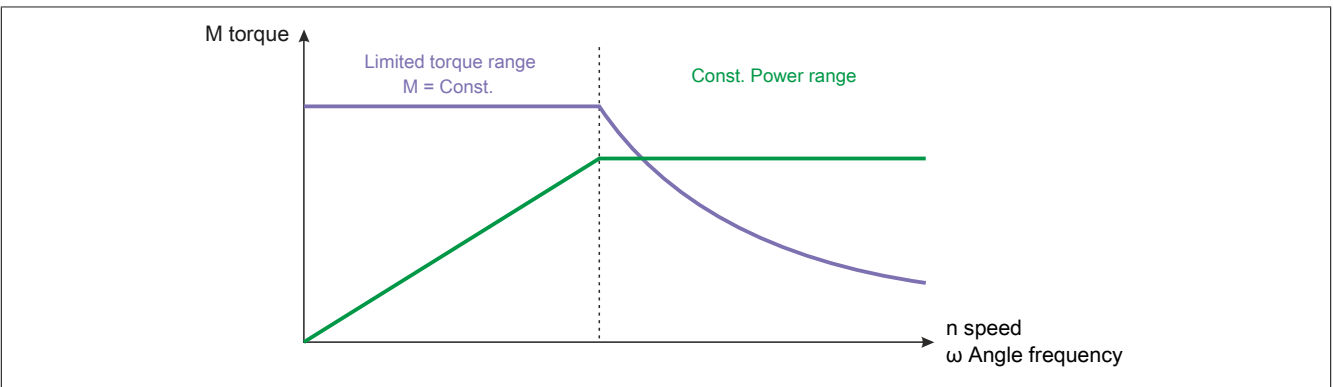
The speed/torque diagram is a general specification that can be created for any motor. In electric motors, speed is directly dependent on AC voltage frequency; the y-axis is therefore often displayed as a frequency axis and divided into two sections. Frequencies greater than nominal frequency are subjected to what is known as field suppression, i.e. in this frequency range it may happen 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 ACOPOS inverter 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:



### 6.4.1.1 PARK transformation

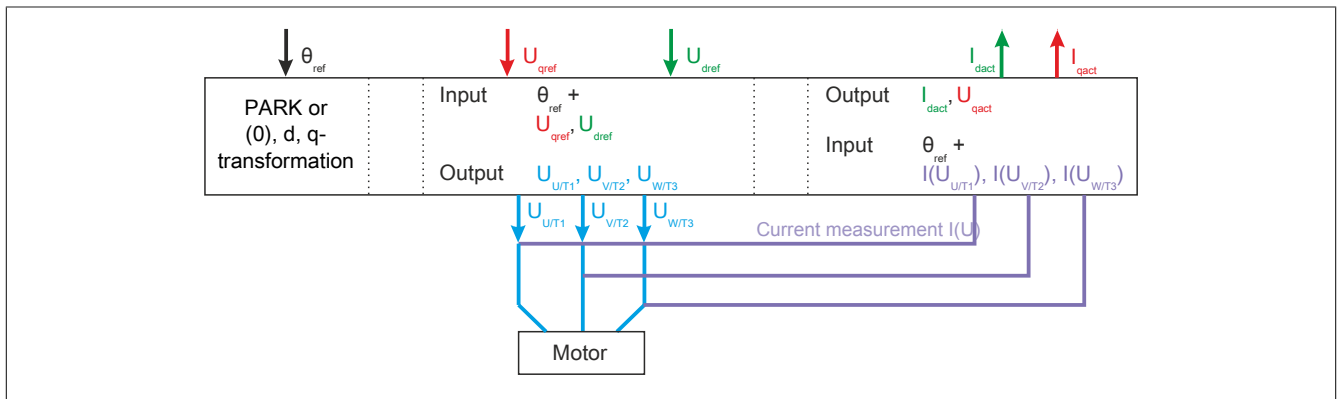
#### Motor management - Part 1

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  $\theta$  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", for example:

$$U_{U/T1}, U_{V/T2} \text{ or } U_{W/T3} \quad < \theta \text{ (angle)} > \quad U_d, U_q$$

The mathematical transformation is reversible and can be applied to other sizes in the rotating field, for example:

$$U_{U/T1}, U_{V/T2} \text{ or } U_{W/T3} \quad < \theta \text{ (angle)} > \quad U_d, U_q$$



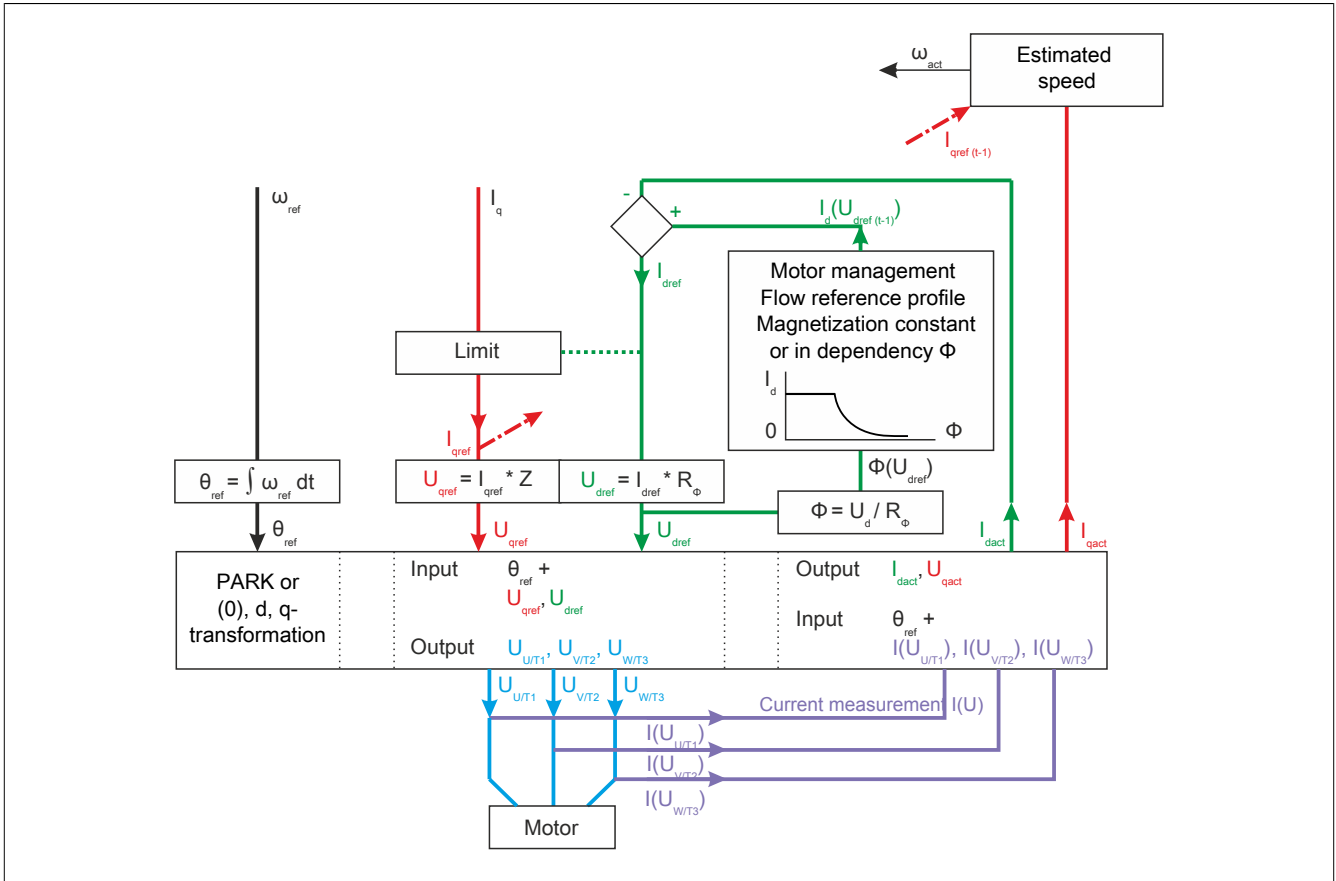
Three controlled variables are necessary for controlling PWM output on ACOPOSinverter:

- $\theta_{ref}$ : 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  $120^\circ$  and  $U_{W/T3}$  to an offset of  $240^\circ$ .

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 ( $\omega_{act}$ ) 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 ( $\omega_{set}$ ) corresponds to the formula:

- $\omega_{set} = 2 \pi f = 2 \pi \text{ LFR}$
- $\omega_{set} = 2 \pi (n_{mech} * \text{ Pole pairs} / 60) = 2 \pi (\text{ LFRD} * \text{ Pole pairs} / 60)$

To extrapolate from a value for angular velocity  $\omega$  to angle  $\theta$ , a derivative with respect to time occurs at the end of control of angle  $\theta$ .

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  $I_d$ .

The way in which the information for  $I_{qact}$ ,  $\omega_{act}$  and  $\omega_{set}$  is used for calculating angle  $\theta$  and for controlling  $U_q$  is determined by the slip control or torque control.

### 6.4.1.2 Torque control

The torque control of the ACOPOSinverter is based on direct field-oriented vector control (in short: "direct FOC").

#### Setpoint processing during torque control

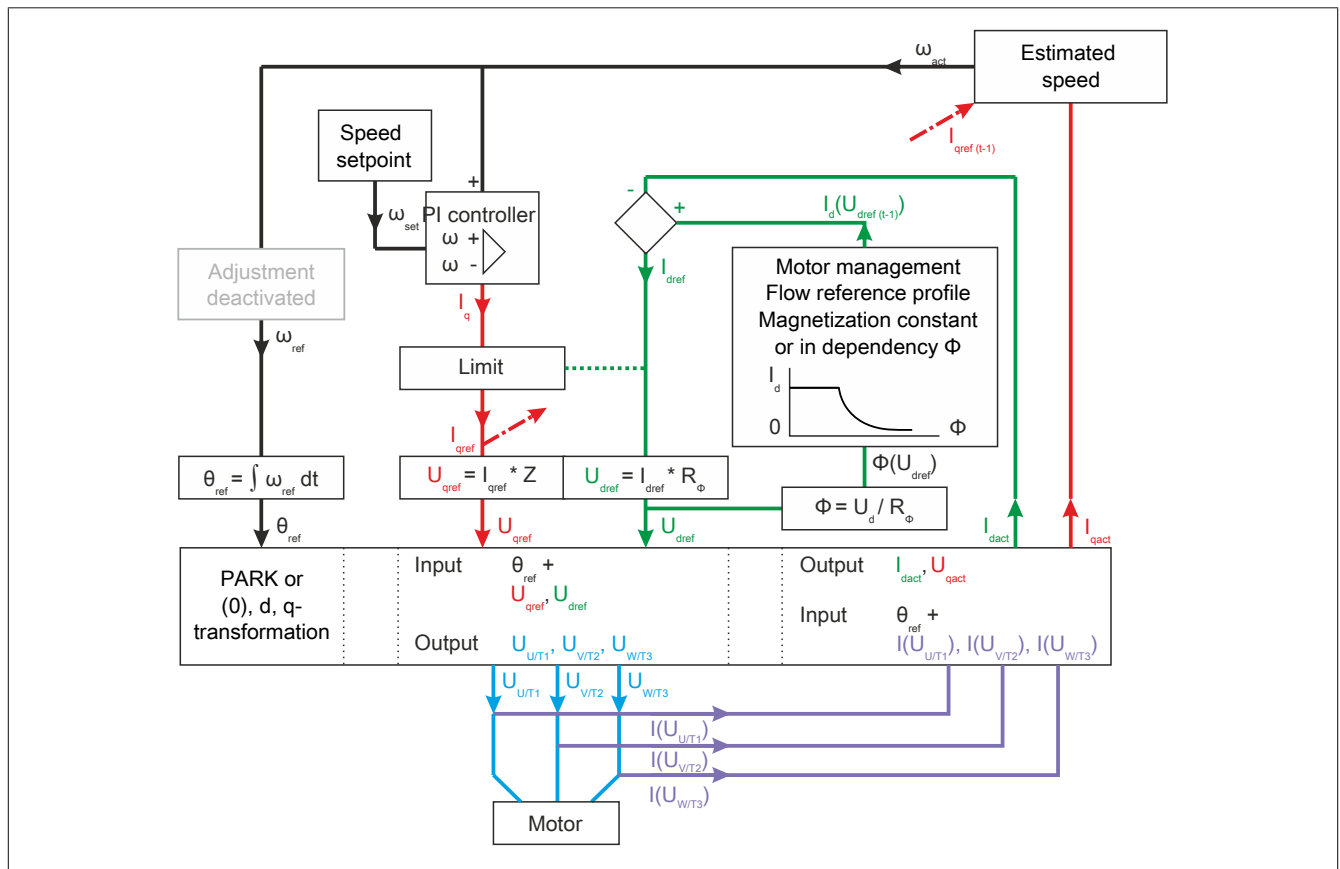
During torque control, the value  $\omega_{act}$  is used as a basis for calculating the reference angle  $\theta$ . The q-portion is calculated using a PI controller. The next (unlimited) reference value for  $I_q$  is calculated from the difference in speed between  $\omega_{act}$  and  $\omega_{set}$ .

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.**



### 6.4.1.3 Slip control

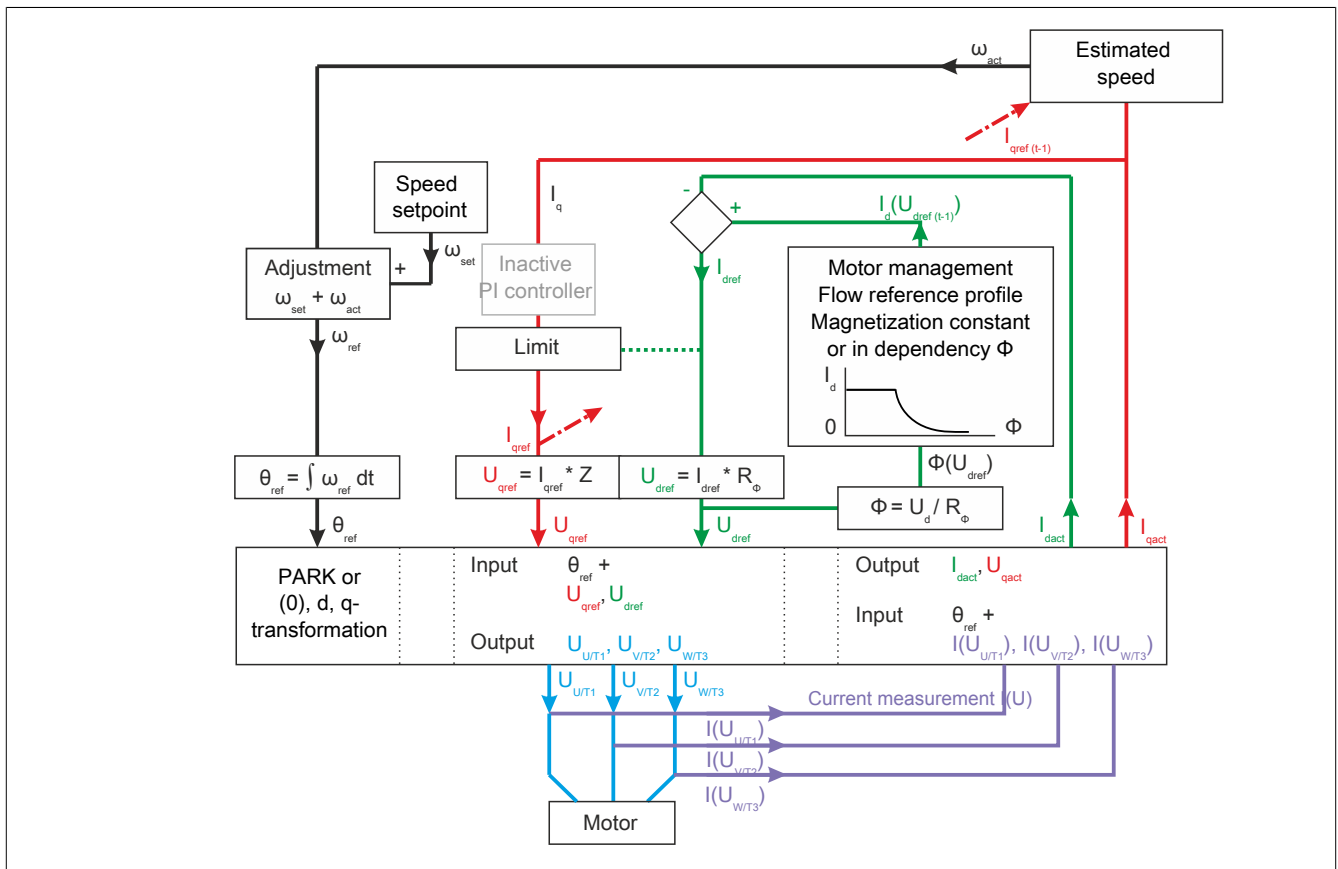
The slip control of the ACOPOSinverter is based on indirect field-oriented vector control (in short "indirect FOC"). It is only available in function model "Direct control" because the results are too inaccurate for control via mapp Motion.

#### Setpoint processing during slip control

Values for  $\omega_{act}$  and  $\omega_{set}$  are added together during slip control. This "adjusted" angular velocity is then used for calculating reference angle  $\theta$ . The q-portion is calculated as a single control loop based on the current measurement on 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:

Torque control is not recommended for using ACOPOSinverter with a controller.



## 6.4.2 Axis management

### 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 AC 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 AC 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:

$$n_{\text{mech. [rpm]}} * \text{Pole pairs} = f_{\text{el. [Hz]}} * 60$$

#### Information:

Since the frequency inverter primarily controls the electrical frequency of the output AC voltage, it displays the currently generated electrical frequency by default in state 5 "Running". If necessary, a conversion factor can be applied to this value using parameter SDS.

## 6.5 The drive as a mapp object of type "axis"

For information about commissioning as an object of type "mappAxis axis", see the general mapp Motion description in the respective "Getting started" tutorial chapters "Axis" and "mapp Cockpit".

The following chapters describe the most important device-specific configuration options. Some of these functions are only available in function model "Direct control" because they are either managed internally via mapp Motion or are not compatible.

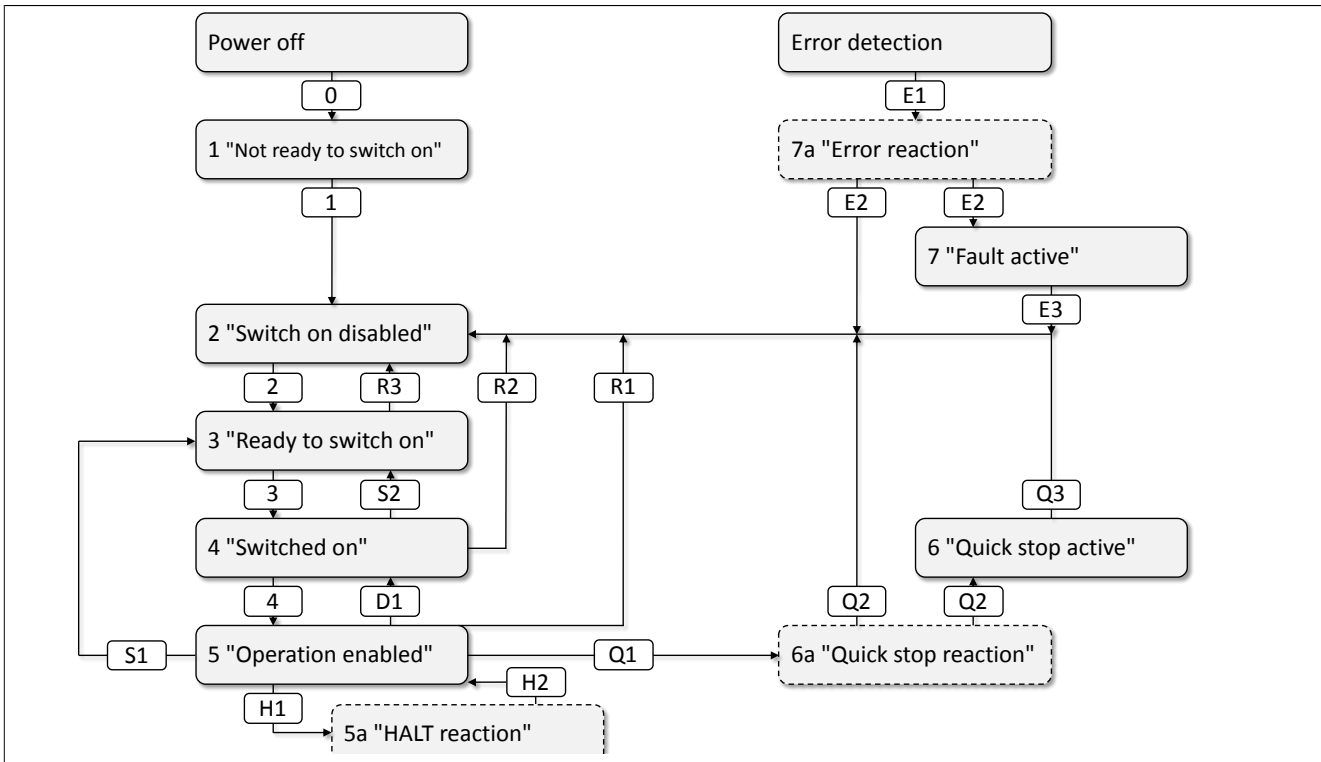
## 6.6 The drive as a standard module

To implement the drive as a standard module, a task for managing the drive must be written in the Automation Studio project. To write this task, the programmer must take into account the specifications of standard DS402.

### 6.6.1 The DS402 state machine

The following overview shows the underlying state machine of standard DS402. DS402 is a device profile that is used to control electrical drives. It can be used in connection with POWERLINK and other communication networks.

The overview shows the DS402 interface, which basically consists of a status word and a command word. The DS402 status word can be used to determine which state the frequency inverter is currently in. An appropriate DS402 command can then be issued or an adequate setpoint specified to interact with the drive.



### 6.6.1.1 Determining the DS402 state

If the ACOPOSinverter is used in function model "Direct control", the PLC task should check the current value of status word 0x6041 at the beginning of each task cycle to find out which DS402 state the drive is currently in.

#### Check routine (recommended sequence)

The lower half word can be used to determine which DS402 state the ACOPOSinverter is currently in.

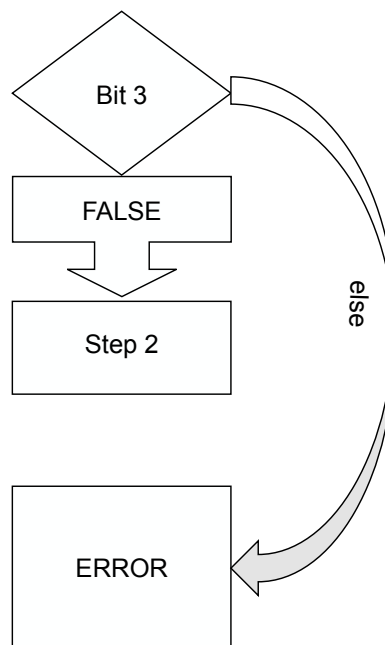
##### 1. Bit 3 (status word & 0x08)

If FALSE is reported on bit 3, the current DS402 state has not yet been clearly determined. Proceed to the next step of the test routine.

If TRUE is displayed on bit 3, the ACOPOSinverter is in an error state. In this case, register 0x603F "Error-Code\_I603F" must be evaluated. In addition, the corresponding device-specific register can be used to perform detailed diagnostics.

In the event of an error, the ACOPOSinverter first changes to state 7a "Error reaction" and performs a previously determined action. It then changes to state 7 "Fault active".

Bits 0, 1 and 2 can be evaluated to distinguish between the two states. If all bits return FALSE, the error response is complete, i.e. the drive is in state 7 "Fault active" and is waiting for an acknowledge command.



#### Information:

To issue acknowledge command "Acknowledge", a positive edge must be transferred to bit 7 of command word 0x6040. Acknowledge commands are assessed as invalid if the cause of error has not been eliminated.

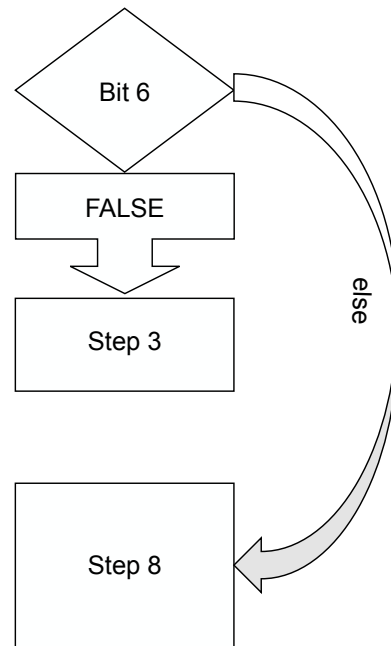
## 2. Bit 6 (status word & 0x40)

If FALSE is reported on bit 6, the current DS402 state has not yet been clearly determined.

Proceed to the next step of the test routine.

If TRUE is displayed on bit 6, the ACOPOSinverter is in state 2 "Switch on disabled".

To assess the current situation at the device in detail, it is recommended to continue the test routine with the final step 8 "Checking bit 7".



## 3. Bit 5 (status word & 0x20)

### NOTICE: Negative logic

If TRUE is reported on bit 5, the current DS402 state has not yet been clearly determined.

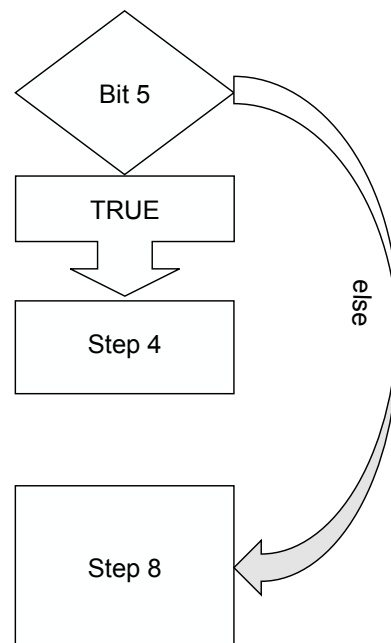
Proceed to the next step of the test routine.

If FALSE is displayed on bit 5, the ACOPOSinverter is in state 1 "Not ready to switch on" or is currently executing a quick stop.

To distinguish between the two states, bits 0, 1, 2 and 3 of the status word must be checked. If all four bits return the value FALSE, the drive is not yet in state 1 "Not ready to switch on".

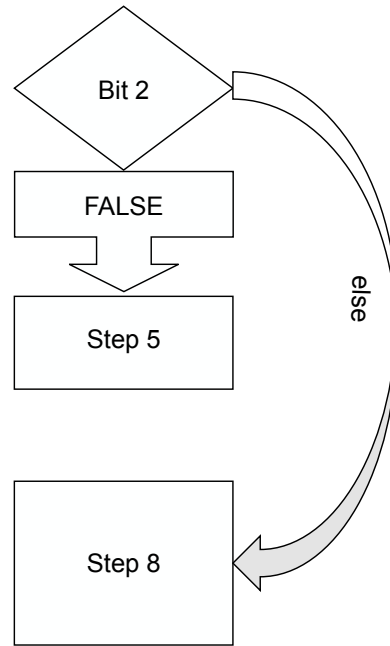
The quick stop function can be used, for example, to implement an emergency stop. After completion of a quick stop, an acknowledge command may be required to return to state 1 "Not ready to switch on".

To assess the current situation at the device in detail during a quick stop, it is recommended to continue the test routine with the final step 8 "Checking bit 7".



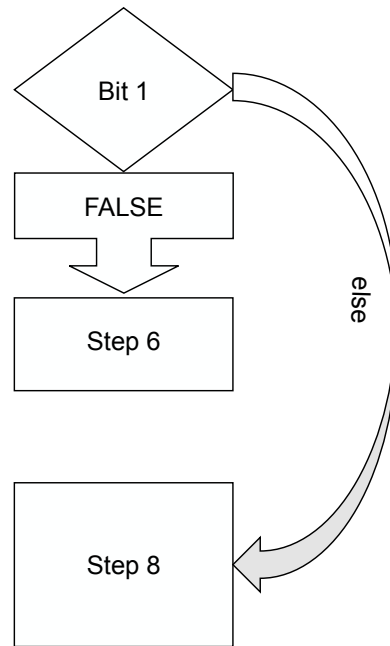
4. Bit 2 (status word & 0x04)

If FALSE is reported on bit 2, the current DS402 state has not yet been clearly determined.  
 Proceed to the next step of the test routine.  
 If TRUE is displayed on bit 2, the ACOPOSinverter is in state 5 "Operation enabled".  
 In this state, the ACOPOSinverter processes the setpoint from the PLC and controls the motor.  
 To assess the current situation at the device in detail, it is recommended to continue the test routine with the final step 8 "Checking bit 7".



5. Bit 1 (status word & 0x02)

If FALSE is reported on bit 1, the current DS402 state has not yet been clearly determined.  
 Proceed to the next step of the test routine.  
 If TRUE is displayed on bit 1, the ACOPOSinverter is in state 4 "Switched on".  
 To assess the current situation at the device in detail, it is recommended to continue the test routine with the final step 8 "Checking bit 7".



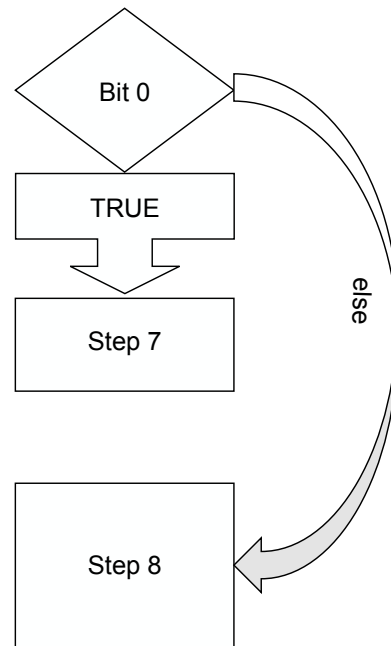
## 6. Bit 0 (status word & 0x01)

If bit 0 reports FALSE, the ACOPOSinverter is in state 1 "Not ready to switch on".

To assess the current situation at the device in detail, it is recommended to continue the test routine with the final step 8 "Checking bit 7".

If TRUE is displayed on bit 0, the ACOPOSinverter is in state 3 "Ready to switch on".

If the drive is additionally supplied with 24 VDC from an external source, it is not yet ensured that the DC bus is sufficiently supplied. To check the voltage level of the DC bus, continue with step 7 "Checking bit 4".

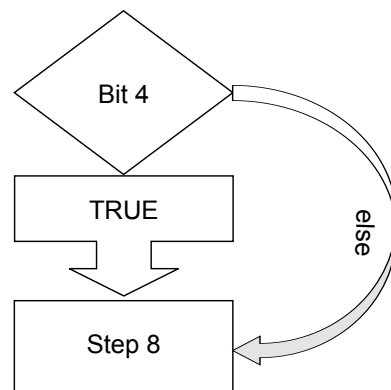


## 7. Bit 4 (status word & 0x10)

If bit 4 TRUE is displayed, the DC bus is sufficiently supplied with voltage.

If bit 4 FALSE is displayed, the DC bus of the drive is not sufficiently supplied.

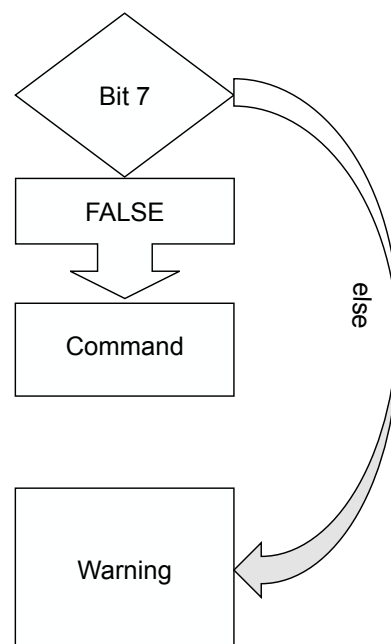
In both cases, it is recommended to continue the test routine with the final step 8 "Checking bit 7".



## 8. Bit 7 (STS & 0x80)

If FALSE is reported on bit 7, there is no current message.

If TRUE is displayed on bit 7, the drive is reporting a warning. In this case, register 0x603F "ErrorCode\_I603F" and the corresponding device-specific register should be evaluated.



### 6.6.1.2 Permissible actions

The DS402 status word has been used to determine which DS402 state the drive is in. The permissible transitions or possible commands for the command word are derived depending on the current DS402 state.

#### State 1 "Not ready to switch on"

This state is reported during the boot operation of the ACOPOSinverter. After switching on, the components of the drive are initialized, e.g. the power unit, the I/O circuit board and the communication card. If the evaluation of the status word shows that the drive is in state 1 "Not ready to switch on", the drive is not yet ready for operation.

Transition 0:

If the boot operation is completed successfully, the drive changes to state 2 "Switch on disabled".

If an error occurs during the boot operation, the drive automatically changes to state 7a "Fault reaction". This ensures that the drive leaves this state automatically and that a renewed check of the DS402 status word at a later time results in a different result.

#### State 2 "Switch on disabled"

This state is reported when the logic of the ACOPOSinverter is ready for operation. The DS402 interface is in standby and waits for the initial command from the application.

Transition 2:

If command 0x06 is issued via the DS402 command word, the drive changes to state 3 "Ready to switch on".

#### State 3 "Ready to switch on"

This state can be used to ensure that the mains connections (L1, L2, L3) correspond to expectations.

Transition 3:

If command 0x07 is issued via the DS402 command word, the drive changes to state 4 "Switched on". This transition can be refused by the drive if the DC bus is insufficiently supplied with voltage or the line contactor function has been enabled and a required feedback is missing.

Transition R3:

If the DS402 command word is reset or the command 0x00 is issued, the drive changes back to state 2 "Switch on disabled".

Transition 34 (special case):

If command 0x0F is issued via the DS402 command word, the drive also changes from state 3 "Ready to switch on" to state 5 "Operation enabled".

### Notice!

**This transition is not explicitly mentioned in the DS402 standard. It is a device-specific special case that is only supported by individual inverter types. B&R recommends not using this transition.**

#### State 4 "Switched on"

This state can be used to ensure that the motor connections (T1, T2, T3) correspond to expectations.

Transition 4:

If command 0x0F is issued via the DS402 command word, the drive changes to state 5 "Operation enabled".

This transition can be refused by the drive if the motor contactor function has been enabled and a required feedback is missing.

Transition S2:

If command 0x06 is issued via the DS402 command word, the drive changes back to state 3 "Ready to switch on".

Transition R2:

If the DS402 command word is reset or the command 0x00 is issued, the drive changes back to state 2 "Switch on disabled".

#### State 5 "Operation enabled" and state 5a "HALT reaction"

In state 5 "Operation enabled", the velocity setpoint is processed.

### Warning!

**Failure to observe these safety guidelines and notices can result in death, severe injury or substantial damage to property.**

Transition Q1:

If command 0x02 is issued via the DS402 command word, the drive changes to state 6a "Quick stop reaction".

**Information:**

The "Quick stop option code" defines how the motor should be stopped when transition Q1 has been requested.

In addition, the "Quick stop option code" defines which variant of the subsequent transition Q2 is executed.

Transition S1:

If command 0x06 is issued via the DS402 command word, the drive changes back to state 3 "Ready to switch on".

**Information:**

The "Shutdown option code" defines how the motor should be stopped when transition S1 has been requested.

Transition D1:

If command 0x07 is issued via the DS402 command word, the drive changes to state 4 "Switched on".

**Information:**

The "Disable option code" defines how the motor should be stopped when transition D1 has been requested.

Transitions H1 and H2:

If bit 8 of the DS402 command word is set, the drive changes to state 5a "HALT reaction". As soon as the bit is reset, the drive changes back to state 5 "Operation enabled".

**Information:**

The "HALT option code" defines how the motor should be stopped when transition H1 has been requested.

Transition R1:

If the DS402 command word is reset or the command 0x00 is issued, the drive changes back to state 2 "Switch on disabled".

**State 6 "Quick stop active" and state 6a "Quick stop reaction"**

If a valid "Quick stop" command has been issued, the drive changes to state 6a "Quick stop reaction". The behavior of the drive in this case is determined by the quick stop option code.

**Information:**

The "Quick stop option code" defines how the motor should be stopped when transition Q1 has been requested.

In addition, the "Quick stop option code" defines which variant of the subsequent transition Q2 is executed.

Transition Q2:

If the quick stop option code is configured to value 1, 2, 3 or 4, the drive changes to state 2 "Switch on disabled" after the axis has been stopped.

Transition Q3:

If the quick stop option code is configured to value 5, 6, 7 or 8, the drive changes to state 6 "Quick stop active" after the axis has been stopped.

To exit state 6 "Quick stop active" and change to state 2 "Switch on disabled", the DS402 command word must be reset or the command 0x00 issued.

**State 7 "Fault active" and state 7a "Fault reaction"**

The ACOPOSinverter monitors itself during operation. This self-diagnostics serves to protect the device and cannot be disabled by the user. If the drive diagnoses an error, it changes to state 7a "Error reaction" within the DS402 state machine and generates an error message. The behavior of the drive in this case is determined by the "fault reaction option code" (or "abort connection option code").

**Information:**

The "fault reaction option code" (or the "abort connection option code") defines how the motor should be stopped when the drive detects an error.

Transition E2:

Depending on the severity of the error, the drive automatically changes to either state 2 "Switch on disabled" or state 7 "Fault active" after the axis is stopped.

Transition E3:

To exit state 7 "Fault active" and change to state 2 "Switch on disabled", the reported cause of error must be eliminated and acknowledge command 0x80 or the DS402 command word must be issued.

**6.6.2 DS402-Drive modes**

The ACOPOSinverter is designed to use VL mode. VL mode enables the processing of a velocity setpoint.

**6.6.2.1 Register description (drive modes)**

Register	Name	Data type	Read		Write	
			Cyclic	Acyclic	Cyclic	Acyclic
0x6502	SupportedDriveModes_I6502	UDINT		•		
0x6060	ModesOfOperation_I6060Out	SINT				•
	ModesOfOperation_I6060In	SINT		•		
0x6061	ModesOfOperationDisplay_I6061	SINT		•		

**6.6.2.2 Supported DS402 modes of operation**

Name:

SupportedDriveModes\_I6502

DS402 profile register 0x6502 provides information about the modes of operation supported by the POWER-LINK-CN.

Data type	Default	Range of values
UDINT	2	See the bit structure.

Bit	Name	Value	Information
...		...	
1	VL mode "Velocity mode"	0	Mode is not supported.
		1	Mode is supported.
...		...	

**Information:**

The DS402 standard describes further drive modes that are not listed here.

**6.6.2.3 Requesting DS402 mode of operation**

Name:

ModesOfOperation\_I6060Out

ModesOfOperation\_I6060In

DS402 profile register 0x6060 enables switching between supported modes of operation. The register can be written and read. When reading out the register, it must be noted that the mode of operation reported back was only requested. The currently active mode of operation is prepared in register 0x6061 "ModesOfOperationDisplay\_I6061".

Data type	Range of values
SINT	2 Switching to VL mode requested

**Information:**

Since the drive only supports one DS402 mode of operation, only one permissible value is defined.

**6.6.2.4 Current DS402 mode of operation**

Name:

ModesOfOperationDisplay\_I6061

DS402 profile register 0x6061 displays the active mode of operation.

Data type	Range of values	
SINT	2	Switching to VL mode requested

**Information:**

Since the drive only supports one DS402 mode of operation, only one permissible value is defined.

## 7 The drive in 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.

### 7.1 Automation Studio and ACPI SafeConfigurator

ACPI SafeConfigurator is required to enable the drive's safety functions (STO, SS1, SLS, SMS and GDL). It is intended as a supplementary configuration tool since all non-safety-related parameters can be defined from Automation Studio.

#### Note:

Using tab "Parameter", ACPI SafeConfigurator offers the possibility to read out and adjust the current set of non-safety-related parameters. This means that it is also possible to configure the non-safety-related parameters of the drive. However, there are widely branched dependencies between the individual drive parameters that are currently only taken into account in the module configuration in Automation Studio. To avoid CFI errors, which are very difficult to correct, B&R recommends defining the desired settings in the module configuration in Automation Studio and downloading them to the PLC with the overall project.

### 7.2 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.

### 7.3 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

## 7.4 Establishing connection

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

Initial situation:

- 1) Cable 810XC001.003-1 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 810XC001.003-1 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

### 7.4.1 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.

### 7.4.2 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 810XC001.003-1 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 810XC001.003-1 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.

### 7.4.3 Cable 810XC001.003-1

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.

### 7.4.4 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 344).

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.

### 7.4.5 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.

#### 7.4.5.1 Step 1 - Connect and disconnect

To establish a connection in the first step, action "Connect and disconnect FDTcontainer" is necessary. These connections are pure 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).

#### 7.4.5.2 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.

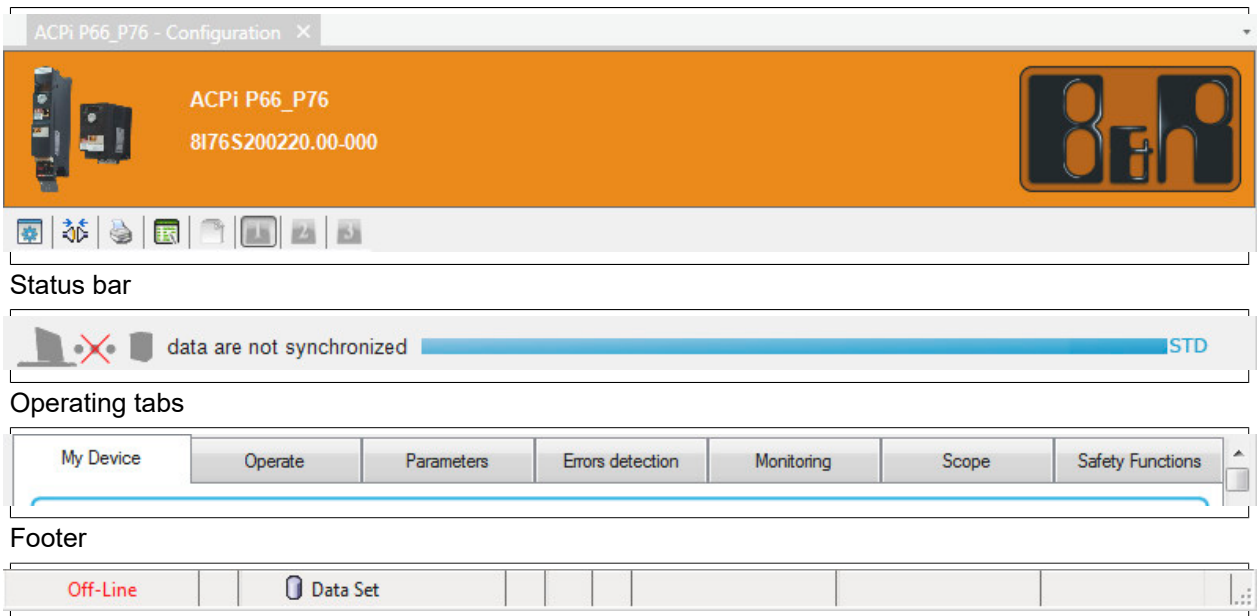
In contrast to virtual connections, which are used exclusively for administration on the PC, synchronized online communication involves the exchange of information between the PC and ACOPOSinverter. Note that cable 8I0XC001.003-1 is designed for point-to-point connections, so you cannot connect multiple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

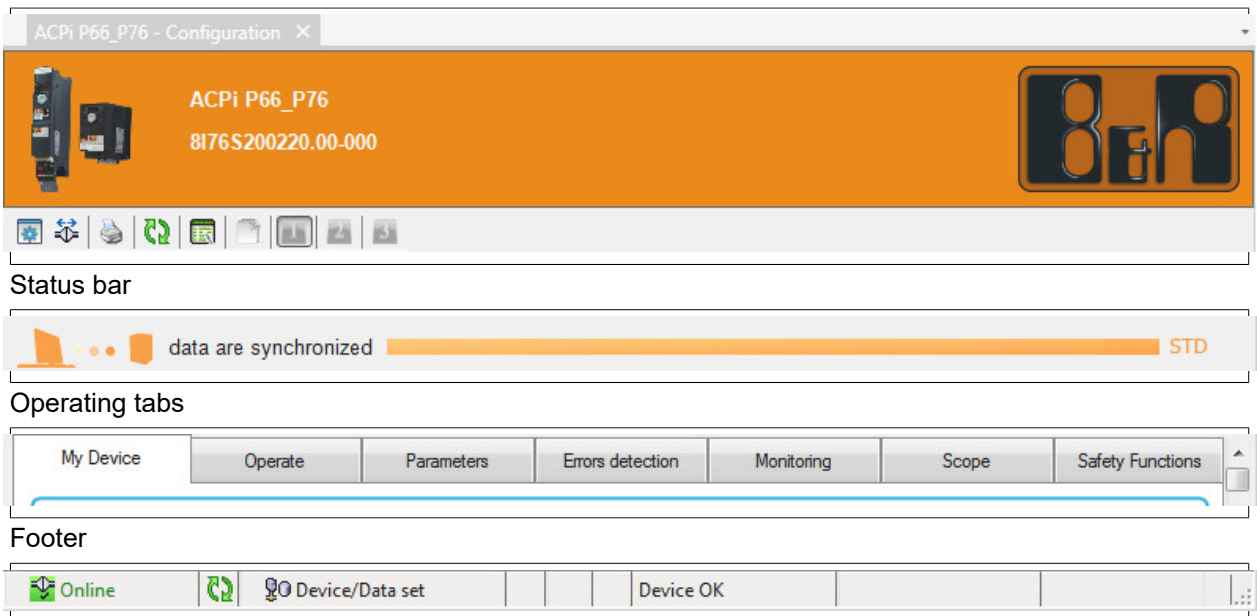
- 1) Header with device-specific user interfaces



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



## 7.5 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.

### 7.5.1 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 information, see chapter "Safety functions" on page 363.

## 7.5.2 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 810XD301.300-1.

For additional details, see ["The drive" on page 85](#).

### 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.**

## 7.6 Monitoring drive parameters

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

### 7.6.1 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.**

### 7.6.2 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.

### 7.6.3 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.**

## 8 Interfaces

### 8.1 POWERLINK

#### 8.1.1 General information

- POWERLINK V2 for real-time Ethernet communication
- Firmware update via fieldbus
- Integrated hub for efficient cabling
- PollResponse Chaining
- Dynamic node allocation (DNA)

#### 8.1.2 Order data


Order number	Short description	Figure
810IF108.400-2	<b>Interface modules</b> 2x POWERLINK interface, POWERLINK V2, interface module for ACOPOSinverter P76.	

Table 11: 810IF108.400-2 - Order data


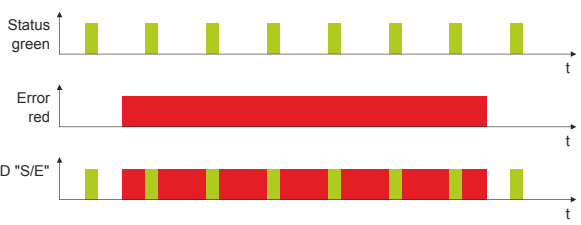
## 8.1.3 Technical data

<b>Order number</b>	<b>8I0IF108.400-2</b>
<b>Short description</b>	
Communication module	POWERLINK V2 controlled node
<b>General information</b>	
B&R ID code	0xF25A
Status indicators	Module status, bus function
<b>Diagnostics</b>	
Module status	Yes, using LED status indicator and software
Bus function	Yes, using LED status indicator and software
<b>Certifications</b>	
CE	Yes
UKCA	Yes
UL	UL E225616 Power conversion equipment
CSA	CSA E272421 Industrial control equipment
<b>Interfaces</b>	
Fieldbus	POWERLINK V2 controlled node
Type	Type 2 <sup>1)</sup>
Variant	2x shielded RJ45 (hub)
Line length	Max. 100 m between 2 stations (segment length)
Transfer rate	100 Mbit/s
<b>Transfer</b>	
Physical layer	100BASE-TX
Half-duplex	Yes
Full-duplex	No
Autonegotiation	Yes
Auto-MDI/MDIX	Yes
Hub propagation delay	0.96 to 1 µs
<b>Operating conditions</b>	
<b>Mounting orientation</b>	
Horizontal	Yes
Vertical	Yes
<b>Installation elevation above sea level</b>	
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
<b>Ambient conditions</b>	
<b>Temperature</b>	
Operation	
Horizontal mounting orientation	-10 to 50°C
Vertical mounting orientation	-20 to 60°C
Derating	-
Storage	-25 to 70°C
<b>Relative humidity</b>	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing

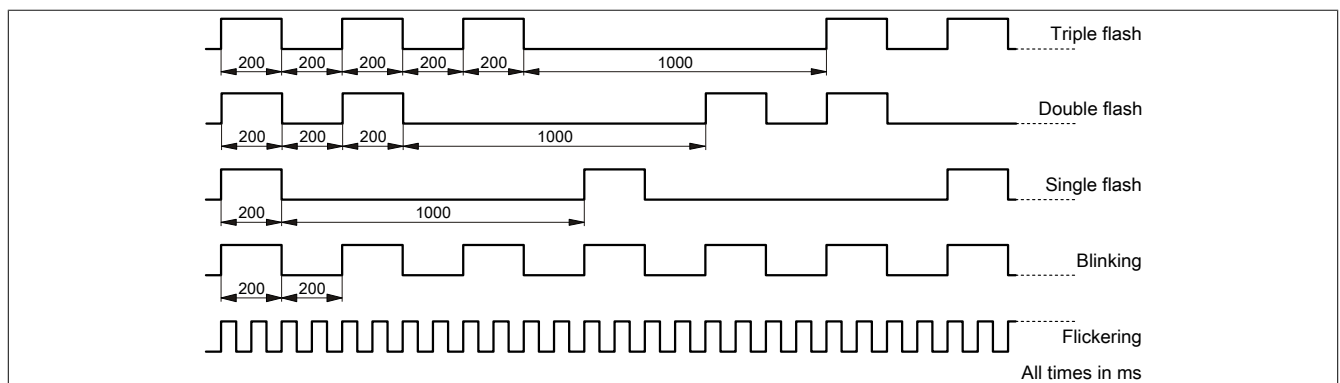
Table 12: 8I0IF108.400-2 - Technical data

1) See Automation Help under "Communication / POWERLINK / General information / Hardware - IF/LS" for additional information.

### 8.1.4 LED status indicators

Figure	LED	Color	Status	Description	
	S/E <sup>1)</sup>	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 s after a restart. Communication is not possible with the CN. If no POWERLINK communication is detected during these 5 s, the CN changes to state BASIC_ETHERNET (flickering). If POWERLINK communication is detected before this time expires, however, the CN immediately changes to 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). If POWERLINK communication is detected in this state, the CN changes to state PRE_OPERATIONAL_1.	
			Single flash	Mode PRE_OPERATIONAL_1. When operating on a POWERLINK V1 manager, the CN immediately changes to state PRE_OPERATIONAL_2. When operating on a POWERLINK V2 manager, the CN waits until an SoC frame is received and then changes to state PRE_OPERATIONAL_2.	
			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 flag "Data valid" in the output data (POWERLINK V1).	
			Triple flash	Mode READY_TO_OPERATE. In a POWERLINK V1 network, the CN switches to state OPERATIONAL automatically as soon as input data is present. In a POWERLINK V2 network, the manager switches to state OPERATIONAL by command.	
			On	Mode OPERATIONAL. 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, the red LED is superimposed by the green flashing LED: <ul style="list-style-type: none"> <li>PRE_OPERATIONAL_1</li> <li>PRE_OPERATIONAL_2</li> <li>READY_TO_OPERATE</li> </ul>  <p>Note:</p> <ul style="list-style-type: none"> <li>Several red blinking signals are displayed immediately after the device is switched on. This is not an error, however.</li> <li>The LED lights up red for CNs with set physical node number 0 that have not yet been assigned a node number via dynamic node allocation (DNA).</li> </ul>	
		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.	

1) The Status/Error LED "S/E" is a green/red dual LED.



### 8.1.4.1 System stop error codes

A system stop error can occur due to incorrect configuration or defective hardware.

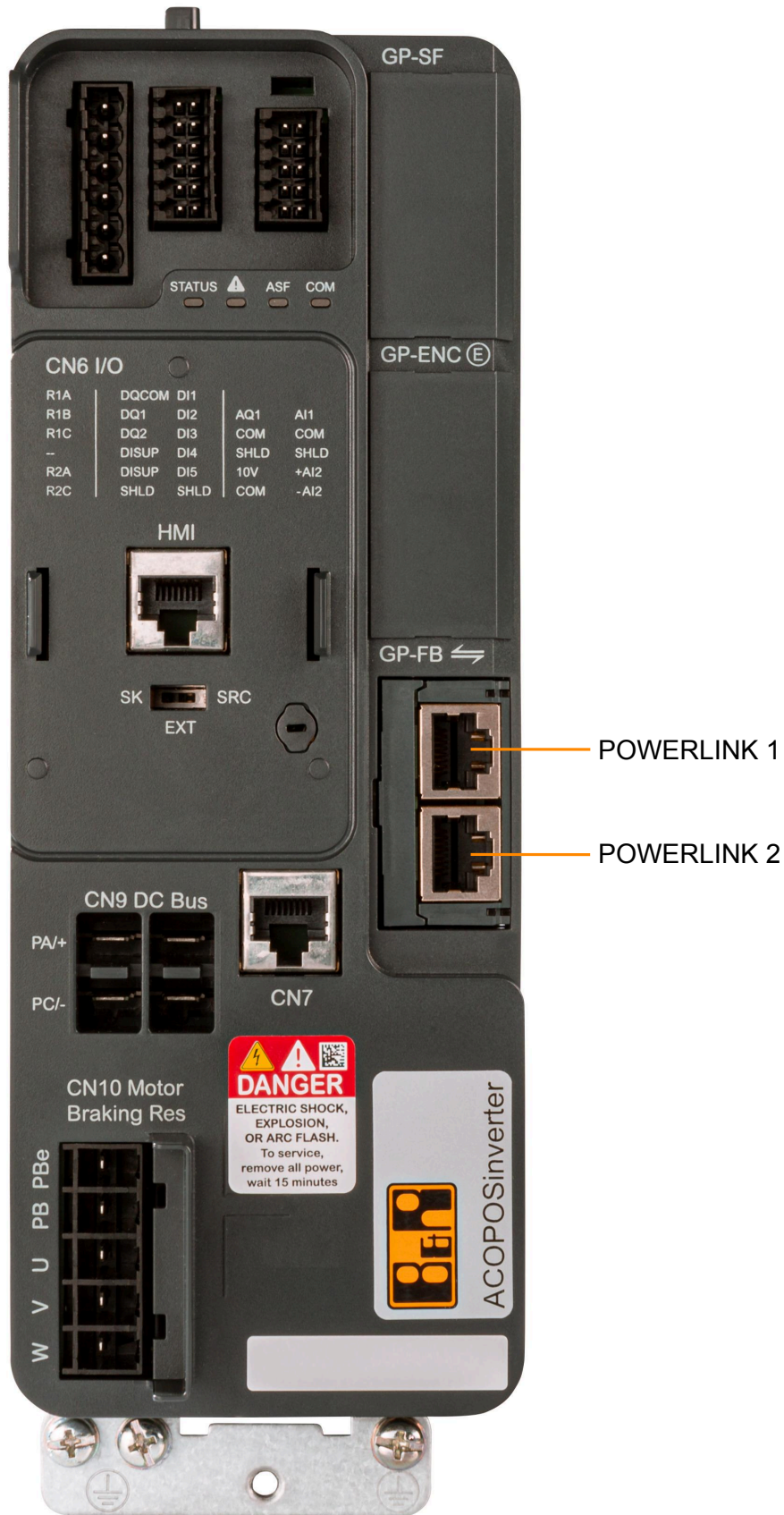
The error code is indicated by LED "S/E" blinking red. The blinking signal of the error code consists of 4 switch-on phases with short (150 ms) or long (600 ms) duration. The error code is repeated every 2 seconds.

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.	-	•	•	•	Pause	-	•	•	•	Pause
<p><b>Information:</b> The module does not support hot plugging.</p>										

Table 13: Status/Error ("S/E") LED - System stop error codes

### 8.1.5 Operating and connection elements

On the ACOPOSinverter P86, the POWERLINK communication card comes is delivered preinstalled in the drive.



### 8.1.6 POWERLINK node number

The station numbers in the range 0x01 (1) to 0xEF (239) can be entered directly via the optional operator terminal or the dial on the device. The value 0x00 (0) is assigned ex works. This setting means that the station number is determined automatically via DNA (dynamic node allocation).

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)	<b>[Address]</b>	0 to 239	0

### 8.1.7 Dynamic node allocation (DNA)

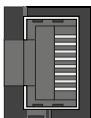
Bus controller POWERLINK offers the option of receiving dynamically assigned node numbers.

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)

### 8.1.8 Ethernet interface

Interface	Pinout		
	Pin	Ethernet	
 Shielded RJ45	1	RXD	Receive data
	2	RXD\	Receive data\
	3	TXD	Transmit data
	4	Termination	
	5	Termination	
	6	TXD\	Transmit data\
	7	Termination	
	8	Termination	

### 8.1.9 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.

## 8.1.10 Register description

### 8.1.10.1 System requirements

To use the full integration of ACOPOSinverter in Automation Studio, the following minimum versions are required:

- Automation Studio 4.3.5
- Automation Runtime D4.10

Function model "Motion configuration" and the associated integration in mapp Motion and mapp Cockpit additionally require Technology Package:

- mapp Motion 5.8.2

To use the full integration of ACOPOSinverter in APROL, the following minimum version is required:

- APROL R4.2-06

### 8.1.10.2 Basic values of drive

Modbus "ADL"	POWERLINK, CAN		Name	Data type	Read		Write	
	"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		•		

### 8.1.10.3 Terminal block inputs/outputs

Modbus "ADL"	POWERLINK, CAN		Name	Data type	Read		Write	
	"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 "ADL"	POWERLINK, CAN		Name	Data type	Read		Write	
	"Index"	"Subindex"			Cyclic	Acyclic	Cyclic	Acyclic
<b>Configuration of the analog inputs</b>								
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	UII1_Input	UII1_Output	UINT		•	•
4413	0x200E	0x0E	UII2_Input	UII2_Output	UINT		•	•
4422	0x200E	0x17	UIH1_Input	UIH1_Output	UINT		•	•
4423	0x200E	0x18	UIH2_Input	UIH2_Output	UINT		•	•

## Interfaces

Modbus "ADL"	POWERLINK, CAN		Name		Data type	Read		Write	
	"Index"	"Subindex"				Cyclic	Acyclic	Cyclic	Acyclic
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		•		•
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		•		•
<b>Configuration of analog outputs</b>									
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		•		•
<b>Configuration of digital inputs</b>									
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		•		•
<b>Configuration of digital outputs</b>									
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		•		•
<b>Additional signals (derived from digital input LI5)</b>									
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		•		•
<b>Additional signals (derived from digital input LI6)</b>									
13203	0x2066	0x04	PTCL_Input	PTCL_Output	UINT		•		•

## 8.1.10.4 Communication (with setpoint in rpm)

Modbus "ADL"	POWERLINK, CAN		Name	Data type	Read		Write	
	"Index"	"Subindex"			Cyclical	Acyclic	Cyclical	Acyclic
<b>Optional status responses</b>								
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		•		
<b>State and command register (default)</b>								
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	•	•		
<b>Optional responses and additional setpoints</b>								
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		•		
<b>Error history</b>								
7393	0x202B	0x5E	FNB_Input	UINT		•		
7200 + Index	0x202A	0x01 + Index	LFT: DP0_Input DP[0...8]_Input	UINT		•		

## Interfaces

Modbus	POWERLINK, CAN		Name	Data type	Read		Write	
	"ADL"	"Index"			"Subindex"	Cyclical	Acyclic	Cyclical
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	LGR: 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		•		

### 8.1.10.5 Communication (with setpoint in Hz)

Modbus	POWERLINK, CAN		Name	Data type	Read		Write	
	"ADL"	"Index"			"Subindex"	Cyclical	Acyclic	Cyclical
<b>Optional status responses</b>								
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		•		
<b>State and command register (default)</b>								
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	•	•		
<b>Optional responses and additional setpoints</b>								
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		•	•	

Modbus "ADL"	POWERLINK, CAN		Name	Data type	Read		Write	
	"Index"	"Subindex"			Cyclical	Acyclic	Cyclical	Acyclic
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	•	•		
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		•		
<b>Error history</b>								
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	CMD: 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	HMS: 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		•		

### 8.1.10.6 Configuration

Modbus "ADL"	POWERLINK, CAN		Name	Data type	Read		Write	
	"Index"	"Subindex"			Cyclical	Acyclic	Cyclical	Acyclic
<b>General</b>								
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		•	•
<b>Nameplate (induction motor)</b>								
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		•	•
<b>Nameplate (SYN motor)</b>								
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		•	•
<b>Tuning settings</b>								
9608	0x2042	0x09	TUN_Input	TUN_Output	UINT		•	•

## Interfaces

Modbus "ADL"	POWERLINK, CAN		Name		Data type	Read		Write	
	"Index"	"Sub-index"				Cyclical	Acyclic	Cyclical	Acyclic
9617	0x2042	0x12	STUN_Input	STUN_Output	UINT		•		•
9610	0x2042	0x0B	TUL_Input	TUL_Output	UINT		•		•
<b>Tuning results (induction motor)</b>									
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		•		•
<b>Tuning results (SYN motor)</b>									
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		•		•
<b>Premagnetization</b>									
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		•		•
<b>High frequency supply for synchronous motors</b>									
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		•		•
<b>Access</b>									
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		•		•
<b>DC bus circuit</b>									
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		•		•
<b>PWM management</b>									
12601	0x2060	0x02	SVL_Input	SVL_Output	UINT		•		•
12602	0x2060	0x03	SOP_Input	SOP_Output	UINT		•		•
<b>General current/torque limiting</b>									
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		•		•

Modbus "ADL"	POWERLINK, CAN		Name	Data type	Read		Write		
	"Index"	"Su- bindex"			Cyclical	Acyclic	Cyclical	Acyclic	
<b>Motor management</b>									
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		•		•
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		•		•
<b>Axis management</b>									
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		•		•
<b>Resonant frequency</b>									
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		•		•
<b>Speed adjustment (ramps)</b>									
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		•		•
<b>Load management</b>									
14401	0x2072	0x02	SRB_Input	SRB_Output	UINT		•		•
14411	0x2072	0x0C	ULT_Input	ULT_Output	UINT		•		•

## Interfaces

Modbus	POWERLINK, CAN		Name		Data type	Read		Write	
	"ADL"	"Index"				"Su- bindex"	Cyclical	Acyclic	Cyclical
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		•		•
14423	0x2072	0x18	FTO_Input	FTO_Output	UINT		•		•
14425	0x2072	0x1A	LOC_Input	LOC_Output	UINT		•		•
<b>Brake controller (DCI)</b>									
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		•		•
<b>Brake controller (BLC)</b>									
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_Output	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		•		•
<b>Line contactor control</b>									
13601	0x206A	0x02	LES_Input	LES_Output	UINT		•		•
13602	0x206A	0x03	LLC_Input	LLC_Output	UINT		•		•
13603	0x206A	0x04	LCT_Input	LCT_Output	UINT		•		•
<b>Motor contactor control</b>									
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		•		•
<b>Error behavior</b>									
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		•		•
<b>Error diagnostics</b>									
3112	0x2001	0x0D	STRT_Input	STRT_Output	UINT		•		•
3121	0x2001	0x16	RFLT_Input	RFLT_Output	UINT		•		•

Modbus	POWERLINK, CAN		Name		Data type	Read		Write	
	"ADL"	"Index"				"Su-index"	Cyclical	Acyclic	Cyclical
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		•		•
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		•		•
<b>User-defined threshold values</b>									
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		•		•
<b>User def. alarm groups</b>									
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		•		•
<b>Handheld settings</b>									
64002	0x2262	0x03	PST_Input	PST_Output	UINT		•		•
64035	0x2262	0x24	PVIS_Input	PVIS_Output	UINT		•		•
<b>Display settings</b>									
12001	0x205A	0x02	SDS_Input	SDS_Output	UINT		•		•
<b>Special function: "Limit switch"</b>									
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		•		•
<b>Special function: "PID controller"</b>									
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	P1I_Input	P1I_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		•		•

## Interfaces

Modbus	POWERLINK, CAN		Name		Data type	Read		Write	
	"ADL"	"Index"				"Sub-index"	Cyclical	Acyclic	Cyclical
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		•		•
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		•		•

### 8.1.10.7 Minimum cycle time

The minimum cycle time specifies how far 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

# 9 Safety functions

## 9.1 General information

### 9.1.1 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 after the power supply has been interrupted.

The safety functions are configured using ACPI SafeConfigurator.

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	<b>Safe torque off</b> No power that could result in a rotation or exertion of force is transferred to the motor.
SLS	<b>Safe limited speed</b> 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	<b>Safe stop 1</b> <ul style="list-style-type: none"> <li>• Initiates and monitors the motor deceleration rate within defined limits in order to stop the motor.</li> <li>• Introduces function "Safe stop" if the motor speed falls below the specified limit value.</li> </ul>

#### Safety functions not in accordance with IEC 61800-5-2

##### Definitions

Abbreviation	Description
SMS	<b>Safe maximum speed</b> 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	<b>Safety door lock</b> 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

##### Note:

For connection examples for the ACOPOSinverter and the safety modules, see the "Integrated safety technology user's manual" – mapp Safety:

- **Connection examples**

## Warning!

The parallel connection/wiring of STO inputs of several inverters is not permitted.

Configuration no. 1:

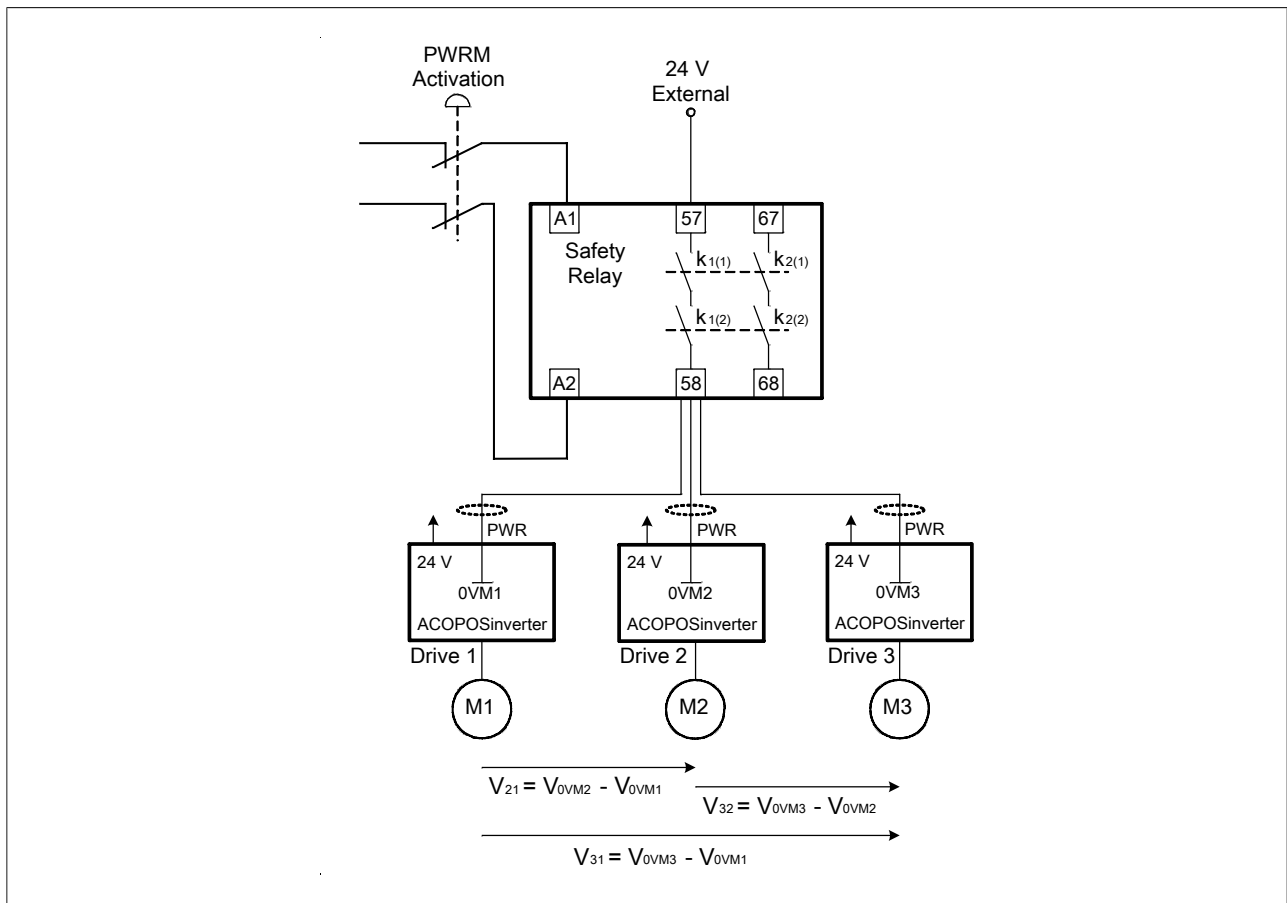
Only one safety contact of the external 24 V power supply is used to activate the power removal safety functions (PWRM activation) on the ACOPOSinverter.

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.



## 9.1.2 Certifications

### EC declaration of conformity

The EC declaration of conformity for the EMC Directive is available at [www.br-automation.com](http://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 399.

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](http://www.br-automation.com).

## 9.1.3 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 $< 3 \times 10^{-6}$
b	$\geq 3 \times 10^{-6}$ 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.

$$SFF = \frac{\sum \lambda_{S\dots} + \dots \sum \lambda_{Dd}}{\sum \lambda_{S\dots} + \dots \sum \lambda_{Dd\dots} + \dots \sum \lambda_{Du}}$$

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
90% 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 1,000,000,000

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.

## 9.2 Description

### 9.2.1 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.

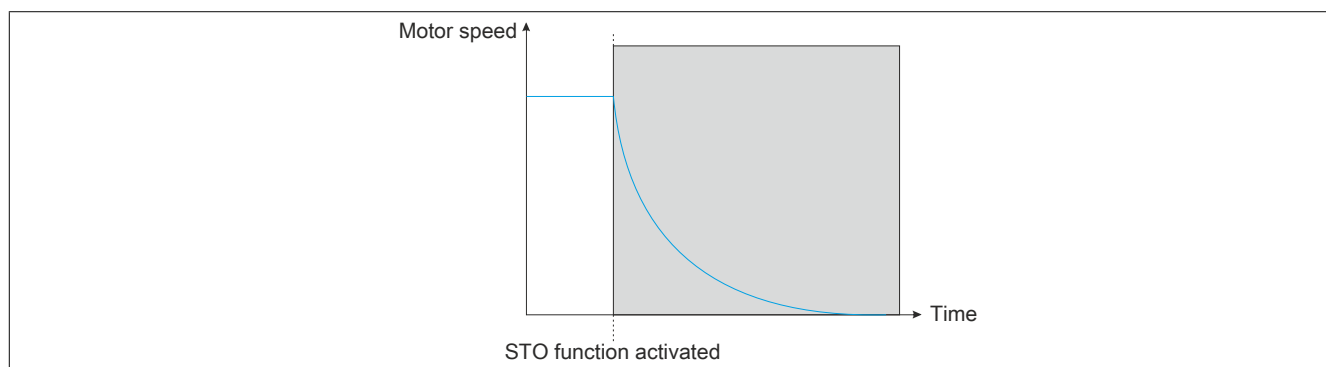
Function "Safe Torque Off" (STO) serves to effectively prevent an unexpected start-up of the motor. This ensures a safe shutdown, as only the power transfer to the motor is interrupted while the main circuits of the frequency inverter continue to be supplied with power.

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.

## 9.2.2 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) for defining the unit for the ramp in 1 Hz/s, 10 Hz/s and 100 Hz/s

**[SS1 ramp value]** (SSrt) (0.1) for defining 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 ["Commissioning" on page 413](#).

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, the following happens:

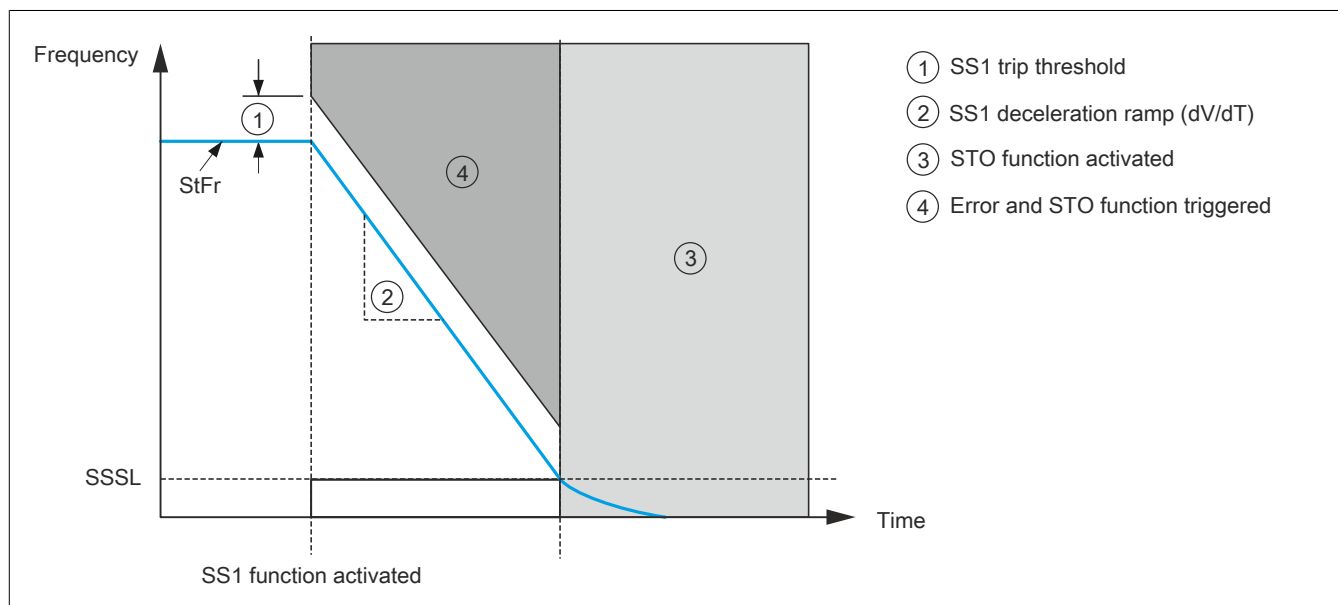
- An error is triggered and error code **[Safe function fault]** (SAFF) is displayed.
- Safety function STO is enabled.

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.

### Note:

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.

### Note:

**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 in which the energy supply to the motor to execute the shutdown process is maintained and 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.

## 9.2.3 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.

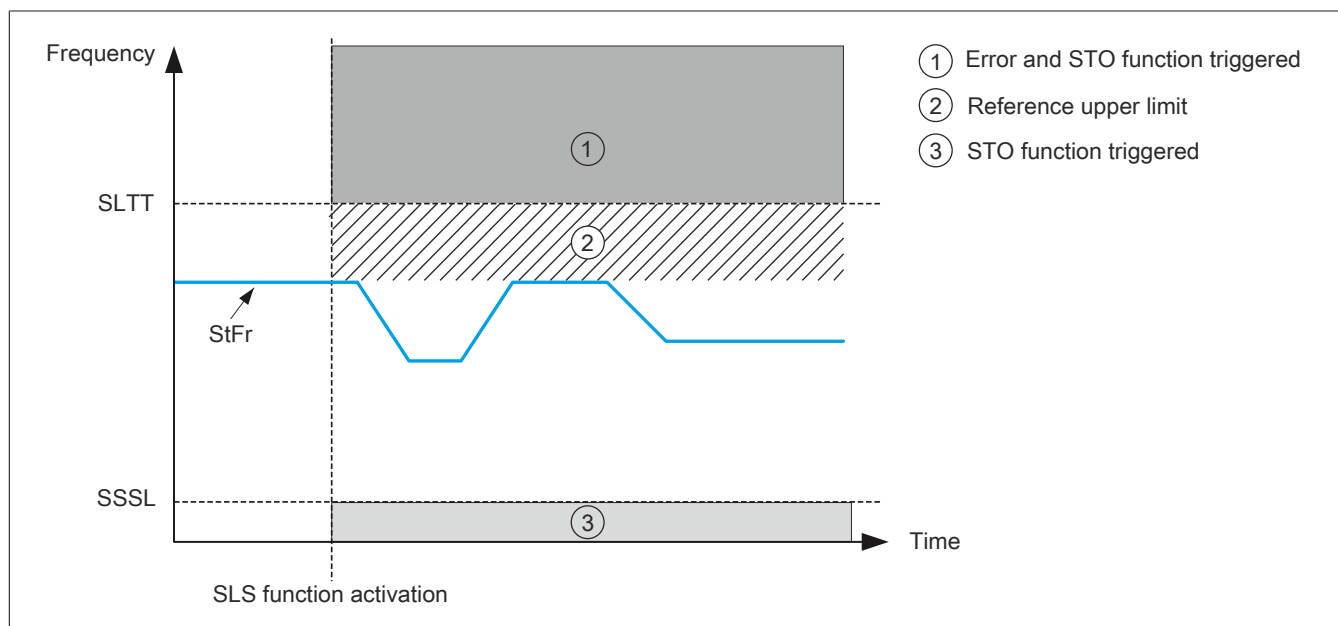
### Note:

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 413](#).

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



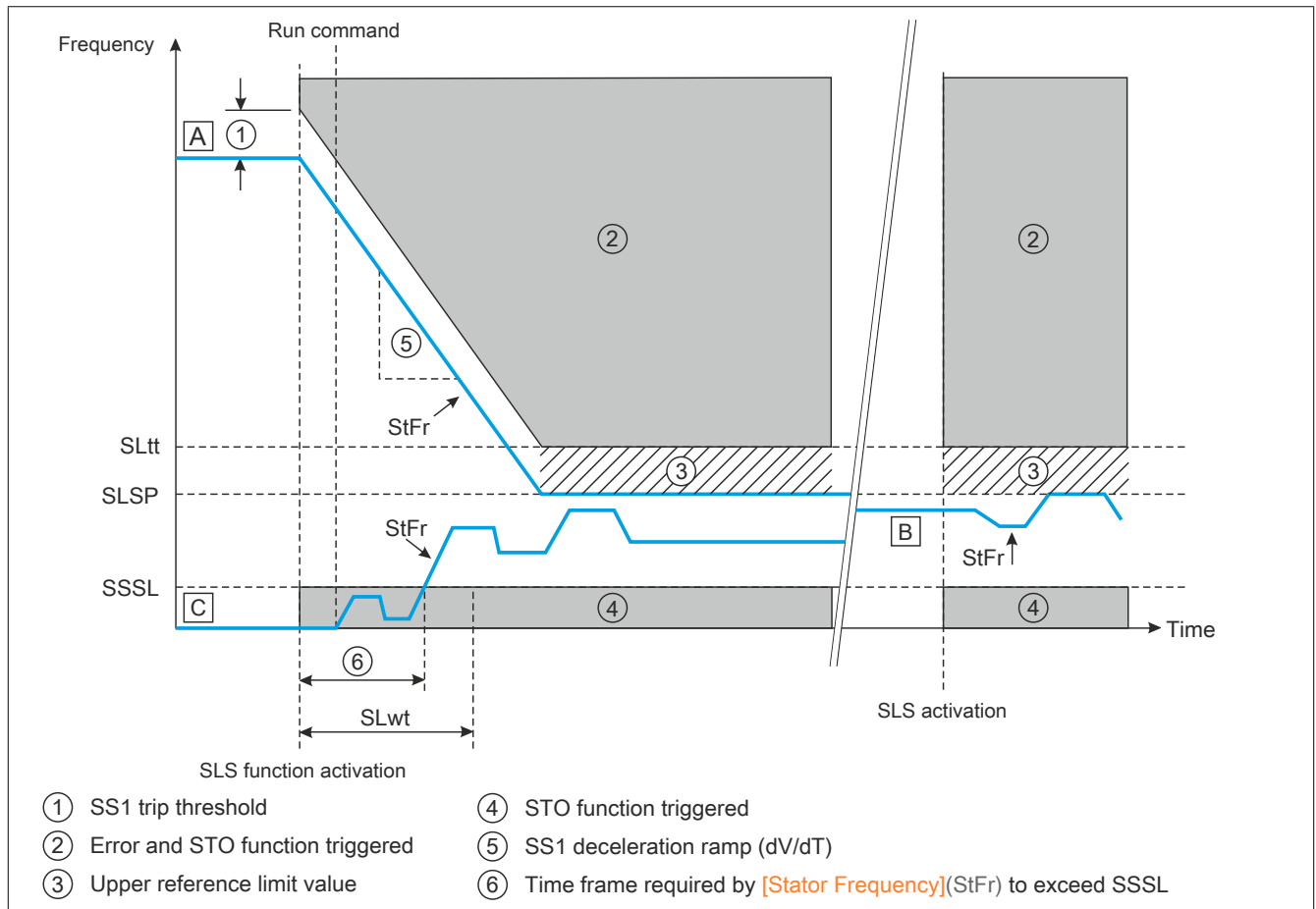
When the safety function is activated:

- 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



[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)  $\neq$  0.

When the function is activated:

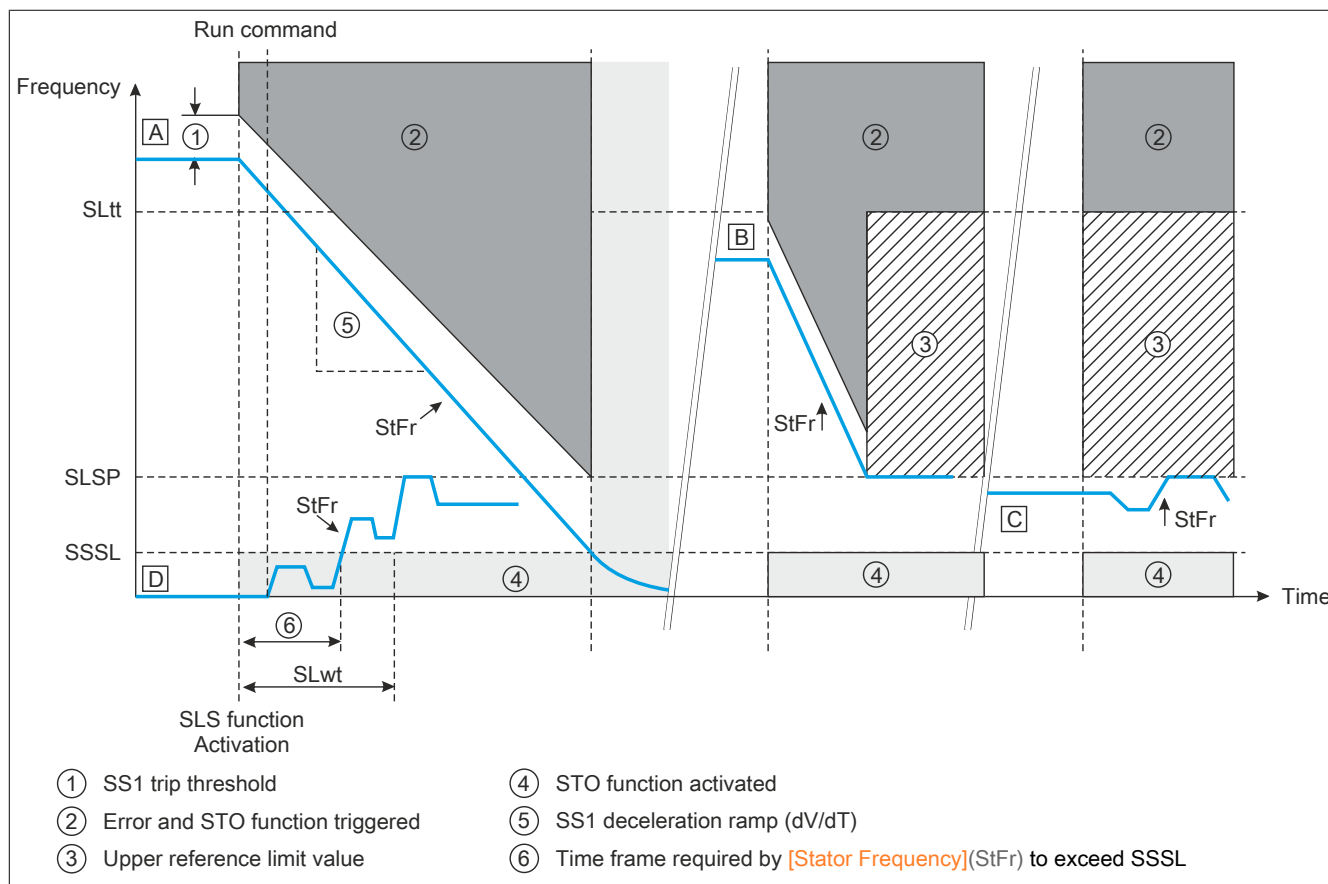
- If [Stator Frequency] (StFr) is above [Reference] (SLSP), the frequency inverter decelerates in accordance with the SS1 deceleration ramp until [Reference] (SLSP) is reached (see case A).
- If [Stator Frequency] (StFr) is below [Reference] (SLSP), the current reference value is not changed but is instead 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)  $\neq$  0.

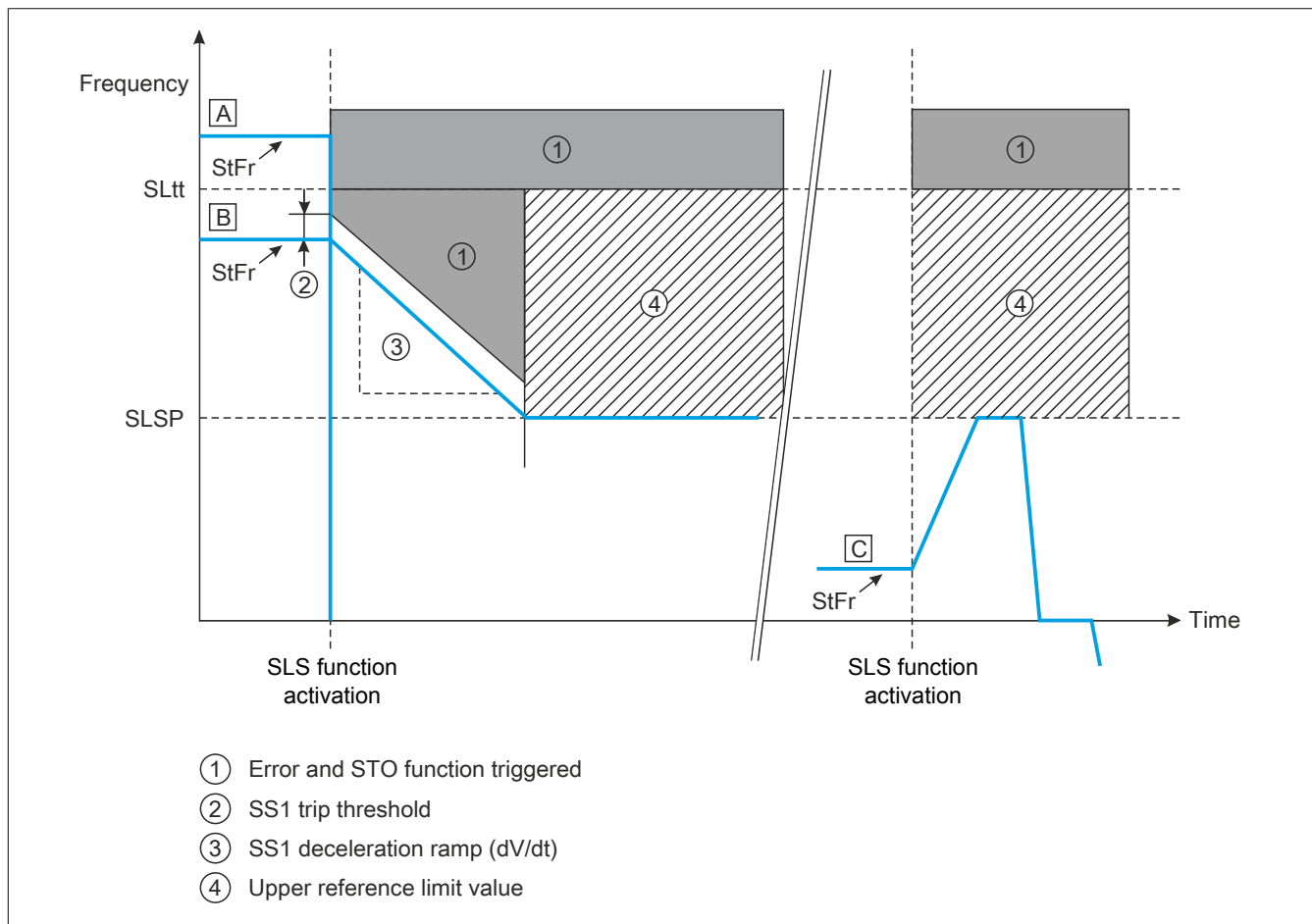
When the function is activated:

- 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).

### Note:

If  $(SLTT) \leq (SLSP)$  for SLS type 4, an SAFF error is triggered.

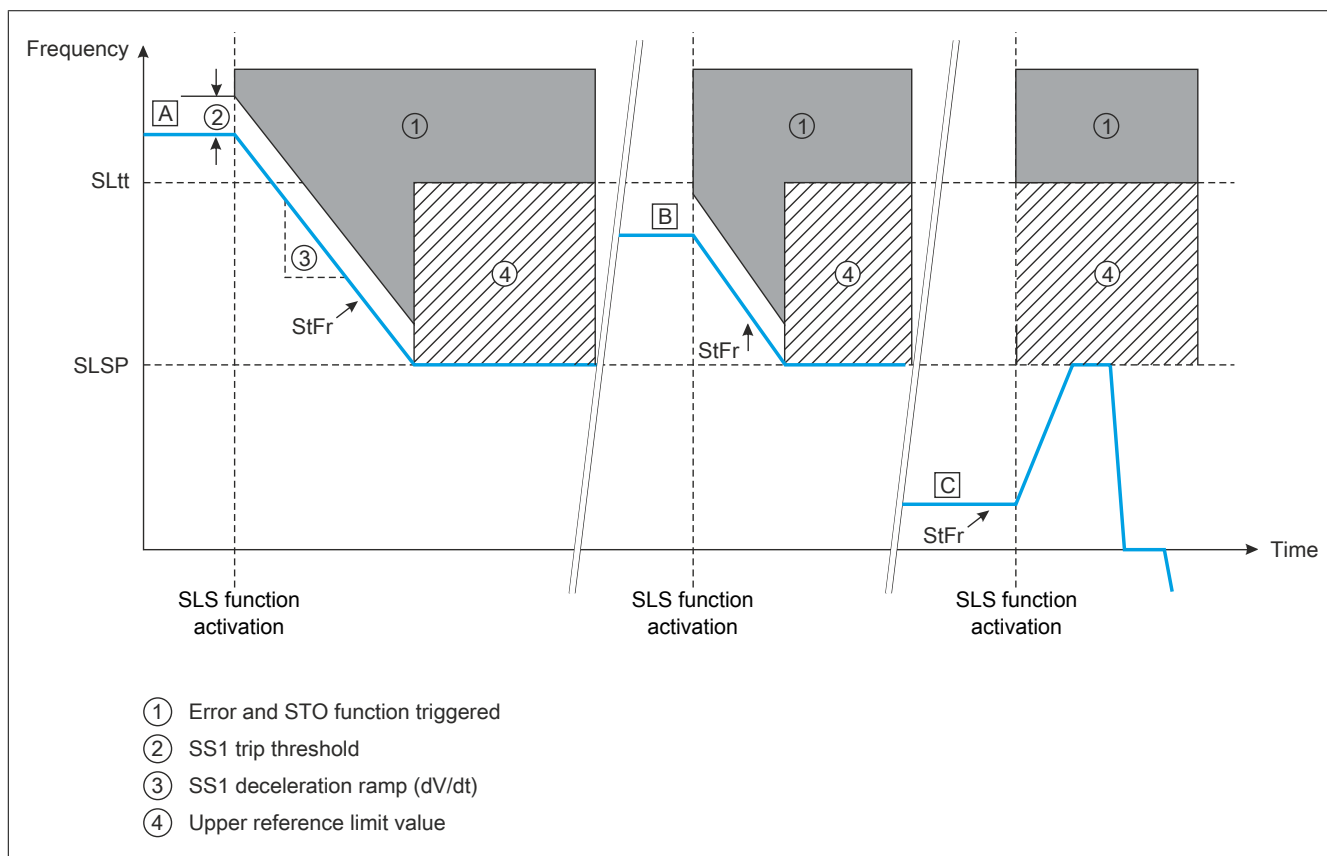
When the function is activated:

- 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).

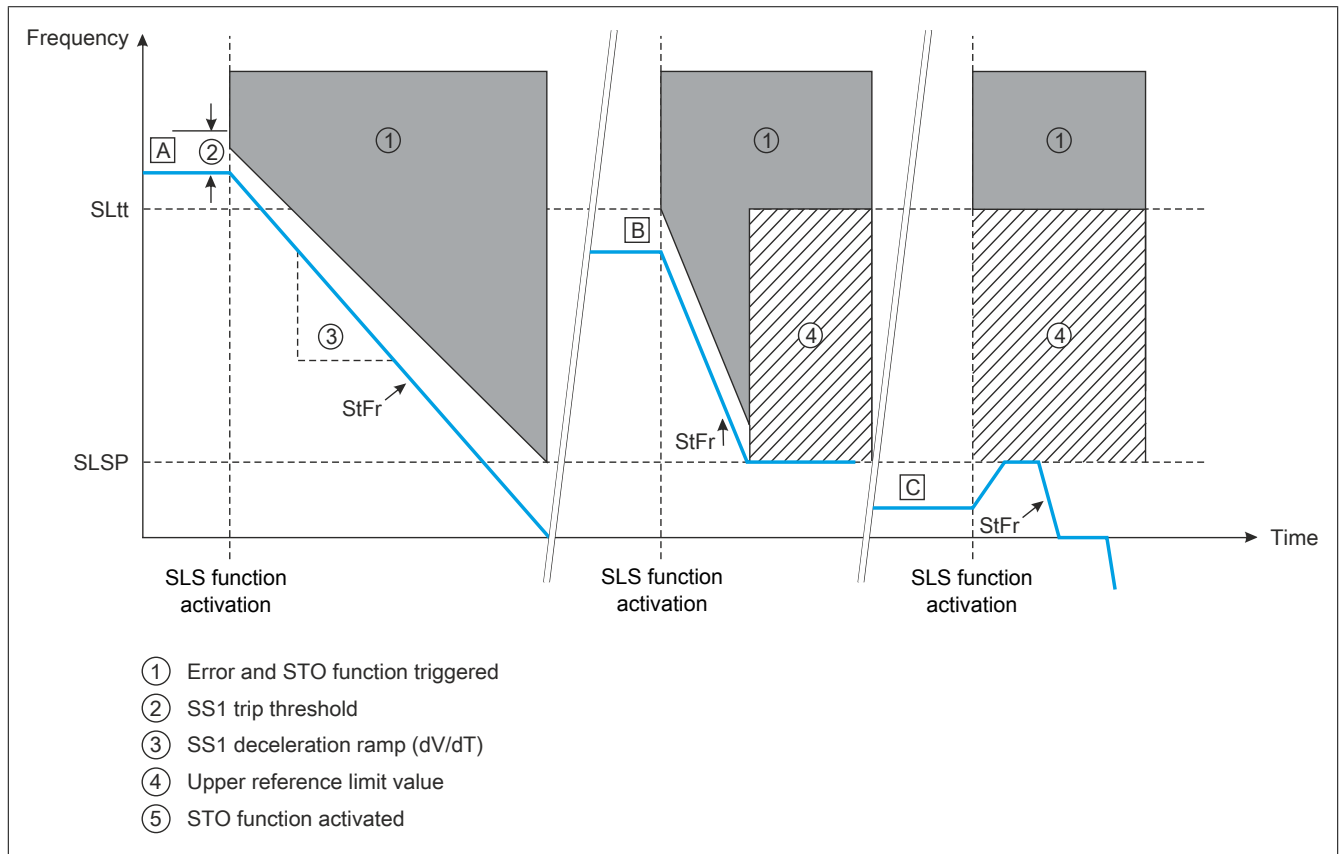
When the function is activated:

- 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



[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 the frequency inverter is still in operation when the function is disabled, then the frequency setpoint of the active channel is applied.
- If safety function STO has been enabled and the frequency inverter is not in an error state, then a new move command must be applied.
- If safety function SLS type 2, 3, 4 is disabled while the drive is decelerating to **[Setpoint]** (SLSP) according to SS1 deceleration ramp, safety function SLS type 3 is disabled while safety function SS1 is enabled, then safety function SLS remains enabled until **[Setpoint]** (SLSP) has been reached. STO is enabled if **[Standstill level]** (SSSL) is reached and a new move command must be applied.
- If a stop command is applied, then safety function SLS remains enabled and the frequency inverter decelerates until standstill is reached. Function STO will be activated for SLS type 1, 2 or 3 if **[Stator Frequency]** (StFr) decreases and the frequency reaches **[Standstill level]** (SSSL).
- If an error is detected, safety function SLS remains active and the frequency inverter decelerates 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

## 9.2.4 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 413](#).

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.

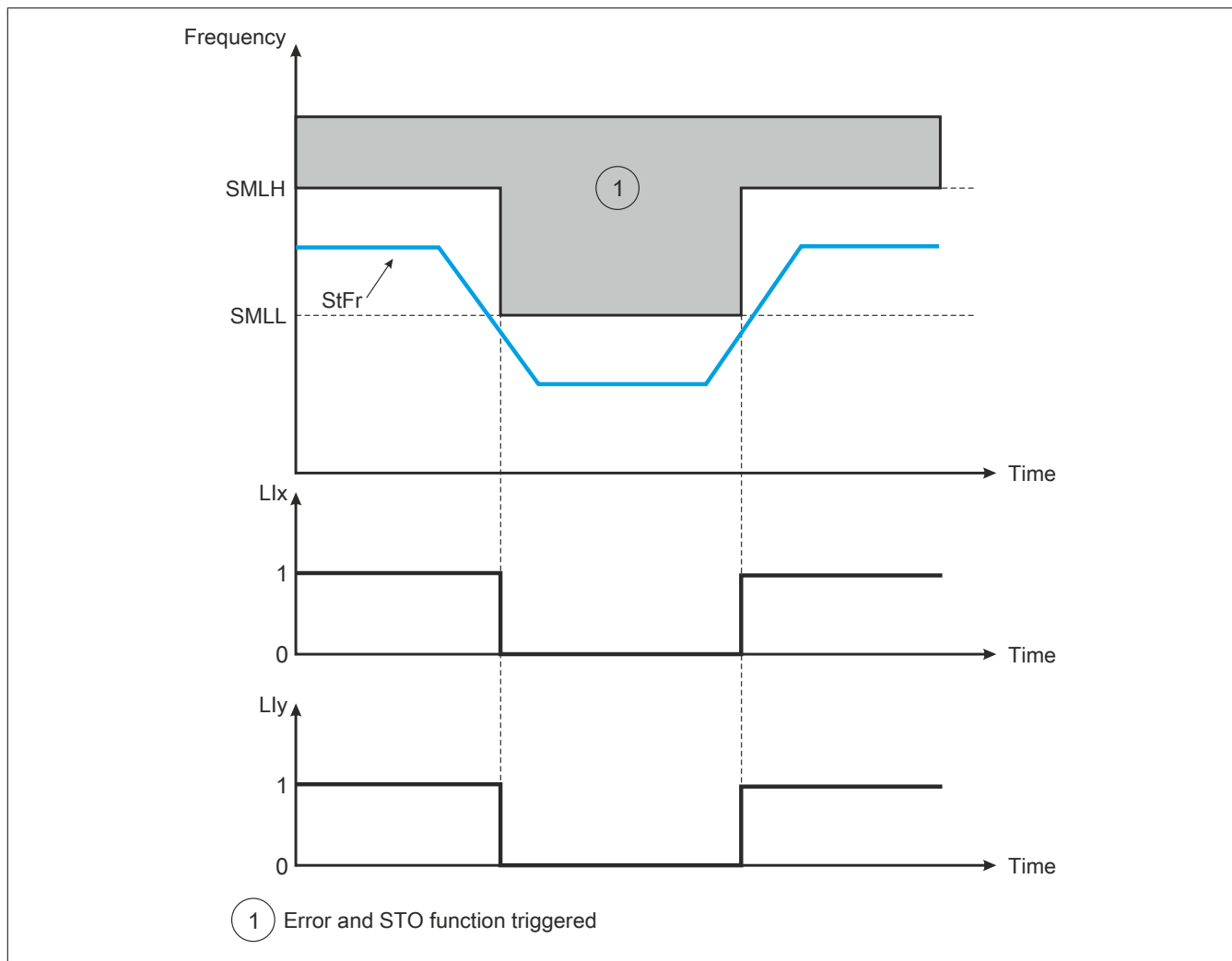
If **[SMS Assignment]** (SMLS) is set to NO, **[SMS Low Limit]** (SMLL) applies as the limit value for the safe maximum speed.

### Note:

- **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 (Llx and Lly) 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 (Llx and Lly) 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 (Llx and Lly) 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

## 9.2.5 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 412).

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.

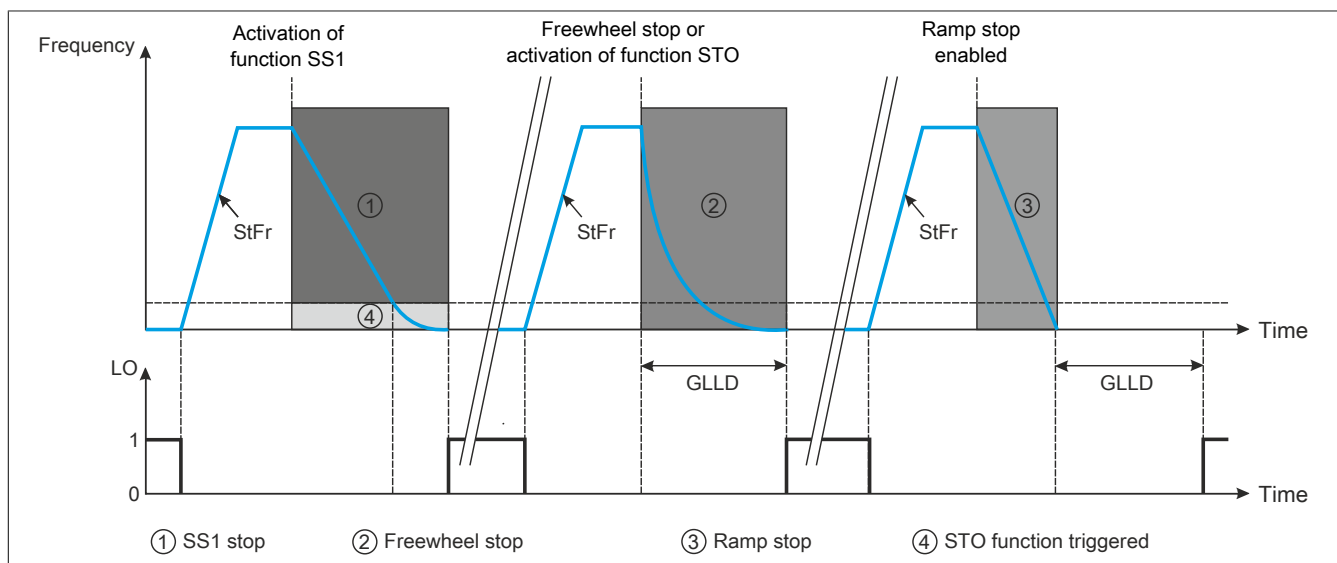
### Note:

**[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 additional information, see "Commissioning" on page 413.

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

## 9.3 Calculation of parameters relating to safety

### 9.3.1 SLS type 1

#### Record application data

The following data must be recorded before beginning to configure function SLS:

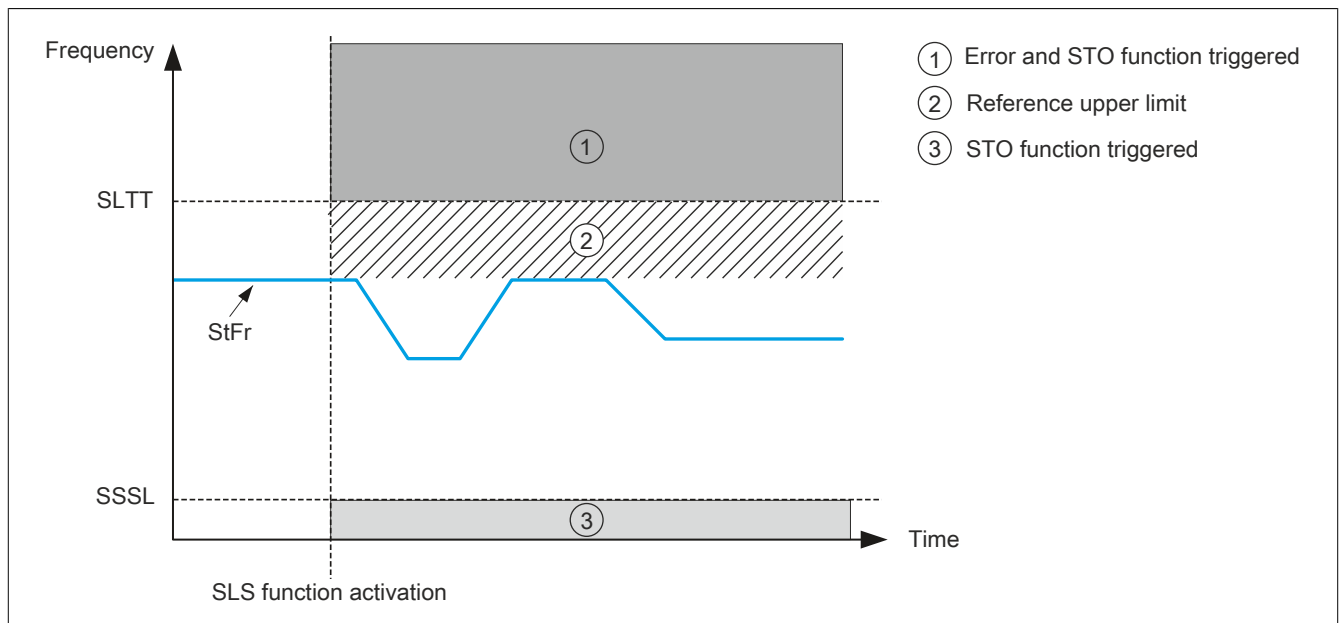
Code	Description	Unit	Note
(FrS)	[Rated motor freq.]	Hz	See motor nameplates.
(nSp)	[Rated motor speed]	rpm	See motor nameplates.
ppn	Number of motor pole pairs	-	See motor nameplates.
Max. HSP freq	Maximum motor frequency in normal operation.	Hz	This value is equal to or lower than value [High speed] (HSP).

Calculation of the nominal value of slip compensation "Fslip" (Hz) for the motor:

$$F_{slip} = FrS - \frac{N_{sp} \times ppn}{60}$$

#### Configuration of the function

##### Outline diagram



#### Standstill value

The recommended standstill value is:  $SSSL = F_{slip}$

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  $SLtt = 1.2 \times Max. freq HSP + F_{slip}$

#### 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 set-point	<ul style="list-style-type: none"> <li>SAFF error code</li> <li>SFFE.7 = 1</li> </ul>	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:

$$F_{slip} = 50 - \frac{1350 \times 2}{60} = 5 \text{ Hz}$$

$$SSSL = F_{slip} = 5 \text{ Hz}$$

$$SL_{tt} = 1.2 \times \text{Max. freq HSP} + F_{slip} = 1.2 \times 50 + 5 = 65 \text{ Hz}$$

**9.3.2 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:

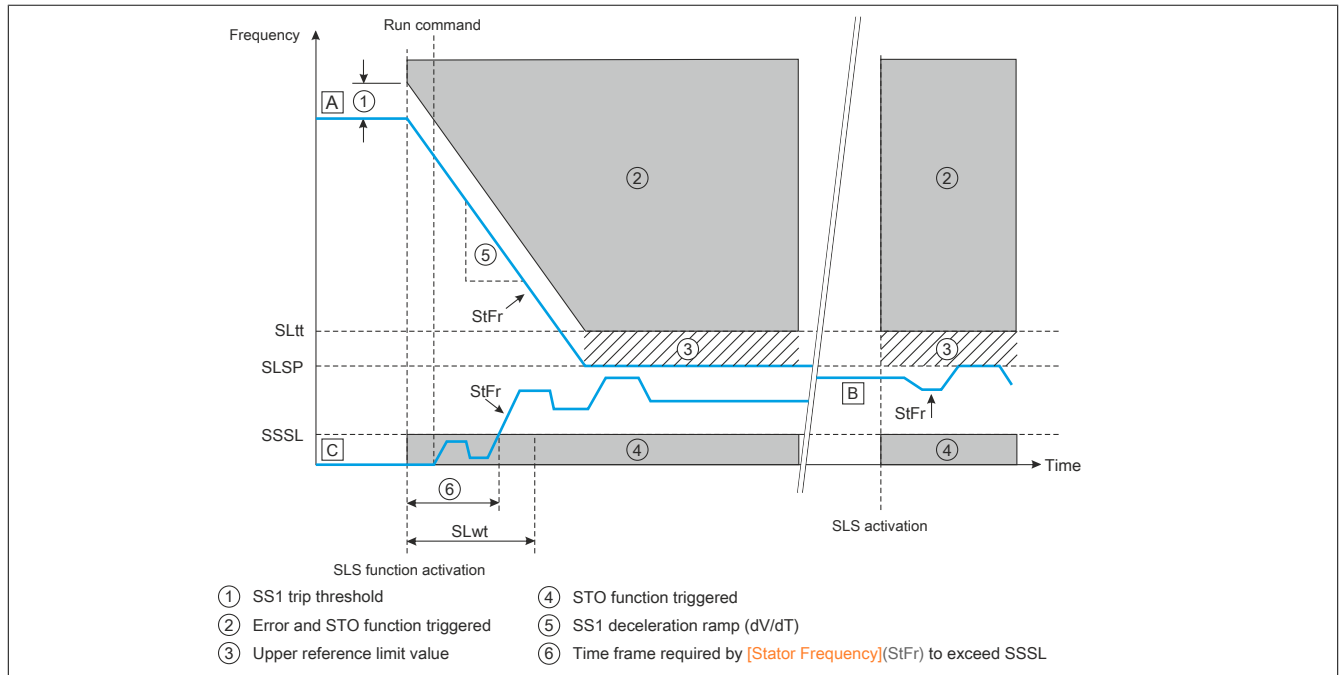
Code	Description	Unit	Note
(FrS)	[Rated motor freq.]	Hz	See motor nameplates.
(nSp)	[Rated motor speed]	rpm	See motor nameplates.
ppn	Number of motor pole pairs	-	See motor nameplates.
Max. HSP freq	Maximum motor frequency in normal operation.	Hz	This value is equal to or lower than value [High speed] (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:

$$F_{slip} = FrS - \frac{Nsp \times ppn}{60}$$

## 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:  $SSSL = F_{slip}$  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 (SSrU) (ramp value) and (SSrU) (ramp unit) according to the deceleration ramp that is to be applied when safety function SS1 is activated.

Ramp calculation:  $Ramp = SSrU \times SSrt$

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:  $SLSP = F_{setpoint}(SLS)$

### Motor frequency and ramp threshold value

The recommended motor frequency threshold value is  $SLtt = 1.2 \times SLSP + F_{slip}$  and the recommended threshold value of the SS1 ramp is  $SSrt = 0.2 \times Max. Freq HSP$ .

### 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.

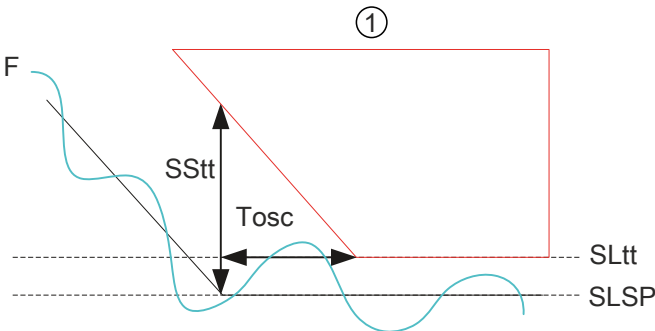
### Note:

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	<ul style="list-style-type: none"> <li>SAFF error code</li> <li>SFFE.3 = 1</li> </ul>	<p>Motor frequency has reached its threshold value.</p> <p>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.</p>
SLS activated and ramp end at SLSP frequency	<ul style="list-style-type: none"> <li>SAFF error code</li> <li>SFFE.3 = 1 or</li> <li>SFFE.7 = 1</li> </ul>	<p>Stabilization of the motor frequency at SLSP is taking too long and has reached the error detection conditions of the safety function.</p>  <p>① Safety function error detection Tosc: T oscillation F: Frequency</p> <p>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 <b>[Safe function fault] (SAFF)</b> is displayed. The relationship between (SStt) and T (oscillation) is as follows:</p> $T(osc) = \frac{SStt - (SLtt - SLSP - Fslip)}{SSrt \times SSRU}$ <p>Motor frequency has reached its threshold value.</p> <p>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.</p>
SLS activated and motor running with SLSP frequency	<ul style="list-style-type: none"> <li>SAFF error code</li> <li>SFFE.7 = 1</li> </ul>	<p>Motor frequency has reached its threshold value.</p> <p>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.</p>

### 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 <b>[High speed] (HSP)</b> .	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:

$$Fslip = 50 - \frac{1350 \times 2}{60} = 5 \text{ Hz}$$

$$SSSL = Fslip = 5 \text{ Hz}$$

$$SSrU = 1 \text{ Hz/s and } SSrt = 20 \text{ when } SS1 \text{ deceleration ramp} = 20 \text{ Hz/s (accuracy: 0.1 Hz)}$$

$$SLSP = Fsetpoint(SLS) = 15 \text{ Hz}$$

$$SLtt = 1.2 \times SLSP + Fslip = 1.2 \times 15 + 5 = 23 \text{ Hz}$$

$$SStt = 0.2 \times \text{Max. Freq HSP} = 0.2 \times 50 = 10 \text{ Hz}$$

$$T(oscillation) = \frac{SStt - (SLtt - SLSP - Fslip)}{SSrt \times SSRU} = \frac{10 - (23 - 15 - 5)}{20 \times 1} = 350 \text{ ms}$$

In this example, the frequency fluctuations are permitted to exceed SLtt for 350 ms.

### 9.3.3 SS1

#### Record application data

The following data must be recorded before configuring function SS1:

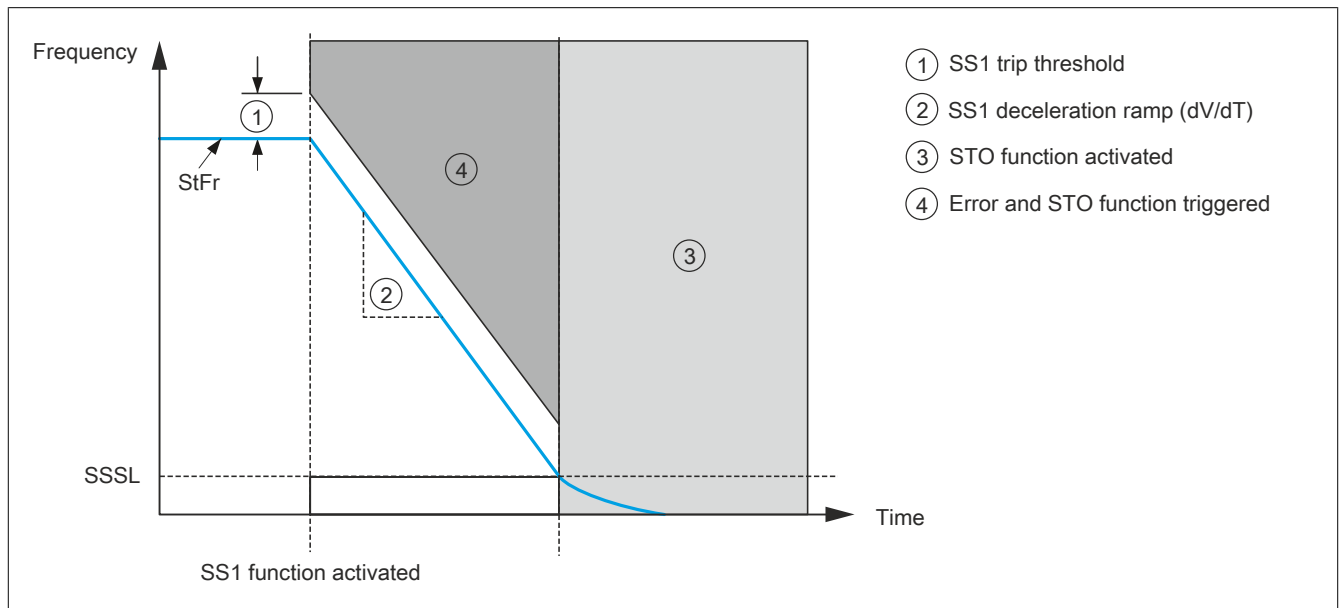
Code	Description	Unit	Note
FrS	Rated motor frequency	Hz	From the motor
(nSp)	Rated motor speed	rpm	From the motor
ppn	Number of motor pole pairs	-	From the motor
Max. HSP freq	Maximum motor frequency in normal operation.	Hz	This value is equal to or lower than value <b>[High speed]</b> (HSP).

Calculation of the nominal value of slip compensation "Fslip" (Hz) for the motor:

$$F_{slip} = FrS - \frac{N_{sp} \times ppn}{60}$$

#### Configuration of the function

##### Outline diagram



##### Standstill value

The recommended standstill value is:  $SSSL = F_{slip}$

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:  $Ramp = SSrU \times SSrt$

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:  $SSrt = 0.2 \times Max. Freq\ HSP$

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.

## Safety functions

Context	Inverter state	Tuning the inverter
SS1 activated and [Standstill level] (SSSL) has not been reached yet	<ul style="list-style-type: none"> <li>SAFF error code</li> <li>SFFE.3 = 1</li> </ul>	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 SSIt 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 deceleration ramp	Deceleration ramp to be applied when SS1 is triggered	20 Hz/s

With these numeric values, the configuration of SS1 is as follows:

$$F_{slip} = 50 - \frac{1350 \times 2}{60} = 5 \text{ Hz}$$

$$SSSL = F_{slip} = 5 \text{ Hz}$$

$$SSrU = 1 \text{ Hz/s and } SSrt = 20 \text{ when SS1 deceleration ramp} = 20 \text{ Hz/s (accuracy: 0.1 Hz)}$$

$$SSIt = 0.2 \times \text{Max. Freq HSP} = 0.2 \times 50 = 10 \text{ Hz}$$

### 9.3.4 SMS

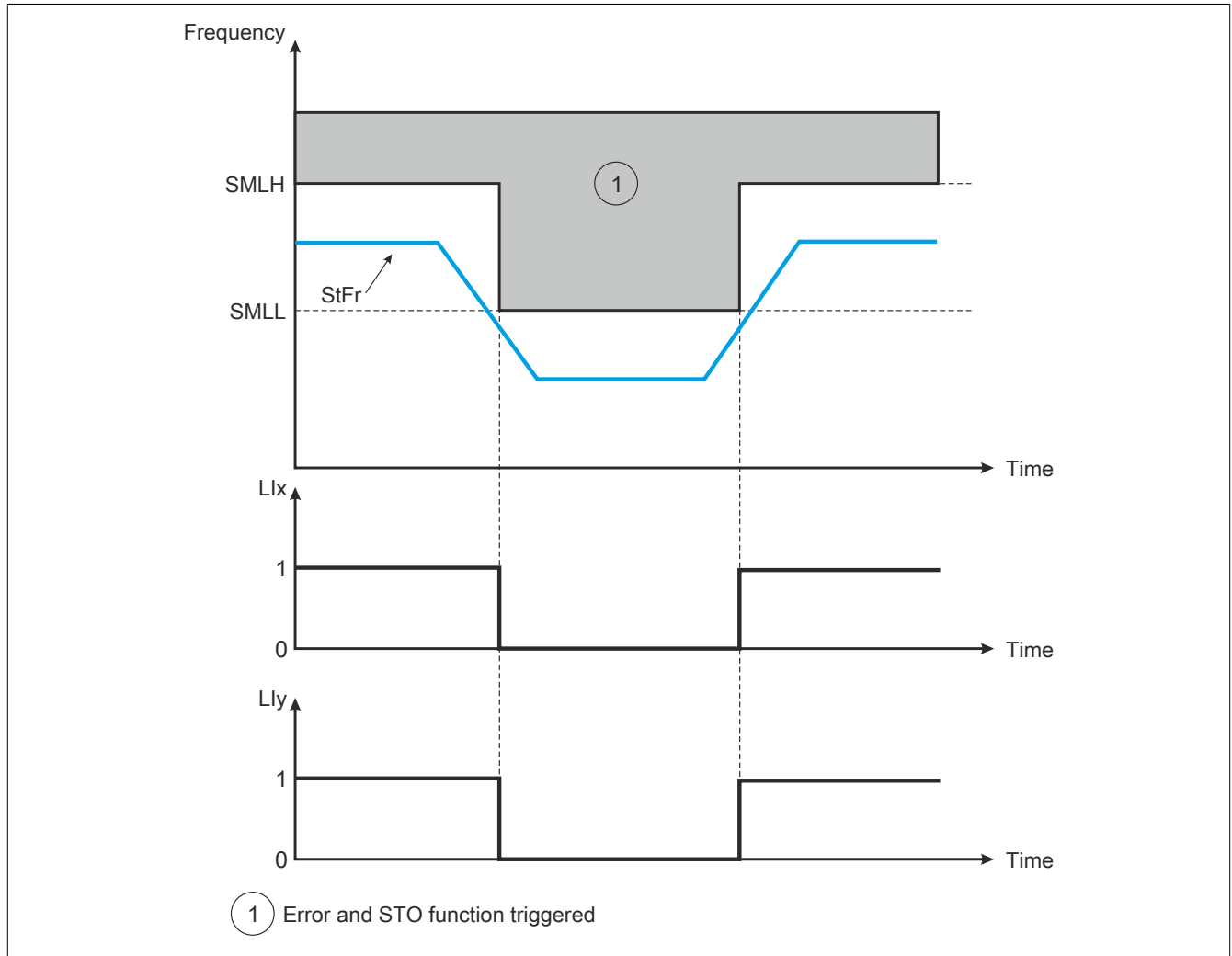
#### Record application data

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

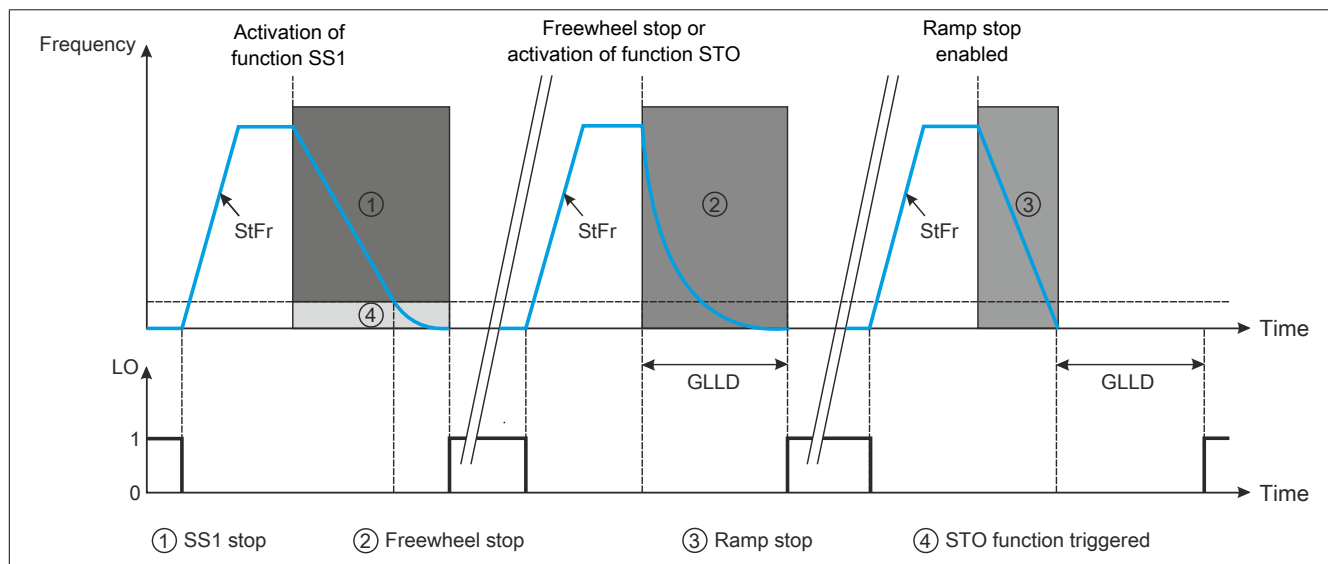
### 9.3.5 GDL

#### 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).

## 9.4 Behavior of safety functions

### 9.4.1 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.

### 9.4.2 Error inhibition

If a safety function has been configured, error **[Safe function fault]** (SAFF) cannot be inhibited using function **[Fault inhibit assign.]** (InH)

### 9.4.3 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.

#### 9.4.4 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 413](#).

#### 9.4.5 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.

#### 9.4.6 Priority of safety functions and functions that do not relate to safety

For more information about these functions see ["The drive" on page 85](#).

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 optm] (HSH-)	▲	▲	▲	▲
[+/- speed] (UPd-)	▲	▲	▲	▲
[Skip Frequency] (JPF)	▲	o	o	▲
[Low speed time out] (LS)	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.] (PIId-)	▲	o	o	▲
[RAMP] (rPt-)	▲	▲	▲	o
[Freewheel] (nSt)	◄	◄	▲	o
[Fast stop assignment] (FSt)	▲: SLS ramp ◄: SLS stable	▲	▲	o
[TRAVERSE CONTROL] (trO-)	▲	▲	▲	▲
[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-related 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-related parameters.			
[Energy Sav.] (nLd)	x	x	o	x

## 9.5 Display of the safety function through HMI

### 9.5.1 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 additional information about the safety functions, see section "Introduction" on page 363.

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.

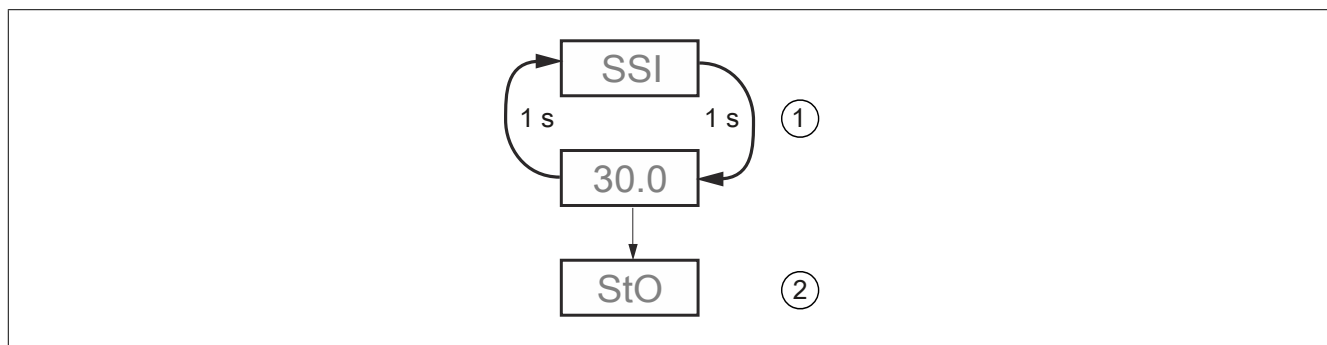
For additional information about this register, see "Safety functions display and states" on page 419.

### 9.5.2 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.

### 9.5.3 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 395.
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.

## 9.6 Technical data

### 9.6.1 Electrical data

#### Logic type

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

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

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

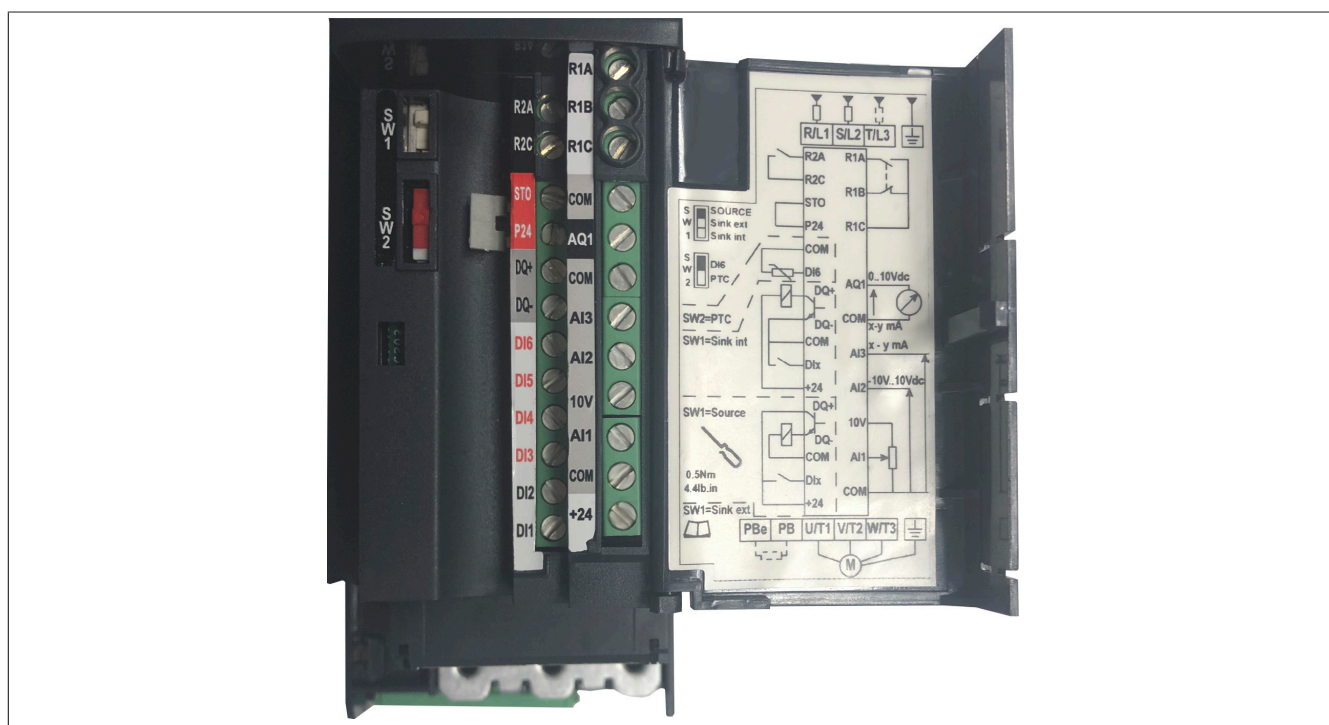
The logic inputs and outputs of the frequency inverter can be wired for logic type 1 or logic type 2.

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



### 9.6.2 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.

### 9.6.3 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 <sup>5)</sup>		SLS/STO /SS1/ SMS type B <sup>6)</sup>	
	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 <sup>1)</sup>	SIL 2	SIL 3 CL	SIL 2 CL	SIL 3 CL	SIL 2 CL	
IEC 62061 <sup>2)</sup>	Category 3	Category 4	Category 3	Category 4	Category 3	
ISO 13849-1 <sup>3)</sup>	PL d	PL e	PL d	PL e	PL d	
IEC 60204-1 <sup>4)</sup>	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 <sup>2)</sup>		SLS/STO /SS1/ SMS type B <sup>3)</sup>	
	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 <sup>1)</sup>	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 <sub>10y</sub>	7.26 x 10 <sup>-4</sup>	4.00 x 10 <sup>-4</sup>	2.44 x 10 <sup>-3</sup>
		PFD <sub>1y</sub>	7.18 x 10 <sup>-5</sup>	3.92 x 10 <sup>-5</sup>	2.33 x 10 <sup>-4</sup>
		PFH <sub>equ_1y</sub>	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%
PFD <sub>10y</sub>			7.26 x 10 <sup>-4</sup>	4.00 x 10 <sup>-4</sup>	2.44 x 10 <sup>-3</sup>
PFD <sub>1y</sub>			7.18 x 10 <sup>-5</sup>	3.92 x 10 <sup>-5</sup>	2.33 x 10 <sup>-4</sup>
PFH <sub>equ_1y</sub>			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		
	PFD <sub>10y</sub>				2.72 x 10 <sup>-3</sup>
	PFH <sub>equ_10y</sub>				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 <sub>10y</sub>	8.2 x 10 <sup>-4</sup>
		PFD <sub>1y</sub>	8.2 x 10 <sup>-3</sup>
		PFH <sub>equ_1y</sub>	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.

**Note:**

The table above is insufficient for assessing the power stage (PL) of a PDS. The PL assessment must take place at the 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.

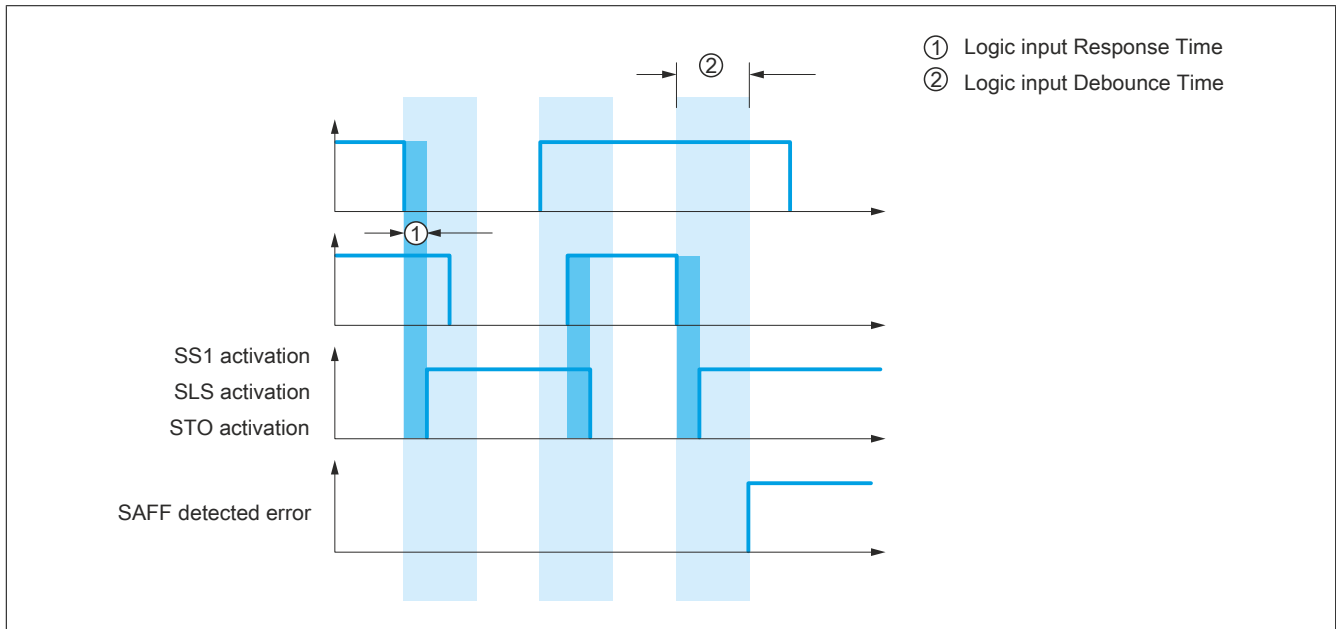
## 9.6.4 Debounce time and response time

### 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]** (Lldt): 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]** (Llrt): The logic input response time controls the delay until the safety function is activated.



## 9.7 Certified architectures

### 9.7.1 Introduction

#### Certified architectures

**Note:**

**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.

## 9.7.2 Multiple drive with safety relay XPS AF - Case 1

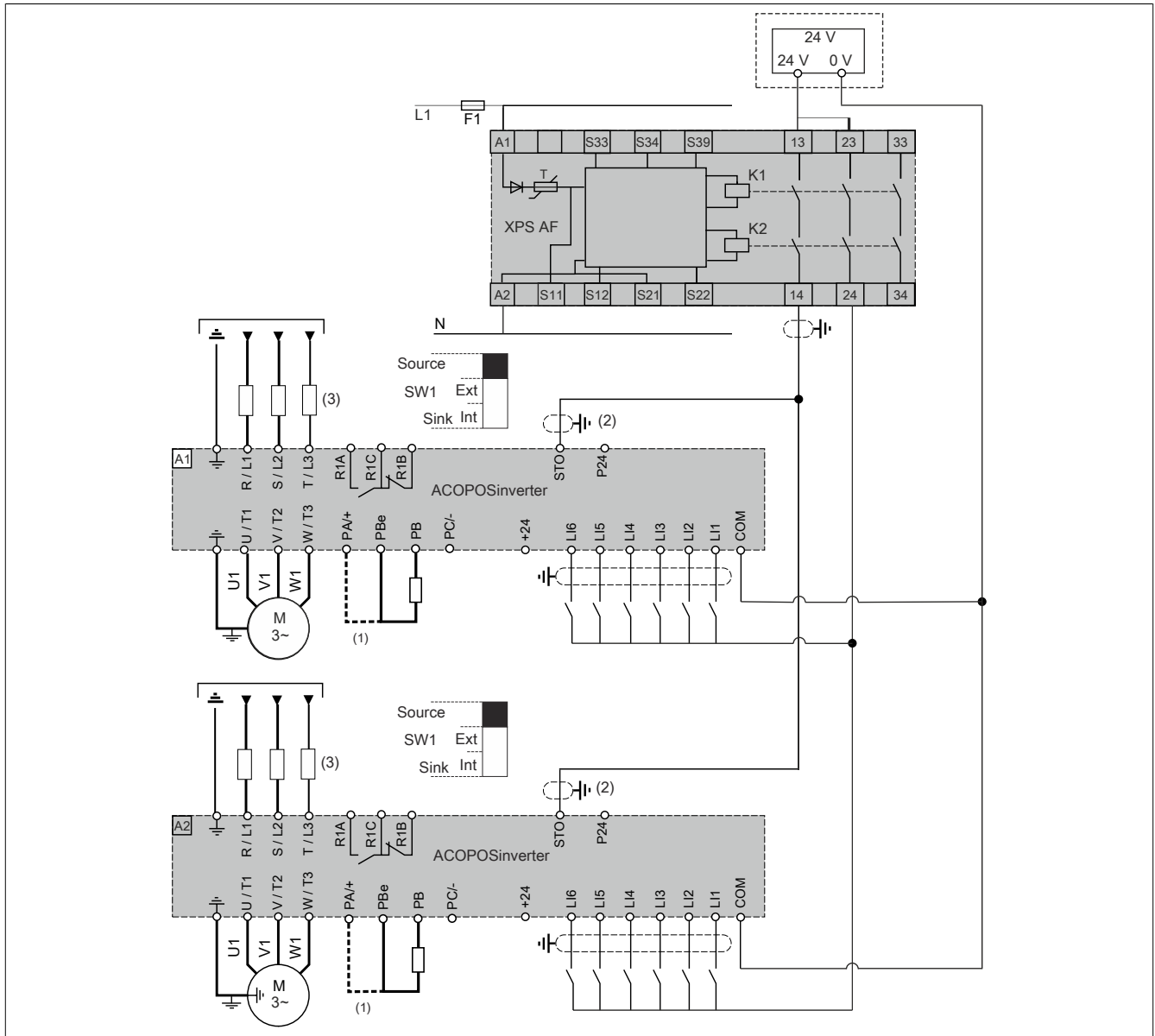
### Multiple drive with safety relay per EN 954-1, IEC 13849-1 and IEC 60204-1 (machine)

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).

### Note:

For additional information about the characteristics of the control terminal, see ["Installation" on page 37](#).



## 9.7.4 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:

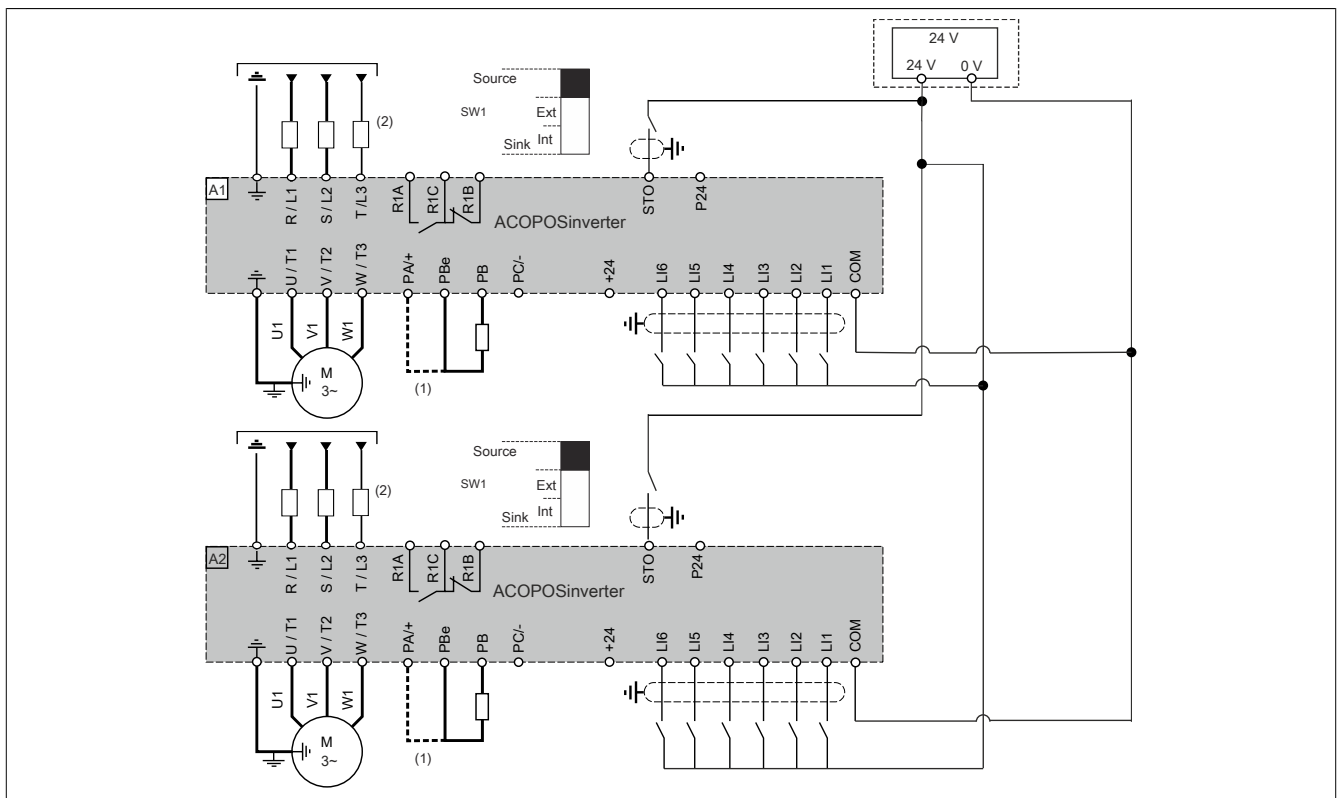
- STO SIL 2 on STO.
- LI3/LI4 and LI5/LI6 are not set to a safety function.

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)

### Note:

For additional information about the characteristics of the control terminal, see "Installation" on page 37.

### 9.7.5 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:

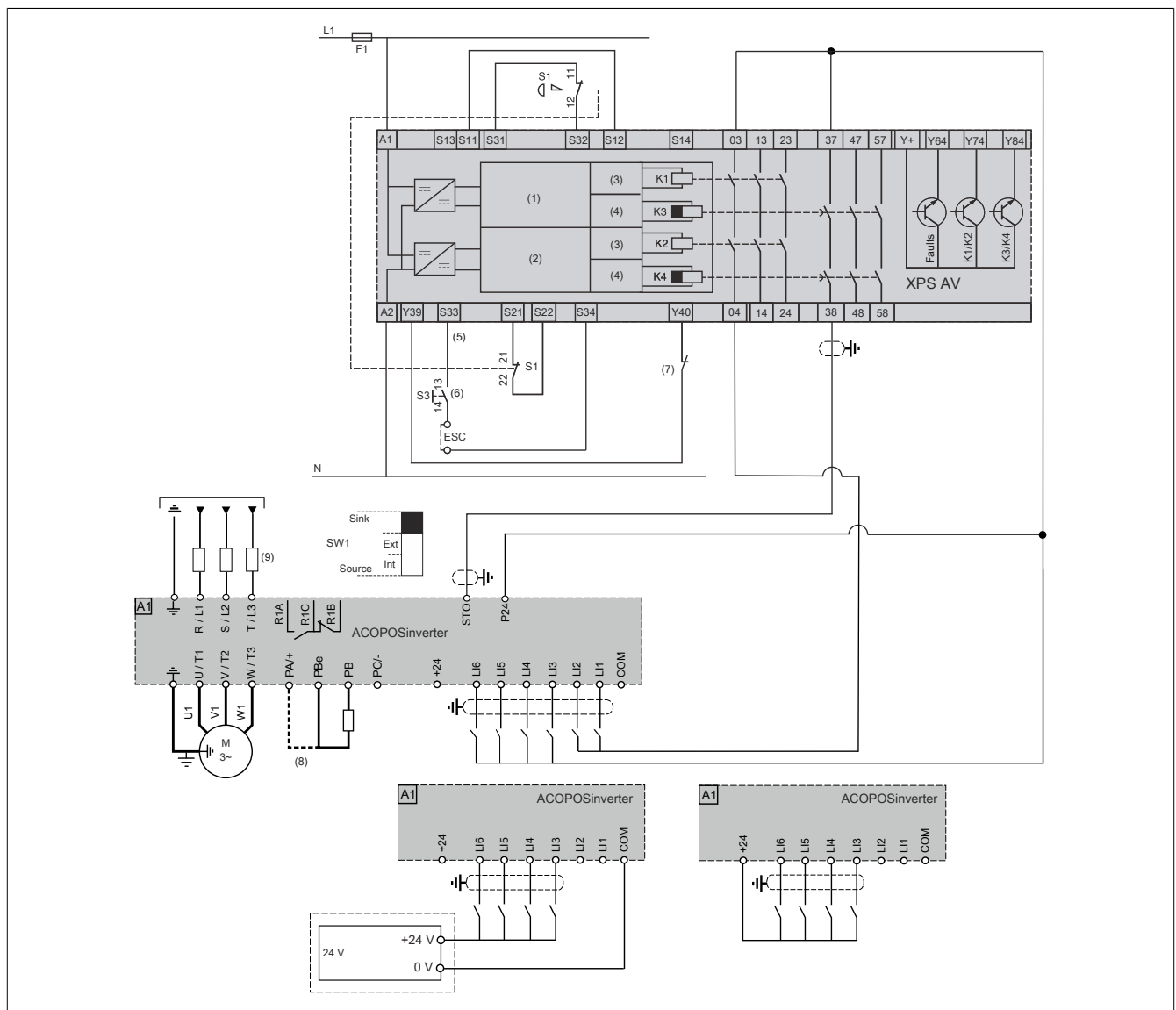
- SS1 type C category 3, PL d/SIL 2 on STO with safety switching device or equivalent.

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)

#### Note:

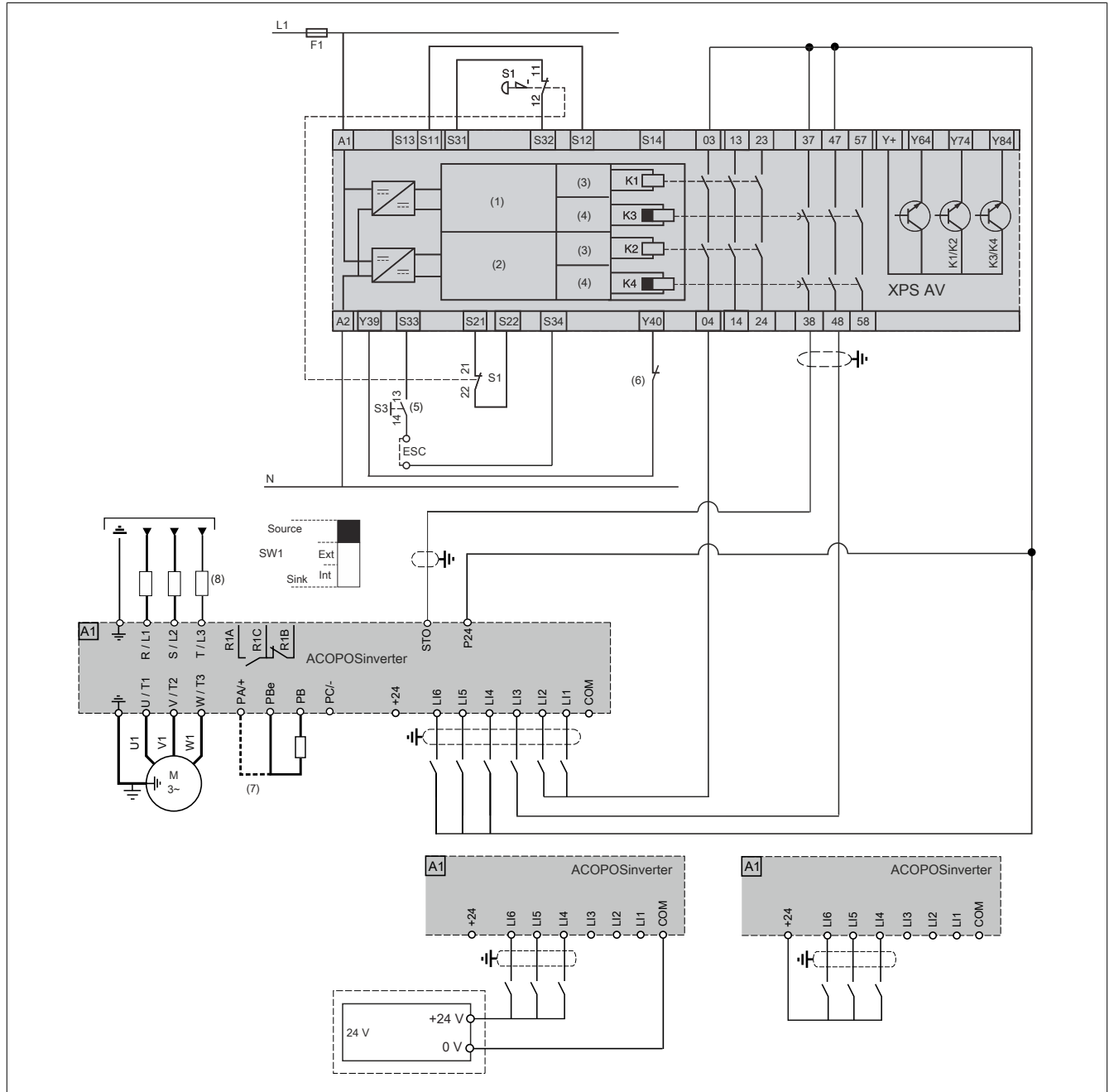
For additional information about the characteristics of the control terminal, see "Installation" on page 37.

### 9.7.6 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)

**Note:**

For additional information about the characteristics of the control terminal, see "Installation" on page 37.

### 9.7.7 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:

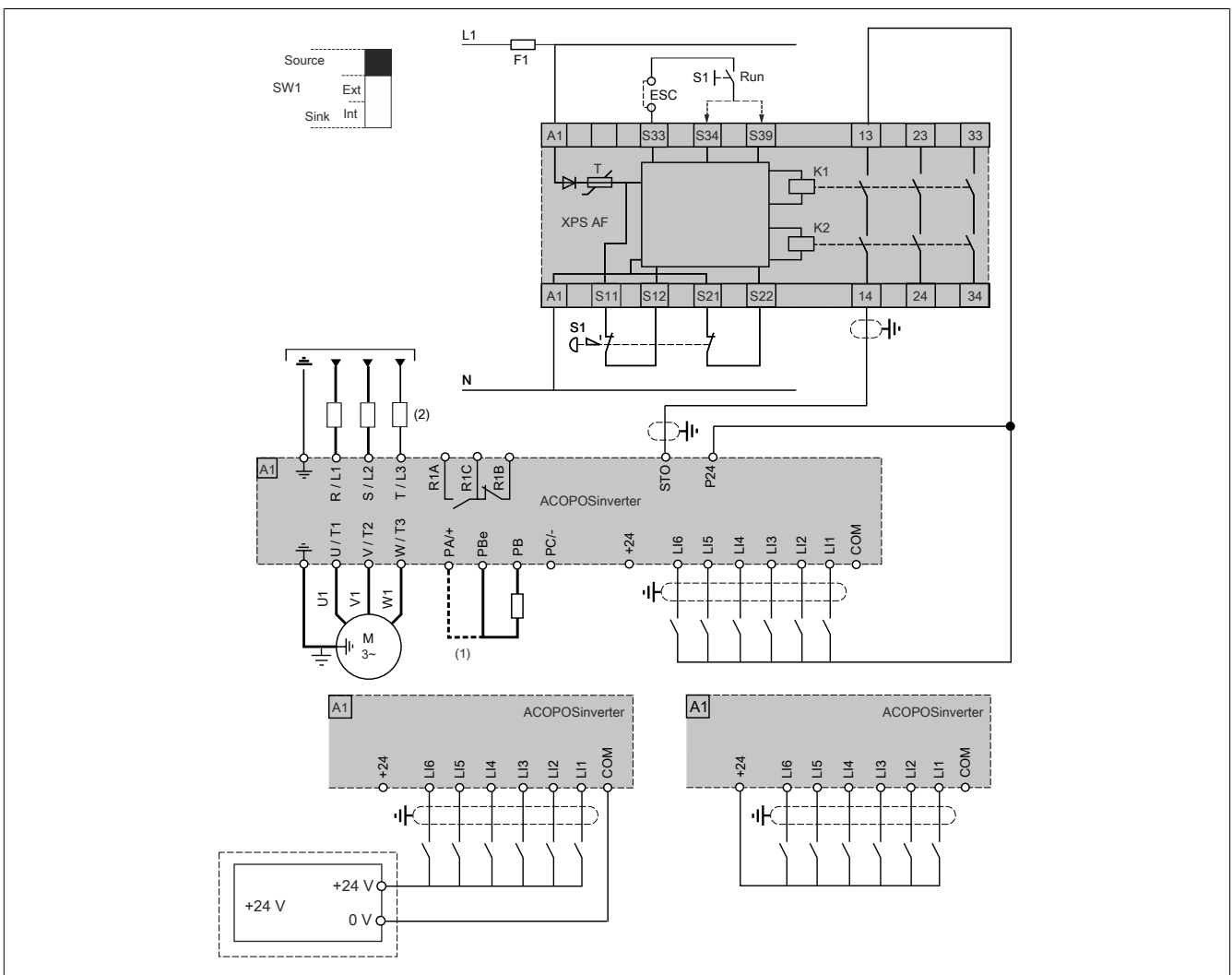
- STO category 3, PL d/SIL 2 on STO with safety switching device or equivalent.
- SLS category 3, PL d/SIL 2 or SS1 type B category 3 on LI3/LI4 or LI5/LI6.

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)

#### Note:

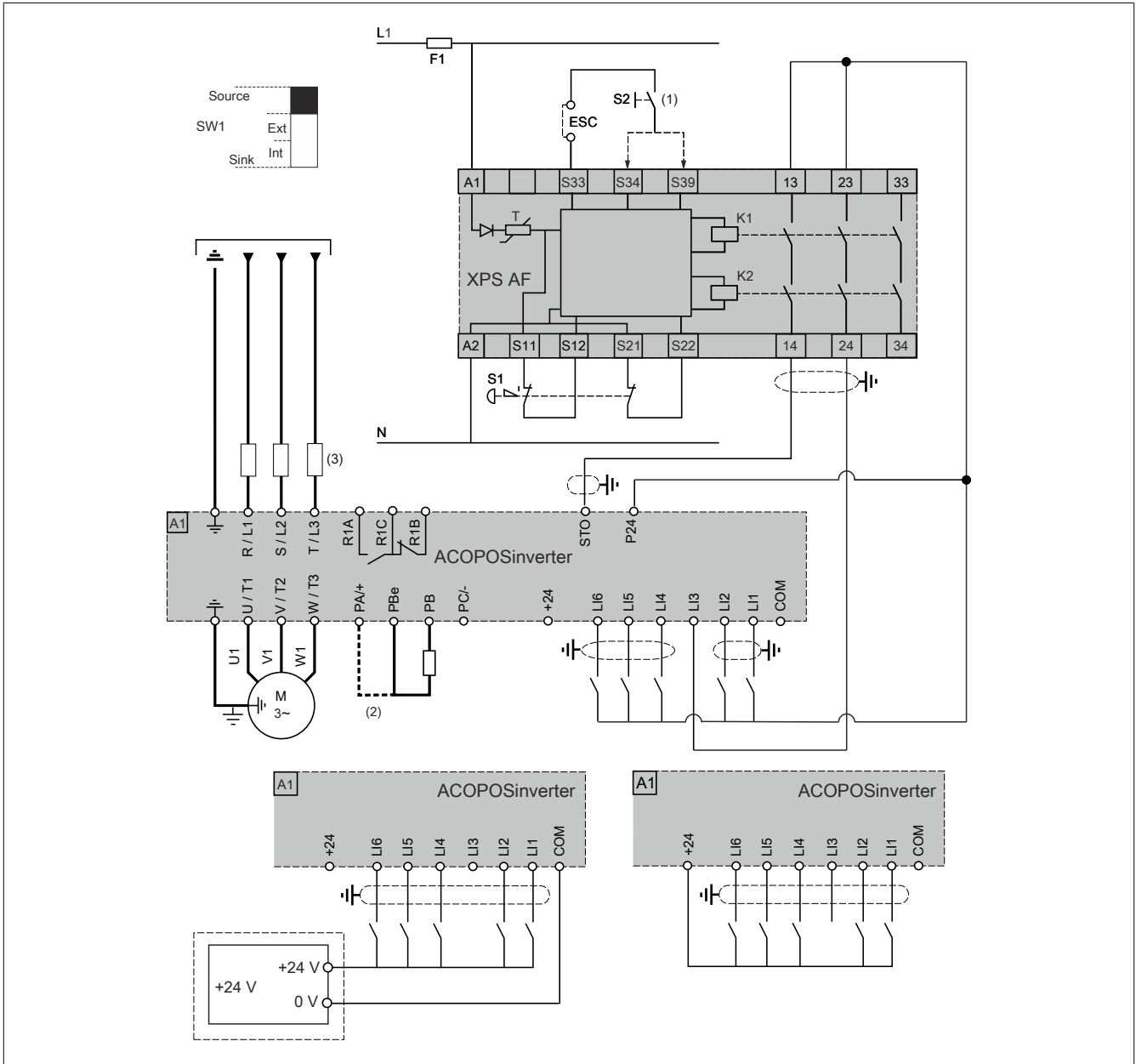
For additional information about the characteristics of the control terminal, see "Installation" on page 37.

### 9.7.8 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)

#### Note:

For additional information about the characteristics of the control terminal, see ["Installation" on page 37](#).

### 9.7.9 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:

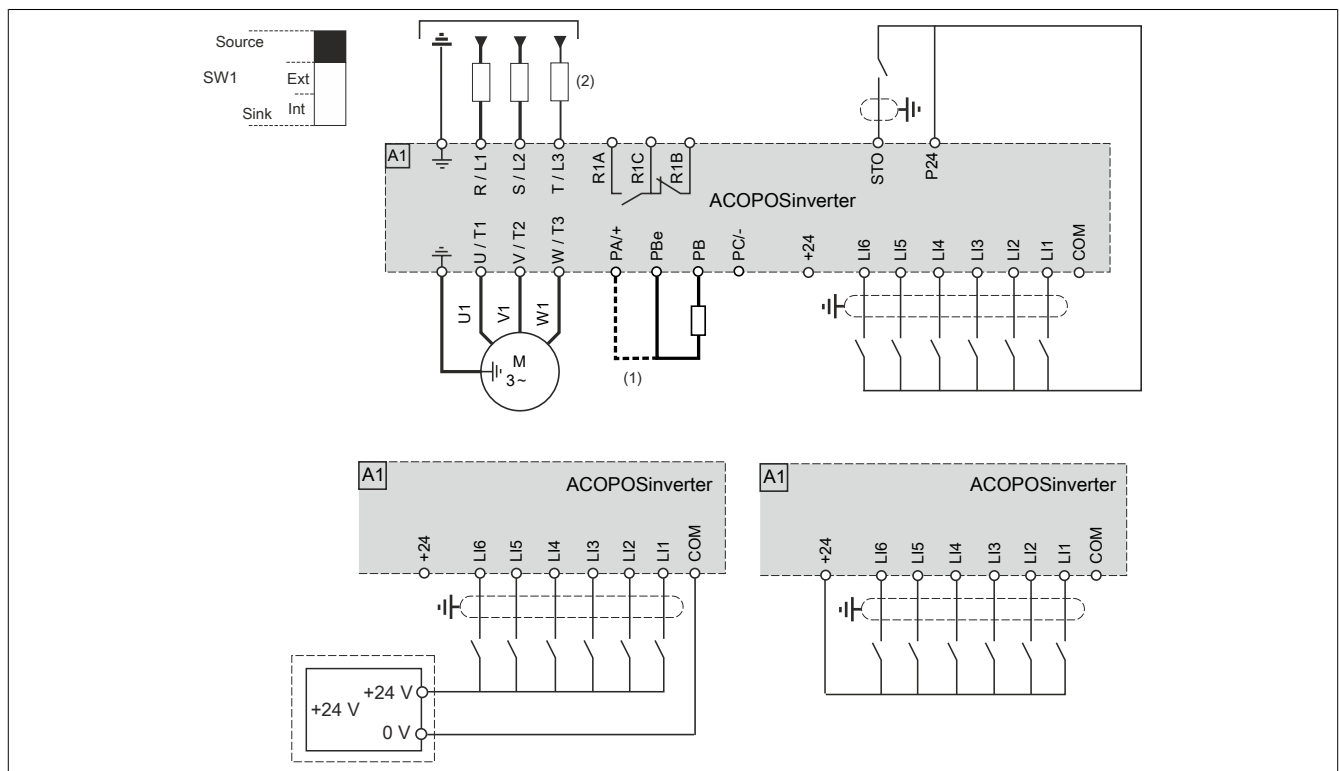
- STO SIL 2 on STO.
- LI3/LI4 and LI5/LI6 are not set to a safety function.

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)

#### Note:

For additional information about the characteristics of the control terminal, see "Installation" on page 37.

### 9.7.10 Single drive per IEC 61508 and IEC 60204-1 - Case 2

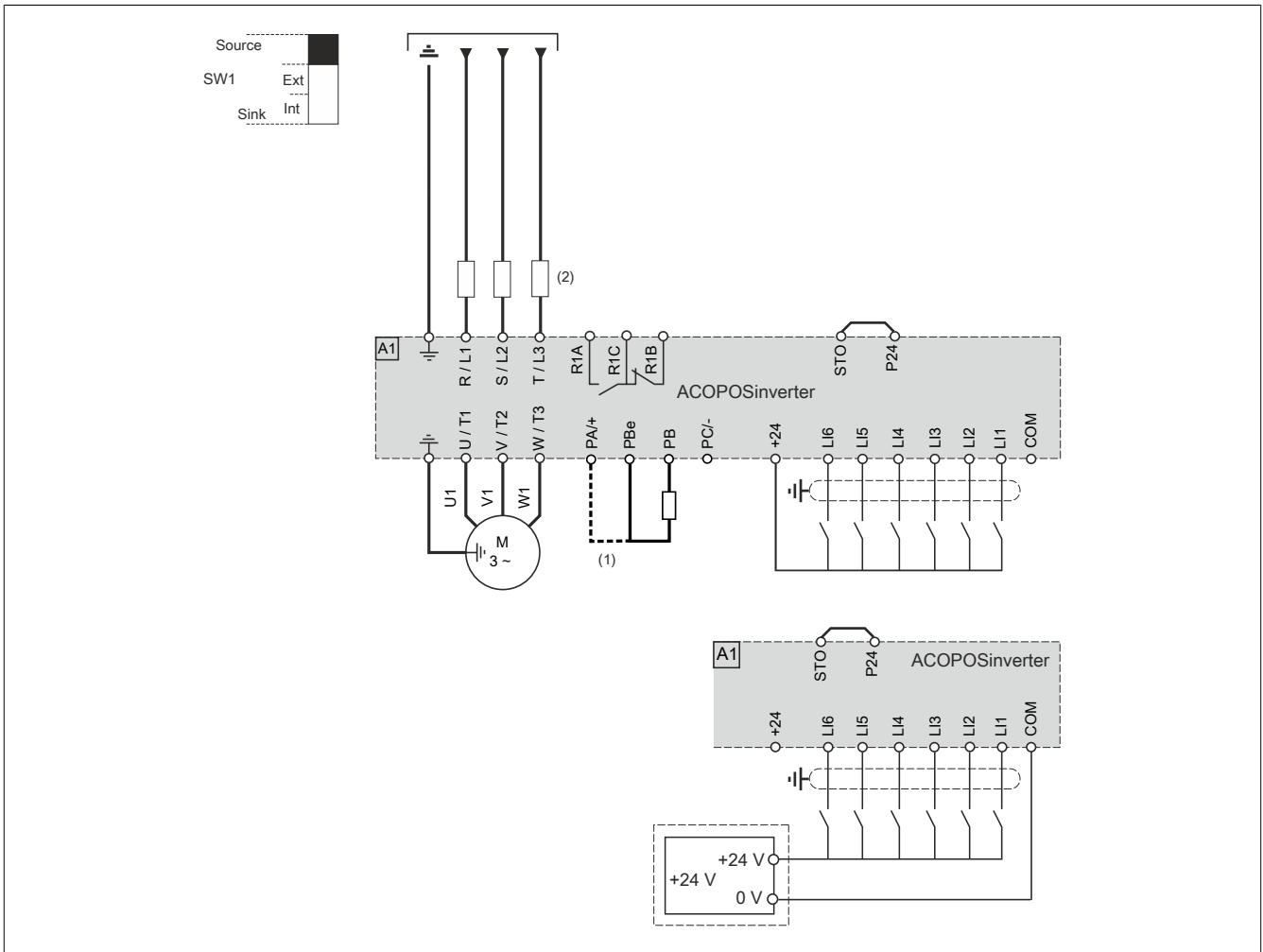
Single drive in accordance with IEC 61508 and IEC 60204-1 without protection from interruption of power supply or power reduction and subsequent rotation.

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)

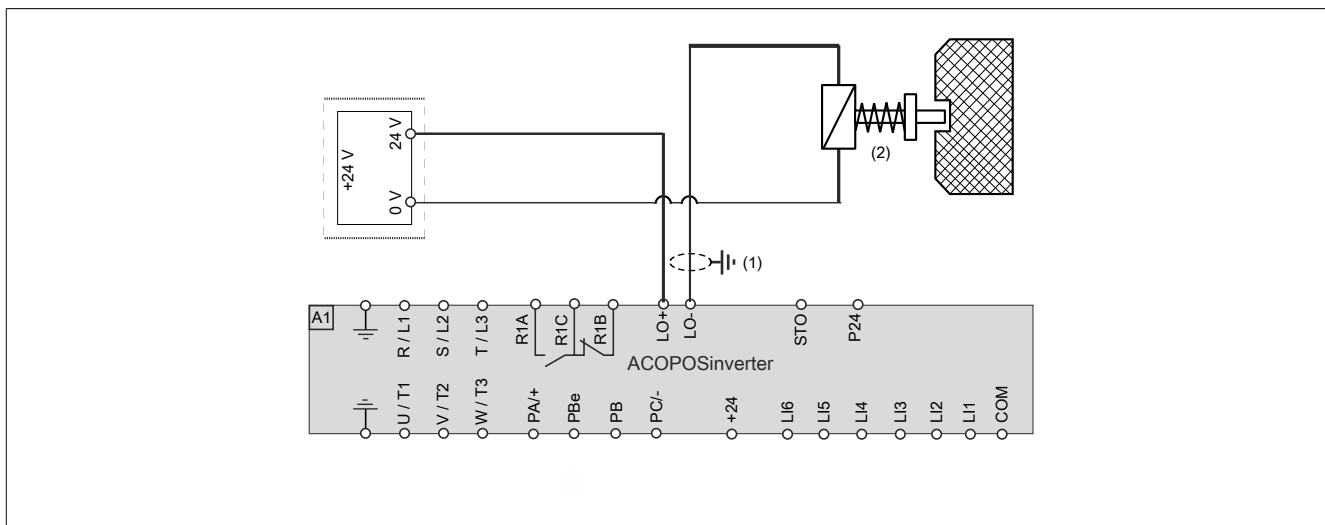
#### Note:

For additional information about the characteristics of the control terminal, see ["Installation"](#) on page 37.

### 9.7.11 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

## 9.8 Commissioning

To enable the safety functions of the ACOPOSinverter, the additional software package "ACPi SafeConfigurator" must be used. The necessary requirements for using this tool and establishing a connection to ACOPOSinverter are explained in chapter 7 "The drive in ACPi SafeConfigurator" on page 342.

### 9.8.1 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 you are not in online mode, then click Communication → **Connect to device** in the menu bar or click icon **Connect to device**.
- If you are located in online mode, click button **Configure** in tab "Safety functions".

As soon as you are connected, proceed as follows:

- 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**.

#### Note:

Your password must be structured as follows:

- 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 you have already defined a password, then enter your configuration password for the security functions in dialog box **Enter configuration password** and click **OK**.

Result: Window "Configuration of the safety functions" is opened.

## 9.8.2 Window "Configuration of safety functions"

### Overview

Window "Configuration of safety functions" contains the tabs "Information", "STO", "SLS", "SS1", "SMS", "GDL" and "IO".

### Tab "Information"

On tab **Information**, you can define and display product system information.

The following data is automatically entered by the ACPI SafeConfigurator:

- Date (format depends on the local options and the language settings of the PC)
- Device type
- Order number of the inverter

The following data must be entered manually:

- Device serial number (numerical value)
- Device name
- Company name
- Name of the end user
- Comments

### Tab "STO" (Safe Torque Off)

For more information about the STO function, see "Safety function "Safe Torque Off " (STO)" on page 368. 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	<b>[Safe stop]</b>	
StOA	<b>[STO function activated]</b>	<b>[No]</b>
nO	<b>[No]:</b> Not assigned	
L34	<b>[LI3 and LI4]:</b> LI3/4 Low state	
L56	<b>[LI5 and LI6]:</b> LI5/6 Low state	
L3PW	<b>[LI3 and STO]:</b> LI3/STO Low state	
	This parameter is used 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 "Safety function "Safely Limited Speed" (SLS)" on page 372.

Code	Name/Description	Setting range	Clear all
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 is used 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 Wait time]  This parameter is used to set the maximum time so that (StFr) is greater than (SSSL). If (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 additional information, see "SS1" on page 385.	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 additional information, see "SS1" on page 385.		[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, see "Safety function "Safe Stop 1" (SS1)" on page 370.

Code	Name/Description	Setting range	Clear all
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 is used 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 "Safety function SMS (Safe Maximum Speed)" on page 378.

Code	Name/Description	Setting range	Clear all
SMS	<b>[SMS status]</b>		
SMSA	<b>[SMS Activation]</b> nO <b>[No]:</b> The SMS function is not active. Yes <b>[YES]:</b> The SMS function is active. This parameter is used to configure the channel that is used to trigger the SMS function.		<b>[No]</b>
SMLS	<b>[SMS Assignment]</b> This parameter is used to select the limit value for the safe maximum speed. nO <b>[No]:</b> <b>[SMS Low Limit]</b> (SMLL) is selected as the limit value for the safe maximum speed. L34 <b>[LI3 and LI4]</b> <ul style="list-style-type: none"> <li>If logic inputs 3/4 are in Low state (0), <b>[SMS Low Limit]</b> (SMLL) is selected as the limit value for the safe maximum speed.</li> <li>If logic inputs 3/4 are in High state (1), <b>[SMS High Limit]</b> (SMLH) is selected as the limit value for the safe maximum speed.</li> </ul> L56 <b>[LI5 and LI6]</b> <ul style="list-style-type: none"> <li>If logic inputs 5/6 are in Low state (0), <b>[SMS Low Limit]</b> (SMLL) is selected as the limit value for the safe maximum speed.</li> <li>If logic inputs 5/6 are in High state (1), <b>[SMS High Limit]</b> (SMLH) is selected as the limit value for the safe maximum speed.</li> </ul>		<b>[No]</b>
SMLL	<b>[SMS Low Limit]</b> This parameter is used to set the lower speed limit.	0 to 599 Hz	0 Hz
SMLH	<b>[SMS High Limit]</b> This parameter is used to set the upper speed limit.	0 to 599 Hz	0 Hz

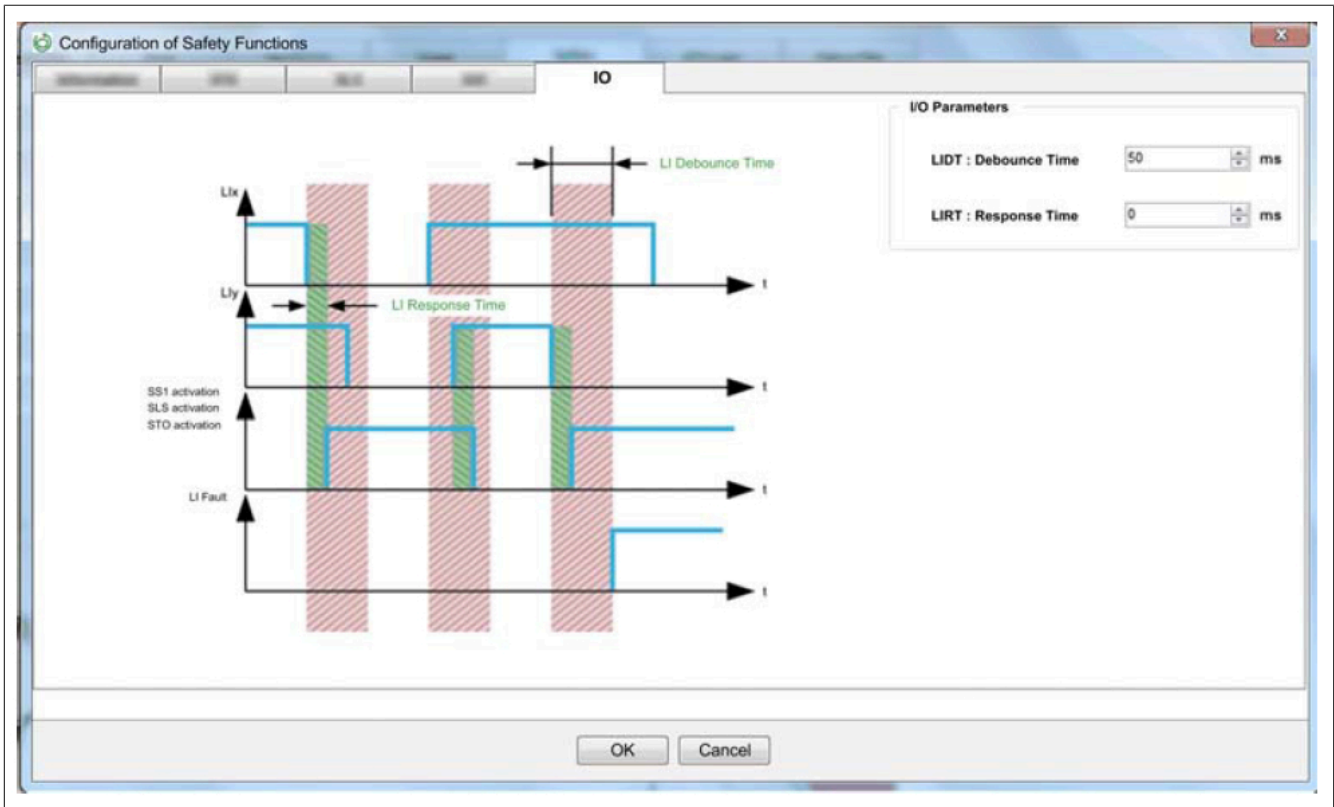
**Tab "Safety gate locking" (GDL)**

For more information about the GDL function, see "Safety function GDL (safety gate interlock)" on page 380.

Code	Name/Description	Setting range	Clear all
GdL	<b>[GDL status]</b>		
GdLA	<b>[GDL Assignment]</b> nO <b>[No]:</b> Safety gate locking is not assigned. YES <b>[YES]:</b> Safety gate locking is assigned.  <b>Note:</b> (GdLA) can only be set to <b>[YES]</b> if the LO1 parameter is set to <b>[No]</b> . This parameter is used to configure the channel that is used to trigger the GDL function.		<b>[No]</b>
GLLd	<b>[Guard Door Locking Long Delay]</b> 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.  <b>Note:</b> The value for <b>[Guard Door Locking Long Delay]</b> must be higher than the value for <b>[Guard Door Locking Short Delay]</b>	1 to 3600 s	1 s
GLSd	<b>[Guard Door Locking Short Delay]</b> 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	Clear all
I/O	<b>[Inputs/outputs]</b>		
Lldt	<b>[LI debounce time]</b> 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. (Lldt) is the parameter that is used to set this delay. If both logic inputs change to a state with a delay of less than (Lldt), this is regarded as a simultaneous transition of the logic inputs. If the delay is longer than (Lldt), the frequency inverter regards the logic inputs as no longer synchronized and triggers an error.	0 to 2000 ms	50 ms
Llirt	<b>[LI response time]</b> 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 (Llirt). If the duration is below this value, the frequency inverter assumes that there is no command pending: The command is filtered out.	0 to 50 ms	0 ms

### 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**.

#### Note:

The same password must be entered in fields "Enter new password" and "Confirm new password".

#### Note:

Your password must be structured as follows:

- 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:** 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.

After this action has been carried out, the device 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.

### 9.8.3 Safety functions display and states

Code	Name/Description
SAF-	Menu <b>[MONIT. SAFETY]</b> : Visible in ACPi SafeConfigurator and on the graphic display terminal.
StFr	<b>[Stator Frequency]</b> Displays the calculated stator frequency in Hz
StOS	<b>[STO state]</b> State of the STO (Safe Torque Off) safety function
IdLE	<b>[Idle]</b> : STO has not been executed
StO	<b>[Safe stop]</b> : STO has been executed
FLt	<b>[Fault]</b> : Error detected in STO
SLSS	<b>[SLS state]</b> State of the SLS (Safely Limited Speed) safety function
nO	<b>[Not config.]</b> : SLS not configured
IdLE	<b>[Idle]</b> : SLS has not been executed
SSI	<b>[Safe ramp]</b> : SLS ramp has been executed
StO	<b>[Safe stop]</b> : SLS request for Safe Torque Off has been executed
FLt	<b>[Fault]</b> : Error detected in SLS
WAIt	<b>[Idle]</b> : SLS is awaiting activation.
Strt	<b>[Started]</b> : SLS in temporary operation
SMSS	<b>[SMS state]</b> State of the SMS (Safe Maximum Speed) safety function
nO	<b>[Not config.]</b> : SMS is not configured.
SMS	<b>[Active]</b> : SMS is in active state.
FTI	<b>[Internal Err.]</b> : Internal SMS error detected
FTO	<b>[Max Speed]</b> : SMS overspeed error detected
GDLS	<b>[GDL status]</b> State of the GDL (Safety door locking) safety function
nO	<b>[Not config.]</b> : GDL is not configured.
OFF	<b>[Inactive]</b> : GDL is in inactive state.
STD	<b>[Short delay]</b> : GDL is in "Short delay" state.
LGD	<b>[Long delay]</b> : GDL is in "Long delay" state.
ON	<b>[Active]</b> : GDL is in active state.
FLt	<b>[Internal Err.]</b> : Internal GDL error detected
SS1S	<b>[SS1 state]</b> State of the "Safe Stop 1" safety function
nO	<b>[Not config.]</b> : SS1 not configured
IdLE	<b>[Idle]</b> : SS1 has not been executed
SSI	<b>[Safe ramp]</b> : SS1 ramp has been executed
StO	<b>[Safe stop]</b> : SS1 request for "Safe Torque Off" has been executed.
FLt	<b>[Fault]</b> : Error detected in SS1
SAF-	Menu <b>[MONIT. SAFETY]</b> : Visible in ACPi SafeConfigurator only
SfY	<b>[Safety drive status]</b> Safety function state of the frequency inverter
IStd	<b>[Standard inverter]</b> : Standard product with no configured safety function
SAFE	<b>[Safety drive]</b> : Product with at least one configured safety function

## 9.8.4 Copying the safety configuration from the device to a PC and vice versa

### Overview

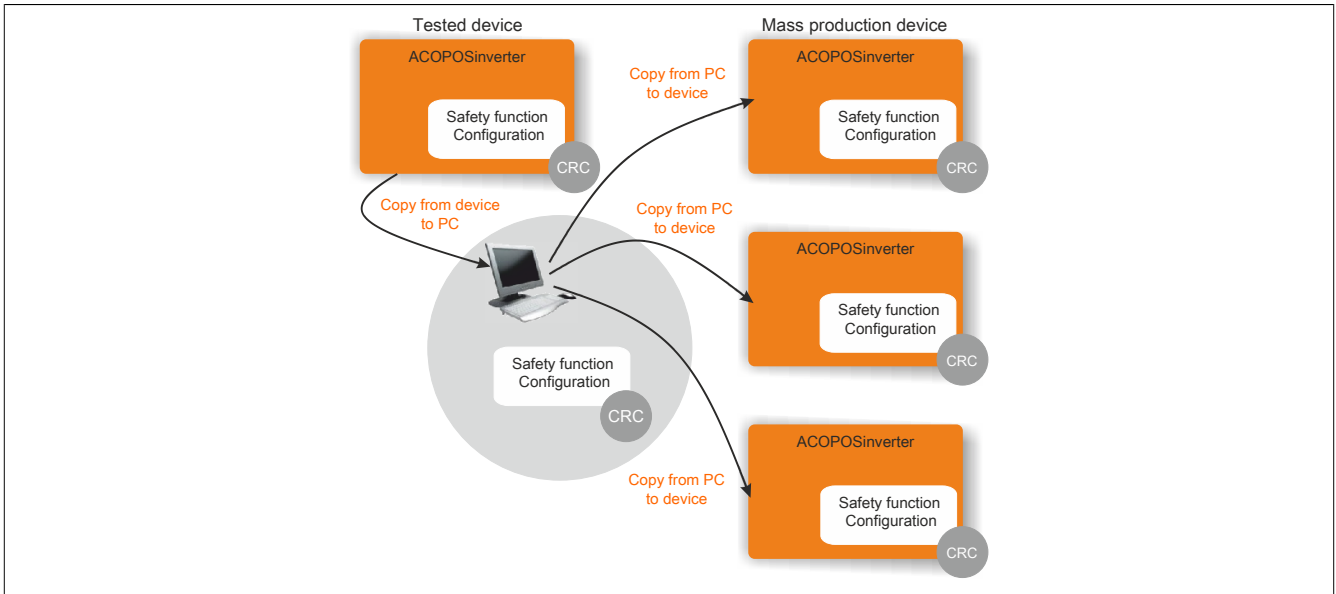
This function is used for copying a tested safety configuration for various frequency inverters and adding it to a different device of the same type.

This function allows you to do 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 the frequency inverter

### Architecture

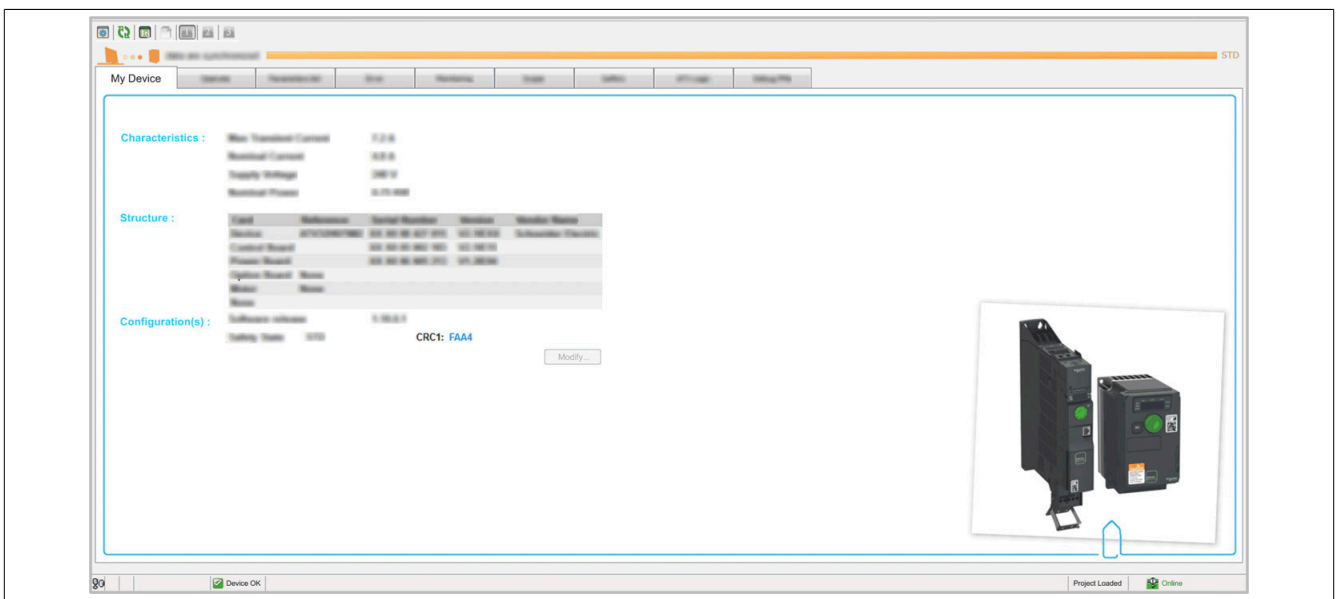
The figure below shows the architecture for copying the safety configuration from the device to a PC and vice versa:



### Identification of a unique safety configuration

The safety configuration is identified using CRC. All safety-related parameters are used for the calculation.

The CRC value is available on tab **My device**. After 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.

## Note:

The configuration file cannot be copied from the device to a PC in the following case:

- 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 enabled

## Copying from a PC to the device

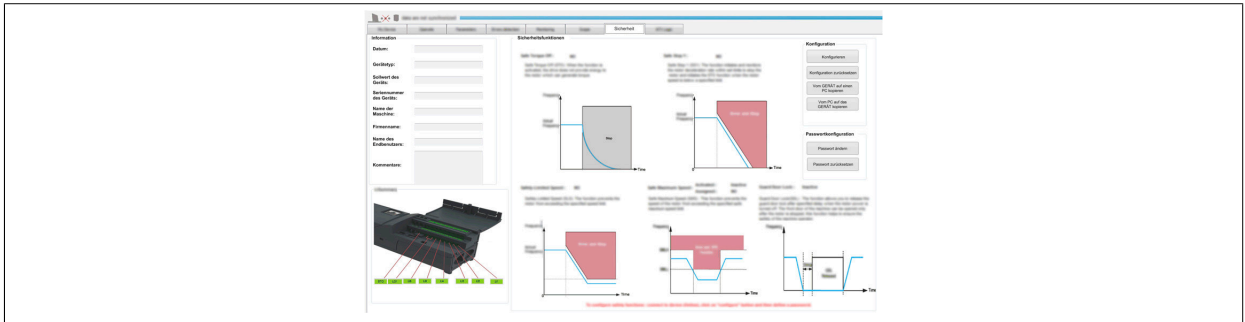
**Warning!****UNINTENDED OPERATION OF THE DEVICE**

- 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.

**Note:**

The configuration file cannot be copied from the PC to the device in the following case:

- 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

## 9.8.5 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 SafeConfigurator.

- 1) Choose option **Device** → **Additional functions** → **Safety functions** → **Machine 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
  - SMS
  - GDL

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-related 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.

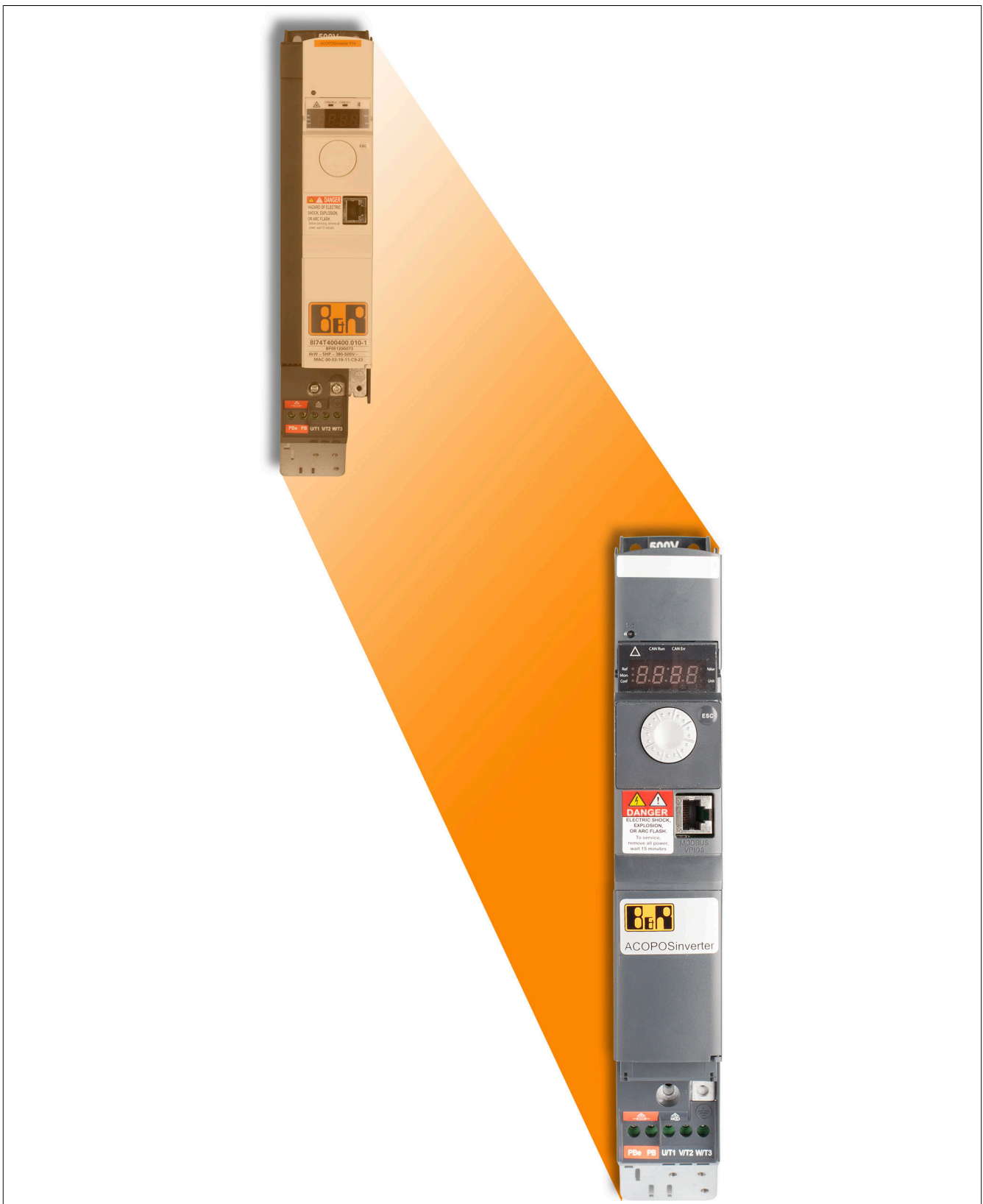
### **Acceptance report**

ACPi SafeConfigurator creates 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.**

## 9.9 Migration of an existing safety configuration



### 9.9.1 Migration from Parameter Tool to SafeConfigurator

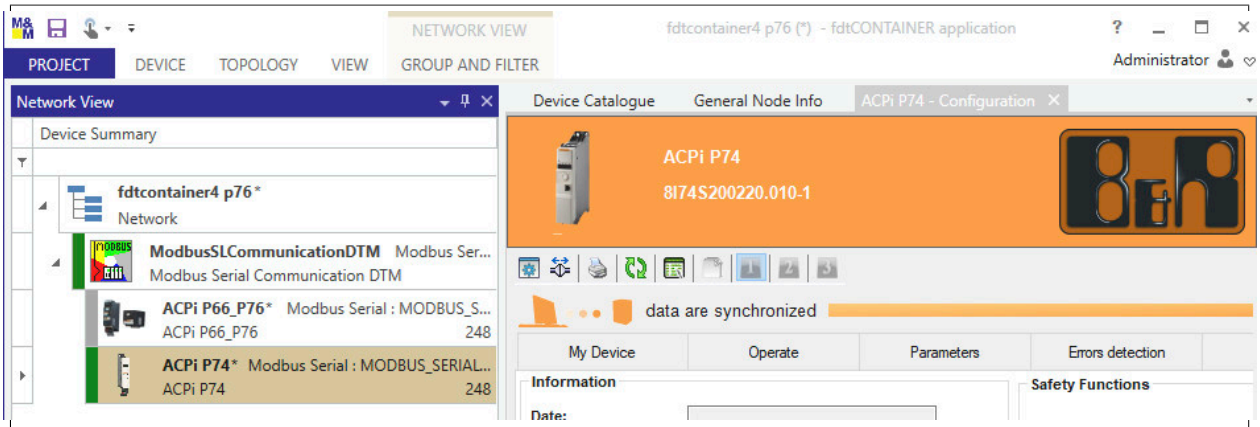
The previously used ACPi Parameter Tool was originally developed for Win XP and later released for Win 7. The successor ACPi SafeConfigurator was developed for use on Windows 10 and replaces the ACPi Parameter Tool.

### 9.9.2 Transfer of safety functions (safety configuration) to the new ACOPOSinverter

The migration of safety functions works similarly to the "copy from device to PC" process described in the previous chapter. The safety configuration can be read out from the device and saved to the PC as usual. Button "Convert" can then be used to convert the check sums and transfer the safety configuration to the connected drive.

The transfer of the safety functions from a P74 ACOPOSinverter to a P66 or P76 ACOPOSinverter works as follows:

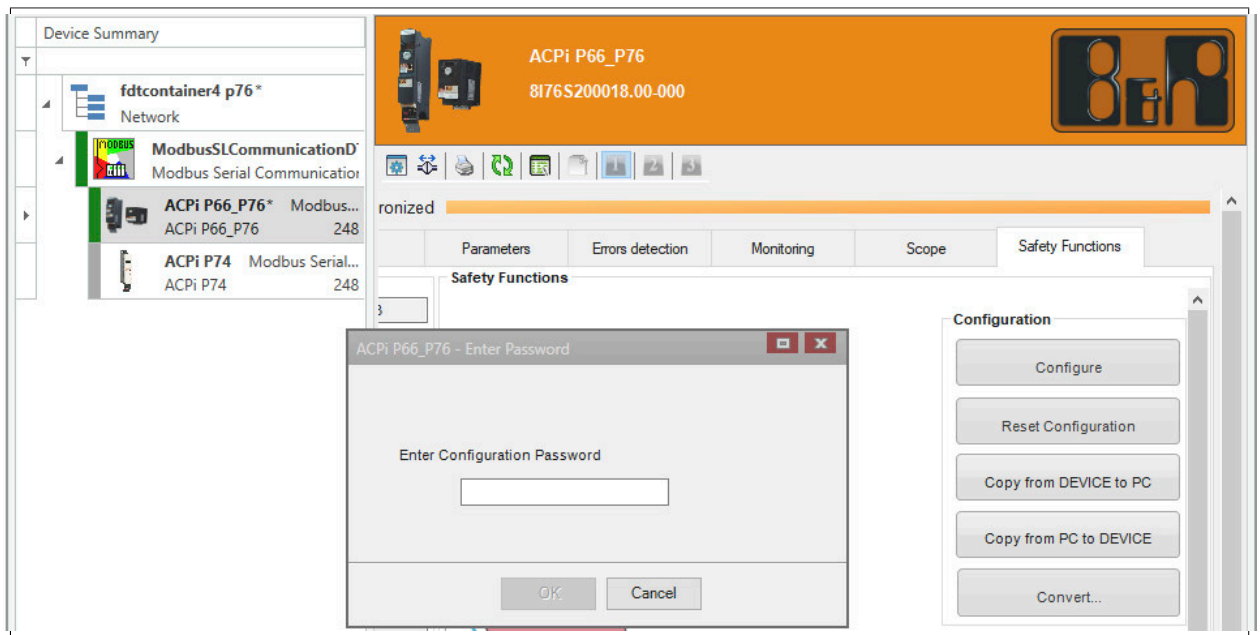
- Create new project in ACPI SafeConfigurator and arrange required hardware in network view of FDTcontainer (for detailed instructions, see ["The drive in ACPI SafeConfigurator" on page 342](#)).
  - 1) Modbus cable (set COM port!)
  - 2) ACOPOSinverter P74
  - 3) ACOPOSinverter P66 and P76
- Connect the Modbus cable to ACOPOSinverter P74, establish the connection and change to synchronized mode.



- Select tab "Safety functions", use button "Copy from device to PC", enter a user-defined password and save the .sfty file.
- Disconnect the connection between ACPI SafeConfigurator and ACOPOSinverter P74.

Then:

- Connect the Modbus cable to ACOPOSinverter P66/P76, establish the connection and change to synchronized mode.
- Select tab "Safety functions", use button "Convert", choose .sfty file and enter user-defined password.



**Information:**

ACOPOSinverter P66/76 is not permitted to have an existing security configuration at the time of the transfer; otherwise, it must first be reset with "Reset security" and then "Reset password" (master password is required).

**Information:**

Due to the additional safety functions (SMS, GDL), the CRC values change when converting a safety configuration from ACOPOSinverter P74 to one of ACOPOSinverter P66/P76.

# 10 Accessories

## 10.1 Overview

### Graphics display

Order number	Short description	Page
810XD301.300-1	Graphics display for ACOPOSinverter, 240 x 160 pixels, 8 lines, backlight, function keys, navigation key, IP54 protection.	429

### Braking resistors

Order number	Short description	Page
810BR028.000-1	Braking resistor 28 $\Omega$ , 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	430
810BR060.000-1	Braking resistor 60 $\Omega$ , 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	430
810BR100.000-1	Braking resistor 100 $\Omega$ , 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	430

### Additional EMC filters

Order number	Short description	Page
810FS009.200-2	EMC filter 1-phase 9 A, side installation, for ACOPOSinverter P74/P76 1x 200 to 240 V, 0.18 to 0.75 kW	433
810FS016.200-1	EMC filter 1-phase 16 A, side installation, for ACOPOSinverter P74/P76 1x 200 to 240 V, 1.1 to 1.5 kW	433
810FS022.200-1	EMC filter 1-phase 22 A, side installation, for ACOPOSinverter P74/P76 1x 200 to 240 V, 2.2 kW	433
810FT015.200-1	EMC filter 3-phase 15 A, side installation, for ACOPOSinverter P74/P76 3x 380 to 500 V, 0.37 to 1.5 kW	433
810FT025.200-1	EMC filter 3-phase 25 A, side installation for ACOPOSinverter P74 3x 380 to 500 V, 2.2 to 4 kW	433
810FT047.200-1	EMC filter 3-phase 47 A, bottom or side installation, for ACOPOSinverter P74/P76 3x 380 to 500 V, 5.5 to 7.5 kW	433
810FT049.200-1	EMC filter 3-phase 49 A, bottom or side installation, for ACOPOSinverter P74/P76 3x 380 to 500 V, 11 to 15 kW	433

### Mains chokes

Order number	Short description	Page
810CS004.000-1	Mains choke 1-phase 4 A, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 0.18 to 0.37 kW.	438
810CS007.000-1	Mains choke 1-phase 7 A, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 0.55 to 0.75 kW.	438
810CS018.000-1	Mains choke 1-phase 18 A, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 1.1 to 2.2 kW.	438
810CT004.000-1	ACOPOSinverter mains choke 3-phase, 4 A, 50/60 Hz	438
810CT010.000-1	ACOPOSinverter mains choke 3-phase, 10 A, 50/60 Hz	438
810CT016.000-1	ACOPOSinverter mains choke 3-phase, 17 A, 50/60 Hz	438
810CT030.000-1	ACOPOSinverter mains choke 3-phase, 30 A, 50/60 Hz	438

### USB accessories

Order number	Short description	Page
810XC001.003-1	USB adapter cable, USB to Modbus, for ACOPOSinverter.	443

### DC bus cables

Order number	Short description	Page
810XC003.400-1	DC bus cable, 0.18 m, 5 pcs., for ACOPOSinverter	443

### Fans

Order number	Short description	Page
810XF074.010-1	Fan for ACOPOSinverter P74/P76 1x 200 to 240 V, 0.18 to 0.75 kW and 3x 380 to 500 V, 0.37 to 1.5 kW	445
810XF074.020-1	Fan for ACOPOSinverter P74/P76 1x 200 to 240 V, 1.1 to 2.2 kW and 3x 380 to 500 V, 2.2 to 4 kW	445
810XF074.030-1	Fan for ACOPOSinverter P74/P76 3x 380 to 500 V, 5.5 to 7.5 kW	445
810XF074.040-1	Fan for ACOPOSinverter P74/P76 3x 380 to 500 V, 11 to 15 kW	445

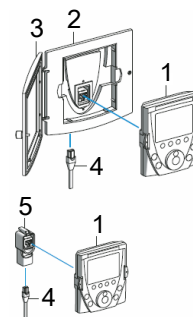
## 10.2 Graphics display

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

### 10.2.1 Order data


	
Order number	Short description
8I0XD301.300-1	Graphic display terminals Graphics display for ACOPOSinverter, 240 x 160 pixels, 8 lines, backlight, function keys, navigation key, IP54 protection.
<b>Optional accessories</b>	
Cables and adapters	
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.

Table 14: 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

## 10.3 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.

### 10.3.1 Order data

Order number	Short description
	<b>Optional braking resistors</b>
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 15: 8I0BR028.000-1, 8I0BR060.000-1, 8I0BR100.000-1 - Order data

### 10.3.2 Technical data

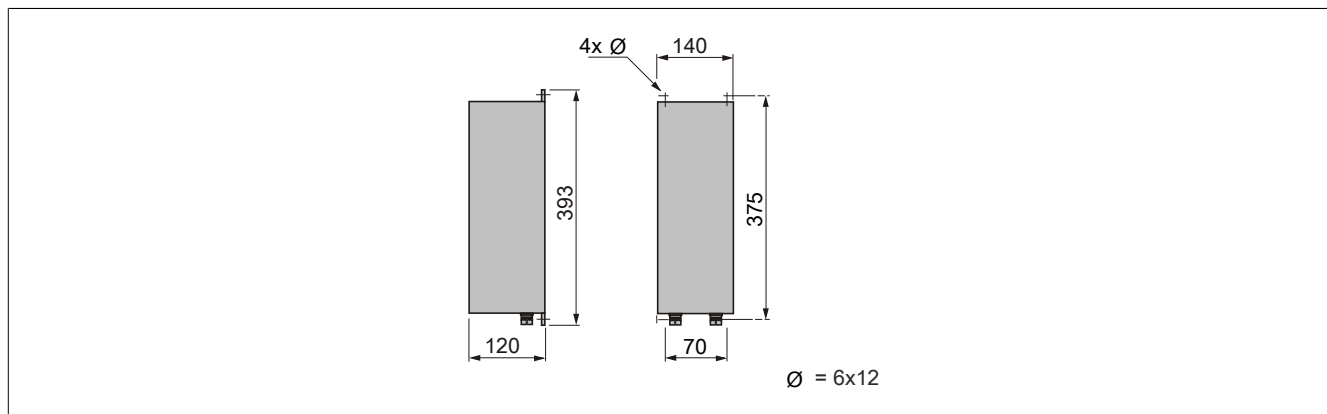
Order number	8I0BR028.000-1	8I0BR060.000-1	8I0BR100.000-1
<b>General information</b>			
Certifications			
KC		Yes	
<b>Operating conditions</b>			
Rated protection of housing		IP20	
Ambient temperature		0 to 50°C	
<b>Ambient conditions</b>			
Temperature			
Storage		-25 to 70°C	
<b>Mechanical properties</b>			
Weight	3.5 kg	2.4 kg	2 kg
<b>Properties</b>			
Resistance value at 20°C	28 Ω	60 Ω	100 Ω
Average available power at 50°C	0.2 kW <sup>1)</sup>	0.1 kW <sup>1)</sup>	0.05 kW <sup>1)</sup>
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 16: 8I0BR028.000-1, 8I0BR060.000-1, 8I0BR100.000-1 - Technical data

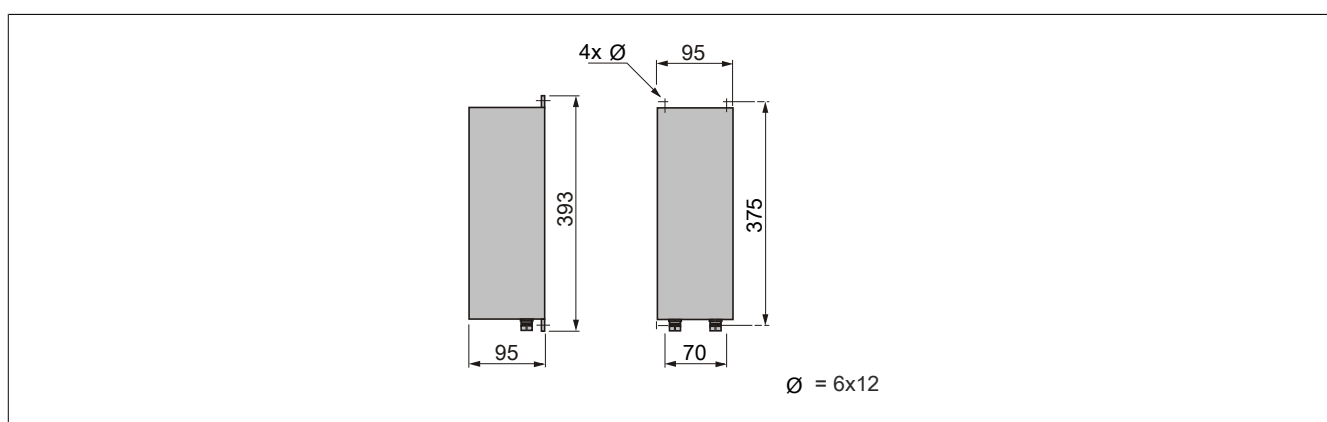
- 1) Load factors for resistances: The value for the average power that can be transferred from the resistor to the housing at 50°C is aligned to a brake load factor that corresponds to most standard applications.
- For 8I0BR100.000-1 to 8I0BR003.000-1:
- Braking for 2 s with a braking torque of 0.6 T<sub>n</sub> for a 40 second cycle
  - Braking for 0.8 s with a braking torque of 1.5 T<sub>n</sub> for a 40 second cycle
- For 8I0BR003.001-1 to 8I0BR001.004-1:
- Braking for 10 s with a braking torque of 2 T<sub>n</sub> for a 30 second cycle

### 10.3.3 Dimensions

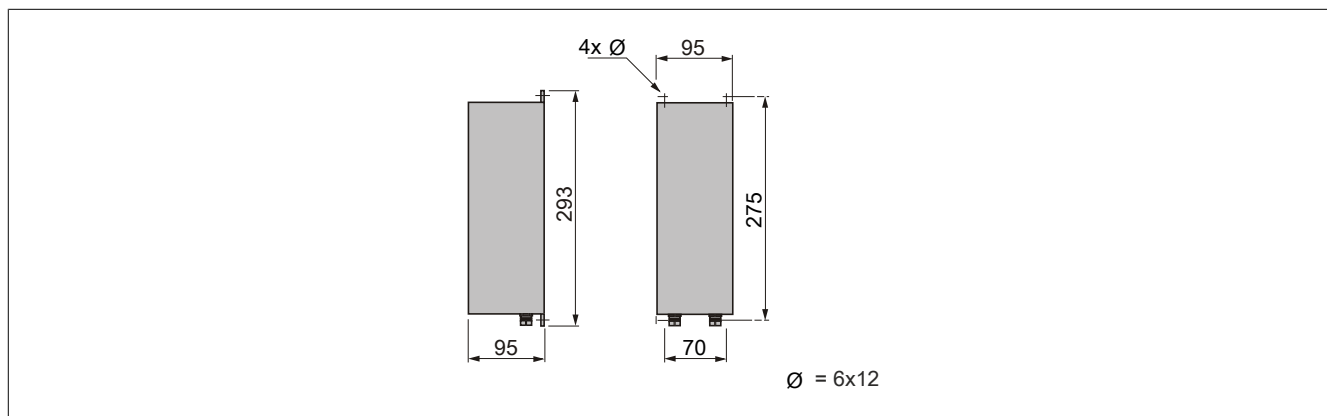
#### 810BR028.000-1



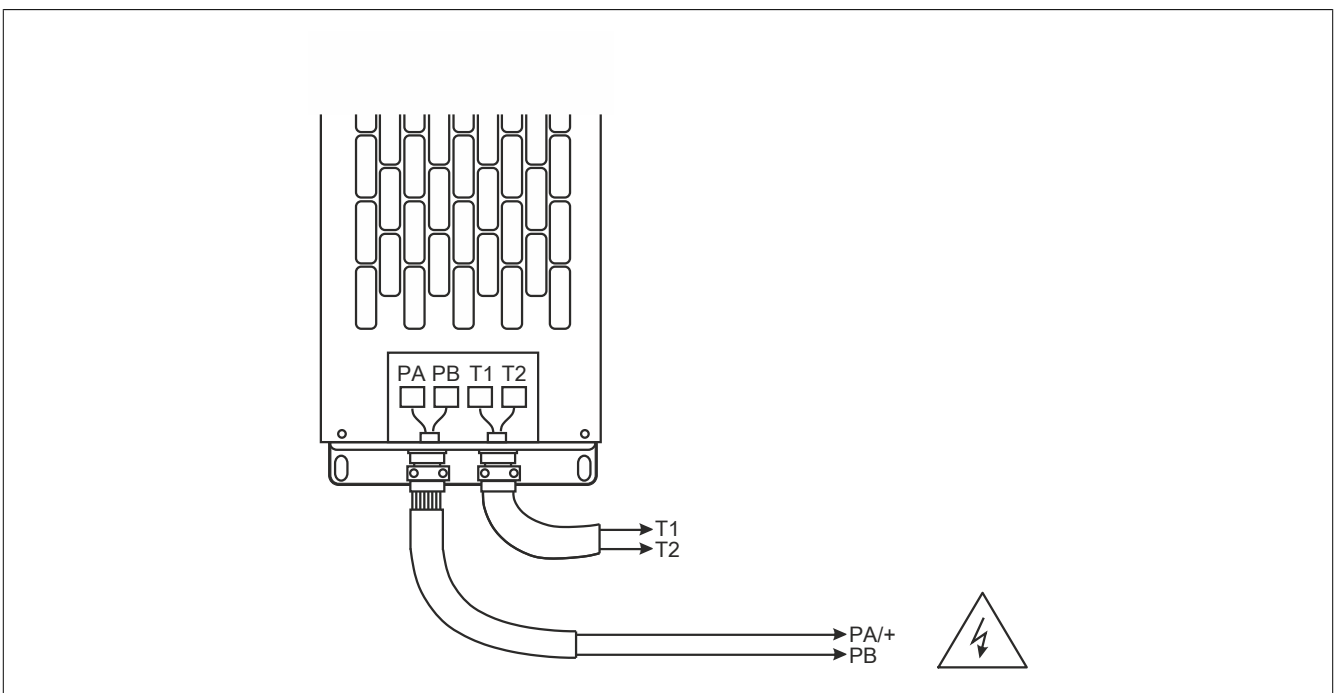
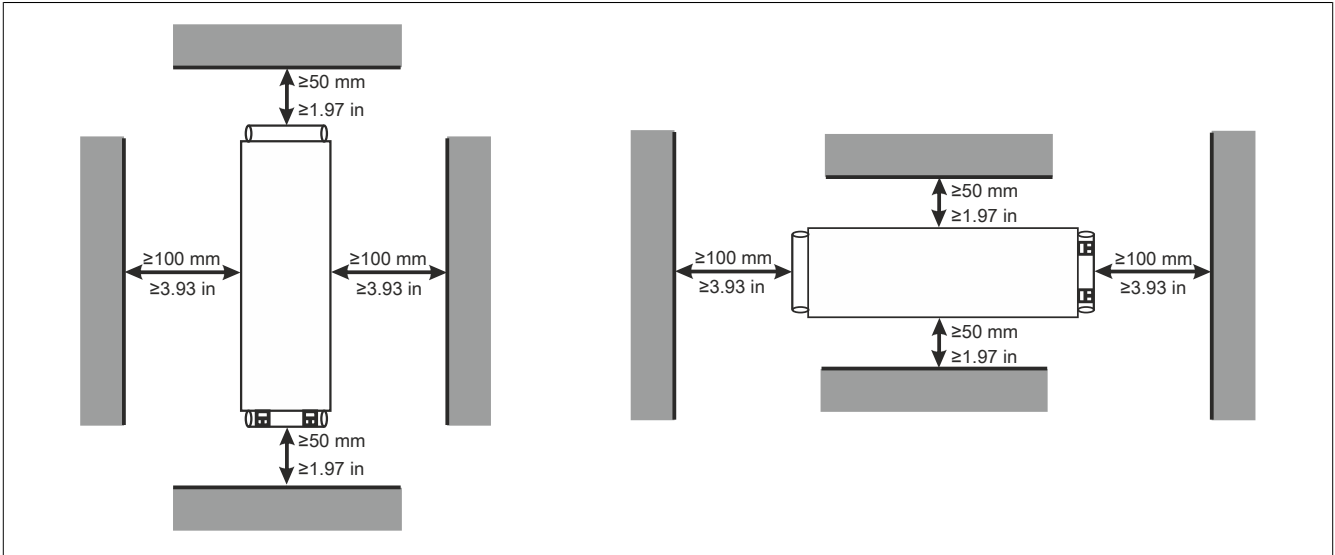
#### 810BR060.000-1



#### 810BR100.000-1



### 10.3.4 Installation



## 10.4 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).

### 10.4.1 Order data


Order number	Short description	Figure
	<b>ACOPOSinverter P74/P76 - Additional EMC input filters</b>	
810FS009.200-2	EMC filter 1-phase 9 A, side installation, for ACOPOSinverter P74/P76 1x 200 to 240 V, 0.18 to 0.75 kW	
810FS016.200-1	EMC filter 1-phase 16 A, side installation, for ACOPOSinverter P74/P76 1x 200 to 240 V, 1.1 to 1.5 kW	
810FS022.200-1	EMC filter 1-phase 22 A, side installation, for ACOPOSinverter P74/P76 1x 200 to 240 V, 2.2 kW	
810FT015.200-1	EMC filter 3-phase 15 A, side installation, for ACOPOSinverter P74/P76 3x 380 to 500 V, 0.37 to 1.5 kW	
810FT025.200-1	EMC filter 3-phase 25 A, side installation for ACOPOSinverter P74 3x 380 to 500 V, 2.2 to 4 kW	
810FT047.200-1	EMC filter 3-phase 47 A, bottom or side installation, for ACOPOSinverter P74/P76 3x 380 to 500 V, 5.5 to 7.5 kW	
810FT049.200-1	EMC filter 3-phase 49 A, bottom or side installation, for ACOPOSinverter P74/P76 3x 380 to 500 V, 11 to 15 kW	

Table 17: 810FS009.200-2, 810FS016.200-1, 810FS022.200-1, 810FT015.200-1, 810FT025.200-1, 810FT047.200-1, 810FT049.200-1 - Order data

### 10.4.2 Technical data

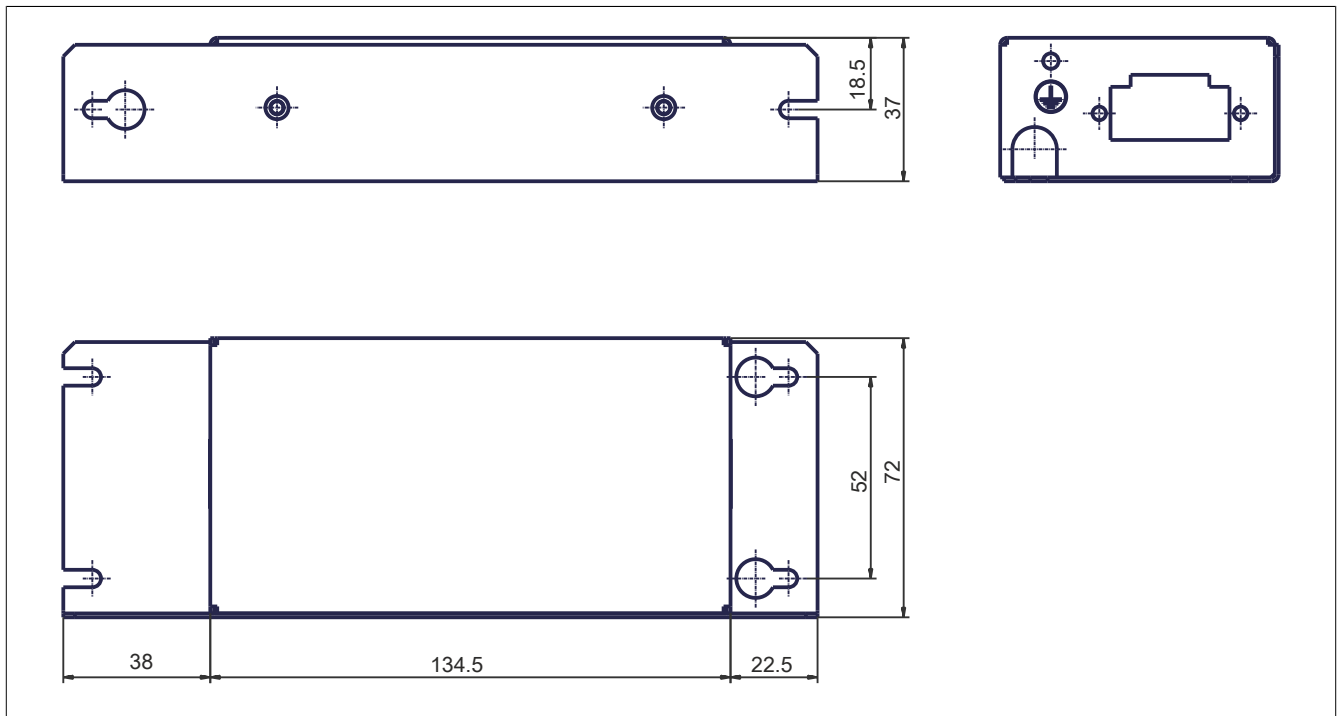
Order number	810FS009.200-2	810FS016.200-1	810FS022.200-1	810FT015.200-1	810FT025.200-1	810FT047.200-1	810FT049.200-1
<b>General information</b>							
Certifications							
CE	-				Yes		
KC	-				Yes		
<b>Mains connection</b>							
Power dissipation	3.7 W	6.9 W	7.5 W	9.9 W	15.8 W	19.3 W	27.4 W
Max. nominal voltage	1x 240 VAC +10%			3x 500 VAC +10%			
Nominal filter current	9 A	16 A	22 A	15 A	25 A	47 A	49 A
Max. fault current	100 mA	150 mA	80 mA	15 mA	35 mA	45 mA	
<b>Operating conditions</b>							
Installation elevation above sea level	0 to 1000 m <sup>1)</sup>						
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					
<b>Ambient conditions</b>							
Temperature							
Storage	-25 to 70°C						
<b>Mechanical properties</b>							
Weight	0.6 kg	0.775 kg	1.13 kg	1.0 kg	1.65 kg	3.15 kg	4.75 kg
Installation	Below or next to the inverter						
<b>General information</b>							
Conformity to standard	EN 133200						

Table 18: 810FS009.200-2, 810FS016.200-1, 810FS022.200-1, 810FT015.200-1, 810FT025.200-1, 810FT047.200-1, 810FT049.200-1 - Technical data

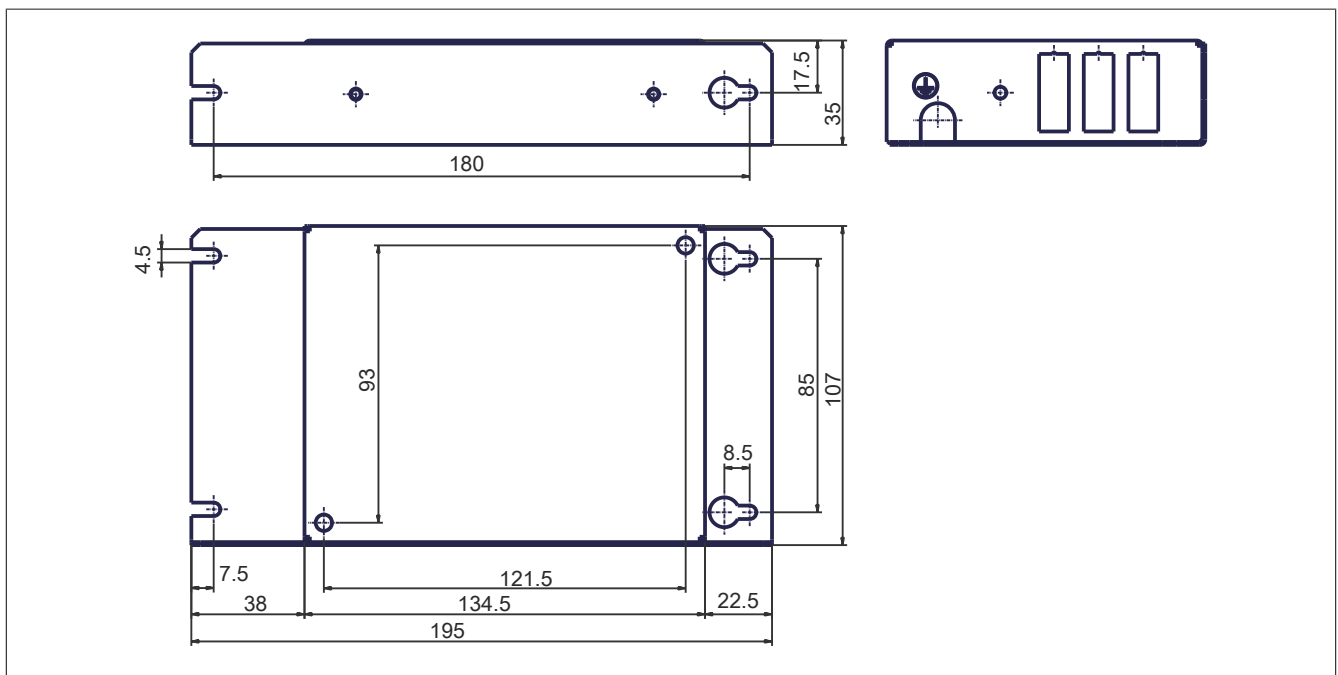
1) Over 1000 m, current reduced by 1% per 100 m

### 10.4.3 Dimensions

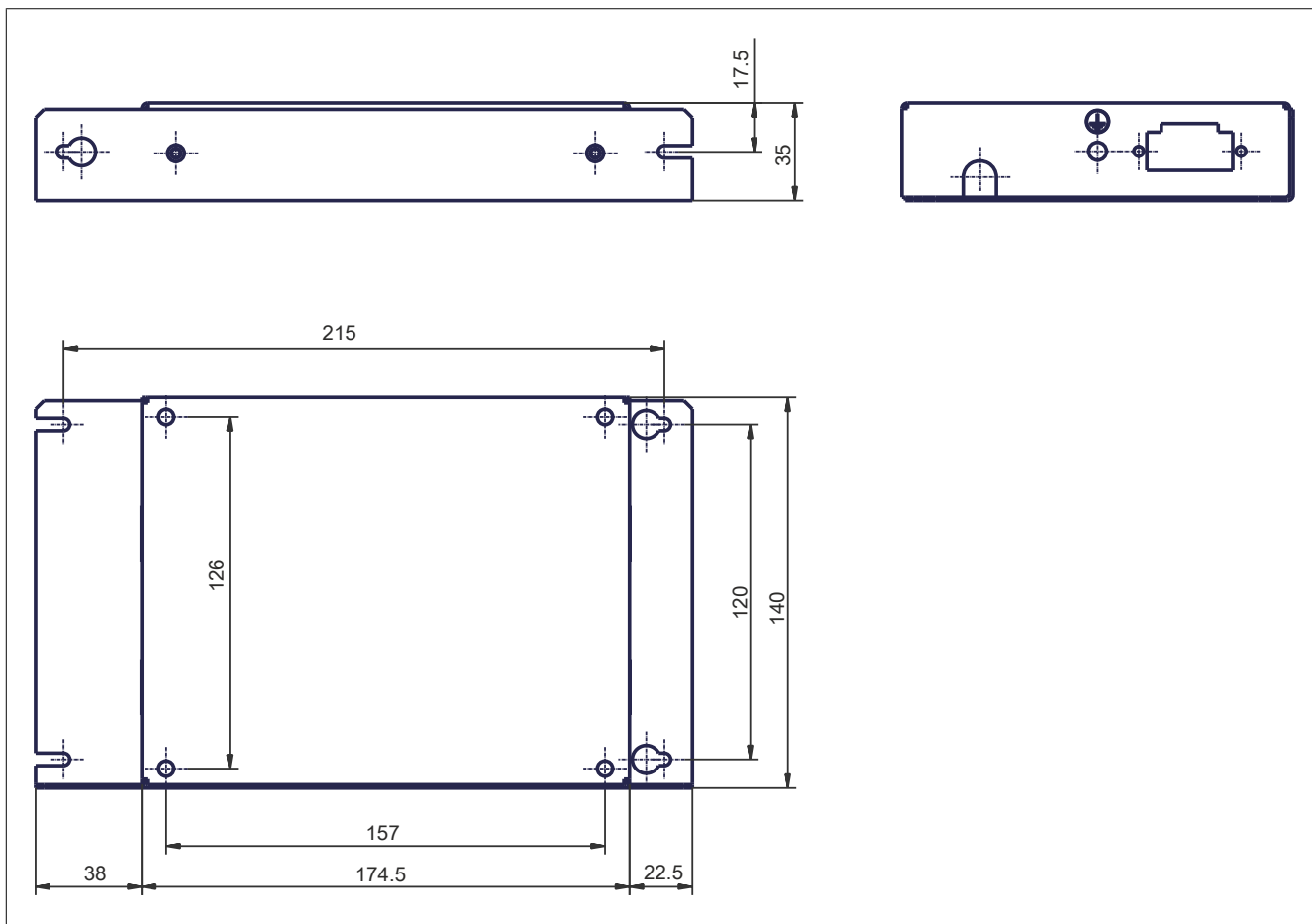
#### 810FS009.200-2



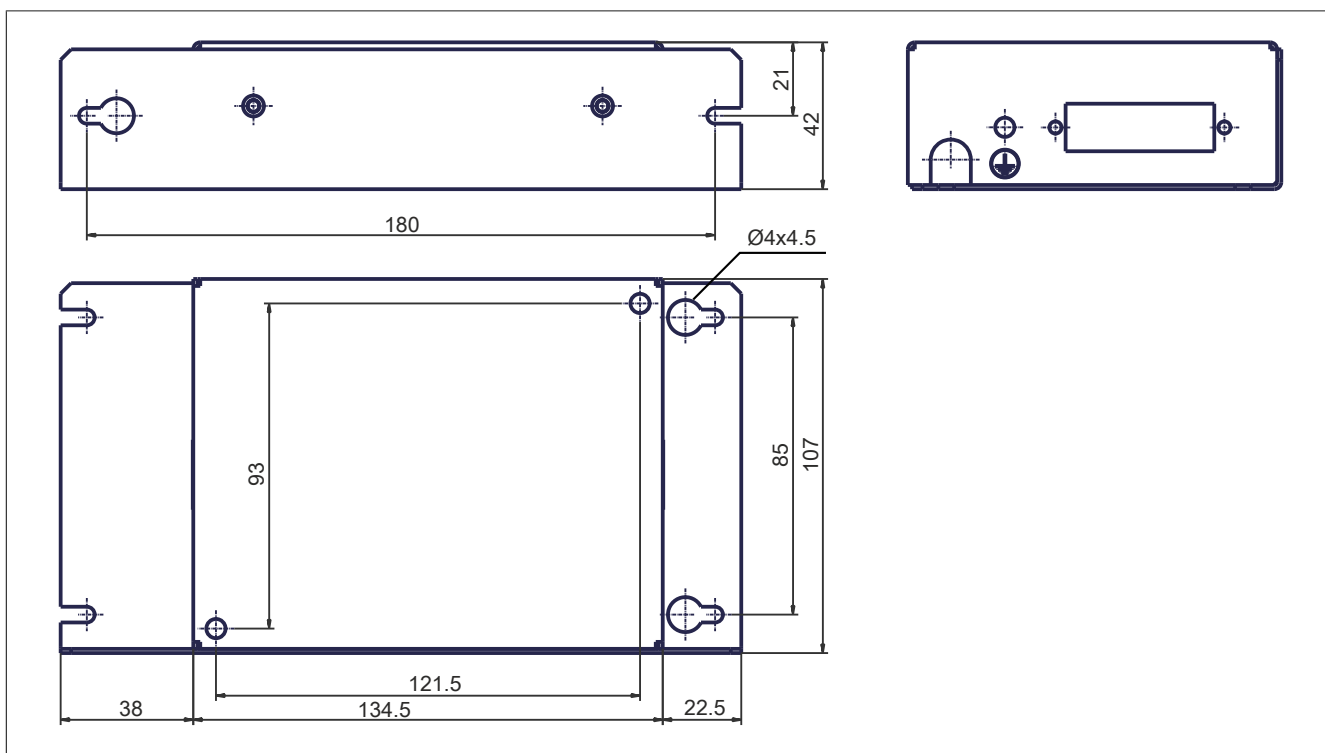
#### 810FS016.200-1



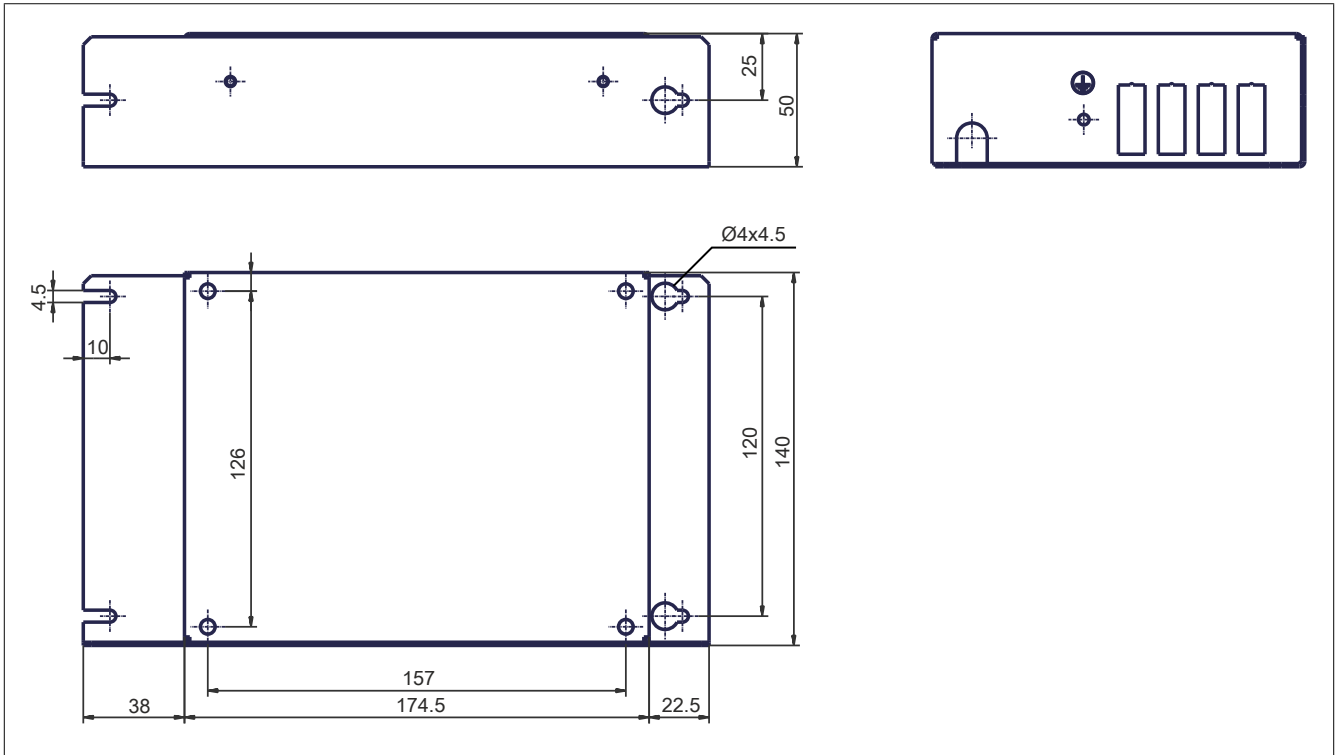
810FS022.200-1



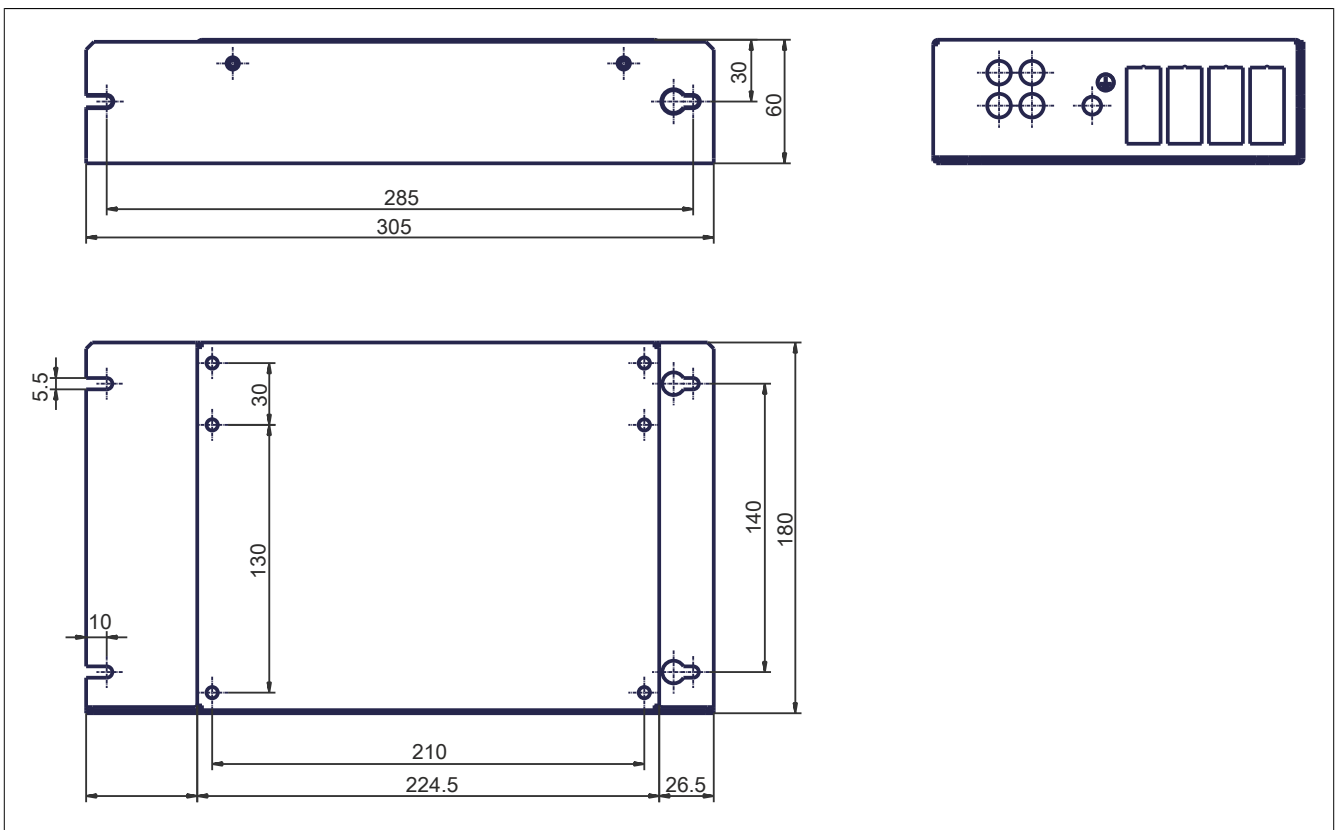
810FT015.200-1



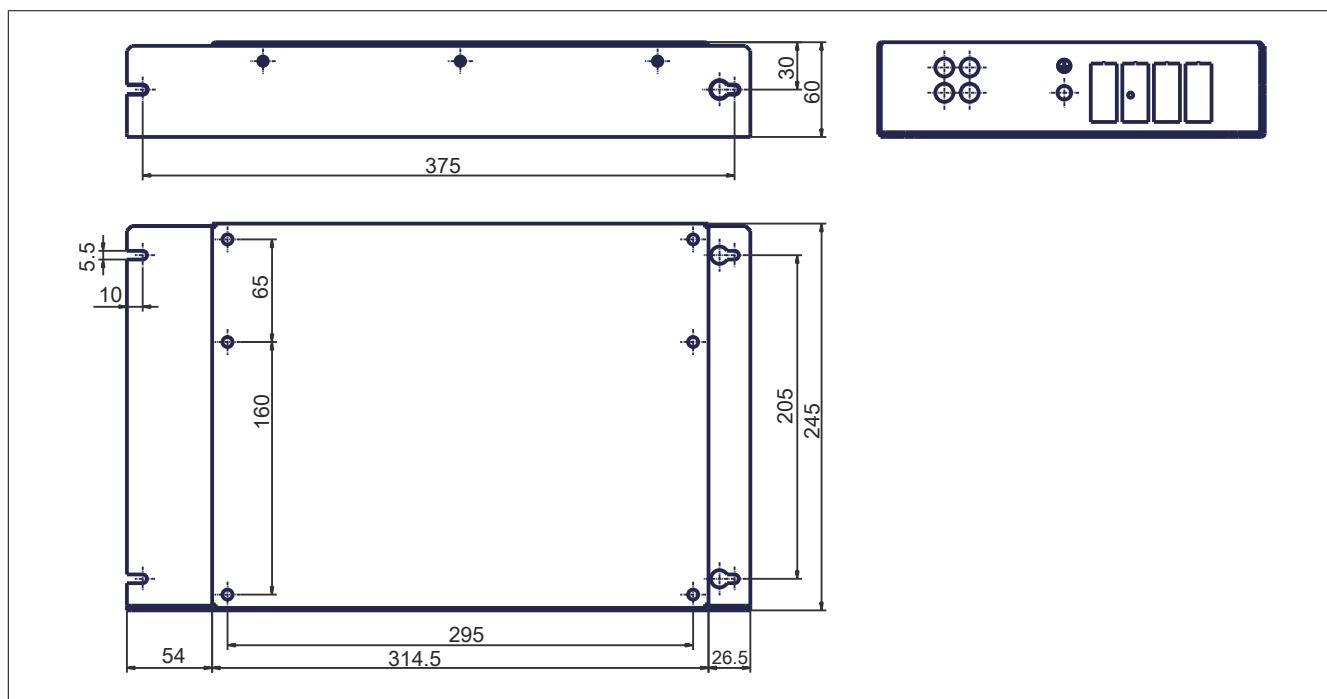
810FT025.200-1



810FT047.200-1

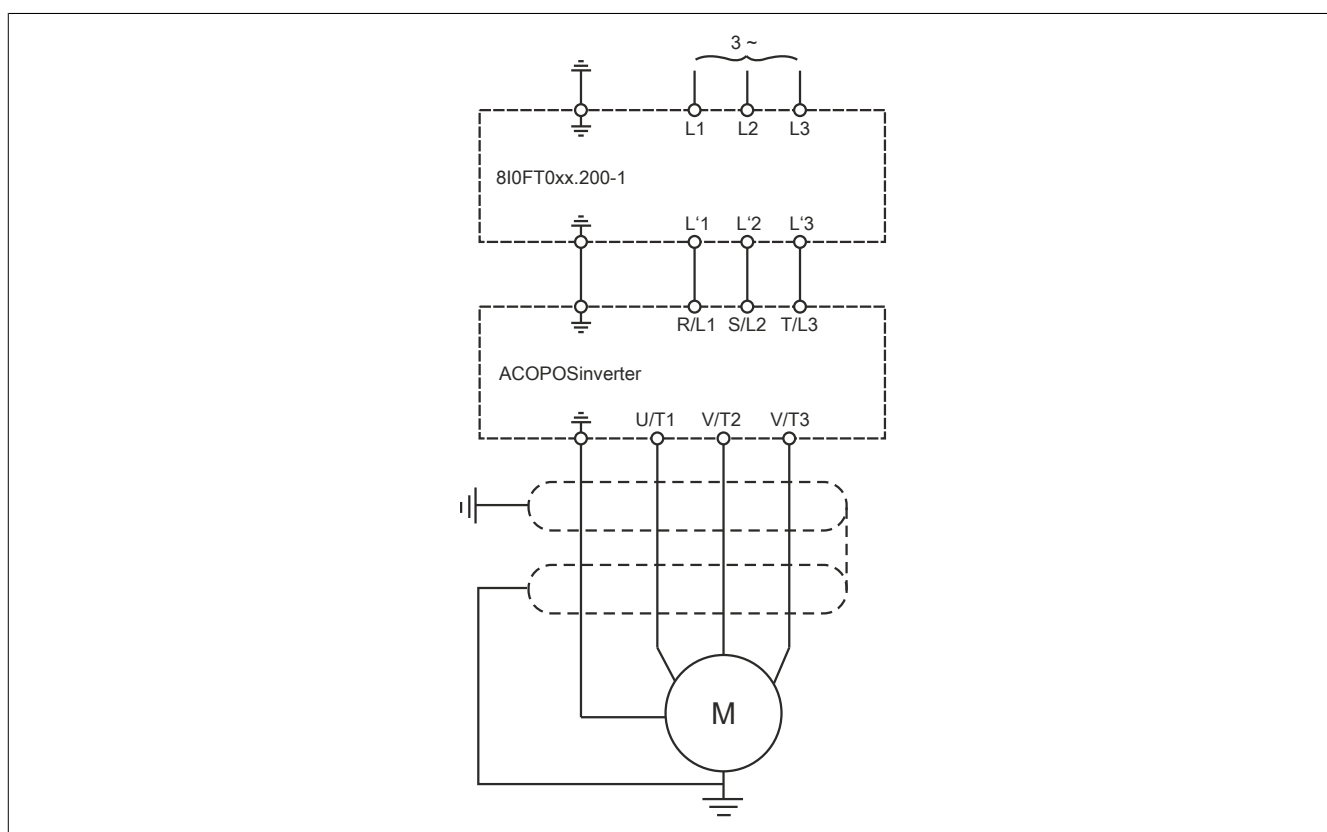


## 810FT049.200-1



## 10.4.4 Installation

## 810FT0xx.200-1

**Notice!**

To comply with EN 55011 and IEC/EN 61800-3, the rule is: only one EMC filter for one inverter.

## 10.5 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  $\phi$  correction if the system has equipment for power factor correction.

### 10.5.1 Order data



Order number	Short description
	<b>Optional line chokes</b>
810CS004.000-1	Mains choke 1-phase 4 A, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 0.18 to 0.37 kW.
810CS007.000-1	Mains choke 1-phase 7 A, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 0.55 to 0.75 kW.
810CS018.000-1	Mains choke 1-phase 18 A, for ACOPOSinverter P76 and P74new 1x 200 to 240 V, 1.1 to 2.2 kW.
810CT004.000-1	ACOPOSinverter mains choke 3-phase, 4 A, 50/60 Hz
810CT010.000-1	ACOPOSinverter mains choke 3-phase, 10 A, 50/60 Hz
810CT016.000-1	ACOPOSinverter mains choke 3-phase, 17 A, 50/60 Hz
810CT030.000-1	ACOPOSinverter mains choke 3-phase, 30 A, 50/60 Hz

Table 19: 810CS004.000-1, 810CS007.000-1, 810CS018.000-1, 810CT004.000-1, 810CT010.000-1, 810CT016.000-1, 810CT030.000-1 - Order data

## 10.5.2 Technical data

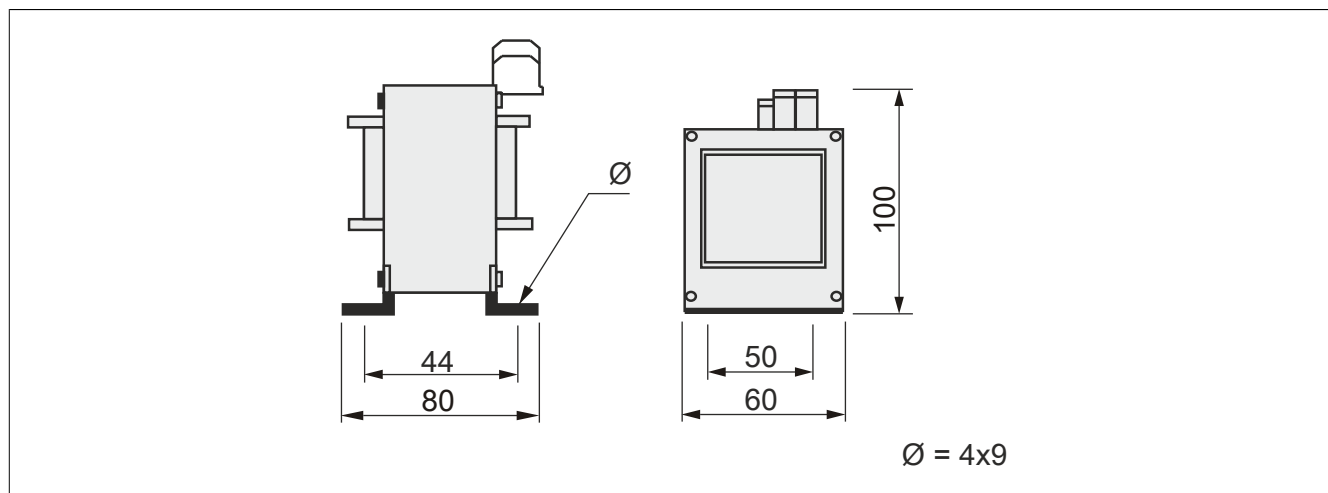
Order number	810CS004. 000-1	810CS007. 000-1	810CS018. 000-1	810CT004. 000-1	810CT010. 000-1	810CT016. 000-1	810CT030. 000-1
<b>General information</b>							
Certifications							
CE	Yes						
KC	Yes						
<b>Mains connection</b>							
Power dissipation	17 W	20 W	30 W	45 W	65 W	75 W	90 W
Inductance	10 mH	5 mH	2 mH	10 mH	4 mH	2 mH	1 mH
Nominal current	4 A	7 A	18 A	4 A <sup>1)</sup>	10 A <sup>1)</sup>	17 A <sup>1)</sup>	30 A <sup>1)</sup>
Voltage drop	From 3 to 5% of the rated supply voltage. Higher values result in torque loss.						
Saturation current	-						
<b>Operating conditions</b>							
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 <sup>2)</sup>						
Maximum installation elevation	3000 m <sup>3)</sup>						
<b>Ambient conditions</b>							
Temperature							
Storage	-25 to 70°C						
<b>Mechanical properties</b>							
Weight	0.63 kg	0.88 kg	1.99 kg	1.5 kg	3.0 kg	3.5 kg	6.0 kg
<b>General information</b>							
Conformity to standard	IEC 61800-5-1 (protection level 1 regarding overvoltages in the mains supply according to VDE 0160)						

Table 20: 810CS004.000-1, 810CS007.000-1, 810CS018.000-1, 810CT004.000-1, 810CT010.000-1, 810CT016.000-1, 810CT030.000-1 - Technical data

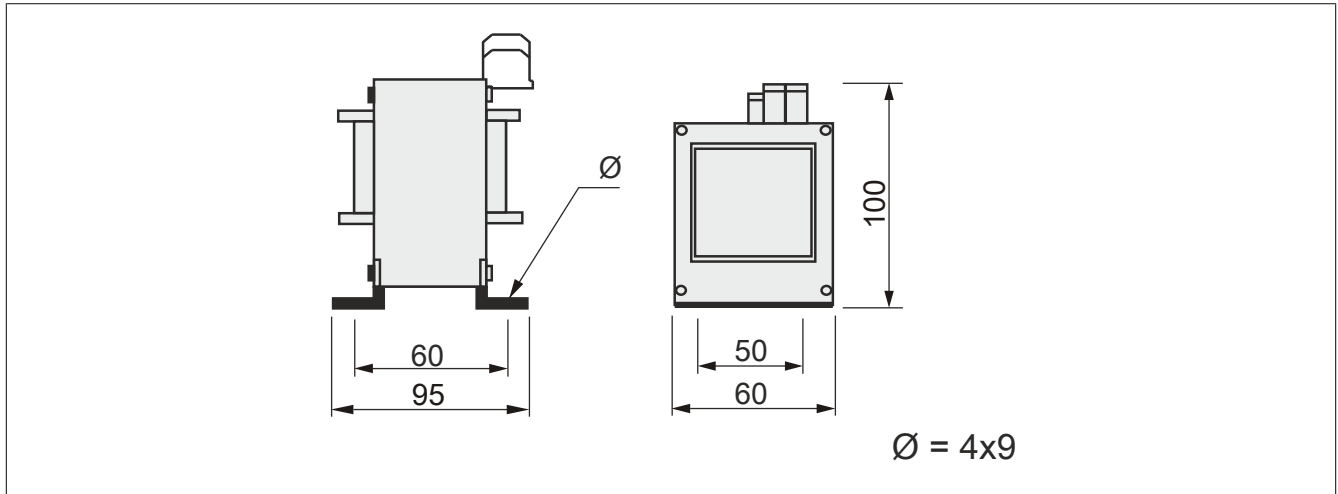
- 1) Max. current = 1.65 x rated current for 60 seconds.
- 2) With current reduction of 2% per °C above 45°C.
- 3) From 1000 to 3000 m, current reduced by 1% per 100 m

## 10.5.3 Dimensions

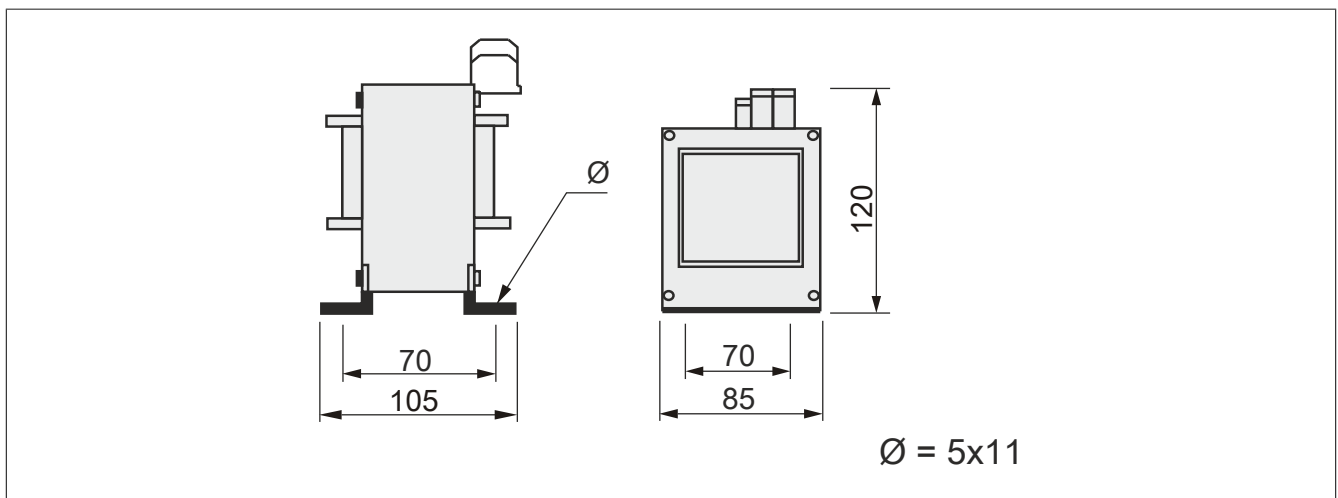
### 810CS004.000-1



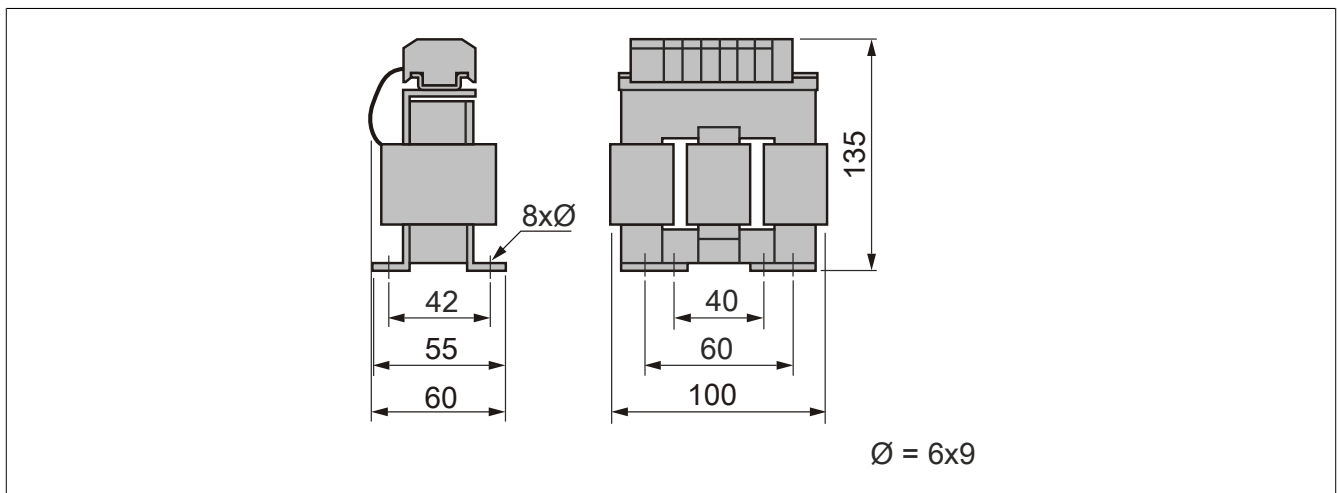
**810CS007.000-1**



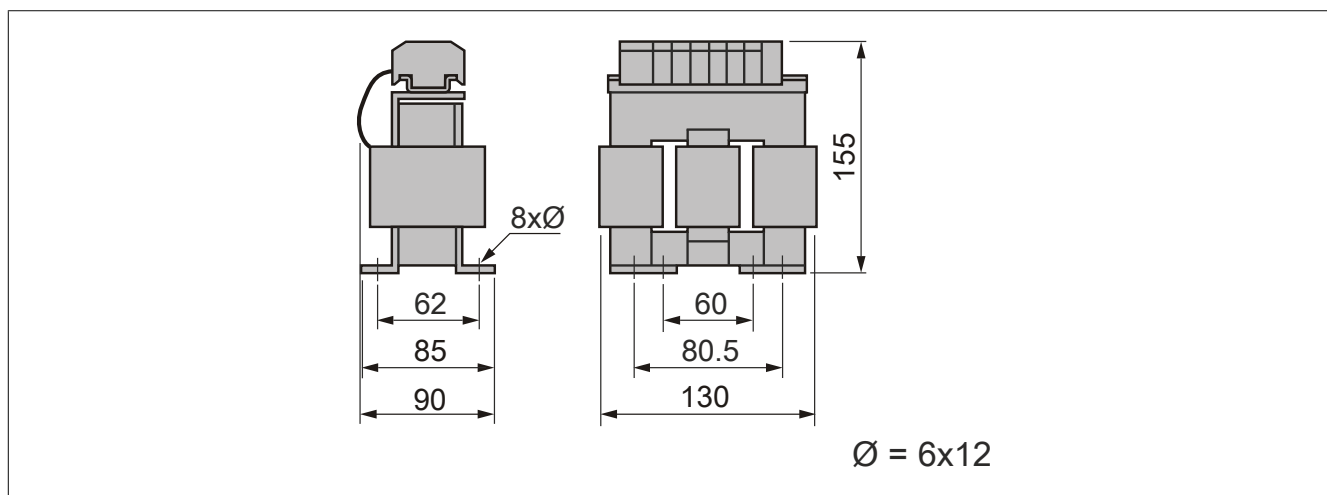
**810CS018.000-1**



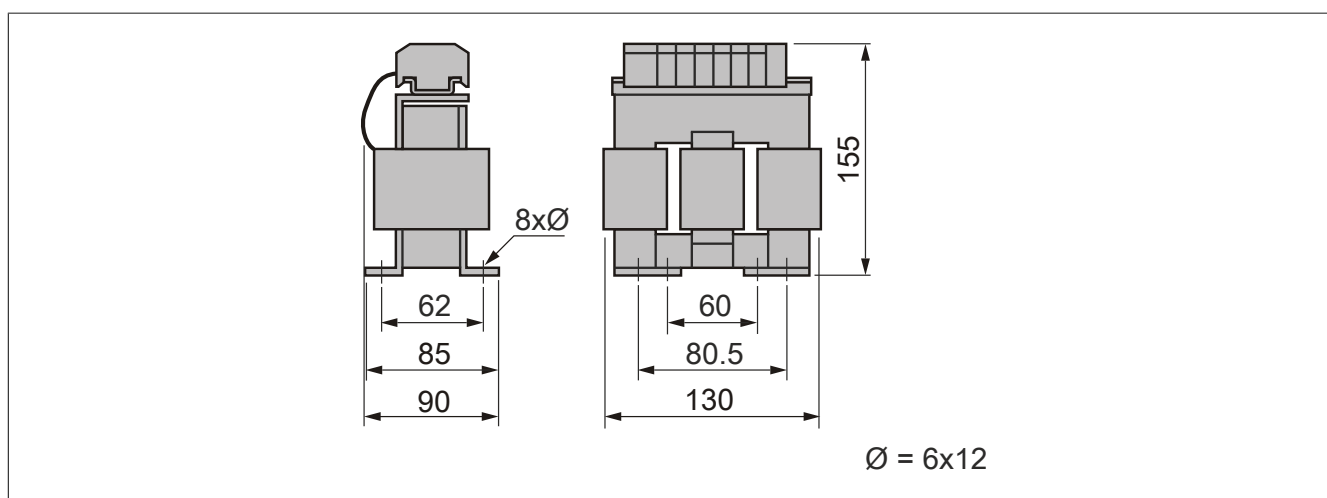
**810CT004.000-1**



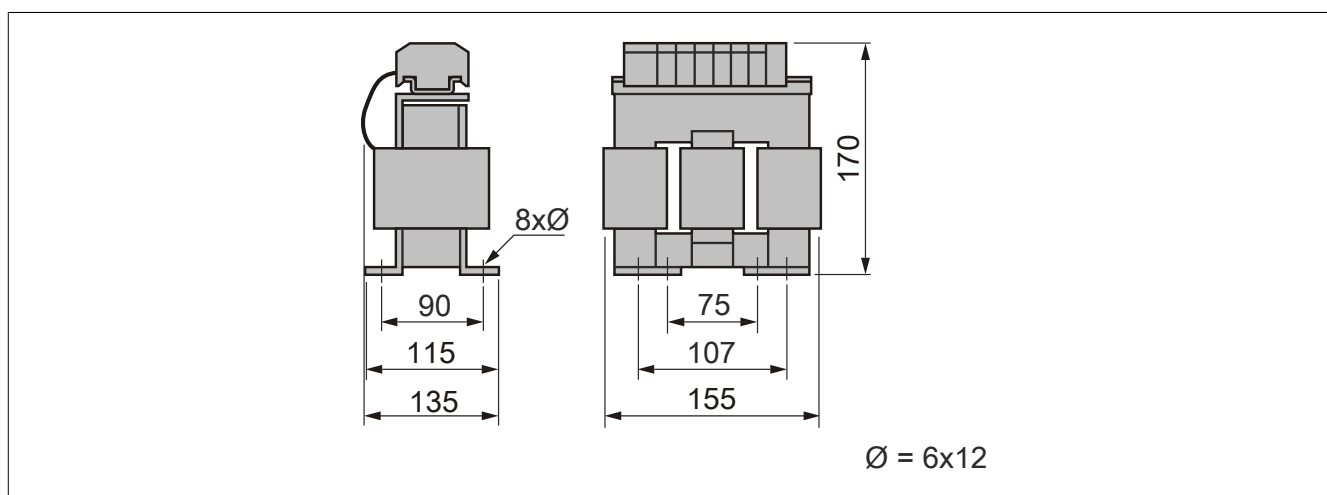
## 810CT010.000-1



## 810CT016.000-1

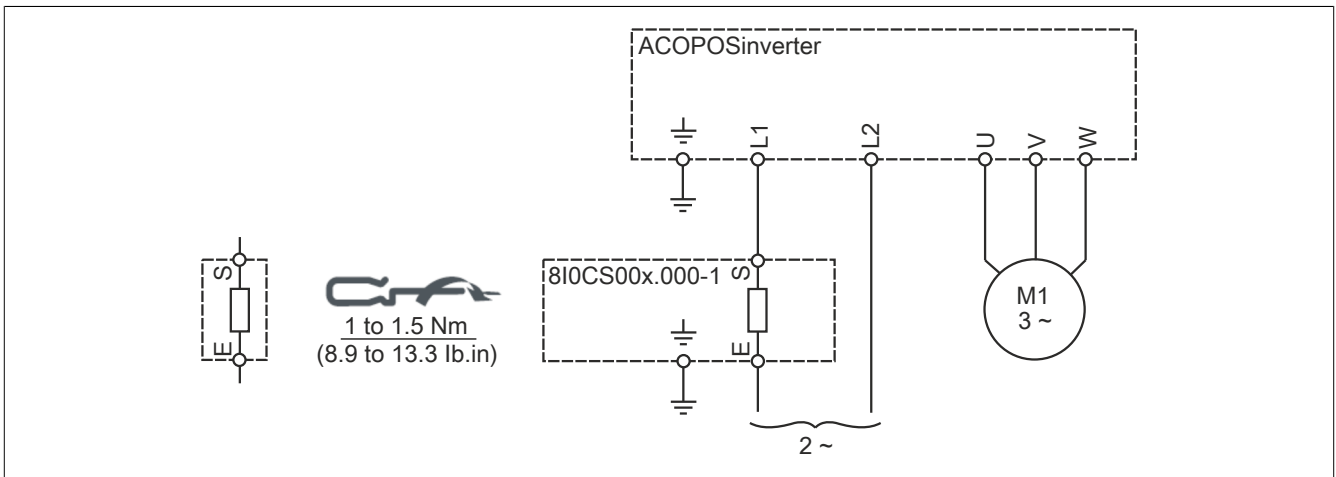


## 810CT030.000-1

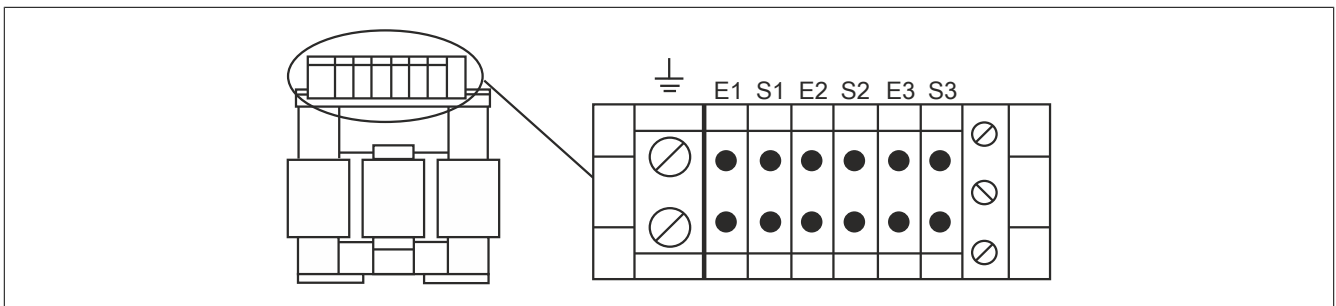
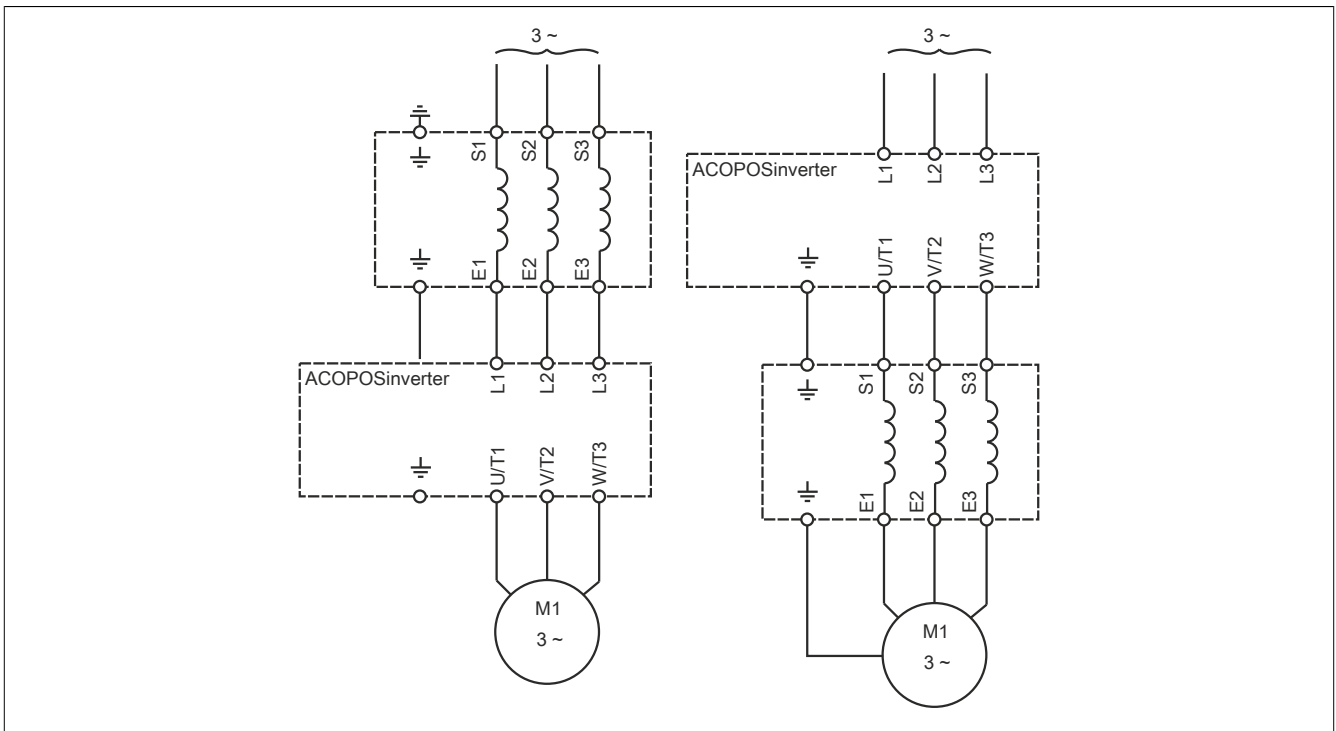


### 10.5.4 Installation

#### 810CS0xx.000-1



#### 810CT0xx.000-1



## 10.6 USB accessories

### 10.6.1 Order data


Order number	Short description	Figure
	<b>Cable and adapters</b>	
8I0XC001.003-1	USB adapter cable, USB to Modbus, for ACOPOSinverter.	

Table 21: 8I0XC001.003-1 - Order data

## 10.7 DC bus cable

### 10.7.1 Order data


Order number	Short description	Figure
	<b>Cable and adapters</b>	
8I0XC003.400-1	DC bus cable, 0.18 m, 5 pcs., for ACOPOSinverter	

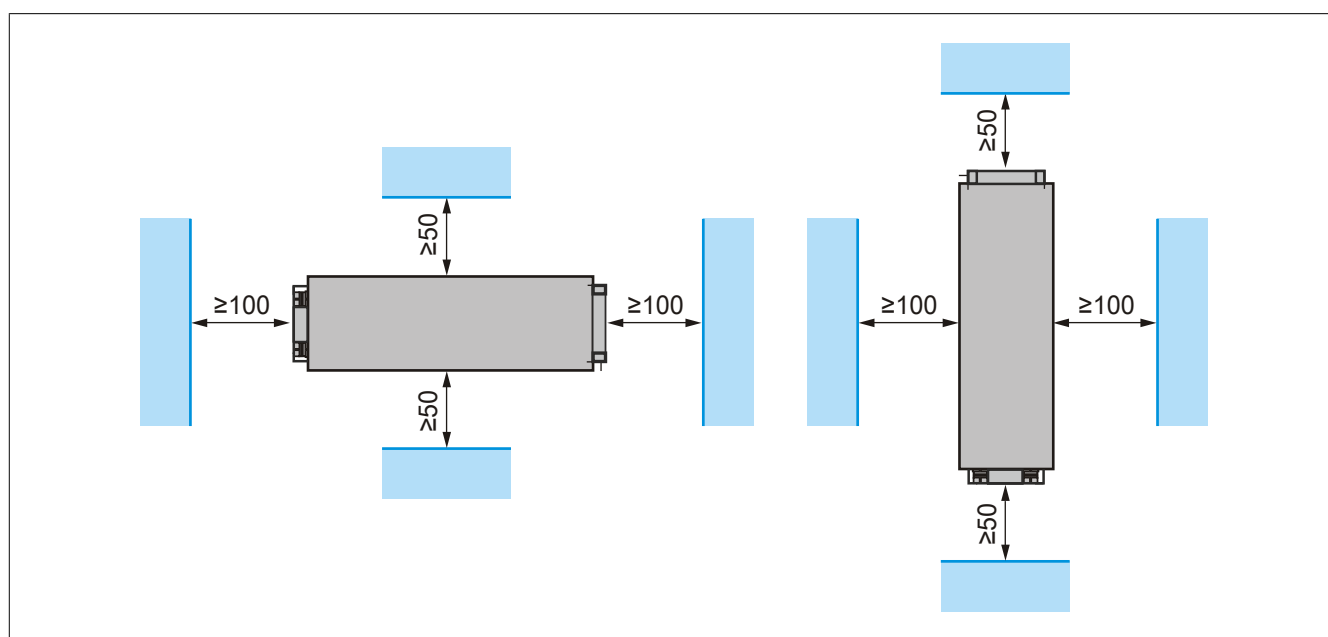
Table 22: 8I0XC003.400-1 - Order data

### 10.7.2 Technical data

Order number	8I0XC003.400-1	
Short description		
Accessories	ACPi P66/P74/P76/P86 DC bus cables	
Mechanical properties		
Dimensions		
Length	0.18 m	
Brief overview		
Content of delivery	5 pcs.	

Table 23: 8I0XC003.400-1 - Technical data

### 10.7.3 Installation



## 10.8 Fan (replacement parts requirement)

### **Danger!**

#### **RISK OF ELECTRIC SHOCK OR ARC AND RISK OF EXPLOSION**

- Work on and with this drive system is only permitted to be carried out by appropriately trained and authorized personnel who are familiar with the contents of this manual and all associated product documentation and who have completed safety training to recognize and avoid the hazards involved. Installation, adjustment, repair and servicing must be carried out by qualified personnel.
- The system integrator is responsible for compliance with all relevant local and national electrical engineering requirements and any other applicable regulations regarding the protective grounding of all equipment.
- Many components of the product, including the printed circuits, are supplied by the mains voltage.
- Only use electrically insulated tools and measuring instruments with the correct rated voltage.
- Do not touch any unshielded components or terminals when voltage is applied.
- Motors can generate voltage when the shaft is rotated. Before performing any work on the drive system, secure the motor shaft against being driven by an external source.
- With AC voltage, voltage can be coupled out to unused conductors in the motor cable. Insulate unused conductors in the motor cable at both ends.
- 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:
  - Disconnect all power supplies, including any external voltage to the control unit. Note that the circuit breaker or main power disconnect switch does not de-energize all circuits.
  - 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 "Checking for the absence of voltage" in the product installation instructions.
- Before switching on the power supply to the inverter system:
  - Ensure that work is completed and that there are no hazards resulting from installation.
  - If the mains input terminals and motor output terminals are grounded and shorted, remove the grounding and shorts circuits from the main input terminals and motor output terminals.
  - Ensure that all devices are properly grounded.
  - Ensure that all protective equipment such as covers, doors and screens are installed or closed.
- Install and close all covers before switching on the power supply.

**Failure to follow these instructions will result in death or life-threatening injury.**

## 10.8.1 Order data

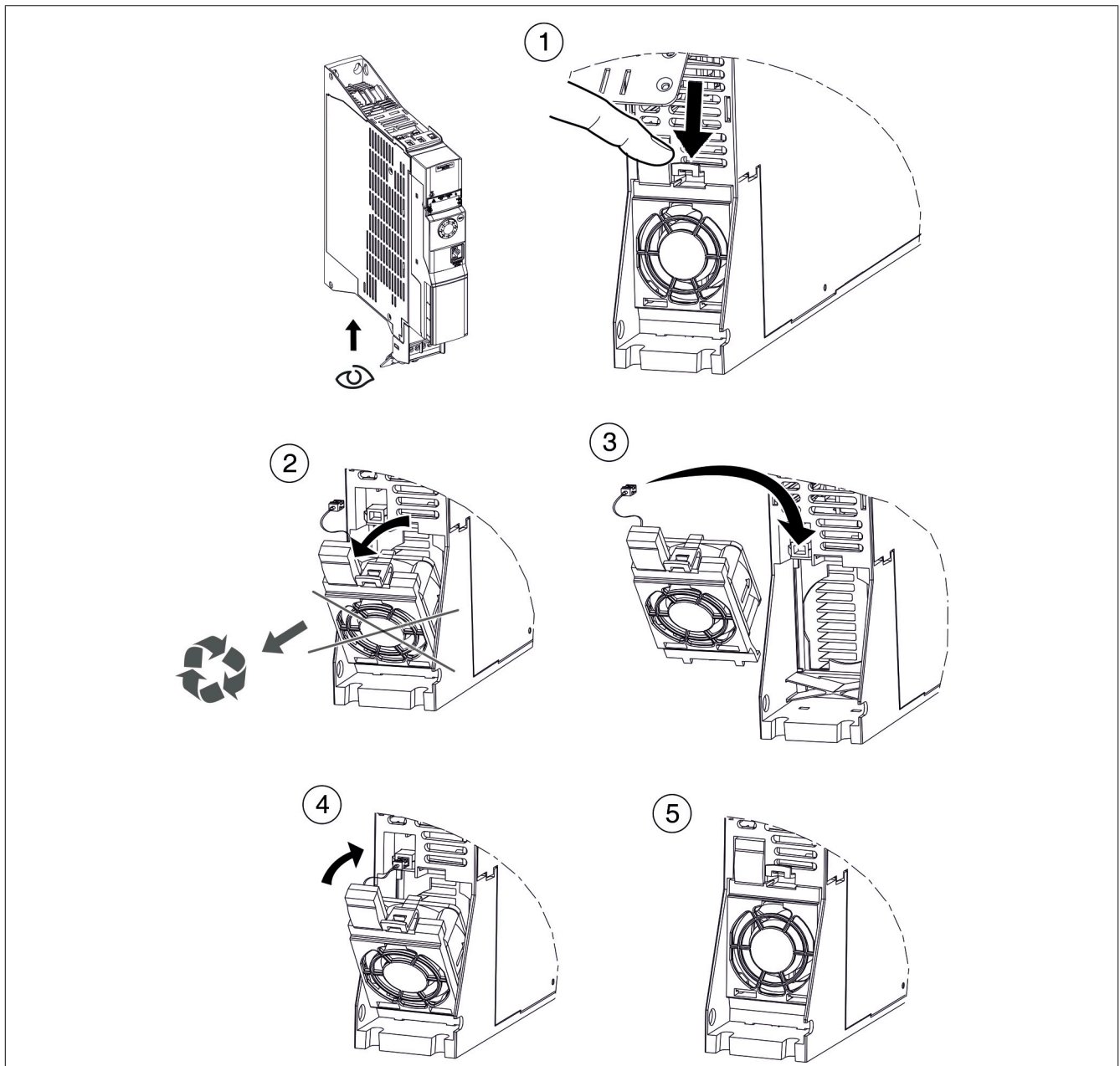


Order number	Short description
	<b>ACOPOSinverter P74/P76 - Fan</b>
810XF074.010-1	Fan for ACOPOSinverter P74/P76 1x 200 to 240 V, 0.18 to 0.75 kW and 3x 380 to 500 V, 0.37 to 1.5 kW
810XF074.020-1	Fan for ACOPOSinverter P74/P76 1x 200 to 240 V, 1.1 to 2.2 kW and 3x 380 to 500 V, 2.2 to 4 kW
810XF074.030-1	Fan for ACOPOSinverter P74/P76 3x 380 to 500 V, 5.5 to 7.5 kW
810XF074.040-1	Fan for ACOPOSinverter P74/P76 3x 380 to 500 V, 11 to 15 kW

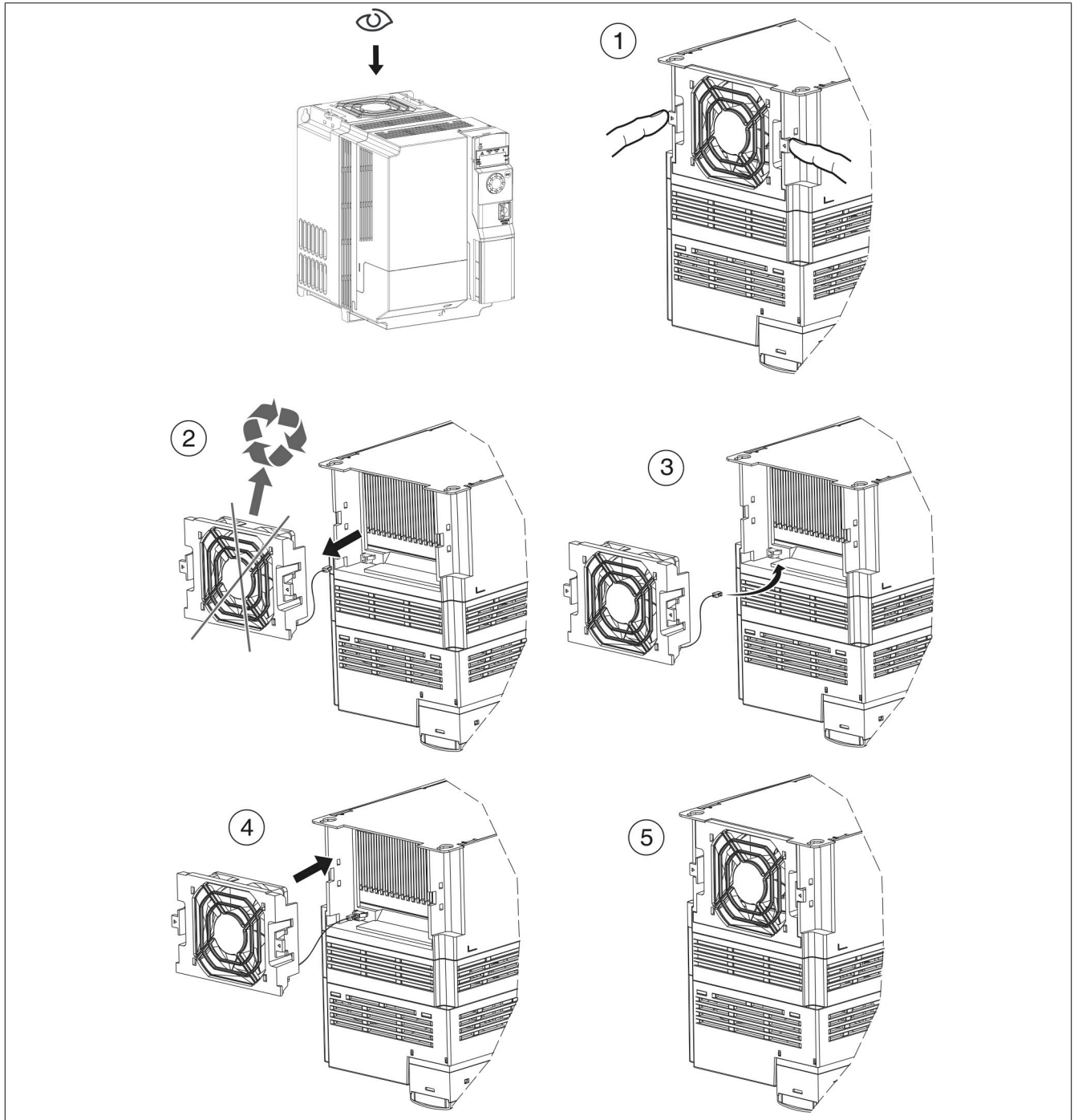
Table 24: 810XF074.010-1, 810XF074.020-1, 810XF074.030-1, 810XF074.040-1 - Order data

## 10.8.2 Installation

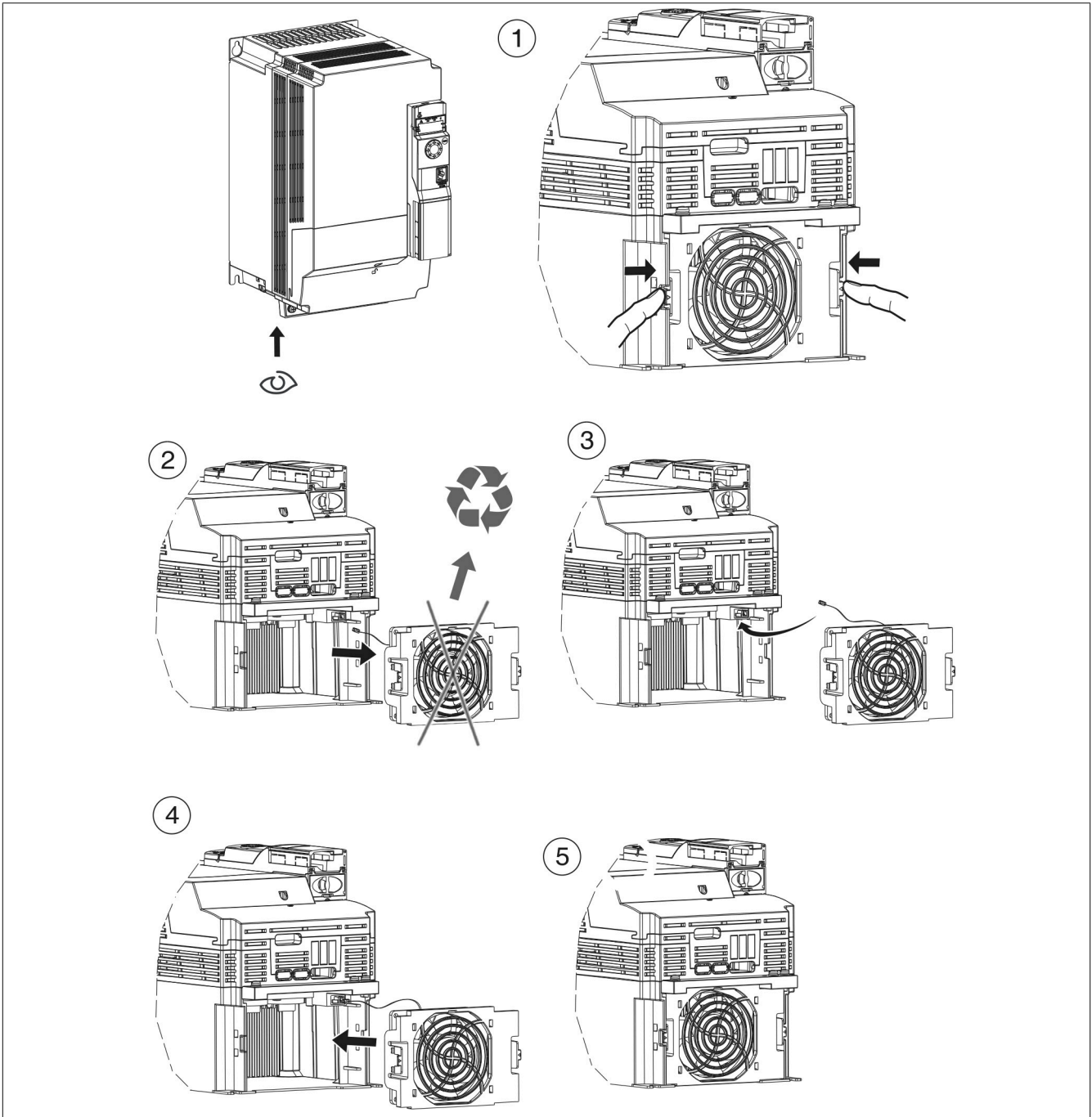
### 810XF074.010-1, 810XF074.020-1



810XF074.030-1



810XF074.040-1



## 11 EC declaration of conformity

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This document was originally written in the English language. The English 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

5142 Eggelsberg

AUSTRIA

The EC declarations of conformity can be downloaded from the B&R website ([www.br-automation.com](http://www.br-automation.com)).