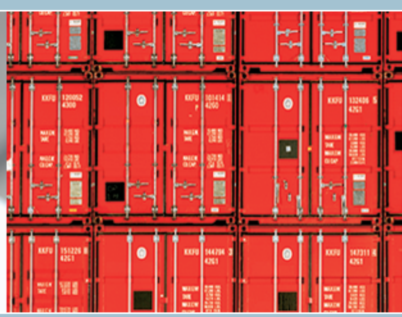
Product Manual

MOVITRAC® B

Edition 01/2024

31960421/EN



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1 General information

1.1 About this documentation

The documentation at hand is the original.

This documentation is an integral part of the product. The documentation is intended for all employees who perform work on the product.

Make sure this documentation is accessible and legible. Ensure that persons responsible for the systems and their operation as well as persons who work on the product independently have read through the documentation carefully and understood it. If you are unclear about any of the information in this documentation or if you require further information, contact SEW-EURODRIVE.

1.2 Other applicable documentation

Observe the corresponding documentation for all additional components.

1.3 Structure of the safety notes

1.3.1 Meaning of signal words

The following table shows the graduation and meaning of the signal words in the safety notes.

Signal word	Meaning	Consequences if not observed
⚠ **DANGER**	Imminent danger	Death or severe injuries
⚠ **WARNING**	Possibly dangerous situation	Death or severe injuries
⚠ **CAUTION**	Possibly dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the product or its environment
INFORMATION	Useful information or tip: Simplifies handling of the product.	

1.3.2 Structure of section-related safety notes

Section-related safety notes do not apply to a specific action but to several actions pertaining to one subject. The hazard symbols used either indicate a general hazard or a specific hazard.

This is the formal structure of a safety note for a specific section:

SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

1.3.3 Meaning of the hazard symbols

The hazard symbols in the safety notes have the following meaning:

Hazard symbol	Meaning
	General hazard
	Warning of dangerous electrical voltage
	Warning of hot surfaces
	Warning of risk of crushing
	Warning about suspended load

1.3.4 Structure of embedded safety notes

Embedded safety notes are directly integrated into the instructions just before the description of the dangerous step.

This is the formal structure of an embedded safety note:

⚠ **SIGNAL WORD!** Type and source of danger. Possible consequence(s) if disregarded. Measure(s) to prevent danger.

1.4 Decimal separator in numerical values

In this document, a period is used to indicate the decimal separator.

Example: 30.5 kg

1.5 Rights to claim under limited warranty

Read the information in this documentation. This is essential for fault-free operation and fulfillment of any rights to claim under limited warranty. Read the documentation before you start working with the product.

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1.6 Recycling, reprocessing, reuse

SEW-EURODRIVE GmbH & Co KG strives to use as few new natural resources as possible in the production of its products. An important aspect of this is the circular economy with the recycling of materials as well as the inspection and/or reprocessing of returned components and their reuse in new products. SEW-EURODRIVE GmbH & Co KG only uses these processes if the resulting materials and components are of the same quality as new parts.

1.7 Product names and trademarks

The product names mentioned in this documentation are trademarks or registered trademarks of the respective titleholders.

1.8 Copyright notice

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2 Safety notes

2.1 Preliminary information

The following general safety notes serve the purpose of preventing injury to persons and damage to property. They primarily apply to the use of products described in this documentation. If you use additional components, also observe the relevant warning and safety notes.

2.2 Duties of the user

As the user, you must ensure that the basic safety notes are observed and complied with. Make sure that persons responsible for the machinery and its operation as well as persons who work on the device independently have read through the documentation carefully and understood it.

As the user, you must ensure that all of the work listed in the following is carried out only by qualified specialists:

- Setup and installation
- Installation and connection
- Startup
- Maintenance and repairs
- Shutdown
- Disassembly

Ensure that the persons who work on the product pay attention to the following regulations, conditions, documentation, and information:

- The national and regional regulations governing safety and the prevention of accidents
- Product safety label on the product
- All other associated project planning documents, installation and startup instructions, as well as wiring diagrams
- Do not assemble, install or operate damaged products
- All system-specific specifications and regulations

Ensure that systems in which the product is installed are equipped with additional monitoring and protection devices. Observe the applicable safety regulations and legislation governing technical work equipment and accident prevention regulations.

2.3 Target group

Specialist for mechanical work

Any mechanical work may be performed only by adequately qualified specialists. Specialists in the context of this documentation are persons who are familiar with the design, mechanical installation, troubleshooting, and maintenance of the product, and who possess the following qualifications:

- Qualifications in the field of mechanics in accordance with the national regulations
- Familiarity with this documentation

Specialist for electrotechnical work

Any electrotechnical work may be performed only by electrically skilled persons with a suitable education. Electrically skilled persons in the context of this documentation are persons who are familiar with electrical installation, startup, troubleshooting, and maintenance of the product, and who possess the following qualifications:

- Qualifications in the field of electrical engineering in accordance with the national regulations
- Familiarity with this documentation

Additional qualifications

In addition to that, these persons must be familiar with the valid safety regulations and laws, as well as with the requirements of the standards, directives, and laws specified in this documentation.

The persons must have the express authorization of the company to operate, program, parameterize, label, and ground devices, systems, and circuits in accordance with the standards of safety technology.

Instructed persons

All work in the areas of transport, storage, installation, operation and waste disposal may only be carried out by persons who are trained and instructed appropriately. These instructions must enable the persons to carry out the required activities and work steps safely and in accordance with regulations.

2.4 IT security

2.4.1 Contact

If you need support with the configuration, contact SEW-EURODRIVE Service. You can obtain information about current security-related issues by e-mail or on the Product Security Management website. There you will find various contact options for reporting security-related problems.

2.4.2 IT security of the product

The product has no access levels.

The IT security of the product is only guaranteed when used in an environment secured by defense-in-depth strategies.

2.4.3 IT security of the environment

For drive and control components that are integrated into a network (e.g. a fieldbus, WLAN, or Ethernet network), it is possible to make settings even more remotely. This brings with it the risk of a parameter change that is not visible externally resulting in unexpected, but not uncontrolled system behavior, and this may impact negatively on operational security, system availability, or data security.

Make sure that unauthorized access is not possible, especially for WLAN- or Ethernet-based networked systems and engineering interfaces. Using IT-specific security standards, such as network segmentation, adds to the protection of access to the ports. For an overview of the ports and of the services provided by the communication interfaces, refer to Online Support. The IT security of the product is only guaranteed when used in an environment secured by defense-in-depth strategies.

Ensure that clear responsibility for security is guaranteed during operation. SEW-EURODRIVE recommends an IT security management system in accordance with ISO/IEC 27001 and ISO/IEC 62443-2-4.

2.5 Designated use

The product is intended for control cabinet installation in electrical systems or machines.

In case of installation in electrical systems or machines, startup of the product is prohibited until it is determined that the machine meets the requirements stipulated in the local laws and directives. For Europe, Machinery Directive 2006/42/EC as well as the EMC Directive 2014/30/EU apply. Observe EN 60204-1 (Safety of machinery - electrical equipment of machines). The product meets the requirements stipulated in the Low Voltage Directive 2014/35/EU.

The standards given in the declaration of conformity apply to the product.

The systems can be mobile or stationary.

Only connect ohmic/inductive loads.

The product can be used to operate the following motors in industrial and commercial systems:

- AC asynchronous motors

Technical data and information on the connection conditions are provided on the nameplate and in chapter "Technical data" in the documentation. Always comply with the data and conditions.

Unintended or improper use of the product may result in severe injury to persons and damage to property.

2.5.1 Lifting applications

To avoid danger of fatal injury due to falling hoists, observe the following points when using the product in lifting applications:

- Use mechanical protection devices.
- Perform a hoist startup.

2.5.2 Restrictions under the European WEEE Directive 2012/19/EU

Options and accessories from SEW-EURODRIVE may only be used in combination with products from SEW-EURODRIVE.

2.5.3 Restrictions of use

The following applications are prohibited unless the device is explicitly designed for such use:

- Use in potentially explosive areas.
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, and radiation.
- Operation in applications with impermissibly high mechanical vibration and shock loads in excess of the regulations stipulated in EN 61800-5-1.
- Use at an elevation of more than 3800 m above sea level.

The product can be used at altitudes above 1000 m above sea level up to 3800 m above sea level under the following conditions:

- The reduction of the nominal output current and/or line voltage is taken into account as per chapter "Technical data" in the associated product manual.

- Above 2000 m above sea level, the air and creepage distances are only sufficient for overvoltage class II according to EN 60664. At altitudes above 2000 m above sea level, limiting measures must therefore be taken that reduce the line side overvoltage from category III to category II for the entire system.
- If a protective electrical separation (in accordance with EN 61800-5-1 and EN 60204-1) is required, then implement this outside the product at altitudes of more than 2000 m above sea level.

Observe the restrictions of use in chapter "General technical data".

2.6 Functional safety technology

The product must not perform any safety functions without a higher-level safety system unless explicitly allowed by the documentation.

2.7 Creating a safe working environment

Before you work on the product, ensure a safe working environment. Observe the following basic safety note:

2.7.1 Performing work on the product safely

Defective or damaged product

Never install defective or damaged products. Observe the following information to avoid injuries or damage:

- Before installation, check the product for external damage and replace a damaged product.

Hot surfaces

The surfaces of the product can become very hot during operation. Observe the following information to avoid burns:

- Let the product and its accessories cool down before touching it.
- Do not touch any surfaces of the product during operation, except for the control elements.
- Also observe the labels and hazard symbols on the product.

Missing protective equipment

To avoid injuries, wear the appropriate protective equipment during all work on the product:

- Wear safety gloves.
- Wear safety shoes.
- Wear protective goggles.

2.7.2 Performing electrical work safely

Observe the following information to perform electrical work safely:

Electrical work may only be performed by a qualified electrician or an electronically instructed person under the supervision of an electrician.

The fact that the operation or display elements are no longer illuminated does not indicate that the product has been disconnected from the supply system and no longer carries any voltage.

Live parts

Always adhere to the 5 safety rules for all work on electrical components:

1. Disconnect.
2. Secure the device against a restart.
3. Check that no voltage is applied.
4. Ground and short-circuit.
5. Cover or isolate neighboring live parts.

Depending on the situation, it is possible to deviate from rules 4 and 5. Observe standard EN 50110-1.

Dangerous voltage

When the system is switched on, dangerous voltages are present at all power connections as well as any cables and terminals that are connected. This is also the case even if the product is inhibited. Observe the following information to avoid the risk of electric shock:

- Do not touch any exposed live parts (e.g. male contacts, plug connectors, terminals).
- Secure all open live components with a touch guard.
- Before applying the supply voltage, make sure that all required covers are mounted.

Damage to property due to damaged or loose cables

To avoid damaging electrical components (e.g. cables and plug-in connections), observe the following information:

- Do not insert plug-in connections if cables are subjected to tensile stress.
- Do not kink cables when connecting plug-in connections.
- Replace loose or defective plug-in connections.
- Make sure that cables are not pinched or crushed.
- Do not run cables near or along a sharp edge.

2.8 Transport

Inspect the shipment for damage as soon as you receive the delivery. Inform the shipping company immediately about any damage. If the product or the packaging is damaged, do not assemble, install, connect, or start up the product. If the packaging is damaged, the product itself may also be damaged.

Observe the following notes when transporting the device:

- Ensure that the product is not subject to mechanical impact.
- Before transportation, cover the connections with the supplied protection caps.
- Only place the product on the cooling fins or on the side without connectors during transportation.
- Always use all attachment points if available. The attachment points are designed to carry only the mass of the product. Do not apply any additional loads.

If necessary, use suitable, adequately dimensioned transport aids.

Observe the notes on the climatic conditions in accordance with chapter "Technical data" in the corresponding product manual.

2.9 Installation/assembly

Ensure that the product is installed and cooled in accordance with the regulations in the documentation.

Protect the product from excessive mechanical strain. The product and its mounted components must not protrude into the path of persons or vehicles. Ensure that no components are deformed or no insulation spaces are modified, particularly during transportation. Electrical components must not be mechanically damaged or destroyed.

2.10 Electrical installation

Ensure that all of the required covers are correctly attached after the electrical installation.

Make sure that preventive measures and protection devices comply with the applicable regulations (e.g. EN 60204-1 or EN 61800-5-1).

2.10.1 Required preventive measure

Make sure that the product is correctly attached to the ground connection.

2.10.2 Stationary application

The necessary preventive measure for the product is:

Type of energy transfer	Preventive measure
Direct power supply	Ground connection

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2.11 Protective separation

The product meets all requirements for protective separation of power and electronics connections in accordance with IEC 61800-5-1. The connected signal circuits must meet requirements according to SELV (**S**afety **E**xtra **L**ow **V**oltage) or PELV (**P**rotective **E**xtra **L**ow **V**oltage) to ensure protective separation. The installation must meet the requirements for protective separation.

In order to avoid exceeding the permitted contact voltages in SELV or PELV power circuits in the event of a fault, continuous equipotential bonding is required in the vicinity of these power circuits. If this is not possible, other preventive measures must be taken. These preventive measures are described in IEC 61800-5-1.

2.12 Startup/operation

Make sure the connection boxes are closed and screwed before connecting the supply voltage.

Depending on the degree of protection, products may have live, uninsulated, and sometimes moving or rotating parts as well as hot surfaces during operation.

Additional preventive measures may be required for applications with increased hazard potential. Be sure to check the effectiveness of the protection devices after every modification.

In the event of deviations from normal operation, switch off the product. Possible deviations are increased temperatures, noise, or vibration, for example. Determine the cause. Contact SEW-EURODRIVE if necessary.

Risk of burns due to arcing: Do not disconnect power connections during operation. Do not connect power connections during operation.

When the system is switched on, dangerous voltages are present on all voltage-controlled product parts as well as any cables and terminals that are connected. This also applies even when the product is inhibited and the motor is in an idle state. Do not touch the components during operation.

If you disconnect the product from the voltage supply, do not touch any live components or power connections because capacitors might still be charged. Observe the following minimum switch-off time:

10 minutes.

Observe the corresponding information signs on the product.

The fact that the operation or display elements are no longer illuminated does not indicate that the product has been disconnected from the supply system and no longer carries any voltage.

Mechanical blocking or internal protective functions of the product can cause a motor standstill. Removing the cause of this problem or performing a reset can result in the machine or the system re-starting on its own. First, disconnect the product from the supply system before you start troubleshooting.

Risk of burns: The surface temperature of the product can exceed 60 °C during operation. Do not touch the product during operation. Let the product cool down before touching it.

2.12.1 Energy storage unit

Products with a connected energy storage unit are not necessarily de-energized when they have been disconnected from the supply system. Usually, the energy storage unit stores sufficient energy to continue operation of the connected motors for a limited period of time. It is not sufficient to observe a minimum switch-off time.

Perform a shutdown as described in the documentation in the chapter "Service" > "Shutdown".

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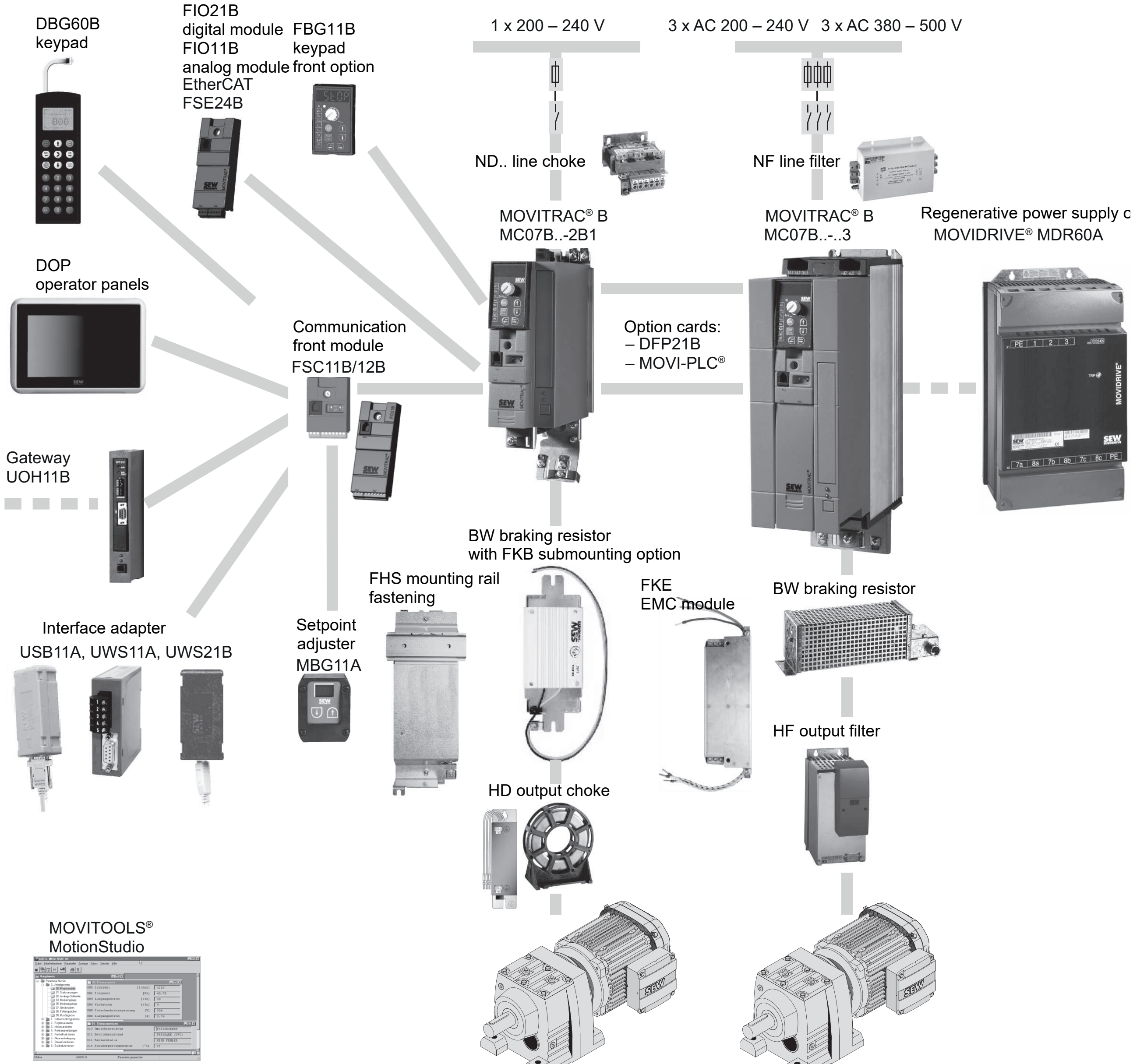
3 System description

3.1 System overview



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Line connection

- Line choke ND..
- NF line filter power connection
- HF.. output filter
- HD output choke

BW braking resistor

Front module

- FBG11B keypad
- FIO11B analog module or
- FIO21B digital module or
- FSC11B/FSC12B communication
- EtherCAT FSE24B

Option cards

- Fieldbus option DFx
- MOVI-PLC® controller installation
- FHS mounting rail fastening
- Submounting option for FKB braking resistor
- FKE EMC module

MOVITOOLS® MotionStudio software

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3.2 The units at a glance

Line connection	Motor power	Nominal output current	MOVITRAC® B type	Part number	Size
230 V 1-phase	0.25 kW	AC 1.7 A	MC07B**0003**-2B1-4-00	8284911	0XS
	0.37 kW	AC 2.5 A	MC07B**0004**-2B1-4-00	8284938	
	0.55 kW	AC 3.3 A	MC07B**0005**-2B1-4-00	8284946	0S
	0.75 kW	AC 4.2 A	MC07B**0008**-2B1-4-00	8284954	
	1.1 kW	AC 5.7 A	MC07B**0011**-2B1-4-00	8284962	0L
	1.5 kW	AC 7.3 A	MC07B**0015**-2B1-4-00	8284970	
	2.2 kW	AC 8.6 A	MC07B**0022**-2B1-4-00	8284989	
230 V 3-phase	0.25 kW	AC 1.7 A	MC07B**0003**-2A3-4-00	8284997	0XS
	0.37 kW	AC 2.5 A	MC07B**0004**-2A3-4-00	8285004	
	0.55 kW	AC 3.3 A	MC07B**0005**-2A3-4-00/S0	8285012	0S
	0.75 kW	AC 4.2 A	MC07B**0008**-2A3-4-00/S0	8280520	
	1.1 kW	AC 5.7 A	MC07B**0011**-2A3-4-00/S0	8285039	0L
	1.5 kW	AC 7.3 A	MC07B**0015**-2A3-4-00/S0	8285047	
	2.2 kW	AC 8.6 A	MC07B**0022**-2A3-4-00/S0	8285055	
	3.7 kW	AC 14.5 A	MC07B**0037**-2A3-4-00	8285063	1
	5.5 kW	AC 22 A	MC07B**0055**-2A3-4-00	8285071	2
	7.5 kW	AC 29 A	MC07B**0075**-2A3-4-00	8285098	
	11 kW	AC 42 A	MC07B**0110**-203-4-00	8285101	3
	15 kW	AC 54 A	MC07B**0150**-203-4-00	8285128	
	22 kW	AC 80 A	MC07B**0220**-203-4-00	8285136	4
	30 kW	AC 95 A	MC07B**0300**-203-4-00	8285144	
400 V 3-phase	0.25 kW	AC 1.0 A	MC07B**0003**-5A3-4-00	8285152	0XS
	0.37 kW	AC 1.6 A	MC07B**0004**-5A3-4-00	8285160	
	0.55 kW	AC 2.0 A	MC07B**0005**-5A3-4-00/S0	8285179	0S
	0.75 kW	AC 2.4 A	MC07B**0008**-5A3-4-00/S0	8285187	
	1.1 kW	AC 3.1 A	MC07B**0011**-5A3-4-00/S0	8285195	
	1.5 kW	AC 4.0 A	MC07B**0015**-5A3-4-00/S0	8285209	
	2.2 kW	AC 5.5 A	MC07B**0022**-5A3-4-00/S0	8285217	0L
	3.0 kW	AC 7.0 A	MC07B**0030**-5A3-4-00/S0	8285225	
	4.0 kW	AC 9.5 A	MC07B**0040**-5A3-4-00/S0	8285233	
	5.5 kW	AC 12.5 A	MC07B**0055**-5A3-4-00	8285241	2S
	7.5 kW	AC 16 A	MC07B**0075**-5A3-4-00	8285268	
	11 kW	AC 24 A	MC07B**0110**-5A3-4-00	8285276	2
	15 kW	AC 32 A	MC07B**0150**-503-4-00	8285284	3
	22 kW	AC 46 A	MC07B**0220**-503-4-00	8285292	
	30 kW	AC 60 A	MC07B**0300**-503-4-00	8285306	
	37 kW	AC 73 A	MC07B**0370**-503-4-00	8285314	4
	45 kW	AC 89 A	MC07B**0450**-503-4-00	8285322	
	55 kW	AC 105 A	MC07B**0550**-503-4-00	8295271	5
	75 kW	AC 130 A	MC07B**0750**-503-4-00	8295298	

3.3 Functions/features

3.3.1 Standard functions and device features

MOVITRAC® B frequency inverters are characterized by the following features.

- Large voltage range:
  - 230 V devices for the voltage range 1 × AC 200 – 240 V, 50/60 Hz
  - 230 V devices for the voltage range 3 × AC 200 – 240 V, 50/60 Hz
  - 400/500 V devices for the voltage range 3 × AC 380 – 500 V, 50/60 Hz
- Overload capacity:
  - 125% I_N continuous duty
  - 150% I_N for at least 60 s
- Nominal operation up to ambient temperature ϑ = 50 °C, operation up to ambient temperature ϑ = 60 °C possible with current reduction.
- Speed range 0 – 5500 1/min.
- Range of output frequency:
  - VFC: 0.5 – 150 Hz
  - V/f: 0 – 599 Hz
- 4-quadrant capability due to integrated brake chopper.
- Compact device design for minimum required control cabinet space and optimum use of the control cabinet volume.
- Devices with the "STO" function (safe torque off):
  - Device variant size S0: 3 × AC 380 – 500 V, 0.55 – 4.0 kW and 3 × AC 200 – 240 V, 0.55 – 2.2 kW
  - Standard device: 3 × AC 380 – 500 V, 5.5 – 75 kW
- STO (as of size 1 as standard, for size 0 only for size S0 devices) according to EN 61800-5-2
  - Performance level d according to EN ISO 13849-1
- Integrated EMC line filter for line-side compliance with the specified limit value classes/C1/C2 according to EN 61800-3:
  - Sizes 0 – 2: C2 without further measures
  - Sizes 0 – 5: C1 with corresponding filters / folding ferrites
- Parameterizable inputs/outputs:
  - 1 analog input
  - 6 digital inputs
  - 3 digital outputs, of which 1 relay output
  - Optional: An additional analog input or an additional analog output
- Integrated voltage supply and evaluation for TF (PTC temperature sensor) for temperature monitoring of the motor
- Integrated evaluation of TH for temperature monitoring of the motor
- Braking resistor with size 0 can be optionally submounted
- Separable signal terminals
- Size 0:
  - Separable power terminals and signal terminals

- EMC capacitor can be insulated for reduced leakage currents
- "Cold plate" installation possible
- Long motor cable length

Control

The following features characterize the control of the MOVITRAC® B frequency inverters:

- V/f control mode or VFC
- Automatic brake rectifier control by the inverter
- Standstill current function for:
  - Quick start
  - Heating current to prevent condensation in the motor at low temperatures
- Flying start function for connecting the inverter to the motor that is still rotating
- Hoist capability
- DC braking for deceleration of the motor in 1-quadrant operation
- Slip compensation for high stationary speed accuracy
- Motor stall prevention due to sliding current limitation in the field weakening range
- 2 complete motor parameter sets
- Factory setting can be reactivated
- Parameter lock to protect against parameter changes
- Protection functions for protection against:
  - Overcurrent
  - Ground fault
  - Overload
  - Overtemperature of the inverter
  - Overtemperature of the motor (TF/TH)
- Speed monitoring and monitoring of the motor and regenerative limit power
- 5 fault memories with all relevant operating data at the moment of the fault
- Uniform operation, identical parameter setting and the same device connection technology for the entire MOVITRAC® B device family
- Parameterizable signal range message (speed)
- Energy-saving function for automatic optimization of the magnetizing current

Setpoint technology

MOVITRAC® B frequency inverters are characterized by the following features:

- Motor potentiometer
- External setpoint specifications:
  - 0 – 10 V (unidirectional and bidirectional)
  - 0 – 20 mA
  - 4 – 20 mA
  - -10 V to +10 V bidirectional with FIO11B

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- 6 fixed setpoints
- Frequency input

Low emission

The MOVITRAC®B frequency inverters are manufactured in high quality with very low emissions. A special aspect of this are lead-free soldering materials during processing in the production of the electronic products. The lead-free soldering processes are in line with the RoHS EU Directive and the law on electronic equipment.

3.3.2 Optional communication/operation

The following options are available for communication:

- CAN-based system bus (SBus) for networking a maximum of 64 MOVITRAC® B devices
- CANopen protocol DS301 V4
- RS485 interface
- Optional operator panel for the display of setpoints and parameterization
  - 5-digit 7-segment display
  - 9 LEDs for displaying the selected symbols
  - 6 operating buttons
  - 1 setpoint adjuster for velocity control
  - Parameter set data backup
- Fieldbus interfaces:
  - PROFIBUS
  - DeviceNet™
  - CANopen
- Industrial Ethernet:
  - EtherCAT®
  - PROFINET
  - EtherNet/IP™
  - Modbus TCP

3.3.3 Energy efficiency

Various options are available to improve the energy balance:

- Process adaptation
- Energy-saving function
- DC link power with MOVITRAC® B possible from size 2S (3 × AC 400 V, 5.5 kW)
- Connection of a regenerative power supply to MOVITRAC® B possible from size 2S (3 × AC 400 V, 5.5 kW)

3.3.4 Functional safety

The following functions are available in the standard version:

- Safe Torque Off (STO) up to Performance Level (PL) d in accordance with EN ISO 13849-1 for 3 × AC 230 V/400 V devices from 0.55 to 75 kW (optionally 230 V up to 2.2 kW and 400 V up to 4 kW)
- Safety stop (SS1[1]) up to Performance Level (PL) d in accordance with EN ISO 13849-1 for 3 × AC 230 V/400 V devices from 0.55 kW to 75 kW (optionally 230 V up to 2.2 kW and 400 V up to 4 kW).

The following table shows the availability of safety technology for the individual MOVITRAC®-07B sizes.

MOVITRAC® 07B	Size	Power kW	Safety technology		
			Standard	Option	Not available
3 × AC 400 V					
0003-5A3-4-....	0XS	0.25			x
0004-5A3-4-....		0.37			x
0005-5A3-4-....	0S	0.55		x	
0008-5A3-4-....		0.75		x	
0011-5A3-4-....		1.1		x	
0015-5A3-4-....		1.5		x	
0022-5A3-4-....	0L	2.2		x	
0030-5A3-4-....		3		x	
0040-5A3-4-....		4		x	
0055-5A3-4-....	2S	5.5	x		
0075-5A3-4-....		7.5	x		
0110-5A3-4-....	2	11	x		
0150-503-4-....	3	15	x		
0220-503-4-....		22	x		
0300-503-4-....		30	x		
0370-503-4-....	4	37	x		
0450-503-4-....		45	x		
0550-503-4-....	5	55	x		
0750-503-4-....		75	x		
3 × AC 230 V					
0003-2A3-4-....	0XS	0.25			x
0004-2A3-4-....		0.37			x
0005-2A3-4-....	0S	0.55		x	
0008-2A3-4-....		0.75		x	
0011-2A3-4-....	0L	1.1		x	
0015-2A3-4-....		1.5		x	
0022-2A3-4-....		2.2		x	
0037-2A3-4-....	1	3.7	x		
0055-2A3-4-....	2	5.5	x		
0075-2A3-4-....		7.5	x		
0110-203-4-....	3	11	x		
0150-203-4-....		15	x		
0220-203-4-....	4	22	x		
0300-203-4-....		30	x		
1 × AC 230 V Safety technology is not available.					

1) An external connection is required for SS1.

Sizes 0S and 0L with "STO – Safe Torque Off": 3 × AC 380 – 500 V, 50/60 Hz

MC07B... type motor 3 × AC 380 – 500 V	Standard design (...-S0)	Technology version (...-S0/T)	Recommended max. motor power kW	Nominal output current AC A	Size
	Part number	Part number			
0005-5A3-4-...[1]	8289956	[2]	0.55	2.0	0S
0008-5A3-4-...[1]	8289964		0.75	2.4	
0011-5A3-4-...[1]	8289972		1.1	3.1	
0015-5A3-4-...[1]	8289980		1.5	4.0	
0022-5A3-4-...[1]	8289999		2.2	5.5	0L
0030-5A3-4-...[1]	8290008		3.0	7.0	
0040-5A3-4-...[1]	829 001 6		4.0 / 5.0	9.5	

1) With integrated line filter, category C2 is maintained on the input end as standard.
2) Without part number. Can only be ordered via the configurator.

Sizes 0S and 0L with "STO – Safe Torque Off": 3 × AC 230 V, 50/60 Hz

MC07B... type motor 3 × AC 230 V	Standard design (...-S0)	Technology version (...-S0/T)	Recommended max. motor power kW	Nominal output current AC A	Size
	Part number	Part number			
0005-2A3-4-...[1]	8299870	[2]	0.55	3.3	0S
0008-2A3-4-...[1]	8299889		0.75	4.2	
0011-2A3-4-...[1]	8299897		1.1	5.7	0L
0015-2A3-4-...[1]	8299900		1.5	7.3	
0022-2A3-4-...[1]	8299919		2.2	8.6	

1) With integrated line filter, category C2 is maintained on the input end as standard.
2) Without part number. Can only be ordered via the configurator.

3.3.5 Additional functions, technology version

The "Simple positioning" software module is available as a technology function, see chapter "Application modules" (→ 🗎 23).

3.3.6 Application modules

The software modules are part of the MOVITOOLS® MotionStudio software and can be used with MOVITRAC® B in the technology version (...-0T). Application manuals can also be downloaded as PDF files from the SEW-EURODRIVE website.

At present, only the "simple positioning" application module is available as a technology function.

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3.4 MOVITOOLS® MotionStudio engineering software

3.4.1 Tasks

The software package enables you to perform the following tasks with consistency:

- Establishing communication with devices
- Executing functions of the devices

3.4.2 Establishing communication with the units

The SEW communication server is integrated in the software package MOVITOOLS® MotionStudio to set up communication with the devices.

The SEW Communication Server allows you to create communication channels. Once the channels are established, the devices communicate via these communication channels using their communication options. You can operate up to 4 communication channels at the same time.

MOVITOOLS® MotionStudio supports the following types of communication channels:

- Serial (RS485) via interface adapters
- System bus (SBus) via interface adapter
- Ethernet
- EtherCAT®
- Fieldbus (PROFIBUS DP/DP-V1)
- Tool Calling Interface

The available channels can vary depending on the device and its communication options.

3.4.3 Executing functions with the units

The software package offers you consistency when performing the following functions:

- Parameterization (e.g. in the parameter tree of the device)
- Startup
- Visualization and diagnostics
- Programming

The following basic components are integrated into the MOVITOOLS® MotionStudio software package, allowing you to use the devices to execute functions:

- MOVITOOLS® MotionStudio
- MOVITOOLS®

All functions correspond with tools. MOVITOOLS® MotionStudio offers the right tools for every device type.

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3.4.4 Technical support

SEW-EURODRIVE offers you a 24h Hotline Service.

Dial the area code (+49) 0800 - and enter the letter combination SEWHELP on your telephone keypad. You can also call (+49) 0800 - 7 39 43 57.

3.4.5 Online help

The following types of help are available to you after installation:

- This documentation is displayed in a help window after starting the software.

  To prevent the help window from being displayed at startup, deactivate the "Display" check box in the [Settings]/[Options]/[Help] menu item.

  If you want the help window to be displayed again, activate the "Display" check box in the [Settings]/[Options]/[Help] menu item.
- Context-sensitive help is available for the fields which require you to enter values. For example, pressing the <F1> key displays the range of values of the device parameters.

3.4.6 SCOPE

SCOPE for MOVITOOLS® MotionStudio is an oscilloscope program for SEW-EURODRIVE inverters. You can carry out drive optimizations independently with SCOPE. For example, the inverter records response functions to setpoint jumps in real time. You can transfer this information to the computer and display it graphically there. SCOPE displays up to 8 analog and digital measured variables in color-differentiated curve profiles. You can stretch and compress both the abscissa and the ordinate as required.

SCOPE also offers the option of recording digital input and output signals from the inverter. This allows you to record complete program sequences of the higher-level controller and then analyze them.

SCOPE supports easy documentation of the set parameters and the recorded measurement data:

- Save
- Meta data
- Print

The online help functions make it easy for you to get started with SCOPE.

SCOPE is a multi-document interface (MDI application). This allows you to view and analyze multiple data sets at the same time. SCOPE displays each new data set in a new window. All settings for viewing and editing the data set take effect in the active window only.

4 Technical data

4.1 Technical data of the basic unit

4.1.1 Marks

The following table shows an example of the markings on the nameplate.

Mark	Definition
	The CE mark states compliance with the following European directives: • Low Voltage Directive 2014/35/EU • EMC Directive 2014/30/EU • Machinery Directive 2006/42/EC • Directive 2011/65/EU for limiting the use of certain hazardous substances in electrical and electronic equipment
	The UL and cUL mark indicates UL approval. cUL is equally eligible for approval by the CSA.
	The EAC mark indicates compliance with the requirements of the technical regulations of the Customs Union (Eurasian Economic Union), Armenia, Belarus, Kazakhstan, Kyrgyzstan, and Russia.
	The RCM mark indicates compliance with the technical regulations of the Australian Communications and Media Authority (ACMA).

4.1.2 General technical data

The following technical data applies to all MOVITRAC® B frequency inverters independent of size and power.

MOVITRAC® B	All sizes
Interference immunity	Complies with EN 61800-3
Interference emission with EMC-compliant installation (line-side)	According to limit value class[1)] • Sizes 0 – 2: C2 without further measures • Sizes 0 – 5: C1 with corresponding filters / folding ferrites C1/C2 according to EN 61800-3
Leakage current	> 3.5 mA

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MOVITRAC® B	All sizes
Ambient temperature ϑ_A (up to 60 °C with current reduction)	• **230 V, 0.25 – 2.2 kW / 400/500 V, 0.25 – 4.0 kW** **With overload capacity** (max. 150% I_N for 60 s): I_D = 100% I_N / f_{PWM} = 4 kHz: -10 °C to +40 °C **Without overload capacity:** I_D = 100% I_N / f_{PWM} = 4 kHz: -10 °C to +50 °C I_D = 100% I_N / f_{PWM} = 8 kHz: -10 °C to +40 °C I_D = 125% I_N / f_{PWM} = 4 kHz: -10 °C to +40 °C • **3 × 230 V, 3.7 – 30 kW / 400/500 V, 5.5 – 75 kW** **With overload capacity** (max. 150% I_N for 60 s): I_D = 100% I_N / f_{PWM} = 4 kHz: 0 °C to +40 °C **Without overload capacity:** I_D = 100% I_N / f_{PWM} = 4 kHz: 0 °C to +50 °C I_D = 100% I_N / f_{PWM} = 8 kHz: 0 °C to +40 °C I_D = 125% I_N / f_{PWM} = 4 kHz: 0 °C to +40 °C • Mounting plate with **"Cold plate"** < 70 °C
Ambient temperature derating (current reduction)	2.5% I_N per K at 40 °C to 50 °C 3% I_N per K at 50 °C to 60 °C
Climate class	EN 60721-3-3, class 3K3
Storage temperature Transport temperature	-25 °C to +75 °C -25 °C to +75 °C
Type of cooling	Self-cooled: 230 V: ≤ 0.75 kW 400/500 V: ≤ 1.1 kW Externally cooled: 230 V: ≥ 1.1 kW 400/500 V: ≥ 1.5 kW (temperature-controlled fan, response threshold 45 °C)
Degree of protection EN 60529 (NEMA 1)	Sizes 0 – 2: IP20 Size 3: Status fields 2 and 5 of the power section nameplate do not have any entries: • IP10 without touch guard • IP20 with touch guard Status fields 2 and 5 of the power section nameplate have entries: • IP20 (power connections) with connected cable and installed heat shrink tubing (not included in the delivery) or with the delivered protection caps Size 4 – 5 power connections: • IP00 • With the supplied Plexiglas cover and heat shrink tubing fitted (not supplied): IP10
Duty type	Continuous duty

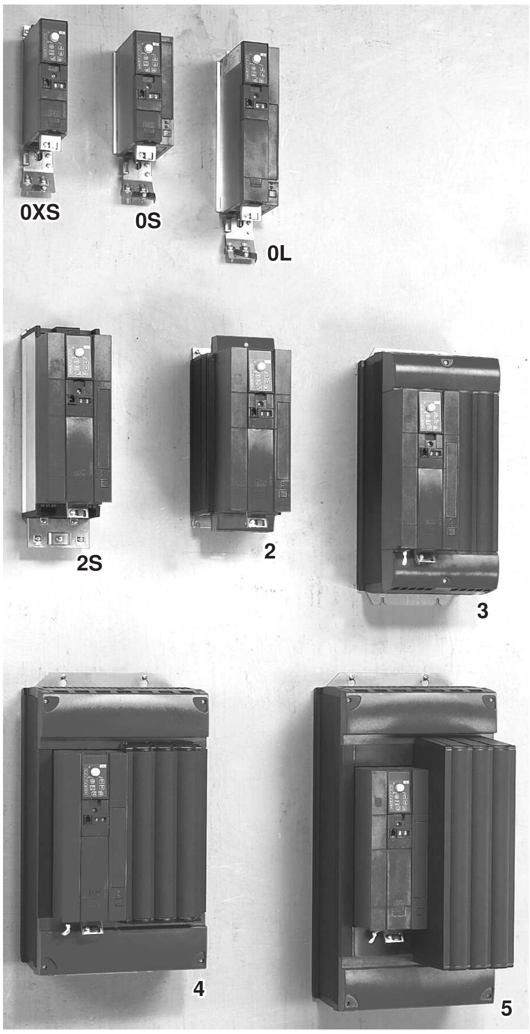
MOVITRAC® B	All sizes
Overvoltage category	III according to IEC 60664-1 (VDE 0110-1)
Line voltage tolerance	EN 50160: ±10%
Pollution class	2 according to IEC 60664-1 (VDE 0110-1)
Protection against mechanically active substances	EN60721-3-3, 3S1
Protection against chemically active substances	EN60721-3-3, 3C2
Installation altitude	Up to h ≤ 1000 m without restrictions. The following restrictions apply to altitudes ≥ 1000 m: • From 1000 m to max. 4000 m: – I_N reduction by 1% per 100 m • From 2000 m to max. 4000 m: – Protective separation of power and electronic connections is no longer guaranteed above 2000 m. This requires external measures (IEC 60664-1 / EN 61800-5-1) – You have to connect an overvoltage protection device in order to reduce the overvoltages from category III to category II.
Dimensioning	According to DIN ISO 276-v
Size 0: Restrictions for continuous duty with 125% I_N	• Maximum ambient temperature ϑ_A: 40 °C • No mounting rail installation/submounting resistance • With 1 × 230 V: Provide line choke ND..

1) Electrical installation in compliance with applicable regulations is necessary for maintaining the EMC limit value class. Observe the installation notes.

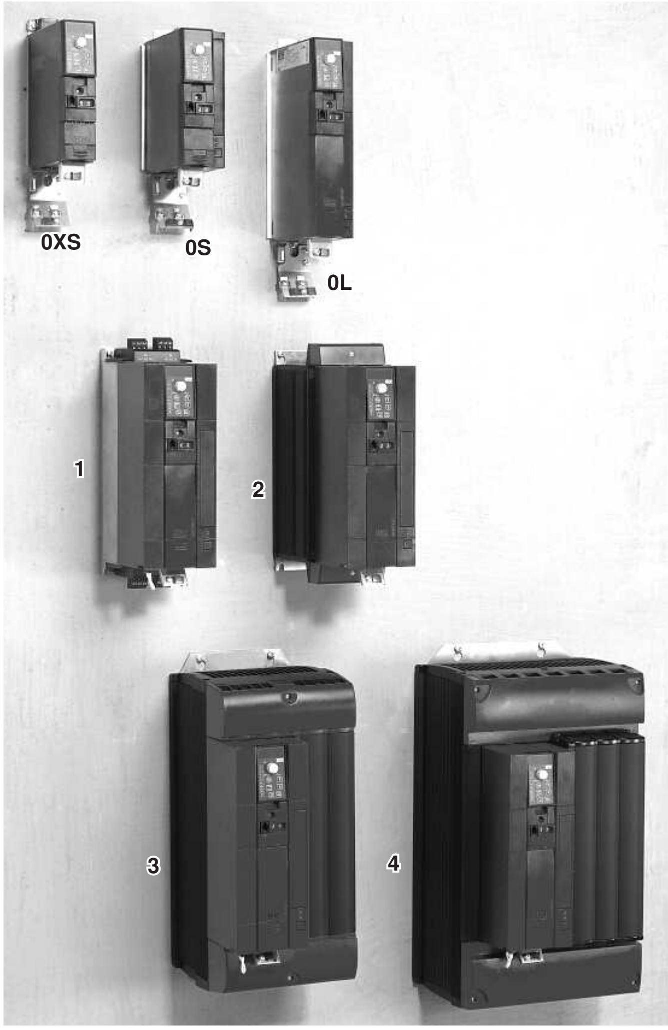
4.1.3 Technical data of MOVITRAC® B, 3 × AC 400 V

Overview of MOVITRAC® B

400 / 500 V



230 V



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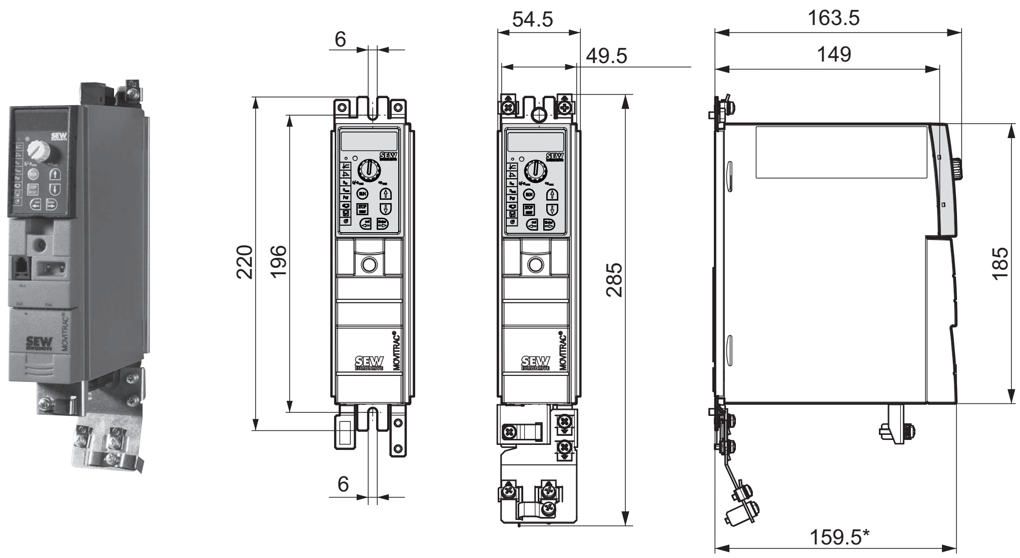
400/500 V / 3-phase line connection								
Size	**0XS**	**0S**	**0L**	**2S**	**2**	**3**	**4**	**5**
Power kW	0.25 0.37	0.55 0.75 1.1 1.5	2.2 3.0 4.0	5.5 7.5	11	15 22 30	37 45	55 75

AC 400/500 V / 3-phase / size 0XS / 0.25 / 0.37 kW

All dimensions are in mm.



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MOVITRAC® MC07B (3-phase supply system)		0003-5A3-4-00	0004-5A3-4-00
Part number (without "Safe Torque Off")		**8285152**	**8285160**
INPUT[1]			
Nominal line voltage	V_{line}	3 × AC 380 – 500 V	
Nominal line frequency	f_{line}	50/60 Hz ±5%	
Nominal line current (at V_{line} = 3 × AC 400 V)	I_{line}	AC 0.9 A	AC 1.4 A
	$I_{line\ 125}$	AC 1.1 A	AC 1.8 A
OUTPUT			
Output voltage	V_A	3 × 0 – V_{line}	
Recommended motor power for 100% operation	P_{Mot}	0.25 kW	0.37 kW
Recommended motor power for 125% operation	$P_{Mot\ 125}$	0.37 kW	0.55 kW
Nominal output current for 100% operation	I_N	AC 1.0 A	AC 1.6 A
Nominal output current for 125% operation	$I_{N\ 125}$	AC 1.3 A	AC 2.0 A
Apparent output power for 100% operation	S_N	0.7 kVA	1.1 kVA
Apparent output power for 125% operation	$S_{N\ 125}$	0.9 kVA	1.4 kVA
Max. output frequency	f_{max}	599 Hz	
Minimum permitted braking resistance value (4-quadrant operation)	R_{BW_min}	68 Ω	
GENERAL			
Power loss for 100% operation	P_V	30 W	35 W
Power loss for 125% operation	$P_{V\ 125}$	35 W	40 W
Type of cooling/cooling air requirement		Natural convection/ –	
Current limiting		150% I_N for at least 60 seconds	
Device terminal cross section/tightening torque	Terminals	4 mm²/0.6 Nm	
Dimensions	W × H × D	54.5 mm × 185 mm × 163.5 mm	
Mass	m	1.3 kg	

1) The system and output currents must be reduced by 20% from the nominal values for V line = 3 × 500 V.

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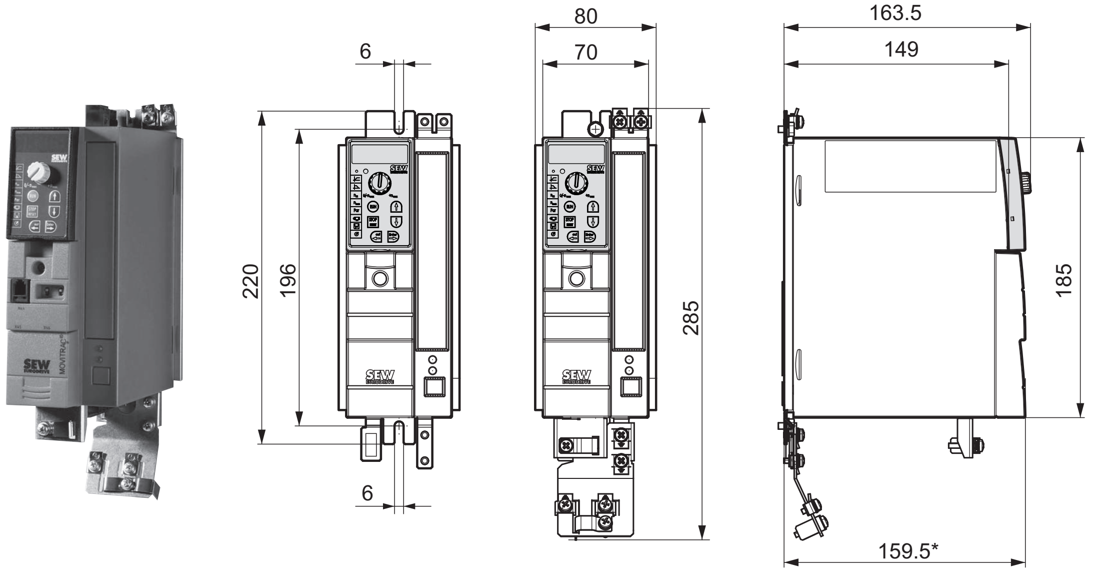
AC 400 / 500 V / 3-phase / size 0S / 0.55 / 0.75 / 1.1 / 1.5 kW

All dimensions are in mm.



MOVITRAC® MC07B (3-phase supply system)		0005-5A3-4-x0	0008-5A3-4-x0	0011-5A3-4-x0	0015-5A3-4-x0
Part number of standard device (-00) Part number of "Safe Torque Off" (-S0[1])		8285179 8289956	8285187 8289964	8285195 8289972	8285209 8289980
INPUT[2]					
Nominal line voltage	V_{line}	3 × AC 380 – 500 V			
Nominal line frequency	f_{line}	50/60 Hz ±5%			
Nominal line current (at V_{line} = 3 × AC 400 V)	I_{line}	AC 1.8 A	AC 2.2 A	AC 2.8 A	AC 3.6 A
	$I_{line\ 125}$	AC 2.3 A	AC 2.6 A	AC 3.5 A	AC 4.5 A
OUTPUT					
Output voltage	V_A	3 × 0 – V_{line}			
Recommended motor power for 100% operation	P_{Mot}	0.55 kW	0.75 kW	1.1 kW	1.5 kW
Recommended motor power for 125% operation	$P_{Mot\ 125}$	0.75 kW	1.1 kW	1.5 kW	2.2 kW
Nominal output current for 100% operation	I_N	AC 2.0 A	AC 2.4 A	AC 3.1 A	AC 4.0 A
Nominal output current for 125% operation	$I_{N\ 125}$	AC 2.5 A	AC 3.0 A	AC 3.9 A	AC 5.0 A
Apparent output power for 100% operation	S_N	1.4 kVA	1.7 kVA	2.1 kVA	2.8 kVA
Apparent output power for 125% operation	$S_{N\ 125}$	1.7 kVA	2.1 kVA	2.7 kVA	3.5 kVA
Max. output frequency	f_{max}	599 Hz			
Minimum permitted braking resistance value (4-quadrant operation)	R_{BW_min}	68 Ω			
GENERAL					
Power loss for 100% operation	P_V	40 W	45 W	50 W	60 W
Power loss for 125% operation	$P_{V\ 125}$	45 W	50 W	60 W	75 W
Type of cooling/cooling air requirement		Natural convection			Forced air cooling/ 12 m^3/h
Current limiting		150% I_N for at least 60 seconds			
Device terminal cross section/tightening torque	Terminals	4 mm^2/0.6 Nm			
Dimensions	W × H × D	80 mm × 185 mm × 163.5 mm			
Mass	m	1.5 kg			

1) The MC07B...-S0 device type must always be supplied by an external DC 24 V power supply unit.

2) The system and output currents must be reduced by 20% from the nominal values for V line = 3 × 500 V.

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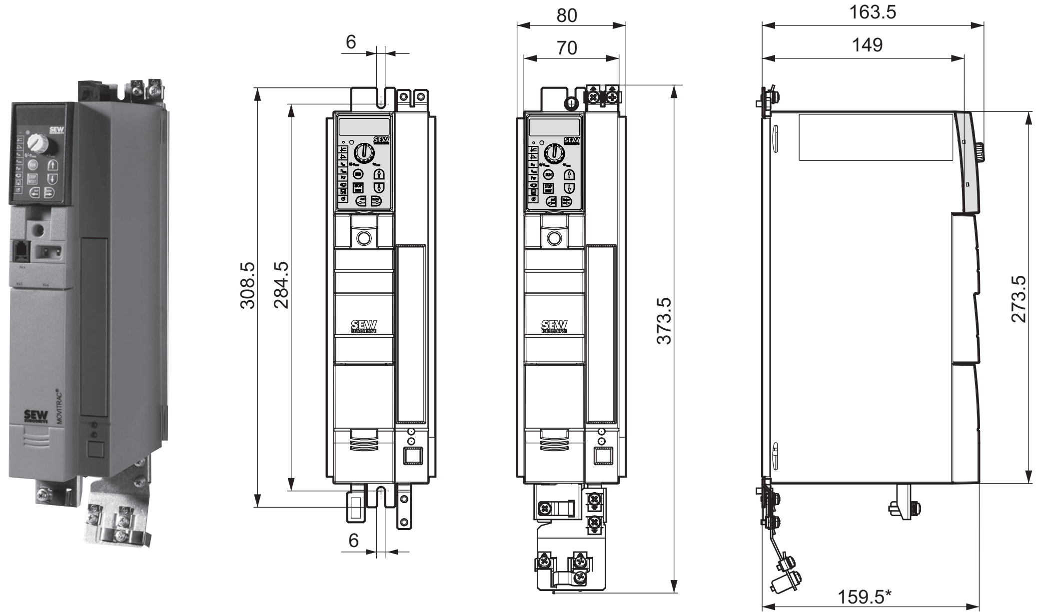
AC 400/500 V / 3-phase / size 0L / 2.2 / 3.0 / 4.0 kW

All dimensions are in mm.



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MOVITRAC® MC07B (3-phase supply system)		0022-5A3-4-x0	0030-5A3-4-x0	0040-5A3-4-x0
Part number of standard device (-00) **Part number of "Safe Torque Off" (-S0[1])**		**8285217** **8289999**	**8285225** **8290008**	**8285233** **8290016**
INPUT[2]				
Nominal line voltage	V_{line}	3 × AC 380 – 500 V		
Nominal line frequency	f_{line}	50/60 Hz ±5%		
Nominal line current (at V_{line} = 3 × AC 400 V)	I_{line}	AC 5.0 A	AC 6.3 A	AC 8.6 A
	$I_{line\ 125}$	AC 6.2 A	AC 7.9 A	AC 10.7 A
OUTPUT				
Output voltage	V_A	3 × 0 – V_{line}		
Recommended motor power for 100% operation	P_{Mot}	2.2 kW	3.0 kW	4.0 kW
Recommended motor power for 125% operation	$P_{Mot\ 125}$	3.0 kW	4.0 kW	5.5 kW
Nominal output current for 100% operation	I_N	AC 5.5 A	AC 7.0 A	AC 9.5 A
Nominal output current for 125% operation	$I_{N\ 125}$	AC 6.9 A	AC 8.8 A	AC 11.9 A
Apparent output power for 100% operation	S_N	3.8 kVA	4.8 kVA	6.6 kVA
Apparent output power for 125% operation	$S_{N\ 125}$	4.8 kVA	6.1 kVA	8.2 kVA
Max. output frequency	f_{max}	599 Hz		
Minimum permitted braking resistance value (4-quadrant operation)	R_{BW_min}	68 Ω		
GENERAL				
Power loss for 100% operation	P_V	80 W	95 W	125 W
Power loss for 125% operation	$P_{V\ 125}$	95 W	120 W	180 W
Type of cooling/cooling air requirement		Natural convection		Forced air cooling/ 18 m^3/h
Current limiting		150% I_N for at least 60 seconds		
Device terminal cross section/tightening torque	Terminals	4 mm^2/0.6 Nm		
Dimensions	W × H × D	80 mm × 273.5 mm × 163.5 mm		
Mass	m			

1) The MC07B...-S0 device type must always be supplied by an external DC 24 V power supply unit.

2) The system and output currents must be reduced by 20% from the nominal values for V line = 3 × 500 V.

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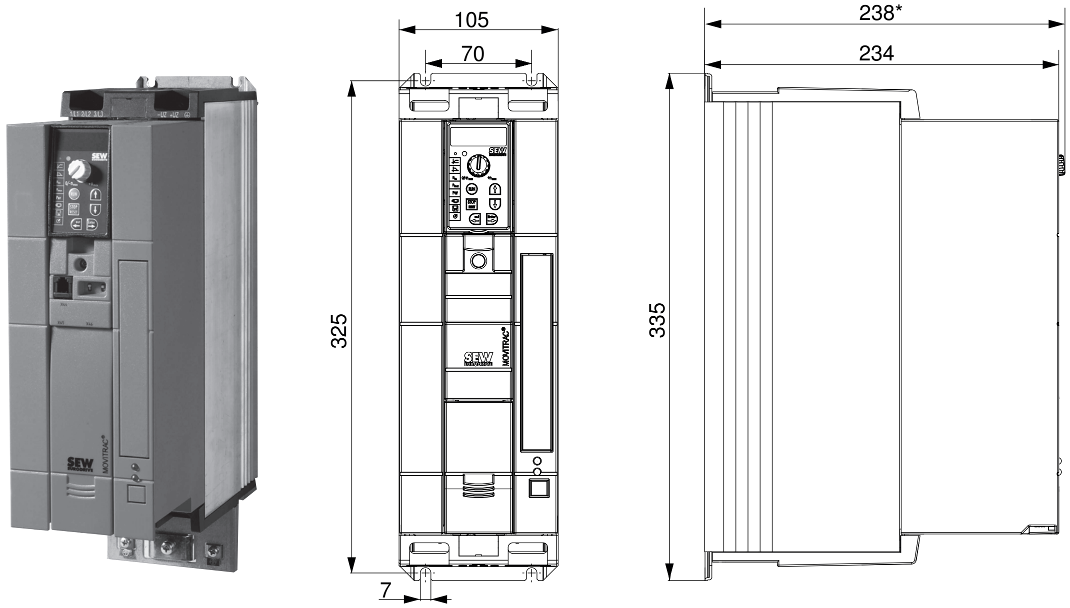
AC 400/500 V / 3-phase / size 2S / 5.5 / 7.5 kW



MOVITRAC® MC07B (3-phase supply system)		0055-5A3-4-00	0075-5A3-4-00
Part number ("Safe Torque Off" integrated)		**8285241**	**8285268**
INPUT[1)]			
Nominal line voltage	V_{line}	3 × AC 380 – 500 V	
Nominal line frequency	f_{line}	50/60 Hz ±5%	
Nominal line current (at V_{line} = 3 × AC 400 V)	I_{line}	AC 11.3 A	AC 14.4 A
	$I_{line\ 125}$	AC 14.1 A	AC 18.0 A
OUTPUT			
Output voltage	V_A	3 × 0 – V_{line}	
Recommended motor power for 100% operation	P_{Mot}	5.5 kW	7.5 kW
Recommended motor power for 125% operation	$P_{Mot\ 125}$	7.5 kW	11 kW
Nominal output current for 100% operation	I_N	AC 12.5 A	AC 16 A
Nominal output current for 125% operation	$I_{N\ 125}$	AC 15.6 A	AC 20 A
Apparent output power for 100% operation	S_N	8.7 kVA	11.1 kVA
Apparent output power for 125% operation	$S_{N\ 125}$	10.8 kVA	13.9 kVA
Max. output frequency	f_{max}	599 Hz	
Minimum permitted braking resistance value (4-quadrant operation)	R_{BW_min}	47 Ω	
GENERAL			
Power loss for 100% operation	P_V	180 W	230 W
Power loss for 125% operation	$P_{V\ 125}$	220 W	280 W
Current limiting		150% I_N for at least 60 seconds	
Type of cooling/cooling air requirement		Forced air cooling/80 m^3/h	
Device terminal cross section/tightening torque	Terminals	4 mm^2/0.6 Nm	
Dimensions	W × H × D	105 mm × 335 mm × 238 mm	
Mass	m		

1) The system and output currents must be reduced by 20% from the nominal values for V line = 3 × 500 V.

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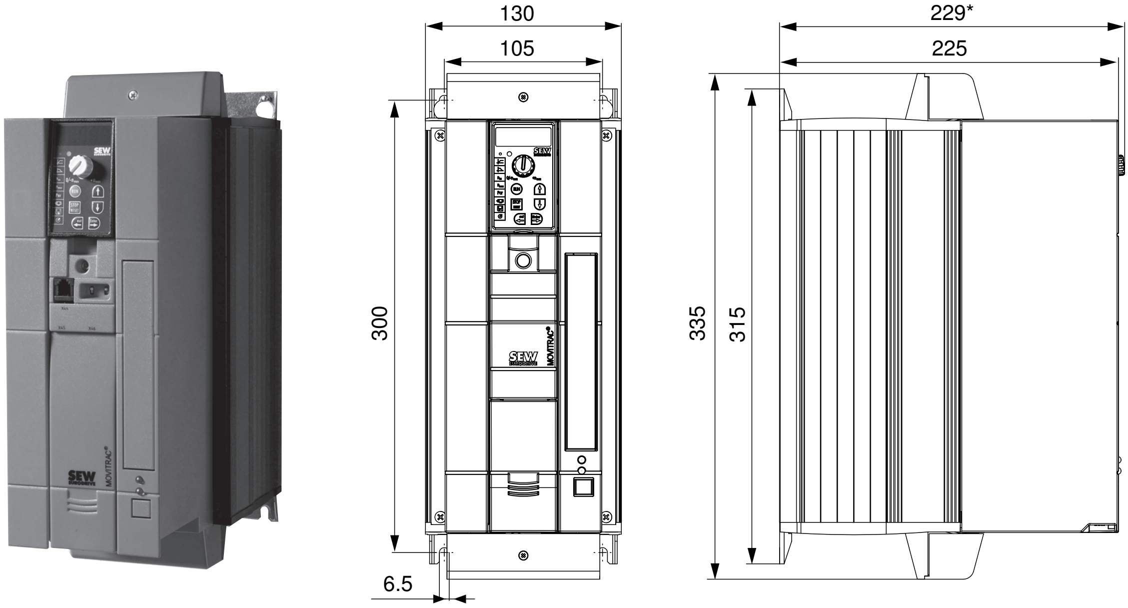
AC 400/500 V / 3-phase / size 2 / 11 kW



MOVITRAC® MC07B (3-phase supply system)		0110-5A3-4-00
Part number ("Safe Torque Off" integrated)		**8285276**
INPUT[1)]		
Nominal line voltage	V_{line}	3 × AC 380 – 500 V
Nominal line frequency	f_{line}	50/60 Hz ±5%
Nominal line current (at V_{line} = 3 × AC 400 V)	I_{line}	AC 21.6 A
	$I_{line\ 125}$	AC 27.0 A
OUTPUT		
Output voltage	V_A	3 × 0 – V_{line}
Recommended motor power for 100% operation	P_{Mot}	11 kW
Recommended motor power for 125% operation	$P_{Mot\ 125}$	15 kW
Nominal output current for 100% operation	I_N	AC 24 A
Nominal output current for 125% operation	$I_{N\ 125}$	AC 30 A
Apparent output power for 100% operation	S_N	16.6 kVA
Apparent output power for 125% operation	$S_{N\ 125}$	20.8 kVA
Max. output frequency	f_{max}	599 Hz
Minimum permitted braking resistance value (4-quadrant operation)	R_{BW_min}	22 Ω
GENERAL		
Power loss for 100% operation	P_V	400 W
Power loss for 125% operation	$P_{V\ 125}$	500 W
Type of cooling/cooling air requirement		Forced air cooling/80 m^3/h
Current limiting		150% I_N for at least 60 seconds
Device terminal cross section / tightening torque	Terminals	4 mm^2/0.6 Nm 6 mm^2/1.5 Nm
Dimensions	W × H × D	130 mm × 335 mm × 229 mm
Mass	m	

1) The system and output currents must be reduced by 20% from the nominal values for V line = 3 × 500 V.

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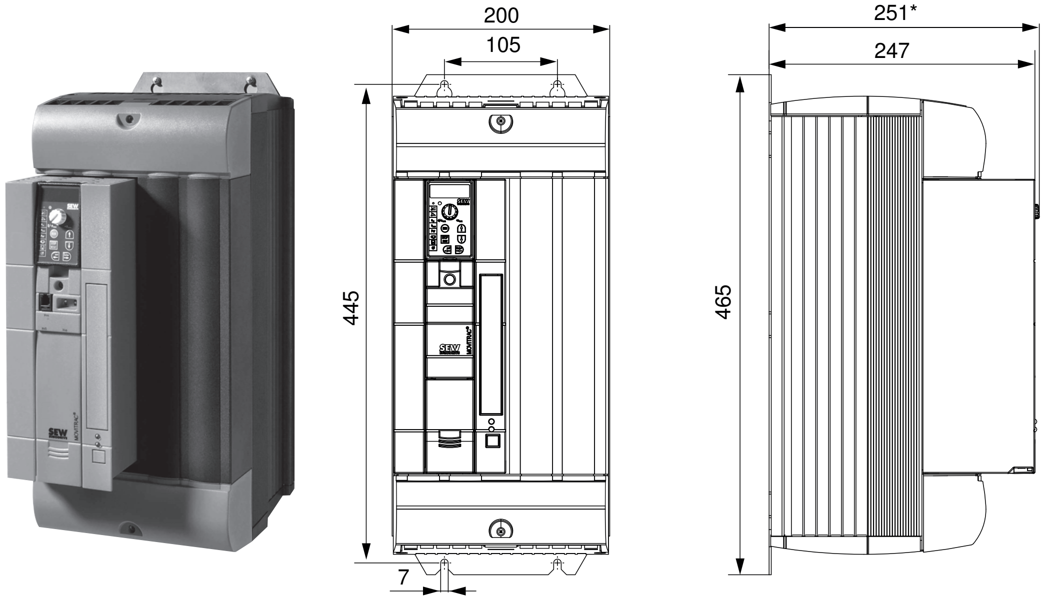
AC 400/500 V / 3-phase / size 3 / 15 / 22 / 30 kW



MOVITRAC® MC07B (3-phase supply system)		0150-503-4-00	0220-503-4-00	0300-503-4-00
Part number ("Safe Torque Off" integrated)		**8285284**	**8285292**	**8285306**
INPUT[1)]				
Nominal line voltage	V_{line}	3 × AC 380 – 500 V		
Nominal line frequency	f_{line}	50/60 Hz ±5%		
Nominal line current (at V_{line} = 3 × AC 400 V)	I_{line}	AC 28.8 A	AC 41.4 A	AC 54.0 A
	$I_{line\ 125}$	AC 36.0 A	AC 51.7 A	AC 67.5 A
OUTPUT				
Output voltage	V_A	3 × 0 – V_{line}		
Recommended motor power for 100% operation	P_{Mot}	15 kW	22 kW	30 kW
Recommended motor power for 125% operation	$P_{Mot\ 125}$	22 kW	30 kW	37 kW
Nominal output current for 100% operation	I_N	AC 32 A	AC 46 A	AC 60 A
Nominal output current for 125% operation	$I_{N\ 125}$	AC 40 A	AC 57.5 A	AC 75 A
Apparent output power for 100% operation	S_N	22.2 kVA	31.9 kVA	41.6 kVA
Apparent output power for 125% operation	$S_{N\ 125}$	27.7 kVA	39.8 kVA	52.0 kVA
Max. output frequency	f_{max}	599 Hz		
Minimum permitted braking resistance value (4-quadrant operation)	R_{BW_min}	15 Ω	12 Ω	
GENERAL				
Power loss for 100% operation	P_V	550 W	750 W	950 W
Power loss for 125% operation	$P_{V\ 125}$	690 W	940 W	1250 W
Type of cooling / cooling air requirement		Forced air cooling/180 m^3/h		
Current limiting		150% I_N for at least 60 seconds		
Device terminal cross section/tightening torque	Terminals	Status fields 2 and 5 of the power section nameplate do not have any entries: 25 mm^2 Status fields 2 and 5 of the power section nameplate have entries: M6 bolt with nut, max. 25 mm^2, crimp cable lug DIN 46235		
		3.5 Nm		
Dimensions	W × H × D	200 mm × 465 mm × 251 mm		
Mass	m			

1) The system and output currents must be reduced by 20% from the nominal values for V line = 3 × 500 V.

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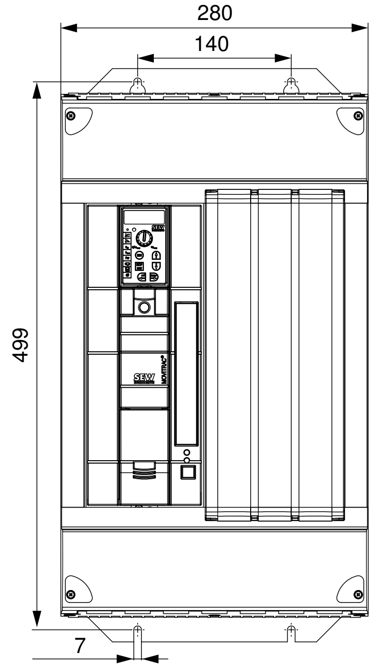
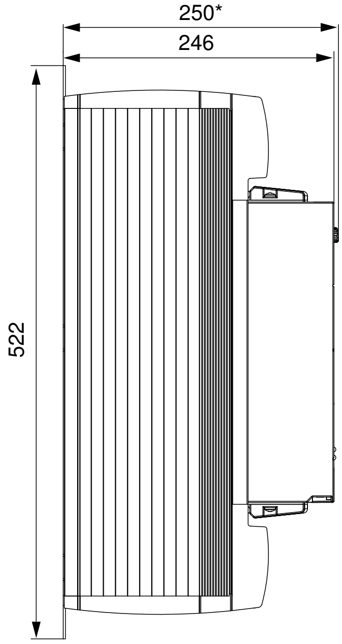
AC 400/500 V / 3-phase / size 4 / 37 / 45 kW

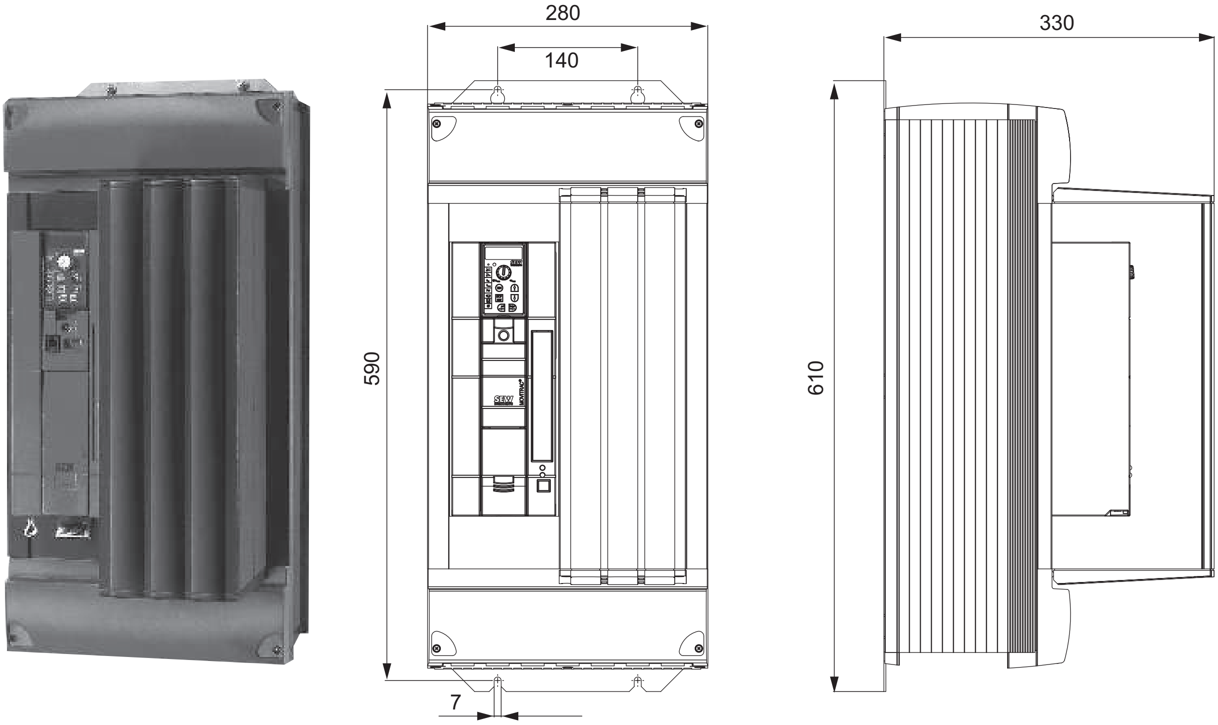




MOVITRAC® MC07B (3-phase supply system)		**0370-503-4-00**	**0450-503-4-00**
Part number ("Safe Torque Off" integrated)		**8285314**	**8285322**
INPUT[1)]			
Nominal line voltage	V_{line}	3 × AC 380 – 500 V	
Nominal line frequency	f_{line}	50/60 Hz ±5%	
Nominal line current (at V_{line} = 3 × AC 400 V)	I_{line}	AC 65.7 A	AC 80.1 A
	$I_{line\ 125}$	AC 81.9 A	AC 100.1 A
OUTPUT			
Output voltage	V_A	3 × 0 – V_{line}	
Recommended motor power for 100% operation	P_{Mot}	37 kW	45 kW
Recommended motor power for 125% operation	$P_{Mot\ 125}$	45 kW	55 kW
Nominal output current for 100% operation	I_N	AC 73 A	AC 89 A
Nominal output current for 125% operation	$I_{N\ 125}$	AC 91.3 A	AC 111.3 A
Apparent output power for 100% operation	S_N	50.6 kVA	61.7 kVA
Apparent output power for 125% operation	$S_{N\ 125}$	63.2 kVA	77.1 kVA
Max. output frequency	f_{max}	599 Hz	
Minimum permitted braking resistance value (4-quadrant operation)	R_{BW_min}	6 Ω	
GENERAL			
Power loss for 100% operation	P_V	1200 W	1400 W
Power loss for 125% operation	$P_{V\ 125}$	1450 W	1820 W
Type of cooling/cooling air requirement		Forced air cooling/180 m^3/h	
Current limiting		150% I_N for at least 60 seconds	
Device terminal cross section/tightening torque	Terminals	70 mm^2	
		14 Nm	
Dimensions	W × H × D	280 mm × 522 mm × 250 mm	
Mass	m		

1) The system and output currents must be reduced by 20% from the nominal values for V line = 3 × 500 V.

AC 400/500 V / 3-phase / size 5 / 55 / 75 kW



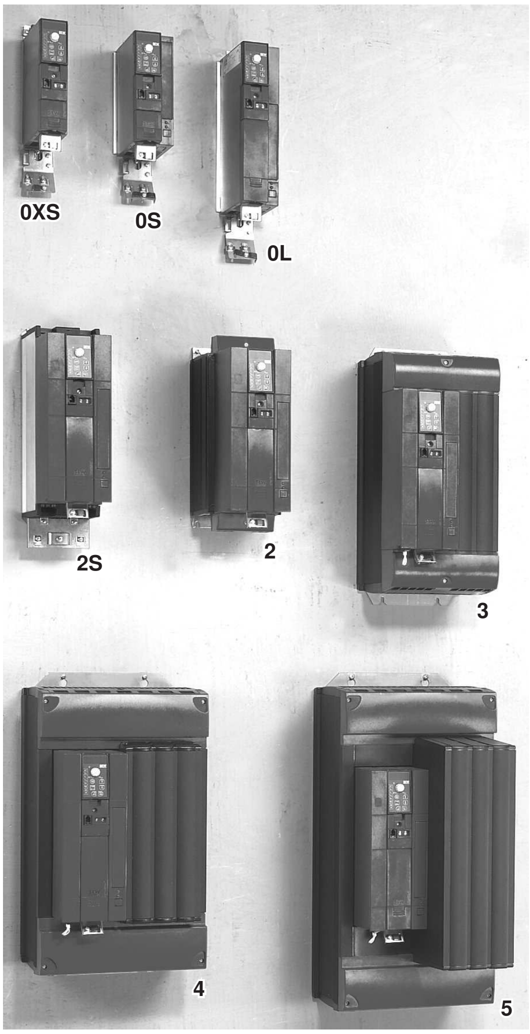
MOVITRAC® MC07B (3-phase supply system)		0550-503-4-00	0750-503-4-00
Part number ("Safe Torque Off" integrated)		**8295271**	**8295298**
INPUT[1)]			
Nominal line voltage	V_{line}	3 × AC 380 – 500 V	
Nominal line frequency	f_{line}	50 / 60 Hz ±5%	
Nominal line current (at V_{line} = 3 × AC 400 V)	I_{line}	AC 94.5 A	AC 117 A
	$I_{line\ 125}$	AC 118.1 A	AC 146.3 A
OUTPUT			
Output voltage	V_A	3 × 0 – V_{line}	
Recommended motor power for 100% operation	P_{Mot}	55 kW	75 kW
Recommended motor power for 125% operation	$P_{Mot\ 125}$	75 kW	90 kW
Nominal output current for 100% operation	I_N	AC 105 A	AC 130 A
Nominal output current for 125% operation	$I_{N\ 125}$	AC 131 A	AC 162 A
Apparent output power for 100% operation	S_N	73.5 kVA	91.0 kVA
Apparent output power for 125% operation	$S_{N\ 125}$	90.8 kVA	112.2 kVA
Max. output frequency	f_{max}	599 Hz	
Minimum permitted braking resistance value (4-quadrant operation)	R_{BW_min}	6 Ω	4 Ω
GENERAL			
Power loss for 100% operation	P_V	1700 W	2000 W
Power loss for 125% operation	$P_{V\ 125}$	2020 W	2300 W
Type of cooling/cooling air requirement		Forced air cooling/360 m^3/h	
Current limiting		150% I_N for at least 60 seconds	
Device terminal cross section/tightening torque	Terminals	70 mm^2	
		14 Nm	
Dimensions	W × H × D	280 mm × 610 mm × 330 mm	
Mass	m		

1) The system and output currents must be reduced by 20% from the nominal values for V line = 3 × 500 V.

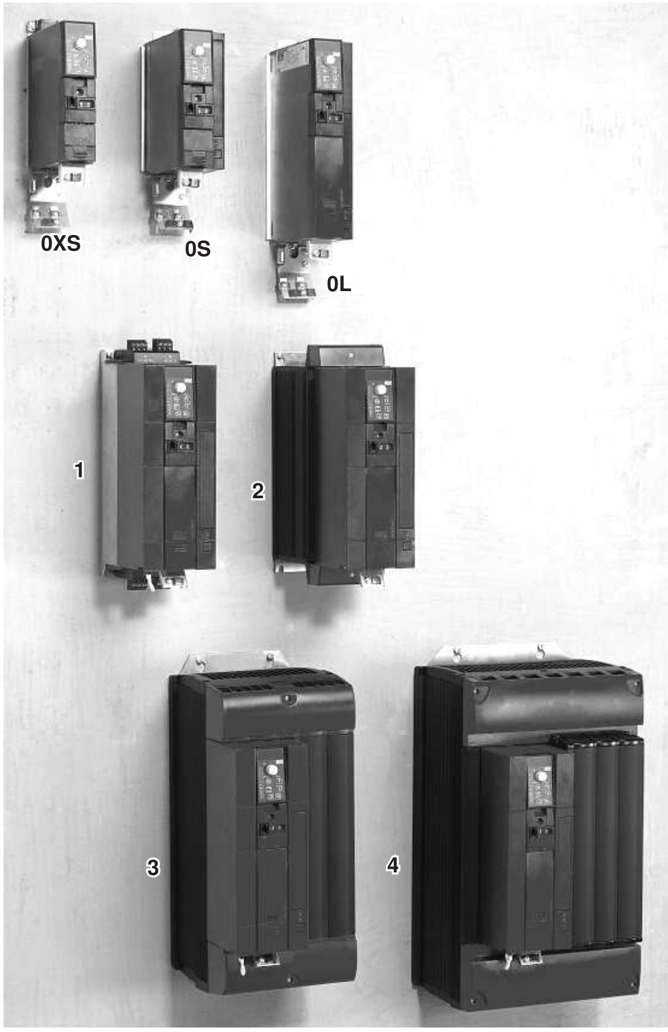
4.1.4 Technical data of MOVITRAC® B, 3 × AC 230 V

Overview of MOVITRAC® B

400 / 500 V



230 V



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230 V / 3-phase line connection							
Size	**0XS**	**0S**	**0L**	**1**	**2**	**3**	**4**
Power kW	0.25 0.37	0.55 0.75	1.1 1.5 2.2	3.7	5.5 7.5	11 15	22 30

AC 230 V / 3-phase / size 0XS/ 0.25/ 0.37 kW

MOVITRAC® MC07B (3-phase supply system)		**0003-2A3-4-00**	**0004-2A3-4-00**
Part number (without "Safe Torque Off")		**8284997**	**8285004**
INPUT			
Nominal line voltage	V_{line}	3 × AC 200 – 240 V	
Nominal line frequency	f_{line}	50/60 Hz ±5%	
Nominal line current (at V_{line} = 3 × AC 230 V)	I_{line}	AC 1.6 A	AC 2.0 A
	$I_{Netz125}$	AC 1.9 A	AC 2.4 A
OUTPUT			
Output voltage	V_A	3 × 0 – V_{line}	
Recommended motor power for 100% operation	P_{Mot}	0.25 kW	0.37 kW
Recommended motor power for 125% operation	$P_{Mot\ 125}$	0.37 kW	0.55 kW

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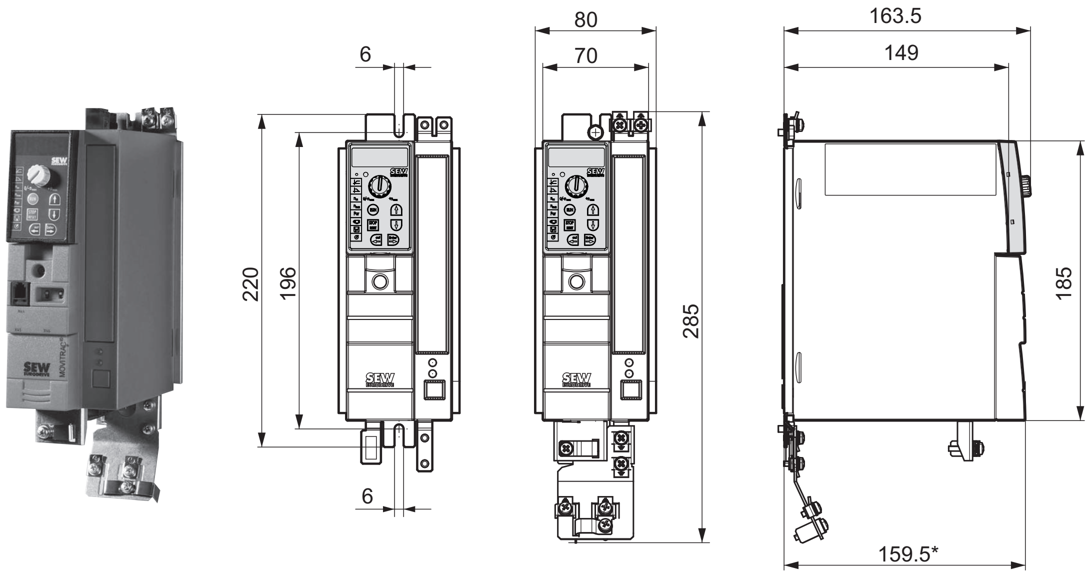
MOVITRAC® MC07B (3-phase supply system)		0003-2A3-4-00	0004-2A3-4-00
Part number (without "Safe Torque Off")		**8284997**	**8285004**
Nominal output current for 100% operation	I_N	AC 1.7 A	AC 2.5 A
Nominal output current for 125% operation	$I_{N\ 125}$	AC 2.1 A	AC 3.1 A
Apparent output power for 100% operation	S_N	0.7 kVA	1.0 kVA
Apparent output power for 125% operation	$S_{N\ 125}$	0.9 kVA	1.3 kVA
Max. output frequency	f_{max}	599 Hz	
Minimum permitted braking resistance value (4-quadrant operation)	R_{BW_min}	27 Ω	
GENERAL			
Power loss for 100% operation	P_V	35 W	40 W
Power loss for 125% operation	$P_{V\ 125}$	40 W	50 W
Type of cooling/cooling air requirement		Natural convection/–	
Current limiting		150% I_N for at least 60 seconds	
Device terminal cross section/tightening torque	Terminals	4 mm^2/0.6 Nm	
Dimensions	W × H × D	54.5 mm × 185 mm × 163.5 mm	
Mass	m	1.3 kg	

AC 230 V / 3-phase / size 0S / 0.55 / 0.75 kW

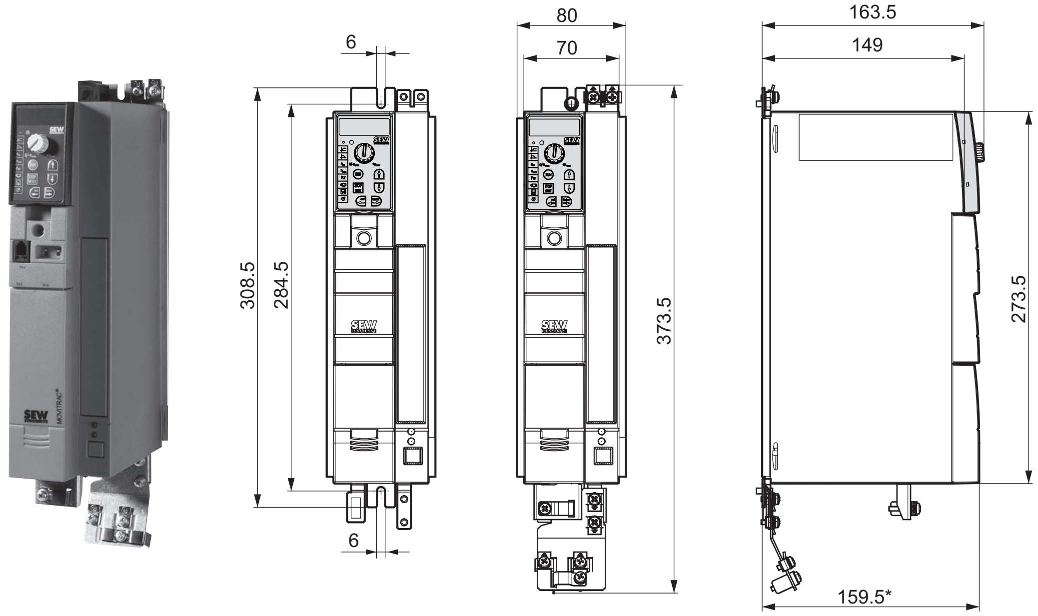


MOVITRAC® MC07B (3-phase supply system)		0005-2A3-4-x0	0008-2A3-4-x0
Part number of standard device (-00) **Part number of "Safe Torque Off" (-S0[1])**		**8285012** **8299870**	**8285020** **8299889**
INPUT			
Nominal line voltage	V_{line}	3 × AC 200 – 240 V	
Nominal line frequency	f_{line}	50/60 Hz ±5%	
Nominal line current (at V_{line} = 3 × AC 230 V)	I_{line}	AC 2.8 A	AC 3.3 A
	$I_{line\ 125}$	AC 3.4 A	AC 4.1 A
OUTPUT			
Output voltage	V_A	3 × 0 – V_{line}	
Recommended motor power for 100% operation	P_{Mot}	0.55 kW	0.75 kW
Recommended motor power for 125% operation	$P_{Mot\ 125}$	0.75 kW	1.1 kW
Nominal output current for 100% operation	I_N	AC 3.3 A	AC 4.2 A
Nominal output current for 125% operation	$I_{N\ 125}$	AC 4.1 A	AC 5.3 A
Apparent output power for 100% operation	S_N	1.4 kVA	1.7 kVA
Apparent output power for 125% operation	$S_{N\ 125}$	1.7 kVA	2.1 kVA
Max. output frequency	f_{max}	599 Hz	
Minimum permitted braking resistance value (4-quadrant operation)	R_{BW_min}	27 Ω	

MOVITRAC® MC07B (3-phase supply system)		0005-2A3-4-x0	0008-2A3-4-x0
Part number of standard device (-00) **Part number of "Safe Torque Off" (-S0[1])**		**8285012** **8299870**	**8285020** **8299889**
GENERAL			
Power loss for 100% operation	P_V	50 W	60 W
Power loss for 125% operation	$P_{V\ 125}$	60 W	75 W
Type of cooling/cooling air requirement		Natural convection/–	
Current limiting		150% I_N for at least 60 seconds	
Device terminal cross section/tightening torque	Terminals	4 mm^2/0.6 Nm	
Dimensions	W × H × D	80 mm × 185 mm × 163.5 mm	
Mass	m	1.5 kg	

1) The MC07B...-S0 device type must always be supplied by an external DC 24 V power supply unit.

AC 230 V / 3-phase / size 0L / 1.1 / 1.5 / 2.2 kW



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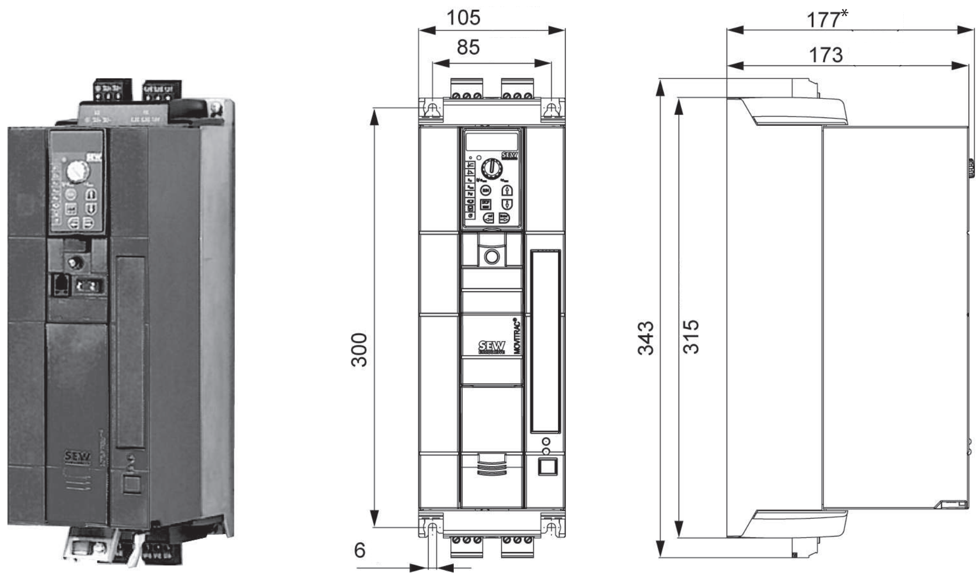
MOVITRAC® MC07B (3-phase supply system)		0011-2A3-4-00	0015-2A3-4-00	0022-2A3-4-00
Part number of standard version (-00) **Part number of "Safe technology" (-S0[1])**		**8285039** **8299897**	**8285047** **8299900**	**8285055** **8299919**
INPUT				
Nominal line voltage	V_{line}	3 × AC 200 – 240 V		
Nominal line frequency	f_{line}	50/60 Hz ±5%		
Nominal line current (at V_{line} = 3 × AC 230 V)	I_{line}	AC 5.1 A	AC 6.4 A	AC 7.6 A
	$I_{line\ 125}$	AC 6.3 A	AC 7.9 A	AC 9.5 A
OUTPUT				
Output voltage	V_A	3 × 0 – V_{line}		
Recommended motor power for 100% operation	P_{Mot}	1.1 kW	1.5 kW	2.2 kW
Recommended motor power for 125% operation	$P_{Mot\ 125}$	1.5 kW	2.2 kW	3.0 kW
Nominal output current for 100% operation	I_N	AC 5.7 A	AC 7.3 A	AC 8.6 A
Nominal output current for 125% operation	$I_{N\ 125}$	AC 7.1 A	AC 9.1 A	AC 10.8 A
Apparent output power for 100% operation	S_N	2.3 kVA	3.0 kVA	3.5 kVA
Apparent output power for 125% operation	$S_{N\ 125}$	2.9 kVA	3.7 kVA	4.3 kVA
Max. output frequency	f_{max}	599 Hz		
Minimum permitted braking resistance value (4-quadrant operation)	R_{BW_min}	27 Ω		
GENERAL				
Power loss for 100% operation	P_V	75 W	90 W	105 W

MOVITRAC® MC07B (3-phase supply system)		0011-2A3-4-00	0015-2A3-4-00	0022-2A3-4-00
Part number of standard version (-00) **Part number of "Safe technology" (-S0[1])**		**8285039** **8299897**	**8285047** **8299900**	**8285055** **8299919**
Power loss for 125% operation	$P_{V\ 125}$	90 W	110 W	140 W
Type of cooling/cooling air requirement		Natural convection		Forced air cooling/ 18 m³/h
Current limiting		150% I_N for at least 60 seconds		
Device terminal cross section/tightening torque	Terminals	4 mm²/0.6 Nm		
Dimensions	W × H × D	80 mm × 273.5 mm × 163.5 mm		
Mass	m	2.2 kg		

1) The MC07B...-S0 device type must always be supplied by an external DC 24 V power supply unit.

AC 230 V / 3-phase / size 1 / 3.7 kW



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MOVITRAC® MC07B (3-phase supply system)		0037-2A3-4-00
Part number ("Safe Torque Off" integrated)		**8285063**
INPUT		
Nominal line voltage	V_{line}	3 × AC 200 – 240 V
Nominal line frequency	f_{line}	50/60 Hz ±5%
Nominal line current (at V_{line} = 3 × AC 230 V)	I_{line}	AC 12.9 A
	$I_{line\ 125}$	AC 16.1 A
OUTPUT		
Output voltage	V_A	3 × 0 – V_{line}
Recommended motor power for 100% operation	P_{Mot}	3.7 kW
Recommended motor power for 125% operation	$P_{Mot\ 125}$	5.5 kW
Nominal output current for 100% operation	I_N	AC 14.5 A
Nominal output current for 125% operation	$I_{N\ 125}$	AC 18.1 A
Apparent output power for 100% operation	S_N	5.8 kVA
Apparent output power for 125% operation	$S_{N\ 125}$	7.3 kVA
Max. output frequency	f_{max}	599 Hz
Minimum permitted braking resistance value (4-quadrant operation)	R_{BW_min}	27 Ω
GENERAL		
Power loss for 100% operation	P_V	210 W
Power loss for 125% operation	$P_{V\ 125}$	270 W
Type of cooling/cooling air requirement		Forced air cooling/40 m³/h
Current limiting		150% I_N for at least 60 seconds

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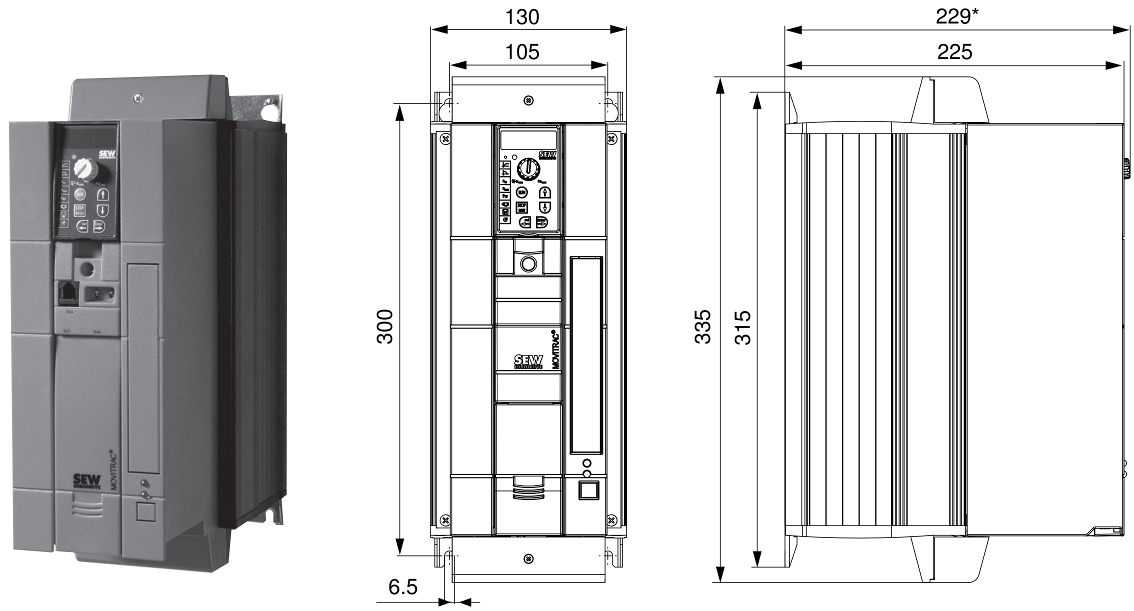
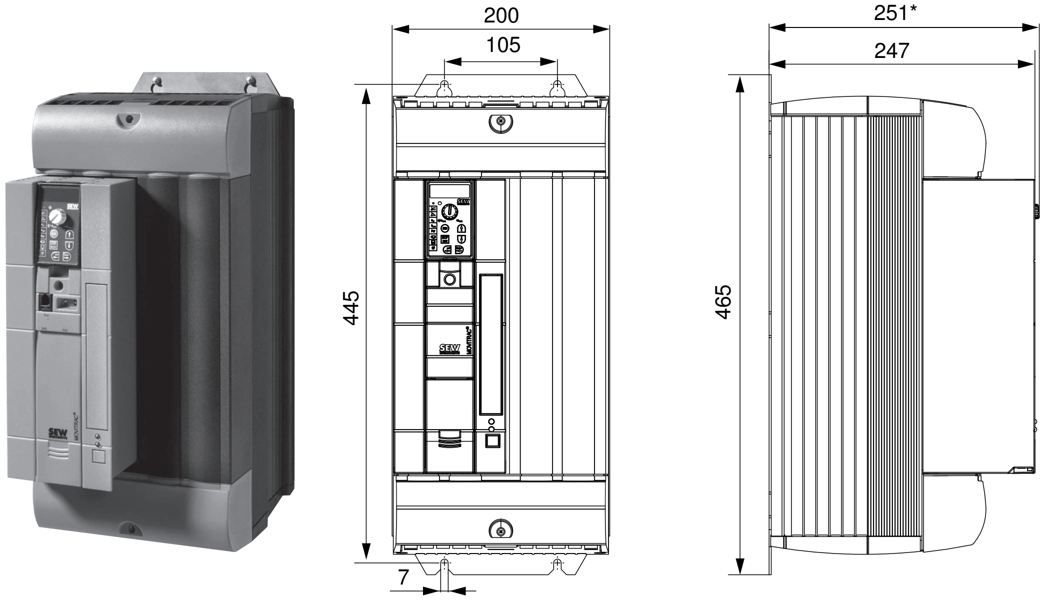
MOVITRAC® MC07B (3-phase supply system)		0037-2A3-4-00
Part number ("Safe Torque Off" integrated)		**8285063**
Device terminal cross section/tightening torque	Terminals	4 mm²/0.6 Nm
Dimensions	W × H × D	105 mm × 315 mm × 173 mm
Mass	m	

AC 230 V / 3-phase / size 2 / 5.5 / 7.5 kW



MOVITRAC® MC07B (3-phase supply system)		0055-2A3-4-00	0075-2A3-4-00
Part number ("Safe Torque Off" integrated)		**8285071**	**8285098**
INPUT			
Nominal line voltage	V_{line}	3 × AC 200 – 240 V	
Nominal line frequency	f_{line}	50/60 Hz ±5%	
Nominal line current (at V_{line} = 3 × AC 230 V)	I_{line}	AC 19.5 A	AC 27.4 A
	$I_{line\ 125}$	AC 24.4 A	AC 34.3 A
OUTPUT			
Output voltage	V_A	3 × 0 – V_{line}	
Recommended motor power for 100% operation	P_{Mot}	5.5 kW	7.5 kW
Recommended motor power for 125% operation	$P_{Mot\ 125}$	7.5 kW	11 kW
Nominal output current for 100% operation	I_N	AC 22 A	AC 29 A
Nominal output current for 125% operation	$I_{N\ 125}$	AC 27.5 A	AC 36.3 A
Apparent output power for 100% operation	S_N	8.8 kVA	11.6 kVA
Apparent output power for 125% operation	$S_{N\ 125}$	11.0 kVA	14.5 kVA
Max. output frequency	f_{max}	599 Hz	
Minimum permitted braking resistance value (4-quadrant operation)	R_{BW_min}	12 Ω	
GENERAL			
Power loss for 100% operation	P_V	300 W	380 W
Power loss for 125% operation	$P_{V\ 125}$	375 W	475 W
Type of cooling/cooling air requirement		Forced air cooling/80 m³/h	
Current limiting		150% I_N for at least 60 seconds	
Device terminal cross section/tightening torque	Terminals	4 mm²/0.6 Nm 6 mm²/1.5 Nm	
Dimensions	W × H × D	130 mm × 335 mm × 229 mm	
Mass	m		

AC 230 V / 3-phase / size 3 / 11 / 15 kW



MOVITRAC® MC07B (3-phase supply system)		0110-203-4-00	0150-203-4-00
Part number ("Safe Torque Off" integrated)		**8285101**	**8285128**
INPUT			
Nominal line voltage	V_{line}	3 × AC 200 – 240 V	
Nominal line frequency	f_{line}	50/60 Hz ±5%	
Nominal line current (at V_{line} = 3 × AC 230 V)	I_{line}	AC 40.0 A	AC 48.6 A
	$I_{line\ 125}$	AC 50.0 A	AC 60.8 A
OUTPUT			
Output voltage	V_A	3 × 0 – V_{line}	
Recommended motor power for 100% operation	P_{Mot}	11 kW	15 kW
Recommended motor power for 125% operation	$P_{Mot\ 125}$	15 kW	22 kW
Nominal output current for 100% operation	I_N	AC 42 A	AC 54 A
Nominal output current for 125% operation	$I_{N\ 125}$	AC 52.5 A	AC 67.5 A
Apparent output power for 100% operation	S_N	16.8 kVA	21.6 kVA
Apparent output power for 125% operation	$S_{N\ 125}$	21.0 kVA	26.9 kVA
Max. output frequency	f_{max}	599 Hz	
Minimum permitted braking resistance value (4-quadrant operation)	R_{BW_min}	7.5 Ω	5.6 Ω
GENERAL			
Power loss for 100% operation	P_V	580 W	720 W
Power loss for 125% operation	$P_{V\ 125}$	720 W	900 W
Type of cooling/cooling air requirement		Forced air cooling/180 m^3/h	
Current limiting		150% I_N for at least 60 seconds	
Device terminal cross section/tightening torque	Terminals	Status fields 2 and 5 of the power section nameplate do not have any entries: 25 mm^2 Status fields 2 and 5 of the power section nameplate have entries: M6 bolt with nut, max. 25 mm^2, crimp cable lug DIN 46235	
		3.5 Nm	
Dimensions	W × H × D	200 mm × 465 mm × 251 mm	
Mass	m		

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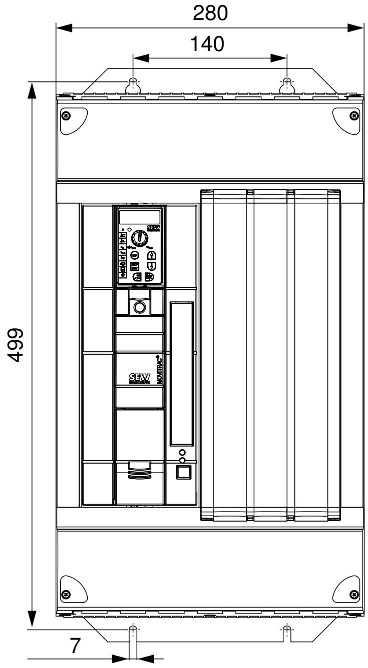
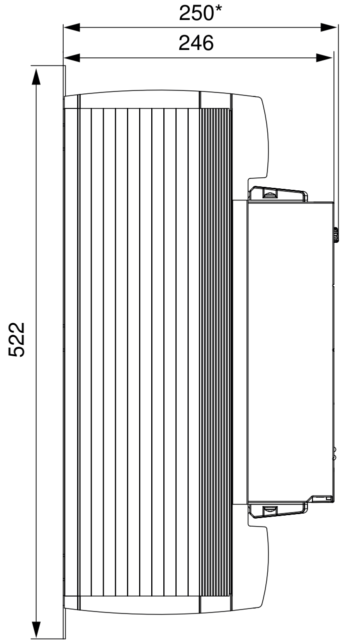
AC 230 V / 3-phase / size 4/ 22/ 30 kW



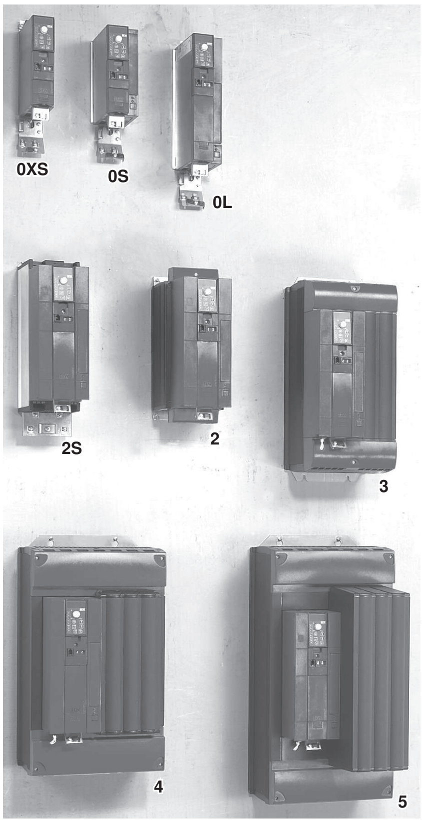


MOVITRAC® MC07B (3-phase supply system)		**0220-203-4-00**	**0300-203-4-00**
Part number ("Safe Torque Off" integrated)		**8285136**	**8285144**
INPUT			
Nominal line voltage	V_{line}	3 × AC 200 – 240 V	
Nominal line frequency	f_{line}	50/60 Hz ±5%	
Nominal line current (at V_{line} = 3 × AC 230 V)	I_{line}	AC 72 A	AC 86 A
	$I_{line\ 125}$	AC 90 A	AC 107 A
OUTPUT			
Output voltage	V_A	3 × 0 – V_{line}	
Recommended motor power for 100% operation	P_{Mot}	22 kW	30 kW
Recommended motor power for 125% operation	$P_{Mot\ 125}$	30 kW	37 kW
Nominal output current for 100% operation	I_N	AC 80 A	AC 95 A
Nominal output current for 125% operation	$I_{N\ 125}$	AC 100 A	AC 118.8 A
Apparent output power for 100% operation	S_N	31.9 kVA	37.9 kVA
Apparent output power for 125% operation	$S_{N\ 125}$	39.9 kVA	47.4 kVA
Max. output frequency	f_{max}	599 Hz	
Minimum permitted braking resistance value (4-quadrant operation)	R_{BW_min}	3 Ω	
GENERAL			
Power loss for 100% operation	P_V	1100 W	1300 W
Power loss for 125% operation	$P_{V\ 125}$	1400 W	1700 W
Type of cooling/cooling air requirement		Forced air cooling/180 m^3/h	
Current limiting		150% I_N for at least 60 seconds	
Device terminal cross section/tightening torque	Terminals	70 mm^2	
		14 Nm	
Dimensions	W × H × D	280 mm × 522 mm × 250 mm	
Mass	m		

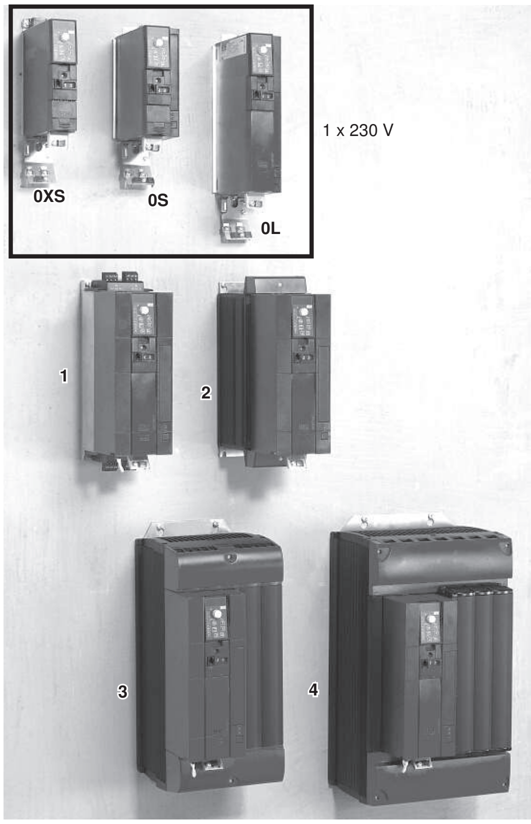
4.1.5 Technical data of MOVITRAC® B, 1 × AC 230 V

Overview of MOVITRAC® B

400 / 500 V



230 V



230 V / 1-phase line connection			
Size	**0XS**	**0S**	**0L**
Power kW	0.25 0.37	0.55 0.75	1.1 1.5 2.2

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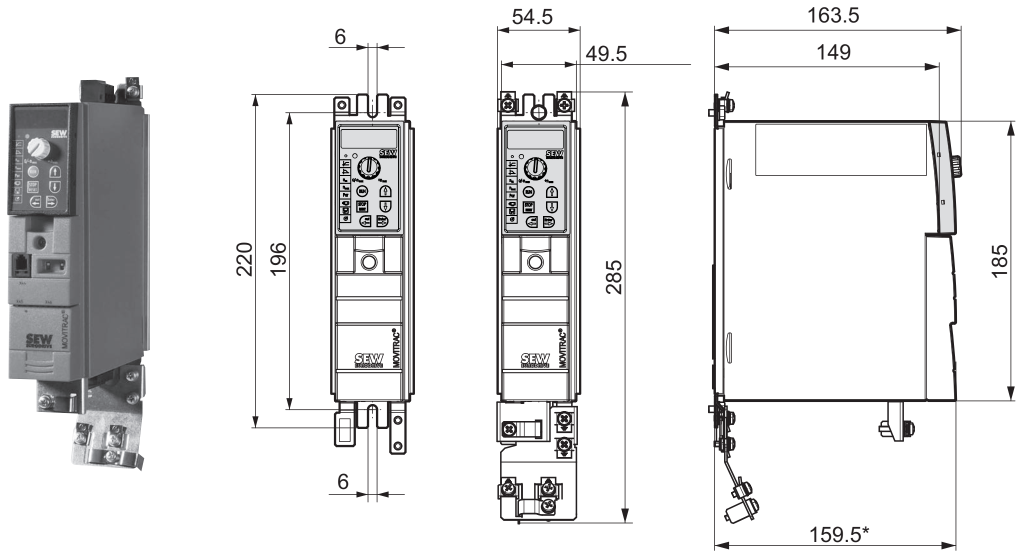
AC 230 V/1-phase/size 0XS/0.25/0.37 kW



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MOVITRAC® MC07B (1-phase supply system)		0003-2B1-4-00	0004-2B1-4-00
Part number (without "Safe Torque Off")		**8284911**	**8284938**
INPUT			
Nominal line voltage	V_{line}	1 × AC 200 – 240 V	
Nominal line frequency	f_{line}	50/60 Hz ±5%	
Nominal line current (at V_{line} = 1 × AC 230 V)	I_{line}	AC 4.3 A	AC 6.1 A
	$I_{line\ 125}$	AC 5.5 A	AC 7.5 A
OUTPUT			
Output voltage	V_A	3 × 0 – V_{line}	
Recommended motor power for 100% operation	P_{Mot}	0.25 kW	0.37 kW
Recommended motor power for 125% operation	$P_{Mot\ 125}$	0.37 kW	0.55 kW
Nominal output current for 100% operation	I_N	AC 1.7 A	AC 2.5 A
Nominal output current for 125% operation	$I_{N\ 125}$	AC 2.1 A	AC 3.1 A
Apparent output power for 100% operation	S_N	0.7 kVA	1.0 kVA
Apparent output power for 125% operation	$S_{N\ 125}$	0.9 kVA	1.3 kVA
Max. output frequency	f_{max}	599 Hz	
Minimum permitted braking resistance value (4-quadrant operation)	R_{BW_min}	27 Ω	
GENERAL			
Power loss for 100% operation	P_V	30 W	35 W
Power loss for 125% operation	$P_{V\ 125}$	35 W	45 W
Type of cooling/cooling air requirement		Natural convection/–	
Current limiting		150% I_N for at least 60 seconds	
Device terminal cross section/tightening torque	Terminals	4 mm^2/0.5 Nm	
Dimensions	W × H × D	54.5 mm × 185 mm × 163.5 mm	
Mass	m	1.3 kg	

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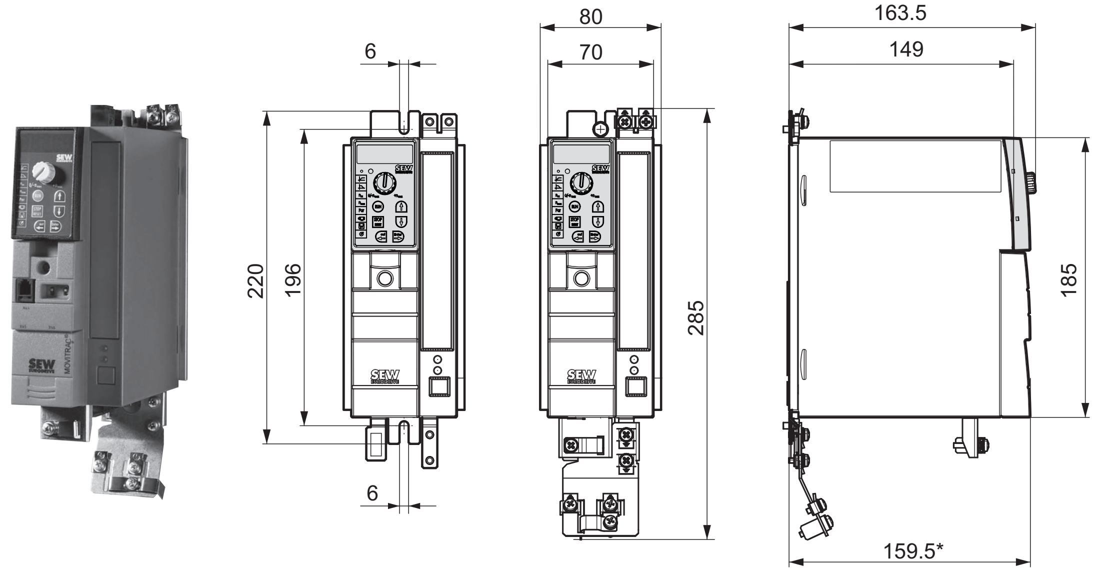
AC 230 V/1-phase/size 0S/0.55/0.75 kW



MOVITRAC® MC07B (1-phase supply system)		**0005-2B1-4-00**	**0008-2B1-4-00**
Part number (without "Safe Torque Off")		**8284946**	**8284954**
INPUT			
Nominal line voltage	V_{line}	1 × AC 200 – 240 V	
Nominal line frequency	f_{line}	50/60 Hz ±5%	
Nominal line current (at V_{line} = 1 × AC 230 V)	I_{line}	AC 8.5 A	AC 9.9 A
	$I_{line\ 125}$	AC 10.2 A	AC 11.8 A
OUTPUT			
Output voltage	V_A	3 × 0 – V_{line}	
Recommended motor power for 100% operation	P_{Mot}	0.55 kW	0.75 kW
Recommended motor power for 125% operation	$P_{Mot\ 125}$	0.75 kW	1.1 kW
Nominal output current for 100% operation	I_N	AC 3.3 A	AC 4.2 A
Nominal output current for 125% operation	$I_{N\ 125}$	AC 4.1 A	AC 5.3 A
Apparent output power for 100% operation	S_N	1.4 kVA	1.7 kVA
Apparent output power for 125% operation	$S_{N\ 125}$	1.7 kVA	2.1 kVA
Max. output frequency	f_{max}	599 Hz	
Minimum permitted braking resistance value (4-quadrant operation)	R_{BW_min}	27 Ω	
GENERAL			
Power loss for 100% operation	P_V	45 W	50 W
Power loss for 125% operation	$P_{V\ 125}$	50 W	65 W
Type of cooling/cooling air requirement		Natural convection/–	
Current limiting		150% I_N for at least 60 seconds	
Device terminal cross section/tightening torque	Terminals	4 mm²/0.5 Nm	
Dimensions	W × H × D	80 mm × 185 mm × 163.5 mm	
Mass	m	1.5 kg	

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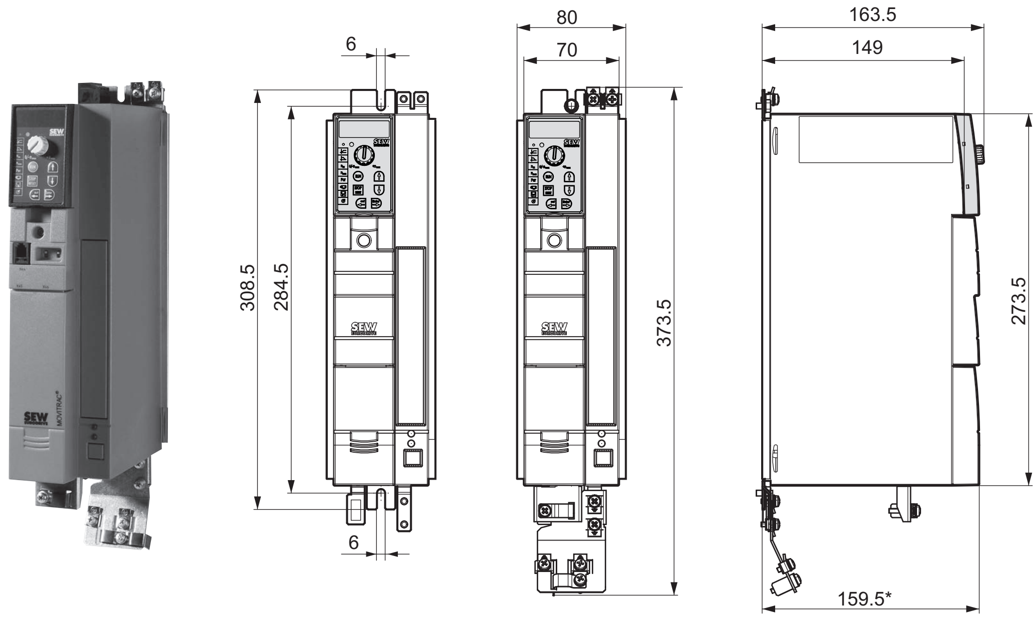
AC 230 V/1-phase/size 0 L/1.1/1.5/2.2 kW



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MOVITRAC® MC07B (1-phase supply system)		**0011-2B1-4-00**	**0015-2B1-4-00**	**0022-2B1-4-00**
Part number (without "Safe Torque Off")		**8284962**	**8284970**	**8284989**
INPUT				
Nominal line voltage	V_{line}	1 × AC 200 – 240 V		
Nominal line frequency	f_{line}	50 / 60 Hz ±5%		
Nominal line current (at V_{line} = 1 × AC 230 V)	I_{line}	AC 13.4 A	AC 16.7 A	AC 19.7 A
	$I_{line\ 125}$	AC 16.8 A	AC 20.7 A	AC 24.3 A
OUTPUT				
Output voltage	V_A	3 × 0 – V_{line}		
Recommended motor power for 100% operation	P_{Mot}	1.1 kW	1.5 kW	2.2 kW
Recommended motor power for 125% operation	$P_{Mot\ 125}$	1.5 kW	2.2 kW	3.0 kW
Nominal output current for 100% operation	I_N	AC 5.7 A	AC 7.3 A	AC 8.6 A
Nominal output current for 125% operation	$I_{N\ 125}$	AC 7.1 A	AC 9.1 A	AC 10.8 A
Apparent output power for 100% operation	S_N	2.3 kVA	3.0 kVA	3.5 kVA
Apparent output power for 125% operation	$S_{N\ 125}$	2.9 kVA	3.7 kVA	4.3 kVA
Max. output frequency	f_{max}	599 Hz		
Minimum permitted braking resistance value (4-quadrant operation)	R_{BW_min}	27 Ω		
GENERAL				
Power loss for 100% operation	P_V	70 W	90 W	105 W
Power loss for 125% operation	$P_{V\ 125}$	90 W	110 W	132 W
Type of cooling/cooling air requirement		Natural convection		Forced air cooling/18 m^3/h
Current limiting		150% I_N for at least 60 seconds		
Device terminal cross section/tightening torque	Terminals	4 mm^2/0.5 Nm		
Dimensions	W × H × D	80 mm × 273.5 mm × 163.5 mm		
Mass	m	2.2 kg		

4.1.6 MOVITRAC® B electronics data

Function	Terminal	Designation	Default	Data
Setpoint input (differential input)	X10:1	REF1		+10 V, I_{max} = 3 mA
	X10:2	AI11 (+)		0 – 10 V (R_i > 200 kΩ) 0 – 20 mA/4 – 20 mA (R_i = 250 Ω), Resolution 10 bit, sampling cycle 1 ms, accuracy ±100 mV, 200 µA
	X10:3	AI12 (–)		
	X10:4	GND		GND = reference potential for binary and analog signals, PE potential, voltage-resistant up to 30 V
Digital inputs	X12:1	DI00	Fault reset	R_i = 3 kΩ, I_E = 10 mA, sampling cycle 5 ms, PLC-compatible Signal level according to EN 61131-2 Type1 or Type3: • 11 – 30 V → 1/contact closed • -3 to +5 V → 0/contact open • X12:2/DI01 permanently assigned with CW/stop. • X12:5/DI04 can be used as frequency input • X12:6/DI05 can be used as TF input
	X12:2[1)]	DI01	CW/stop	
	X12:3	DI02	CCW/stop	
	X12:4	DI03	Enable/stop	
	X12:5	DI04	n11/n21	
	X12.6	DI05TF	n12/n22	
Supply voltage for TF	X12:7	VOTF		Special characteristic for TF according to DIN EN 60947-8/trigger value 3 kΩ
Auxiliary voltage output/external voltage supply[2)]	X12:8	24VIO		Auxiliary voltage output: V = DC 24 V, current carrying capacity I_{max} = 50 mA External voltage supply: V = DC 24 V -15%/+20% to EN 61131-2 See project planning/external DC 24 V voltage supply chapter
Reference terminal	X12:9	GND		Reference potential for binary and analog signals, PE potential
Digital outputs	X13:1	GND		PLC-compatible, response time 5 ms, I_{max} DO02 = 150 mA, I_{max} DO03 = 50 mA, Short-circuit proof, supply-proof up to 30 V GND = reference potential for binary and analog signals, PE potential
	X13:2	DO02	Brake on	
	X13:3	DO03	Ready	
	X13:4	GND		

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Function	Terminal	Designation	Default	Data
Relay output	X13:5	DO01-C		Shared relay contact Current-carrying capacity: V_{max} = 30 V, I_{max} = 800 mA
	X13:6	DO01-NO		NO contact Current-carrying capacity: V_{max} = 30 V, I_{max} = 800 mA
	X13:7	DO01-NC		NC contact Current-carrying capacity: V_{max} = 30 V, I_{max} = 800 mA
Safety contact	See chapter "MOVITRAC® B electronics data for functional safety" (→ 🗎 51).			
Terminal response times	Digital input and output terminals are updated every 5 ms			
Max. cable cross section	1.5 mm² without conductor end sleeves 1.0 mm² with conductor end sleeves			
Stripped length	X10/X12/X13: 5 mm FSC11B/12B/FIO11B/21B/FSE24B: 7 mm			
Tightening torque	X10/X12/X13: 0.25 Nm FSC11B/12B/FIO11B/21B/FSE24B: 0.22 – 0.25 Nm			

1) X12:2/DI01 permanently assigned with CW/stop.
2) The device type MC07B...-S0 must always be supplied with external voltage.

DC 24 V power demand for 24 V backup mode

Size	Power demand of basic device[1)]	DBG60B	FIO11B	Fieldbus option[2)3)]	DHP11B[4)]	DHE21B / 41B[5)]	FSE24B
0 MC07B..-00	5 W	1 W	2 W	3.4 W	4.5 W	8.5 W	1.2 W
0 MC07B..-S0	12 W						
1, 2S, 2	17 W						
3	23 W						
4, 5	25 W						

1) Including FIO21B, FBG11B, FSC11B/12B (UWS11A / USB11A). Take into account the load of the digital outputs with an additional 2.4 W per 100 mA.
2) Fieldbus options are: DFP21B, DFD11B, DFE32B, ...
3) These options must always be supplied externally.
4) These options must always additionally be supplied externally.
5) These options must ALWAYS additionally be supplied externally.

4.1.7 MOVITRAC® B electronics data for functional safety

Safety input X17 for devices with integrated functional safety:

Terminal	Designation
X17:1	GND: Reference potential for X17:2
X17:2	VO24: V_{OUT} = DC 24 V, only to supply X17:4 of the same device; must **not** be used to supply further devices
X17:3	SOV24: Reference potential for DC+24 V input "STO" (safety contact)
X17:4	SVI24: Direct current +24 V input "STO" (safety contact)

<table>
<tr><td>Permitted cable cross section</td><td colspan="5">1 conductor per terminal: 0.75 – 1.5 mm²
2 conductors per terminal: 0.75 – 1.0 mm²</td></tr>
<tr><td>Tightening torque</td><td colspan="5">• Min. 0.22 Nm
• Min. 0.25 Nm</td></tr>
<tr><th></th><th>Size</th><th>Input capacitance</th><th>Min.</th><th>Typical.</th><th>Max.</th></tr>
<tr><td>Safety-related 24 V voltage supply</td><td>–</td><td>–</td><td>DC 19.2 V</td><td>DC 24 V</td><td>DC 30 V</td></tr>
<tr><td rowspan="6">Power consumption X17:4</td><td>0S/0L</td><td>27 µF</td><td rowspan="6">–</td><td rowspan="6">–</td><td>3 W</td></tr>
<tr><td>1</td><td>270 µF</td><td>5 W</td></tr>
<tr><td>2/2S</td><td>270 µF</td><td>6 W</td></tr>
<tr><td>3</td><td>270 µF</td><td>7.5 W</td></tr>
<tr><td>4</td><td>270 µF</td><td>8 W</td></tr>
<tr><td>5</td><td>270 µF</td><td>10 W</td></tr>
<tr><td rowspan="2">Time from shutdown of the safety-related 24 V voltage supply at MOVITRAC® B to shutdown of the pulse master at the output stage $t_{shutdown}$</td><td>0</td><td>–</td><td>–</td><td>–</td><td>20 ms</td></tr>
<tr><td>1 – 5</td><td>–</td><td>–</td><td>–</td><td>100 ms</td></tr>
<tr><td>Duration for restart</td><td colspan="5">200 ms</td></tr>
</table>

4.2 Technical data for accessories and options

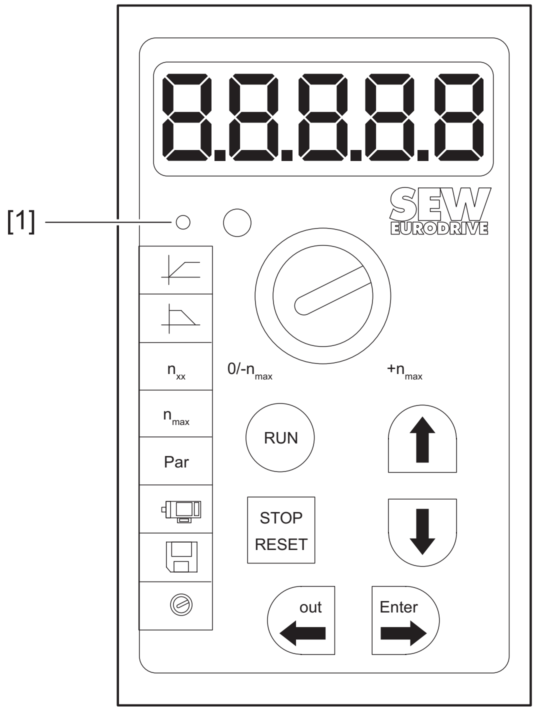
4.2.1 Keypads

Basic keypad FBG11B

Part number: 18206352

Description

Use the FBG11B front module for simple diagnostics and startup.



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[1] LED display

Functions

- Display process values and status displays.
- Query fault memory and fault reset.
- Display and set parameters.
- Data backup and transfer of parameter sets
- Convenient startup menu for SEW-EURODRIVE and third-party motors
- Manual control of MOVITRAC® B

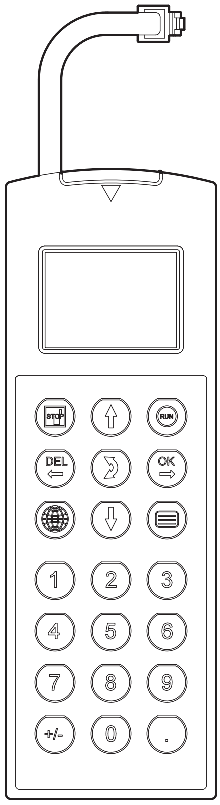
Features

- 5-digit 7-segment display/6 keys/8 pictograms/setpoint adjuster
- Selection of quick menu or complete menu
- Can be plugged onto the inverter (during operation)
- IP20 degree of protection (EN 60529)
- LED display when IPOS$^{plus®}$ program is started

Advanced keypad DBG60B

Description

MOVITRAC® B is designed as a basic device without a DBG60B keypad and the operator panel can be added as an option.

Keypad		Language versions	Part number
	Door installation set[1)]	Description (= scope of delivery)	
	DBM60B	• Housing for DBG60B (IP65) • Extension cable DKG60B, length 5 m (20 ft)	8248532
	Extension cable	Description (= scope of delivery)	
	DKG60B	• Length 5 m (20 ft) • 4-wire, shielded conductor	8175837

1) The DBG60B keypad is not included in the scope of delivery and must be ordered separately.

Functions

- Display of process values and status displays
- Status displays of the digital inputs/outputs
- Fault memory and error reset queries
- Display and setting of parameters and service parameters
- Data backup and transfer of parameter sets to other MOVITRAC® B devices
- Convenient startup menu
- Manual control of MOVITRAC® B

Features

- Illuminated plain text display
- Keypad with 21 keys
- Can be connected via extension cable DKG60B (5 m)
- IP40 degree of protection (EN 60529)

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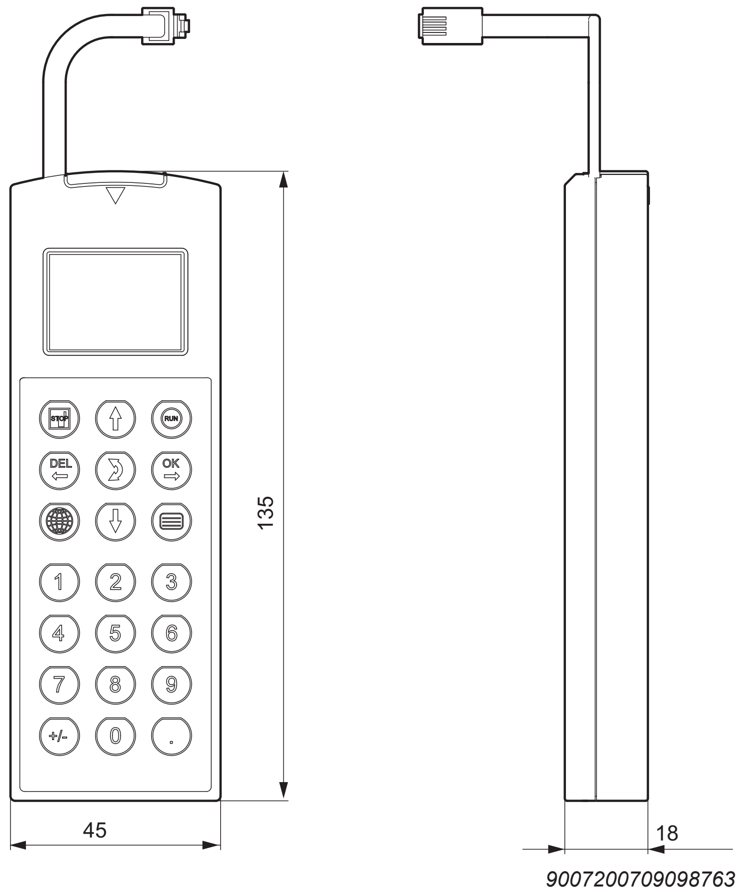
INFORMATION

The DBG60B keypad option is connected to the FSC11B/12B, FSE24B or FIO11B / FIO21B communication front module. If using DBG60B, you must not additionally connect the MOVITRAC® B via RS485.

Dimension drawing for DBG60B

The following figure shows the mechanical dimensions in mm.



Dimensions in mm

DBM60B/DKG60B housing for DBG60B

Description

The DBM60B option can be used to mount the keypad close to the inverter (e.g. in the control cabinet door). The DBM60B option consists of a housing in IP65 degree of protection, and a 5 m DKG60B extension cable.

Part numbers

- DBM60B: 08248532
- DKG60B: 08175837

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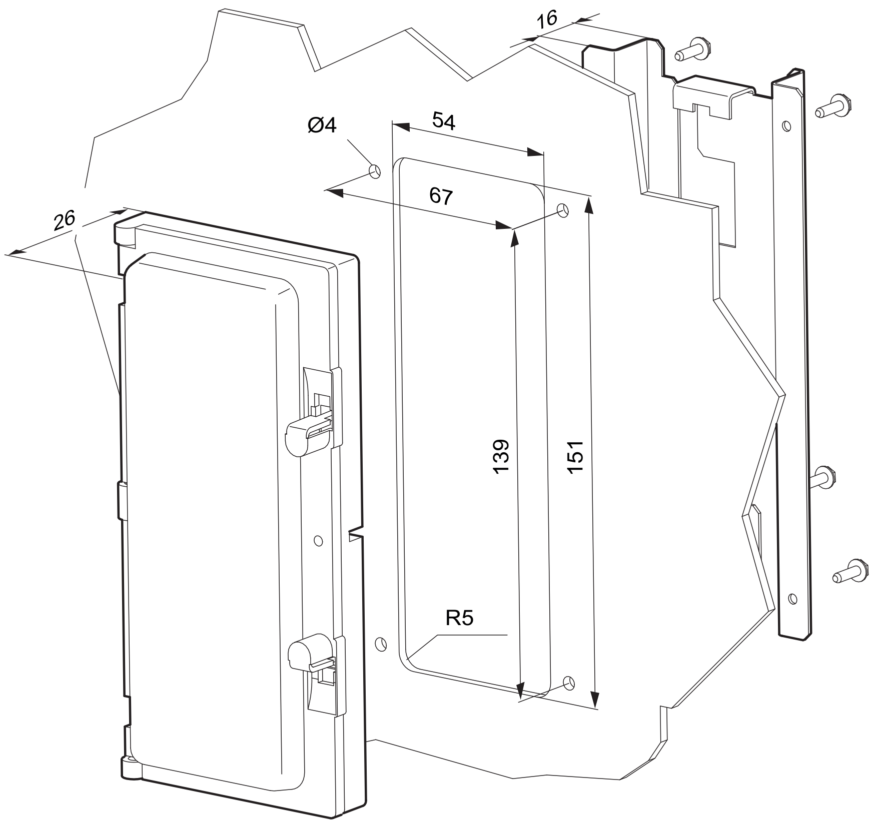
Dimension drawing DBM60B/DKG60B

The following figure shows the mechanical dimensions in mm.



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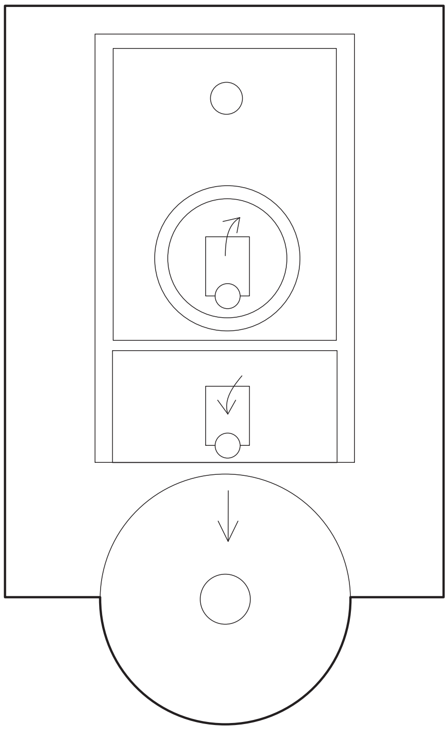
Dimensions in mm

UBP11A parameter module



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Part number

8239339

Description

- Saving data from the inverter to the parameter module
- Storage of data from the parameter module in the inverter
- Display of the operating state
- Meaning of the LED:
  - Green: Data available
  - Flashing green: Data transmission in progress
  - yellow: no data available
  - Red: Copy error

INFORMATION

The parameter module UBP11A is connected to the FSC11B/12B, FSE24B or FIO11B / FIO21B communication front module. If using UBP11A, you must not additionally connect the MOVITRAC® B via RS485.

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MBG11A setpoint adjuster

Part number

8225478

Description

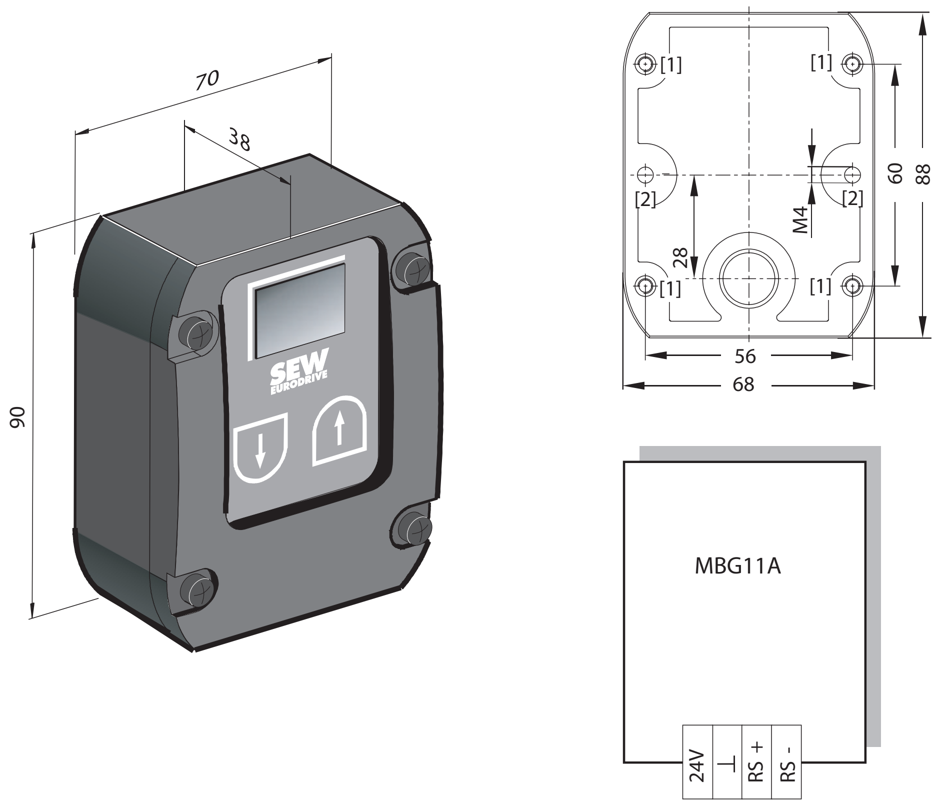
- The MBG11A setpoint adjuster has 2 buttons and a display. They enable remote speed control in the range from -100% to +100% n_{max} (*P302*).
- Up to 31 MOVITRAC® B devices can be controlled simultaneously (broadcasting).
- The MBG11A setpoint adjuster requires the FSC11B/12B or FIO11B front module.

INFORMATION

If the MBG11A setpoint adjuster is connected via the RS485 interface, engineering via the FSC.. is not possible. To still be able to carry out engineering on the inverter, disconnect the communication to the MBG11A setpoint adjuster.

Dimensions and connection assignment

All dimensions are in mm.



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[1] Tapped hole on the back

[2] Mounting holes for M4 screws

Technical data

Part number	8225478

Input voltage	DC 24 V ±25%
Power demand	approx. 70 mA
Setpoint resolution	1%
Serial interface[1]	RS485 for connecting a maximum of 31 MOVITRAC® inverters (max. 200 m, 9600 baud)
Degree of protection	IP65
Ambient temperature	-15 °C to +60 °C
Dimensions	90 mm × 70 mm × 38 mm

1) with integrated dynamic terminating resistor

4.2.2 Interface adapters

UWS11A interface adapter

INFORMATION

The FSC11B/12B or FIO11B is required to connect the UWS11A.

Part number

0822689X

Description

The UWS11A option converts RS232 signals, for example from the PC, into RS485 signals. These RS485 signals can then be routed to the RS485 interface of the inverter.

The UWS11A option requires a DC 24 V voltage supply.

RS232 interface

The connection between UWS11A and PC is made using a commercially available serial interface cable (shielded!).

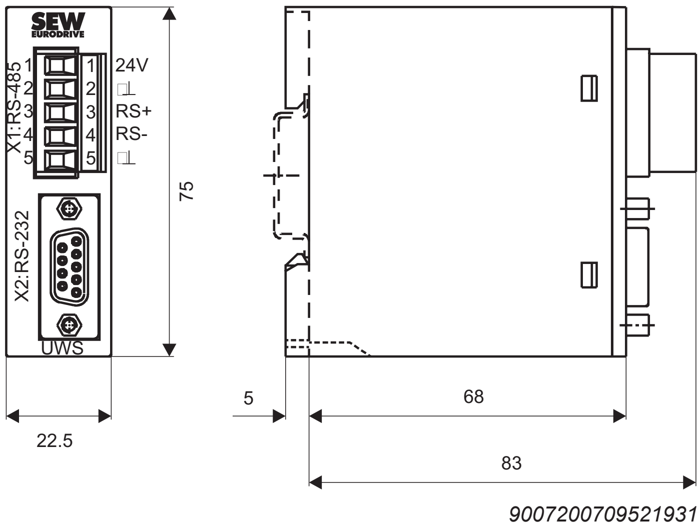
RS485 interface

Max. 32 inverters can be networked for communication (max. total line length 200 m) via the RS485 interface of the UWS11A. Do not connect any external terminating resistors, as dynamic terminating resistors are already permanently installed.

Permitted cable cross section: 1 conductor per terminal 0.20 – 2.5 mm²

2 conductors per terminal 0.2 – 1 mm²

Dimension drawing of UWS11A



Dimensions in mm

The UWS11A option is mounted in the control cabinet on a mounting rail (EN 50022-35 × 7.5).

Technical data

UWS11A	
Part number	822689X
Ambient temperature	0 °C to 40 °C
Storage temperature	-25 °C to +70 °C (according to EN 60721-3-3, class 3K3)
Degree of protection	IP20
Voltage supply	DC 24 V (I_{max} = 50 mA)
Current consumption	max. DC 50 mA
Mass	150 g
Dimensions	83 mm × 75 mm × 22.5 mm

UWS21B interface adapter

INFORMATION

The FSC11B/12B, FSE24B or FIO11B/21B is required to connect the UWS21B.

Part number

18204562

Description

The UWS21B option converts RS232 signals, for example from the PC, into RS485 signals. These RS485 signals can then be routed to the XT slot of the inverter.

RS232 interface

The connection between UWS21B and PC is made using a commercially available serial interface cable (shielded!).

RS485 interface

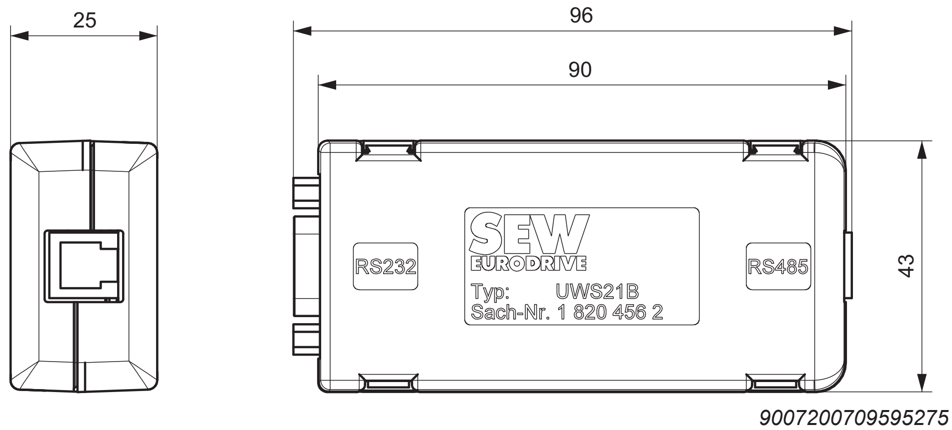
UWS21B and inverter are connected using a serial interface cable with RJ10 connectors.

Scope of delivery

The scope of delivery for the UWS21B option includes:

- UWS21B device
- Serial interface cable with 9-pin D-sub socket and 9-pin D-sub connector for connection of UWS21B – PC.
- Serial interface cable with two RJ10 plugs to connect UWS21B and inverter.

Dimension drawing for UWS21B



Dimensions in mm

Technical data

UWS21B	
Part number	18204562
Ambient temperature	0 °C to 40 °C
Storage temperature	-25 °C to +70 °C (according to EN 60721-3-3, class 3K3)
Degree of protection	IP20
Mass	300 g
Dimensions	96 mm × 43 mm × 25 mm

USM21A interface adapter USB/RS485/SBus/CAN

The USM21A option is required for engineering between PC or laptop and inverter.

The connection between USM21A and PC is made using a standard USB cable type A-B (shielded).

If the LT Shell software is used via RS485, the PC engineering package (cable set C) is required.

If the MOVITOOLS® MotionStudio software is used via SBus, the CKS13A (connection cable RJ10/RJ45) is required.

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INFORMATION

Use the correct components for the software in use.
Observe the different functionalities of the software.

Type	Part number
USM21A	28231449
CKS13A (connection cable RJ10/RJ45)	28118677

USM21A scope of delivery

- USM21A device
- USB connection cable type USB A-B to connect PC to USM21A
- Serial interface cable with 2 × RJ10 connectors

CKS13A scope of delivery (connection cable RJ10/RJ45)

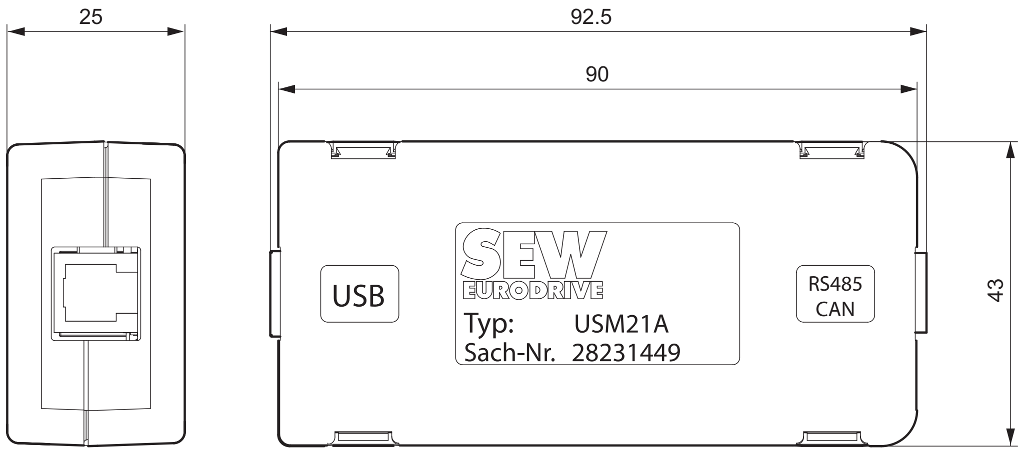
- Serial interface cable with 1 × RJ10 connector to 1 × RJ45 connector for the USM21A – inverter connection.

Technical data

Ambient temperature during operation	0 °C to 40 °C
Degree of protection	IP20

Dimensions

All dimensions are specified in mm.



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RS485 interface

A maximum of 63 MOVITRAC® LTP-B and LTE-B devices can be connected via the RS485 interface of the USM21A for communication purposes.

The maximum shielded cable length is 100 m.

Each inverter needs a unique address.

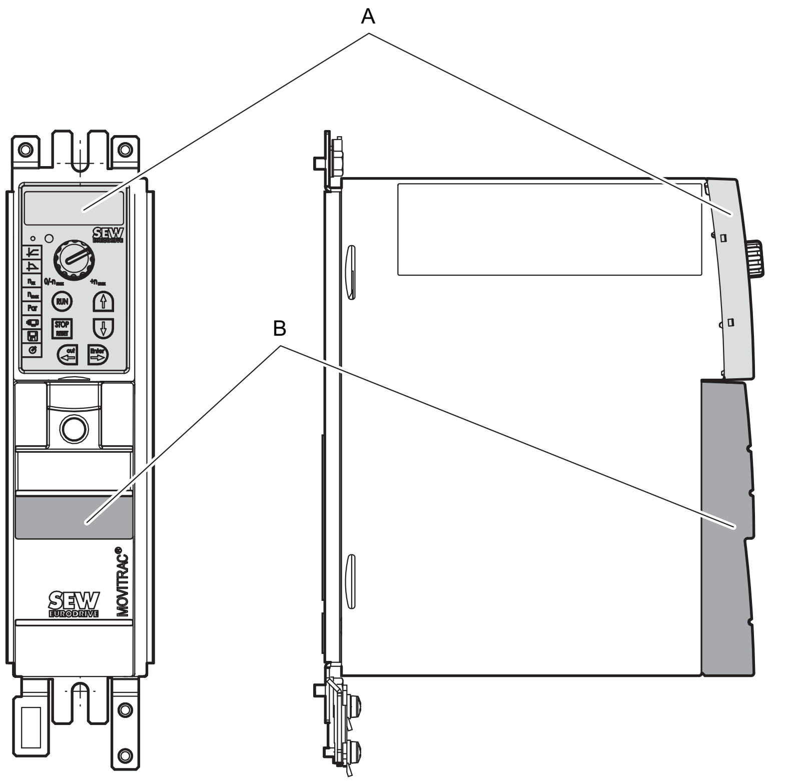
4.2.3 Front modules

MOVITRAC® B is equipped with 2 slots for directly pluggable modules that can be used to implement many additional functions.

INFORMATION

The modules can only be attached to the predetermined slot.

Only one module per slot possible (the FIO11B, FSC11B/12B and FSE24B modules are mounted in the same mounting location and therefore cannot be used at the same time).



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Slot A is reserved for FBG11B.

Slot B is intended for one of the following modules:

- FSC11B/12B
- FSE24B
- FIO11B/21B

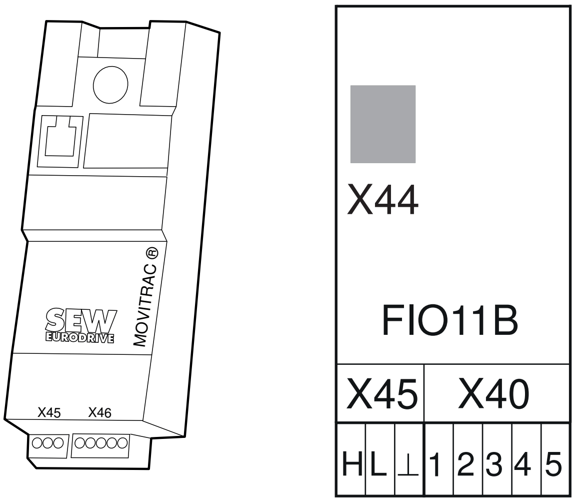
FIO11B analog module

Part number: 18206379

Description

The FIO11B analog module supplements the basic device with the following interfaces:

- Setpoint input
- Analog output
- RS485 interface



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Electronics data FIO11B analog module

Function	Terminal	Designation	Data
Setpoint input[1]	X40:1 X40:2	AI2: Voltage input GND: Reference potential	-10 to +10 V R_i > 40 kΩ Resolution 10 bits Sampling cycle 5 ms Accuracy ±100 mV, 200 µA
Analog output / alternatively as current output or voltage output	X40:3 X40:4 X40:5	GND: Reference potential AOV1: Voltage output AOC1: Current output	0 – 10 V / I_{max} = 2 mA 0 (4) – 20 mA Resolution 10 bits Sampling cycle 5 ms Short-circuit and supply-proof up to 30 V Load impedance R_L ≤ 750 Ω Accuracy ±100 mV, 200 µA
Service interface	X44 RJ10	Service interface	EIA standard 9.6 kB Connection: For service purposes only, exclusively for point-to-point connection Maximum cable length 3 m
RS485 interface	X45:H X45:L X45:'	ST11: RS485+ ST12: RS485- GND: Reference potential	EIA standard, 9.6 kB, max. 32 stations Maximum cable length 200 m Fixed dynamic terminating resistor
	X44 RJ10	Service interface	Connection: For service purposes only, exclusively for point-to-point connection Maximum cable length 3 m X44 and X45 are connected in parallel in the FIO11B.

1) If the setpoint input is not used, it should be connected to GND. Otherwise, a measured input voltage of -1 to +1 V is set.

The terminal cross-section for all terminals of the FIO11B is:

- 1.5 mm^2 without conductor end sleeves
- 1.0 mm^2 with conductor end sleeves

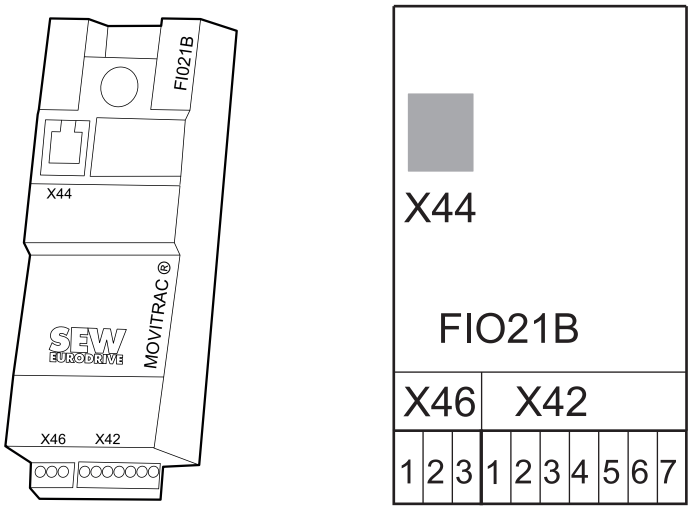
FIO21B digital module

Part number 18225411

Description

The FIO21B digital module supplements the basic device with the following interfaces:

- 7 additional digital inputs DI10 – DI16
- RS485 service interface
- CAN-based system bus SBus (sub-listed protocols: MOVILINK®, CANopen)



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Electronics data of the FIO21B digital module

Function	Terminal	Designation	Data
Digital inputs	X42:1 X42:2 X42:3 X42:4 X42:5 X42:6 X42:7	DI10 DI11 DI12 DI13 DI14 DI15 DI16	R_i = 3 kΩ, IE = 10 mA, sampling cycle 5 ms, PLC-compatible Signal level according to EN 61131-2 type 1 or type 3: • 11 to 30 V: Contact closed • -3 to +5 V: Contact open Set to "No function" by default
Service interface	X44 RJ10	Service interface	EIA standard 9.6 kB Connection: For service purposes only, exclusively for point-to-point connection Maximum cable length 3 m
SBus system bus	X46:1 X46:2 X46:3	SC11: CAN High SC12: CAN Low GND: Reference potential	CAN bus to CAN specification 2.0, parts A and B Transmission technology according to ISO 11898, max. 64 stations Bus termination possible with enclosed 120 Ω resistor between SC11 and SC12

The terminal cross-section for all terminals of the FIO21B is:

- 1.5 mm² without conductor end sleeves
- 1.0 mm² with conductor end sleeves

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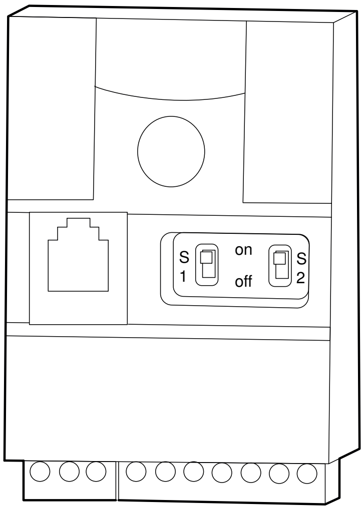
FSC11B communication module

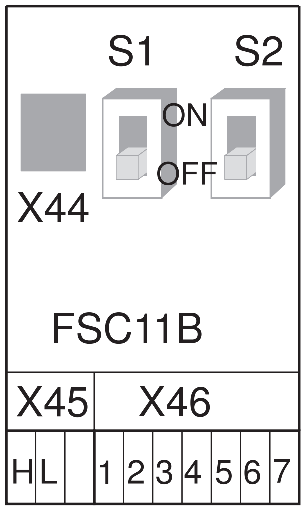
Part number: 18207162

Description

The FSC11B communication module routes the communication interfaces of the MOVITRAC® B to the outside, for communication with PLC, MOVITRAC® B, MOVIDRIVE®, PC or operator terminal. The following interfaces are available for this purpose:

- RS485
- CAN-based system bus (SBus) (supported protocols: MOVILINK® / CANopen)





9007199490002443

Electronics data for FSC11B communication module

Function	Terminal	Designation	Data
System bus (SBus)	X46:1 X46:2 X46:3 X46:4 X46:5 X46:6 X46:7	SC11: SBus High SC12: SBus Low GND: Reference potential SC21: SBus High SC22: SBus Low GND: Reference potential 24VIO: Auxiliary voltage / External voltage supply	CAN bus to CAN specification 2.0, parts A and B, transmission technology to ISO 11898, max. 64 stations, terminating resistor (120 Ω) can be activated using DIP switch **S1** **S2** is reserved and must always be set to Off.
Service interface	X44 RJ10	Service interface	EIA standard 9.6 kB Connection: For service purposes only, exclusively for point-to-point connection Maximum cable length 3 m
RS485 interface	X45:H X45:L X45:'	ST11: RS485+ ST12: RS485- GND: Reference potential	EIA standard, 9.6 kB, max. 32 stations Maximum cable length 200 m Fixed dynamic terminating resistor

The terminal cross-section for all terminals of the FSC11B is:

- 1.5 mm² without conductor end sleeves
- 1.0 mm² with conductor end sleeves

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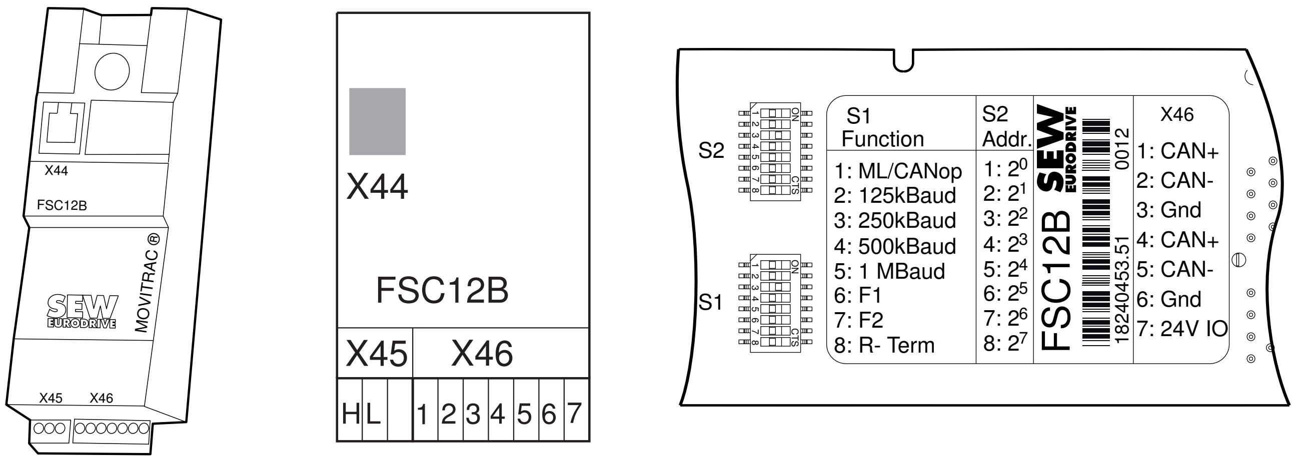
FSC12B communication module

Part number: 18240453



9007203088328203

Description

The FSC12B communication module routes the communication interfaces of the MOVITRAC® B to the outside, for communication with PLC, MOVITRAC® B, MOVIDRIVE®, PC or operator terminal. The following interfaces are available for this purpose:

- RS485
- CAN-based system bus (SBus) (supported protocols: MOVILINK®/CANopen)

The following communication parameters can be set via DIP switches:

- Profile (MOVILINK®, CANopen)
- Baud rate
- Address

In contrast to the FSC11B communication module, the CAN address can be permanently set with the FSC12B. A software setting is not necessary. The address can be retained in the event of device replacement.

Electronics data for FSC12B communication module

Function	Terminal/ switch	Designation	Data
System bus (SBus)	X46:1 X46:2 X46:3 X46:4 X46:5 X46:6 X46:7	SC11: SBus High SC12: SBus Low GND: Reference potential SC11: SBus High SC12: SBus Low GND: Reference potential 24VIO: Auxiliary voltage/external voltage supply	CAN bus to CAN specification 2.0, parts A and B, transmission technology to ISO 11898, max. 64 stations, terminating resistor (120 Ω) can be activated using DIP switch **S1:8** (rear side)
Service interface	X44 RJ10	Service interface	EIA standard 9.6 kB Connection: For service purposes only, exclusively for point-to-point connection Maximum cable length 3 m
RS485 interface	X45:H X45:L X45:'	ST11: RS485+ ST12: RS485- GND: Reference potential	EIA standard, 9.6 kB, max. 32 stations Maximum cable length 200 m Fixed dynamic terminating resistor

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Function	Terminal/ switch	Designation	Data
DIP switch	S2	Address	Binary coded: 1:2^0; 2:2^1; 3:2^2 Example: Address 9: S2:1 and S2:4 = ON Approved address range: • 0 – 63 (MOVILINK®: S1:1 = OFF) • 1 – 127 (CANopen: S1:1 = ON)
	S1	S1:1 CAN profile S1:2 125 kB S1:3 250 kB S1:4 500 kB S1:5 1 MB S1:6 F1 S1:7 F2 S1:8 Terminating resistor	OFF = MOVILINK®, ON = CANopen S1:2 – S1:5 • Baud rate: exactly 1 baud rate is allowed to be selected S1:6 – S1:7 • F1 and F2 are reserved and must not be pressed S1:8 Switches 120 Ω bus termination between CAN high and CAN low

The terminal cross-section for all terminals of the FSC12B is:

- 1.5 mm^2 without conductor end sleeves
- 1.0 mm^2 with conductor end sleeves

The default value for all DIP switches is OFF. This means that the values entered in parameter *P88.* apply.

If no baud rate or several baud rates are selected via DIP switches S1:2 – S1:5, the baud rate set in parameter *P884* is used.

If an invalid address is set via DIP switch S2, the addresses set in the parameters *P881* and *P886* apply.

Examples of invalid addresses:

- Address > 63 in the MOVILINK® profile (S1:1 = OFF) or
- Address > 127 or address = 0 in the CANopen profile (S1:1 = ON)

The FSC12B is only supported from MOVITRAC® firmware 1822 5632.**11**.

Communication via CAN is not possible with older firmware versions.

SEW-EURODRIVE recommends using the engineering software MOVITOOLS® MotionStudio version 5.80 or higher.

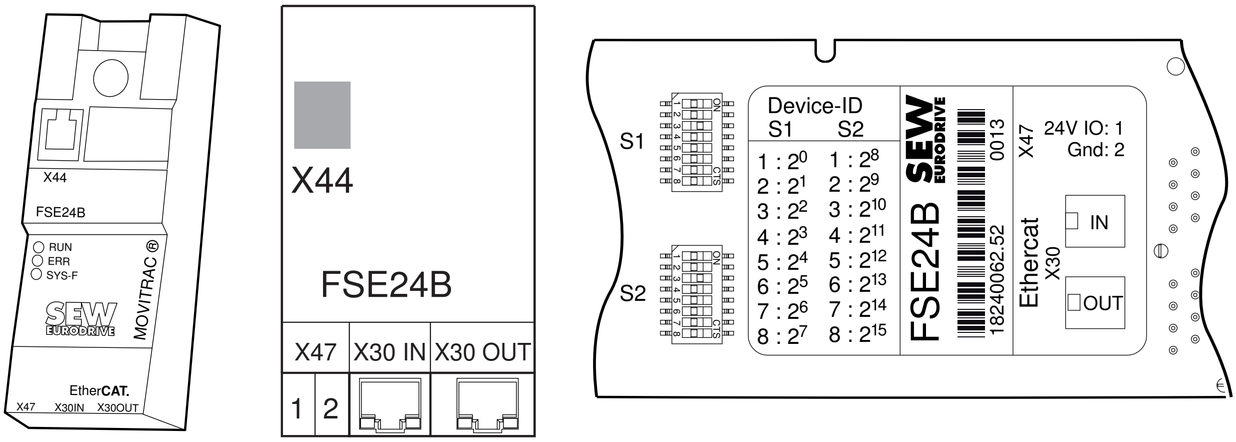
EtherCAT® module FSE24B

Part number: 18240062

Description

The EtherCAT® FSE24B communication module upgrades the basic device with the following interfaces:

- EtherCAT®
- RS485 service interface



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The communication module is also available as a DFE24B gateway version.

To avoid the increased susceptibility to interference an enhanced grounding of the EtherCAT® cable via a new shield plate for MOVITRAC® B is necessary.

For this purpose, either remove the insulation of the EtherCAT® cable at the shield terminal, so that the cable lug can be connected over a large area, or order an EtherCAT® cable from SEW-EURODRIVE. Both solutions also provide good strain relief for the EtherCAT® cable. The shield plate can be ordered separately under the part number: 28229401.

Electronics data of EtherCAT® FSE24B

Function	Terminal	Designation	Data
EtherCAT®	X30 IN X30 OUT (2 × RJ45)	Incoming and outgoing EtherCAT® connection	• Fast Ethernet (100 MB, full duplex) • Auto-Crossing • IEC 61158, IEC 61784-2
Service interface	X44 RJ10	Service interface	EIA standard 9.6 kB Connection: For service purposes only, exclusively for point-to-point connection Maximum cable length 3 m
External voltage supply	X47:1 X47:2	24 V IO GND	• V = DC 24 V (-15%, +20%) • The FSE24B and also the MOVITRAC® B are supplied with 24 V via X47 • Alternatively, the FSE24B can also be supplied only from the MOVITRAC® B

You can use DIP switches S1 and S2 to set a binary-coded unit identification that can be read-out in MOVITOOLS® MotionStudio in parameter group P09. (bus diagnostics) in the parameter tree. Alternatively, this device identification can be read out via index 10497, subindex 3.

The MOVITOOLS® MotionStudio engineering software version 5.70 or newer is required for the display of the extended diagnostics parameters in parameter group *P09*. of the parameter tree.

4.2.4 Fieldbus connection

INFORMATION

All option cards must be specified when ordering. Subsequent installation by the customer is not permitted.

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DFP21B fieldbus interface for PROFIBUS

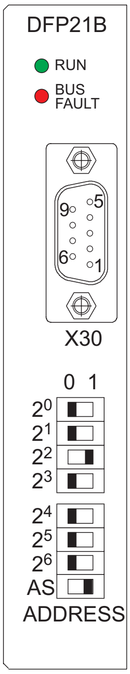
Description

Thanks to its powerful universal fieldbus interface with the DFP21B option, the MOVITRAC® B frequency inverter enables connection to higher-level automation systems via PROFIBUS DP and DP-V1.

For installation, refer to the documentation "Fieldbus interface DFP21B PROFIBUS DP-V1".

Electronics data

Option DFP21B



External voltage supply via X26	V = DC 24 V (-15%, +20%) I_{max} = DC 200 mA P_{max} = 3.4 W
PROFIBUS protocol variants	PROFIBUS DP and DP-V1 according to IEC 61158
Automatic baud rate detection	9.6 kB – 12 MB
Connection technology	• Via 9-pin D-sub connector • Pin assignment to IEC 61158
Bus termination	Not integrated, must be realized with a suitable PROFIBUS connector with switchable terminating resistors.
Station address	1 – 125, can be set via DIP switch
GSD file name	SEW_6009.GSD
DP ID number	6009_{hex} = 24585_{dec}
Application-specific parameterization data (Set-Prm-UserData)	• Length 3 bytes • Hex parameterization 00.00.00
DP configurations for DDLM_Chk_Cfg	See documentation "Fieldbus interface DFP21B PROFIBUS DP-V1".
Diagnostics data	Standard diagnosis 6 byte

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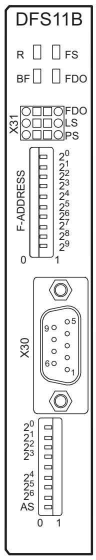
DFS11B fieldbus interface for PROFIBUS / PROFIsafe®

Description

The MOVITRAC® B frequency inverter enables connection to higher-level automation systems via PROFIBUS with PROFIsafe thanks to its powerful universal fieldbus interface with the DFS11B option.

For installation, refer to the documentation "Fieldbus interface DFS11B PROFIBUS DP-V1 with PROFIsafe".

Electronics data

Option DFS11B		
	External voltage supply via X26	V = DC 24 V (-15%, +20%) I_{max} = DC 200 mA P_{max} = 3.4 W
	PROFIBUS protocol variants	PROFIBUS DP and DP-V1 according to IEC 61158
	Automatic baud rate detection	9.6 kB – 12 MB
	Connection technology	• Via 9-pin D-sub connector • Pin assignment to IEC 61158
	Bus termination	Not integrated, must be realized with a suitable PROFIBUS connector with switchable terminating resistors.
	Station address	1 – 125, can be set via DIP switch
	F-address	1 – 1022, can be set via DIP switch
	GSD file name	SEW_6009.GSD
	DP ID number	6009_{hex} = 24585_{dec}
	Application-specific parameterization data (Set-Prm-UserData)	• Length 3 bytes • Hex parameterization 00.00.00
	DP configurations for DDLM_Chk_Cfg	See documentation "Fieldbus interface DFS11B PROFIBUS DP-V1 with PROFIsafe".
	Diagnostics data	Standard diagnosis 6 byte

- ⚠ **CAUTION!** Safety-related applications are realized with the use of PROFIsafe interfaces.

  Refer to the documentation "Fieldbus interface DFS11B PROFIBUS DP-V1 with PROFIsafe".

DFD11B fieldbus interface for DeviceNet

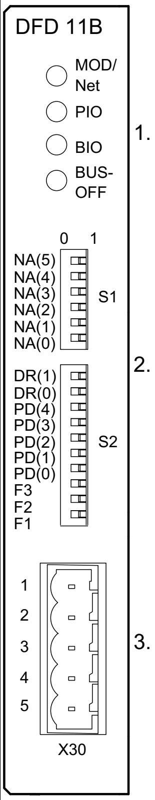
Description

Thanks to its powerful universal fieldbus interface with the DFD11B option, the MOVITRAC® B frequency inverter enables connection to higher-level automation systems via the open and standardized DeviceNet fieldbus system.

For installation, refer to the documentation "DFD11B DeviceNet fieldbus interface".

Electronics data

Option DFD11B



Option DFD11B	
External voltage supply via X26	V = DC 24 V (-15%, +20%) I_{max} = DC 200 mA P_{max} = 3.4 W
Communication protocol	Master slave connection set according to DeviceNet™ specification version 2.0
Number of process data words	Adjustable via DIP switch: • 1 – 24 process data words with polled I/O • 1 – 4 process data words for bit-strobe I/O
Baud rate	125, 250 or 500 kB, adjustable via DIP switch
Bus cable length	For thick cable according to DeviceNet™ specification 2.0 appendix B: • 500 m for 125 kB • 250 m for 250 kB • 100 m for 500 kB
Transmission level	ISO 11 98 – 24 V
Connection technology	• 5-pin Phoenix combicon terminal • Pin assignment according to DeviceNet specification
MAC ID	• 0 – 63, can be set via DIP switch • Max. 64 stations
Supported services	• Polled I/O • Bit strobe I/O • Explicit Messages: – Get_Attribute_Single – Set_Attribute_Single – Reset – Allocate_MS_Connection_Set – Release_MS_Connection_Set
EDS file name	SEW_GATEWAY_DFD11B.eds

DFE24B fieldbus interface for EtherCAT®

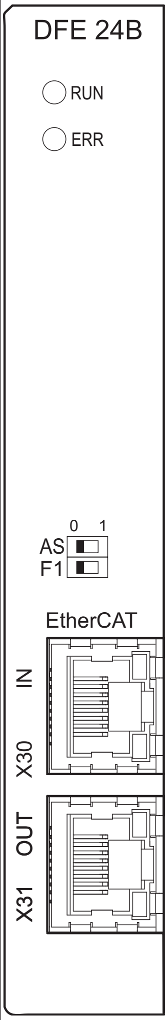
Description

Thanks to its powerful universal fieldbus interface with the DFE24B option, the MOVITRAC® B frequency inverter enables connection to higher-level automation systems via EtherCAT®.

For installation, refer to the documentation "Fieldbus interface DFE24B EtherCAT®".

The FSE24B front module can also be used instead of the DFE24B. It offers a wider range of functions and does not require an additional FSC11B. One FSE24B is required per MOVITRAC® B device.

Electronics data



Option DFE24B	
External voltage supply via X26	V = DC 24 V (-15%, +20%) I_{max} = DC 200 mA P_{max} = 3.4 W
Standards	IEC 61158, IEC 61784-2
Baud rate	100 MB, full duplex
Connection technology	2 × RJ45 (8 × 8 modular jack)
Bus termination	Not integrated, as bus termination is activated automatically.
OSI Layer 1/2	Ethernet II
Station address	Setting via EtherCAT® master (→ Display with P093)
XML file name	SEW_DFE24B.xml
Vendor ID	0x59 (CANopenVendor ID)
EtherCAT® services	• CoE (CANopen over EtherCAT®) • VoE (Simple MOVILINK® protocol over EtherCAT®)

DFE32B fieldbus interface for PROFINET IO RT

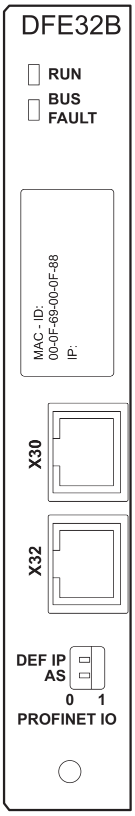
Description

Thanks to its powerful universal fieldbus interface with the DFE32B option, the MOVITRAC® B frequency inverter enables connection to higher-level automation systems via PROFINET IO RT.

For installation, refer to the documentation "Fieldbus interface DFE32B PROFINET IO".

Electronics data

Option DFE32B



External voltage supply via X26	V = DC 24 V (-15%, +20%) I_{max} = DC 200 mA P_{max} = 3.4 W
Application protocols	• **PROFINET IO** (Ethernet frames with frame identification 8892_{hex}) for control and parameterization for the frequency inverter. • **HTTP** (Hypertext Transfer Protocol) for diagnostics using a web browser. • **SMLP** (Simple MOVILINK® protocol), protocol used by MOVITOOLS® MotionStudio.
Port numbers used	• 300 (SMLP) • 80 (HTTP)
Ethernet services	• ARP • ICMP (ping)
OSI layer 1/2	Ethernet II
Baud rate	100 MB in full duplex process
Connection technology	2 × RJ45 with internal switch and auto-crossing
addressing	4 byte IP address and/or MAC-ID (00:0F:69:xx:xx:xx)
Manufacturer identification (Vendor ID)	$010A_{hex}$
GSD file name	GSML-V2.1-SEW-DFE-DFS-2Ports-YYYYMMTT.xml

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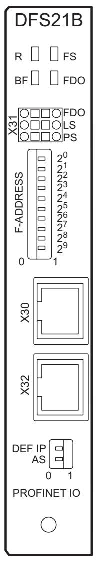
DFS21B fieldbus interface for PROFINET / PROFIsafe®

Description

Thanks to its powerful universal fieldbus interface with the DFS21B option, the MOVITRAC® B frequency inverter enables connection to higher-level automation systems via PROFINET IO RT with PROFIsafe.

For installation, refer to the documentation "Fieldbus interface DFS21B PROFINET with PROFIsafe".

Electronics data



Option DFS21B	
External voltage supply via X26	V = DC 24 V (-15%, +20%) I_{max} = DC 200 mA P_{max} = 3.4 W
Application protocols	• **PROFINET IO** (Ethernet frames with frame identification 8892_{hex}) for control and parameterization for the frequency inverter. • **HTTP** (Hypertext Transfer Protocol) for diagnostics using a web browser. • **SMLP** (Simple MOVILINK® protocol), protocol used by MOVITOOLS® MotionStudio.
Port numbers used	• 300 (SMLP) • 80 (HTTP)
Ethernet services	• ARP • ICMP (ping)
OSI layer 1/2	Ethernet II
Baud rate	100 MB in full duplex process
Connection technology	2 × RJ45 with internal switch and auto-crossing
addressing	4 byte IP address and/or MAC-ID (00:0F:69:xx:xx:xx)
F-address	1 – 1022, can be set via DIP switch
Manufacturer identification (Vendor ID)	$010A_{hex}$
GSD file name	GSML-V2.1-SEW-DFE-DFS-2Ports-YYYYMMTT.xml

- ⚠ **CAUTION!** Safety-related applications are realized with the use of PROFIsafe interfaces.

  Refer to the documentation "Fieldbus interface DF21B PROFINET with PROFIsafe".

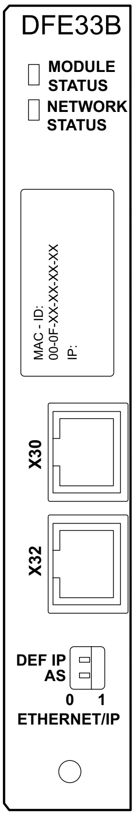
DFE33B fieldbus interface for EtherNet/IP and Modbus/TCP

Description

Thanks to its powerful universal fieldbus interface with the EtherNet/IP DFE33B option, the MOVITRAC® B frequency inverter enables connection to higher-level automation systems via EtherNet/IP.

For installation, refer to the documentation "Fieldbus interface DFE33B EtherNet/IP".

Electronics data

Option DFE33B		
	External voltage supply	V = DC 24 V (-15%, +20%) I_{max} = DC 200 mA P_{max} = 3.4 W
	Application protocols	• **EtherNet/IP** (Industrial Protocol) or **Modbus/TCP** for control and parameterization of the inverter. • **HTTP** (Hypertext Transfer Protocol) for diagnostics using a web browser. • **SMLP** (Simple MOVILINK® protocol), protocol used by MOVITOOLS® MotionStudio. • **DHCP** (Dynamic Host Configuration Protocol) for automatic assignment of address parameters.
	Port numbers used	• 44818 EtherNet/IP (TCP) • 2222 EtherNet/IP (UDP) • 502 Modbus/TCP • 300 SMLP (TCP, UDP) • 80 HTTP • 67 / 68 DHCP
	Ethernet services	• ARP • ICMP (ping)
	ISO / OSI-Layer 1/2 ISO / OSI layer 4/5	• Ethernet II • TCP/IP and UDP/IP
	Automatic baud rate detection	10 / 100 MB
	Connection technology	2 × RJ45 with internal switch and auto-crossing
	addressing	4 byte IP address and/or MAC-ID (00-0F-69-xx-xx-xx)
	Manufacturer identification (Vendor ID)	• $013B_{hex}$ (EtherNet/IP™) • "SEW-EURODRIVE" (Modbus TCP)
	Tools for startup	MOVITOOLS® MotionStudio software package from version 5.40
	Firmware version of the MOVITRAC® B	No special firmware version is required.
	EDS file name	SEW_GATEWAY_DFE33B.eds

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Fieldbus gateways

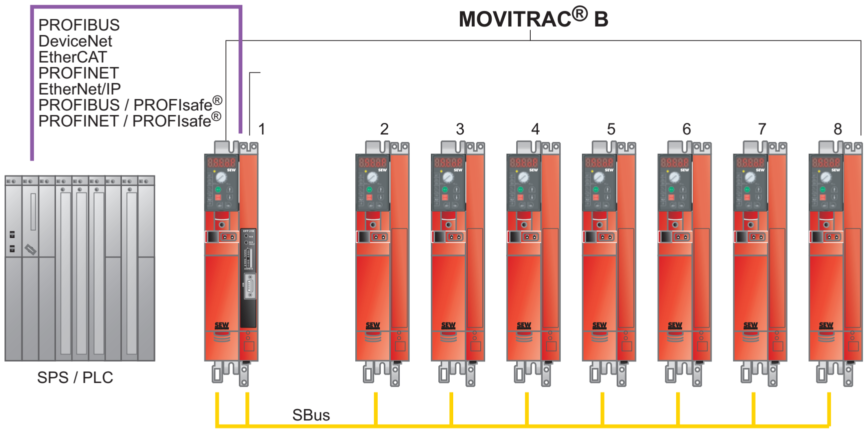
The fieldbus gateways convert standard fieldbuses to the SEW-EURODRIVE SBus. This means that up to 8 inverters can be addressed by one gateway.

The controller (PLC or PC) and the MOVITRAC® B frequency inverter exchange process data, such as control word or speed, using the fieldbus. The FSC11B/12B communication module is required to connect the MOVITRAC® B to the fieldbus gateways. This is also necessary if the gateway is integrated in the inverter. The FIO11B module cannot be used for the connection.

In principle, you can also connect and operate other SEW-EURODRIVE devices (e.g. MOVIDRIVE® frequency inverters) to the fieldbus via the SBus.

The gateway functionality is available in 2 different versions:

- Integrated in the inverter: The DF..B fieldbus interface is mounted in the MOVITRAC® B.



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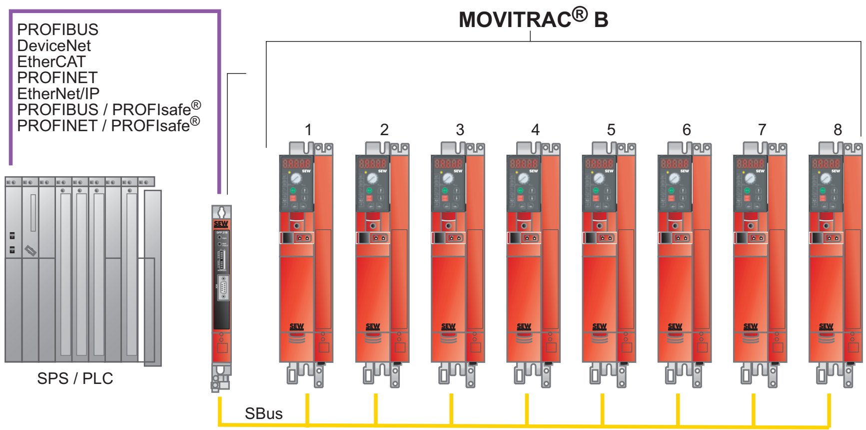
- In a separate housing: The DF..B fieldbus interface is mounted in a UOH11B housing.



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INFORMATION

If a fieldbus interface is installed in a MOVITRAC® B at the factory, the SBus address *P881* is already set to "1".

For MOVITRAC® B without fieldbus interface, the SBus address *P881* is set to "0" at the factory.

Gateways for the following bus systems are available for connection to fieldbuses.

Bus	Separate housing	Integrated in inverter[1)]
PROFIBUS	DFP21B / UOH11B	MC07B... / FSC11B/12B / DFP21B
DeviceNet	DFD11B / UOH11B	MC07B... / FSC11B/12B / DFD11B
EtherCAT®[2)]	DFE24B / UOH11B	MC07B... / FSC11B/12B / DFE24B
PROFINET	DFE32B / UOH11B	MC07B... / FSC11B/12B / DFE32B
EtherNet/IP + Modbus/TCP	DFE33B / UOH11B	MC07B... / FSC11B/12B / DFE33B
PROFIBUS / PROFIsafe®	DFS11B / UOH11B	MC07B... / FSC11B/12B / DFS11B
PROFINET / PROFIsafe®	DFS21B / UOH11B	MC07B... / FSC11B/12B / DFS21B

1) Integration in inverter not for size 0XS.

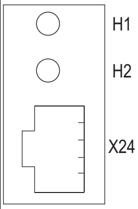
2) Alternatively, any MOVITRAC® B device can be connected to an EtherCAT® network via an FSE24B front module.

MOVITRAC® B with built-in option card is supplied with a connection cable for the system bus connection.

When the gateways are supplied by MOVITRAC® B, the MOVITRAC® B itself must be supplied with DC 24 V at terminals X12.8 and X12.9.

Functional principle

The fieldbus gateways have standardized interfaces. Connect the lower-level MOVITRAC® B devices to the fieldbus gateway via the device system bus (SBus).

Front view of MOVITRAC® B / UOH11B	Description	Function
	LED H1 (red)	System error (only for gateway functionality)
	LED H2 (green)	Reserved
	X24 X-Terminal	RS485 interface for diagnostics via PC and MOVITOOLS® MotionStudio

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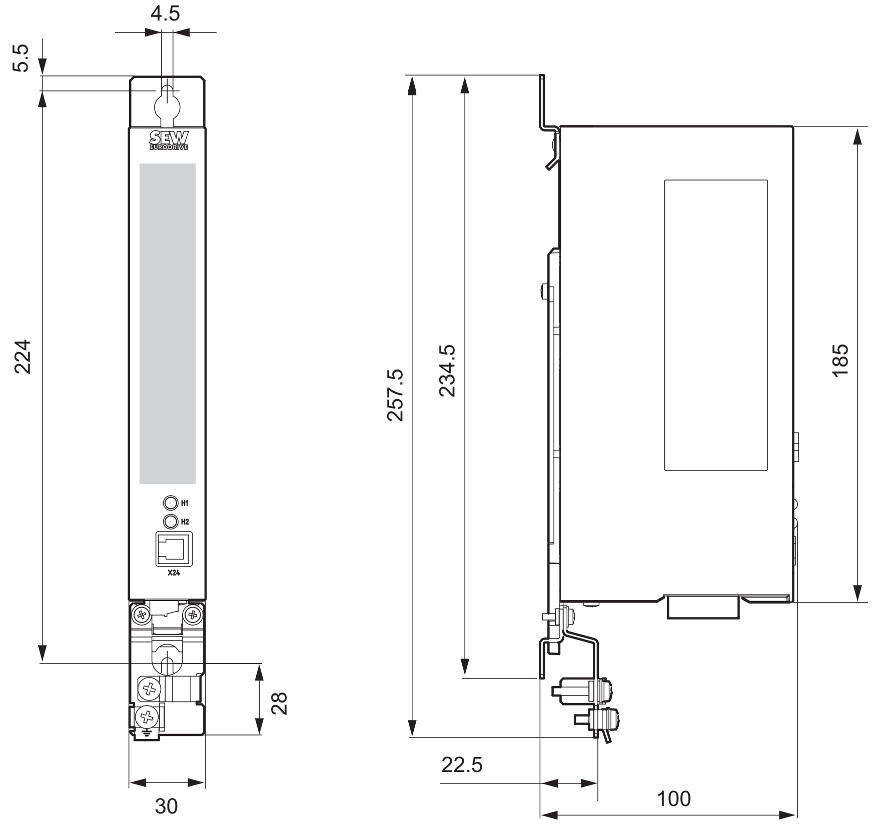
Dimension drawing for UOH

All dimensions are in mm.



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4.2.5 MOVI-PLC® controller

INFORMATION

All option cards must be specified when ordering. Subsequent installation by the customer is not permitted.

Unit variants

The MOVI-PLC® controller is available in various designs, which differ in the modules available from a range of libraries. For installation, refer to the "MOVI-PLC® controller" documentation.

MOVI-PLC® unit design		Description
MOVI-PLC® basic	DHP11B-T0	MOVI-PLC® basic controller
	DHP11B-T1[1)]	Technology version I enables electronic cam, synchronous operation, etc. in addition to design T0
	DHP11B-T2[1)]	Technology version II enables handling etc. in addition to design T1
MOVI-PLC® advanced	DHE21B/41B	Functionality of MOVI-PLC® basic, plus enormous power reserves and high-speed interfaces.

1) The T1 and T2 designs are only of limited use together with MOVITRAC® B. Contact SEW-EURODRIVE.

Description

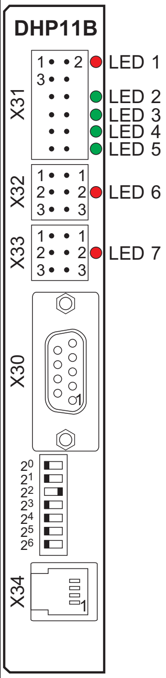
With the MOVI-PLC® basic DHP11B controller, SEW-EURODRIVE offers a freely programmable controller in its product portfolio in accordance with IEC 61131-3 and PLCopen.

The DHP11B option is integrated ex works (not in size 0XS) or supplied in its own UOH housing. An extension of a device with this option can only be carried out by SEW-EURODRIVE.

The MOVI-PLC® DHP11B.. controller is equipped with a PROFIBUS DP-V1 slave interface, 2 SBus interfaces (CAN), RS485 and 8 digital inputs/outputs, 5 of which are interrupt-capable. The DHP11B can control 12 devices simultaneously (MOVIDRIVE®, MOVITRAC®, MOVIMOT®).

MOVI-PLC® basic DHP11B

MOVI-PLC® basic DHP11B electronics data:



	LEDs for • Voltage supply I/O • Firmware • Program • PROFIBUS • System buses
	• PROFIBUS DP and DPV1 according to IEC 61158 • Automatic baud rate detection from 9.6 kB to 12 MB • Implement bus termination with a suitable plug • GSD file SEW_6007.GSD • DP ID number 6007_{hex} (24579_{dec}) • Maximum of 32 process data units
System bus	• 2 system buses (CAN) for control of 12 inverters and CANopen I/O modules • CAN layer 2 (SCOM cyclical, acyclical) or via the SEW-MOVILINK® protocol • Baud rate: 125 kB – 1 MB • External bus termination • Address range: 0 – 127
Engineering	Via RS485, PROFIBUS and the system buses
Panel operation	About RS485
Connection technology	• PROFIBUS: 9-pin D-sub connector according to IEC 61158 • System buses and I/O: pluggable terminals • RS485: RJ10
Digital inputs/outputs	8 I/O according to IEC 61131-2, configurable as input or output, 5 of which are interrupt-capable.
Memory	• Program: 512 kB • Data: 128 kB • Retain: 24 kB
Tools for startup	• Programming languages – STL – ST – LAD – FBD – AS • Libraries for optimized control of the inverters

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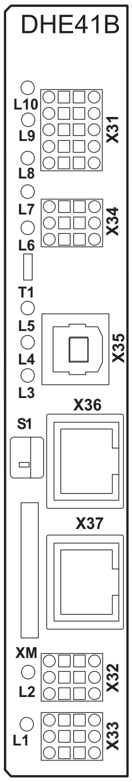
MOVI-PLC® basic DHE21B/41B

Electronics data of MOVI-PLC® basic DHE21B/41B:



DHE21B/41B option	
Part number	• Option DHE21B: 18236073 Option DHE41B: 18211607
Electrical supply	• X26: V = DC 24 V (-15% / +20%) DGND must be grounded (PELV) • Power consumption: P_{max} = 8.5 W • I_{max} = 600 mA • X31: Digital inputs and outputs must be supplied separately with DC 24 V
Potential levels	The DHE21B/41B option has the following potential levels: • Control / CAN 1 / COM1 potential • COM2 potential • Digital inputs/outputs potential • CAN 2 system bus potential
Memory	• Retain data: 32 kB • System variables (Retain): 8 kB Program memory: • DHE21B: 2 MB (for user program, incl. IEC libraries) • DHE41B: 6 MB (for user program, incl. IEC libraries) Data memory: • DHE21B: 4 MB (for IEC application) • DHE41B: 8 MB (for IEC application)
System bus CAN 2 X32:1 – X32:3 System bus CAN 1 X33:1 – X33:3	• CAN 1 and CAN 2 system bus according to CAN specification 2.0, parts A and B, transmission technology according to ISO 11898 • The CAN 2 system bus is galvanically isolated • Max. 64 stations per CAN system bus • Max. 64 SCOM transmit objects / 32 receive objects per CAN system bus • Address range 0 – 127 • Baud rate: 125 kB – 1 MB • If X32 or X33 is the bus termination, you must connect a terminating resistor (120 Ω) externally • You can remove connector X32 or X33 without interrupting the system bus • The system bus can be operated in layer 2 (SCOM cyclical, acyclical) or in accordance with the SEW-MOVILINK® protocol
Ethernet 1 X36	System bus, reserved
Ethernet 2 X37	• TCP/IP • Possible connections: Engineering PC, other controller, intranet
USB	USB 1.0 for connecting an engineering PC
RS485 interface COM1/2 X34:1 – X34:4	• For connecting a DOP11A/B operator terminal or a gearmotor with integrated MOVIMOT® frequency inverter • I/O standard, 57.6 / 9.6 kB, max. cable length 200 m total • Fixed dynamic terminating resistor

DHE21B/41B option		
	SD memory card	• PC-readable • Contains: – Firmware – IEC program – Data • Min. 128 MB memory • Designs, part numbers and functions: – OMH41B-T0: 1821 204 2 Functions: Management of speed control, positioning, e.g. with the MPLCMotion_MDX library – OMH41B-T1: 1821 205 0 Functions: additional e.g. electronic cam, electronic gear unit, cam switch – OMH41B-T2: 1821 206 9 Functions: additional e.g. handling
	Engineering	Engineering is carried out via one of the following interfaces: • Ethernet 2 (X37) • USB (X35) All SEW components connected to the MOVI-PLC®*advanced* DHE41B controller can be engineered via the MOVI-PLC®*advanced* DHE41B controller. The engineering of the MOVI-PLC®*advanced* DHE41B controller cannot be carried out via the inverters. • MOVITOOLS® MotionStudio engineering software with PLC Editor

Control technology

SEW-EURODRIVE control technology consists of a scalable modular design of controllers that can either be programmed in IEC 61131-3 (MOVI-PLC®) or configured using ready-made software modules (CCU). The controllers can either be integrated directly into the device as an option card or operate any SEW drive electronics as a compact controller (UOH housing). SEW-EURODRIVE recommends the Basic and Standard performance classes for MOVITRAC® B, as these are intended for applications with coordinated single-axis movements of up to 16 axes.

Freely programmable motion and logic controller (MOVI-PLC®)

By using SD memory cards of type OMH41B, the controller can be used as a freely programmable MOVI-PLC® motion and logic controller. MOVI-PLC® is a series of programmable motion and logic controllers. It allows drive solutions, logic processes and sequence controls to be automated simply and efficiently using IEC 61131-3 compliant programming languages.

- MOVI-PLC® is a universal solution because it is able to control the entire portfolio of SEW-EURODRIVE inverters and offers a simple upgrade to a more powerful MOVI-PLC® version thanks to the universal execution of the programs.
- MOVI-PLC® is scalable due to several different hardware platforms (standard, advanced, etc.) and modular software concepts (libraries for numerous applications).
- MOVI-PLC® is powerful due to extensive technologies (such as electronic cam, synchronous operation) and the control of sophisticated applications (such as material handling).

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MOVI-PLC® standard performance class

The DH.21B controller enables the execution of coordinated single-axis movements as well as the integration of external inputs and outputs and Drive Operator Panels (DOP). This makes the DH.21B option suitable as a module controller or as a stand-alone controller for machines of medium complexity.

Configurable application controller (CCU)

By using SD memory cards of type OMC41B, the controller can be used as a configurable application controller (CCU). This means that only standardized software modules created by SEW-EURODRIVE can be executed. The software modules can be quickly and easily put into operation via a graphical configuration. A defined process data interface makes this functionality available to a higher-level controller. A process data monitor with control mode is available to support startup.

Performance class CCU Standard

The CCU standard performance class is intended for software modules with single-axis functionality and medium response times. A maximum of 16 axes can be connected to a configurable application controller. The following software modules are available and can be put into operation using the "AxisConfigurator" tool:

- Velocity control
- Cam positioning

Unit variants

As an option card

Option card	Description
MOVI-PLC® basic DH-P11B-T0	MOVI-PLC® basic
Controller standard DHE21B-T0	Controller with integrated Ethernet interface (protocols UDP, TCP/IP) for the automation of coordinated single-axis movements. USB interface for engineering and SD memory card for easy data storage.

As compact controller in the UOH housing

Option card	Description
MOVI-PLC® basic DH-P11B-T0	MOVI-PLC® basic
Controller standard DHE21B-T0	Controller with integrated Ethernet interface (protocols UDP, TCP/IP) for the automation of coordinated single-axis movements. USB interface for engineering and SD memory card for easy data storage.
Controller DHF21B-T0	Like DHE21B but additionally with the fieldbus slave interfaces Profibus and DeviceNet.
Controller DHR21B-T0	Like DHE21B but additionally with the Industrial Ethernet interfaces PROFINET, Ethernet TCP/IP and Modbus TCP.

Documentation for MOVI-PLC®

Detailed information on functionality, configuration and technical data can be found in the following publications:

- "Controller DHE21B / DHF21B / DHR21B (standard), DHE41B / DHF41B / DHR41B (advanced)" manual
- "MOVI-PLC® basic DHP11B.. controller" manual

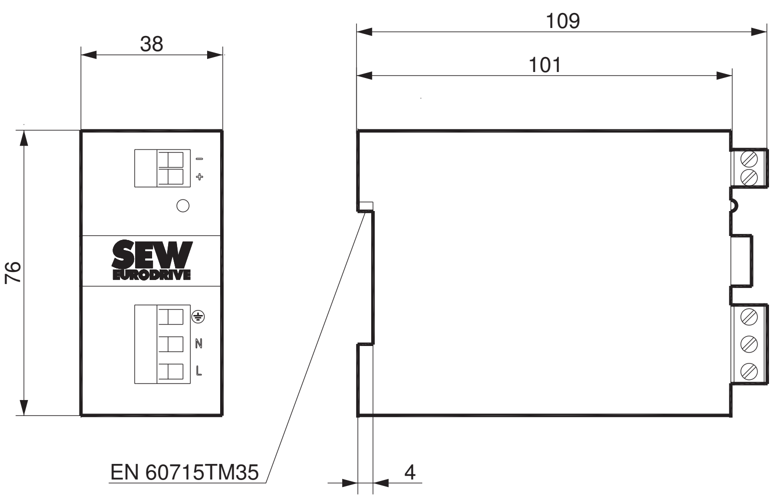
4.2.6 UWU52A switched-mode power supply

Technical data

UWU52A switched-mode power supply	
Part number	1881817
Input voltage	1 × AC 110 – 240 V
Voltage range	AC 95 – 265 V, DC 110 – 300 V
Frequency	50/60 Hz
Maximum no-load current	AC 40 mA
Nominal input current with 1 × AC 110 V With 1 × AC 230 V	AC 1.04 A AC 0.63 A
Output voltage	DC 24 V (-1% / +3%)
Nominal output current at 40 °C at 55 °C	DC 2.5 A DC 2.0 A
Residual ripple	< 50 mV
Interference voltage	< 120 mV
Power loss	< 5.5 W
Mass	0.23 kg
Working temperature	0 °C to +55 °C (condensation not permitted)
Degree of protection	IP20 (EN 60529)
Protection class	I
Connection	Screw terminals for cable cross section 0.20 – 2.5 mm^2 Tightening torque 0.4 – 0.5 Nm

Dimension drawing

All dimensions are in mm.



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4.2.7 Regenerative power supply

For MOVITRAC® B inverters from size 2 in 4Q operation with generator mode, the MOVIDRIVE® MDR60A regenerative power supply can be used as an alternative to braking resistors. The prerequisite for this is a high-performance supply system. You can find detailed information on this in the system manual "MOVIDRIVE® MDR60A/61B regenerative power supply and MDX62B motor inverters", which you can order from SEW-EURODRIVE.

MOVIDRIVE® MDR60A supplies the DC link circuit of the connected MOVIDRIVE® drive inverters with electrical power from the supply system in motoring operation and returns regenerative power to the supply system in regenerative operation.

UL approval

UL and cUL approval has been granted for MOVIDRIVE® MDR60A0150-503-00, MDR60A0370-503-00, MDR60A0750-503-00, MDR61B1600-503-00, and MDR61B2500-503-00 devices. cUL is equivalent to CSA approval. The MOVIDRIVE® MDR60A1320-503-00 does not have UL or cUL approval.

Protection and monitoring functions

- Monitoring and protection against thermal overload.
- Detection of power failure within a power half-wave.
- Protection against overvoltage.

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Features of a regenerative power supply unit compared to an inverter with braking resistors

- Energy balance: Regenerative power is fed back into the supply system instead of being converted into waste heat.
- Reduced complexity of installation when there are several inverters (mains and braking resistor connections). However, a braking resistor is required for bringing the drive to a controlled stop even when there is a disruption in the supply system.
- Reduction in use of control cabinet space and fan power if the braking resistor was previously installed in the control cabinet.

General technical data

MOVIDRIVE® MDR60A regenerative power supply unit

MOVIDRIVE® MDR60A	**0150-503-00 (size 2)** **0370-503-00 (size 3)** **0750-503-00 (size 4)**
Interference immunity	Complies with EN 61800-3
Interference emission with EMC-compliant installation	Complies with EN 61800-3: • With line filter NF035-503 (MDR60A0150-503-00) • With line filter NF048-503 (MDR60A0150-503-00) • With line filter NF085-503 (MDR60A0370-503-00) • With line filter NF150-503 (MDR60A0750-503-00)
Ambient temperature ϑ_{amb} Ambient temperature derating	0 °C to +40 °C I_N reduction: 3% I_N per K up to max. 60 °C
Climate class	EN 60721-3-3, class 3K3
Storage temperature[1)] ϑ_S	-25 °C to +70 °C (EN 60721-3-3, class 3K3)
Type of cooling (DIN 51751)	External cooling (temperature-controlled fan, response threshold 50 °C)
Degree of protection size 2 EN 60529 size 3 (NEMA1) size 4	IP20 IP20 IP00 (power connections) IP10 (power connections) • with fitted Plexiglas cover supplied as standard • with heat shrink tubing fitted (not included in the scope of delivery) IP20 • With fitted DLB11B touch guard
Duty type	Continuous duty (EN 60034-1 and 1-3)
Overvoltage category	III according to IEC 60664-1 (VDE 0110-1)
Pollution class	2 in accordance with IEC 60664-1 (VDE 0110-1)
Installation altitude	At h ≤ 1000 m without restrictions. The following restrictions apply to altitudes ≥ 1000 m: • From 1000 m to max. 4000 m: – I_N reduction by 1% per 100 m • From 2000 m to max. 4000 m: – Protective separation of power and electronic connections is no longer guaranteed above 2000 m. This requires external measures (IEC 60664-1/EN 61800-5-1) – An overvoltage protection device must be installed upstream to reduce the overvoltage from category III to category II.

1) In case of extended storage, connect the device to line voltage for at least 5 minutes every two years, otherwise the device's service life might be reduced.

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Technical data of MOVIDRIVE® MDR60A

MOVIDRIVE® MDR60A0150/0370 size 2 and size 3

MOVIDRIVE® MDR60A **Standard design** **Design with painted printed circuit boards**		**Size 2** **0150-503-00** **0150-503-00/L**	**Size 3** **0370-503-00** **0370-503-00/L**
Part number		1 8252710 1 8252729	8266581 8296723
INPUT			
Nominal line voltage (according to EN 50160)	V_{line}	3 × AC 380 V - 500 V	
Line frequency	f_{line}	50 Hz – 60 Hz ±5%	
Rated connected load	P_N	15 kW	37 kW
Nominal line current (at V_{line} = 3 × AC 400 V)	I_{line}	AC 29 A	AC 66 A
ELECTRONICS TERMINALS			
Digital inputs Internal resistance		PLC-compatible (EN 61131), sampling cycle 1 ms R_i ≈ 3.0 kΩ, I_E ≈ 10 mA	
Signal level		+13 V – +30 V = "1" = contact closed -3 V – +5 V = "0" = contact open	
Digital outputs		PLC-compatible (EN 61131-2), response time 1 ms, short-circuit proof, I_{max} = 50 mA	
Signal level		"0"=0 V, "1"=+24 V, **Notice: Do not apply external voltage.**	
DC LINK			
Apparent output power (at V_{line} = 3 × AC 380 – 500 V)	S_A	25 kVA	50 kVA
DC link voltage (at nominal line current I_{line})	V_{DCL}	DC 560 V – 780 V	
Nominal DC link current (at nominal line current I_{line})	I_{DCL}	DC 35 A	DC 70 A
Max. DC link current	I_{DCL_max}	DC 53 A	DC 105 A
GENERAL			
Power loss at P_N	P_{Vmax}	120 W	950 W
Cooling air requirement		100 m³/h	180 m³/h
Power terminal connection	X1, X2	Separable terminal strips Conductor end sleeve DIN 46228	Screw and washer assembly M6
Permitted tightening torque		1.8 Nm	3.5 Nm
Permitted cable cross section		6 mm² PE: M4 with 1.5 Nm	25 mm²
Electronics terminals connection	X3	Permitted cable cross section: • One conductor per terminal: 0.20 – 2.5 mm² • Two conductors per terminal: 0.25 – 1 mm²	
Mass		4 kg	16 kg
Dimensions	W × H × D	118 mm × 320 mm × 127 mm	200 mm × 465 mm × 221 mm
Line choke (always necessary)		ND045-013 L_N = 0.1 mH Part number 8260133	ND085-013 L_N = 0.1 mH Part number 8260141
Line filter (optional)		NF035-503 up to 15 kW Part number 8271283 NF048-503 up to 22 kW (15 kW × 125%) Part number 8271178	NF085-503, Part number 8274150
For MOVITRAC®		0055 – 0150	0055 – 0370
Recommended line fuse		63 A	100 A

MOVIDRIVE® MDR60A0750/1320 size 4

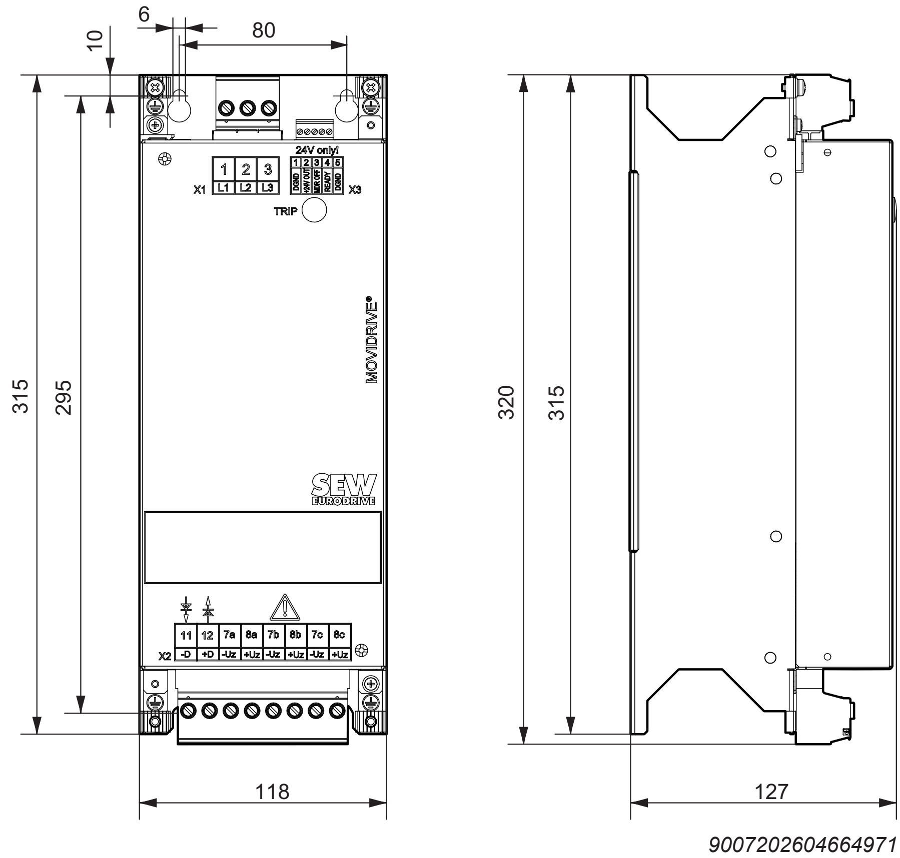
MOVIDRIVE® MDR60A Standard design Design with painted printed circuit boards		**Size 4 0750-503-00 0750-503-00/L**
Part number		8265569 8296731
INPUT		
Nominal line voltage (according to EN 50160)	V_{line}	3 × AC 380 V - 500 V
Line frequency	f_{line}	50 Hz – 60 Hz ±5%
Rated connected load	P_N	75 kW
Nominal line current (at V_{line} = 3 × AC 400 V)	I_{line}	AC 117 A
ELECTRONICS TERMINALS		
Digital inputs Internal resistance		Isolated (optocoupler), PLC-compatible (EN 61131), sampling cycle 1 ms R_i ≈ 3.0 kΩ, I_E ≈ 10 mA
Signal level		+13 V – +30 V = "1" = contact closed -3 V – +5 V = "0" = contact open
Digital outputs		PLC-compatible (EN 61131-2), response time 1 ms, short-circuit proof, I_{max} = 50 mA
Signal level		"0"=0 V, "1"=+24 V, **Notice: Do not apply external voltage.**
DC LINK		
Apparent output power (at V_{line} = 3 × AC 380 – 500 V)	S_A	90 kVA
DC link voltage	V_{DCL}	DC 560 V – 780 V
Nominal DC link current (at nominal line current I_{line})	I_{DCL}	DC 141 A
Max. DC link current (at nominal line current I_{line})	I_{DCL_max}	DC 212 A
GENERAL		
Power loss at P_N	P_{Vmax}	1700 W
Cooling air requirement		360 m^3/h
Power terminal connection	X1, X2	Terminal stud M10
Permitted tightening torque		14 Nm
Permitted cable cross section		70 mm^2
Connection for power terminals SKS 1 – 3		–
Electronics terminals connection	X3	Permitted cable cross section: • One conductor per terminal: 0.20 – 2.5 mm^2 • Two conductors per terminal: 0.25 – 1 mm^2
Mass		24 kg
Dimensions	W × H × D	280 mm × 522 mm × 205 mm
Line choke (always necessary)		ND200-0033 L_N = 0.03 mH Part number 8265798
Line filter (optional)		NF150-503, Part number 8274177
For MOVITRAC®		0055 – 0750
Recommended line fuse		175 A

Dimension drawings

MOVIDRIVE® MDR60A0150 size 2

When installing in the control cabinet, observe the following minimum clearance:

- 100 mm above and below
- No lateral clearance required



Dimensions in mm

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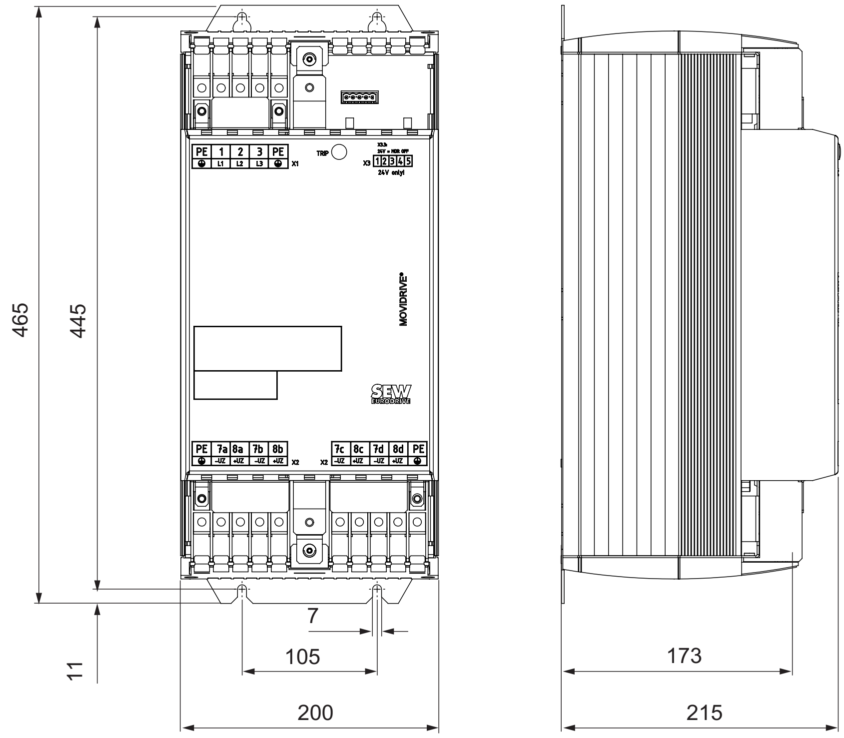
MOVIDRIVE® MDR60A0370 size 3

When installing in the control cabinet, observe the following minimum clearance:

- 100 mm above and below
- No lateral clearance required



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Dimensions in mm

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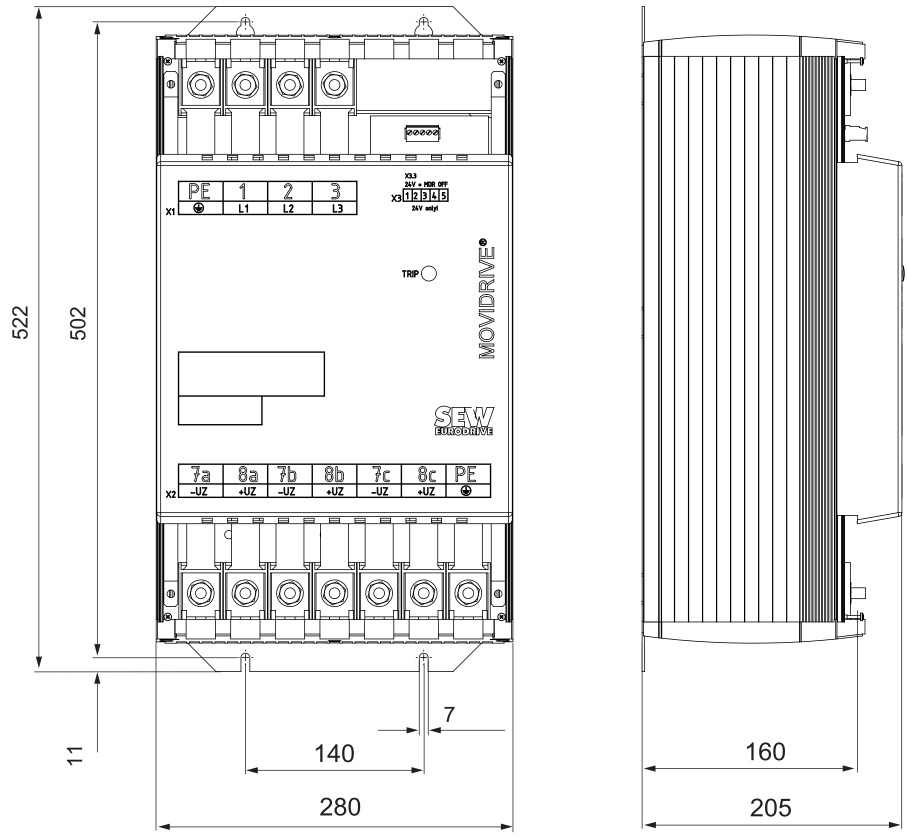
MOVIDRIVE® MDR60A0750 size 4

When installing in the control cabinet, observe the following minimum clearance:

- 100 mm above and below
- The minimum distance above the inverter for installing temperature-sensitive components, such as contactors or fuses, is 300 mm
- No lateral clearance required



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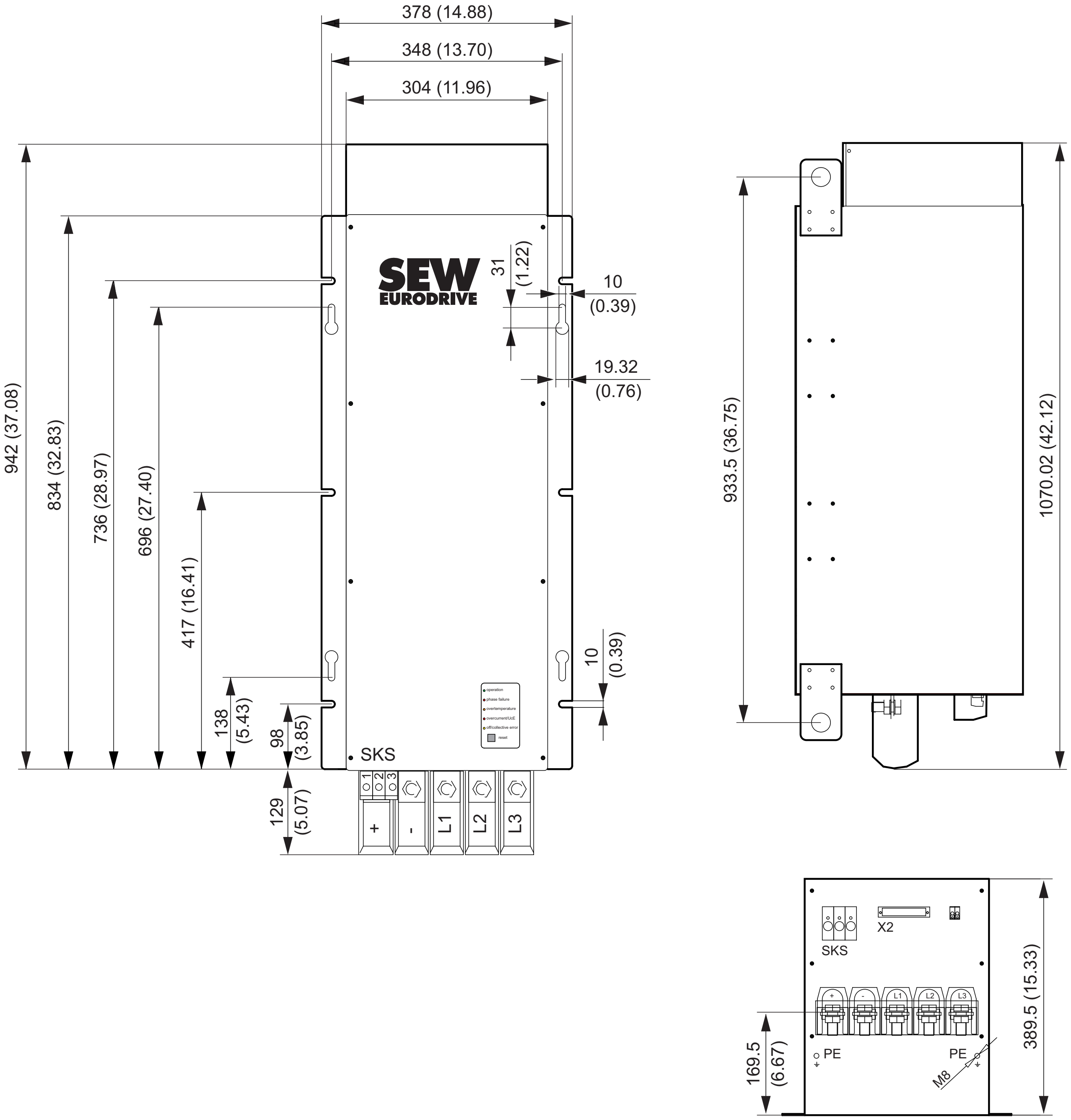
Dimensions in mm

MOVIDRIVE® MDR60A1320 size 6

Observe the following minimum clearance for control cabinet installation:

- 100 mm above
- Do not install any components that are sensitive to high temperatures within 300 mm above the device, for example contactors or fuses
- No clearance required below
- 70 mm on the side



All dimensions in mm (in)

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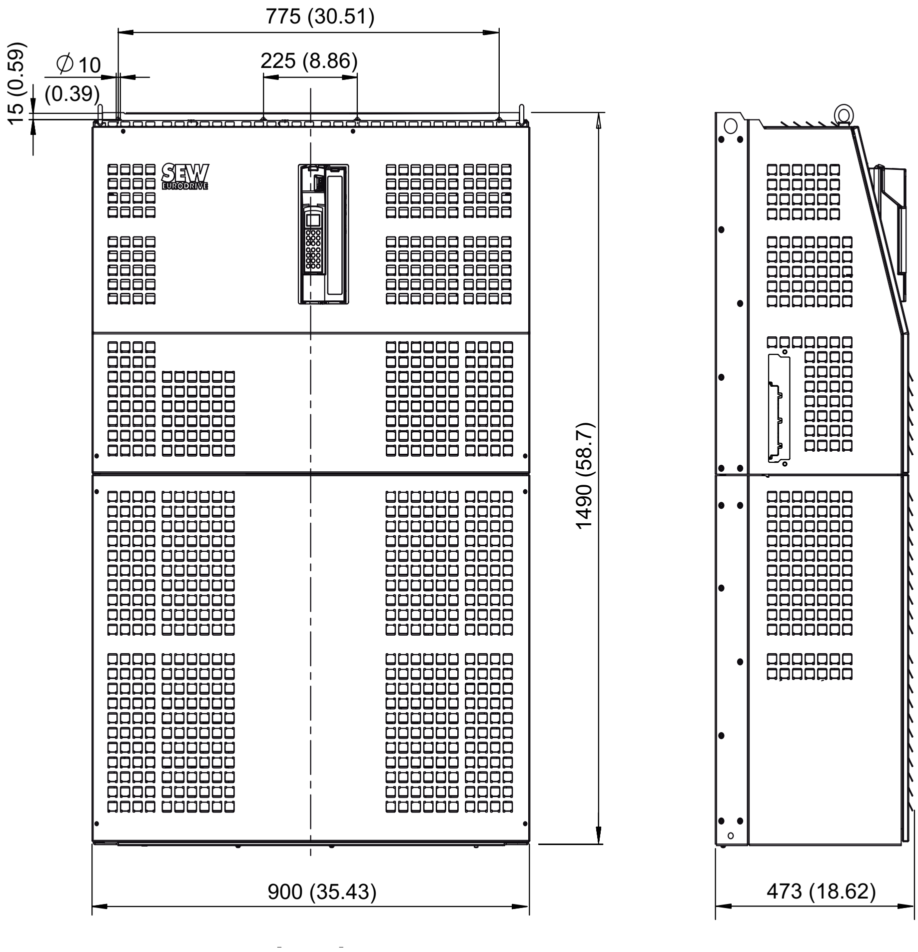
MOVIDRIVE® MDR61B1600/2500 size 7

Observe the following minimum clearance for control cabinet installation:

- 100 mm above
- Do not install any components that are sensitive to high temperatures within 300 mm above the device, for example contactors or fuses
- Mounting on a base (e.g. DLS31B mounting base) is recommended due to the choke ventilation
- No clearance required on the side



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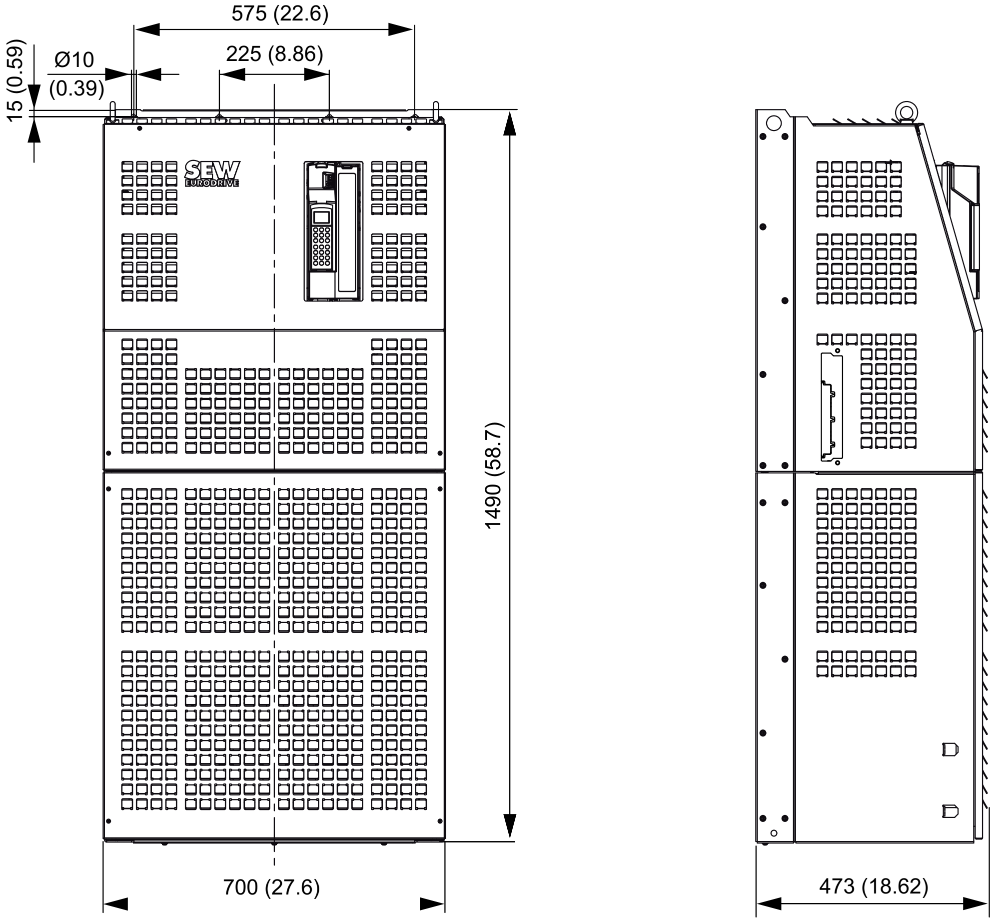
MOVIDRIVE® MDX62B1600/2000/2500 size 7

Observe the following minimum clearance for control cabinet installation:

- 100 mm above
- Do not install any components that are sensitive to high temperatures within 300 mm above the device, for example contactors or fuses
- No clearance required below
- No clearance required on the side



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DC link connection

SEW-EURODRIVE recommends using the following cable sets for the DC link connection. These cable sets have the appropriate dielectric strength and are also color-coded. This is necessary because reverse polarity and ground faults will destroy the connected devices.

The length of the cables restricts the DC link connection to the permitted length of 5 m. They can also be cut to length by the customer for connecting several devices. The cable lugs for connection to the regenerative power supply and to an inverter are included in the cable set. Commercially available cable lugs must be used to connect additional inverters. The inverters must then be connected to the regenerative power supply in a star configuration.

Cable set type	DCP12A	DCP13A	DCP15A
Part number	8145679	8142505	8142513
for connecting MOVITRAC®	0055 ... 0110	0150 ... 0300	0400 ... 0750

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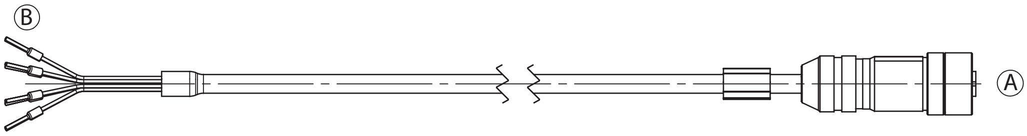
INFORMATION

For information on the DC link connection, refer to the "MOVIDRIVE® MDR60A regenerative power supply" system manual, which you can order from SEW-EURODRIVE.

4.2.8 Built-in encoder EI7C connection

Encoder cable with an M12



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Inverter connection			Motor connection side
Contact	**Signal**	**Cable core color**	**Contact**
X12.5 (DI04)	A	Brown (BN)	3
	A	White (WH)	4
X12.4 (DI03)	B	Yellow (YE)	5
	B	Green (GN)	6
	nc	Red (RD)	7
	nc	Blue (BU)	8
X12.8 (24VIO)	UB	Gray (GY)	1
X12.9 (GND)	GND	Pink (PK)	2

The encoder requires a current of up to 40 mA. An external 24 V supply might be required if the digital inputs are also supplied.

Part number:

Cable type	M12, conductor end sleeves
Fixed installation	1362 3273
Cable carrier installation	1362 3281

Further information can be found in the chapter "Simple positioning application module" (→ 🗎 185).

4.3 Technical data of braking resistors, chokes and filters

4.3.1 Braking resistors

BW braking resistors

General information

The BW braking resistors are matched to the MOVITRAC® B inverter series. The type of cooling is KS = natural cooling (air cooling).

The surfaces of the resistors get very hot if loaded with P_N. The installation location must take this circumstance into account. Braking resistors are therefore usually mounted on the control cabinet roof.

From an ambient temperature of 45 °C, a load derating of 4% per 10 K must be allowed for. Do not exceed a maximum ambient temperature of 80 °C. Observe the maximum permissible temperature of other components (e.g. MOVITRAC® B) for installation in the control cabinet.

UL and cUL approval

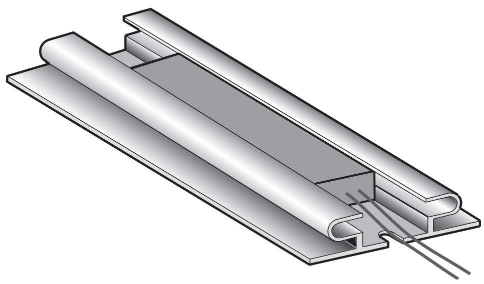
In connection with the MOVITRAC® B frequency inverters, the type BW.. braking resistors are approved in accordance with UL and cUL. SEW-EURODRIVE will provide proof of this upon request. The BW..-T and BW..-P braking resistors have cRUus approval independent of the MOVITRAC® B inverters.

PTC braking resistors

Observe the following points for PTC braking resistors:

- Only recommended for applications with low generator mode energy.
- The resistor protects itself reversibly against overload by becoming high-impedance and no longer absorbing any energy.

  The inverter then shuts down with the "brake chopper" error (error *F04*).



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Assignment of the PTC braking resistors:

Braking resistor type	BW1	BW2	BW3	BW4
Part number	8228973	8231362	8235988	8235996
Ambient temperature ϑ_A	-25 °C to +60 °C			
For MOVITRAC® B	0003 – 0040 (400/500 V)		0003 – 0022 (230 V)	

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Flat design

The flatpack resistors have degree of protection IP54 and internal thermal overload protection (not replaceable). You can install the resistors as follows, depending on the type:

- With mounting rail fastening FHS or by submounting FKB under the heat sink. Submounted braking resistors do not achieve the specified cdf performance. The FHS and FKB options are only suitable for the BW027-003 and BW072-003 braking resistors.
- With BS touch guard on a mounting rail.

230 V

Braking resistor type	BW027-003	BW027-005
Part number	8269491	8269505
100% cdf 50% cdf 25% cdf 12% cdf 6% cdf	230 W 310 W 410 W 550 W 980 W	450 W 610 W 840 W 1200 W 2360 W
Resistance value R_{BW}	27 Ω ±10%	27 Ω ±10%
Tripping current of external bimetallic relay	1.0 A	1.4 A
Ambient temperature ϑ_A	-20 °C to +45 °C	
For MOVITRAC® B 230 V	0003 – 0022	0003 – 0022

400/500 V

Braking resistor type	BW072-003	BW072-005
Part number	8260583	8260605
100% cdf 50% cdf 25% cdf 12% cdf 6% cdf	230 W 310 W 420 W 580 W 1000 W	450 W 600 W 830 W 1110 W 2000 W
Resistance value R_{BW}	72 Ω ±10%	72 Ω ±10%
Tripping current of external bimetallic relay	0.6 A	1.0 A
Ambient temperature ϑ_A	-20 °C to +45 °C	
For MOVITRAC® B 400/500 V	0003 – 0040	0003 – 0040

Wire resistors and grid resistors

- The MOVITRAC® B frequency inverter consists of a perforated sheet cover (IP20) that is open to the mounting surface.
- The short-time load capacity of the wire and grid resistors is higher than that of the flatpack resistors, see chapter "Selecting the braking resistor" (→ 🗎 124).
- A temperature switch is integrated in the BW..-T braking resistor.
- A thermal overcurrent relay is integrated in the BW..-P braking resistor.

SEW-EURODRIVE recommends implementing protection against overload for the wire and grid resistors by using a bimetallic relay with trip characteristics of trip class 10 or 10 A (in accordance with EN 60947-4-1). Set the tripping current to the value I_F, see the following tables.

Do not use any electronic or electromagnetic fuses, as these can trip even if the current is exceeded for a short time and is still permissible.

For braking resistors of the BW..-T / BW..-P series, you can connect the integrated temperature sensor or overcurrent relay using a 2-core, shielded cable as an alternative to a bimetallic relay. The cable entry for BW..-T and BW..-P braking resistors can be run from the front or the back (→ dimension drawing for braking resistors BW.. / BW..-T / BW..-P). Use filler plugs for unconnected tapped holes.

The surfaces of the resistors get very hot if loaded with P_N. The installation location must take this circumstance into account. For this reason, braking resistors are usually mounted on the control cabinet roof.

The performance data listed in the following tables indicate the current-carrying capacity of the braking resistors depending on their cyclic duration factor. The cyclic duration factor (cdf) of the braking resistor in% is based on a cycle duration ≤ 120 s.

Assignment to AC 230 V devices

Type	BW027-006	BW027-012	BW018-015	BW018-035	BW018-075	BW012-025	BW012-050	BW012-100
Part number	8224226	8224234	–	–	–	8216800	–	–
Part number of type BW...-T	–	–	–	18201385	18201393	–	18201407	18201415
Part number of type BW...-P	–	–	18204163	–	–	18204147	–	–
100% cdf 50% cdf 25% cdf 12% cdf 6% cdf	0.6 kW 1.1 kW 1.9 kW 3.6 kW 5.7 kW	1.2 kW 2.2 kW 3.8 kW 7.2 kW 8.7 kW[1]	1.5 kW 2.7 kW 4.5 kW 6.7 kW 13.0 kW[1]	3.5 kW 5.9 kW 10.5 kW 13.0 kW[1] 13.0 kW[1]	7.5 kW 12.7 kW 13.0 kW[1] 13.0 kW[1] 13.0 kW[1]	2.5 kW 4.2 kW 7.5 kW 11.2 kW 19.0 kW	5.0 kW 8.5 kW 15.0 kW 19.6 kW[1] 19.6 kW[1]	10 kW 17 kW 19.6 kW[1] 19.6 kW[1] 19.6 kW[1]
Resistance	27 Ω ±10%		18 Ω ±10%			12 Ω ±10%		
Tripping current I_F	4.7 A	6.7 A	9.1 A	13.9 A	20.4 A	14.4 A	20.4 A	28.9 A
Connections	Ceramic terminals 2.5 mm²			Bolt M8				
Tightening torque	0.5 Nm		6 Nm					
Design	Wire resistor			Grid resistor				
For MOVITRAC® B	0015 – 0037		2 × parallel with 0110			0055 / 0075		

1) Physical power limit due to DC link voltage and resistance value.

Type	BW039-003	BW039-006	BW039-012	BW039-026	BW915	BW106	BW206
Part number	8216878	8216886	8216894	–	–	–	–
Part number of type BW...-T	–	–	18201369	18204155	18204139	18200834	18204120
100% cdf 50% cdf 25% cdf 12% cdf 6% cdf	0.3 kW 0.5 kW 1.0 kW 1.8 kW 2.9 kW	0.6 kW 1.1 kW 1.9 kW 3.5 kW 5.7 kW	1.2 kW 2.2 kW 3.8 kW 6.0 kW[1] 6.0 kW[1]	2.6 kW 4.6 kW 6.0 kW[1] 6.0 kW[1] 6.0 kW[1]	15.6 kW 15.6 kW 15.6 kW[1] 15.6 kW[1] 15.6 kW[1]	13.5 kW 23 kW 39.2 kW[1] 39.2 kW[1] 39.2 kW[1]	18 kW 30.6 kW 39.2 kW[1] 39.2 kW[1] 39.2 kW[1]
Resistance	39 Ω ±10%				15 Ω ±10%	6 Ω ±10%	
Tripping current I_F	2.8 A	3.9 A	5.5 A	8.1 A	28 A	38 A	42 A
Connections	Ceramic terminals 2.5 mm²				Bolt M8		
Tightening torque	0.5 Nm				6 Nm		
Design	Wire resistor				Grid resistor		
For MOVITRAC® B	0015 – 0022				2 × parallel with 0110	0150 / 2 × parallel with 0220 / 0300	

1) Physical power limit due to DC link voltage and resistance value.

BW...-T / BW...-P	
Signal contact connection cross section/tightening torque	1 x 2.5 mm²/ 1 Nm
Switching capacities of the temperature switch signal contact	• DC 2 A/DC 24 V (DC11) • AC 2 A/AC 230 V (AC11)
Switch contact (NC contact)	according to EN 61800-5-1

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Assignment to AC 400 V units

Type	BW100-006	BW168	BW268	BW147	BW247	BW347
Part number	8217017	820604X	8207151	8207135	8207143	8207984
Part number of type BW..-T	18204198	18201334	18204171	18201342	18200842	18201350
100% cdf 50% cdf 25% cdf 12% cdf 6% cdf	0.6 kW 1.1 kW 1.9 kW 3.6 kW 5.7 kW	0.8 kW 1.4 kW 2.6 kW 4.8 kW 7.6 kW	1.2 kW 2.2 kW 3.8 kW 7.2 kW 11.4 kW[1]	1.2 kW 2.2 kW 3.8 kW 7.2 kW 11.4 kW	2.0 kW 3.8 kW 6.4 kW 12 kW 19 kW	4.0 kW 7.2 kW 12.8 kW 20 kW[1] 20 kW[1]
Resistance	100 Ω ±10%	68 Ω ±10%		47 Ω ±10%		
Tripping current I_F	2.4 A	3.4 A	4.2 A	5 A	6.5 A	9.2 A
Connections	Ceramic terminals 2.5 mm^2					Ceramic terminals 10 mm^2
Tightening torque	0.5 Nm					1.6 Nm
Design	Wire resistor					
For MOVITRAC® B	0015 – 0040			0055 / 0075		

1) Physical power limit due to DC link voltage and resistance value.

Type	BW039-012	BW039-026	BW039-050	BW018-015	BW018-035	BW018-075
Part number	8216894	–	–	8216843	–	–
Part number of type BW..-T	18201369	18204155	18201377	–	18201385	18201393
Part number of type BW..-P	–	–	–	18204163	–	–
100% cdf 50% cdf 25% cdf 12% cdf 6% cdf	1.2 kW 2.1 kW 3.8 kW 7.0 kW 11.4 kW	2.6 kW 4.7 kW 8.3 kW 15.6 kW 24.1 kW[1]	5.0 kW 8.5 kW 15.0 kW 22.5 kW[1] 24.1 kW[1]	1.5 kW 2.5 kW 4.5 kW 6.7 kW 11.4 kW	3.5 kW 5.9 kW 10.5 kW 15.7 kW 26.6 kW	7.5 kW 12.8 kW 22.5 kW 33.8 kW 52.3 kW[1]
Resistance	39 Ω ±10%			18 Ω ±10%		
Tripping current I_F	5.5 A	8.1 A	11.3 A	9.1 A	13.9 A	20.4 A
Connections	Ceramic terminals 2.5 mm^2		Bolt M8	Ceramic terminals 2.5 mm^2	Bolt M8	
Tightening torque	0.5 Nm		6 Nm	1.0 Nm	6 Nm	
Design	Wire resistor		Grid resistor			
For MOVITRAC® B	0110		0110	0150 / 0220		

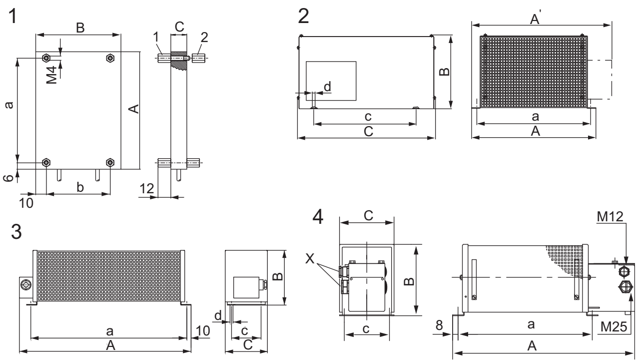
1) Physical power limit due to DC link voltage and resistance value.

Type	BW915	BW012-025	BW012-050	BW012-100	BW0106	BW206
Part number	–	8216800	–	–	–	–
Part number of type BW..-T	18204139	–	18201407	18201415	18200834	18204120
Part number of type BW..-P	–	18204147	–	–	–	–
100% cdf 50% cdf 25% cdf 12% cdf 6% cdf	16.0 kW 27.2 kW 48.0 kW[1] 62.7 kW[1] 62.7 kW[1]	2.5 kW 4.2 kW 7.5 kW 11.2 kW 19.0 kW	5.0 kW 8.5 kW 15.0 kW 22.5 kW 38.0 kW	10 kW 17 kW 30 kW 45 kW 76.0 kW[1]	13.5 kW 23 kW 40 kW 61 kW 102 kW	18 kW 30.6 kW 54 kW 81 kW 136.8 kW
Resistance	15 Ω ±10%	12 Ω ±10%			6 Ω ±10%	
Tripping current I_F	32.6 A	14.4 A	20.4 A	28.8 A	47.4 A	54.7 A
Connections	Bolt M8					
Tightening torque	6 Nm					
Design	Grid resistor					
For MOVITRAC® B	0220	0300			0370 – 0750	

1) Physical power limit due to DC link voltage and resistance value.

Dimension drawing BW... / BW...-T / BW...-P

The following figure shows the mechanical dimensions in mm.



BW... :
- 1 = Flatpack design
  The connection lead is 500 mm long. The scope of delivery includes 4 M4 stud bolts each of type 1 and 2.
- 2 = Grid resistor
- 3 = Wire resistor
- 4 = Wire resistor with temperature switch (-T/-P)
  Cable entry (X) is possible from both sides.

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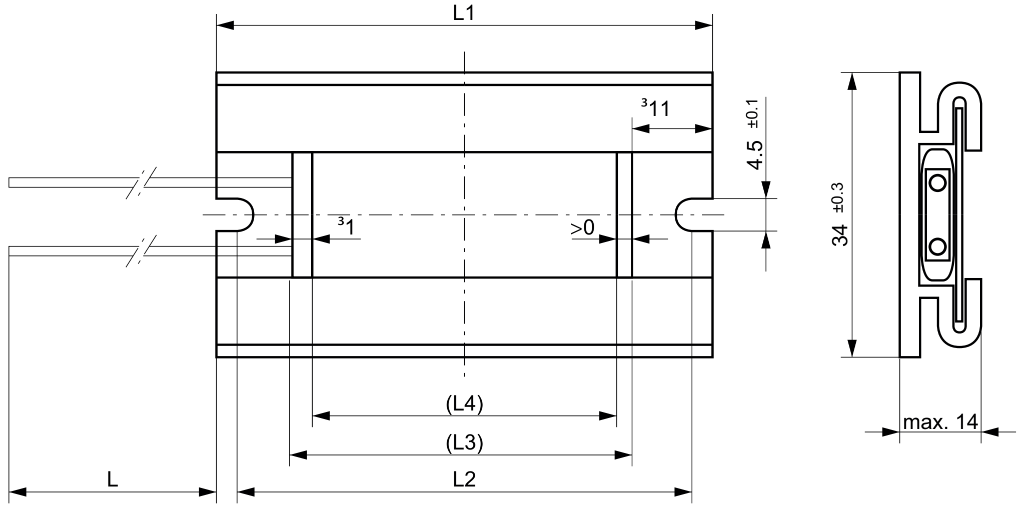
Type BW...	Mounting position	Main dimensions in mm			Fastenings mm			Cable gland	Mass kg
BW..-T/ BW...-P		A/A'	B	C	a	b/c	d		
BW072-003	1	110	80	15	98	60	–	–	0.3
BW027-003	1	110	80	15	98	60	–	–	0.3
BW072-005	1	216	80	15	204	60	–	–	0.6
BW027-005	1	216	80	15	204	60	–	–	0.6
BW027-006	3	486	120	92	430	64	6.5	PG11	2.2
BW027-012	3	486	120	185	426	150	6.5	PG11	4.3
BW100-006	4	486	120	92	430	64	6.5	PG11	2.2
BW100-006-T	4	549	120	92	430	80	6.5	M12 + M25	3.0
BW168	3	365	120	185	326	150	6.5	PG13.5	3.5
BW168-T	4	449	120	185	326	150	6.5	M12 + M25	3.6
BW268	3	465	120	185	426	150	6.5	PG13.5	4.3
BW268-T	4	549	120	185	426	150	6.5	M12 + M25	4.9
BW147	3	465	120	185	426	150	6.5	PG13.5	4.3
BW147-T	4	549	120	185	426	150	6.5	M12 + M25	4.9
BW247	3	665	120	185	626	150	6.5	PG13.5	6.1
BW247-T	4	749	120	185	626	150	6.5	M12 + M25	9.2
BW347	3	670	145	340	630	300	6.5	PG13.5	13.2
BW347-T	4	749	210	185	630	150	6.5	M12 + M25	12.4
BW039-003	3	286	120	92	230	64	6.5	PG11	1.5
BW039-006	3	486	120	92	430	64	6.5	PG11	2.2
BW039-012	3	486	120	185	426	150	6.5	PG11	4.3
BW039-012-T	4	549	120	185	426	150	6.5	M12 + M25	4.9
BW039-026-T	4	649	120	275	530	240	6.5	M12 + M25	7.5
BW018-015	3	620	120	92	544	64	6.5	PG11	4.0
BW018-015-P	4	649	120	185	530	150	6.5	M12 + M25	5.8
BW012-025	2	295	260	490	270	380	10.5	M12 + M25	8.0
BW012-025-P	2	295/355	260	490	270	380	10.5	M12 + M25	8.0
BW012-050-T	2	395	260	490	370	380	10.5	–	12
BW012-100-T	2	595	270	490	570	380	10.5	–	21
BW018-035-T	2	295	270	490	270	380	10.5	–	9.0
BW018-075-T	2	595	270	490	570	380	10.5	–	18.5
BW039-050-T	2	395	260	490	370	380	10.5	–	12
BW915-T	2	795	270	490	770	380	10.5	–	30
BW106-T	2	795	270	490	770	380	10.5	–	32
BW206-T	2	995	270	490	970	380	10.5	–	40

Dimension drawing PTC braking resistors



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Type	L1	L2	L3	L4	L
BW1	89	82	64	60	100
BW2	124	117	97	95	165
BW3	89	82	64	60	100
BW4	124	117	97	95	165

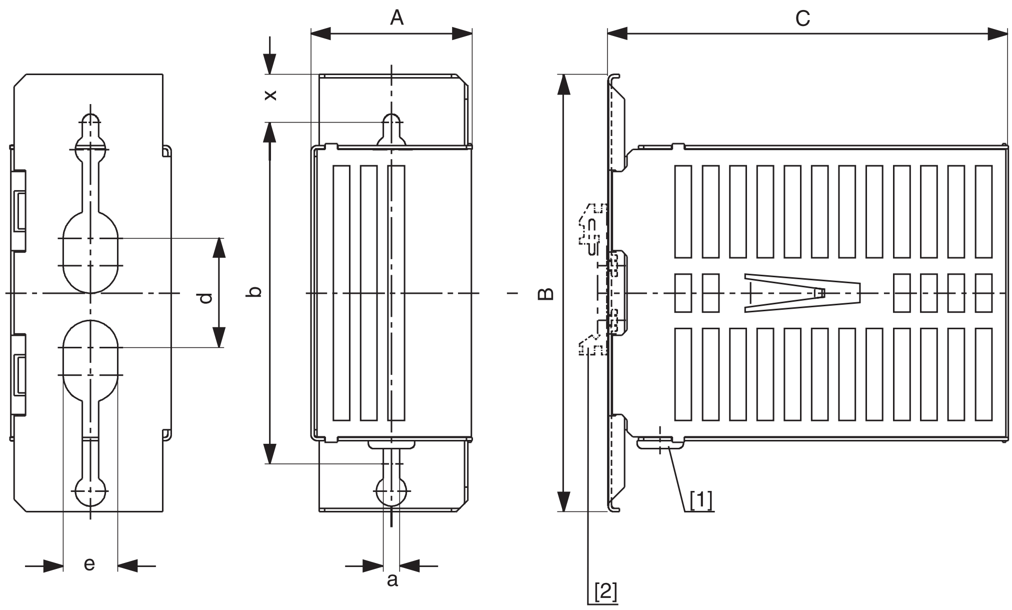
BS... touch guard

Description

A BS.. touch guard is available for braking resistors in flat design.

Touch guard	BS003	BS005
Part number	08131511	0813152X
for braking resistor	BW027-003 BW072-003	BW027-005 BW072-005 BW100-005

Dimension drawing for BS...



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[1] Grommet
[2] Support rail mounting

Type	Main dimensions in mm			Mounting dimensions in mm					Mass kg
	A	B	C	b	d	e	a	x	
BS-003	60	160	146	125	40	20	6	17.5	0.35
BS-005	60	160	252	125	40	20	6	17.5	0.5

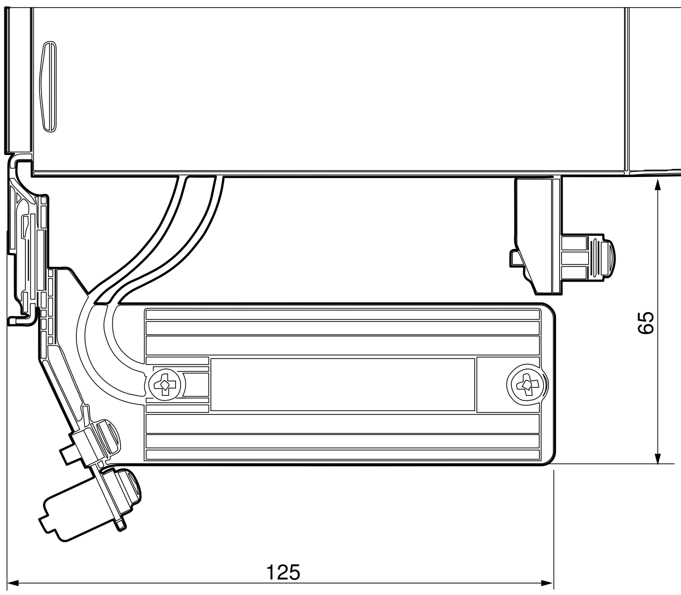
Mounting rail installation

A mounting rail attachment HS001 is available from SEW-EURODRIVE, part number 8221944, for mounting the touch guard on a mounting rail.

Mounting braking resistors FKB10B

Type	Part number	Size	230 V	400 V
FKB10B	18216218	0XS, 0S, 0L	BW3	BW1

Dimension drawing for sizes 0XS, 0S, 0L



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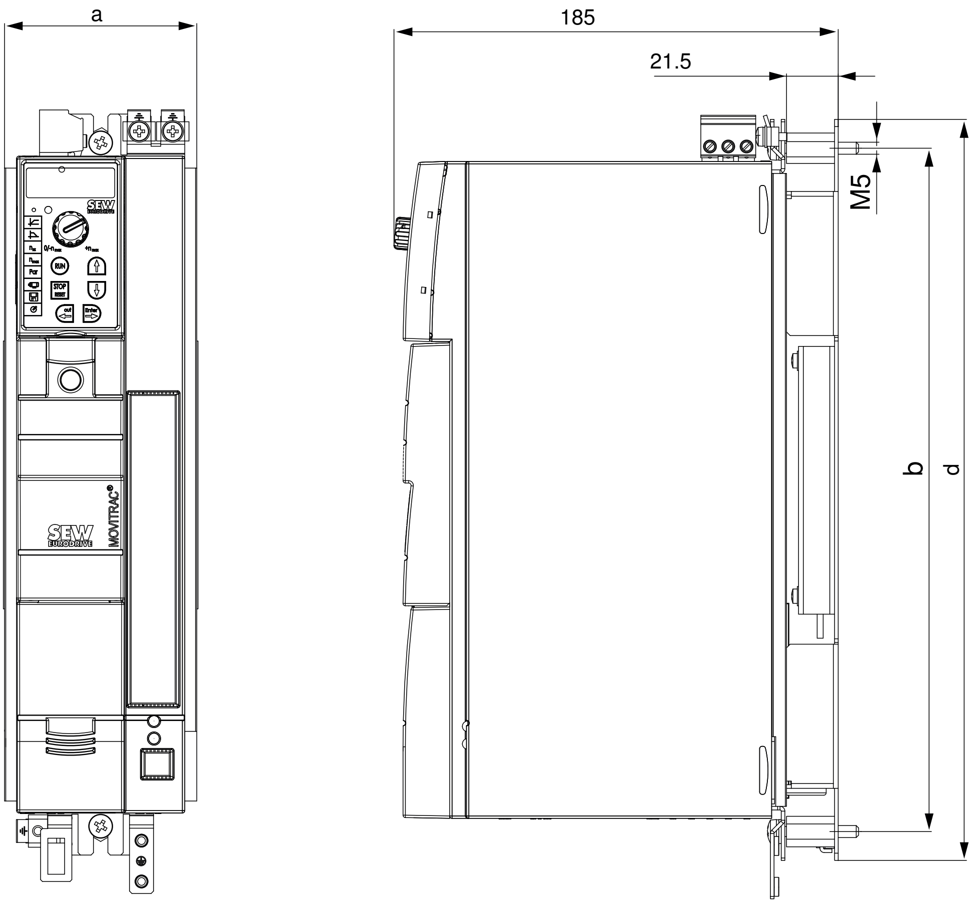
FKB11/12/13B for submounting of braking resistors

The FKB..B is used to submount braking resistors under the inverter.

Type	Part number	Size	Braking resistor	
			230 V	400/500 V
FKB11B	18207286	0XS, 0S	BW4	BW2
FKB12B	18207294	0S	BW027-003	BW072-003
FKB13B	18207308	0L		

Submounted braking resistors might not achieve the specified cyclic duration factor performance.

Dimension drawing



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MOVITRAC® B size	Dimensions in mm		
	a	b	d
0XS	55	196	220
0S	80	196	220
0L	80	284.5	308.5

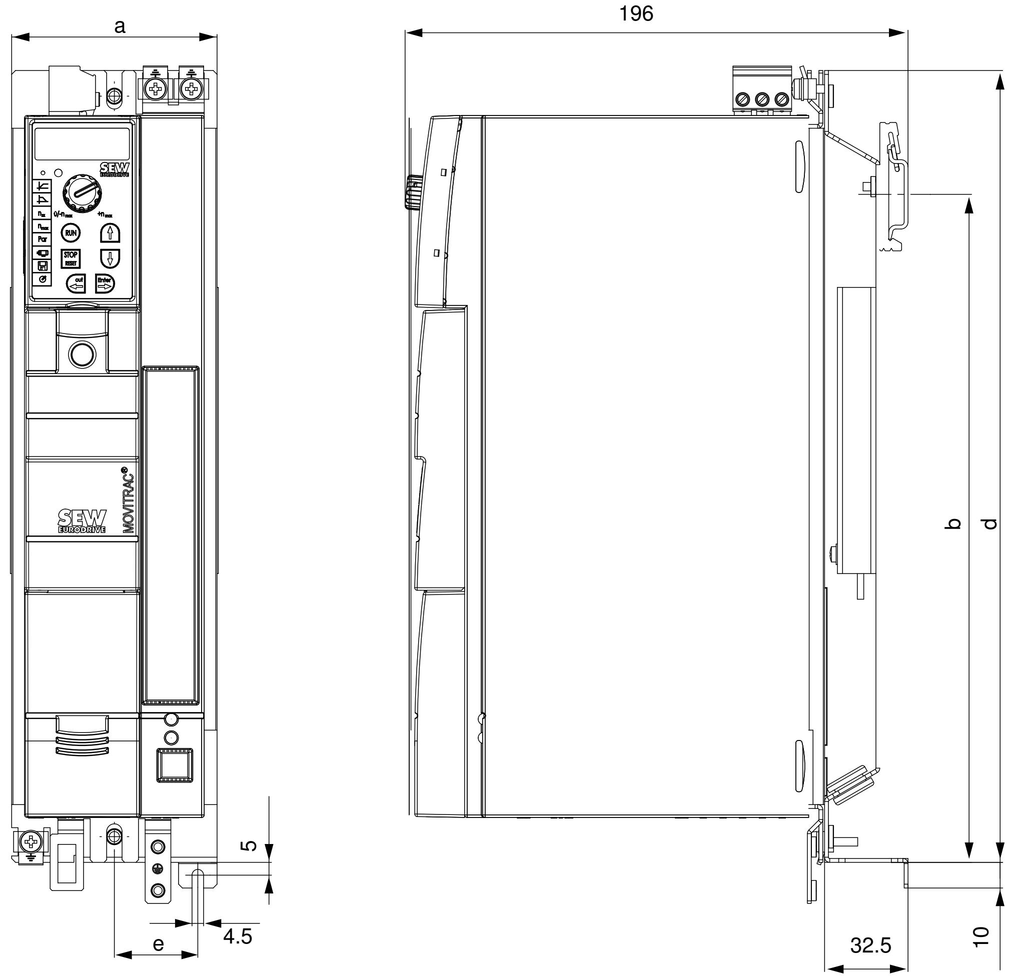
FHS11/12/13B for submounting of braking resistors with mounting rail fastening

The FHS..B is used for mounting MOVITRAC® B frequency inverters on mounting rails and for submounting braking resistors.

Type	Part number	Size	Braking resistor	
			230 V	400/500 V
FHS11B	18207243	0XS	BW4	BW2
FHS12B	18207251	0S	BW027-003	BW072-003
FHS13B	18207278	0L		

Dimension drawing

All dimensions are in mm.



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MOVITRAC® B size	Dimensions in mm			
	a	b	d	e
0XS	55	171.5	220	7.5
0S	80	171.5	220	32.5
0L	80	260.3	308.5	32.5

4.3.2 ND.. line chokes

The ND.. line chokes have cRUus approval independent of MOVITRAC® B.

Line choke type	ND 010-301	ND 020-151
Part number	8269726	8269734
Nominal voltage V_N	1 × AC 230 V ±10%	
Ambient temperature °C	-25 °C to +45 °C	
Degree of protection	IP00 (EN 60529)	
Nominal current I_N	AC 10 A	AC 20 A
Power loss at I_N P_V	6 W	10 W
Inductance L_N	3 mH	1.5 mH
Terminal strip	4 mm^2	10 mm^2
Tightening torque	0.6 Nm	1.5 Nm
Suitable for MOVITRAC® B		
1-phase 230 V	0003 – 0008	0011 – 0022

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Line choke type		ND 020-013	ND045-013	ND085-013	ND150-013
Part number		8260125	8260133	8260141	8255482
Nominal voltage V_N		3 × AC 200 – 500 V ±10%			
Ambient temperature °C		- 25 °C to +45 °C			
Degree of protection		IP00 (EN 60529)			
Nominal current I_N		AC 20 A	AC 45 A	AC 85 A	AC 150 A
Power loss at I_N P_V		10 W	15 W	25 W	65 W
Inductance L_N		0.1 mH			
Terminal strip		4 mm^2	10 mm^2	35 mm^2	Bolt M10 / PE: M8
Tightening torque		0.6 – 0.8 Nm	2.5 Nm	3.2 – 3.7 Nm	Bolt M10: 10 Nm PE: 6 Nm
Suitable for MOVITRAC® B					
3-phase 400/500 V	100% I_N	0003 – 0075	0110 – 0220	0300 – 0450	0550 – 0750
	125% I_N	0003 – 0075	0110 – 0150	0220 – 0370	0450 – 0750
3-phase 230 V	100% I_N	0003 – 0055	0075 – 0110	0150 – 0220	0300
	125% I_N	0003 – 0037	0055 – 0750	0110 – 0150	0220 – 0300

1-phase inverter

Use is required:

- With a device load of I_N > 100%
- For line inductances < 100 µH per phase
- During operation of several simultaneously connected devices. The line choke limits overvoltage caused by switching.

Use is optional for:

- Reduction of supply system harmonics
- Support for overvoltage protection

Connecting several single-phase inverters on a three-phase line choke

You can connect several 1-phase inverters to a 3-phase line choke if:

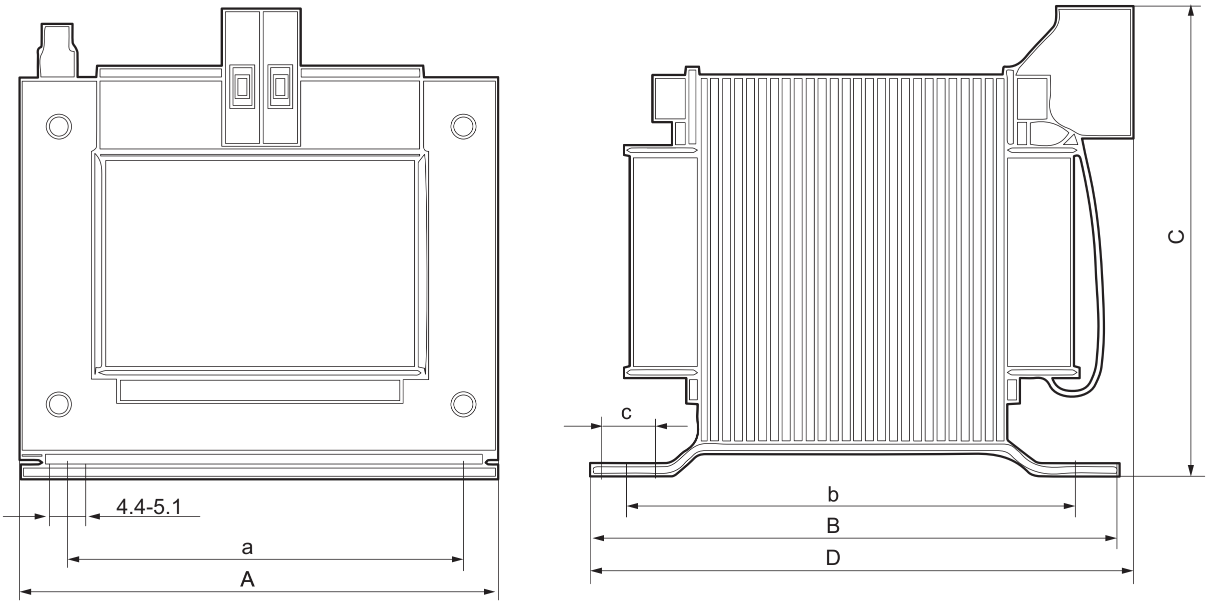
- The line contactor is designed for the total current and
- The back-up fuse corresponds to the rated current of the line choke and
- The connection of MOVITRAC® B is symmetrical to the line choke.

3-phase inverters

Use is required for the operation of 5 or more simultaneously connected inverters. The line choke limits overvoltage caused by switching.

Use is optional to support overvoltage protection.

Dimension drawing of ND010.. line choke



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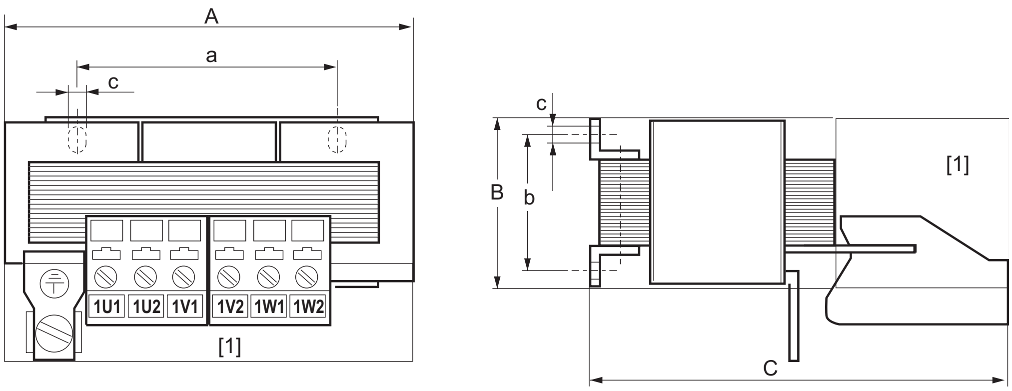
Line choke type	Main dimensions in mm				Mounting dimensions in mm		Hole dimension in mm	Mass kg
	A	B	C	D	a	b	c	
ND010-301	84	64	96	< 80	64	52	6	1.4
ND020-151				< 90				

Dimension drawing of line choke ND020.. / ND045.. / ND085..



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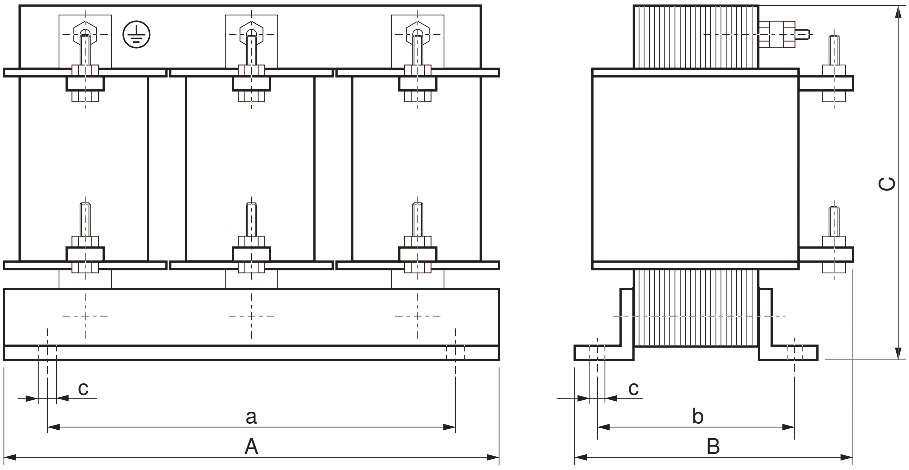
[1] Space for installation terminals — Input: 1U1, 1V1, 1W1
Any mounting position — Output: 1U1, 1V2, 1W2

Line choke type	Main dimensions in mm			Mounting dimensions in mm		Hole dimension in mm	Mass
	A	B	C	a	b	c	kg
ND020-013	85	60	120	50	31 – 42	5 – 10	0.5
ND045-013	125	95	170	84	55 – 75	6	2.5
ND085-013	185	115	235	136	56 – 88	7	7

Dimension drawing for line chokes ND150..



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Line choke type	Main dimensions in mm			Mounting dimensions mm		Hole dimension mm	Mass
	A	B	C	a	b	c	kg
ND150-013	255	140	230	170	77	8	17

4.3.3 NF line filters

- To suppress interference emission on the line side of inverters.
- Do not switch between the NF... line filter and inverter.
- NF.. line filters have cRUus approval independent of inverter.

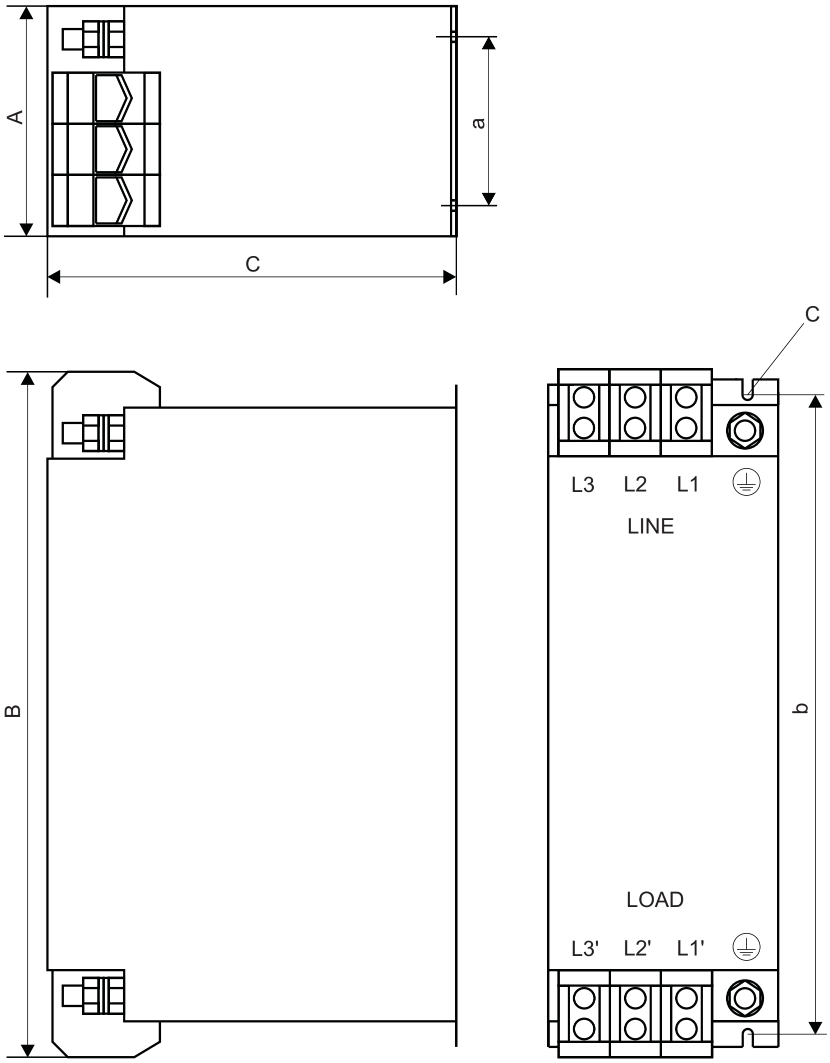
Type	NF009-503	NF014-503	NF018-503	NF035-503	NF048-503
Part number	827 412 6	827 116 X	827 413 4	827 128 3	827 117 8
Nominal voltage	3 × AC 200 – 500 V ±10%				
Ambient temperature	- 25 °C to +45 °C				
Degree of protection	IP20 (EN 60529)				
Nominal current	AC 9 A	AC 14 A	AC 18 A_{AC}	AC 35 A	AC 48 A
Power loss	6 W	9 W	12 W	15 W	22 W
Leakage current	≤ 25 mA	≤ 25 mA	≤ 25 mA	≤ 25 mA	≤ 40 mA
Connections PE screw	4 mm^2 M5			10 mm^2 M5/M6	
Tightening torque	0.6 – 0.8 Nm			1.8 Nm	

Suitable for MOVITRAC® B						
3 × 400/500 V	100% I_N	0003 – 0040	0055 / 0075	–	0110 / 0150	0220
	125% I_N	0003 – 0030	0040 / 0055	0075	0110	0150
3 × 230 V	100% I_N	0015 / 0022	0037	–	0055 / 0075	0110
	125% I_N	0015	0022	0037	0055 / 0075	–

Type	NF063-503	NF085-503	NF115-503	NF150-503
Part number	827 414 2	827 415 0	827 416 9	827 417 7
Nominal voltage	3 × AC 200 – 500 V ±10%			
Ambient temperature	- 25 °C to +45 °C			
Degree of protection	IP20 (EN 60529)			
Nominal current	AC 63 A	AC 85 A	AC 115 A	AC 150 A
Power loss	30 W	35 W	60 W	90 W
Leakage current	≤ 30 mA	≤ 30 mA	≤ 30 mA	≤ 30 mA
Connections PE screw	16 mm^2 M6	35 mm^2 M8	50 mm^2 M10	50 mm^2 M10
Tightening torque	3 Nm	3.7 Nm		

Suitable for MOVITRAC® B					
3 × 400/500 V	100% I_N	0300	0370 / 0450	0550	0750
	125% I_N	0220	0300 / 0370	0450	0550 / 0750
3 × 230 V	100% I_N	0150	0220	0300	–
	125% I_N	0110 / 0150	–	0220 / 0300	–

Dimension drawing of line filter NF009-503 – NF150-503



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Any mounting position

Line filter type	Main dimensions in mm			Mounting dimensions in mm		Hole dimension in mm	PE connection	Mass
	A	B	C	a	b	c		kg
NF009-503	55	195	80	20	180	5.5	M5	0.8
NF014-503		225			210			0.9
NF018-503	50	255			240			1.1
NF035-503	60	275	100	30	255			1.7
NF048-503		315			295		M6	2.1
NF063-503	90	260		60	235	6.5		2.4
NF085-503		320	140		255		M8	3.5
NF115-503	100	330	155	65			M10	4.8
NF150-503								5.6

4.3.4 ULF11A folding ferrites

Part number: 18212131 (3 pieces)

Description

You can reduce the interference emission of the power cable with folding ferrites. The folding ferrites are only intended for use with single-phase devices.

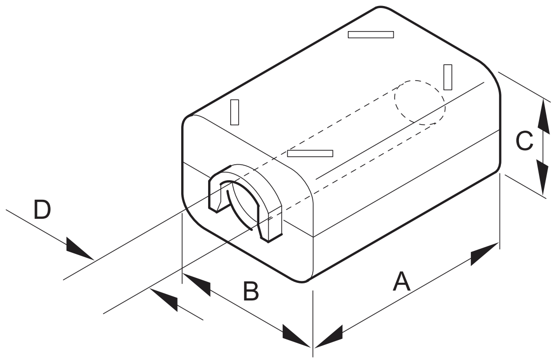
The scope of delivery includes 3 folding ferrites, which must be attached in accordance with the installation notes.

Technical data

For cable diameter	10.5 – 12.5 mm
Storage temperature	-40 °C to +85 °C
Operating temperature	-25 °C to +105 °C

Dimension drawing

All dimensions are in mm.



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Type	Main dimensions in mm			
	A	B	C	D
ULF11A	42.2	33.5	28.8	Ø 12.5

4.3.5 HD output chokes

You can reduce the interference emission of the unshielded motor cable with an output choke.

Output choke type	HD001	HD002	HD003
Part number	813 325 5	813 557 6	813 558 4
Maximum power loss Power loss P_{Vmax}	15 W	8 W	30 W
Mass	0.5 kg	0.2 kg	1.1 kg
For cable cross sections	1.5 – 16 mm²	≤ 1.5 mm²	≥ 16 mm²

Output choke type	HD012	HD100	HD101
Part number	1821 217 4	829 837 8	829 838 6
Nominal current	12 A	5.3 A	11.9 A
Power loss (at nominal current)	11 W	20 W	
Ambient temperature	-10 °C to +60 °C Derating 3% I_N at 40 °C to 60 °C	-10 °C to +60 °C Derating 2.5% I_N per K at 40 °C to 50 °C 3% I_N per K at 50 °C to 60 °C	
Degree of protection	IP20		

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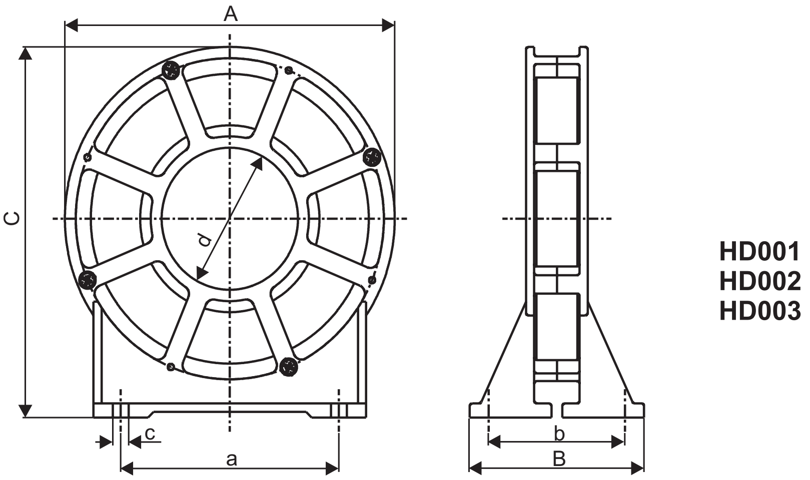
Output choke type	HD012	HD100	HD101
Supply system and Motor	≤ 4 mm^2	Screw terminals 4 mm^2	
Inverter connection		Cables with conductor end sleeves	
Mass	0.55 kg	0.40 kg	0.48 kg
Can be submounted for Size	Not suitable for sub-mounting	0S	0L
For MOVITRAC® B ..-5A3	0003 – 0040	0005 / 0008 / 0011 / 0015	0022 / 0030 / 0040
For MOVITRAC® B ..-2A3	0003 – 0022	0005 / 0008	0011 / 0015 / 0022
For MOVITRAC® B ..-2B1	0003 – 0022	0005 / 0008	0011 / 0015 / 0022

Dimension drawing HD001 – HD003

The following figure shows the mechanical dimensions in mm:

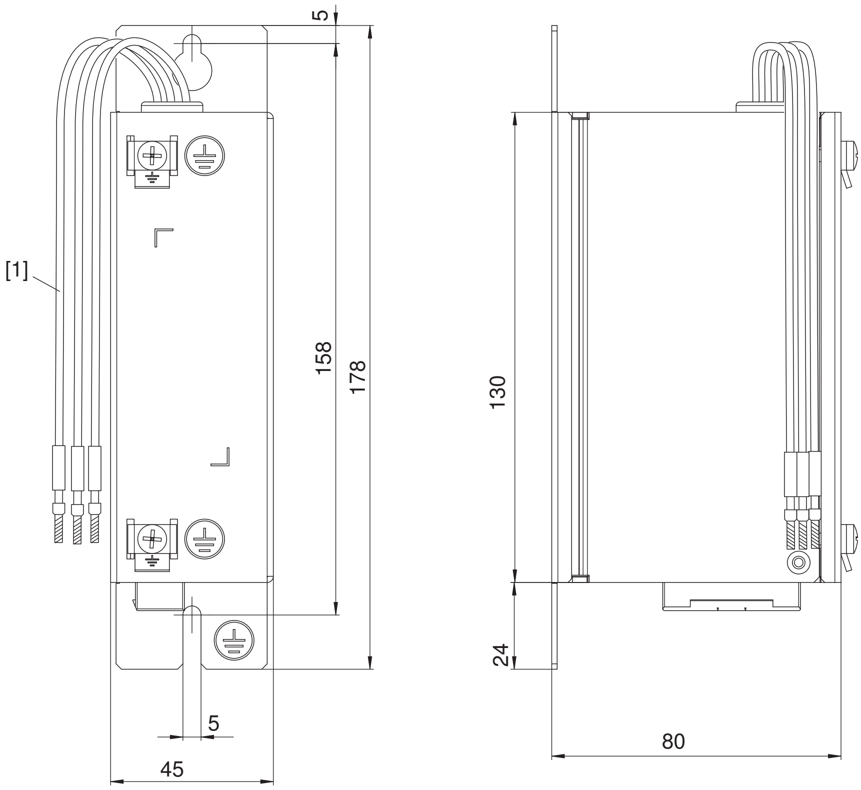


1456392203

Output choke type	Main dimensions in mm			Mounting dimensions in mm		Inner Ø mm	Hole dimension in mm	Mass
	A	B	C	a	b	d	c	kg
HD001	121	64	131	80	50	50	5.8	0.5
HD002	66	49	73	44	38	23		0.2
HD003	170	64	185	120	50	88	7.0	1.1

Dimension drawing HD012

The following figure shows the mechanical dimensions in mm:



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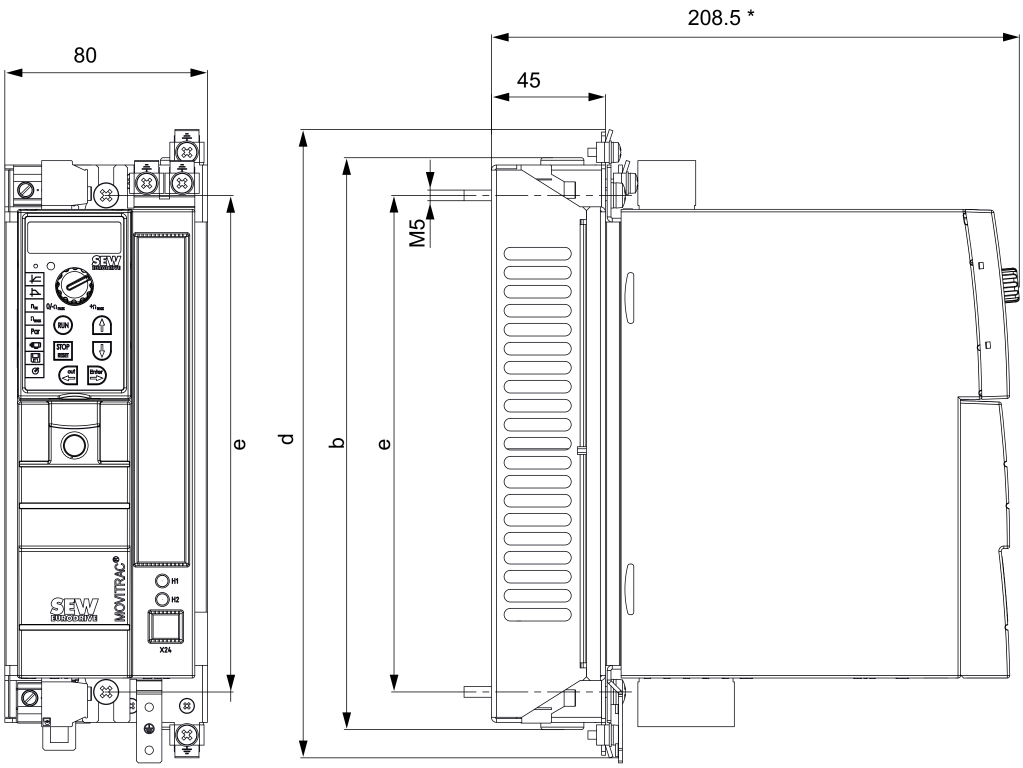
[1] Length = 100 mm

Dimension drawing HD100/HD101

The following figure shows the mechanical dimensions in mm.



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* With front module FSE24B + 4 mm

Output choke type	MOVITRAC® B	Main dimensions in mm		
		b	d	e
HD100	Size 0S	226	248	196
HD101	Size 0L	314.5	336.5	284.5

4.3.6 HF.. output filter

Output filters HF.. are sine filters for smoothing the output voltage of inverters. The output filters HF.. (except HF450-503 and HF180-403) are approved as per UL/cUL in combination with MOVITRAC®.

Output filters HF.. are used:

- For group drives (several parallel motor cables); the recharging currents in the motor cables are suppressed.
- To protect the motor winding insulation of third-party motors that are not suitable for inverters.
- To protect against overvoltage peaks in long motor cables (> 100 m).

Observe the following information:

INFORMATION

- Output filters are only allowed to be used in VFC and V/f operating modes.
- Output filters must not be used with hoists.
- During project planning of the drive, take the voltage drop in the output filter into account and the reduced motor torque that results. This applies in particular to AC 230 V devices with output filters.

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Output filter type	HF008-503 1)	HF015-503 1)	HF022-503 1)	HF030-503 1)	HF040-503 1)	HF055-503 1)
Part number	826029X	8260303	8260311	826032X	8263116	8263124
Nominal voltage V_N	3 × AC 230 – 500 V, 50/60 Hz 2)					
Leakage current at V_N ΔI	0 mA					
Power loss at I_N P_V	25 W	35 W	55	65 W	90 W	115 W
Interference emission via unshielded motor cable	In accordance with limit value class C1/C2 to EN 61800-3 3)					
Ambient temperature ϑ_{amb}	0 °C to +45 °C (reduction: 3% I_N per K up to max. 60 °C)					
Degree of protection (EN 60529)	IP20					
Connections/tightening torque	Terminal stud M4 1.6 Nm ±20%					
Mass	3.1 kg	4.4 kg			10.8 kg	
Assignment of AC 400/500 V devices						
Voltage drop at I_N ΔV	< 6.5% (7.5%) at AC 400 V / < 4% (5%) at AC 500 V with f_{Amax} = 50 Hz (60 Hz)					
Nominal throughput current $I_{N\ 400\ V}$ (at V_{line} = 3 × AC 400 V) Nominal throughput current $I_{N\ 500\ V}$ (at V_{line} = 3 × AC 500 V)	AC 2.5 A AC 2 A	AC 4 A AC 3 A	AC 6 A AC 5 A	AC 8 A AC 6 A	AC 10 A AC 8 A	AC 12 A AC 10 A
Nominal operation (100%) 3)	0005 – 0011	0014 / 0015	0022	0030	0040	0055
Increased power (125%) 3)	0005	0008 / 0011	0014 / 0015	0022	0030	0040
Assignment of AC 230 V devices						
Voltage drop at I_N ΔV	–	< 18.5% (19%) at AC 230 V with f_{Amax} = 50 Hz (60 Hz)				
Nominal throughput current $I_{N\ 230\ V}$ (at V_{line} = 3 × AC 230 V)	AC 4.3 A	AC 6.5 A	AC 10.8 A	AC 13 A	AC 17.3 A	AC 22 A
Nominal operation (100%) 3)	–	–	0015/0022	–	0037	0055
Increased power (125%) 3)	–	–	0015/0022	–	–	0037

1) Approved according to UL/cUL in connection with MOVITRAC® frequency inverters. SEW-EURODRIVE will provide proof of this upon request.
2) A reduction of 6% I N per 10 Hz applies above f A = 60 Hz for the nominal through current IN.
3) In compliance with the chapter on EMC-compliant installation to EN 61800-3 in the SEW documentation

Output filter type	HF075-503 1)	HF023-403 1)	HF033-403 1)	HF047-403 1)	HF450-503	HF180-403
Part number	8263132	8257841	825785X	8257868	8269483	08299099
Nominal voltage V_N	3 × AC 230 – 500 V, 50/60 Hz 2)					
Leakage current at V_N ΔI	0 mA					
Power loss at I_N P_V	135 W	90 W	120 W	200 W	400 W	860 W
Interference emission via unshielded motor cable	In accordance with limit value class C1/C2 to EN 61800-3 3)					
Ambient temperature ϑ_{amb}	0 °C to +45 °C (reduction: 3% I_N per K up to max. 60 °C)					-25 °C to +85 °C
Degree of protection (EN 60529)	IP20	IP20			IP10	IP00
Connections/tightening torque	Connection bolt M4 1.6 Nm ±20%	35 mm^2 3.2 Nm				Terminal stud M10/70 mm^2 30 Nm
Mass	10.8 kg	15.9 kg	16.5 kg	23 kg	32 kg	85.3 kg
Assignment of AC 400/500 V devices						
Voltage drop at I_N ΔV	< 6.5% (7.5%) at AC 400 V / < 4% (5%) at AC 500 V with f_{Amax} = 50 Hz (60 Hz)					
Nominal throughput current $I_{N\ 400\ V}$ (at V_{line} = 3 × AC 400 V) Nominal throughput current $I_{N\ 500\ V}$ (at V_{line} = 3 × AC 500 V)	AC 16 A AC 13 A	AC 23 A AC 19 A	AC 33 A AC 26 A	AC 47 A AC 38 A	AC 90 A AC 72 A	AC 180 A AC 180 A
Nominal operation (100%) 3)	0075	0110	0150/0300 4)	0220	0370/0450/0550 4)/0750	0550/0750
Increased power (125%) 3)	0055	0075	0110/0220 4)	0150	0300/0370/0450 4)/0550/0750 4)	0550/0750
Assignment of AC 230 V devices						
Voltage drop at I_N ΔV	< 18.5% (19%) at AC 230 V with f_{Amax} = 50 Hz (60 Hz)					

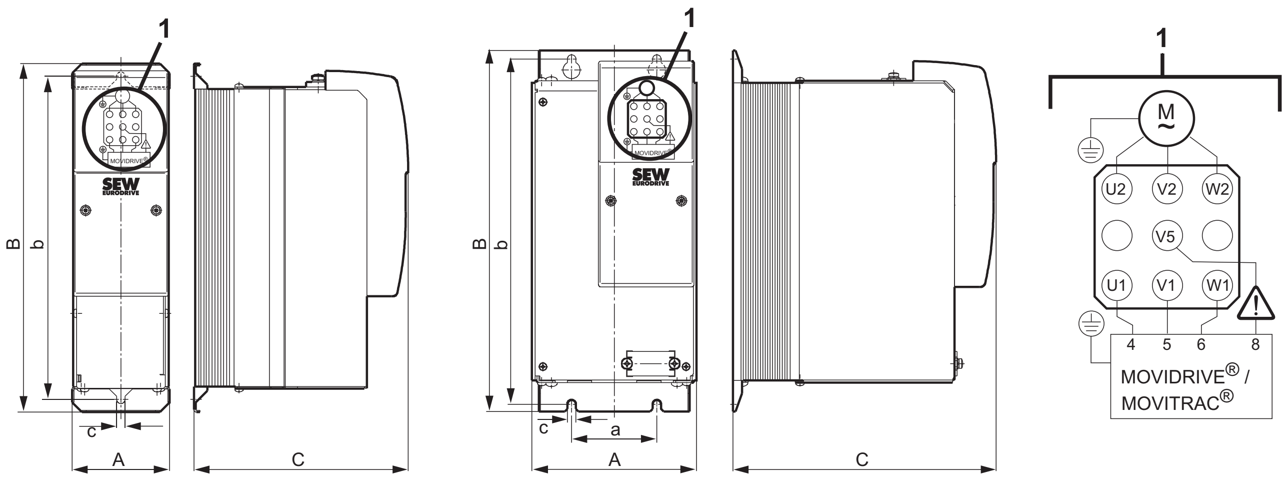
Output filter type	HF075-503 [1]	HF023-403[1]	HF033-403[1]	HF047-403[1]	HF450-503	HF180-403
Nominal throughput current $I_{N\ 230\ V}$ (at V_{line} = 3 × AC 230 V)	AC 29 A	AC 42 A	AC 56.5 A	AC 82.6 A	AC 156 A	–
Nominal operation (100%)[3]	0075	0110	0150/0300[4]	0220	0300	–
Increased power (125%)[3]	0055	0075	0110/0220[4]	0150	0220/0300	–

1) Approved according to UL/cUL in connection with MOVITRAC® frequency inverters. SEW-EURODRIVE will provide proof of this upon request.
2) A reduction of 6% I N per 10 Hz applies above f A = 60 Hz for the nominal through current IN.
3) In compliance with the chapter on EMC-compliant installation to EN 61800-3 in the SEW documentation
4) For operation with these MOVITRAC® devices, connect 2 output filters HF.. in parallel.

Dimension drawings of output filter HF..-503

The following figures show the mechanical dimensions in mm.

HF008/015/022/030-503 HF040/055/075-503



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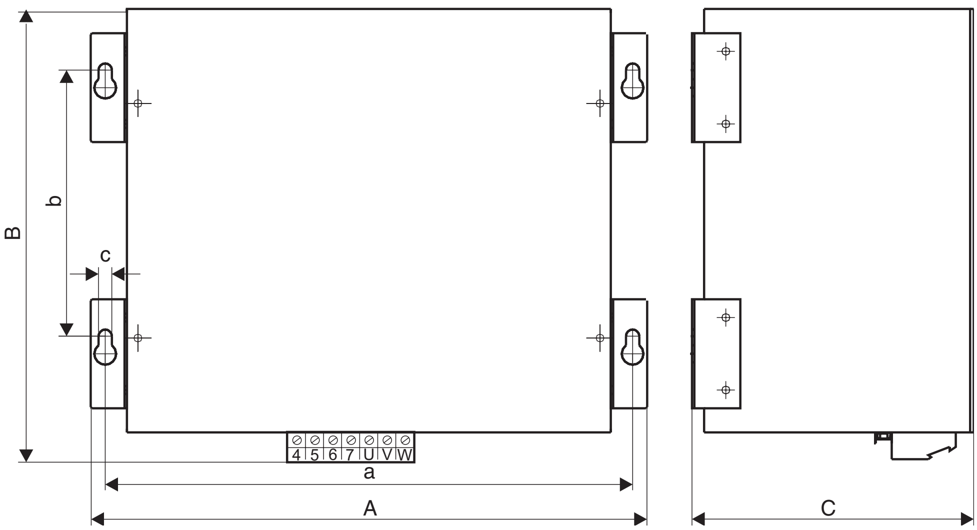
Only the mounting position shown in the dimension drawing is approved.

Output filter type	Main dimensions in mm			Mounting dimensions in mm		Hole dimension in mm	Ventilation clearances[1] mm	
	A	B	C	a	b	c	Top	Bottom
HF008/015/022/030-503	80	286	176	–	265	7	100	100
HF040/055/075-503	135	296	216	70	283			

1) No lateral clearance required, the devices are allowed to be lined up side by side.

HF450-503



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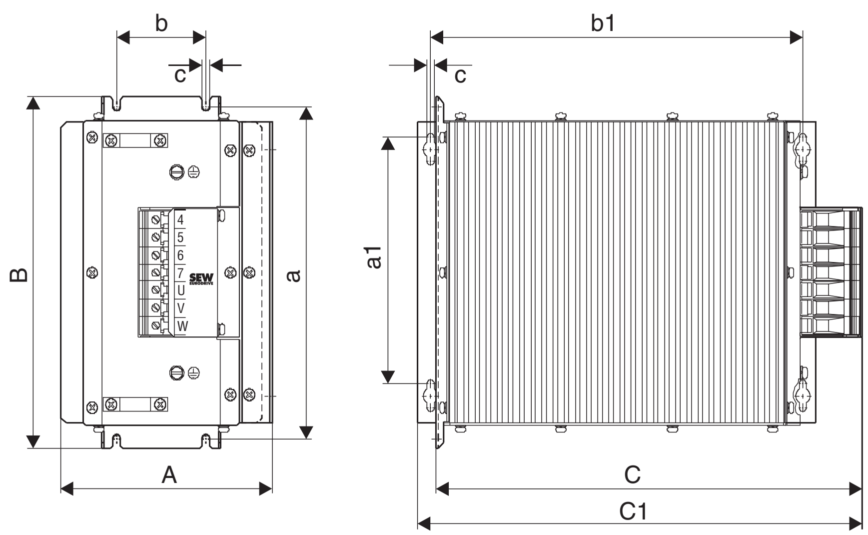
Only the mounting position shown in the dimension drawing is approved.

Output filter type	Main dimensions in mm			Mounting dimensions in mm		Hole dimension in mm	Ventilation clearances mm	
	A	B	C	a	b	c	Top	Bottom
HF450-503	465	385	240	436	220	8.5	100	100

Dimension drawings output filter HF..-403

The following figure shows the mechanical dimensions in mm.



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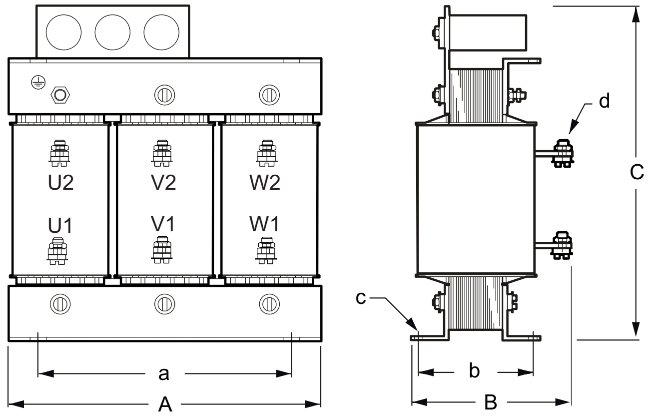
Type	Main dimensions in mm			Mounting dimensions in mm				Hole dimension in mm	Ventilation clearances mm		
				Standard installation		Transverse mounting position					
	A	B	C/C1	a	b	a1	a2	c	On the side	Top	Bottom
HF023-403	145	284	365/390	268	60	210	334	6.5	30 each	150	150
HF033-403											
HF047-403	190	300	385/400	284	80						



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The ring cable lug must be attached directly to the copper tab.
Only the mounting position shown in the dimension drawing is approved.

Output filter type	Main dimensions in mm			Mounting dimensions in mm		Hole dimension in mm		Ventilation clearances mm		
	A	B	C	a	b	c	d	On the side	Top	Bottom
HF180-403	480	260	510	430	180	18 × 13	11	192 each	510	510

4.3.7 EMC module FKE12B / FKE13B

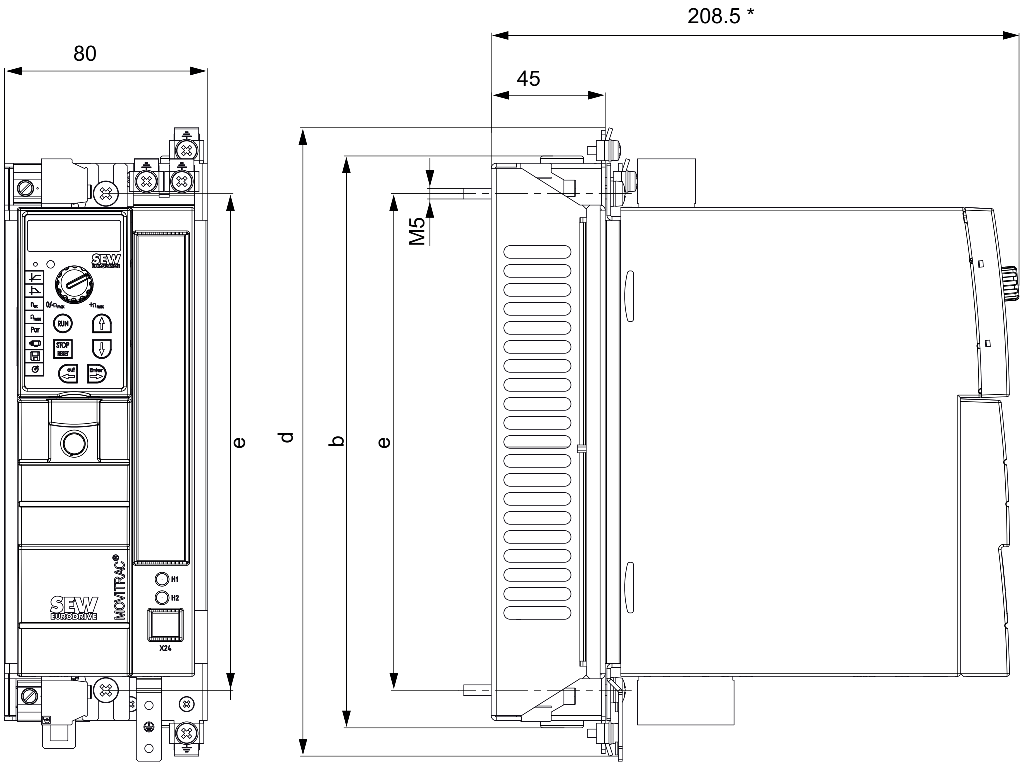
Using the EMC module, you can reach limit class C1 (B). The EMC module is designed for 100% and 125% operation.

Technical data

Type	FKE12B	FKE13B
Part number	8295905	8295913
Nominal voltage	3 × AC 230 – 500 V	
Voltage drop in the filter (at nominal current)	< 1%	
Nominal current	5.3 A	11.9 A
Power loss (at nominal current)	20 W	
Ambient temperature	-10 °C to +60 °C Derating 2.5% I_N per K at 40 °C to 50 °C 3% I_N per K at 50 °C to 60 °C	
Degree of protection	IP20	
Grid and motor connection	Screw terminals 4 mm^2	
Inverter connection	Cables with conductor end sleeves	
Mass	0.40 kg	0.48 kg
Can be submounted for Size	0S	0L
for MOVITRAC® B ...-5A3	0005 / 0008 / 0011 / 0015	0022 / 0030 / 0040
for MOVITRAC® B ...-2A3	0005 / 0008	0011 / 0015 / 0022

Dimension drawing of EMC modules FKE12B / FKE13B

All dimensions are in mm.



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* With front module FSE24B + 4 mm

EMC module	MOVITRAC® B	Main dimensions in mm		
		b	d	e
FKE12B	Size 0S	226	248	196
FKE13B	Size 0L	314.5	336.5	284.5

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5 Configuration

5.1 Schematic sequence

Clarification of
- Technical data and requirements
- Boundary conditions
- System connection

↓

Calculate the relevant application data
- Stationary, dynamic, generator mode performance
- Rotational speeds

↓

Gear unit selection
Determination of
- Gear unit design, gear unit size, gear unit ratio

Check the gear unit utilization ($M_{amax} \geq M_a(t)$)

↓

Motor selection
- Conversion of torque and rotational speed to the motor shaft
- Determining the motor

↓

Checking of
- Maximum occurring torque $M_{max} < 1.5 \times M_N$
- Required motor speed < n_N
- Thermal load taking into account the setting range and cyclic duration factor

↓

Selection of the MOVITRAC® B frequency inverter
- Motor/inverter assignment
- Continuous power, peak power
- Installation conditions
- FBG11B keypad option
- Plain text keypad option DBG60B
- Communication option FSC11B/21B
- Analog module option FIO11B
- Digital module option FIO21B
- EtherCAT® option FSE24B
- Interface adapter option UWS11A / UWS21B / USB11A

↓

Select the braking resistor
- Based on the calculated generator mode performance and the cyclic duration factor

↓

Component composition
- Line choke, output choke, touch guard

↓

Verify that all requirements are covered.

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5.2 Description of applications

5.2.1 Project planning for trolleys

The motor load in the dynamic sections determines the peak motor power to be dimensioned. The thermal load determines the required continuous power of the motor. Determine the thermal load from the travel cycle. The speed curve largely determines the self-cooling of the motor.

5.2.2 Project planning for hoists

You must consider the dimensioning of hoists in practice under special thermal and safety-related criteria.

You must design the controller in such a way that the direction of rotation of the drive can only be changed from an idle state.

Notice.

The speed monitoring is set by changing the parameters *P500* / *P502* and *P501* / *P503*. The sagging of hoists cannot be avoided safely if the delay time is set to an excessively high value.

Thermal considerations

In contrast to horizontal drives, hoists require approx. 70 – 90% of the rated motor torque at constant speed.

Starting torque

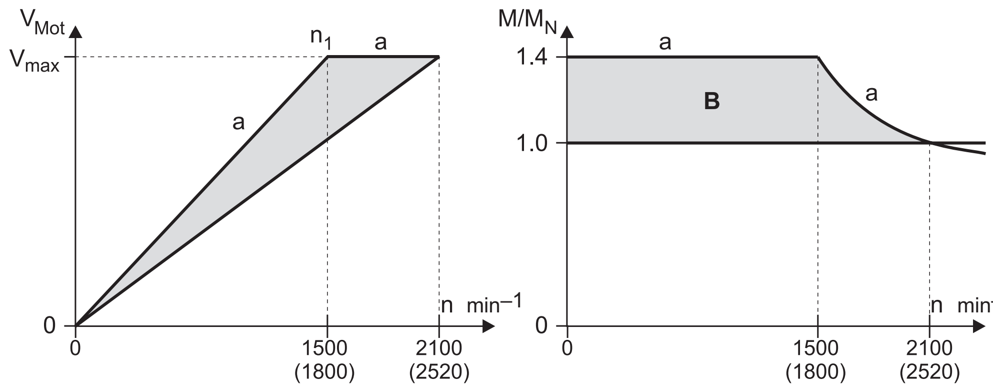
The motor requires the highest operating torque when accelerating with maximum load and lifting direction **Up**.

Always set the 4-pole gearmotor to a maximum speed of:

- 2100 1/min (70 Hz) at base speed 1500 1/min (50 Hz)
- 2500 1/min (83 Hz) at base speed 1800 1/min (60 Hz)

This increases the gear unit input speed by a factor of approx. 1.4. This is why you also need to select a 1.4-fold higher gear unit ratio. This measure means that the motor does not lose any torque at the input shaft in the field weakening range (50 – 70 Hz or 60 – 83 Hz). The drive compensates for the torque decreasing reciprocally to the speed through the larger gear unit ratio. In addition, the motor has 1.4 times more starting torque. Further advantages are the larger setting range and better self-cooling of the motor.

Voltage-speed characteristic curve for hoists



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a = recommended voltage-speed characteristic curve and resulting torque characteristic

B = torque reserve range

Select the motor power for hoists according to the loading method:

- S1 (100% cdf): Select the motor power 1 type step higher than the selected inverter power, e.g. for long upward travel or continuous vertical conveyors.
- S3 (40% cdf): Select the motor power according to the selected inverter power.

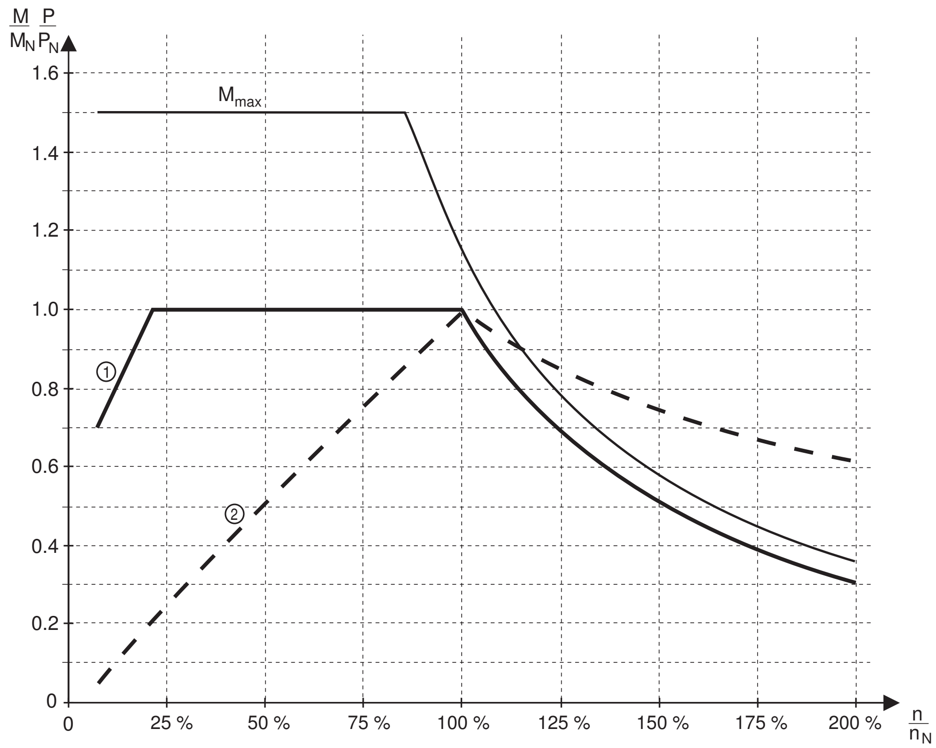
Activate the hoist function independently of the above guidelines by selecting the operating mode *P700* = VFC & hoist.

Set the start/stop speed P300/P310 and the minimum speed P301/P311 to at least 1.5 times the nominal motor slip.

5.3 Basic recommendations for selecting motors/inverters

5.3.1 Speed-torque characteristic curve

The speed-torque characteristic is as follows:



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[1] M at S1 100% cdf

[2] P at S1 100% cdf

For characteristic 1:

The drive cannot be loaded with the nominal motor torque below 20 Hz. The reduced speed reduces the motor's self-cooling, which would cause the motor to heat up excessively.

This limit is not caused by the inverter; motors with sufficient external cooling can also be loaded with nominal torque below 20 Hz.

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5.3.2 Motor selection

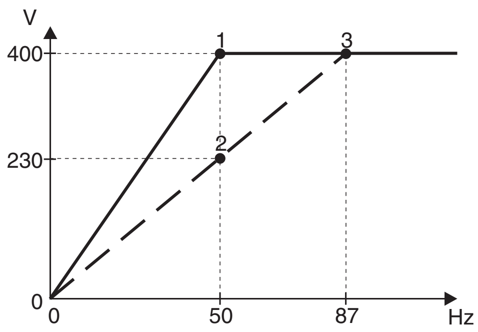
Basic recommendations

- Only use motors with a thermal class of at least 155 (F).
- Use thermal sensor TF or bimetallic switch TH.
- Preferably use 4-pole motors. This applies in particular if you operate gearmotors with a high oil filling level due to the vertical mounting position. With 2-pole motors, the churning losses are very high.

Voltage-frequency characteristic curve

The V/f operating modes start the asynchronous motor on a load-dependent voltage-frequency characteristic. The motor model is constantly calculated in the VFC operating modes. Set the characteristic during startup to the rated motor voltage and rated motor frequency. The setting determines the speed-dependent torque and power characteristics of the asynchronous motor.

The following figure shows an example of the voltage-frequency characteristics of an asynchronous AC motor 230/400 V, 50 Hz.



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1 Star connection; 400 V, 50 Hz

2 Delta connection; 230 V, 50 Hz

3 Delta connection; 400 V, 87 Hz (startup 230 V, 50 Hz)

The output voltage of the MOVITRAC® B is limited by the connected supply voltage.

Dynamic applications

For dynamic applications, you need a drive in which the nominal inverter current is greater than the rated motor current.

Set the following parameters so that the motor can develop a maximum of 150% of the rated motor torque:

- *P303 Current limit*
- *P324 Slip compensation*

Increase these parameters manually to approx. 1.4 times higher values for dynamic applications.

Inverter/motor combinations

The 4-pole DRN motors (1500 1/min) are stored in the MOVITRAC® B in the factory setting.

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You can also assign motors with 1 type step difference to the inverters. With smaller motors, impairments in the control behavior can occur.

MOVITRAC® B	Recommended nominal motor power P_N
MC07B0003-..-4-00	0.25 kW
MC07B0004-..-4-00	0.37 kW
MC07B0005-..-4-00	0.55 kW
MC07B0008-..-4-00	0.75 kW
MC07B0011-..-4-00	1.1 kW
MC07B0015-..-4-00	1.5 kW
MC07B0022-..-4-00	2.2 kW
MC07B0030-..-4-00	3.0 kW
MC07B0040-..-4-00	4.0 kW
MC07B0055-..-4-00	5.5 kW
MC07B0075-..-4-00	7.5 kW
MC07B0110-..-4-00	11 kW
MC07B0150-..-4-00	15 kW
MC07B0220-..-4-00	22 kW
MC07B0300-..-4-00	30 kW
MC07B0370-..-4-00	37 kW
MC07B0450-..-4-00	45 kW
MC07B0550-..-4-00	55 kW
MC07B0750-..-4-00	75 kW

5.3.3 Overload capacity

MOVITRAC® B frequency inverters permanently calculate the load on the inverter output stage (device utilization). They can deliver the maximum possible power in any operating state.

The approved continuous output current depends on:

- Ambient temperature
- Heat sink temperature
- Line voltage
- PWM frequency

If a PWM frequency > 4 kHz is set and *P862 / P863 PWM fixed 1 / 2* is set to "Off", the inverter automatically reduces the PWM frequency in the event of device overload. If the inverter is loaded more than permitted, it reacts with error message *F44 Device utilization* and immediate switch-off.

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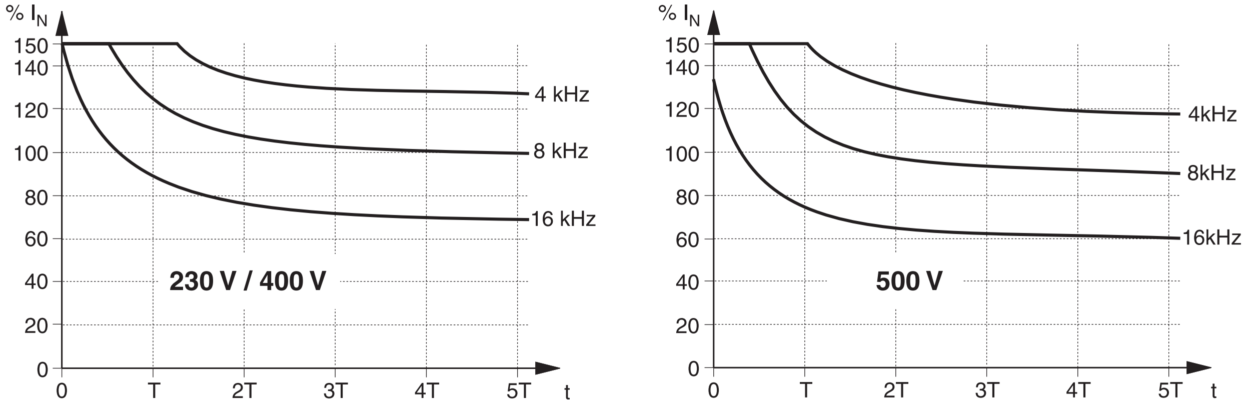
Overload capacity at 40 °C



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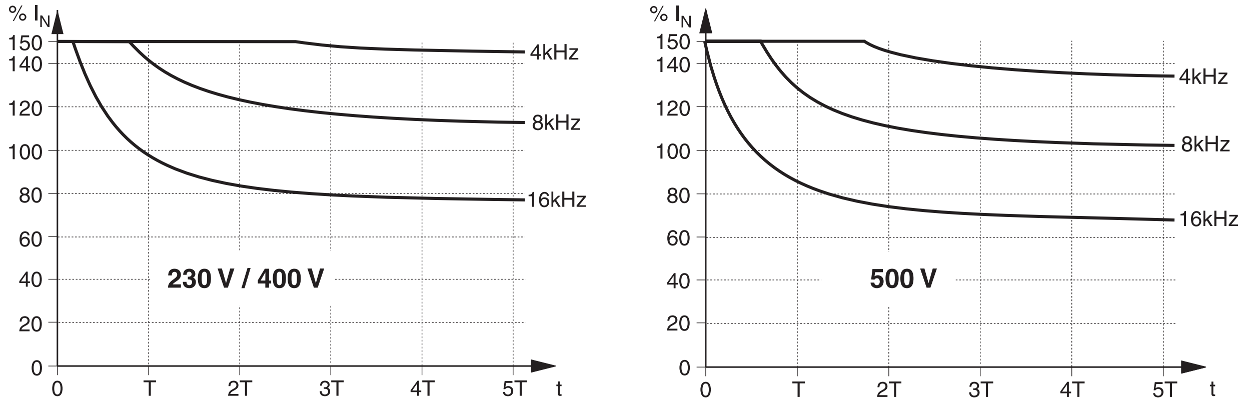
Overload capacity at 25 °C



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Size	0XS	0S < 1.5 kW	0S 1.5 kW	0L	1	2S	2	3	4	5
T (min)	20	20	8	8	3.5	4	5	4	9	5

5.3.4 Load capacity of the units at low output frequencies

The thermal model of the MOVITRAC® B implements dynamic limiting of the maximum output current. At high capacity utilization, the thermal model therefore only allows less than 100% nominal current at output frequencies below 2 Hz.

For such operating states, configure the average output current of the inverter to a maximum of 70% of the rated current of the inverter.

INFORMATION

The output frequency of the inverter is made up of the rotational frequency (= speed) and the slip frequency.

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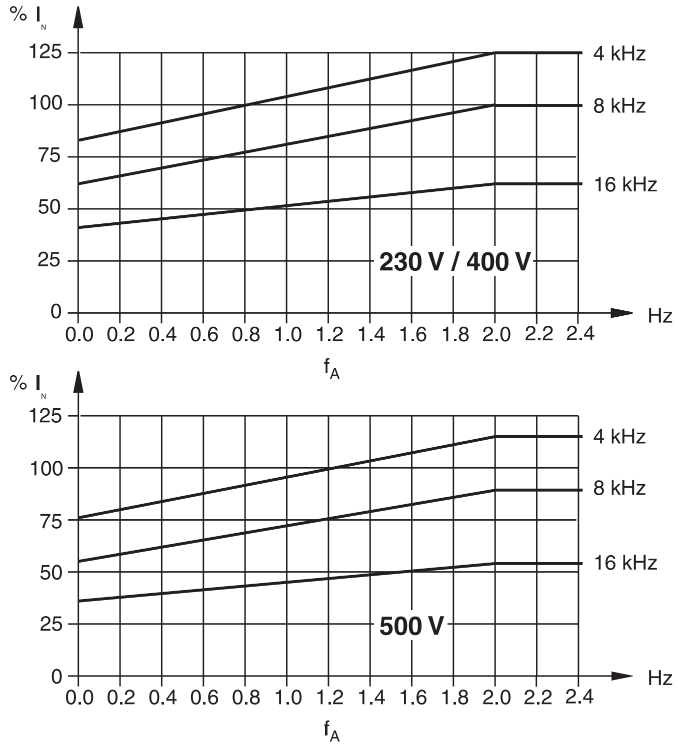
Guaranteed continuous currents depending on the output frequency:



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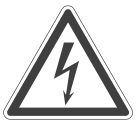
5.4 Selecting the braking resistor



⚠ DANGER

The supply cables to the braking resistor carry a high DC voltage (approx. DC 900 V)

Severe or fatal injuries due to electric shock.

- The brake resistor cables must be suitable for this high DC voltage.
- Install the brake resistor lines in accordance with the regulations.

⚠ WARNING

The surfaces of the braking resistors reach high temperatures under a load of P_N.

Risk of burns and fire.

- Select a suitable installation location. Braking resistors are usually mounted on the control cabinet.
- Do not touch the braking resistor.

INFORMATION

- The specifications apply to the braking resistors BW.., BW..-T and BW..-P.
- From an ambient temperature of 45 °C, a load derating of 4% per 10 K must be allocated for the braking resistors BW.., BW..-T and BW..-P. Do not exceed a maximum ambient temperature of 80 °C.
- By using the integrated temperature relay, the overload factor of the braking resistors BW..-T and BW..-P is limited:
  - BW..-T up to overload factor 12
  - BW..-P up to overload factor 40
- The **maximum permissible cable length** between **MOVITRAC®** B and the braking resistor is **100 m**.

- **Parallel connection**

With some inverter/resistor combinations, you must connect 2 braking resistors in parallel. In this case, you must then set the tripping current on the bimetallic relay to twice the table value I_F.

- **Peak braking power**

Due to the DC link voltage and the resistance value, the peak braking power might be lower than the current-carrying capacity of the braking resistor. The formula for calculating the peak braking power is:

$P_{max} = V^2_{DC}/R$

V_{DC} is the maximum permissible DC link voltage and amounts to

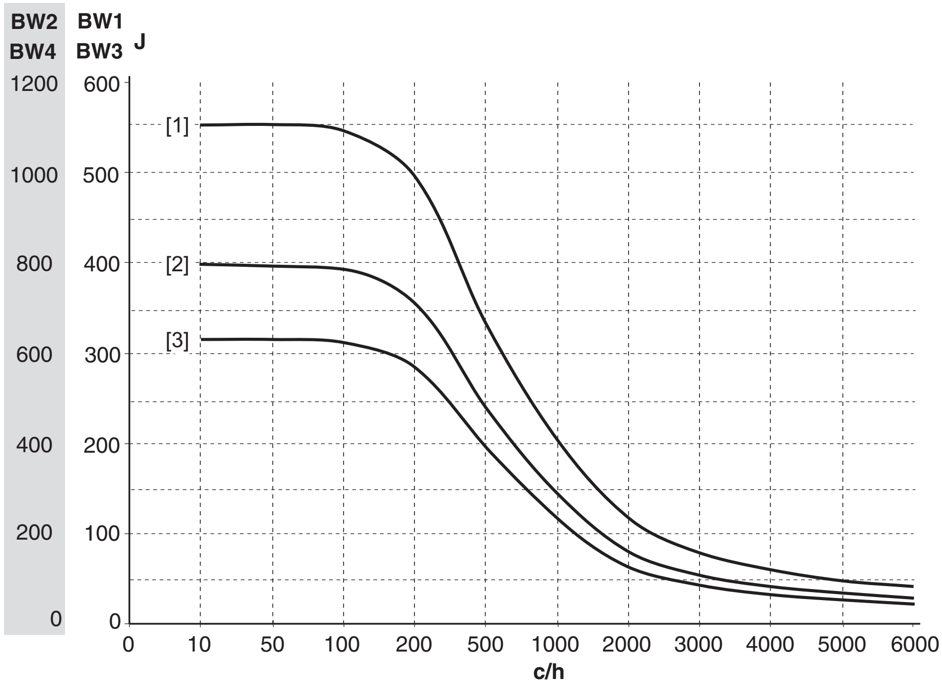
- for 400/500 V devices: DC 970 V
- for 230 V devices: DC 485 V

The following table shows the peak braking power possible with the different resistance values.

Resistance in Ω	Peak braking power in kW	
	400/500 V devices	230 V devices
100	9.4	–
72	13.0	–
68	13.8	–
47	20.0	–
39	24.0	–
27	34.8	8.7
18	52.2	–
15	62.7	–
12	78.4	19.6
9 (2 × 18 Ω parallel)	–	26.1
6	156	39.2

5.4.1 Load capacity of PTC braking resistors

The following diagram shows the current-carrying capacity of the BW1 – BW4 braking resistors per braking operation:



9007199346699275

[1] Deceleration ramp 10 s

[2] Deceleration ramp 4 s

[3] Deceleration ramp 0.2 s

c/h switching operations per hour

Calculation example

Given:

- Average braking power: 0.25 kW
- Brake ramp: 2 s
- 200 braking operations per hour

Procedure:

Calculate energy from the power of the braking ramp:
$W = P \times t = 0.25 \text{ kW} \times 2 \text{ s} = 500 \text{ J}$

For the braking ramp of 2 s, the braking ramp [3] (0.2 s) can be used in the diagram. Use the characteristic curve with the shorter braking ramp, as a shorter braking ramp means more power.

The diagram allows an energy of 580 J for the braking ramp 0.2 s at 200 switching operations per hour. In this case, the required 500 J can be dissipated with the BW2/ BW4.

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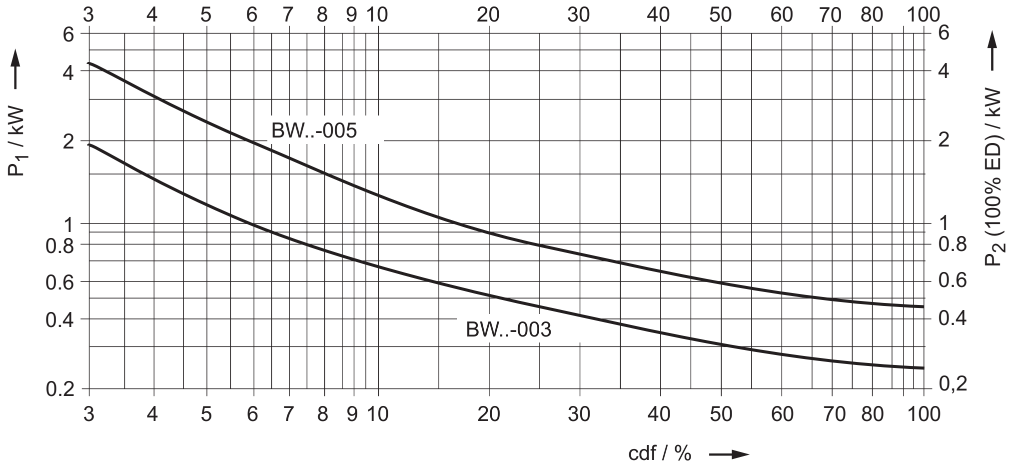
5.4.2 Load capacity flat design, wire resistors, grid resistors

For braking within the cycle duration T_D (standard: $T_D \leq 120$ s), the resulting resistance continuous power (100% cdf power) can be determined from the cdf braking power using power diagrams. The Y axis on the right displays the 100% cdf power. When determining the current-carrying capacity, take into account the peak braking power caused by the DC link voltage.

Flat-design power diagram

Power diagram for flatpack resistors:



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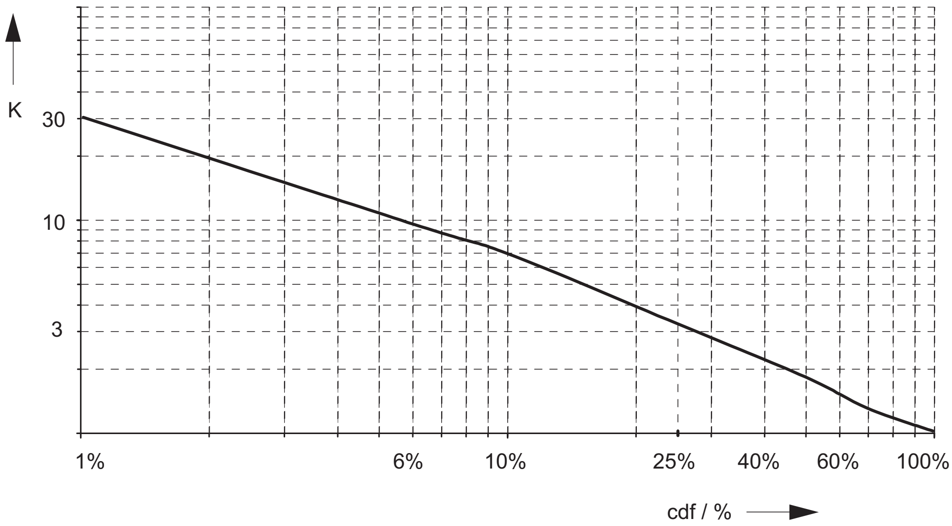
P_1 = short-term power

P_2 = continuous power

cdf = cyclic duration factor of the braking resistor

Overload factor for wire resistors

Overload factor as a function of the cyclic duration factor for wire resistors:



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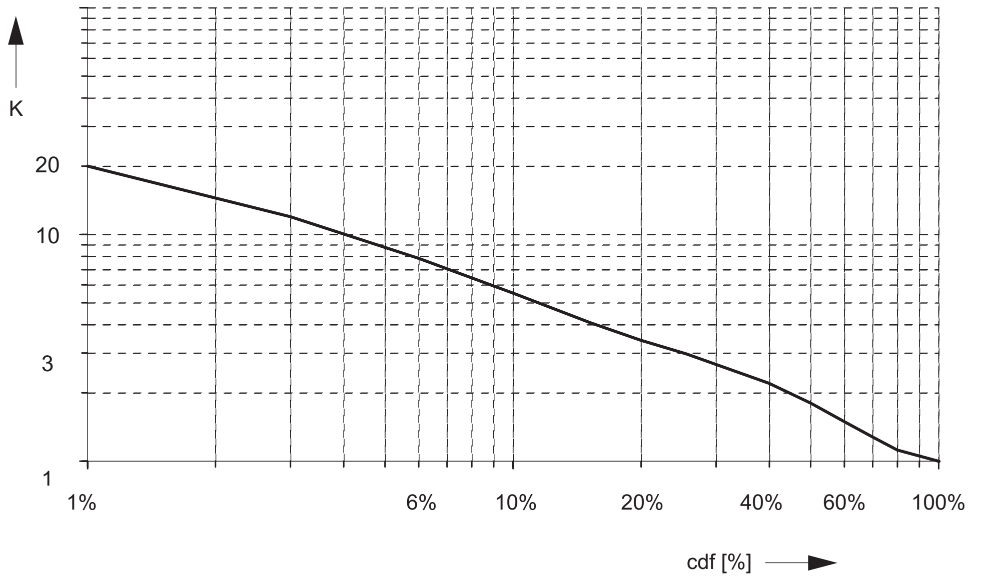
Cyclic duration factor cdf	1%	3%	6%	15%	25%	40%	60%	80%	100%
Overload factor K	30	15	9.5	5	3.2	2.2	1.5	1.12	1

Overload factor for grid resistors

Overload factor as a function of the cyclic duration factor for grid resistors:



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Cyclic duration factor cdf	1%	3%	6%	15%	25%	40%	60%	80%	100%
Overload factor K	20	12	7.6	4	3	2.2	1.5	1.12	1

Calculation example

Given:

- Peak braking power 13 kW
- Average braking power 6.5 kW
- Cyclic duration factor cdf 6%

Required:

- BW.. braking resistor

Procedure

- First, the 100% cdf power for wire and grid resistors is calculated using the following formula:

  Average braking power/overload factor (wire/grid resistor)

  The overload factor (wire or grid resistor) at a cyclic duration factor cdf of 6% can be found in the respective diagrams.
- Results:

  100% cdf power for wire resistors: 685 W.

  100% cdf power for grid resistors: 856 W.
- When using a **MC07B..-5A3 (AC 400/500 V device)**, the **maximum braking resistance value is 72 Ω** with a peak braking power of 13 kW (see peak braking power table).
- Select the appropriate braking resistor from the assignment tables based on the following points:
  – Maximum braking resistance value

– MOVITRAC® B device used

Result when using e.g. MC07B0110-5A3: BW039-12

5.5 Electromagnetic compatibility (EMC)

MOVITRAC® B frequency inverters are components of machines and systems. They comply with the EMC product standard EN 61800-3 **Adjustable speed electrical power drive systems**. If you want to equip the machine/system with frequency inverters in accordance with EMC Directive 2004/108/EC: Observe the information on EMC-compliant installation.

Limit value class in accordance with EN 61800-3	Old limit value class according to EN 55011/ EN 55014
C2	A
C1	B

5.5.1 Interference immunity

MOVITRAC® B fulfills at least the requirements of EN 61800-3 with regard to interference immunity.

5.5.2 Interference emission

The interference emission of MOVITRAC® B was proven using typical setups. The achieved limit values allow the devices to be used in both industrial and residential environments. Depending on the desired limit value class, the following measures are recommended. Higher interference levels are permitted in industrial environments. In industrial environments, depending on the situation of the feeding network and the system configuration, you can dispense with the following measures.

Limit value class

Depending on the system configuration, the following solutions are available for EMC-compliant installation. Carry out an EMC-compliant installation.

Limit value class C1 and C2 according to EN 61800-3.

Limit value class		Size 0 230 V, 1-phase	
C2		No additional filtering required	Output choke HD012 / HD100 / HD101 or shielded motor cable or output filter HF
C1	Wired	No additional filtering required	Shielded motor cable
	Radiation-bound	Folding ferrites[1]	

1) 3 Folding ferrites ULF11A via supply system cables L and N (without PE)

Limit value class	Size 0 400/500 V / 230 V, 3-phase	
C2	No additional filtering required	Output choke HD012 / HD100 / HD101 or shielded motor cable or output filter HF
C1	NF line filter	Output choke HD012 / HD100 / HD101 or shielded motor cable
	FKE EMC module	
Limit value class	**Size 1 / 2S / 2 400/500 V / 230 V, 3-phase**	
C2	No additional filtering necessary	HD output choke or shielded motor cable or HF output filter

Limit value class	Size 1 / 2S / 2 400/500 V / 230 V, 3-phase	
C1	NF line filter	HD output choke or shielded motor cable
Limit value class	**Sizes 3 / 4 / 5 400/500 V / 230 V, 3-phase**	
C2	NF line filter	HD output choke or shielded motor cable or HF output filter
C1		HD output choke or shielded motor cable

5.5.3 Connection

For EMC-compliant installation, refer to the chapter "Mechanical installation" (→ 🗎 196).

5.5.4 IT systems

INFORMATION

- The EMC limit values for interference emission are not specified for voltage supply systems without grounded star point (IT systems). The efficiency of line filters is severely limited.

5.5.5 Inverter-related earth-leakage currents

During normal operation, leakage currents ≥ 3.5 mA might occur.

The leakage currents are essentially determined by:

- The level of the DC link voltage
- The PWM frequency
- The motor cable used and its length
- The motor used

Reduction of leakage currents (size 0 only)

To reduce the inverter-internal leakage currents when switching on the power supply, the interference suppression capacitors against PE can be deactivated, see chapter "Installation / operation on IT systems".

The EMC filter is no longer active when the interference suppression capacitors are deactivated.

SEW-EURODRIVE recommends dispensing with the use of residual current devices and selecting other measures for personal protection (e.g. in accordance with EN 61800-5-1, EN 50178, EN 60204-1, ...).

5.6 Mains and motor connection

5.6.1 Permitted voltage supply systems

Observe the following information:

- **Voltage supply systems with grounded star point**

  MOVITRAC® B is intended for operation on TN and TT systems with a directly grounded star point.

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- **Voltage supply systems with non-grounded star point**

  For operation on voltage supply systems with a non-grounded star point (IT systems), SEW-EURODRIVE recommends an insulation monitor that can drive capacitive loads. This prevents false tripping of the insulation monitor by the inverter's ground capacitance.
- **Outer conductor-grounded supply systems**

  The inverters are only allowed to be operated on outer conductor-grounded supply systems with a maximum phase-to-ground voltage of AC 300 V.

5.6.2 Line contactors and line fuses

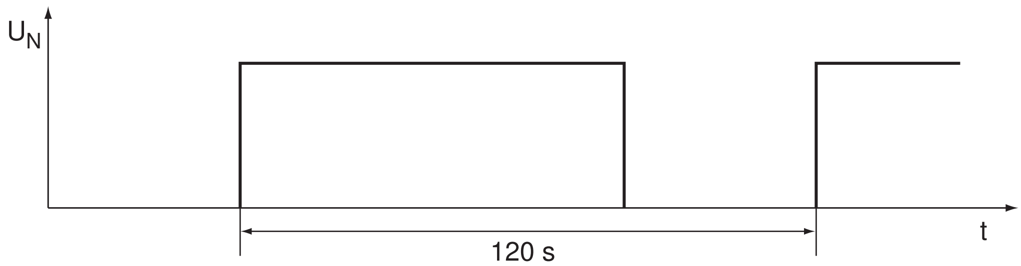
Line contactor

Observe the following information:

- Use only line contactors in utilization category AC-3 (EN 60947-4-1).

Switching the supply system

- For AC 230 V 1-phase devices, observe a minimum time of 120 s between 2 supply system switch-ons.



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- Observe a minimum switch-off time of 10 s for 3-phase devices.
- Do not turn the supply system on or off more than once per minute.

INFORMATION

Do not use the line contactor K11 for jog mode, but only for switching the inverter on and off. Use the following commands for jog mode:

- Enable/stop
- CW/stop
- CCW/stop

Input fuses

You have the following fuse types to choose from:

- Circuit breaker types of utilization categories gL, gG:
  - Nominal fuse voltage ≥ nominal supply system voltage
  - Depending on the inverter load, the nominal fuse current must be set to at least 100% or 125% of the nominal inverter current.
- Miniature circuit breaker with characteristics B, C:
  - Nominal voltage of miniature circuit breaker ≥ nominal supply system voltage
  - The nominal current of the miniature circuit breakers must be 10% above the nominal inverter current.

5.6.3 Connecting AC brakemotors

Detailed information on the brake system can be found in the "AC motors" catalog, which you can order from SEW-EURODRIVE.

Brake systems from SEW-EURODRIVE are DC-excited disk brakes that release electromagnetically and brake by spring force. A brake rectifier supplies the brake with DC voltage.

INFORMATION

The brake rectifier must have its own supply system cable for inverter operation; supply via the motor voltage is not permitted.

Brake rectifier

Shutdown of the brake rectifier, which causes the brake to be applied, can take place in 2 ways:

1. Cut-off in the AC circuit
2. Cut-off in the DC and AC circuit (faster shutdown)

Always use cut-off in the DC and AC circuit of the brake for all lifting applications.

Activating the brake

Always control the brake via digital output DOØ2 "/Brake", not via PLC.

The digital output DOØ2 "/Brake" is designed as an output for the operation of a relay with a freewheeling diode with a control voltage of DC 24 V/max. 150 mA/3.6 W. This can be used to directly control a power contactor with DC 24 V coil voltage or the BMK brake rectifier. The brake is switched with this power contactor.

The startup function in the FBG11B keypad and in the MOVITOOLS® MotionStudio software is used to set the brake parameters for SEW-EURODRIVE 2 and 4-pole motors. The brake parameters (*P73_*) must be set manually for low-speed motors from SEW-EURODRIVE and third-party motors.

Brake parameters

INFORMATION

The brake parameters are adapted to the brake control function listed in the wiring diagram. If the brake release and application time is set too short, e.g. with long response times in the brake control function, this can cause hoists to sag, for example.

5.6.4 Multi-motor drive/group drive

Group drives are mechanically decoupled from each other (e.g. different conveyor belts). In this operating mode, the inverter operates without slip compensation and with a constant V/f ratio.

Multi-motor drives are mechanically coupled to each other (e.g. chain drive with several motors). Observe the information in the documentation "Multi-motor drives".

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⚠ WARNING

Current peaks occur when switching between drives.

Possible material damage or shutdown with error *F01 Overcurrent*.

- Only switch at the output of the frequency inverter when the output stage is disabled.

Motor currents

The total of the motor currents must not exceed the nominal output current of the inverter.

Motor cable

You can determine the total approved length of all motor cables connected in parallel as follows:

$$l_{total} \leq \frac{l_{max}}{n}$$

l_{Total} = total cable length of the motor cables connected in parallel

l_{max} = recommended maximum motor cable length for "single drive" (→ 🗎 138)

n = number of motors connected in parallel

No additional fusing is required if the cross section of the motor cable corresponds to that of the supply system cable. If the cross section of the motor cable is smaller than the cross section of the supply system cable, you must secure the motor cable against short circuit for the corresponding cross section. Motor circuit breakers are suitable for this.

Motor size

The motors in a group must not be more than 3 type steps apart.

Output filters

SEW-EURODRIVE recommends the use of an HF.. output filter for groups of 3 or 4 motors. If the maximum motor cable length (l_{max}) according to the table is exceeded, the use of an HF.. output filter is necessary. This is possible with large groups (n) or large motor cable lengths connected in parallel (l_{Total}). Then the voltage drop on the motor cable limits the maximum motor cable length and not the limit value according to the table. The sum of the rated motor currents must not exceed the nominal throughput current of the output filter.

5.6.5 External voltage supply DC 24 V

The internal voltage supply is sufficient for the basic device and digital outputs up to 200 mA (DO02: 150 mA; DO03: 50 mA). The maximum current carrying capacity of terminals X12:8 and X12:9 is DC 8 A. FBG11B, FSC11B/12B and FSE24B with the options DBG60B, USB11A or UWS21A/UWS21B can also be supplied by the internal voltage supply.

The MOVITRAC® B can be supplied by an external DC 24 V voltage supply, this makes sense e.g. for bus operation. This voltage supply must be large enough to also operate the digital outputs. Fieldbus options always require an external voltage supply.

In this case, the external DC 24 V power supply unit must always be switched on before the line contactor and switched off after the line contactor.

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The DC 24 V voltage output can be switched off with *P808*. External voltage supply is therefore still possible.

INFORMATION

The MC07B...-S0 device type must always be supplied with external voltage.

The following table shows the DC 24 V power demand of MOVITRAC® B.

The power demand per input terminal is 0.2 W.

Size	Power demand of basic device 1)	DBG60B	FIO11B / FIO21B	Fieldbus option 2)3)	DHP11B 4)	DHE21B / DHE41B	FSE24B
Size 0 MC07B..-00	3.8 W	1 W	2 W	3.4 W	4.5 W	8.5 W	1.2 W
Size 0 MC07B..-S0 5)	10.8 W 6)						
1, 2S, 2	15.8 W 7)						
3	21.8 W 8)						
4, 5	23.8 W 9)						

1) Including FBG11B, FSC11B/12B (UWS11A/USB11A). Take into account the load of the digital outputs with an additional 2.4 W per 100 mA.
2) Fieldbus options are: DFP21B, DFD11B, DFE11B, ...
3) These options must always be supplied externally.
4) These options must always additionally be supplied externally.
5) The MC07B..-S0 device type can be supplied either via X12:8 and X12:9 or via X17:1 and X17:2 from an external DC 24 V power supply unit.
6) Of which 3 W power demand for the output stage via X17:3 SOV24, X17:4 SVI24 (if the device STO is supplied by the device itself, i.e. without external 24 V wiring).
7) Including power demand for Safe Torque Off (STO)
8) Including power demand for Safe Torque Off (X17)
9) Including power demand for STO (X17)

INFORMATION

- When using an auxiliary voltage for backup operation on VIO24, ensure that the backup voltage is always present during line operation or switch off *P808*, as otherwise other devices connected to VIO24 will be supplied by MOVITRAC® B during line operation without backup voltage.
- The maximum current load for looping through the backup power supply from VIO24/basic device to VIO24 / FSC/FIO is 1 A.

Example

MC07B0015-5A3-4-00/DFP21B with the options FSC11B & FBG11B. The digital inputs DI01 (CW/stop) and DI03 (enable) are supplied with voltage by the MOVITRAC® B. The motor brake is controlled via DO02, the brake coil of the brake relay requires 100 mA at DC 24 V. The fault signaling contact via DO00 is evaluated by the higher-level PLC with a current requirement of 50 mA.

Calculation of total power demand:

- Power demand of the basic device (incl. FSC11B): 3.8 W
- Power demand of the DFP21B fieldbus option: 3 W
- Power demand of the brake coil: 2.4 W

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- Power demand of the fault signaling contact: 24 V x 0.05 A = 1.2 W
- Power demand of the input terminals: 0.4 W

The total power demand is 10.8 W. This must be provided by an external DC 24 V supply.

5.6.6 Line protection and core cross section

When fusing and selecting the cable cross sections, observe country-specific and system-specific regulations. Also comply with the information on **UL-compliant installation** if necessary.

When using several single-phase devices, always dimension the common neutral conductor for the total current. Also dimension it to the total current if you connect the devices distributed over the 3 line phases, as the 3rd supply system harmonics are always added.

Select the cable cross section of the motor cable so the voltage drop is as small as possible. If the voltage drop is too large, the motor will not reach its full torque.

Smallest wire bending space (EN 61800-5-1)

According to EN 61800-5-1, the distance between a power connection terminal and an obstacle to which the wire is directed after leaving the power connection terminal must be at least the value specified in the following table.

<table>
<tr><th rowspan="3">Cable cross section in mm²</th><th colspan="3">Smallest bending space in mm</th></tr>
<tr><th colspan="3">Wires per terminal</th></tr>
<tr><th>1</th><th>2</th><th>3</th></tr>
<tr><td>10 – 16</td><td>40</td><td>–</td><td>–</td></tr>
<tr><td>25</td><td>50</td><td>–</td><td>–</td></tr>
<tr><td>35</td><td>65</td><td>–</td><td>–</td></tr>
<tr><td>50</td><td>125</td><td>125</td><td>180</td></tr>
<tr><td>70</td><td>150</td><td>150</td><td>190</td></tr>
<tr><td>95</td><td>180</td><td>180</td><td>205</td></tr>
<tr><td>120</td><td>205</td><td>205</td><td>230</td></tr>
<tr><td>150</td><td>255</td><td>255</td><td>280</td></tr>
<tr><td>185</td><td>305</td><td>305</td><td>330</td></tr>
</table>

Recommendation for standard installation, SI units

SEW-EURODRIVE recommends the following cable cross sections and fusing when using copper conductors with PVC insulation and routing in cable ducts at an ambient temperature of 25 °C and nominal line currents of 100% of the nominal inverter current:

<table>
<tr><th colspan="2">MOVITRAC® B 1 × 230 V</th><th>0003</th><th>0004</th><th>0005</th><th>0008</th><th>0011</th><th>0015</th><th>0022</th></tr>
<tr><td rowspan="3">1-phase</td><td>Line protection</td><td colspan="4">C16[1)] / gL16 / K16</td><td colspan="3">C32[2)] / gL25 / K25 / D20</td></tr>
<tr><td>Supply system cable</td><td colspan="4">1.5 mm²</td><td colspan="3">4 mm²</td></tr>
<tr><td>PE conductor</td><td colspan="4">2 × 1.5 mm²</td><td colspan="3">2 × 4 mm²</td></tr>
<tr><td colspan="2">Motor cable</td><td colspan="4">1.5 mm²</td><td colspan="3">1.5 mm²</td></tr>
</table>

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MOVITRAC® B 1 × 230 V	0003	0004	0005	0008	0011	0015	0022
Device terminal cross section of the power section	Separable terminal strips 4 mm^2 conductor end sleeve DIN 46228						

1) If there are at least 2 minutes between switching off and switching on: B16

2) If there are at least 2 minutes between switching off and switching on: B32

MOVITRAC® B 3 × 230 V		0003	0004	0005	0008	0011	0015	0022
3-phase	Line protection	10 A					16 A	
	Supply system cable	1.5 mm^2				1.5 mm^2		
	PE conductor	2 × 1.5 mm^2				2 × 1.5 mm^2 / 1 × 10 mm^2		
Motor cable		1.5 mm^2				1.5 mm^2		
Device terminal cross section of the power section		Separable terminal strips 4 mm^2 conductor end sleeve DIN 46228						

MOVITRAC® B 3 × 230 V	0037	0055	0075	0110	0150	0220	0300
Fuses F11/F12/F13 I_N	25 A	25 A	35 A	50 A	63 A	80 A	100 A
Supply system cable L1/L2/L3	4 mm^2	4 mm^2	6 mm^2	10 mm^2	16 mm^2	25 mm^2	35 mm^2
PE conductor	2 × 4 mm^2 1 × 10 mm^2	2 × 4 mm^2 1 × 10 mm^2	2 × 6 mm^2 1 × 10 mm^2	1 × 10 mm^2	1 × 16 mm^2	1 × 16 mm^2	1 × 16 mm^2
Motor cable U/V/W	4 mm^2	4 mm^2	6 mm^2	10 mm^2	16 mm^2	25 mm^2	35 mm^2
Device terminal cross section of the power section	Separable terminal strip 4 mm^2 conductor end sleeve DIN 46228	Screw and washer assembly M4 with clamping bracket 4 mm^2 conductor end sleeve DIN 46228 6 mm^2 crimp cable lug DIN 46234		Screw and washer assembly M6 with washer Max. 25 mm^2 Crimp cable lug DIN 46234		M10 bolt with nut Max. 70 mm^2 Compression cable lug DIN 46235	

MOVITRAC® B 400/500 V		0003	0004	0005	0008	0011	0015	0022	0030	0040	0055	0075
3-phase	Line protection	10 A					16 A				16 A	16 A
	Supply system cable	1.5 mm^2									1.5 mm^2	1.5 mm^2
	PE conductor	2 × 1.5 mm^2					2 × 1.5 mm^2 1 × 10 mm^2				2 × 1.5 mm^2 1 × 10 mm^2	2 × 1.5 mm^2 1 × 10 mm^2
Motor cable		1.5 mm^2									1.5 mm^2	2.5 mm^2
Device terminal cross section of the power section		Separable terminal strips 4 mm^2 conductor end sleeve DIN 46228									M4 screw and washer assembly with terminal clip 4 mm^2 conductor end sleeve DIN 46228	

MOVITRAC® B 400/500 V		0110	0150	0220	0300
3-phase	Line protection	25 A	35 A	50 A	63 A
	Supply system cable	4 mm^2	6 mm^2	10 mm^2	16 mm^2
	PE conductor	2 × 4 mm^2 1 × 10 mm^2	2 × 6 mm^2 1 × 10 mm^2	1 × 10 mm^2	1 × 16 mm^2
Motor cable		4 mm^2	6 mm^2	10 mm^2	16 mm^2
Device terminal cross section of the power section		M4 screw and washer assembly with terminal clip 4 mm^2 conductor end sleeve DIN 46228 6 mm^2 crimp cable lug DIN 46234	Screw and washer assembly M6 with washer Max. 25 mm^2 Crimp cable lug DIN 46234		

MOVITRAC® B 400/500 V		0370	0450	0550	0750
3-phase	Line protection	80 A	100 A	100 A	125 A
	Supply system cable	25 mm^2	35 mm^2	35 mm^2	50 mm^2
	PE conductor	1 × 16 mm^2			25 mm^2
Motor cable		25 mm^2	35 mm^2	35 mm^2	50 mm^2
Device terminal cross section of the power section		Bolt: M10 with nut max. 70 mm^2 Compression cable lug: DIN 36235			

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Recommendation for standard installation, USA NEC

MOVITRAC® B 1 × 230 V		**0003**	**0004**	**0005**	**0008**	**0011**	**0015**	**0022**
1-phase	Line protection	C16[1] / gL16 / K16				C32[2] /gL25 / K25 / D20		
	Supply system cable	AWG16				AWG12		
	PE conductor	2 × AWG16				2 × AWG12		
Motor cable		AWG16				AWG16		
Device terminal cross section of the power section		Separable terminal strip AWG10 conductor end sleeve						

1) If there are at least 2 minutes between switching off and switching on: B16

2) If there are at least 2 minutes between switching off and switching on: B32

MOVITRAC® B 3 × 230 V		**0003**	**0004**	**0005**	**0008**	**0011**	**0015**	**0022**
3-phase	Line protection	10 A					16 A	
	Supply system cable	AWG16				AWG12		
	PE conductor	2 × AWG16				2 × AWG12		
Motor cable		AWG16				AWG16		
Device terminal cross section of the power section		Separable terminal strip AWG10 conductor end sleeve						

MOVITRAC® B 3 × 230 V	**0037**	**0055**	**0075**	**0110**	**0150**	**0220**	**0300**
Fuses F11/F12/F13 I_N	25 A	25 A	35 A	50 A	63 A	80 A	100 A
Supply system cable L1/L2/L3	AWG12	AWG12	AWG10	AWG6	AWG4	AWG4	AWG3
PE conductor	AWG12	AWG12	AWG10	AWG10	AWG8	AWG8	AWG6
Motor cable U/V/W	AWG12	AWG10	AWG10	AWG6	AWG4	AWG4	AWG3
Device terminal cross section of the power section	Separable terminal strip AWG10 Conductor end sleeve	Screw and washer assembly M4 with clamping bracket AWG10 conductor end sleeve AWG10 crimp cable lug		Screw and washer assembly M6 with washer Max. AWG4 crimp cable lug		M10 bolt with nut Max. AWG2/0 compression cable lug	

MOVITRAC® B 400/500 V	**0003**	**0004**	**0005**	**0008**	**0011**	**0014**	**0015**	**0022**	**0030**	**0040**
Size	0						1			
Fuses F11/F12/F13 I_N	6 A							10 A		15 A
Supply system cable L1/L2/L3	AWG14						AWG14			
PE conductor	AWG14						AWG14			
Motor cable U/V/W	AWG14						AWG14			
Device terminal cross section of the power section	Separable terminal strip AWG10 conductor end sleeve						Separable terminal strip AWG10 conductor end sleeve			

MOVITRAC® B 400/500 V	**0055**	**0075**	**0110**	**0150**	**0220**	**0300**
Size	2			3		
Fuses F11/F12/F13 I_N	20 A		30 A	40 A	60 A	80 A
Supply system cable L1/L2/L3	AWG12		AWG10	AWG8	AWG6	AWG4
PE conductor	AWG12		AWG10	AWG10		AWG8
Motor cable U/V/W	AWG12		AWG10	AWG8	AWG6	AWG4
Device terminal cross section of the power section	Screw and washer assembly M4 with clamping bracket AWG10 conductor end sleeve AWG10 crimp cable lug			Screw and washer assembly M6 with washer max. AWG4 crimp cable lug		

MOVITRAC® B 400/500 V	0370	0450	0550	0750
Size	4		5	
Fuses F11/F12/F13 I_N	90 A	110 A	150 A	175 A
Supply system cable L1/L2/L3	AWG4	AWG3	AWG1	AWG2/0
PE conductor	AWG8	AWG6	AWG6	AWG6
Motor cable U/V/W	AWG4	AWG3	AWG1	AWG2/0
Device terminal cross section of the power section	M10 bolt with nut Max. AWG2/0 compression cable lug			

5.6.7 Motor cable length

The maximum motor cable length depends on the:

- Cable type
- Voltage drop in the cable
- Set PWM frequency
- Use of an output filter

  If you use an output filter, the limit values in the table do not apply. The motor cable length is then limited exclusively by the voltage drop on the motor cable.

MOVITRAC® B		Approved maximum motor cable length in m			
Size		0XS / 0S / 0L		2S 0055	2S 0075 / 2 / 3 / 4 / 5
Voltage V_{line}		3 × AC 400 V 3 × AC 230 V 1 × AC 230 V	3 × AC 500 V 3 × AC 400 V (125% I_N)	3 × AC 230 V 3 × AC 400/500 V	
Shielded cable	4 kHz 1)	100	50	300	400
	8 kHz	70	35	250	300
	12 kHz	50	25	200	250
	16 kHz	40	25	150	200
Unshielded cable	4 kHz 1)	200	100	900	1200
	8 kHz	140	70	750	900
	12 kHz	100	50	600	750
	16 kHz	80	50	450	600

1) Default setting

INFORMATION

Do not use a residual current device for long motor cables. Leakage currents caused by cable capacitances can lead to false tripping.

5.6.8 Voltage drop

Select the cable cross section of the motor cable so the **voltage drop is as small as possible**. If the voltage drop is too large, the motor will not reach its full torque.

You can determine the expected voltage drop using the following tables. With shorter cables, you can convert the voltage drop proportionally to the length.

Cable cross section	Load with I/A =															
	4	6	8	10	13	16	20	25	30	40	50	63	80	100	125	150
copper	Voltage drop Δ U / V with length = 100 m and ϑ = 70 °C															
1.5 mm²	5.3	8	10.6	13.3	17.3	21.3	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
2.5 mm²	3.2	4.8	6.4	8.1	10.4	12.8	16	1)	1)	1)	1)	1)	1)	1)	1)	1)
4 mm²	1.9	2.8	3.8	4.7	6.5	8.0	10	12.5	1)	1)	1)	1)	1)	1)	1)	1)
6 mm²					4.4	5.3	6.4	8.3	9.9	1)	1)	1)	1)	1)	1)	1)
10 mm²						3.2	4.0	5.0	6.0	8.2	10.2	1)	1)	1)	1)	1)
16 mm²								3.3	3.9	5.2	6.5	7.9	10.0	1)	1)	1)
25 mm²									2.5	3.3	4.1	5.1	6.4	8.0	1)	1)
35 mm²											2.9	3.6	4.6	5.7	7.2	8.6
50 mm²														4.0	5.0	6.0

1) Load not permitted according to VDE 0100 Part 430.

Cable cross section	Load with I/A =															
	4	6	8	10	13	16	20	25	30	40	50	63	80	100	125	150
copper	Voltage drop Δ U / V with length = 100 m and ϑ = 70 °C															
AWG16	7.0	10.5	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
AWG14	4.2	6.3	8.4	10.5	13.6	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
AWG12	2.6	3.9	5.2	6.4	8.4	10.3	12.9	1)	1)	1)	1)	1)	1)	1)	1)	1)
AWG10					5.6	6.9	8.7	10.8	13.0	1)	1)	1)	1)	1)	1)	1)

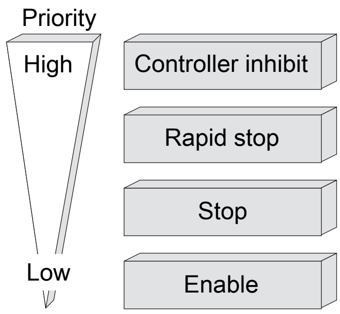
Cable cross section	Load with I/A =															
	4	6	8	10	13	16	20	25	30	40	50	63	80	100	125	150
AWG8						4.5	5.6	7.0	8.4	11.2	1)	1)	1)	1)	1)	1)
AWG6								4.3	5.1	6.9	8.6	10.8	13.7	1)	1)	1)
AWG4									3.2	4.3	5.4	6.8	8.7	10.8	13.5	1)
AWG3									2.6	3.4	4.3	5.1	6.9	8.6	10.7	12.8
AWG2											3.4	4.2	5.4	6.8	8.5	10.2
AWG1												3.4	4.3	5.4	6.8	8.1
AWG1/0												2.6	3.4	4.3	5.4	6.8
AWG2/0													2.7	3.4	4.3	5.1

1) More than 3% voltage drop in relation to V line = AC 460 V.

5.7 Priority of the operating states and interrelation between control signals

5.7.1 Priority of the operating states

The following figure shows the priority of the operating states:



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5.7.2 Interrelation between control signals

The control signals have the following values:

- Controller inhibit
- Rapid stop
- Stop

They are activated via:

- Digital inputs
- Control word processing bus, if *P101 Control signal source* is set to RS485 or SBus
- IPOS$^{plus®}$ control word H484

The following table shows the linking of the control signals. "/CW/Stop" is permanently programmed to digital input DIØ1. The other control signals are only effective if a digital input is programmed for this function (→ parameter *P60.*).

Controller inhibit	Digital input is programmed to			Inverter status
	Enable/ Rapid stop	CW/Stop (DI01)	CCW/stop	
0	1)	1)	1)	Locked
1	0	2)	2)	
1	1	1	0	Approved clockwise rotation

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Controller inhibit	Digital input is programmed to			Inverter status
	Enable/ Rapid stop	CW/Stop (DI01)	CCW/stop	
1	1	0	1	Approved counter-clockwise rotation

1) Not relevant if digital input is programmed to controller inhibit and "/Controller inhibit" = "0"

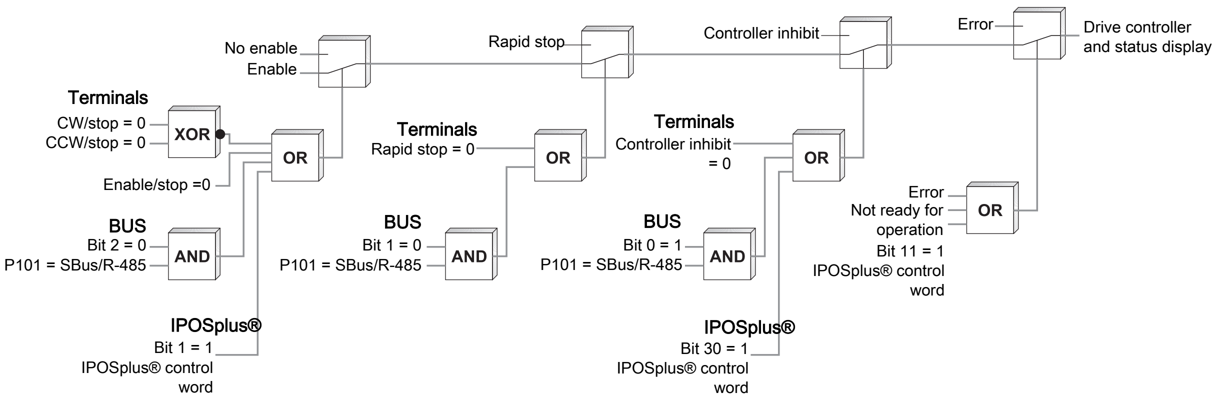
2) Not relevant if "Enable/rapid stop" = "0"

As soon as one of the 3 processing blocks triggers a higher-priority control command (e.g. "Rapid stop" or "/Controller inhibit"), this becomes effective.

In general, the digital inputs remain active even when the inverter is controlling the process data (*P101 Control signal source* = RS485 or SBus). Safety-relevant functions such as "/Controller inhibit" and "No enable" are processed equally both from the terminal strip and from the fieldbus. For control via the fieldbus, the frequency inverter must be enabled via a CW or CCW terminal. The CW or CCW terminal has no influence on the direction of rotation. This is determined by the sign of the speed setpoint.

All other functions that can be activated via terminals as well as via the control word or IPOS$^{plus®}$ control word are processed with OR linking.

Logic operation of control signals from input terminals and SBus



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For safety reasons, the basic control block is defined in such a way that the inverter assumes the safe state "No enable" with the control word specification 0000$_{hex}$, as all common fieldbus master systems definitively reset the outputs to 0000$_{hex}$ in the event of a fault. In this case, the inverter performs a rapid stop and then activates the mechanical brake.

5.8 Project planning for explosion-proof AC asynchronous motors of category 2

Explosion-protected AC motors from SEW-EURODRIVE, which are put into operation with MOVITRAC® B inverters, must be approved for this operation according to the nameplate and EC type examination certificate.

5.9 Application examples

All of the following application examples assume proper startup in accordance with the "Startup" chapter.

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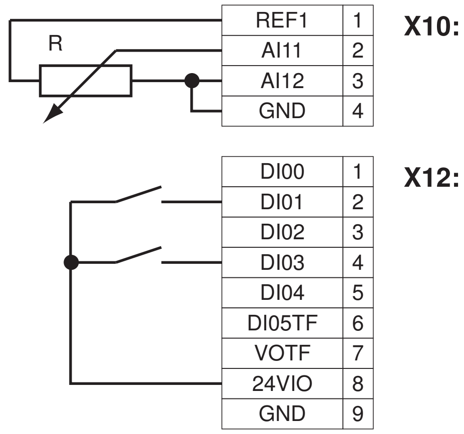
5.9.1 External setpoint potentiometer

The external setpoint potentiometer is not effective when manual mode is activated.

Connect an external setpoint potentiometer as follows:

The resistance value of the external setpoint potentiometer R must be ≥ 3 kΩ.



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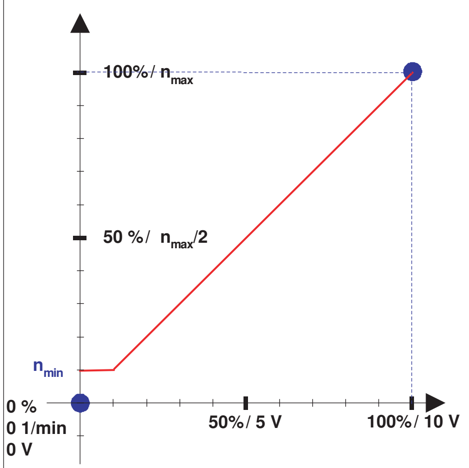
5.9.2 Setpoint value processing

Use of AI1 as 0 – 10 V voltage input, no fixed setpoint selected, frequency inverter enabled.

Setpoint source	X1 *P116* Y1 *P117*	X2 *P118* Y2 *P119*	V_{AI1}	Setpoint speed	Diagram
Bipolar	0% 100%	100% 100%	0 V 5 V 10 V	n_{min} 50% n_{max} n_{max}	 *644458507*

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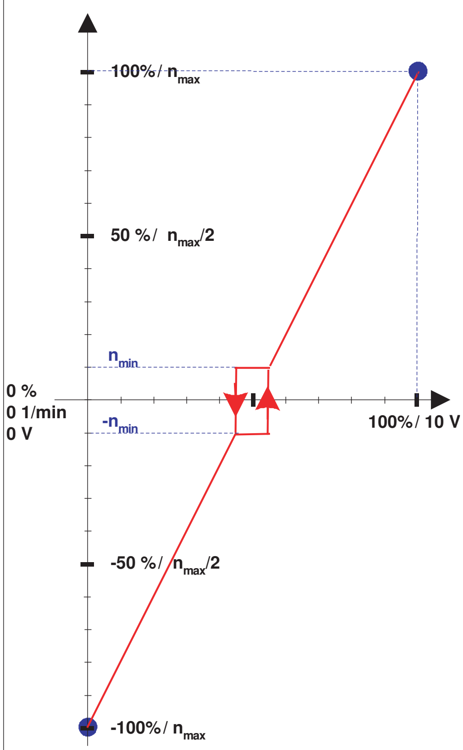
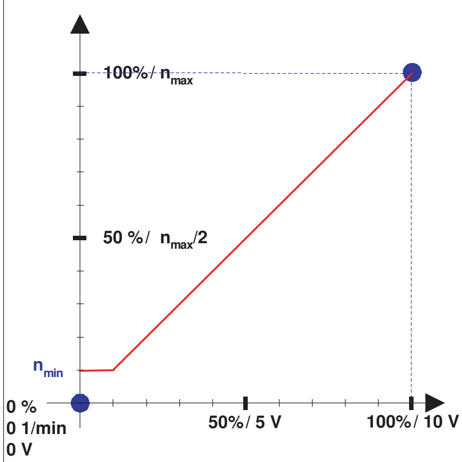
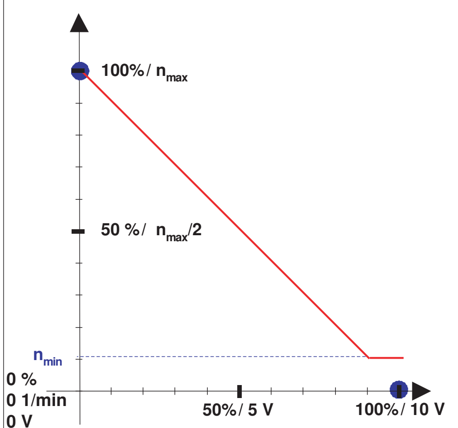
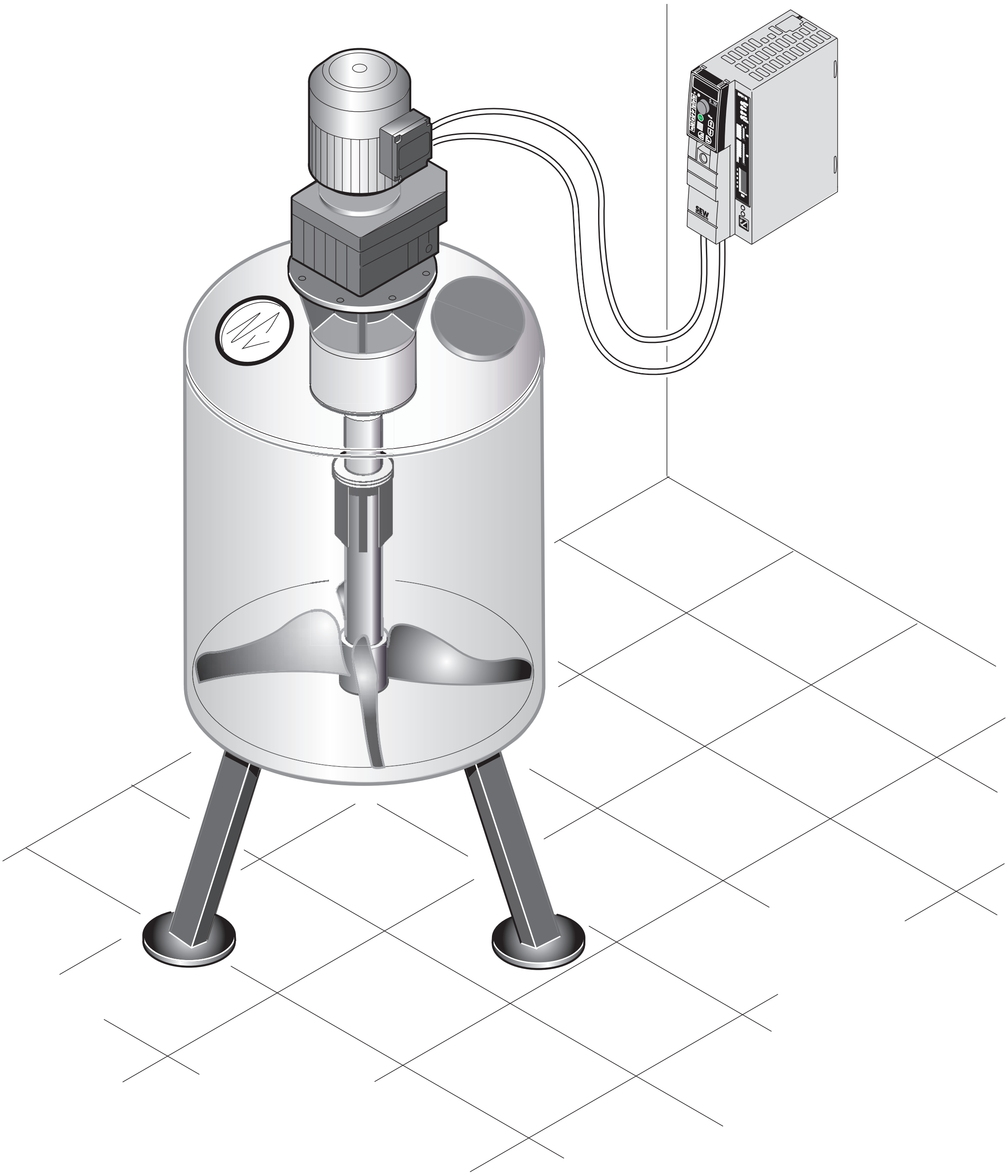
Setpoint source	**X1 *P116* Y1 *P117***	**X2 *P118* Y2 *P119***	**V_{AI1}**	**Setpoint speed**	**Diagram**
Bipolar	0% -100%	100% 100%	0 V 5 V 10 V	$-n_{max}$ $-n_{min}$ / $+n_{min}$ $+n_{max}$	 644987659
Unipolar	0% 100%	100% 100%	0 V 5 V 10 V	n_{min} 50% n_{max} n_{max}	 644992011
Unipolar	0% 0%	100% 0%	0 V 5 V 10 V	n_{max} 50% n_{max} n_{min}	 644996875

5.9.3 Speed-controlled agitator

In this application, you can control the speed with the FBG setpoint adjuster.



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You use the operator panel to control:

- Reset
- Start
- Stop
- Open-loop speed control.

To operate the agitator, you must select the "FBG setpoint adjuster" pictogram.

Parameters

Adjust the following parameters for the agitator:

- *P122 Direction of rotation FBG manual mode*
- Ramp t11 up (adjustment via symbol on the operator panel or parameter *P130*)
- Ramp t11 down (adjustment via symbol on the operator panel or parameter *P131*)
- *P301 Minimum speed 1 / 2*
- *P302 Maximum speed 1 / 2*
- *P860 PWM frequency 1 / 2*

5.9.4 Positioning a trolley

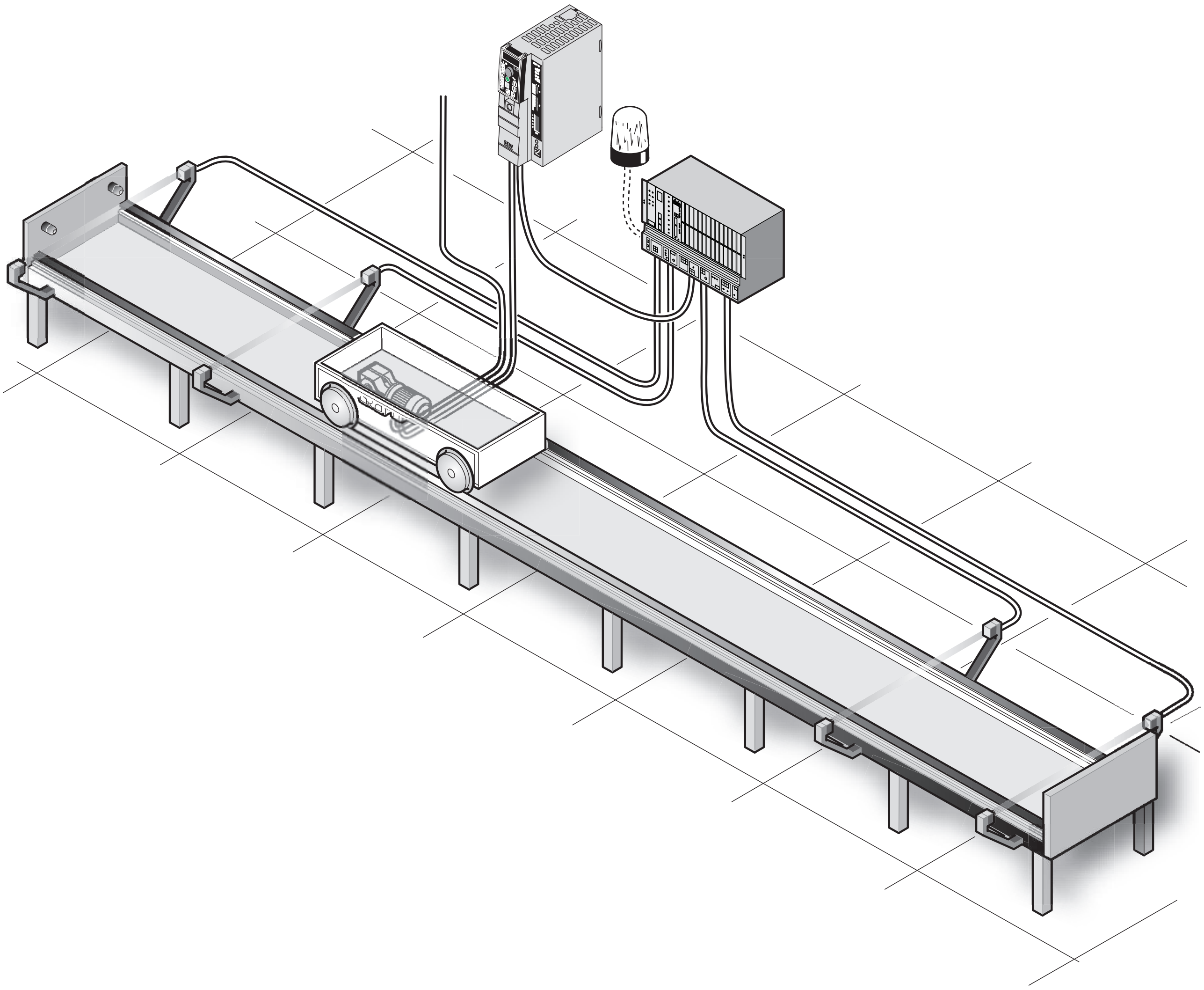
Principle

Positioning of a trolley with rapid speed and creep speed, position detection via initiators.

The emergency off shutdown must be ensured via a separate fuse circuit.

Install a braking resistor.

Perform startup for VFC operating mode.



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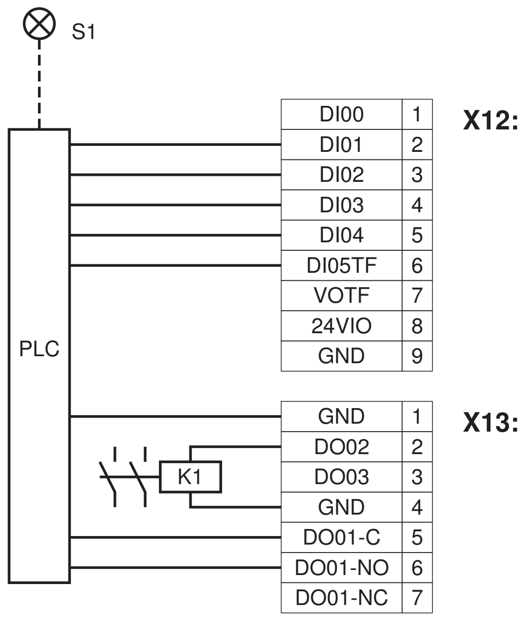
Terminals

- Rapid speed: DI04 = 1 and DI05 = 1
- Creep speed: DI04 = 1 and DI05 = 0

Connection of the electronics terminal strip with

- DI01 = CW/stop
- DI02 = CCW/stop
- DI03 = Enable
- DO01-C and DO01-NO = "Failure"
- DO02 = Brake



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K1 is the braking contactor, S1 the fault signal lamp.

The following signals between the higher-level PLC controller and the MOVITRAC® B are relevant:

X12:2: CW direction of rotation	X12:6: Creep speed/rapid speed
X12:3: CCW direction of rotation	X12:8: 24 V
X12:4: Start/stop	X13:6: No failure
X12:5: Rapid speed	X13:2: Brake on

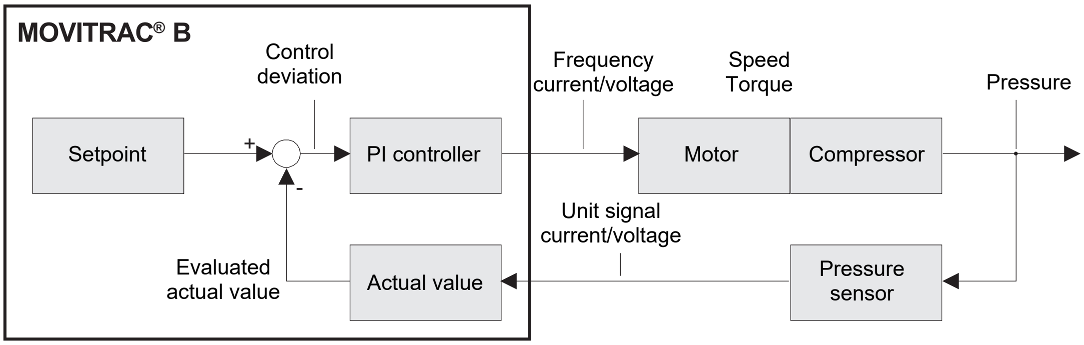
Parameters

The following parameters are relevant for this application. Check whether you can accept the factory setting values unchanged.

P601 Digital input DI02: CCW/stop	*P604 Digital input DI05: n12/n22*
P602 Digital input DI03: Enable	*P620 Digital output DO01:* Failure
P603 Digital input DI04: n11/n21	*P621 Digital output DO02*: Brake on

5.9.5 PI controller

The basic structure of the closed loop system with PI controller is shown here using the example of pressure control.



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5.10 HF.. output filter

5.10.1 Important information

Observe the following information when using output filters:

- Output filters must not be used with hoists.
- During project planning of the drive, take the voltage drop in the output filter into account and the reduced motor torque that results. This applies in particular to AC 230 V devices with output filters.
- With output filter HF.. no flying start function is possible.

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5.10.2 Installation, connection and operation

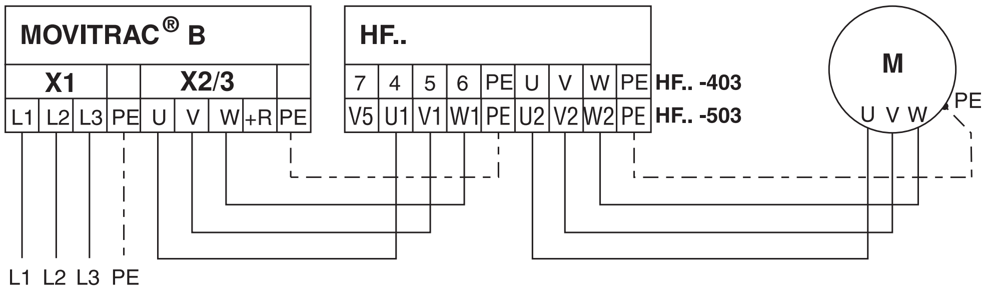
INFORMATION

- Install the output filter next to the corresponding inverter. Maintain a ventilation clearance of at least 100 mm above and below the output filter; a lateral clearance is not necessary.
- Limit the cable between the inverter and the output filter to the absolutely necessary length. Maximum 1 m for unshielded cable and 10 m for shielded cable.
- If an output filter is used, an unshielded motor cable is sufficient. Observe the following information if you are using an **output filter** and **shielded motor cable together**:
-
  – The maximum permissible motor cable length without V_{DCL} connection is 20 m.
  – With a motor cable length of more than 20 m, a V_{DCL} connection is required.
  – Observe the information on "Operation with V_{DCL} connection" on the following page.
- The nominal throughput current of the output filter must be greater than or equal to the output current of the inverter. Note whether the configured output current of the inverter is 100% I_N (= nominal output current) or 125% I_N (= continuous output current).
- When operating a motor group on an inverter, several motors can be connected together to one output filter. The sum of the rated motor currents must not exceed the nominal throughput current of the output filter.
- It is permitted to connect 2 identical output filters in parallel on one inverter output to increase the nominal throughput current. Switch all connections of the same name in parallel on the output filters to do so.
- Particularly during operation with f_{PWM} = 4 kHz, considerable noise can occur in the output filter (magnetostriction). In noise-sensitive environments, SEW-EURODRIVE recommends operation with f_{PWM} = 12 kHz (or 16 kHz) and V_{DCL} connection. Then follow the information on the V_{DCL} connection.
- When operating the inverter with f_{PWM} = 4 or 8 kHz, the output filter connection V5 (for HF..-503) or 7 (for HF..-403) must **not** be connected (no V_{DCL} connection).
- You must not make a V_{DCL} connection for devices of size 0XS.

5.10.3 V_{DCL} connection

Operation without V_{DCL} connection:

- Only permitted for PWM frequencies of 4 or 8 kHz.



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Operation with V_{DCL} connection

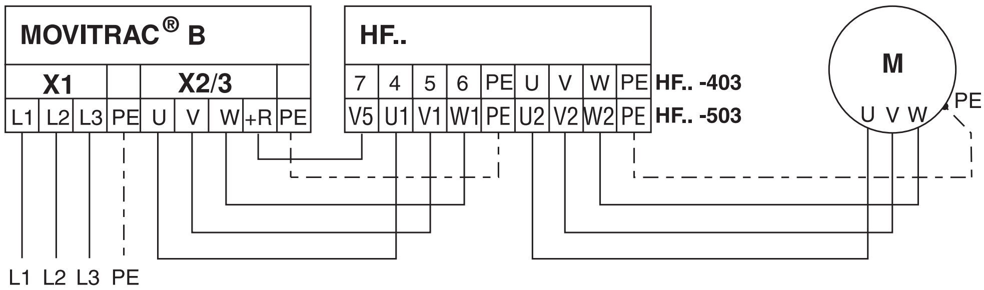
Connection of inverter terminal +R with HF..-503 tml. V5 or HF..-403 tml. 7

INFORMATION

- Optimized filter effect against ground.
- Improved filter effect in the low-frequency range (≤ 150 kHz).
- Only approved for PWM frequencies 12 or 16 kHz. Note that operation at 12 or 16 kHz results in increased losses in the inverter (= power reduction).
- PWM fixed = Set to On, automatic reduction of the PWM frequency by the inverter must be prevented.
- For HF..-403, note: V_{DCL} connection only permitted with V_{line} ≤ AC 400 V, not with V_{line} = AC 500 V.
- The V_{DCL} connection increases inverter utilization. This increases the inverter output current requirement in relation to the nominal output current of the inverter according to the following table.

f_{PWM}	V_{line} = 3 × AC 230 V	V_{line} = 3 × AC 400 V	V_{line} = 3 × AC 500 V
12 kHz	4%	12%	15%
16 kHz	3%	8%	12%

The increased current requirement places an additional load on the inverter. Take this into account when configuring the drive. Failure to observe this might result in an overload shutdown of the inverter.



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INFORMATION

- You must not make a VDCL connection for devices of size 0XS.
- No V_{DCL} connection is possible with HF180-403.

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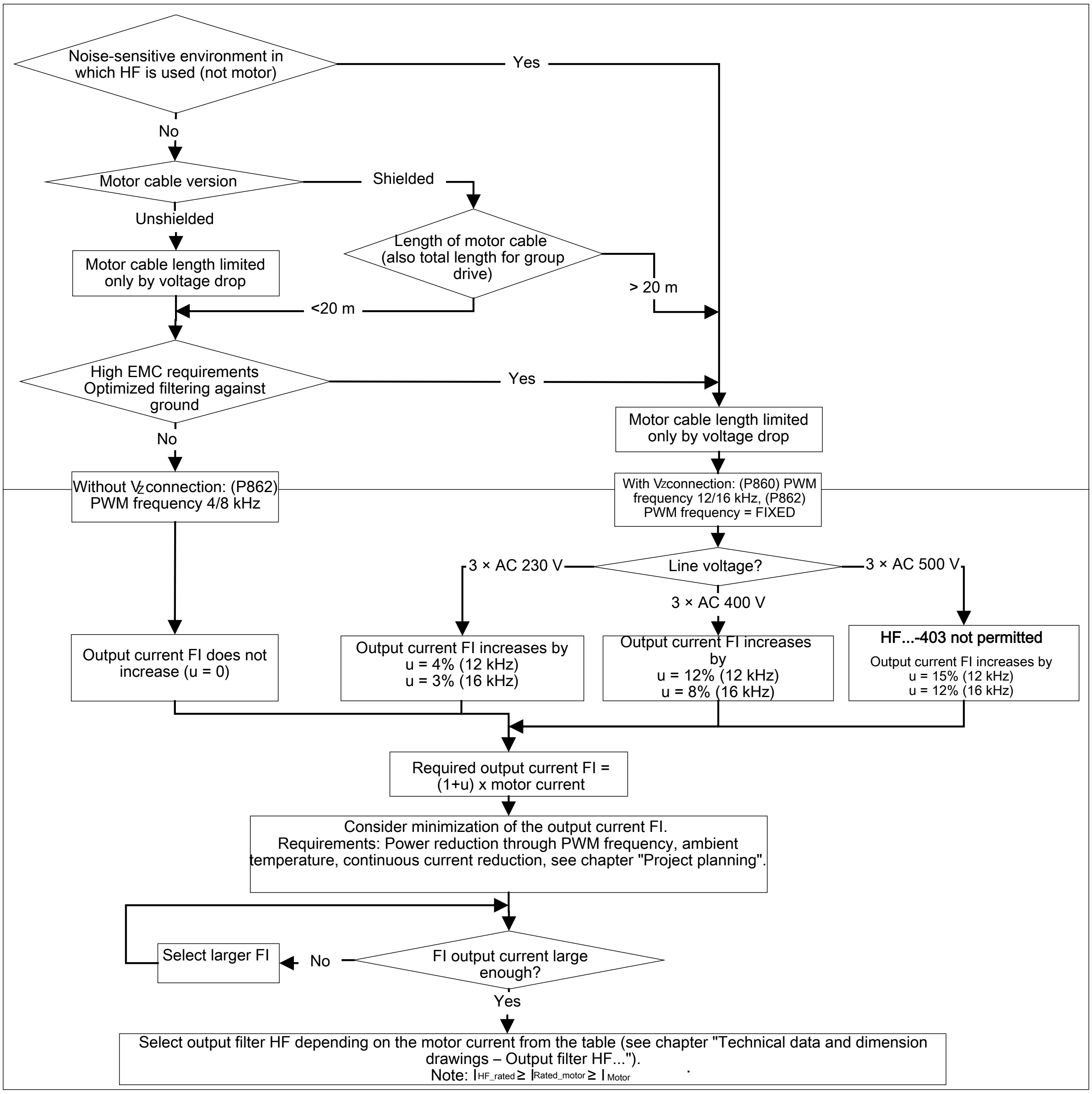
The selection of the PWM frequency and the checking of the inverter is summarized in the following figure.



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5.11 Electronics cables and signal generation

5.11.1 Cable type

The electronics terminals are suitable for:

- Cross sections up to 1.5 mm^2 without conductor end sleeves
- Cross sections up to 0.75 mm^2 with conductor end sleeves

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Use shielded cables as standard. Ground the shield on both sides. Lay electronic cables separately from power-carrying cables and contactor control cables or cables for braking resistors.

5.11.2 0 V cables

Never switch 0 V lines to GND. Do not loop 0 V lines of multiple devices electrically connected to each other from device to device, wire them in a star configuration instead. This means:

- Install the devices in neighboring control cabinet panels and do not distribute them widely
- Route the 0 V lines out from a central point over the shortest path to each individual device with a cross section of at least 1 mm^2.

5.11.3 Coupling relays

You can use coupling relays for galvanic isolation of the digital inputs and digital outputs to functional earth. Only use coupling relays with encapsulated, dust-protected electronic contacts. The relays must be suitable for switching low voltages and currents (5 – 30 V and 0.1 – 20 mA).

5.12 Parameter set switchover

This function can be used to operate 2 motors with 2 different parameter sets on one inverter.

The parameter set changeover takes place via a digital input or via fieldbus. To do this, program a digital input to the "Parameter set changeover" function (→ *P60./P61.*). Inverter status DISABLED can then be used to switch between parameter set 1 and 2.

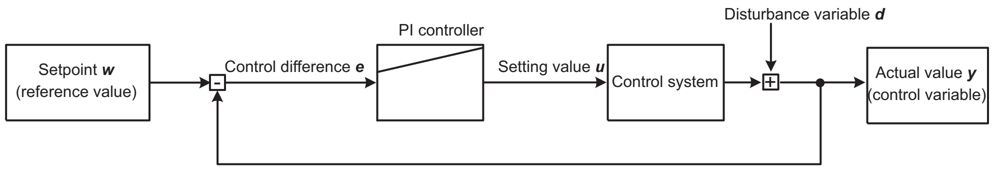
Function	Effect with	
	"0" signal	"1" signal
PARAM. CHANGEOV.	Parameter set 1 active	Parameter set 2 active

INFORMATION

When operating 2 alternately running motors on one inverter using the parameter set changeover function, a changeover contactor must be provided for each of the two motor cables. Only switch the changeover contactors when the device is disabled.

5.13 PI controller

The following figure shows the basic structure of a PI controller.



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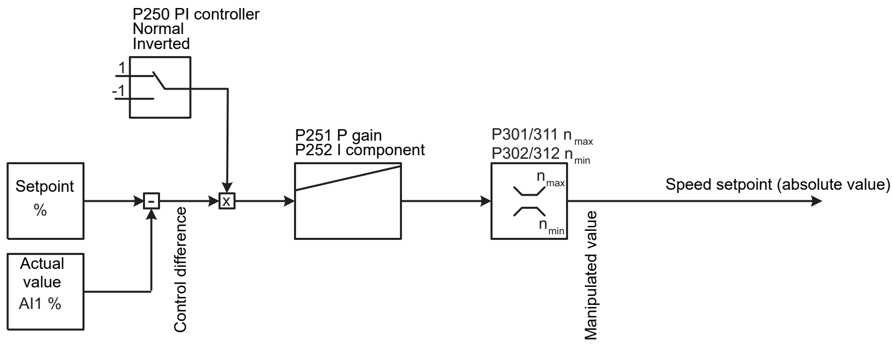
Setpoint *w* (reference value):	Parameter *P100 Setpoint source*. See chapter "Setpoint input" (→ 🗎 152).
Manipulated value *u*	Speed
Actual value *y* (controlled variable)	Feedback via analog input AI1. See chapter "Actual value recording" (→ 🗎 153).

You can use the implemented PI controller for temperature control, pressure control or other applications. The PI controller can be switched on and off.

Structure diagram for implementing the PI controller



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Apply the actual value of the sensor (temperature, pressure, etc.) to the analog input AI1. You can scale the actual value and apply an offset and thus adjust the work envelope of the PI controller.

You can set the setpoint of the PI controller with one of the 6 programmable fixed setpoints or specify it via the RS485 interface or fieldbus (SBus) (*P100 Setpoint source*). It is also possible to specify the setpoint with the local setpoint potentiometer.

The manipulated value of the PI controller is a speed setpoint, limited to minimum and maximum speed (*P301 Minimum speed 1 and P302 Maximum speed 1*). If the PI controller is active, setting the speed ramp times has no effect.

5.13.1 Parameterization

Parameter default settings are shown below in **bold**.

Activating the PI controller

Switch the PI controller off and on via the parameter *P250*. When you switch on the PI controller, the setpoint and actual value settings mentioned at the beginning are active.

The setting *Normal* increases the manipulated value if the control difference is positive and reduces the manipulated value if the control difference is negative.

The setting *Inverted* increases the manipulated value if the control difference is negative; it decreases the manipulated value if the control difference is positive.

P250	PI controller	**Off**
		Normal
		Inverted

Controller parameters

You can adapt the controller to the application with the following settings:

P251	P gain	0 – **1** – 64	Step width:	0.01

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P252	I component	0 – **1** – 2000 s	Range: 0 0.01 – 0.99 1.0 – 9.9 10 – 99 100 – 2000	Step width: I component OFF 0.01 0.1 1 10

5.13.2 Setpoint selection

The following settings are possible as a setpoint source. You can select the setpoint source with parameter *P100*.

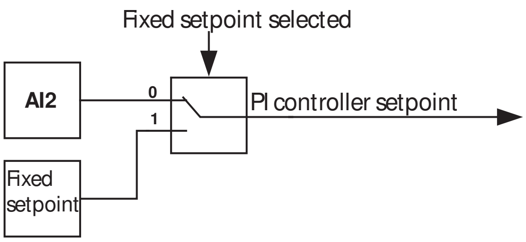
- **Unipolar/fixed setpoint**: The setpoint "0" applies as long as no fixed setpoint is selected. The FBG setpoint adjuster can be added to the setpoint "0" or fixed setpoint with *P121*.

  P163/164/165 Setpoint n11/12/13 scaled PI controller [0 – 100%] step width: 0.1%

  P173/174/175 Setpoint n21/22/23 scaled PI controller [0 – 100%] step width: 0.1%

  Operation with optional 2nd analog input (FIO11B):

  The setpoint from analog input AI2 applies as long as no fixed setpoint is selected. The FBG setpoint adjuster can be added to the AI1 or fixed setpoint with *P121*.



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- **RS485/fixed setpoint**
- **SBus 1/fixed setpoint**: Specify the setpoint and set it with the following bus parameters:

  P870/871/872 Setpoint description PO1/PO2/PO3 [PI controller setpoint %]

  PO1/PO2/PO3 = 0 – 2^{14} = 0 – 100% PI controller setpoint

  The setpoint input is **always unipolar**. The inverter limits negative setpoints to "0", e.g. via RS485 or SBus.
- **SBus 1/fixed setpoint**: Specify the setpoint and set it with the following bus parameters:

  P870/871/872 Setpoint description PO1/PO2/PO3 [PI controller setpoint %]

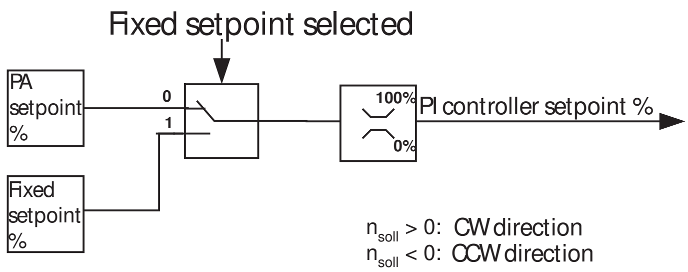
  PO1/PO2/PO3 = 0 – 2^{14} = 0 – 100% PI controller setpoint

  The setpoint input is **always unipolar**. The inverter limits negative setpoints to "0", e.g. via RS485 or SBus.
- **SBus 1/fixed setpoint**: Specify the setpoint and set it with the following bus parameters:

  P870/871/872 Setpoint description PO1/PO2/PO3 [PI controller setpoint %]

  PO1/PO2/PO3 = 0 – 2^{14} = 0 – 100% PI controller setpoint

  The setpoint input is **always unipolar**. The inverter limits negative setpoints to "0", e.g. via RS485 or SBus.



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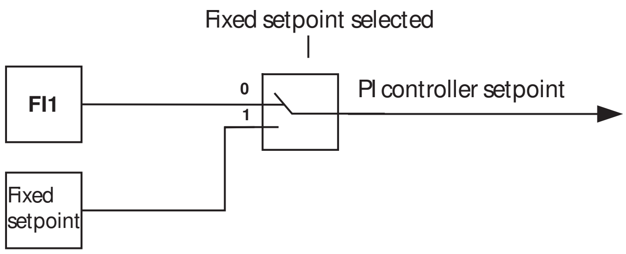
- **For all setpoint sources:** The FBG setpoint adjuster can be added to the setpoint or fixed setpoint with *P121*.
- The settings **bipolar/fixed setpoint**, **motor potentiometer/fixed setpoint** and **fixed setpoint + AI1** and **fixed setpoint × AI1** are not effective. If you set these, the inverter always specifies the setpoint "0".



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5.13.3 Actual value detection

The unipolar input AI1 is the actual value input.

You can use *P112 AI1 operating mode* to set the operating mode for the actual value (see also parameter *P116 – P119*):

- **0 – 10 V**: The following applies for operation as a voltage input:

  0 – 10 V = 0 – 100% PI controller actual value
- 0 – 20 mA: The following applies for operation as current input:

  0 – 20 mA = 0 – 100% PI controller actual value
- 4 – 20 mA: The following applies for operation as current input:

  4 – 20 mA = 0 – 100% PI controller actual value

5.13.4 Reference signal

With the parameter, you can program a reference message regarding the actual value of the PI controller. This allows you to monitor the actual value for a limit value, for example.

P450	**0** – 100%	Step width:	0.1%

P451	*Message = "1" for*	PI actual value < PI reference PI actual value > PI reference

To output the reference message, you must program a binary output terminal to "PI controller actual value reference". The reference message works with a hysteresis of 5%. The reference message comes without delay time and reports "1" depending on *P451*.

You must program the digital output DO01 *P620*, DO02 *P621* or DO03 *P622* to PI controller actual value reference.

5.13.5 Inverter control

You can determine the direction of rotation via the "CW/stop" and "CCW/stop" rotation direction terminals.

When enabled, the inverter increases the speed until the minimum speed *P301* is reached with the speed ramp *P130*. PI control becomes active when the minimum speed is reached. The PI controller manipulated variable directly determines the speed setpoint.

If you remove the CW / CCW terminal, the inverter deactivates PI control and saves the I component of the PI controller. The speed reduces at the speed ramp (*P131*). If you enable the inverter before the drive has reached its stop speed, the PI controller becomes active again with the current setpoint.

If you stop the inverter using the "Enable/stop" terminal, the drive stops at the stop ramp. The inverter stores the I component of the controller.

With setpoint source RS485 or SBUS, the direction of rotation is determined by the absolute value of the PO data item. "PI-CONTROLLER %" and the absolute value of the PO data item "PI-CONTROLLER %" acts as the setpoint for the PI controller.

5.14 Options for standard applications

Refer to the following table for options for simple applications. Conditions for simple applications are:

- Vertical movement: The braking time is less than 25% of the cyclic duration factor cdf and no longer than 30 s.
- Horizontal movement: The braking time is less than 12% of the cyclic duration factor cdf and no longer than 15 s.

Type MC07B		**Braking resistor**		**Output choke**	**Line filter**
		Horizontal movement	**Vertical movement**		
230 V 1-phase	0003	BW027-003	BW027-003	HD012	Integrated[1)]
	0004	BW027-003	BW027-003	HD012	
	0005	BW027-003	BW027-003	HD012	
	0008	BW027-003	BW027-005	HD012	
	0011	BW027-003	BW027-005	HD012	
	0015	BW027-003	BW027-006	HD012	
	0022	BW027-005	BW027-012	HD012	

Type MC07B		Braking resistor		Output choke	Line filter
		Horizontal movement	Vertical movement		
230 V 3-phase	0003	BW027-003	BW027-003	HD012	Integrated[1)]
	0004	BW027-003	BW027-003	HD012	
	0005	BW027-003	BW027-003	HD012	
	0008	BW027-003	BW027-006	HD012	
	0011	BW027-003	BW027-006	HD012	
	0015	BW027-003	BW027-006	HD012	
	0022	BW027-006	BW027-012	HD012	
	0037	BW027-006	BW027-012	HD012	
	0055	BW012-025	BW012-025	HD001	
	0075	BW012-015	BW012-025	HD001	
	0110	BW012-025	BW012-050	HD003	NF048-503
	0150	2 × BW012-025	2 × BW012-050	HD003	NF063-503
	0220	2 × BW106	2 × BW106	HD003	NF085-503
	0300	2 × BW106	2 × BW106	HD003	NF115-503
400 V 3-phase	0003	BW072-003	BW072-003	HD012	Integrated[1)]
	0004	BW072-003	BW072-003	HD012	
	0005	BW072-003	BW072-003	HD012	
	0008	BW072-003	BW072-005	HD012	
	0011	BW072-003	BW072-005	HD012	
	0015	BW072-003	BW168	HD012	
	0022	BW072-005	BW168	HD012	
	0030	BW072-005	BW268	HD012	
	0040	BW168	BW268	HD012	
	0055	BW147	BW247	HD001	
	0075	BW147	BW347	HD001	
	0110	BW039-026	BW039-050	HD001	
	0150	BW018-035	BW018-075	HD003	NF035-503
	0220	BW018-035	BW018-075	HD003	NF048-503
	0300	BW018-075	BW915	HD003	NF063-503
	0370	2 × BW012-025	BW106	HD003	NF085-503
	0450	BW106	BW206	HD003	NF085-503
	0550	BW106	BW206	HD003	NF115-503
	0750	BW106	3 × BW012-100	HD003	NF150-503

1) Additional components are required to achieve limit value class C1.

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5.15 Project planning of drive unit

5.15.1 UL-compliant installation

INFORMATION

Due to UL requirements, the following chapter is always printed in English and in some cases in French, regardless of the language of this documentation.

Field Wiring Power Terminals

- Use 75 °C copper wire only - models with suffix 0075, 0110, 0370, 0450, 0550, 0750.

  Use 60/75 °C copper wire only - models with suffix 0003, 0004, 0005, 0008, 0011, 0015, 0022, 0030, 0037, 0040, 0055, 0150, 0220, 0300.
- Tighten terminals to in-lbs (Nm) as follows:

Series	Size	in-lbs	Nm
MOVITRAC®	0XS, 0S, 0L	4	0.5
	1, 2S	5	0.6
	2	13	1.5
	3	31	3.5
	4, 5	120	14

Short Circuit Current Rating

Suitable for use on a circuit capable of delivering not more than

- 200,000 rms symmetrical amperes when protected by fuses and circuit breakers as described in the tables below.
- 65,000 rms symmetrical amperes when protected by ABB and Rockwell Type E Combination Motor controllers as described in the tables below.
- MOVITRAC® models with suffix 0003 to 0750 (400 V units only).

  Max. voltage is limited to 500 V.
- MOVITRAC® models with suffix 0003 to 0300 (230 V units only).

  Max. voltage is limited to 240 V.

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Branch Circuit Protection

Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electrical Code and any additional local codes.

⚠ WARNING

The opening of the branch-circuit protective device may be an indication that a fault current has been interrupted.

- To reduce the risk of fire or electric shock, current-carrying parts and other components of the controller should be examined and replaced if damaged. If burnout of the current element of an overload relay occurs, the complete overload relay must be replaced.

NOTICE

LE DÉCLENCHEMENT DU DISPOSITIF DE PROTECTION DU CIRCUIT DE DÉRIVATION PEUT ÊTRE DÛ À UNE COUPURE QUI RÉSULTE D'UN COURANT DE DÉFAUT.

- POUR LIMITER LE RISQUE D'INCENDIE OU DE CHOC ÉLECTRIQUE, EXAMINER LES PIÈCES PORTEUSES DE COURANT ET LES AUTRES ÉLÉMENTS DU CONTRÔLEUR ET LES REMPLACER S'ILS SONT ENDOMMAGÉS. EN CAS DE GRILLAGE DE L'ÉLÉMENT TRAVERSÉ PAR LE COURANT DANS UN RELAIS DE SURCHARGE, LE RELAIS TOUT ENTIER DOIT ÊTRE REMPLACÉ

Single Phase 200 V – 240 V Voltage Range				
	SCCR: 200 kA/ 500 V **when protected by:**	**SCCR: 200 kA/ 500 V** **when protected by:**	**SCCR: 65 kA/ 480 V [1)]** **when protected by:**	**SCCR: 65 kA/ 480 V** **when protected by:**
Model	**Non Semiconductor Fuses (currents are maximum values)**	**Inverse-Time Circuit Breaker**	**Type E Combination Motor Controller**	
MOVITRAC MC07B 0003 (Size 0XS)	15 A / 250 V	25 A max / 240 V Min	ABB, Model MS132-6.3 Rated 480 V, 3 HP	Rockwell Automation Model 140M-C2E-B63, 140MT-C3E-B63, Rated 480 V, 5 HP
MOVITRAC MC07B 0004 (Size 0XS)	15 A / 250 V	25 A max / 240 V Min	ABB, Model MS132-10 Rated 480 V, 5 HP	Rockwell Automation Model 140M-C2E-C10, 140MT-C3E-C10, Rated 480 V, 7.5 HP
MOVITRAC MC07B 0005 (Size 0S)	15 A / 250 V	25 A max / 240 V Min	ABB, Model MS132-12 Rated 480 V, 7.5 HP	Rockwell Automation Model 140M-D8E-C16, 140MT-D9E-C16, Rated 480 V, 10 HP

Single Phase 200 V – 240 V Voltage Range				
	SCCR: 200 kA/ 500 V **when protected by:**	**SCCR: 200 kA/ 500 V** **when protected by:**	**SCCR: 65 kA/ 480 V** [1] **when protected by:**	**SCCR: 65 kA/ 480 V** **when protected by:**
Model	**Non Semiconductor Fuses (currents are maximum values)**	**Inverse-Time Circuit Breaker**	**Type E Combination Motor Controller**	
MOVITRAC MC07B 0008 (Size 0S)	15 A / 250 V	25 A max / 240 V Min	ABB, Model MS132-12 Rated 480 V, 7.5 HP	Rockwell Automation Model 140M-D8E-C16, 140MT-D9E-C16, Rated 480 V, 10 HP
MOVITRAC MC07B 0011 (Size 0L)	30 A / 250 V	30 A max / 240 V Min	ABB, Model MS132-20 Rated 480 V, 10 HP	Rockwell Automation Model 140M-D8E-C20, 140MT-D9E-C20, Rated 480 V, 15 HP
MOVITRAC MC07B 0015 (Size 0L)	30 A / 250 V	30 A max / 240 V Min	ABB, Model MS132-25 Rated 480 V, 15 HP	Rockwell Automation Model 140M-F8E-C25, Rated 480 V, 20 HP
MOVITRAC MC07B 0022 (Size 0L)	30 A / 250 V	30 A max / 240 V Min	ABB, Model MS132-25 Rated 480 V, 15 HP	Rockwell Automation Model 140M-F8E-C25, Rated 480 V, 20 HP

1) Drives employing Type E Combination Motor Controller model MS132-12, -16, -20, -25, -32 must be installed with Current Limiter Series S803W-SCLxxx-SR manufactured by ABB, otherwise SCCR rated 30kA/ 480 V0 Vrms

Three Phase 200 V – 240 V Voltage Range				
	SCCR: 200 kA/ 240 V **when protected by:**	**SCCR: 200 kA/ 240 V** **when protected by:**	**SCCR: 65 kA/ 240 V** **when protected by:** [1]	**SCCR: 65 kA/ 240 V** **when protected by:**
Model	**Non Semiconductor Fuses (currents are maximum values)**	**Inverse-Time Circuit Breaker**	**Type E Combination Motor Controller**	
MOVITRAC MC07B 0003 (Size 0XS)	15 A / 250 V	25 A max / 240 V Min	ABB, Model MS132-2.5 Rated 480 V, 1 HP	Rockwell Automation Model 140M-C2E-B25, 140MT-C3E-B25, Rated 480 V, 1.5 HP
MOVITRAC MC07B 0004 (Size 0XS)	15 A / 250 V	25 A max / 240 V Min	ABB, Model MS132-2.5 Rated 480 V, 1 HP	Rockwell Automation Model 140M-C2E-B25, 140MT-C3E-B25, Rated 480 V, 1.5 HP

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Three Phase 200 V – 240 V Voltage Range				
	SCCR: 200 kA/ 240 V **when protected by:**	**SCCR: 200 kA/ 240 V** **when protected by:**	**SCCR: 65 kA/ 240 V** **when protected by:** 1)	**SCCR: 65 kA/ 240 V** **when protected by:**
Model	**Non Semiconductor Fuses (currents are maximum values)**	**Inverse-Time Circuit Breaker**	**Type E Combination Motor Controller**	
MOVITRAC MC07B 0005 (Size 0S)	15 A / 250 V	25 A max / 240 V Min	ABB, Model MS132-4.0 Rated 480 V, 2 HP	Rockwell Automation Model 140M-C2E-B40, 140MT-C3E-B40, Rated 480 V, 3 HP
MOVITRAC MC07B 0008 (Size 0S)	15 A / 250 V	25 A max / 240 V Min	ABB, Model MS132-6.3 Rated 480 V, 3 HP	Rockwell Automation Model 140M-C2E-B63, 140MT-C3E-B63, Rated 480 V, 5 HP
MOVITRAC MC07B 0011 (Size 0L)	30 A / 250 V	25 A max / 240 V Min	ABB, Model MS132-6.3 Rated 480 V, 3 HP	Rockwell Automation Model 140M-C2E-B63, 140MT-C3E-B63, Rated 480 V, 5 HP
MOVITRAC MC07B 0015 (Size 0L)	30 A / 250 V	25 A max / 240 V Min	ABB, Model MS132-10 Rated 480 V, 5 HP	Rockwell Automation Model 140M-C2E-C10, 140MT-C3E-C10, Rated 480 V, 7.5 HP
MOVITRAC MC07B 0022 (Size 0L)	30 A / 250 V	25 A max / 240 V Min	ABB, Model MS132-10 Rated 480 V, 5 HP	Rockwell Automation Model 140M-C2E-C10, 140MT-C3E-C10, Rated 480 V, 7.5 HP
MOVITRAC MC07B 0037 (Size 1)	30 A / 250 V	25 A max / 240 V Min	ABB, Model MS132-20 Rated 480 V, 10 HP	Rockwell Automation Model 140M-D8E-C20, 140MT-D9E-C20, Rated 480 V, 15 HP
MOVITRAC MC07B 0055 (Size 2)	60 A / 250 V	40 A max / 240 V Min	ABB, Model MS132-25 Rated 480 V, 15 HP	Rockwell Automation Model 140M-F8E-C25, Rated 480 V, 20 HP
MOVITRAC MC07B 0075 (Size 2)	60 A / 250 V	40 A max / 240 V Min	ABB, Model MS450-40E or MS165-42, Rated 480 V, 30 HP	Rockwell Automation Model 140M-F8E-C45, Rated 480 V, 30 HP

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Three Phase 200 V – 240 V Voltage Range				
	SCCR: 200 kA/ 240 V when protected by:	**SCCR: 200 kA/ 240 V when protected by:**	**SCCR: 65 kA/ 240 V when protected by:** [1]	**SCCR: 65 kA/ 240 V when protected by:**
Model	**Non Semiconductor Fuses (currents are maximum values)**	**Inverse-Time Circuit Breaker**	**Type E Combination Motor Controller**	
MOVITRAC MC07B 0110 (Size 3)	175 A / 250 V	90 A max / 240 V Min	ABB, Model MS450-50E or MS165-65, Rated 480 V, 40 HP	-
MOVITRAC MC07B 0150 (Size 3)	175 A / 250 V	90 A max / 240 V Min	ABB, Model MS495-63E Rated 480 V, 50 HP	-
MOVITRAC MC07B 0220 (Size 4)	350 A / 250 V	175 A max / 240 V Min	ABB, Model MS495-90E Rated 480 V, 75 HP	-
MOVITRAC MC07B 0300 (Size 4)	350 A / 250 V	175 A max / 240 V Min	-	-

1) Drives employing Type E Combination Motor Controller model MS132-12, -16, -20, -25, -32 must be installed with Current Limiter Series S803W-SCLxxx-SR manufactured by ABB, otherwise SCCR rated 30kA/ 480 V0 Vrms

Three Phase 380 V – 500 V Voltage Range				
	SCCR: 200 kA/ 500 V when protected by:	**SCCR: 200 kA/ 500 V when protected by:**	**SCCR: 65 kA/ 480 V when protected by:** [1]	**SCCR: 65 kA/ 480 V when protected by:**
Model	**Non Semiconductor Fuses (currents are maximum values)**	**Inverse-Time Circuit Breaker**	**Type E Combination Motor Controller**	
MOVITRAC MC07B 0003 (Size 0XS)	15 A / 600 V	25 A max / 500V Min	ABB, Model MS132-1.6 Rated 480V, 3/4HP	Rockwell Automation Model 140M-C2E-B16, 140MT-C3C-B16, Rated 480V, 1HP
MOVITRAC MC07B 0004 (Size 0XS)	15 A / 600 V	25 A max / 500V Min	ABB, Model MS132-2.5 Rated 480V, 1HP	Rockwell Automation Model 140M-C2E-B25, 140MT-C3E-B25, Rated 480V, 1.5HP
MOVITRAC MC07B 0005 (Size 0S)	15 A / 600 V	25 A max / 500V Min	ABB, Model MS132-2.5 Rated 480V, 1HP	Rockwell Automation Model 140M-C2E-B25, 140MT-C3E-B25, Rated 480V, 1.5HP

Three Phase 380 V – 500 V Voltage Range				
	SCCR: 200 kA/ 500 V when protected by:	**SCCR: 200 kA/ 500 V when protected by:**	**SCCR: 65 kA/ 480 V when protected by:[1)]**	**SCCR: 65 kA/ 480 V when protected by:**
Model	**Non Semiconductor Fuses (currents are maximum values)**	**Inverse-Time Circuit Breaker**	**Type E Combination Motor Controller**	
MOVITRAC MC07B 0008 (Size 0S)	15 A / 600 V	25 A max / 500V Min	ABB, Model MS132-4.0 Rated 480V, 2HP	Rockwell Automation Model 140M-C2E-B40, 140MT-C3E-B40, Rated 480V, 3HP
MOVITRAC MC07B 0011 (Size 0S)	15 A / 600 V	25 A max / 500V Min	ABB, Model MS132-4.0 Rated 480V, 2HP	Rockwell Automation Model 140M-C2E-B40, 140MT-C3E-B40, Rated 480V, 3HP
MOVITRAC MC07B 0015 (Size 0S)	15 A / 600 V	25 A max / 500V Min	ABB, Model MS132-6.3 Rated 480V, 3HP	Rockwell Automation Model 140M-C2E-B63, 140MT-C3E-B63, Rated 480V, 5HP
MOVITRAC MC07B 0022 (Size 0L)	20 A / 600 V	25 A max / 500V Min	ABB, Model MS132-6.3 Rated 480V, 3HP	Rockwell Automation Model 140M-C2E-B63, 140MT-C3E-B63, Rated 480V, 5HP
MOVITRAC MC07B 0030 (Size 0L)	20 A / 600 V	25 A max / 500V Min	ABB, Model MS132-10 Rated 480V, 5HP	Rockwell Automation Model 140M-C2E-C10, 140MT-C3E-C10, Rated 480V, 7.5HP
MOVITRAC MC07B 0040 (Size 0L)	20 A / 600 V	25 A max / 500V Min	ABB, Model MS132-12 Rated 480V, 7.5HP	Rockwell Automation Model 140M-D8E-C16, 140MT-D9E-C16, Rated 480V, 10HP
MOVITRAC MC07B 0055 (Size 2S)	60 A / 600 V	25 A max / 500 V Min	ABB, Model MS132-16 Rated 480 V, 10 HP	Rockwell Automation Model 140M-D8E-C16, 140MT-D9E-C16, Rated 480 V, 10 HP
MOVITRAC MC07B 0075 (Size 2S)	60 A / 600 V	25 A max / 500 V Min	ABB, Model MS132-20 Rated 480 V, 10 HP	Rockwell Automation Model 140M-D8E-C20, 140MT-D9E-C20, Rated 480 V, 15 HP

Three Phase 380 V – 500 V Voltage Range				
	SCCR: 200 kA/ 500 V when protected by:	**SCCR: 200 kA/ 500 V when protected by:**	**SCCR: 65 kA/ 480 V when protected by:[1)]**	**SCCR: 65 kA/ 480 V when protected by:**
Model	**Non Semiconductor Fuses (currents are maximum values)**	**Inverse-Time Circuit Breaker**	**Type E Combination Motor Controller**	
MOVITRAC MC07B 0110 (Size 2)	60 A / 600 V	-	ABB, Model MS132-32 Rated 480 V, 20 HP	Rockwell Automation Model 140M-F8E-C32, Rated 480 V, 25 HP
MOVITRAC MC07B 0150 (Size 3)	175 A / 600 V	90 A max / 500 V Min	ABB, Model MS450-40E or MS165-42, Rated 480 V, 30 HP	Rockwell Automation Model 140M-F8E-C45, Rated 480 V, 30 HP
MOVITRAC MC07B 0220 (Size 3)	175 A / 600 V	90 A max / 500 V Min	ABB, Model MS495-63E Rated 480 V, 50 HP	-
MOVITRAC MC07B 0300 (Size 3)	175 A / 600 V	90 A max / 500 V Min	ABB, Model MS495-90E Rated 480 V, 75 HP	-
MOVITRAC MC07B 0370 (Size 4)	350 A / 600 V	175 A max / 500 V Min	ABB, Model MS495-90E Rated 480 V, 75 HP	-
MOVITRAC MC07B 0450 (Size 4)	350 A / 600 V	175 A max / 500 V Min	-	-
MOVITRAC MC07B 0550 (Size 5)	225 A / 600 V	175 A max / 500 V Min	-	-
MOVITRAC MC07B 0750 (Size 5)	225 A / 600 V	175 A max / 500 V Min	-	-

1) Drives employing Type E Combination Motor Controller model MS132-12, -16, -20, -25, -32 must be installed with Current Limiter Series S803W-SCLxxx-SR manufactured by ABB, otherwise SCCR rated 30kA/ 480 Vrms

Motor Overload Protection

The units are provided with load and speed-sensitive overload protection and thermal memory retention upon shutdown or power loss.

The trip current is adjusted to 150% of the rated motor current.

Ambient Temperature

The units are suitable for an ambient temperature of 40 °C, max. 60 °C with derate output current.

For a surrounding air ambient up to 40 °C the output current is 125% of the ratings.

To determine output current rating at higher than 40 °C, the output current should bederated 2.5 % per °C between 40 °C and 50 °C, and 3% per °C between 50 °C and 60 °C.

Environmental Conditions

The units are for use in pollution degree 2 environments.

Wiring Diagrams

For wiring diagrams, refer to chapter “Wiring Diagrams” in Operating Instructions "MOVITRAC® B".

6 Project planning for functional safety

6.1 Underlying standards

The safety assessment of the device is based on the following standards and safety classes:

Underlying standards	
Safety class/underlying standard	Performance level (PL) and category (cat.) according to EN ISO 13849-1:2015

6.2 Integrated safety technology

The safety technology of MOVITRAC® MC07B described below has been developed and tested in accordance with the following safety requirements:

- EN-ISO 13849-1:2015 PL d (applicable up to category 3)

This was certified by TÜV Nord. Copies of the TÜV certificate can be obtained from SEW-EURODRIVE.

6.2.1 Safe condition

For safety-related operation of MOVITRAC® MC07B, safe torque off is defined as a safe state (see STO safety function). The safety concept is based on this definition.

6.2.2 Safety concept

- In the event of danger, any potential risk related to a machine must be eliminated as quickly as possible. Idle state with restart prevention is generally the safe state for preventing dangerous movements.
- The MOVITRAC® MC07B drive inverter is characterized by the option to connect an external safety relay. The safety relay disconnects all active elements (disconnection of the safety-related 24 V power supply of the output stage control) that generate the pulse trains to the power output stage (IGBT) when a connected command device (e.g. an emergency stop button with latching function) is activated.
- Disconnecting the safety-related 24 V supply voltage ensures that the supply voltages required for operating the inverter and consequently for generating a rotating field of pulse patterns (which allow the generation of a rotating field) are safely interrupted, preventing automatic restart.
- Instead of galvanic separation of the drive from the power supply by means of relays or switches, the disconnection of the 24 V supply described here safely prevents the control of the power semiconductors in the drive inverter. This process disconnects the rotating field generation for the respective motor. The individual motor cannot develop any torque in this state even though the line voltage is still present.

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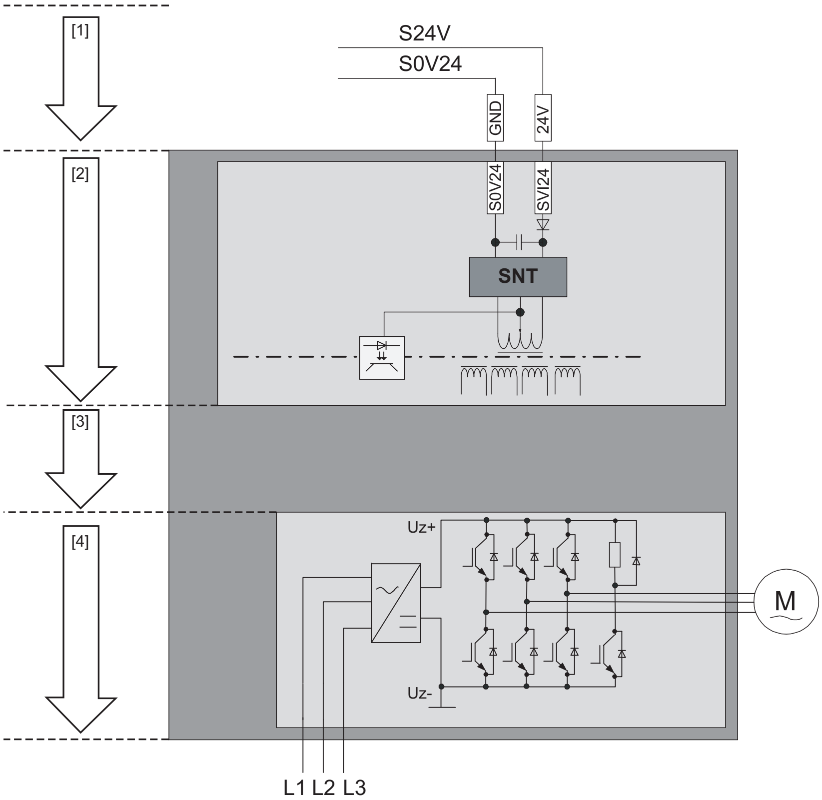
6.2.3 Schematic representation



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[1] Safety-related DC 24 V voltage supply
[2] Electrical isolation
[3] Voltage supply for controlling the power transistors
[4] Pulse width modulated signals for the output stage

6.2.4 Safety functions

The following drive-related safety functions can be used.

STO – Safe Torque Off according to IEC 61800-5-2

STO (Safe Torque Off in accordance with IEC 61800-5-2) by disconnecting the STO input.

If the STO function is activated, the frequency inverter no longer supplies power to the motor for generating torque. This safety function corresponds to a non-controlled stop according to EN 60204-1, stop category 0.

The STO input must be disabled by a suitable external safety controller/safety relay.

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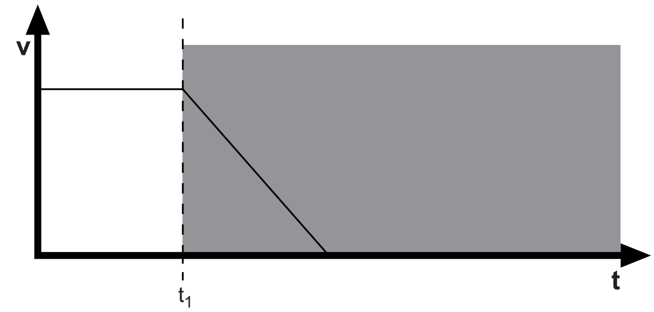
The following figure shows the STO function:



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v	Speed
t	Time
t_1	Point of time when STO is triggered
(dark grey)	Disconnection range

SS1(c) – Safe Stop 1 according to IEC 61800-5-2

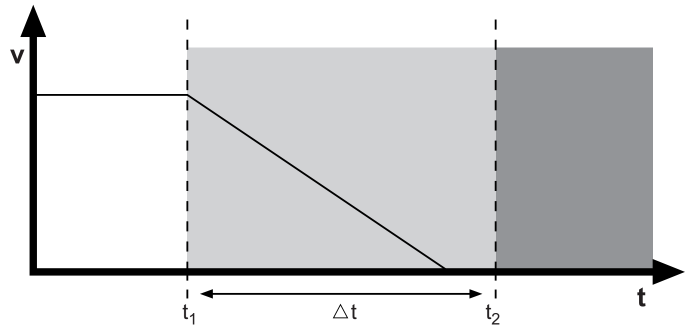
SS1(c) (safe stop 1, function variant c according to IEC 61800-5-2) by means of suitable external control (e.g. safety relay with delayed disconnection).

The following sequence is mandatory:

- Decelerate the drive using an appropriate brake ramp specified via setpoints.
- Disconnect the STO input (= triggering the STO function) after a specified safety-related time delay.

This safety function corresponds to a controlled stop according to EN 60204-1, stop category 1.

The following figure illustrates the SS1(c) function:



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v	Speed
t	Time
t_1	Point of time when brake ramp is initiated
t_2	Point of time when STO is triggered
Δt	Delay time until STO is triggered
(light grey)	Safe time delay range
(dark grey)	Disconnection range

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6.2.5 Restrictions

- Note that if the drive does not have a mechanical brake, or if the brake is defective, the drive may coast to a halt (depending on the friction and mass moment of inertia of the system). In case of regenerative loads, the drive can even accelerate. This must be taken into account in a risk assessment of the system/machine. Additional safety measures might have to be implemented (e.g. safety brake system).

  MOVITRAC® MC07B cannot be used without an additional brake system for application-specific safety functions that require active deceleration (braking) of the dangerous movement.
- When using the SS1-t function as described in chapter "Safety subfunctions", the brake ramp of the drive is not monitored with respect to safety. In the case of an error, the drive might not be decelerated during the delay time, or it might even be accelerated in the worst case. In this case, the safety-related disconnection via the STO function is only activated after the set time delay has elapsed (see chapter "Safety subfunctions"). The resulting hazard must be taken into account in the risk assessment of the system/machine, and additional safety measures have to be implemented.

⚠ WARNING

The safety concept is only suitable for performing mechanical work on driven system/machine components.

If the STO signal is disconnected, the line voltage is still present at the DC link of MOVITRAC® MC07B.

- Before working on the electric part of the drive system, disconnect it from the supply voltage using an appropriate external disconnecting device, and secure it against unintentional reconnection to the voltage supply.

INFORMATION

In case of safety-related disconnection of the DC 24 V supply voltage at X17 (STO activated), the brake is **always** applied. The brake control in MOVITRAC® MC07B is not safety-related.

6.3 Safety conditions

The requirement for safe operation is that the safety functions of MOVITRAC® MC07B are properly integrated into an application-specific higher-level safety function. A system/machine-specific risk assessment must be carried out through the system/machine manufacturer and taken into account for using the drive system with MOVITRAC® MC07B.

The system/machine manufacturer and the user are responsible for the compliance of the system/machine with the applicable safety regulations.

The following requirements are mandatory when installing and operating MOVITRAC® MC07B in safety-related applications.

The requirements are divided into:

- Approved devices
- Installation requirements
- Requirements for external safety controllers and safety relays

- Startup requirements
- Operational requirements

6.3.1 Approved devices

The following device variants of MOVITRAC® MC07B are permitted for safety-related applications.

MOVITRAC® MC07B for a supply voltage of 3 × AC 380 to 500 V

Power kW	Size	Type
0.55	0S	MC07B0005-5A3-4-S0
0.75	0S	MC07B0008-5A3-4-S0
1.1	0S	MC07B0011-5A3-4-S0
1.5	0S	MC07B0015-5A3-4-S0
2.2	0L	MC07B0022-5A3-4-S0
3.0	0L	MC07B0030-5A3-4-S0
4.0	0L	MC07B0040-5A3-4-S0
5.5	2S	MC07B0055-5A3-4-00
7.5	2S	MC07B0075-5A3-4-00
11	2	MC07B0110-5A3-4-00
15	3	MC07B0150-503-4-00
22	3	MC07B0220-503-4-00
30	3	MC07B0300-503-4-00
37	4	MC07B0370-503-4-00
45	4	MC07B0450-503-4-00
55	5	MC07B0550-503-4-00
75	5	MC07B0750-503-4-00

MOVITRAC® MC07B for a supply voltage of AC 200 to 240 V

Power kW	Size	Type
0.55	0S	MC07B0005-2A3-4-S0
0.75	0S	MC07B0008-2A3-4-S0
1.1	0L	MC07B0011-2A3-4-S0
1.5	0L	MC07B0015-2A3-4-S0
2.2	0L	MC07B0022-2A3-4-S0
3.7	1	MC07B0037-2A3-4-00
5.5	2	MC07B0055-2A3-4-00
7.5	2	MC07B0075-2A3-4-00

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Power kW	Size	Type
11	3	MC07B0110-203-4-00
15	3	MC07B0150-203-4-00
22	4	MC07B0220-203-4-00
30	4	MC07B0300-203-4-00

6.3.2 Installation requirements

- For size 0 units of the type MC07B...-S0, an external 24 V supply must always be connected because the control electronics can only be powered in this way.
- The safety-related DC 24 V supply voltage must be routed according to EMC guidelines as follows:
  – Outside an electrical installation space, shielded cables must be routed permanently (fixed) and protected against external damage, or other equivalent measures have to be taken.
  – Individual conductors can be routed inside an electrical installation space.
  – Adhere to the regulations in force for the application.
- Power cables and safety-related control cables must be installed in separate cables.
- Make sure that no parasitic voltages can be generated in the safety-related control cables.
- Wiring technology must comply with EN 60204-1.
- Use only grounded voltage sources with protective extra-low voltage (PELV) according to VDE0100 and EN 60204-1. In case of a single fault, the voltage between the outputs or between any output and grounded parts must not exceed DC 60 V.
- For information on EMC-compliant cabling, refer to the "MOVITRAC® MC07B" operating instructions. It is essential that you connect the shield of the safety-related DC 24 V supply cable to the housing at both ends.
- The lines of the safety-related DC 24 V voltage supply (terminal X17) must be connected to the "signal electronics" shield clamp.
- When planning the installation, observe the technical data of MOVITRAC® MC07B.
- Observe without fail the values specified for safety components when designing the safety circuits.
- The cable length of the safety-related DC 24 V supply voltage must not exceed 100 m.
- The safety-related DC 24 V supply voltage may not be used for feedback.
- All connections (e.g. lines or data communication using bus systems) must already have been taken into account in the performance level of one of the subsystems involved, or it must be possible that faults in the connections can be excluded or neglected.

  The fault assumption "short circuit between any two conductors" can be excluded in accordance with EN ISO 13849-2:2012 under the following conditions:

  The conductors are

  – Permanently (fixed) installed and protected against external damage (for example using a cable duct or armored conduit).

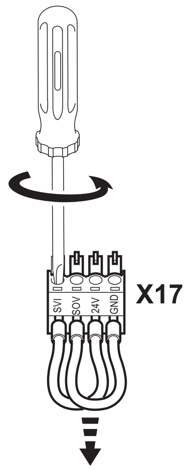
– Installed in different light plastic-sheathed cables in an electrical installation space provided that both the lines and the installation space meet the relevant requirements, see EN 60204-1.

– Protected individually by a ground connection.

The fault assumption "short circuit between any conductor and an exposed conductive part or ground or a protective conductor" can be excluded under the following condition:

– Short circuits between a conductor and any exposed conductive part within an installation space.

- For applications with safety-related disconnection, remove the jumpers on X17:1 to X17:4 (see following figure).



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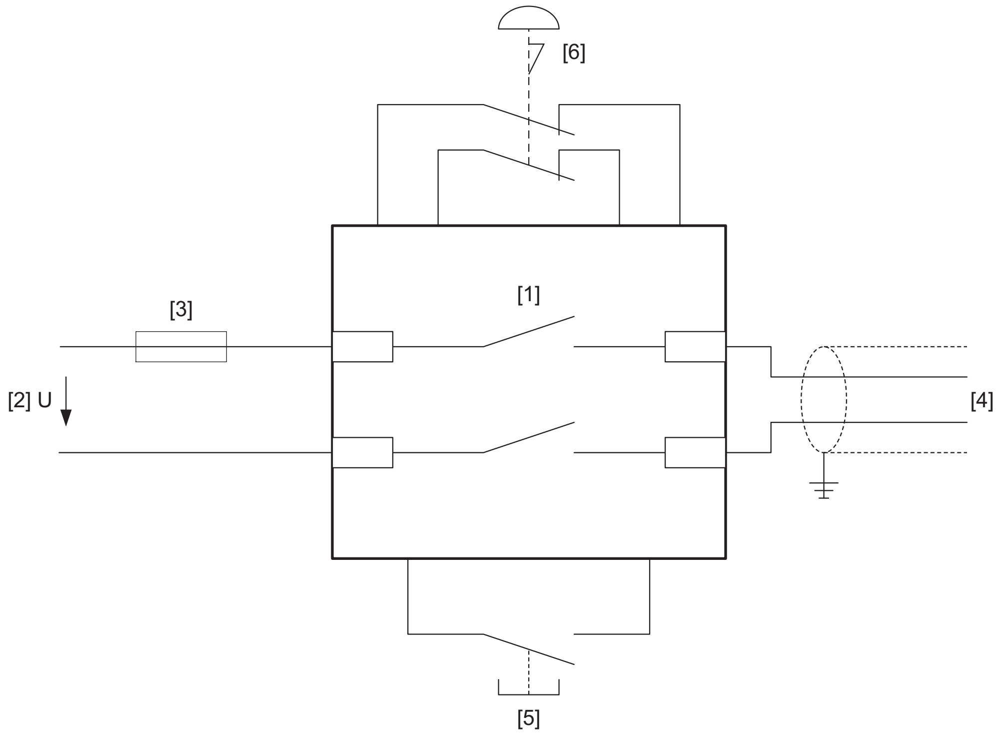
6.3.3 Requirements on the external safety controller



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[1] Safety relay with approval
[2] DC 24 V voltage supply
[3] Fuses in accordance with the manufacturer's specifications of the safety relay
[4] Safety-related DC 24 V voltage supply
[5] Reset button for manual reset
[6] Approved emergency stop actuating device

A safety relay can be used as an alternative to a safety controller. The following requirements apply analogously.

- The safety controller and all other safety-related subsystems must be approved for at least the safety class required in the overall system for the respective application-related safety function.

  The following table shows an example of the required safety class of the safety controller:

Application	Safety controller requirements
Performance level d according to EN ISO 13849-1	Performance level d according to EN ISO 13849-1 SIL 2 according to EN 61508

- The wiring of the safety controller must be suitable for the required safety class (see manufacturer documentation).
  - If the DC 24 V supply is safely disconnected at the positive pole only, no test pulses must be applied to this pole in disconnected condition.

    If the DC 24 V supply is disconnected at both poles, the test pulses must not be applied at the same time at the plus and minus outputs. In this case, the test pulse must be applied with a time delay.
  - SEW-EURODRIVE recommends to switch off the 24 V supply at two poles.

- The values specified for the safety controller must be strictly adhered to when designing the circuit.
- The switching capacity of the safety relays or the relay outputs of the safety controller must correspond at least to the maximally permitted, limited output current of the 24 V supply voltage.

  Observe the manufacturer's instructions concerning the permitted contact loads and fusing that may be required for the safety contacts. If the manufacturer provides no specific information, the contacts must be protected with 0.6 times the nominal value of the maximum contact rating specified by the manufacturer.
- To ensure protection against unintended restart in accordance with EN ISO 14118, the safe control system must be designed and connected in such a way that resetting the command device alone does not lead to a restart. This means that a restart may be carried out only after a manual reset of the safety circuit.

6.3.4 Requirements on startup

- To validate the implemented safety functions, they must be documented and checked after successful startup (validation).

  Observe the limitations for safety functions in the chapter "Limitations" for validating safety functions. Non-safety-related parts and components that affect the result of the validation test (e.g. motor brake) must be deactivated, if necessary.
- For using MOVITRAC® MC07B in safety-related applications, it is essential that you perform and record startup checks for the disconnecting device and correct wiring.

6.3.5 Requirements on operation

- Operation is only allowed within the limits specified in the data sheets. This principle applies to the external safety controller as well as to MOVITRAC® MC07B and approved options.
- You must check the safety functions on a regular basis to ensure proper functioning. Test intervals must be specified in accordance with the risk assessment.

6.4 Connection variants

6.4.1 General information

Generally, all the connection variants listed in this documentation are permitted for safety-relevant applications as long as the basic safety concept is met. This means you have to make sure that the DC 24 V safety inputs are operated by an external safety relay or safety controller, in this way preventing an automatic restart.

All safety-relevant conditions mentioned in chapters 2, 3 and 4 of the documentation in hand must be met for the basic selection, installation, and application of the safety components, such as safety relay, emergency off switch, etc., and the approved connection variants.

The wiring diagrams are block diagrams whose only purpose is to show the safety function(s) with the relevant components. Circuit-related measures, which usually always have to be implemented additionally, are not shown in the diagrams to enhance clarity. Such measures are taken, for example, to ensure protection against contact, to handle overvoltage and undervoltage, to detect insulation faults, line-to-ground faults and short circuits, which can occur on externally installed lines, or to ensure the necessary immunity against electromagnetic interference.

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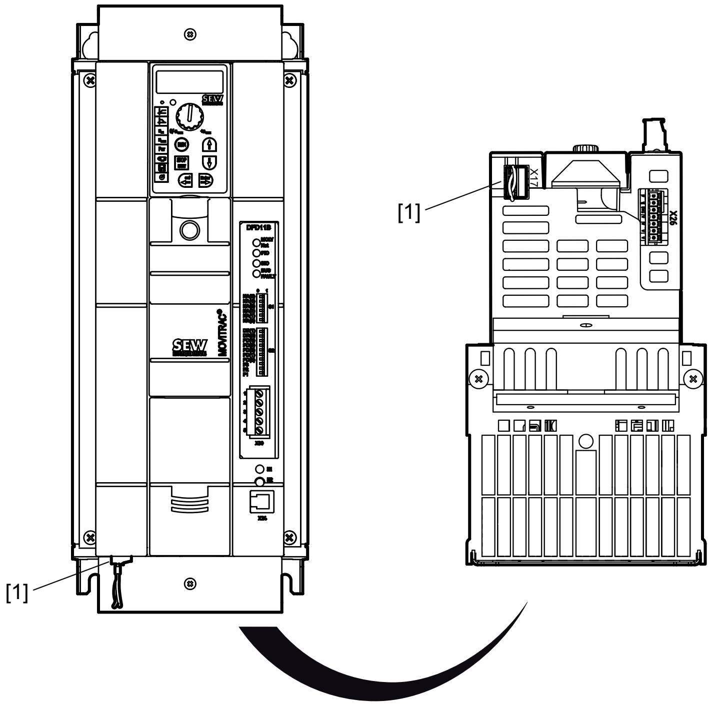
X17 terminal at MOVITRAC® MC07B

The following figure shows the X17 terminal at the bottom of the control unit.



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* View of the underside of the unit

[1] X17: Signal terminal block for STO safety contacts

6.4.2 Requirements

Using safety relays

The requirements of the manufacturers of safety relays (such as protecting the output contacts against welding) or of other safety components must be strictly observed. For cable routing, the basic requirements apply as described in this documentation.

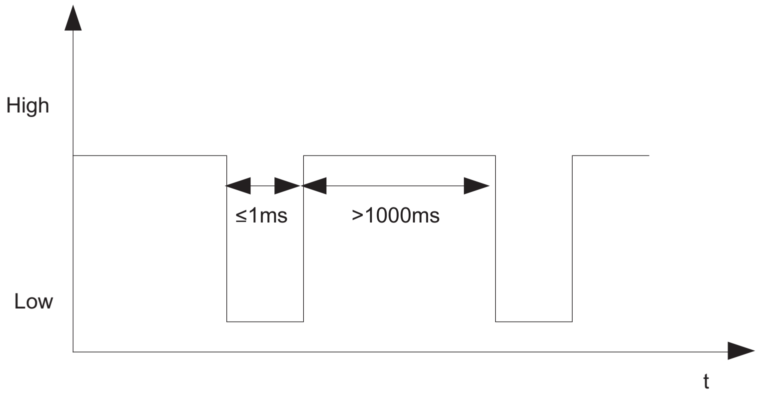
For information on how to connect MOVITRAC® to safety relays, refer to the chapter "Installation requirements".

Other instructions by the manufacturer on the use of safety relays for specific applications must also be observed.

Using safety controllers

Observe the ZVEI specifications for safety sensors if you use a safety PLC.

The starting and stopping pulses of the safe digital outputs (F-DO) used must be ≤ 1 ms. The ratio must not fall below 1:1000.



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INFORMATION

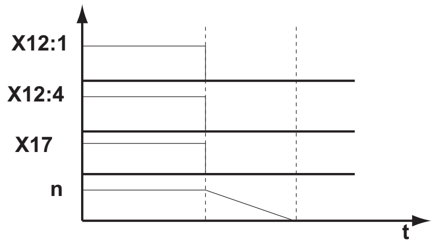
If the DC 24 V supply at X17 is switched off safely (STO activated), you must observe chapter "Requirements on the external safety controller" with regard to the test pulses.

6.4.3 Disconnection of a single drive

STO Safe Torque Off (EN 61800-5-2)

The procedure is as follows:

- Recommendation: X12:1 and X12:4 are disconnected **at the same time**, e.g. in case of an emergency stop.
- The 24 V safety input X17 is disconnected.
- The motor coasts to a halt, if no brake is installed.



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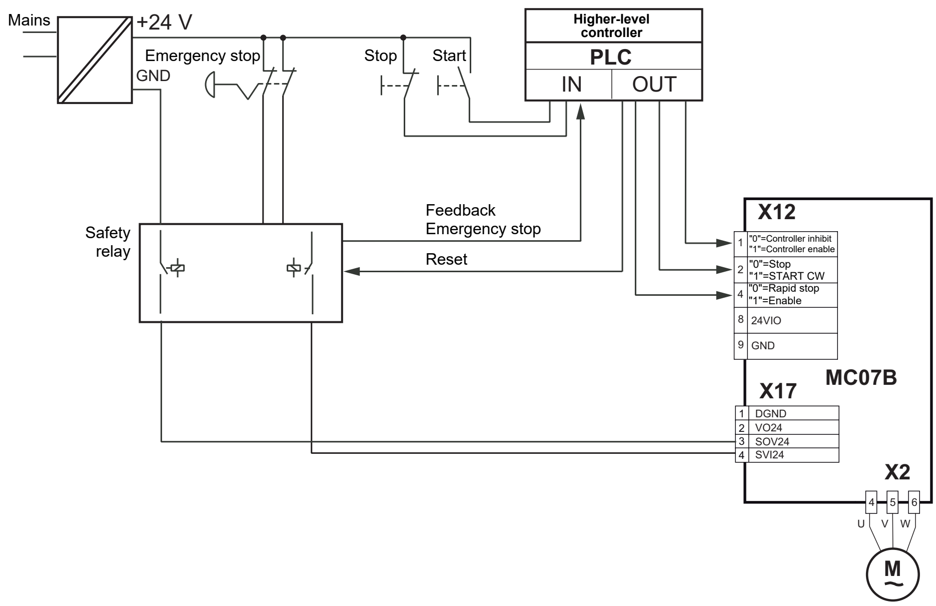
INFORMATION

- The illustrated STO disconnections can be used up to PL d according to EN ISO 13849-1:2015 taking account of the chapter "Requirements".
- MOVITRAC® MC07B size 0 requires an external DC 24 V voltage supply.

Binary control with safety relay (dual-channel)



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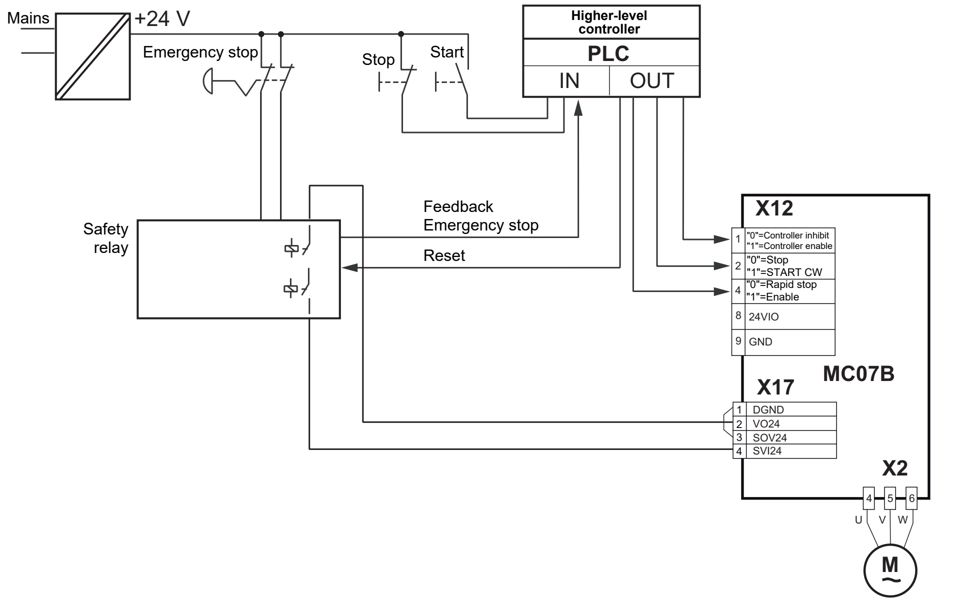
Binary control with safety relay (single-channel)



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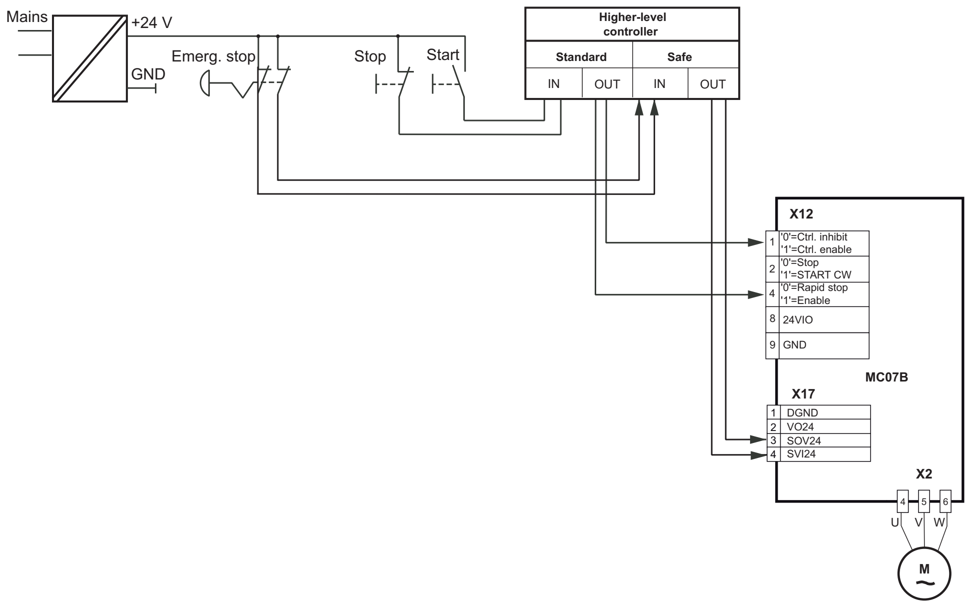
INFORMATION

In the case of a single-channel disconnection, certain fault assumptions must be made and controlled by means of fault exclusion. Observe chapter "Requirements".

SEW-EURODRIVE recommends disconnecting the 24 V voltage supply of STO input X17 in two poles.

Binary control with safety PLC



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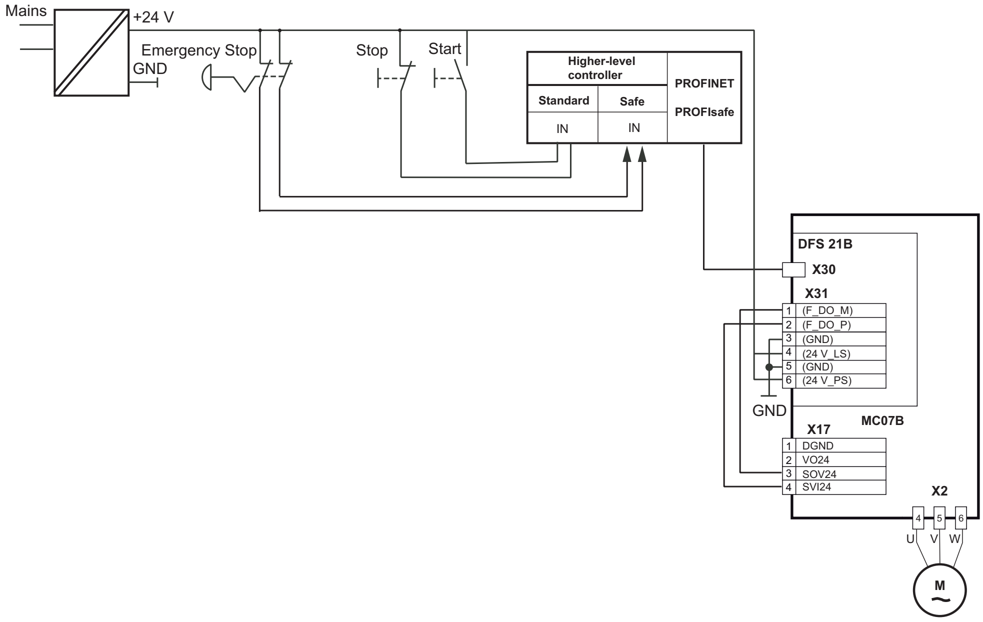
Fieldbus control with safety PLC



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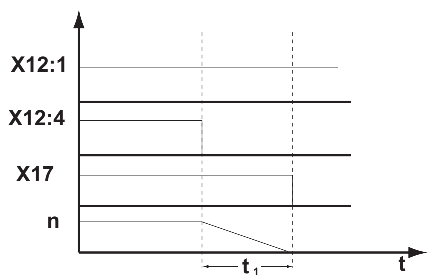
INFORMATION

- Controller inhibit/enable and rapid stop/enable are set via fieldbus.
- Note the respective fieldbus manuals:
  - "DFS11B PROFIBUS DP-V1 Fieldbus Interface with PROFIsafe" manual
  - "DFS21B PROFINET IO Fieldbus Interface with PROFIsafe" manual

SS1(c) Safe Stop 1 (EN 61800-5-2)

The procedure is as follows:

- X12:1 must not be disconnected.
- X12:4 is disconnected, e.g. in case of an emergency stop.
- During the safety time interval t_1, the motor decelerates to a complete stop along the ramp.
- After t_1 has elapsed, the safety input X7 is disconnected. The safe time t_1 must be sufficient for the motor to reach a complete stop.



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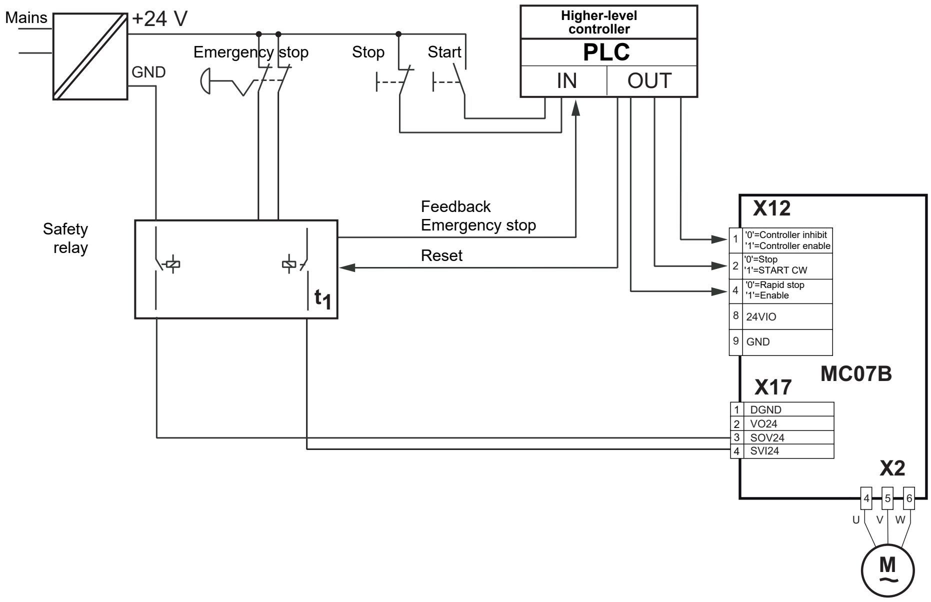
INFORMATION

- The illustrated SS1(c) disconnections can be used up to PL d according to EN ISO 13849-1:2015 taking account of the chapter "Requirements".
- MOVITRAC® MC07B size 0 requires an external DC 24 V voltage supply.

Binary control with safety relay (dual-channel)



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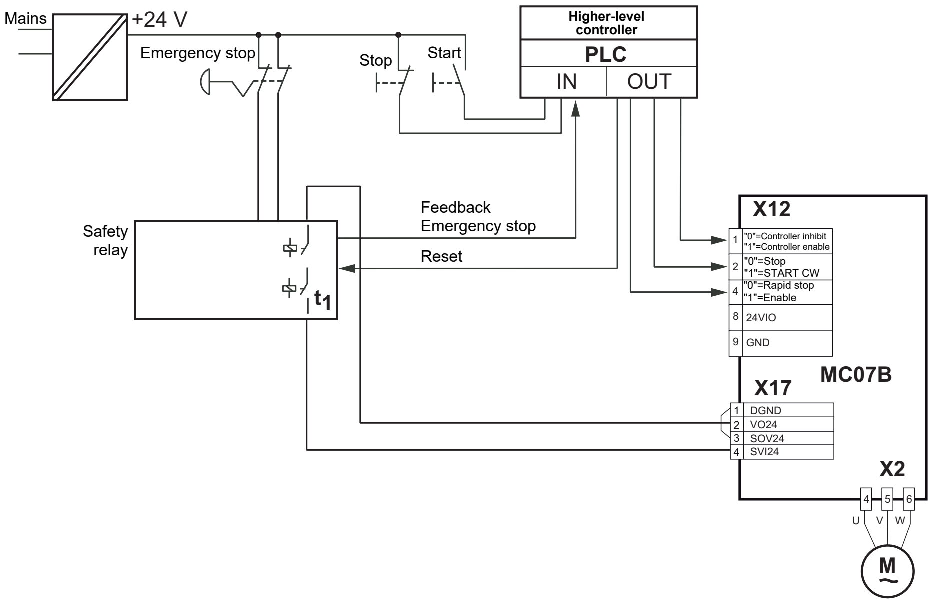
Binary control with safety relay (single-channel)



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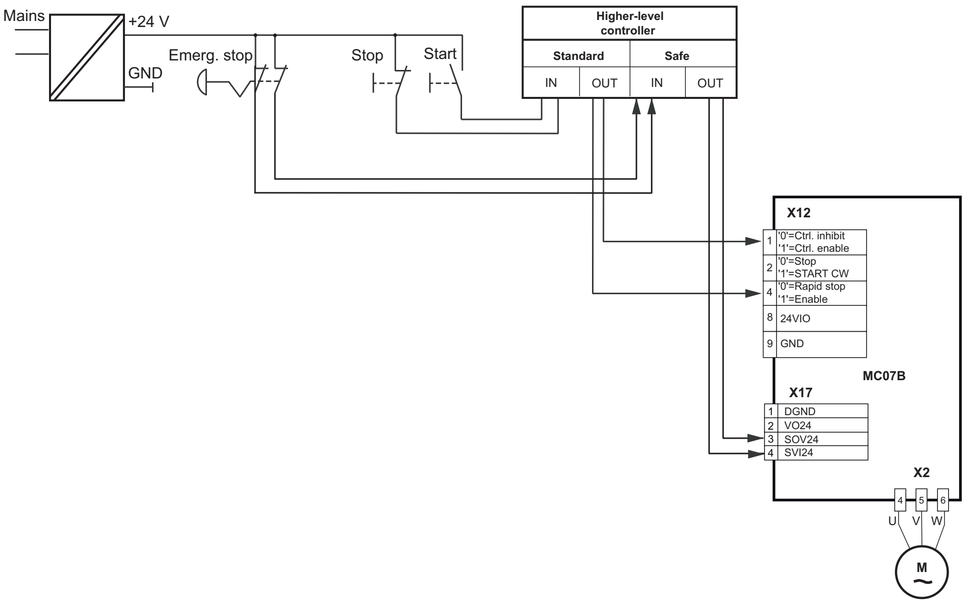
INFORMATION

In the case of a single-channel disconnection, certain fault assumptions must be made and controlled by means of fault exclusion. Observe chapter "Requirements".

SEW-EURODRIVE recommends disconnecting the 24 V voltage supply of STO input X17 in two poles.

Binary control with safety PLC



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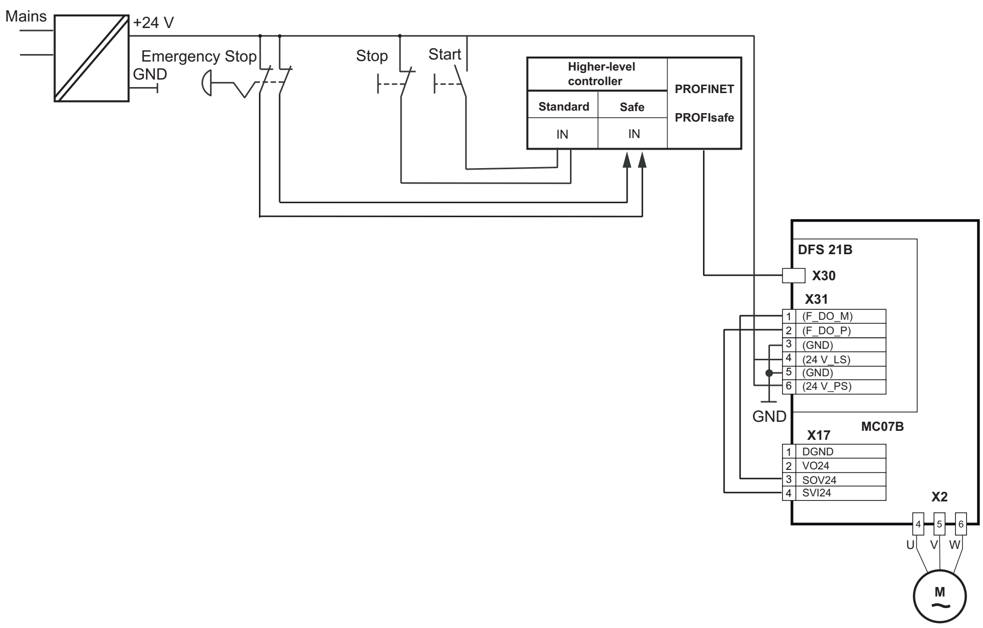
Fieldbus control with safety PLC



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INFORMATION

- Controller inhibit/enable and rapid stop/enable are set via fieldbus.
- Note the respective fieldbus manuals:
  - "DFS11B PROFIBUS DP-V1 Fieldbus Interface with PROFIsafe" manual
  - "DFS21B PROFINET IO Fieldbus Interface with PROFIsafe" manual

6.4.4 Disconnection of group drives

This chapter describes how several MOVITRAC® MC07B are controlled in a safe manner.

INFORMATION

SEW-EURODRIVE recommends against group disconnection via safety PLC.

Requirements

For group drives, the 24 V safety inputs of several MOVITRAC® MC07B can be made available by a single safety relay. The maximum number of axis modules results from the maximum permitted contact load of the safety relay or safety controller.

Other requirements of the manufacturers of safety relays (such as protecting the output contacts against welding) or other safety components must be strictly observed. For cable routing, observe the basic requirements in chapter "Installation requirements".

For connecting MOVITRAC® to safety relays, observe the installation requirements in the chapter "Installation requirements".

Other information by the manufacturer on the use of safety relays for specific applications must also be observed.

Determining the maximum number of MOVITRAC® devices for group disconnection

The number (n units) of MOVITRAC® MC07B devices that can be connected to a group drive is limited by the following factors:

1. Switching capacity of the safety relay.

   A fuse must be connected in front of the safety contacts according to the specifications of the safety relay manufacturer to prevent contact welding.

   The project planner is responsible for ensuring that the specifications for the switching capacity according to EN 60947-4-1, 02/1 and EN 60947-5-1, 11/97 as well as on contact fuse protection given in the operating instructions of the safety relay manufacturer are strictly observed.
2. Maximum permitted voltage drop in the 24 V power supply cable.

   Values concerning cable lengths and permitted voltage drops must be observed during project planning for axis systems.
3. Maximum cable cross section of 1 × 1.5 mm^2 or 2 × 0.75 mm^2.
4. Power consumption of STO input X17: Input voltage, see chapter "Technical data".
5. When using self-testing semiconductor outputs, the increased capacitances of STO input X17 caused by group disconnection (parallel connection) might result in diagnostics errors.

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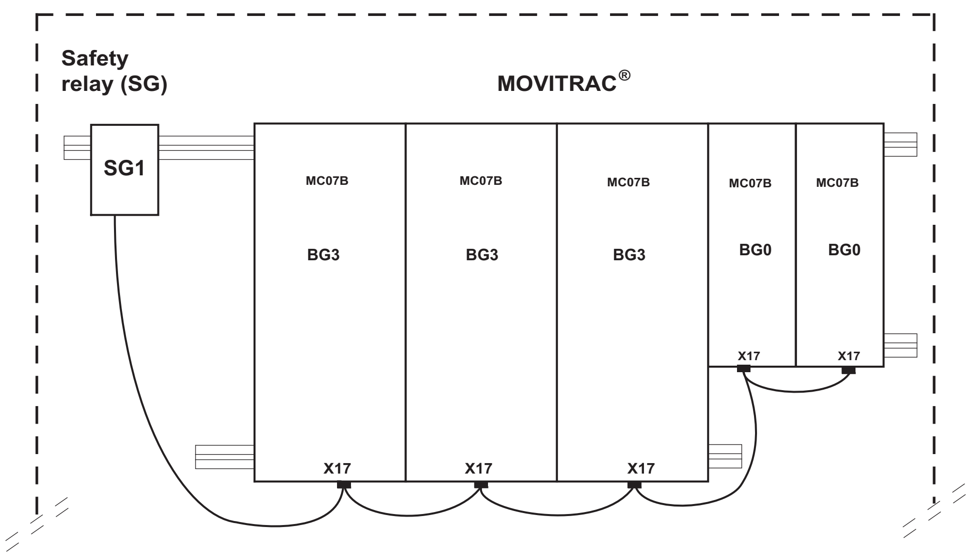
Implementing group disconnection with a safety relay

Group disconnection with one safety relay

The safety inputs of all MOVITRAC® MC07B can be controlled with one safety relay.



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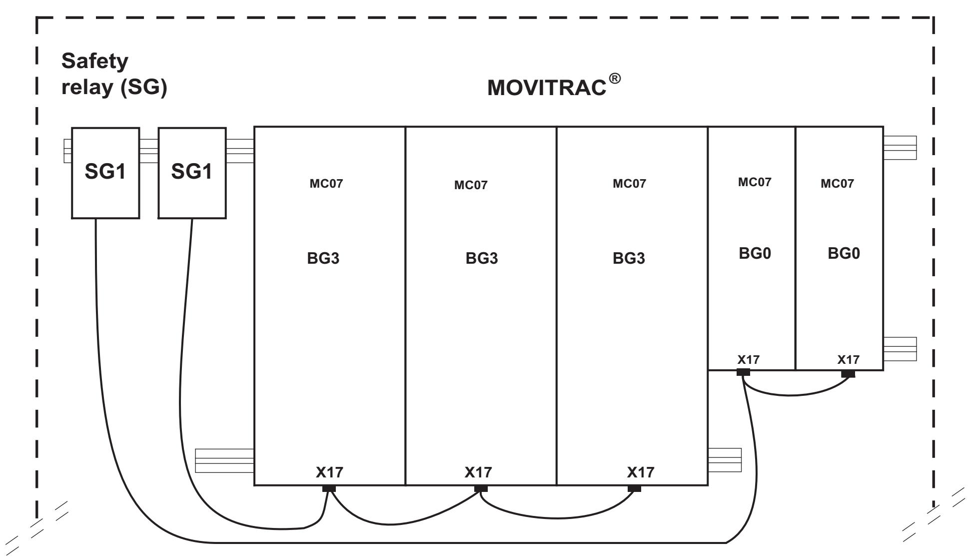
Group disconnection with two safety relays

With several safety relays, the safety inputs of the allocated MOVITRAC® MC07B can be controlled. In the following example, MOVITRAC® MC07B size 3 and MOVITRAC® MC07B size 0 each form one group, and each group is controlled by a safety relay.



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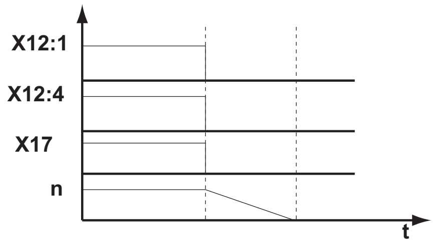
STO Safe Torque Off (EN 61800-5-2)

The procedure is as follows:

- Recommendation: X12:1 and X12:4 are switched off **simultaneously**, e.g. in the event of an emergency stop.

- The 24 V safety input X17 is switched off.
- The motor coasts to a stop if no brake is installed.



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INFORMATION

The indicated STO disconnections can be used up to PL d according to EN ISO 13849-1:2015.

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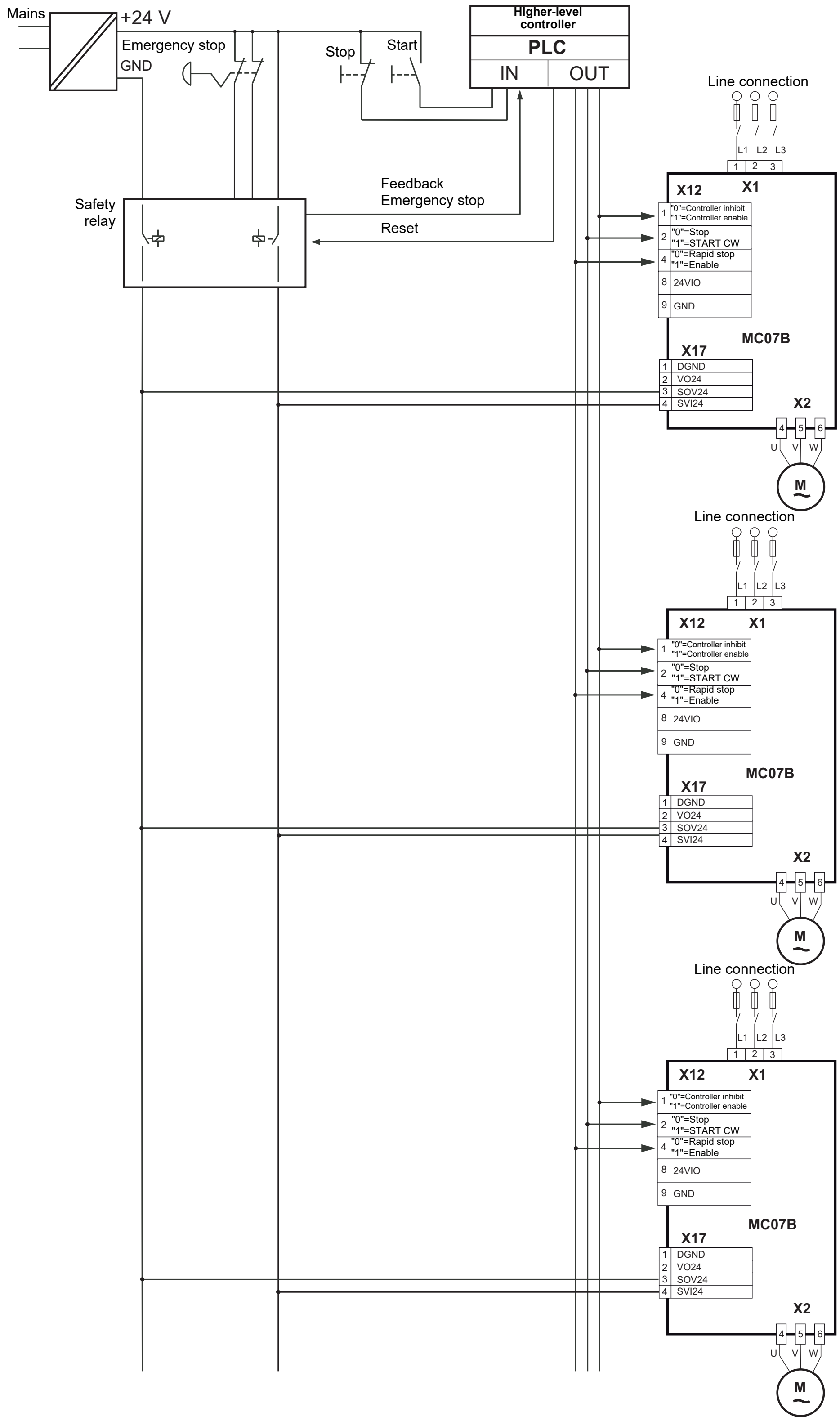
Example: Group disconnection with three MOVITRAC® MC07B



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6.5 Safety characteristics

Characteristic safety values	
Tested safety class/underlying standards	EN ISO 13849-1:2015 PL d (applicable up to cat. 3)
Probability of a dangerous failure per hour (PFH value)	0 (fault exclusion)
Service life	20 years, after which the component must be replaced with a new one.
Safe state	Safe torque off (STO)
Safety function	STO, SS1(c)[1] according to EN 61800-5-2

1) With suitable external control

6.6 Electronics data X17: Signal terminal block for STO safety contact

MOVITRAC®MC07B	Terminal	Electronics data X17
Safety contact	X17:1	DGND: Reference potential for X17:2
	X17:2	VO24: U_{OUT} = DC 24 V, only to supply X17:4 of the same device; must **not** be used to supply further devices.
	X17:3	SOV24: Reference potential for DC+24 V input "STO"
	X17:4	SVI24: DC+24 V input "STO"
Permitted line cross section	X17:1 – 4	• One core per terminal: 0.08 – 1.5 mm² (AWG28 – 16) • Two cores per terminal: 0.25 – 1.0 mm² (AWG23 – 17)
Power consumption	X17:4	Size 0: 3 W
		Size 1: 5 W
		Size 2: 6 W
		Size 3: 7.5 W
		Size 4: 8 W
		Size 5: 10 W
Input capacitance	X17:4	Size 0: 27 µF
		Sizes 1 – 5: 270 µF

Technical data of the STO input	Minimum	Typical	Maximum
Input voltage range	DC 19.2 V	DC 24 V	DC 30 V
Time to inhibit output stage			BG0 = 20 ms BG1 – 5 = 100 ms
Time for restart		200 ms	

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7 Project planning – additional functions

7.1 Master/slave connection

The master-slave function offers the option of automatically implementing functions such as speed synchronism, load sharing and torque control (slave). The RS485 interface (ST11 / ST12) or the system bus interface (SC11 / SC12) can be used as the communication connection.

Also see chapter "RS485 interface connection" and chapter "System bus (SBus 1) connection".

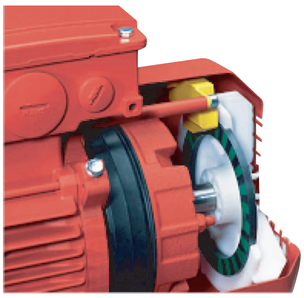
7.2 Simple positioning application module

The "simple positioning" software module is suitable for many applications that were previously implemented using rapid and creep speed switching.

When using the simple positioning application module and the P700 VFC&hoist operating mode, the start/stop speed P300 and minimum speed P301 must not be less than twice the nominal motor slip.

An EI7C built-in encoder with up to 24 pulses per motor revolution is used here, which is more cost-effective than conventional encoders, see figure below. There is no need for an encoder card as the low-resolution encoder can be connected directly to the MOVITRAC® B inverter. In addition, the compact design allows the encoder to be integrated into the motor without resulting in additional length.

Parameterization is carried out via the IPOS$^{plus®}$ positioning control system using the MOVITOOLS® MotionStudio engineering software.



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Built-in encoder EI7C. Further information can be found in the chapter "Connection of built-in encoder EI7C" (→ 🗎 226).

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7.3 Parameter set switchover

This function can be used to operate 2 motors with 2 different parameter sets on one inverter.

The parameter set changeover takes place via a digital input or via fieldbus. To do this, program a digital input to the "Parameter set changeover" function (→ *P60./P61.*). Inverter status DISABLED can then be used to switch between parameter set 1 and 2.

Function	Effect with	
	"0" signal	"1" signal
PARAM. CHANGEOV.	Parameter set 1 active	Parameter set 2 active

INFORMATION

When operating 2 alternately running motors on one inverter using the parameter set changeover function, a changeover contactor must be provided for each of the two motor cables. Only switch the changeover contactors when the device is disabled.

7.4 IPOSplus®

7.4.1 Description

The IPOSplus® positioning and sequence control is integrated as standard in every MOVITRAC® inverter and is activated via parameter P809. With IPOSplus® control functions can be performed either simultaneously or independently of one another.

The IPOSplus® program is written using the MOVITOOLS® MotionStudio engineering software. Startup of the inverter, accessing parameters and changing variables can be carried out using the software or the DBG60B keypad.

7.4.2 Characteristics

The IPOSplus® positioning and sequence control system includes the following features

- Execution of the program independently of the operating mode
- The user program is continued, even if the device develops a failure (troubleshooting is possible in the user program)
- Two user programs can be executed in parallel and independently of each other (Task 1 and Task 2, each interrupt-capable)
- The user programs in assembler programming can have a total of up to 3200 program lines
- Convenient and comprehensive control options for the inverter
- Access to the available options
- Extensive options for communication via system bus (SBus), RS485, RS232 and fieldbus (direct communication with MOVIMOT® is possible)
- Processing of digital and analog input/output signals

Max. program length of Task 1, Task 2 and Task 3	**Approx. 3200 program lines in total**
Command processing time per program line	Task 1: 1 ... 10 commands/ms can be configured Task 2: 2 ... 11 commands/ms can be configured
Variables	1024, of which 128 (0...127) can be stored to non-volatile memory; range of values: -2^{31} to $+(2^{31}-1)$
Sampling cycle of digital and analog inputs	5 ms
Digital inputs/outputs	6 inputs / 3 outputs
Analog inputs/outputs	1 input (DC 0 – 10 V, DC 0...20 mA, DC 4...20 mA)1 output (DC 0 – 20 mA, DC 4...20 mA, DC 0 – 10 V) -> only with FIO11B 1 input (DC 0 – 10 V, DC +-10 V) -> only with FIO11B A further 7 digital inputs are available with FIO21B.

7.5 Energy efficiency

In order to significantly increase energy efficiency, the option of a regenerative power supply and DC link coupling is available from BG2S onwards. The regenerative power supply module MDR60A.. has the following characteristics:

- Feedback of braking energy into the supply system
- The axes are only allowed to be connected to the supply system with a size 2 regenerative power supply.
- Coupling of several axes to a regenerative power supply
- Energy exchange between several axes

The inverter is designed on the basis of the motor load.

The following advantages result from the characteristics of the regenerative power supply:

- Reduced overall energy consumption
- Reduced CO_2 emissions
- Savings during installation
- No investments in braking resistors
- No emission of thermal energy due to braking resistors
- No expense for air conditioning

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8 Device structure

8.1 Type designation

Example: MC07B0022-2B1-4-00/T	
MC	**Product family** MOVITRAC®
07	**Series** Series 07
B	**Version** B = version status of the device series
0022	**Performance class** 0022 = 2.2 kW
2	**Connection voltage** 2 = AC 200 to 240 V 5 = AC 380 to 500 V
B	**Radio interference suppression** 0 = no radio interference suppression A = radio interference suppression level C2 B = radio interference suppression level C1
1	**Connection type** 1 = 1-phase connection type 3 = 3-phase connection type
4	**Quadrants** 4 = 4-quadrant operation
00	**Application level** • 00 = Standard • S0 = Safe Torque Off
/T	**Options** • /T = technology device • /L = Partially coated PCBs

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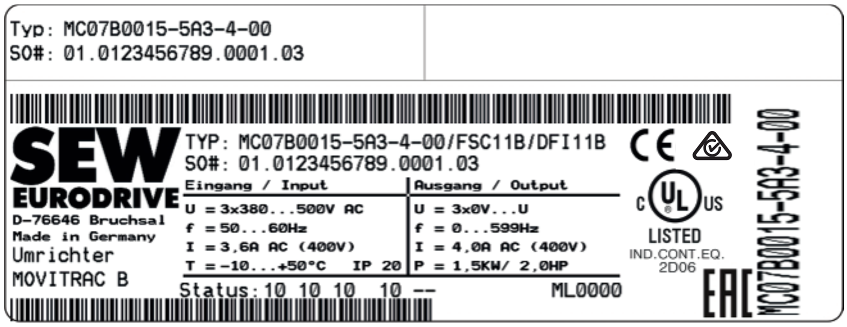
8.2 Nameplate

The following figure shows an example of a nameplate:



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Input	V	Nominal line voltage	T	Ambient temperature
	I	Nominal line current 100% operation	P_{motor}	Recommended motor power 100% operation
	f	Nominal line frequency		
Output	V	Output voltage 100% operation		
	I	Nominal output current 100% operation		
	f	Output frequency		

The device status is shown above the lower barcode. It documents the hardware and software status of the device.

8.3 Scope of delivery

The following parts are combined in one accessory bag for each size.

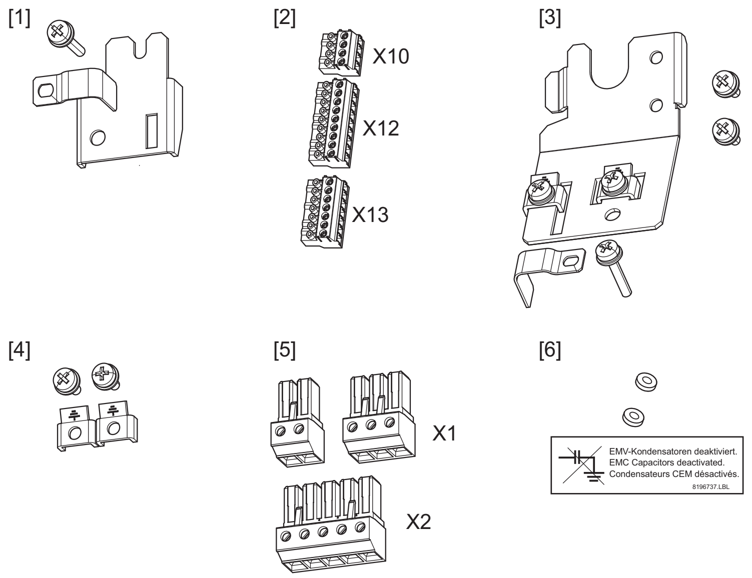

Figure number	**Size**					
	0XS, 0S, 0L	**1**	**2S**	**2**	**3**	**4, 5**
Shield plate for control electronics with terminal and screw						
[1]	1x	1x	1x	1x	1x	1x
[3]	1x					
Shield plate for power section without screws						
		1x				
Shield plate for power section with screws						
			1x	1x		
Electronics terminals connector						
[2]	3x	3x	3x	3x	3x	3x
Grounding terminals with screws						
[4]	1x	1x	1x	1x		
Connectors for supply system (2 or 3-pin) and motor						
[5]	1x					
Plastic insulation with label						
[6]	1x					
Touch guard						
						1x
Fastening tabs						
		1x	1x			

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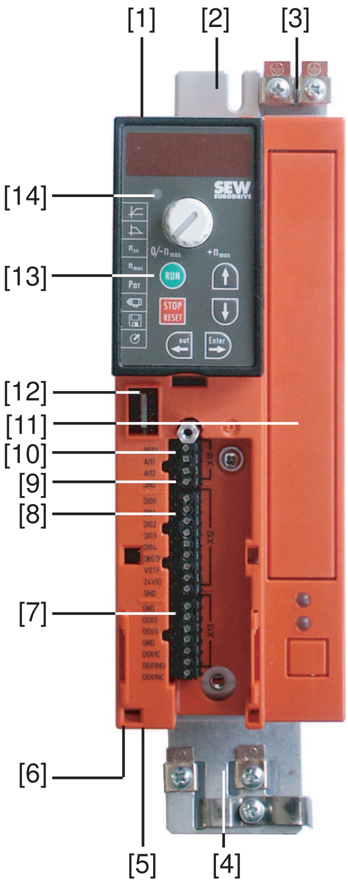
8.4 Sizes 0XS / 0S / 0L



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[1] X1: Line connection:
- 3-phase: L1/L2/L3
- 1-phase: L/N

[2] Fastening tab

[3] PE connection

[4] Shield plate for motor cable, including fastening tab

[5] X2: Motor connection U/V/W / Brake connection +R/-R

[6] X17: Safety contact for Safe Torque Off (only MC07B ...-S0: Size 0S/0L, 400/500 V)

[7] X13: Digital outputs

[8] X12: Digital inputs

[9] X10: Analog input

[10] Switch S11 for V-mA changeover of analog input (for sizes 0XS and 0S behind the removable connector)

[11] Space for option card (cannot be retrofitted/not for BG0XS)

[12] Connection for optional communication/analog module

[13] Optional operator panel, plugged on

[14] Status LED (also visible without optional operator panel)

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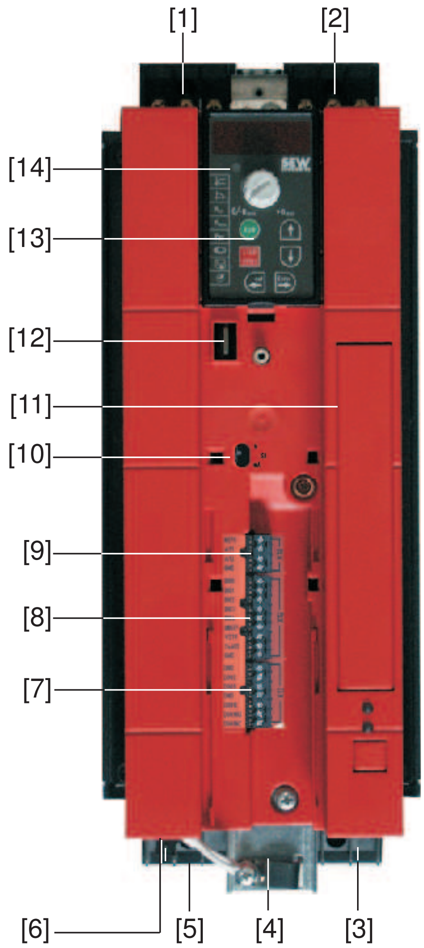
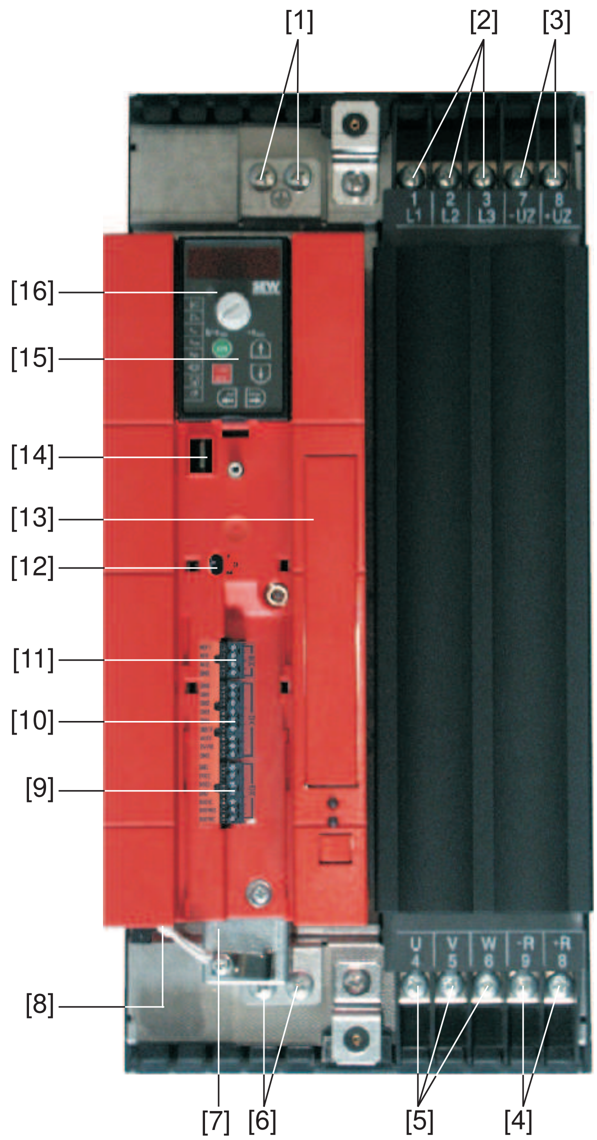
8.5 Sizes 1 / 2S / 2



9007199346901259

[1]	X1: Line connection, 3-phase: L1 / L2 / L3 / PE screw
[2]	X4: DC link connection $-V_{DCL}$ / $+V_{DCL}$
[3]	X3: Connection of braking resistor R+ / R- / PE
[4]	Electronics shield clamp
[5]	X2: Motor connection U / V / W / PE screw
[6]	X17: Safety contact for Safe Torque Off (only 400/500 V)
[7]	X13: Digital outputs
[8]	X12: Digital inputs
[9]	X10: Analog input
[10]	Switch S11 for V-mA changeover of analog input
[11]	Space for option card (cannot be retrofitted)
[12]	Connection for optional communication / analog module
[13]	Optional operator panel, plugged on
[14]	Status LED (also visible without optional operator panel)

8.6 Size 3



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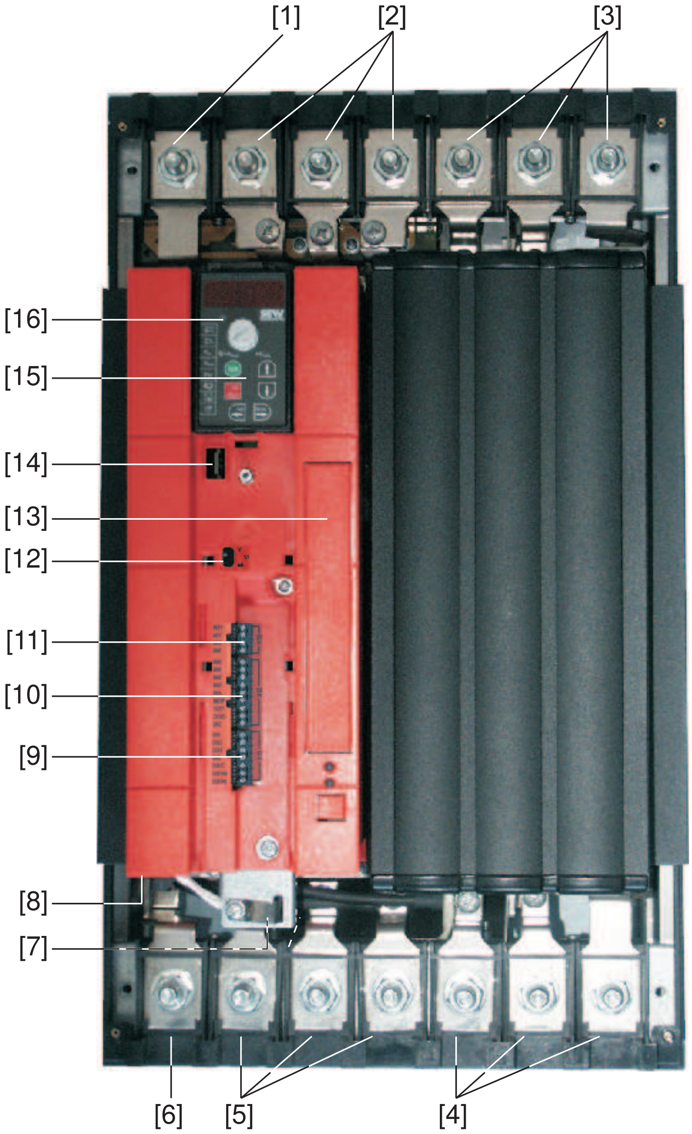
[1]	X2: PE connection
[2]	X1: Line connection, 3-phase: 1/L1 / 2/L2 / 3/L3
[3]	X4: DC link connection $-V_{DCL}$ / $+V_{DCL}$
[4]	X3: Braking resistor connection R+ (8) / R- (9) and PE connection
[5]	X2: Motor connection U (4) / V (5) / W (6)
[6]	X2: PE connection
[7]	Electronics shield clamp
[8]	X17: Safety contact for Safe Torque Off (only 400/500 V)
[9]	X13: Digital outputs
[10]	X12: Digital inputs
[11]	X10: Analog input
[12]	Switch S11 for V-mA changeover of analog input
[13]	Space for option card (cannot be retrofitted)
[14]	Connection for optional communication / analog module
[15]	Optional operator panel, plugged on
[16]	Status LED (also visible without optional operator panel)

8.7 Sizes 4 / 5



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[1]	X2: PE connection
[2]	X1: Line connection, 3-phase: 1/L1 / 2/L2 / 3/L3
[3]	X4: DC link connection $-V_{DCL}$ / $+V_{DCL}$ and PE connection
[4]	X3: Braking resistor connection R+ (8) / R- (9) and PE connection
[5]	X2: Motor connection U (4) / V (5) / W (6)
[6]	X2: PE connection
[7]	Electronics shield clamp
[8]	X17: Safety contact for Safe Torque Off (only 400/500 V)
[9]	X13: Digital outputs
[10]	X12: Digital inputs
[11]	X10: Analog input
[12]	Switch S11 for V-mA changeover of analog input
[13]	Space for option card (cannot be retrofitted)
[14]	Connection for optional communication / analog module
[15]	Optional operator panel, plugged on
[16]	Status LED (also visible without optional operator panel)

9 Mechanical installation

⚠ DANGER

The surfaces of the heat sinks can exceed 70 °C.

Risk of burns.

- Do not touch the heat sink.

⚠ DANGER

Dangerous voltages on cables and terminals.

Death or severe injuries due to electric shock.

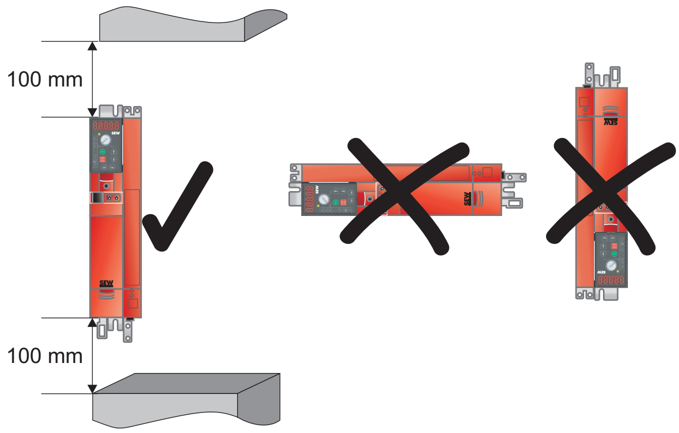
- Disconnect the inverter from the supply system and wait 10 minutes before starting work.
- Use suitable measuring devices to verify that there is no voltage on cables and terminals.

9.1 Installation notes for basic device

9.1.1 Minimum clearance and mounting position

Observe the following information:

- Leave 100 mm free space at the top and bottom of the housing for proper cooling. Lateral clearance is not required, you can line up the devices.
- Make sure that cables and other installation material do not interfere with the air circulation. Prevent the device from being blown by the warm exhaust air from other devices.
- Only install the devices vertically. Do not install them horizontally, tilted or upside down.
- Good heat dissipation from the rear of the heat sink improves the thermal capacity utilization of the device.



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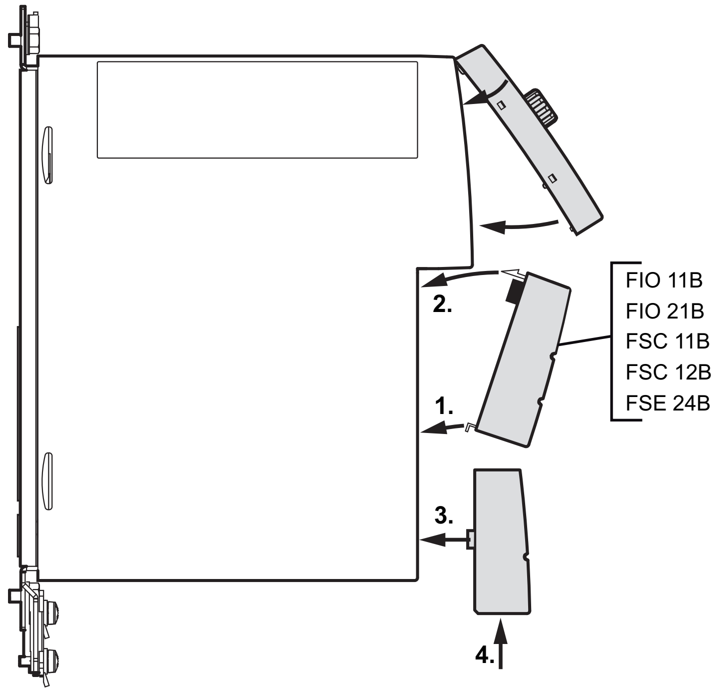
9.2 Installation of accessories and options

9.2.1 Attaching the front modules

Set up the front modules as follows:



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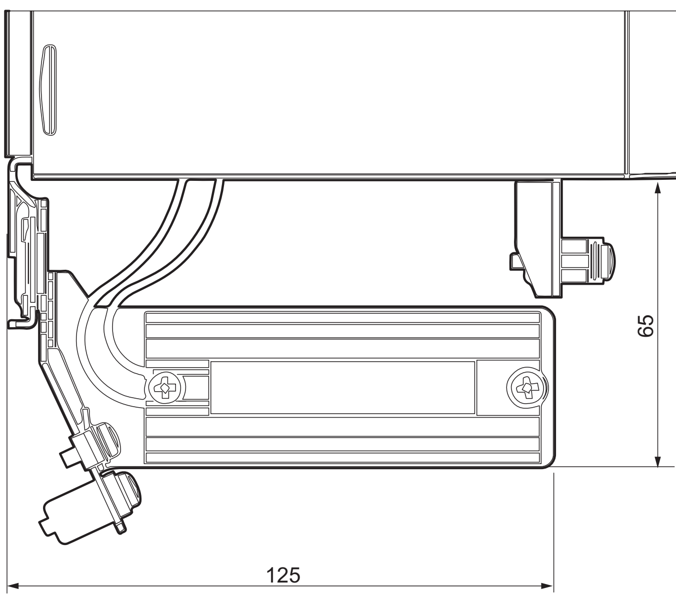
9.2.2 PTC braking resistors BW1 / BW3 with FKB10B

The PTC braking resistors BW1 and BW3 [1] can be mounted on the shield plate below the inverter using an optional angle bracket FKB10B [2], part number 18216218.



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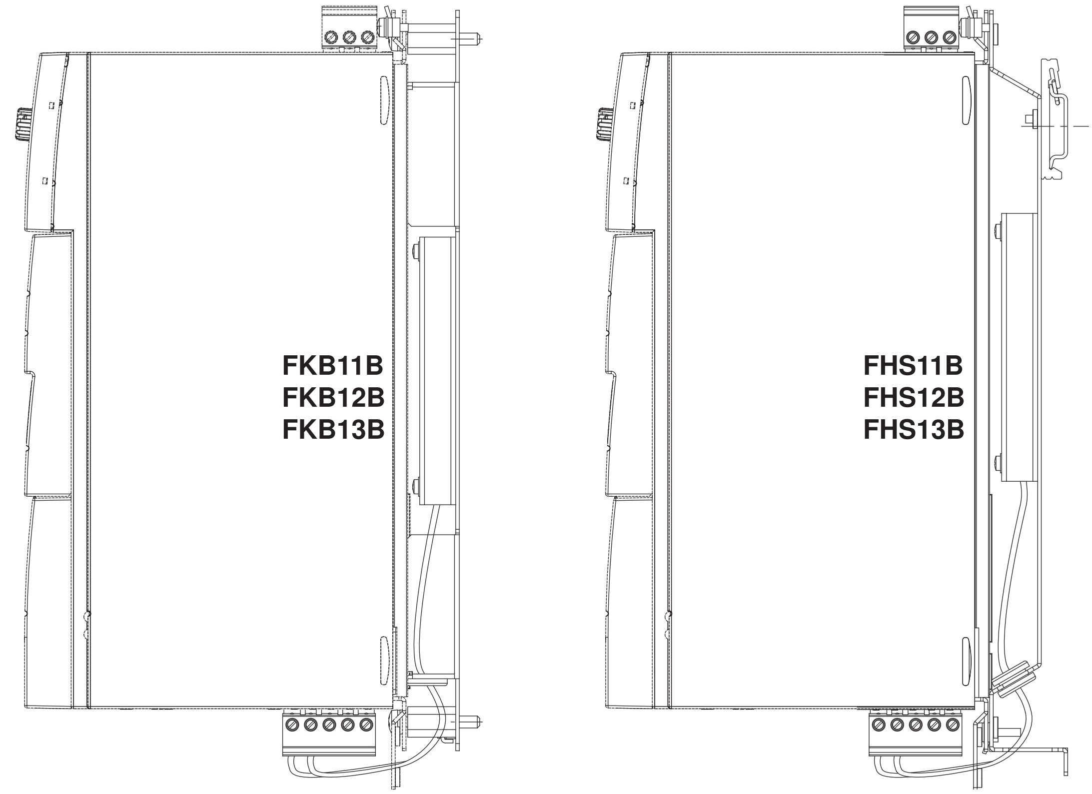
9.2.3 Flat-design resistors with FKB11B / FKB12B / FKB13B and FHS11B / FHS12B / FHS13B

Install flatpack resistors as follows:

- FKB11B / FKB12B / FKB13B: Mounting on the rear panel of the control cabinet
- FHS11B / FHS12B / FHS13B: Mounting with mounting rail



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INFORMATION

Guide the cable of the FKB1xB through the center of the recess through the tabs (burr-free). Ensure that the conductors are not crushed during the subsequent installation of the inverter. For FKB12B, FKB13B, and FHS1xB, the cables must be routed through the grommet.

10 Electrical installation

10.1 Installation notes for basic device

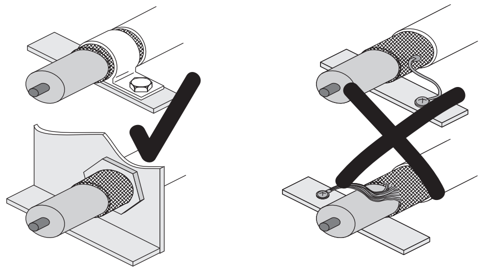
10.1.1 Recommended tools

Use a screwdriver with a blade width of 2.5 mm to connect the electronics terminal strip X10/X12/X13.

10.1.2 EMC-compliant installation

Observe the following information:

- Shield all cables except the supply system cable. For the motor cable, you can use the HD.. option (output choke) as an alternative to the shield to achieve the interference emission limit values.
- When using shielded motor cables, e.g. assembled motor cables from SEW-EURODRIVE, you must keep unshielded conductors between the shield overlay and the terminal of the inverter as short as possible.
- Connect the shield by the shortest possible route and make sure it is grounded over a wide area at both ends. If using double-shielded cables, ground the outer shield on the inverter side and the inner shield on the other end.



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- You can also use grounded sheet-metal ducts or metal pipes to shield the cables. Lay the power and control cables separately from each other.
- Ground the inverter and all additional devices in a high-frequency-compliant manner by making flat, metallic contact between the device housing and ground, e.g. unpainted control cabinet mounting panel.

INFORMATION

- MOVITRAC® B is a product that can cause EMC interference in accordance with EN 61800-3. In this case, it is recommended that the user take the appropriate measures.
- Detailed information on EMC-compliant installation can be found in the documentation "Drive Engineering – Practical Implementation: EMC in Drive Engineering" from SEW-EURODRIVE.

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10.1.3 Shield terminals

Installation of shield plate for control electronics (all sizes)

[1]

MOVITRAC® B is supplied as standard with a shield plate for control electronics with a retaining screw. Install the shield plate for control electronics as follows:

1. First loosen the screw [1]
2. Slide the shield terminal into the slot in the plastic housing
3. Screw the shield terminal tight

Installation of shield plate for the power section

The shield plate for the power section allows you to conveniently install the shielding for the motor and braking resistor cable. Connect the shield and PE conductor as shown in the following pictures.

Size 0

MOVITRAC® B size 0 is supplied as standard with a shield plate for the power section with 2 retaining screws.

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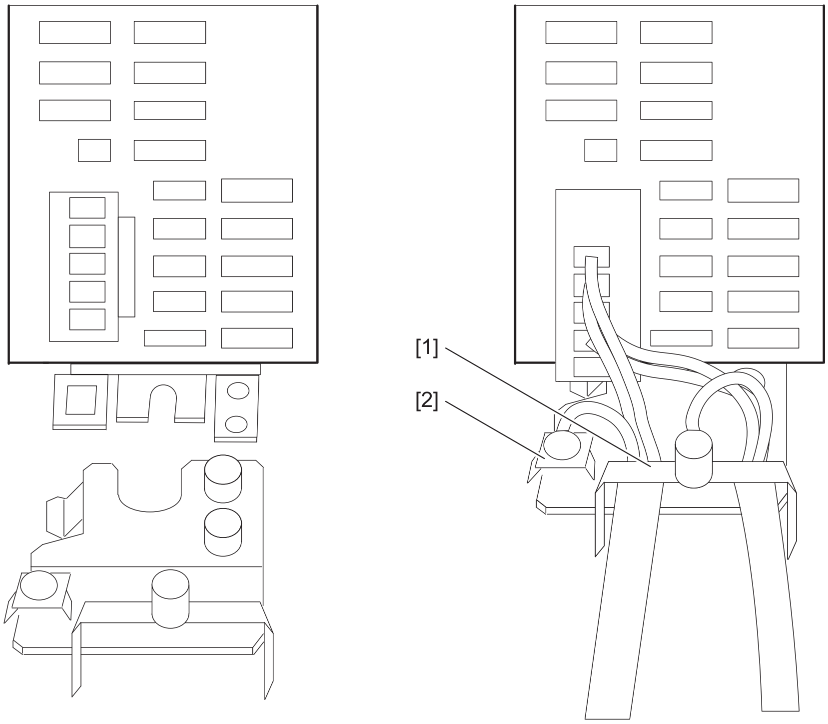
Mount the shield plate for the power section using the two retaining screws.



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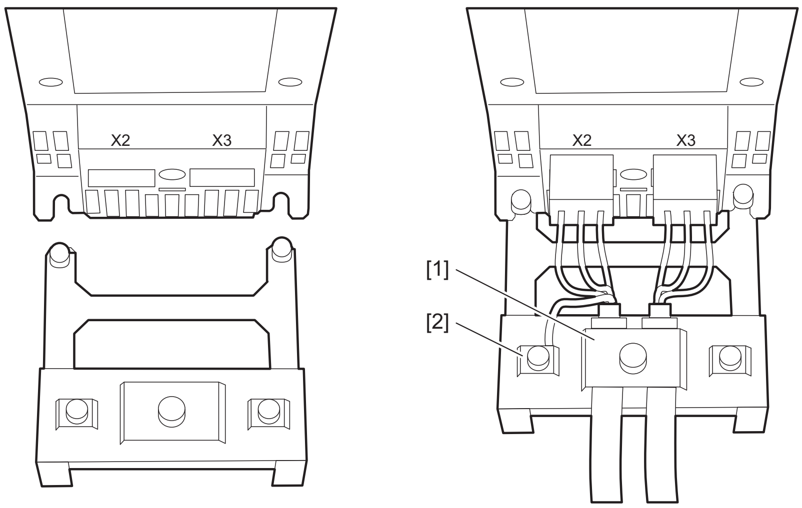
[1] Shield plate
[2] PE connection

Size 1

MOVITRAC® B size 1 is supplied as standard with a shield plate for the power section with 2 retaining screws.

Mount the shield plate for the power section using the two retaining screws.



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[1] Shield plate
[2] PE connection

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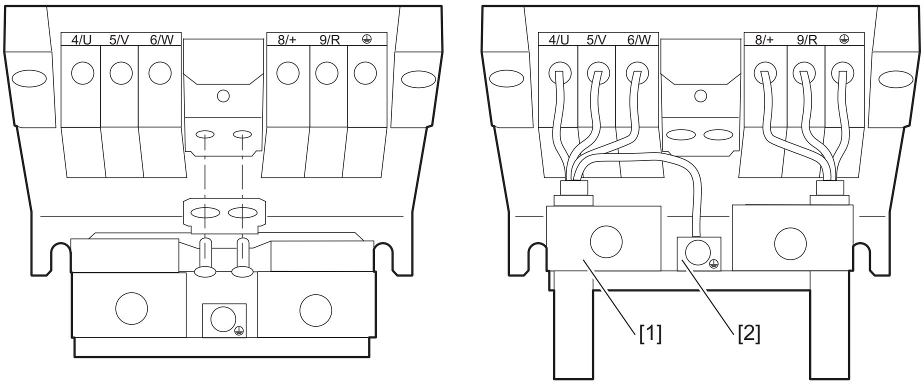
Size 2S/2

For MOVITRAC® B size 2S / 2, a shield plate for the power section with 2 retaining screws is supplied as standard.

Mount the shield plate for the power section using the two retaining screws. The following figure shows size 2.



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[1]	Shield plate
[2]	PE connection

Sizes 3 – 5

MOVITRAC® B sizes 3 – 5 are not supplied with shield plates for the power section. Use commercially available shield terminals for the installation of the shielding of the motor and braking resistor cables. Apply the shielding as closely as possible to the inverter.

Touch guard installation

⚠ DANGER

Uncovered power connections.

Severe or fatal injuries due to electric shock.

- Install the touch guard in accordance with the regulations.
- Never start up the device if the touch guard has not been installed.

Size 2S

MOVITRAC® B size 2S are supplied with 2 pieces of touch guard for the DC link and braking resistor terminals as standard. With the touch guard, MOVITRAC® B size 2S has degree of protection IP20.

INFORMATION

Without touch guard fitted, MOVITRAC® B size 2S has degree of protection IP10.

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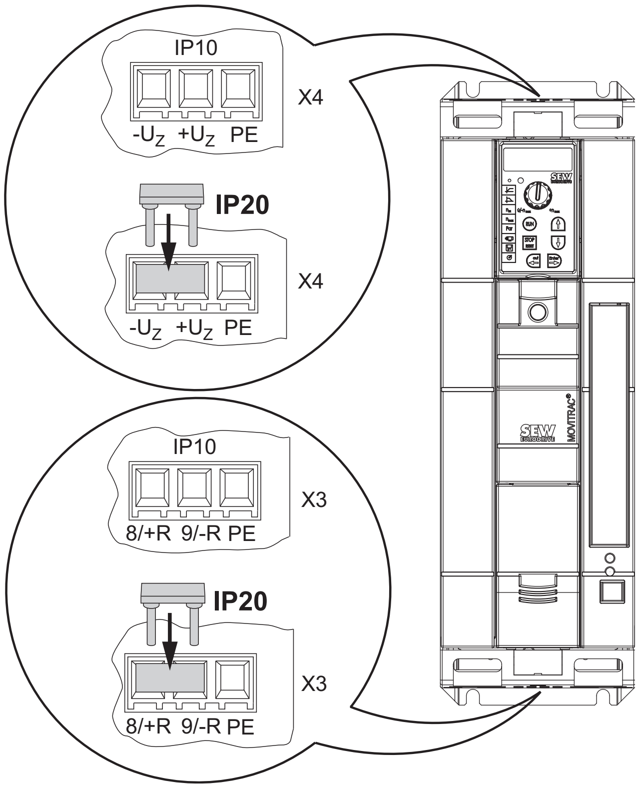
Install the touch guard according to the following diagram.



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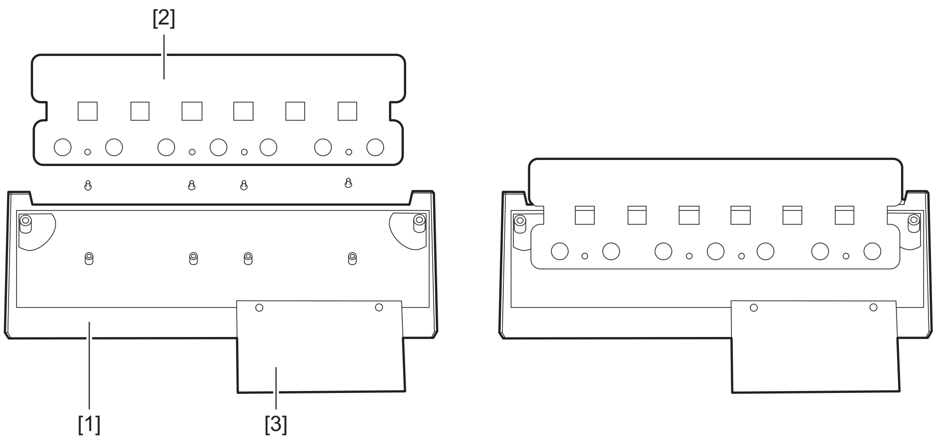
Sizes 4 / 5

MOVITRAC® B size 4/5 are supplied with 2 pieces of touch guard with 8 fixing washers as standard.

Fit the touch guard to the two safety covers for the power section terminals.



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[1] Cover plate
[2] Connection cover
[3] Panel (size 4 only)

MOVITRAC® B size 4 and 5 only achieve degree of protection IP10 under the following conditions:

- The touch guard is fully fitted
- The heat shrink tubing is attached to all power section terminals (X1, X2, X3, X4)

INFORMATION

If the above conditions are not met, the MOVITRAC® B inverters of size 4 and 5 only achieve degree of protection IP00.

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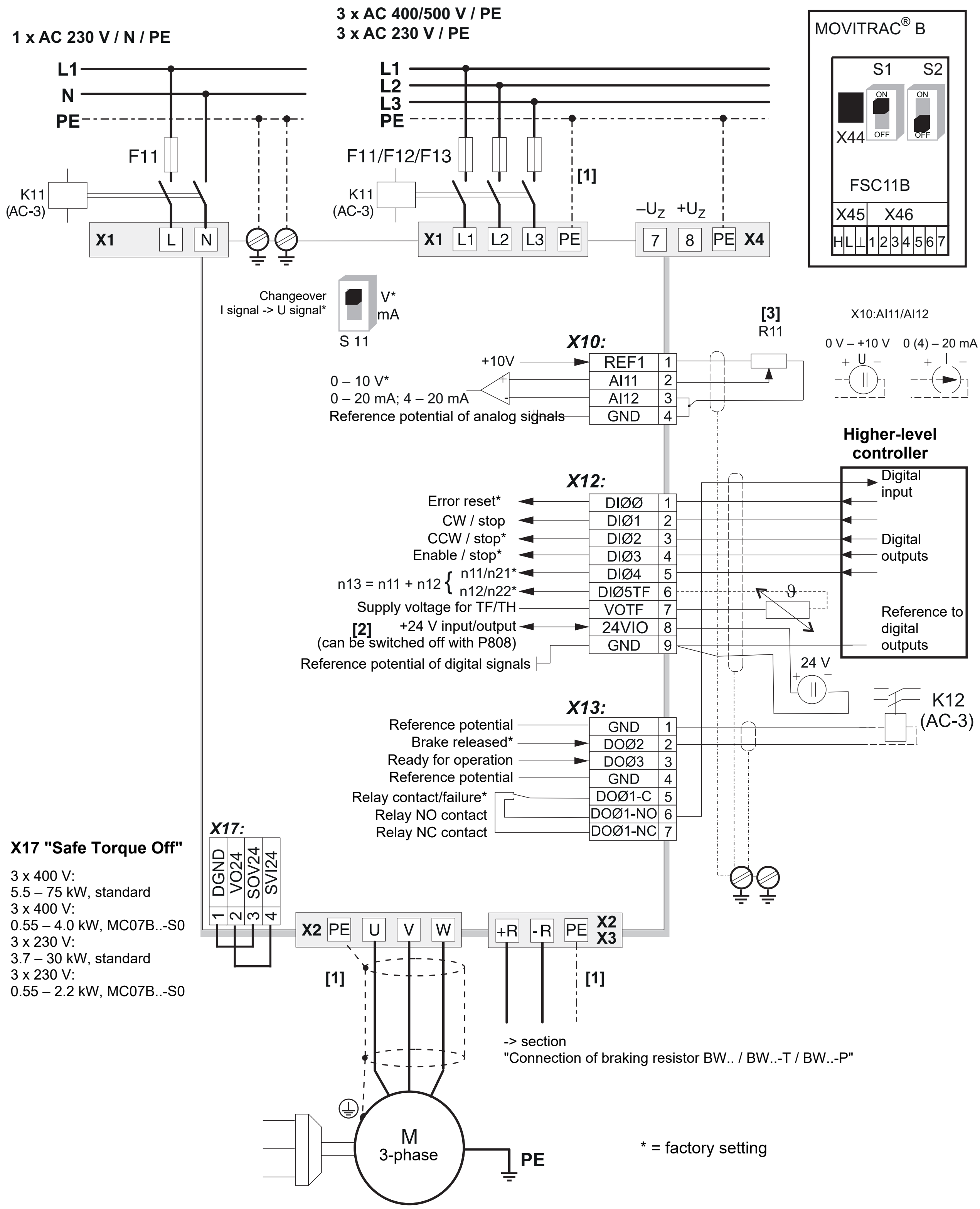
10.1.4 Wiring diagram



[1] Sizes 1, 2S, and 2 do not have a PE connection in addition to the line connection and motor connection terminals [X1]/[X2]. Then use the PE terminal next to the DC link connection [X4] (only available for sizes 1 – 5). For size 0, the sheet metal is the PE connection.

[2] The MC07B..-S0 device type must always be supplied with external voltage.

[3] R11: The resistance value of the external setpoint potentiometer must be ≥ 3 kΩ.

X4 is only available for sizes 1 – 5. From size 3, there are 2 additional PE terminals.

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10.1.5 Requirements for cold plate installation – size 0 only

The dissipation of the frequency inverter's power loss can take place via coolers that work with different cooling media (air, water, oil, etc.). This can be useful in cramped installation conditions, for example. If the usual installation notes are observed (40 °C / 100 mm space above and below), cold plate technology is not necessary.

A good thermal connection to the cooler is important for the safe operation of the frequency inverter:

- The contact surface between the cooler and the frequency inverter must be as large as the cooling plate of the frequency inverter.
- Flat contact surfaces are required, deviation max. 0.05 mm.
- Connect the cooler and cooling plate with all the prescribed screw connections.
- The mounting plate must not get warmer than 70 °C during operation. This must be ensured by the cooling medium.
- Cold plate installation is not possible with FHS or FKB.

10.1.6 Deactivating the EMC capacitors – size 0 only

⚠ DANGER

Death or severe injuries due to electric shock.

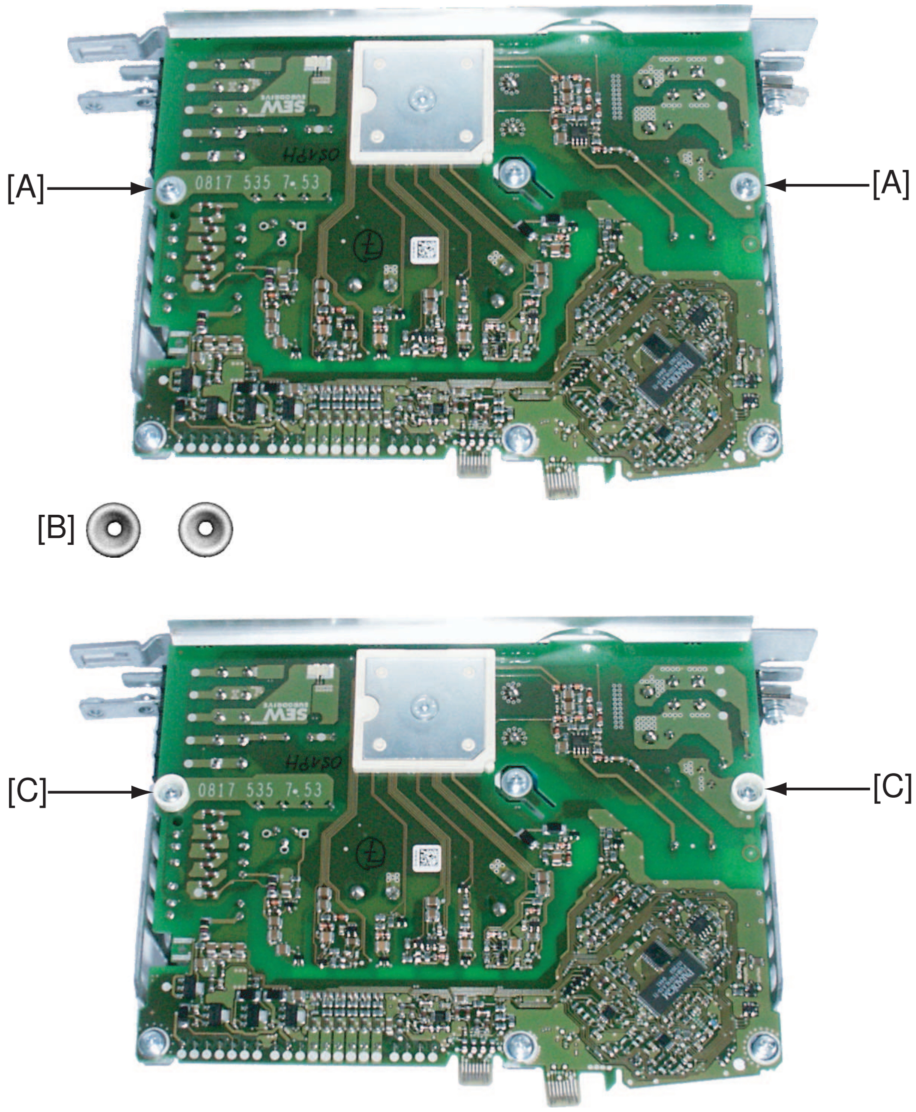
- Disconnect the inverter from the power. Disconnect the DC 24 V and the line voltage.
- Wait 10 minutes.
- Check that power disconnection has been carried out.
- Discharge yourself using suitable measures (discharge strap, conductive shoes, etc.) before removing the hood.
- Only touch the device by the frame and heat sink. Do not touch any electronic components.

The conversion is only allowed to be carried out by a skilled person (electrically). After the conversion, the device must be marked with the label enclosed in the accessory bag.

If you want to deactivate the EMC capacitors on the MOVITRAC® B frequency inverter, proceed as follows:

1. Open the device:
   - Remove **all** connectors
   - Remove the electronics shield clamp
   - Remove the housing retaining screw in the center of the front of the housing
   - Remove the housing
2. Remove the two screws [A] for fastening the circuit board.
3. Insert the screws into the plastic insulators [B] supplied.
4. Screw the screws back onto the device [C].
5. Close the unit.

6. Label the device with the enclosed label.



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By deactivating the EMC capacitors, leakage currents no longer flow via the EMC capacitors.

- Note that the leakage currents are essentially determined by the level of the DC link voltage, the PWM frequency, the motor cable used, its length, and the motor used.

The EMC filter is no longer active when the interference suppression capacitors are deactivated.

10.1.7 Separate cable ducts

Route power cables and electronics cables in separate cable ducts.

10.1.8 Operation on IT systems

SEW-EURODRIVE recommends using insulation monitors with pulse-code measurement in voltage supply systems with a non-grounded star point (IT systems). Using such devices prevents false tripping of the insulation monitor due to the earth capacitance of the inverter.

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10.1.9 Utilization category of contactors

Use only contactors in utilization category AC-3 (EN 60947-4-1).

10.1.10 Required cross sections

Supply system cable: Cross section according to nominal input current I_{Line} at nominal load

Motor cable: Cross section according to nominal output current I_N

Electronic cables: maximum 1.5 mm² without conductor end sleeves[1)]

Maximum 1.0 mm² with conductor end sleeves

1) You must not install fine-stranded conductors without conductor end sleeves.

10.1.11 Cable lengths for individual drives

The cable lengths depend on the PWM frequency. The approved motor cable lengths are listed in the chapter "Project planning" (→ 🗎 138).

10.1.12 Device output

Only connect ohmic/inductive loads (motors).

10.1.13 Switched inductances

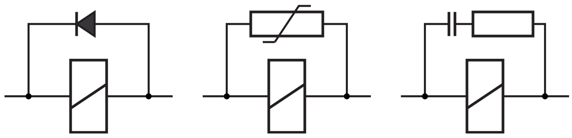
⚠ CAUTION

Switched inductances.

Malfunctions / material damage.

- The distance from switched inductances to the inverter must be at least 150 mm.

- Use suppressors for interference suppression of:
  - Contactors
  - Relay
  - Solenoid valves
- Suppressors are, for example, diodes, varistors or RC elements:



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You must not connect any suppression devices directly to the MOVITRAC® B. Connect the interference suppression devices as close as possible to the inductance.

10.1.14 PE supply system connection according to EN 61800-5-1

During normal operation, leakage currents ≥ 3.5 mA might occur. Note the following for a safe PE connection:

- Supply system cable < 10 mm²:

  - Second PE conductor with the cross section of the supply system cable parallel to the protective earth via separate terminals or
  - Copper PE conductor with a cross section of 10 mm²
- Supply system cable 10 to 16 mm²:
  - Copper protective earth with the cross section of the supply system cable.
- Supply system cable 16 to 35 mm²:
  - Copper PE conductor with a cross section of 16 mm².
- Supply system cable > 35 mm²:
  - Copper protective earth with half the cross section of the supply system cable.

10.1.15 Interference emission

- For EMC-compliant installation, use shielded motor cables or output chokes HD.

10.1.16 Digital outputs

The digital outputs are short-circuit proof and external-voltage-proof up to 30 V. Higher external voltage can destroy the digital outputs.

10.2 Installation of accessories and options

10.2.1 Braking resistor connection

- Shorten the conductor to the required length.
- Use 2 tightly twisted conductors or a shielded power cable. Cable cross-section according to the tripping current I_F of F16. The nominal voltage of the cable must amount to at least V_0/V = 300 V/500 V (according to DIN VDE 0298).
- Protect the braking resistor (except BW90-P52B) with a bimetallic relay. Set the tripping current as per the technical data of the braking resistor. SEW-EURODRIVE recommends using overcurrent relays of tripping class 10 or 10A in accordance with EN 60947-4-1.
- For braking resistors in the BW..-T/BW..-P series, the integrated temperature switch/overcurrent relay can be connected with a shielded cable as an alternative to a bimetallic relay.
- The flatpack resistors have internal thermal overload protection (fuse cannot be replaced). Install the flatpack resistors using appropriate touch guards.

10.2.2 Connecting BW..-P / BW..-T / BW.. to X3 / X2 braking resistor

⚠ WARNING

The surfaces of the braking resistors reach high temperatures under a load of P_N.

Risk of burns and fire.

- Select a suitable installation location. Braking resistors are usually mounted on the control cabinet.
- Do not touch the braking resistor.

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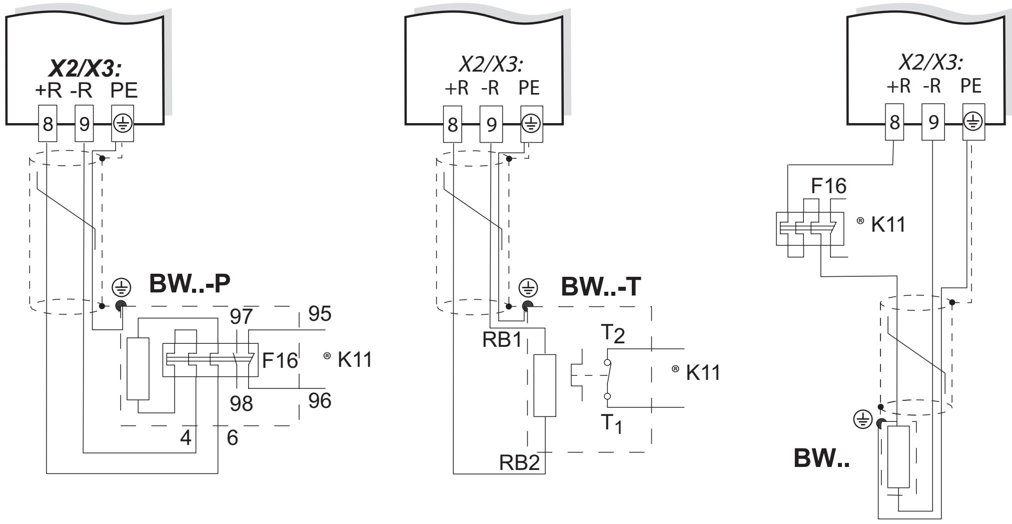

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Program a terminal to "/Controller inhibit". K11 must be opened and the "/Controller inhibit" must receive a "0" signal if:

- BW..-P: the auxiliary contact trips.
- BW..-T: the internal temperature switch trips.
- BW..: the external bimetallic relay F16 trips.

The resistance circuit must not be interrupted.

Overload protection for braking resistors BW:

	Overload protection		
Braking resistor type	**Specified by design**	**Internal temperature switch (..T / ..P)**	**External bimetallic relay (F16)**
BW..	–	–	Required
BW..-T[1] / BW..-P	–	One of the two options must be selected (internal temperature switch / external bimetallic relay).	
BW..-003 / BW..-005	Sufficient	–	Permitted
BW1 – BW4	Sufficient	–	–

1) Permitted installation: On horizontal surfaces or on vertical surfaces with terminals at the bottom and perforated sheets at the top and bottom. Impermissible mounting: On vertical surfaces with terminals at the top, CW or CCW.

10.2.3 Installing the braking resistor

Observe the following information:

- The supply cables to the braking resistors carry a high DC voltage (approx. DC 900 V) during nominal operation.
- The surfaces of the braking resistors reach high temperatures under a load of P_N. Choose a suitable installation location. Braking resistors are usually mounted on the control cabinet roof.

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10.2.4 Installing braking resistors

The surfaces of the braking resistors will reach temperatures of up to 250 °C when the braking resistors are loaded with the nominal power. The installation location of the braking resistor must be designed according to the high temperatures. For this reason, the braking resistors are usually mounted outside the control cabinet. Non-permissible installation might lead to heat build-up in the braking resistor due to reduced convection. A tripping temperature contact or an overheated braking resistor can lead to a system standstill.

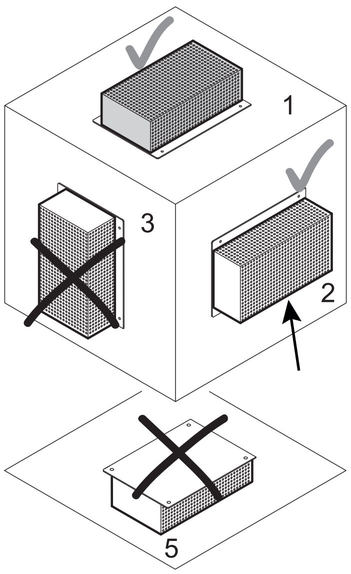
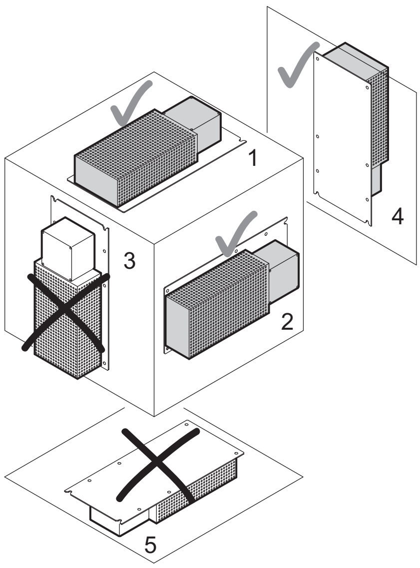
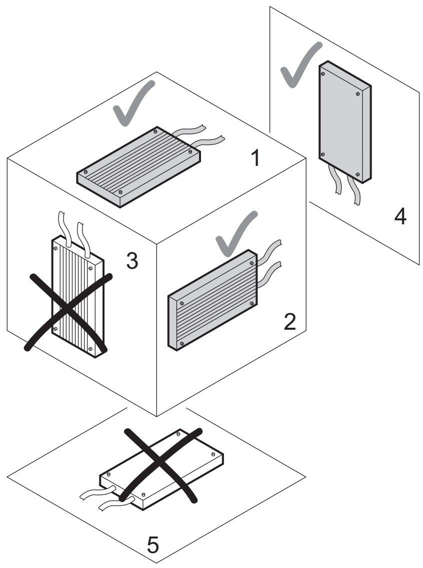
Minimum clearances for convection cooling

The following minimum clearances must be observed for convection cooling depending on the continuous braking power and the mounting position.

Continuous braking power at 100% cdf	Mounting position	Lateral distance in mm	Distance below in mm	Distance above in mm
up to 1 kW	horizontal[1)]	200	0	350
	vertical[2)]	150	250	300
up to 10 kW	horizontal[1)]	300	0	650
	vertical[2)]	250	350	600

1) Corresponds to mounting position 1, 2, 5, 6.
2) Corresponds to mounting position 3, 4.

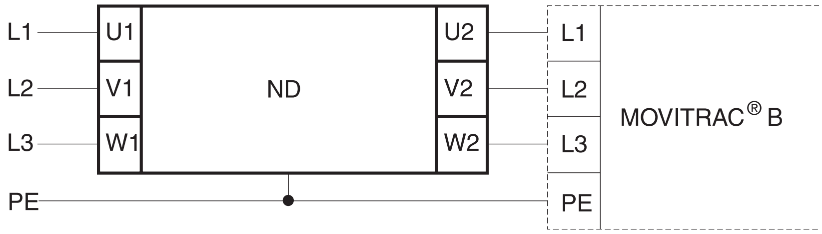
Permitted mounting positions

Grid resistor, frame resistor	Wire resistor	Flat type resistor
	 18512455307	 18512457739

The BW003-420-T and BW1.0-170 braking resistors may only be used in position 1.

10.2.5 Line choke ND..

Connection of line choke type series ND..



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Installing optional power components

Line contactor for multiple devices

Connect a line choke for limiting the inrush current:

- With 5 or more 3-phase devices
- With 2 or more 1-phase devices

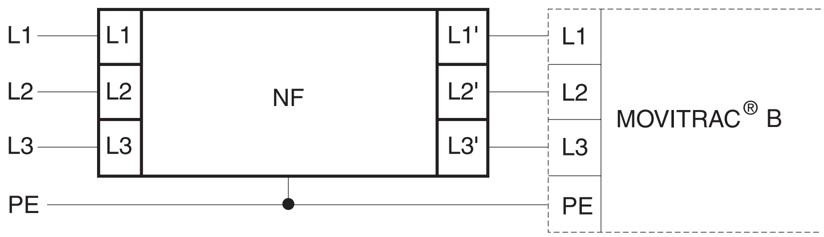
10.2.6 NF.. line filter

- With the NF.. line filter, you can comply with limit value class C1/B for MOVITRAC® B size 0 – 5.
- ⚠ **CAUTION!**
  Possible damage to property:

  Destruction of the input stage.

  – Do not switch between the line filter and MOVITRAC® B.
- Install the line filter close to the inverter but outside the minimum clearance for cooling.
- Limit the cable between the line filter and the inverter to the absolutely necessary length, max. 400 mm. Unshielded, twisted cables are sufficient.
- Also use unshielded cables for the supply system cable.

Connection of line filter NF..



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Line filters

MOVITRAC® B frequency inverters have a line filter installed as standard up to 11 kW. They comply with the following limit value class according to EN 61800-3 on the supply system side without further measures:

- 1-phase connection: C1 wired
- 3-phase connection: C2

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The EMC limit values for interference emission are not specified for voltage supply systems without grounded star point (IT systems). The efficiency of line filters is severely limited.

10.2.7 ULF11A folding ferrites

Insert the supply cable (L and N) into the folding ferrite and press the folding ferrite together until it snaps into place.

Compliance with the EMC limit value class C1 has been proven on the specified test setup. Compliance with class C1 for interference emission is achieved by the professional installation of the folding ferrite ULF11A.

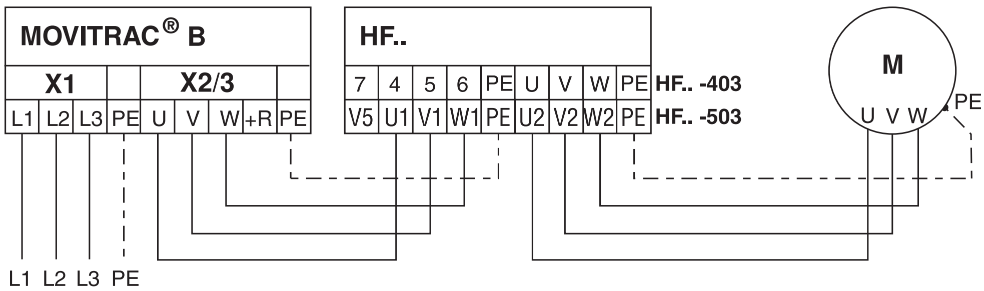
10.2.8 HF.. output filter

INFORMATION

Install the output filter next to the corresponding inverter. Maintain a ventilation clearance of at least 100 mm above and below the output filter; a lateral clearance is not necessary.

- Limit the cable between the inverter and the output filter to the absolutely necessary length. Maximum 1 m for unshielded cable and 10 m for shielded cable.
- You can connect several motors together to an output filter during operation of a motor group on an inverter. The sum of the rated motor currents must not exceed the nominal throughput current of the output filter.
- The parallel connection of 2 identical output filters to an inverter output to double the nominal throughput current is permitted. Switch all connections of the same name in parallel on the output filters to do so.
- If you operate the inverter with f_{PWM} = 4 or 8 kHz, you must not connect the output filter V5 (for HF..-503) or 7 (for HF..-403).
- You must not make a VDCL connection for devices of size 0XS.

Connection of output filter HF.. without V_{DCL} connection (PWM frequency only 4 or 8 kHz)



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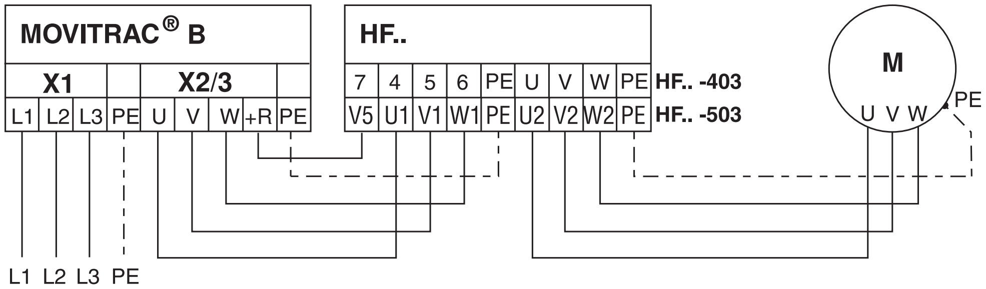
Connection of output filter HF.. with V_{DCL} connection (PWM frequency only 12 or 16 kHz)



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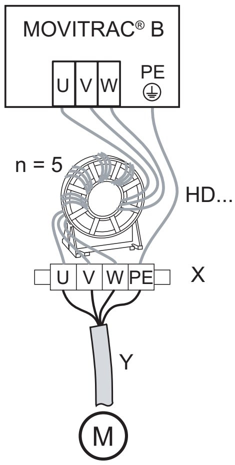
10.2.9 HD.. output choke

- Install the output choke near the MOVITRAC® B outside the minimum free space.
- Always route all 3 phases (not PE) together through the output choke.
- With a shielded cable, you must not feed the shield through the output choke.

  With the HD.. output choke, you must feed the cable through the choke 5 times.



If the cable diameter is large, you can use fewer than 5 windings and connect 2 or 3 output chokes in series. SEW-EURODRIVE recommends connecting 2 output chokes in series for 4 windings and 3 output chokes in series for 3 windings.

- Installation of output choke HD012:

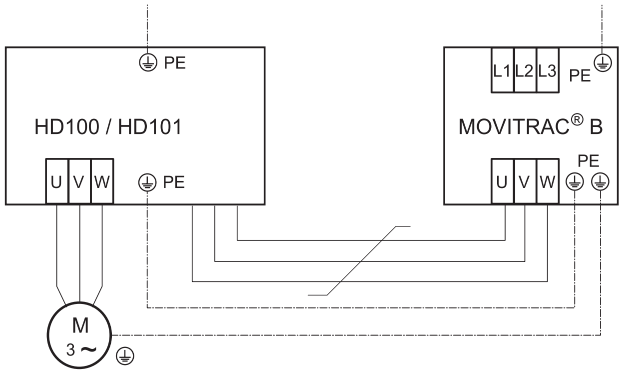
  Install the output choke under the corresponding inverter. Maintain a ventilation clearance of at least 100 mm above and below the output choke. Allow a clearance of 10 mm at each side.

  There are 3 marked alternative connection options for connecting the protective earth. You can connect the PE line of the motor cable directly to the frequency inverter.

Installation of output choke HD100 / HD101

Mount the HD100/HD101 output choke together with the MOVITRAC® B frequency inverter on the conductive installation surface in the control cabinet using the supplied screws.

The U / V / W connections are labeled U / V / W and must be connected accordingly.



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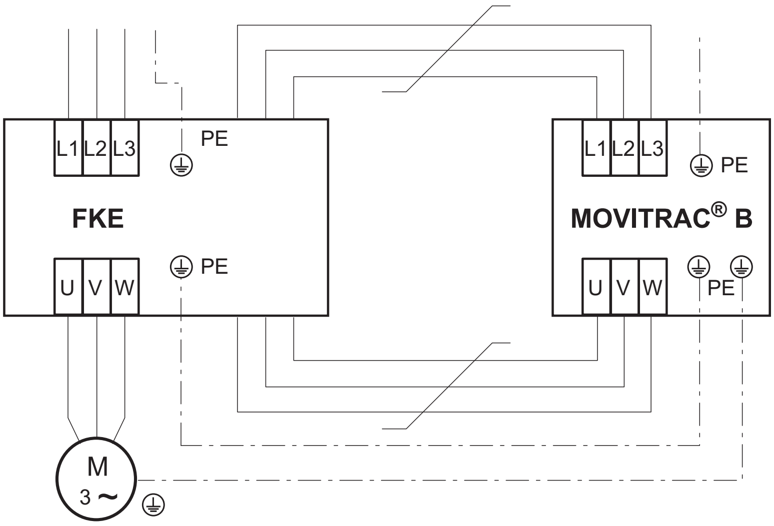
10.2.10 EMC module FKE12B / FKE13B

Mount the EMC module together with the MOVITRAC® B frequency inverter on the conductive installation surface in the control cabinet using the screws supplied.

The U / V / W connections are labeled U / V / W and must be connected accordingly.

The connections L1 / L2 / L3 (brown/orange/white) can be connected in any order.



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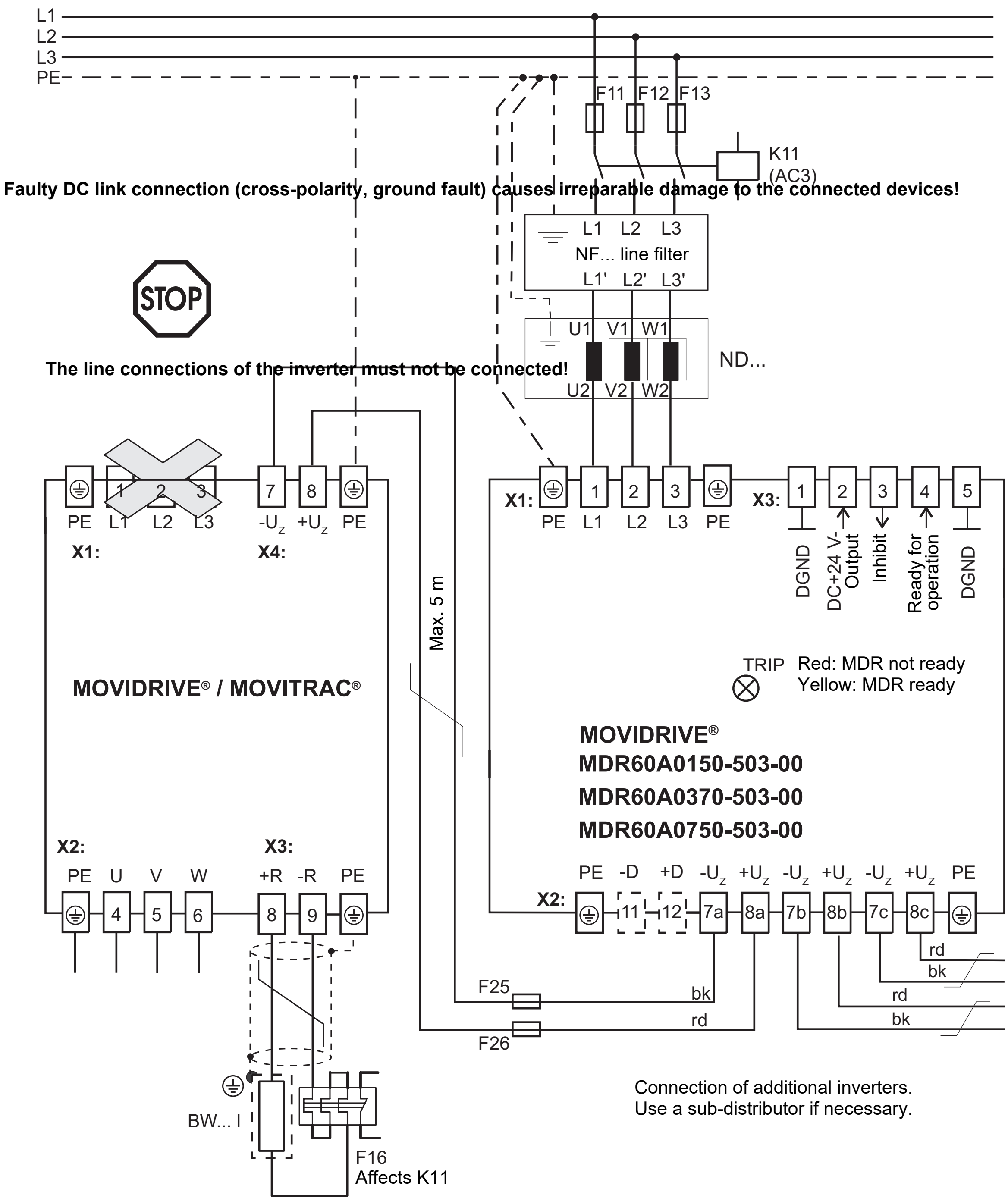
10.2.11 Connection of the regenerative power supply unit

DC link connection with MDR60A0150/0370/0750 regenerative power supply unit



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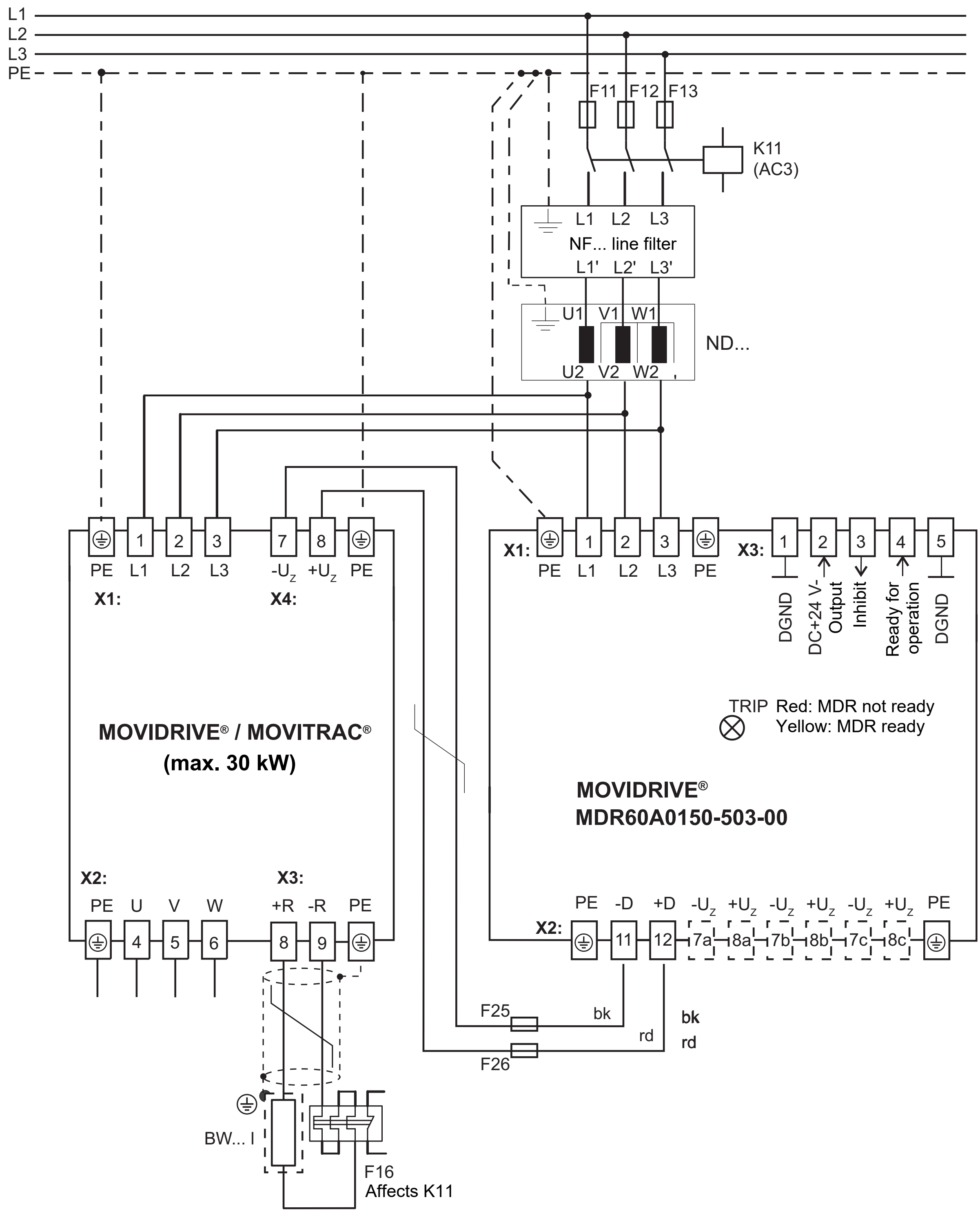
DC link connection with MDR60A0150 regenerative power supply unit with brake module function



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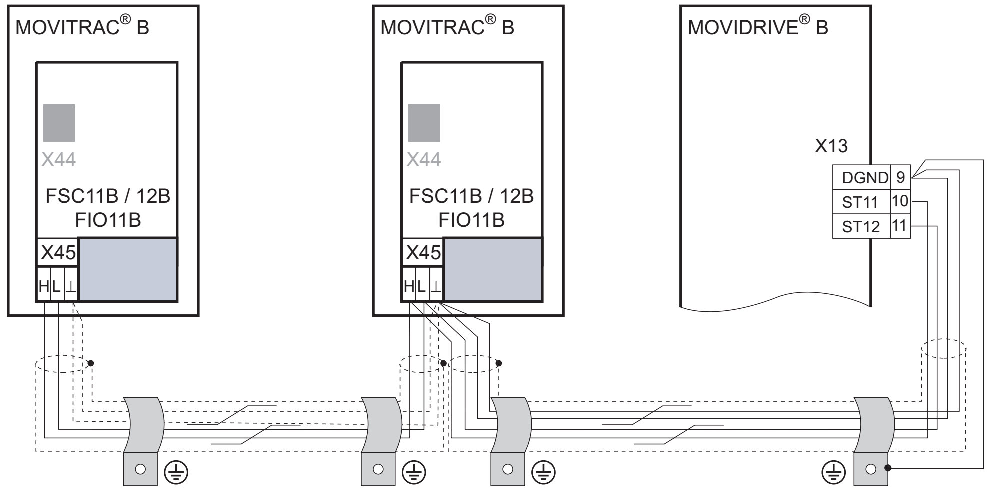
10.2.12 Connection of RS485 interface

Installation of RS485 interface on FSC11B/12B

You can use the RS485 interface to connect a maximum of 32 devices from MOVITRAC® B with each other.

RS485 connection of MOVITRAC® B



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INFORMATION

Terminating resistor: Dynamic terminating resistors are permanently installed. **Do not connect any external terminating resistors.**

Cable length

- The total permissible cable length is 200 m.
- You must use shielded cable.

10.2.13 System bus connection (SBus 1)

Installing system bus (SBus) to FSC11B/12B/FIO21B

Max. 64 CAN bus stations can be addressed via the system bus (SBus). The SBus supports transmission technology in accordance with ISO 11898.

A terminating resistor of 120 Ω can be added via DIP switch S1 or S1:8 (bus termination).

With the FSC11B, the continuing CAN is also disconnected via X46:4;:5.

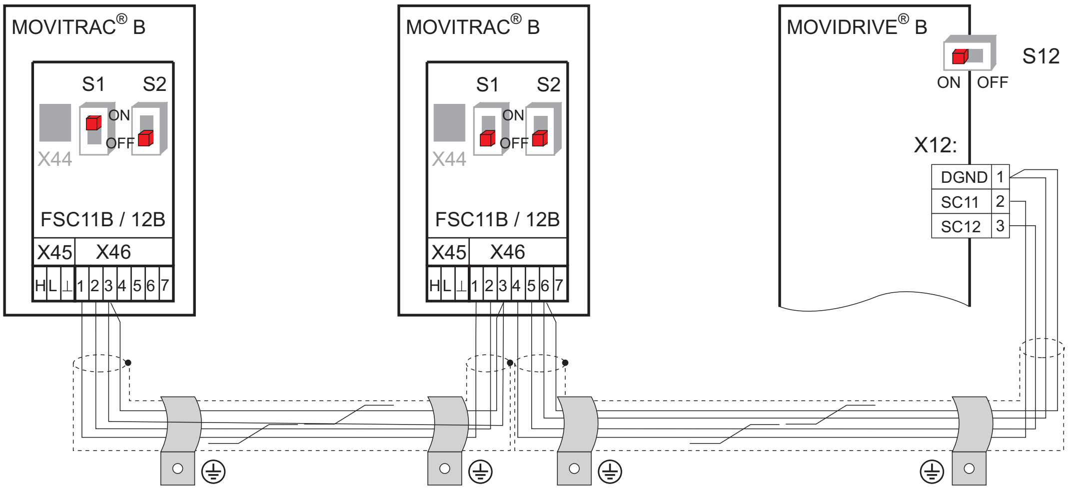
The FIO21B does not have an integrated switchable terminating resistor of 120 Ω; the enclosed resistor must be connected between X46:1 and X46:2 for bus termination.

FSC11	FSC12	FSC11/12	FSC11	FSC12
S1	**S1:8**	**X46:1;:2**	**X46:4;:5**	**X46:4;:5**
Off		CAN 1	CAN 1	CAN 1
On		CAN 1 disconnected	–	CAN 1 disconnected

S2 is reserved on the FSC11B and must always be set to "Off".

A connection cable for the system bus connection is supplied with MOVITRAC® B with built-in option card (not with FIO21B).

System bus connection of MOVITRAC® B



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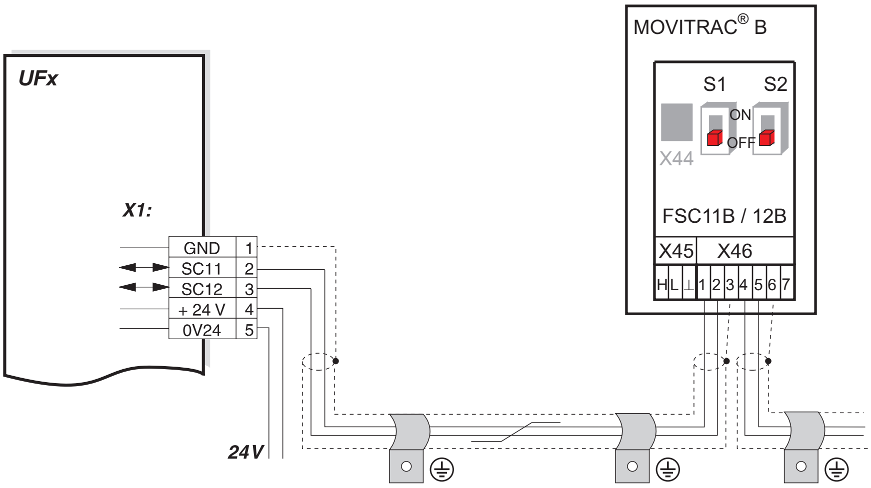
System bus connection of MOVITRAC® B with UFx



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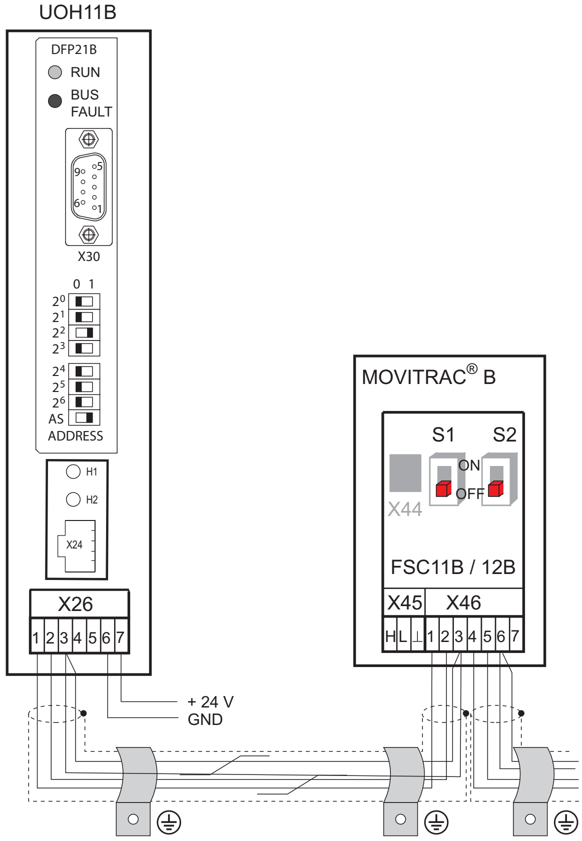
System bus connection of MOVITRAC® B with DFx/UOH11B gateways or DFx installed in MOVITRAC® B



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- The total permissible cable length depends on the set SBus baud rate (*P884*):
  - 125 kB: 500 m
  - 250 kB: 250 m
  - **500 kB: 100 m**
  - 1000 kB: 25 m
- You must use shielded conductors.

INFORMATION

- Terminating resistor: Connect the system bus terminating resistor at the beginning and end of the system bus connection (S1 = ON). For the devices in between, switch off the terminating resistor (S1 = OFF).
- Certain devices have a permanently integrated terminating resistor that cannot be switched off. This is the case with the UFx and DFx/UOH gateways; these gateways form one end of the physical phase. **Do not connect any external terminating resistors.**

Cable specification

Use a 4-core, twisted and shielded copper cable (data transmission cable with braided copper shield). The cable must meet the following specifications:

- Core cross section 0.25 – 0.75 mm^2

- Line resistance 120 Ω at 1 MHz
- Capacitance per unit length ≤ 40 pF/m at 1 kHz

CAN bus or DeviceNet cables, for example, are suitable.

Applying the shield

- Fasten the shield to the electronics shield clamp on the inverter and the master controller and make sure it is connected over a wide area at both ends.
- When making a connection between MOVIDRIVE® B and MOVITRAC® B, always ensure that the electrical isolation between the reference potential DGND and ground at MOVIDRIVE® B is removed.

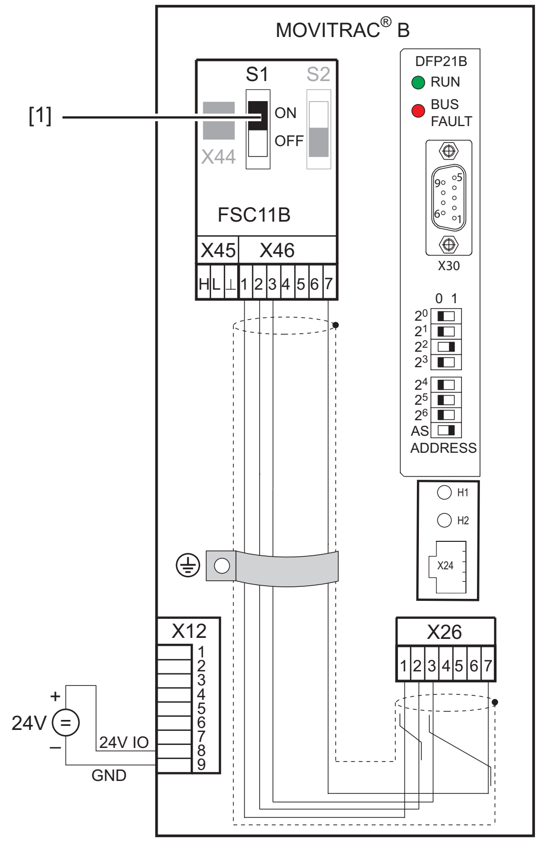
Connecting the system bus (SBus) to DFP21B

Installing the DFP21B option card in MOVITRAC® B

INFORMATION

- The MOVITRAC® B does not require a special firmware status.
- Only SEW-EURODRIVE is allowed to install or remove the option cards for MOVITRAC® B.

SBus connection



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[1] Terminating resistor activated, S1 = ON

INFORMATION

The DFP21B has an integrated SBus terminating resistor and must therefore always be installed at the beginning of the system bus connection.

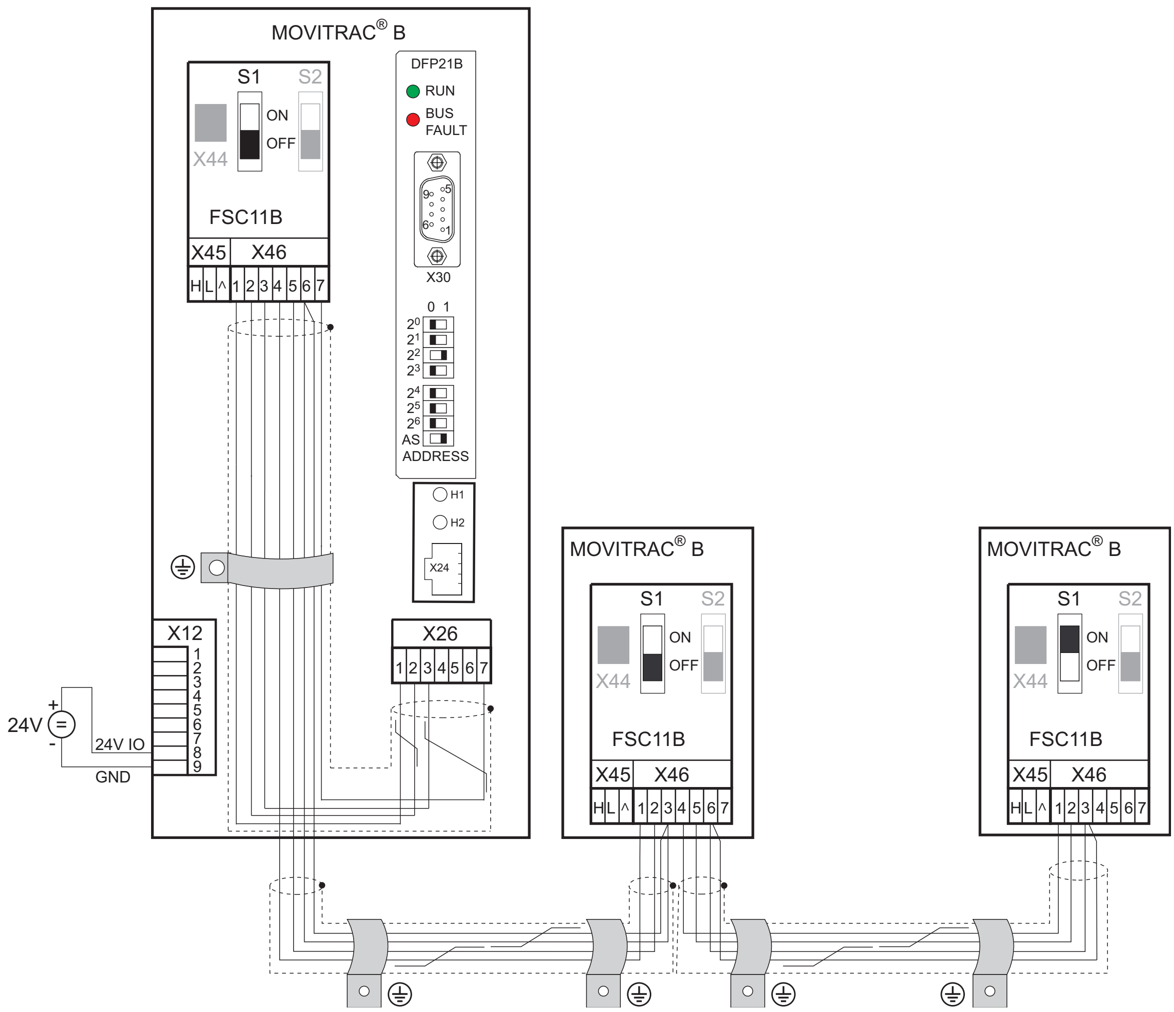
The DFP21B always has the address 0.

X46	X26	
X46:1	X26:1	SC11 SBus +,CAN high
X46:2	X26:2	SC12 SBus -, CAN low
X46:3	X26:3	GND, CAN GND
X46:7	X26:7	DC 24 V
X12		
X12:8	+24 V input	
X12:9	GND reference potential of digital inputs	

For easy cabling, the DFP21B can be supplied with 24 V DC voltage from X46.7 of the MOVITRAC® to X26.7.

If the DFP21B is supplied by MOVITRAC®, the MOVITRAC® itself must be supplied with 24 V DC voltage at terminals X12.8 and X12.9.

System bus connection



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DFP
GND = system bus reference
SC11 = system bus high
SC12 = system bus low

MOVITRAC® B
GND = system bus reference
SC22 = system bus outgoing low
SC21 = system bus outgoing high
SC12 = system bus incoming low
SC11 = system bus incoming high
S12 = system bus terminating resistor

Note:

- Use a 4-core, twisted and shielded copper cable (data transmission cable with braided copper shield). Connect the shield flatly on both sides of the electronics shield clamp of the MOVITRAC® and also connect the ends of the shield to GND. The cable must meet the following specifications:
  - Core cross section 0.25 – 0.75 mm^2
  - Line resistance 120 Ω at 1 MHz
  - Capacitance per unit length ≤ 40 pF/m at 1 kHz
- The permitted total cable length depends on the set SBus baud rate:
  - 250 kB: 160 m
  - 500 kB: 80 m
  - 1000 kB: 40 m
- Switch on the system bus terminating resistor at the end of the system bus connection (S1 = ON). Switch off the terminating resistor on the other devices (S1 = OFF). The DFP21B gateway must always be at the beginning or end of the system bus connection and has a terminating resistor permanently installed.

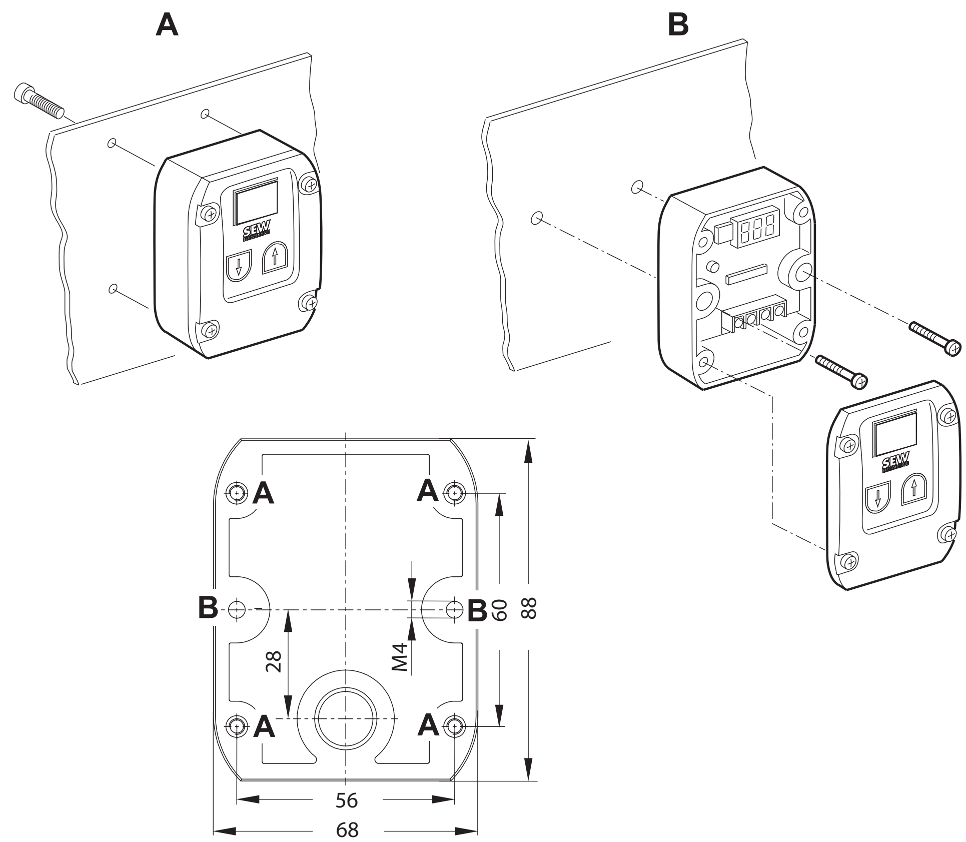
INFORMATION

- There must be no potential shift between the devices that are connected with SBus. Take suitable measures to avoid potential shift, e.g. by connecting the device grounds using a separate cable.
- Star-shaped wiring is not permitted.

10.2.14 Setpoint adjuster connection

Installing the MBG11A setpoint adjuster

- A: Installation from behind via 4 tapped holes
- B: Installation from the front via 2 mounting holes



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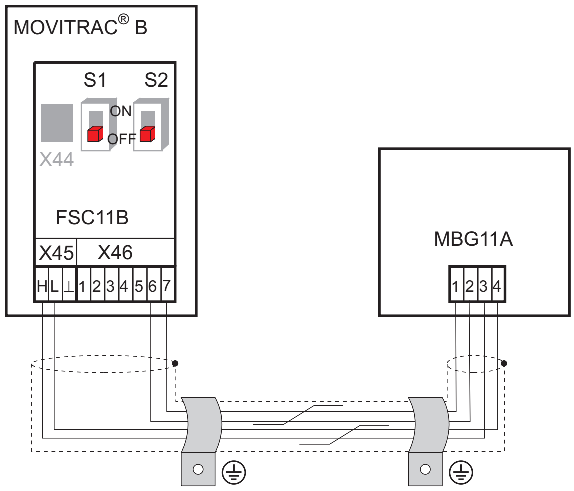
Connection



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10.2.15 Connection of the interface adapter option UWS21B

Part number

UWS21B interface adapter option: 18204562

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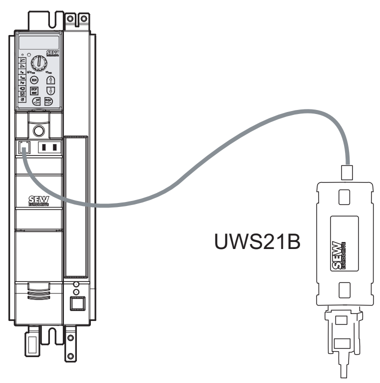
Scope of delivery

The scope of delivery for the UWS21B option includes:

- UWS21B device
- Serial interface cable with 9-pin D-sub socket and 9-pin D-sub connector for connection of UWS21B – PC
- Serial interface cable with two RJ10 connectors for connection of UWS21B – MOVITRAC®

Connecting inverter and UWS21B

- Use the connection cable supplied to connect the UWS21B to the MOVITRAC®.
- Connect the connection cable to the XT slot of the MOVITRAC®.
- Note that the DBG60B keypad and the UWS21B serial interface cannot be connected to the MOVITRAC® at the same time.
- The following image shows the connection cable for MOVITRAC® – UWS21B.



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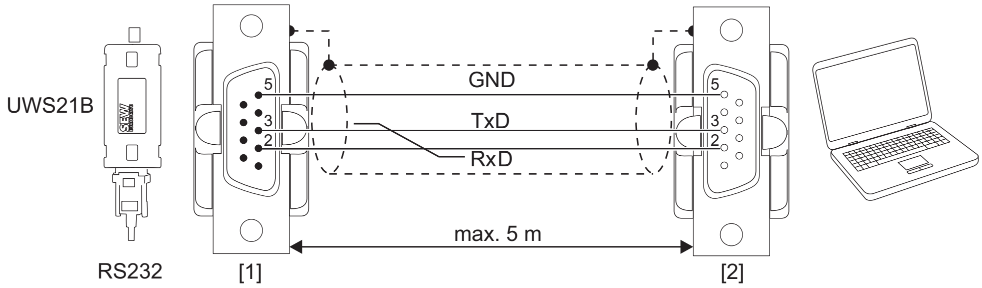
Connecting inverter and PC

- Use the connection cable supplied (shielded RS232 standard interface cable) to connect the UWS21B to the PC.
- The following picture shows the connection cable for UWS21B – PC (1:1 connection).



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[1] 9-pin D-sub connector
[2] 9-pin D-sub socket

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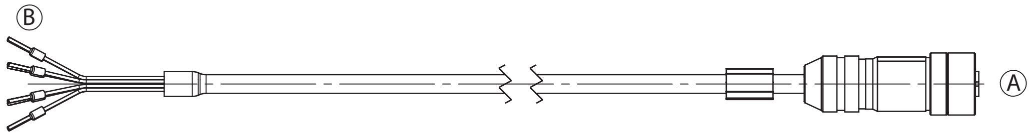
10.2.16 Built-in encoder EI7C connection

Encoder cable with an M12



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Inverter connection			Motor connection side
Contact	**Signal**	**Cable core color**	**Contact**
X12.5 (DI04)	A	Brown (BN)	3
	A	White (WH)	4
X12.4 (DI03)	B	Yellow (YE)	5
	B	Green (GN)	6
	nc	Red (RD)	7
	nc	Blue (BU)	8
X12.8 (24VIO)	UB	Gray (GY)	1
X12.9 (GND)	GND	Pink (PK)	2

The encoder requires a current of up to 40 mA. An external 24 V supply might be required if the digital inputs are also supplied.

Part number:

Cable type	M12, conductor end sleeves
Fixed installation	1362 3273
Cable carrier installation	1362 3281

Further information can be found in the chapter "Simple positioning application module" (→ 🗎 185).

10.2.17 Line protection and earth-leakage circuit breaker

- Install the fuses at the beginning of the supply system cable behind the busbar branch (see wiring diagram for basic device).
- SEW-EURODRIVE recommends that you do not use residual current devices. However, if a residual current device (RCD) is stipulated for direct or indirect protection against contact, observe the following:
- ⚠ **DANGER!** Wrong type of residual current device used:

  Severe or fatal injuries

  – The MOVITRAC® B can cause a direct current in the protective earth conductor. Where a residual current device (RCD) or a residual current monitoring device (RCM) is used for protection in the event of direct or indirect contact, only a type B RCD or RCM is permitted on the power supply side of the MOVITRAC® B.

10.2.18 TF thermistor and TH bimetallic switch

The winding temperature is monitored with thermal sensors TF or bimetallic switches TH. Connect TF or TH to the TF output VOTF and TF input DI05TF of the MOVITRAC® B. Set the digital input DI05TF to TF message. Thermal monitoring is then carried out by the MOVITRAC® B; no additional monitoring device is required.

TH bimetallic switches can also be connected to 24 V IO and a digital input. Parameterize the digital input to "/External fault".

10.2.19 Brake rectifier connection

INFORMATION

A separate supply system cable is required to connect the brake rectifier. Supply via the motor voltage is not permitted.

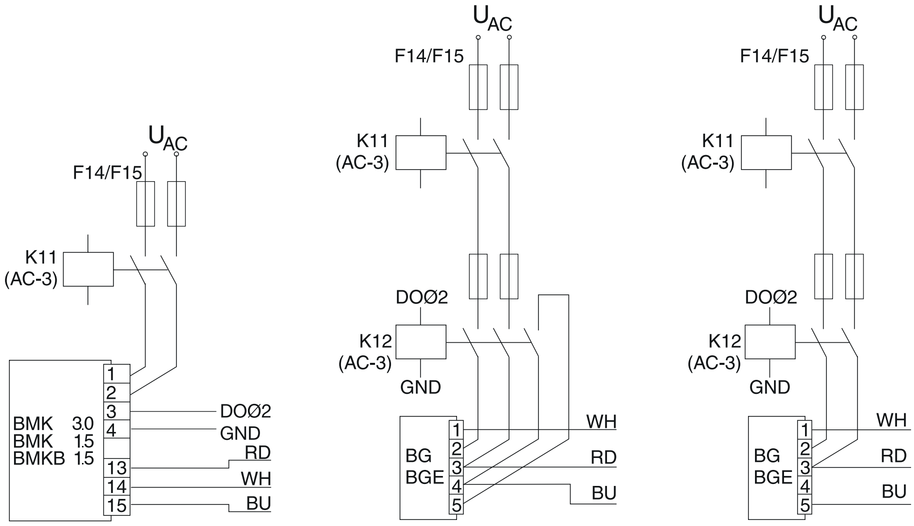
Only use contactors of utilization category AC-3 for K11 and K12.

Use cut-off in the AC and DC circuit for the brake on:

- All hoist applications.
- Drives that require a fast brake response time.

When installing the brake rectifier in the control cabinet: Lay the connection cables between the brake rectifier and brake separately from other power cables. Laying together with other cables is only permitted if the other cables are shielded.

Wiring diagrams



Cut-off in the AC and DC circuit | Cut-off in the AC and DC circuit | Cut-off in the AC circuit

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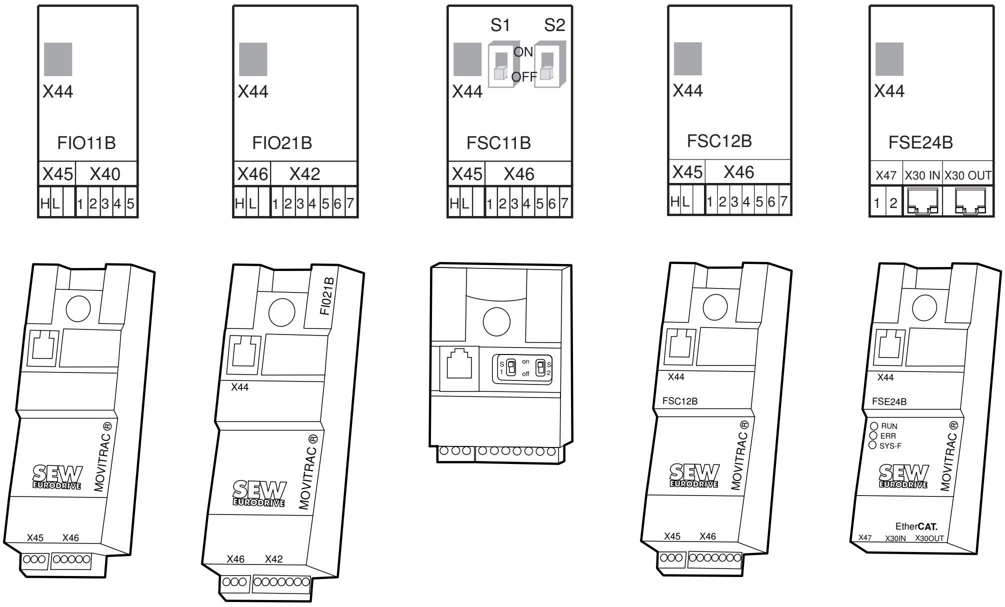
Observe the respective connection regulations for brakes without BG/BGE or BME. Detailed information on SEW-EURODRIVE brakes can be found in the documentation "Drive Engineering – Practical Implementation: SEW disk brakes".

10.2.20 Installation of FIO11B/21B, FSC11B/12B, FSE24B

You can expand the basic devices with the FIO11B/21B, FSC11B/12B and FSE24B modules.



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Connection/module type	FIO11B	FIO21B	FSC11B/12B	FSE24B
	Analog module	**Digital module**	**Communication**	**Communica-tion**
Analog input/output X40	Yes	No	No	No
Digital inputs X42	No	Yes	No	No
RS485 for diagnostics (RJ10) X44	Yes	Yes	Yes	Yes
RS485 terminal connection X45	Yes	No	Yes	No
SBus terminal connection X46	No	Yes	Yes	No
EtherCAT® connection (2 ×RJ45) X30	No	No	No	Yes

Fastening and installation of front modules

Always screw the option to the device using the screw provided. For size 0, first fit the spacer bolt. From size 1, the bolt is already present. The screw fitting ensures the high-frequency EMC connection between the basic device and the option.

Function	Terminal	Description	Data	FIO11B	FIO21B	FSC11B/12B	FSE24B
Service interface	X44	Via RJ10 plug-in connection	For service purposes only Maximum cable length 3 m	Yes	Yes	Yes	Yes
RS485 interface	X45:H	ST11: RS485+	Connected in parallel with X44	Yes	No	Yes	No
	X45:L	ST12: RS485-					
	X45:'	GND: Reference potential					
System bus	X46:1	SC11: SBus High	CAN bus to CAN specification 2.0, parts A and B Max. 64 stations	No	Yes[1)]	Yes[2)]	No
	X46:2	SC12: SBus Low					
	X46:3	GND: Reference potential					
	X46:4	SC21: SBus High		No	No	Yes[3)]	No
	X46:5	SC22: SBus Low					
	X46:6	GND: Reference potential					
DC 24 V	X46:7	24VIO: Auxiliary voltage / external voltage supply		No	No	Yes	No

Function	Terminal	Description	Data	FIO11B	FIO21B	FSC11B/ 12B	FSE24B
DC 24 V	X47:1	24VIO: External voltage supply		No	No	No	Input only
	X47:2	GND: Reference potential					
EtherCAT®	X30:In	Via 2 RJ45 plug-in connections	Fast Ethernet	No	No	No	Yes
	X30:Out						
Analog input	X40:1	AI2: Voltage input	-10 to +10 V R_i > 40 kΩ Resolution 10 bits Sampling cycle 5 ms Accuracy ±100 mV	Yes	No	No	No
	X40:2	GND: Reference potential					
Analog output	X40:3	GND: Reference potential	0 to +10 V I_{max} = 2 mA 0 (4) – 20 mA Resolution 10 bits Sampling cycle 5 ms Short-circuit and supply-proof up to 30 V Accuracy ±100 mV	Yes	No	No	No
	X40:4	AOV1: Voltage output					
	X40:5	AOI1: Current output					
Digital inputs	X42:1	DI10	R_i = 3 kΩ, I_E = 10 mA, Sampling cycle 5 ms, PLC-compatible	No	Yes	No	No
	X42:2	DI11					
	X42:3	DI12					
	X42:4	DI13					
	X42:5	DI14					
	X42:6	DI15					
	X42:7	DI16					

1) Bus termination possible with enclosed 120 Ω resistor between SC11 and SC12.
2) Terminating resistor 120 Ω switchable via DIP switch, SC21 and SC22 are then deactivated.
3) Terminating resistor 120 Ω switchable via DIP switch.

The potential DC 24 V of X46:7 and X47:1 is identical to X12:8 of the basic device. All GND terminals of the device are connected to each other and to PE.

Cable specification	• Use a 4-core, twisted and shielded copper cable (data transmission cable with braided copper shield). The cable must meet the following specifications: – Core cross section 0.25 – 0.75 mm² – Line resistance 120 Ω at 1 MHz – Capacitance per unit length ≤ 40 pF/m at 1 kHz CAN bus or DeviceNet cables, for example, are suitable.
Apply shield	• Fasten the shield to the electronics shield clamp on the inverter and the master controller and make sure it is connected over a wide area at both ends. • With a shielded cable, you can dispense with a ground connection for a connection between MOVITRAC® B and gateways or MOVITRAC® B and MOVITRAC® B. A 2-core cable is permissible in this case. • When making a connection between MOVIDRIVE® B and MOVITRAC® B, always ensure that the electrical isolation between the reference potential DGND and ground at MOVIDRIVE® B is removed.

- ⚠ **CAUTION!** Potential shift

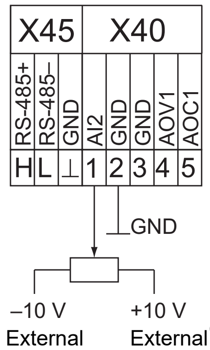
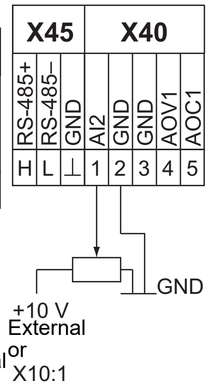
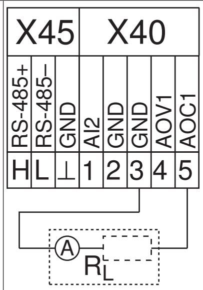
  Possible consequences include malfunction or even destruction of the device.

  – There must be no potential shift between the connected devices. Take suitable measures to avoid potential shift, e.g. by connecting the device grounds using a separate cable.

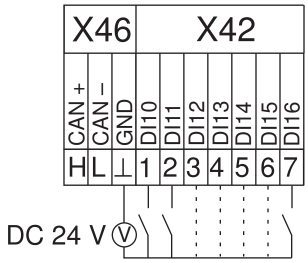
INFORMATION

The FIO21B and FSE24B front modules require a 24 V voltage supply. If no external voltage supply is connected, parameter *P808 24VIO auxiliary voltage output* must not be switched off.

Wiring the FIO11B analog module

Analog input AI1		Analog output AO1	
Bipolar	**Unipolar**	**Current output AOC1**	**Voltage output AOV1**
			
			$R_L \leq 750\ \Omega$

FIO21B digital module wiring



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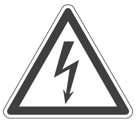
11 Startup

11.1 General startup instructions



⚠ DANGER

Uncovered power connections.

Severe or fatal injuries due to electric shock.

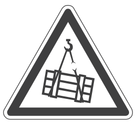
- Install the touch guard in accordance with the regulations.
- Never start up the device if the touch guard has not been installed.

11.1.1 Requirements

The prerequisite for successful startup is the correct configuration of the drive.

MOVITRAC® B frequency inverters are factory-commissioned for the power-adapted SEW-EURODRIVE motor (4-pole, 50 Hz) in V/f control mode. This means you can commission and start the adapted motor from SEW-EURODRIVE without configuration.

11.1.2 Hoist applications



⚠ DANGER

Danger of fatal injury due to falling hoist.

Severe or fatal injuries.

- Use monitoring systems or mechanical protection devices as a safety device.

11.2 Preliminary work and resources

- Check the installation.

⚠ DANGER

Risk of crushing if the motor starts up unintentionally.

Severe or fatal injuries.

- Ensure that the motor cannot start unintentionally, by removing the X12 electronics terminal block for example.
- Depending on the application, additional safety precautions must be taken to avoid injury to personnel and damage to machines, e.g. monitoring systems or mechanical protection devices.

11.2.1 Preliminary work and tools for startup with factory setting

- Connect the supply system and motor.
- Connect the signal terminals.
- Switch on the supply system.

11.2.2 Preliminary work and tools for startup with keypad or with PC

- Connect the supply system and motor. **Do not connect any signal terminals so that the inverter cannot receive an enable signal.**
- Switch on the supply system.
- Display `Stop`.
- Program the signal terminals.
- Set the parameters (e.g. ramps).
- Check the set terminal assignment (*P601 – P622*).
- Switch off the supply system.
- Connect the signal terminals.
- Switch on the supply system.

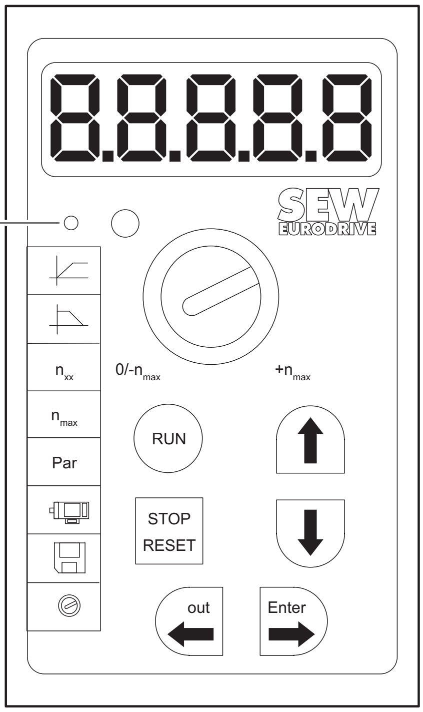
INFORMATION

When you perform a startup, the inverter automatically changes parameter values.

11.3 Keypads

11.3.1 FBG11B – Basic keypad

Arrangement of the buttons and pictograms on the operator panel:

[1]


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[1] LED display when IPOS$^{plus®}$ program is started

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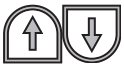
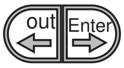
Keypad functions

The UP/DOWN/OUT/ENTER buttons are used for menu navigation. The RUN and STOP/RESET buttons are used to control the drive. The setpoint adjuster is used for setpoint input.

		UP/DOWN to select the symbols and change values.
		OUT/ENTER to activate and deactivate the symbols or parameter menus
		RUN to start the drive.
		STOP/RESET to reset errors and stop the drive.

The STOP/RESET button has priority over a terminal enable or an enable via interface. If you stop a drive with the STOP/RESET button, you must enable it again with the RUN button.

INFORMATION

After power off, the interlocking is canceled by the STOP/RESET button.

After an error has occurred and the programmed error response, you can perform a reset using the STOP/RESET button. The drive is then locked and you must enable it with the RUN button. You can use parameter *P760* to deactivate the stop function via FBG11B.

If you stop the drive with the STOP/RESET button, the display flashes `Stop`. This indicates that you must enable the drive with the RUN button.

After copying the parameter set to the inverter, the device is also stopped.

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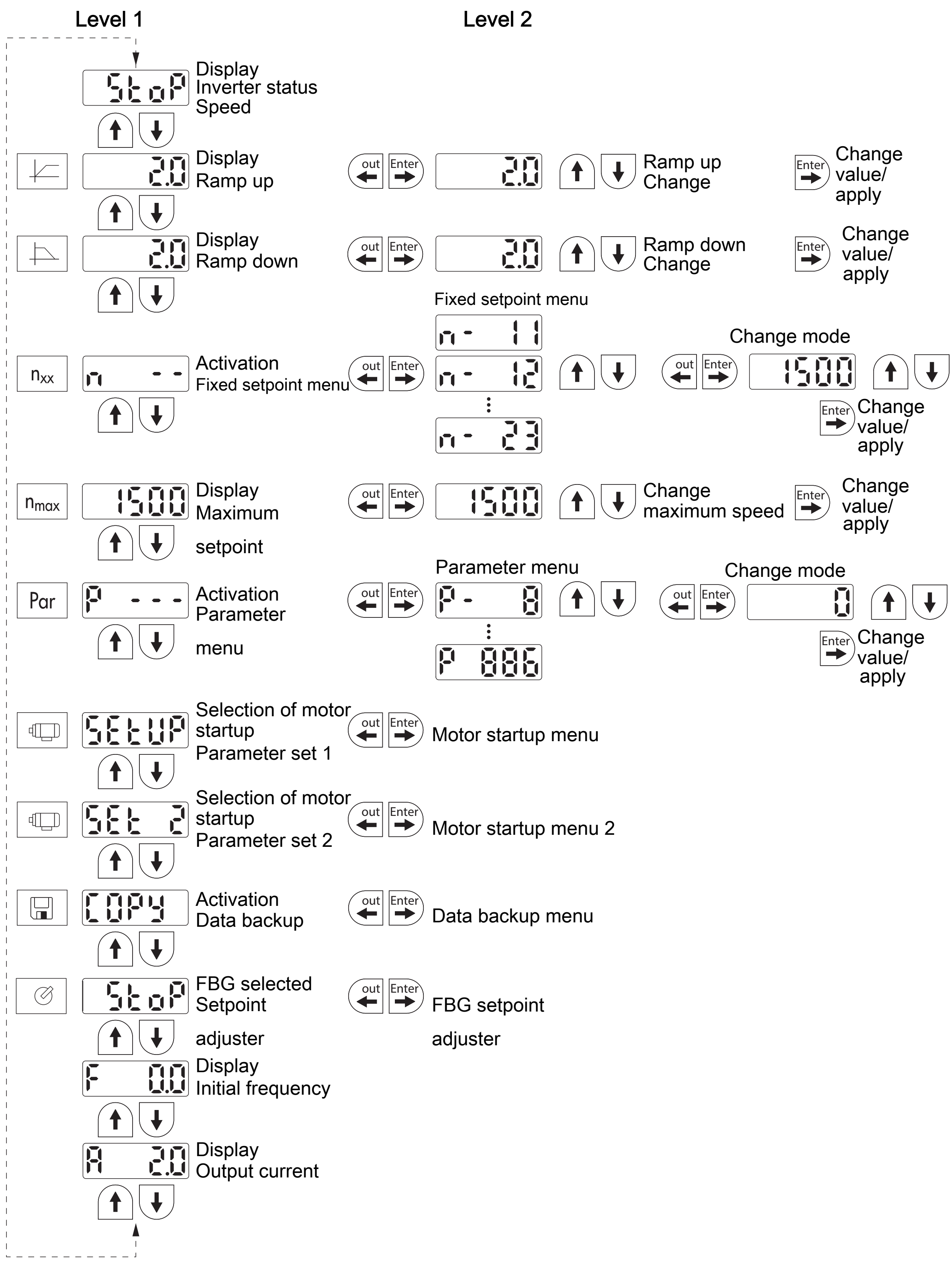
Basic operation of the FBG11B keypad



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Menu system

When you select a symbol, the LED integrated in the symbol lights up. With icons that only represent display values, the current display value appears on the display.

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Changing parameters

After selecting a symbol and pressing the ENTER key, you can select the desired parameter.

To change the parameter value, press the ENTER key once again. The flashing of the value and the LED in the corresponding symbol indicates that you can now change the value. Push the ENTER key once more and the value becomes active and stops flashing.

Status display

If the status is "Drive enabled", the display shows the calculated actual speed.

Fault display

If an error occurs, the display changes and flashes with the error code, e.g. `F-11`, see error list in chapter "Service/error list" (→ 🗎 369). However, this is not the case when startup is active.

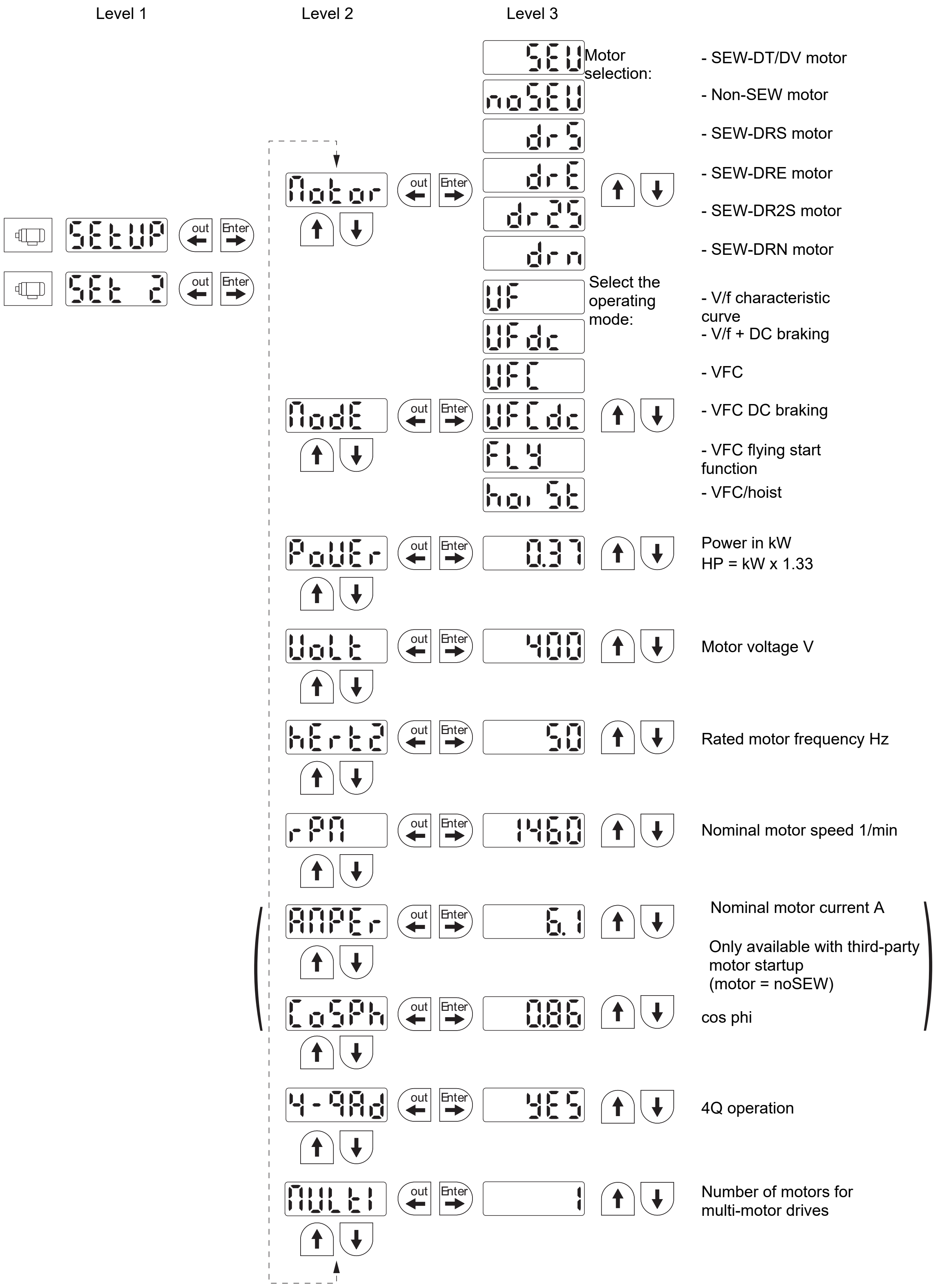
Warnings

Some parameters are not allowed to be changed in all operating states. If you try it anyway, the following is displayed `r-19` – `r-32`. The display shows a code corresponding to the respective action, e.g. `r-28` (controller inhibit required). You can find the list of information in the chapter "Operation" (→ 🗎 358).

Parameter menu change short ↔ long

You can switch between the quick menu and complete menu via the parameter *P800*. The parameter description and parameter list indicate which parameters are accessible via the short and long menus.

Startup using the FBG11B keypad



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Required data

The following data is required for successful startup:

- Motor type (SEW motor or third-party motor)
- Motor data
  - Nominal voltage and nominal frequency.
  - Additionally with third-party motor: Nominal current, nominal power, power factor cosφ and nominal speed.
- Nominal line voltage

Activating startup

Requirements:

- Drive "No enable": `Stop`

If you connect a smaller or larger motor (maximum one type step difference), you must select the value that comes closest to the rated motor power.

The complete startup is only completed when you return to the main menu level with the OUT button.

INFORMATION

The SEW-EURODRIVE motor startup is designed for 4-pole motors. It might be advisable to commission 2-pole or 6-pole SEW-EURODRIVE motors as third-party motors.

Multi-motor drive startup

Multi-motor drives are mechanically coupled to each other, e.g. chain drive with several motors.

Group drive startup

Group drives are mechanically decoupled from each other (e.g. different conveyor belts). In this operating mode, the inverter operates without slip compensation and with a constant V/f ratio.

Observe the information in the "MOVIDRIVE® multi-motor drives" manual.

Startup with large load mass moment of inertia, such as with pumps and fans

The slip compensation is designed for a ratio of load moment of inertia to motor moment of inertia of smaller than 10. If the ratio is greater and the drive vibrates, then the slip compensation must be reduced and possibly even set to 0.

Manual operation with FBG11B setpoint adjuster

FBG11B Setpoint adjuster of the operator panel (local manual mode): LED  flashes

The only relevant variables in the "FBG setpoint adjuster" operating mode are:

- *P122 Direction of rotation FBG manual mode*
- RUN key and STOP / RESET key
- Setpoint adjuster (potentiometer)

When the FBG setpoint adjuster is activated, the symbol flashes.

You can limit the minimum speed with *P301 Minimum speed* and the maximum speed with the symbol n_{max}.

After an error, you can perform a reset using the STOP / RESET key via the terminal or the interface. After the reset, the "manual setpoint adjuster" operating mode is active again. The drive remains stopped.

The display `Stop` flashes as an indication that you must re-enable the drive with the RUN key.

The parameter *P760 Interlocking RUN / STOP keys* is ineffective in the "manual setpoint adjuster" operating mode.

Removing FBG11B operator panel triggers a stop response.

11.3.2 Startup with DBG60B keypad

General information

Startup with the DBG60B keypad is only possible in operating modes VFC and V/f. Startup in CFC and SERVO operating modes is only possible using the MOVITOOLS® MotionStudio engineering software.

Required data

The following data is required to ensure startup is successful:

- Motor type (SEW-EURODRIVE or third-party motor)
- Motor data
  - Nominal voltage and nominal frequency.
  - Additionally for third-party motors: Nominal current, nominal power, power factor cos φ and nominal speed.
- Nominal line voltage

The following data is also needed for startup with a speed controller:

- Encoder type and encoder resolution:
- Motor data
  - SEW-EURODRIVE motor: Brake yes or no and flywheel fan (Z fan) yes or no.
  - Third-party motor: Mass moment of inertia of motor, brake and fan
- Stiffness of the closed-loop control system (factory setting = 1; suitable for most applications)

If the drive tends to oscillate → setting < 1

Transient recovery time is too long → setting > 1

Recommended setting range: 0.80 – 1 – 1.10 (factory setting = 1)

- Converted mass moment of inertia of the load (gear unit + driven machine) on the motor shaft.
- Time required for the shortest ramp

INFORMATION

- Activate encoder monitoring (P504 = "ON") after completing the startup. The function and voltage supply of the encoder will then be monitored.
- If a Hiperface® encoder is connected, it is always monitored regardless of the setting of parameter P504. Encoder monitoring is not a safety function!

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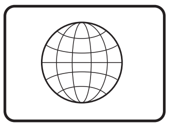
Choose the required language

The following text appears on the display when the keypad is switched on for the first time or after activating the start mode:

SEW

EURODRIVE

The symbol for language selection then appears on the display.



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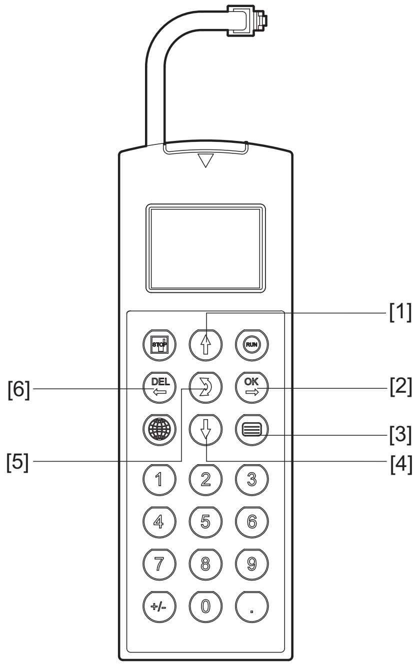
Proceed as follows to select the language:

- Press the key. A list of available languages is displayed on the screen.
- Choose the desired language using the ↑ / ↓ keys.
- Confirm your language selection by pressing the OK key. The basic display is now shown in your chosen language.

Startup

The figure below shows the keys required for startup.



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[1]	Key	↑	Move up to the next menu item
[2]	Key	OK	Confirm entry
[3]	Key		Activate the context menu
[4]	Key	↓	Move down to the next menu item
[5]	Key		Change the menu, display mode ↔ edit mode
[6]	Key	DEL	Cancel or abort startup

Startup procedure

INFORMATION

This example refers to a 400 V device from (MOVIDRIVE®).

1. Apply "0" signal to terminal X13:1 (DIØØ "/CONTROLLER INHIBIT"), e.g. by disconnecting electronics terminal block X13.
   - ⇨ 0.00 1/min
   - ⇨ 0.000 amp
   - ⇨ CONTROLLER INHIBIT
2. Activate the context menu by pushing the ☰ button.
   - ⇨ BASIC DISPLAY
   - ⇨ PARAMETER MODE
   - ⇨ VARIABLE MODE
3. Scroll down using the ↓ button until the menu item "STARTUP" is selected.
   - ⇨ MANUAL MODE
   - ⇨ STARTUP
   - ⇨ COPY TO DBG
   - ⇨ COPY TO MCB
4. Press the OK button to start the startup. The first parameter appears. The operator panel is in display mode, indicated by the flashing cursor under the parameter number.
   - ⇨ STARTUP IS BEING PREPARED
5. Use the ⤸ button to switch to edit mode. The flashing cursor disappears.
   - ⇨ C00*STARTUP
6. Use the ↑ button or the ↓ button to select "PARAMETER SET 1" or "PARAMETER SET 2".
   - ⇨ **PARAMETER SET 1**
   - ⇨ PARAMETER SET 2
7. Confirm your selection with the OK button.
8. Use the ⤸ button to switch back to display mode. The flashing cursor appears again.
9. Use the ↑ button to select the next parameter.
10. Set whether it is a single motor or group drive. Use the ↑ button to select the next parameter.
    - ⇨ C22*MOTORS
    - ⇨ **SINGLE MOTOR**
    - ⇨ IDENT. MOTORS
11. Set the desired operating mode. Use the ↑ button to select the next parameter.
    - ⇨ C26 OPERATING MODE1
    - ⇨ STANDARD V/F

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⇨ **VFC**

12. Set whether an encoder is to be evaluated. Use the ↑ button to select the next parameter.

⇨ C29*Encoder

⇨ **NO**

⇨ YES

13. Set the desired operating mode. Use the context menu button to select the next parameter.

⇨ C36*OPER. MODE

⇨ **SPEED CONTROL**

⇨ HOIST

14. Select the motor type. If the motor is not listed, select the list "THIRD-PARTY MOTOR".

⇨ C02*MOTOR TYPE 1

⇨ DRN80M42

⇨ **DRN90S4**

⇨ DRN90L4

15. Use the context menu button to select the next parameter.

⇨ C02*MOTOR TYPE 1

⇨ **THIRD-PARTY MOTOR**

⇨ DT63K4/DR63S4

16. Enter the nominal motor voltage for the selected connection type according to the motor's nameplate.

⇨ C03* V

⇨ NOMINAL MOTOR VOLT.1

⇨ 400 000

Example: Nameplate 230△ / 400☆ 50 Hz

⅄ circuit → Enter "400 V".

△ circuit → Enter "230 V".

The full torque up to 87 Hz is available in △ connection, as voltage reserves are present (400 V device). After startup, first set parameter P302 "MAXIMUM SPEED 1" to the value 87 Hz, then start the drive.

Example: Nameplate 400△/690☆ 50 Hz

△ circuit → Enter "400 V".

⅄ connection not useful. The motor would be subject to field weakening as of 28 Hz.

17. Use the ↑ button to select the next parameter.

11. Enter the nominal frequency specified on the motor nameplate. Example: 230△/400⅄ 50 Hz Enter "50 Hz" in ⅄ and △ circuit. Use the ↑ button to select the next parameter.	C04* Hz NOMINAL MOTOR FREQ.1 50 000

FOR SEW-MOTORS	
12. The motor values for 2 and 4-pole SEW motors are stored and do not need to be entered.	
FOR THIRD-PARTY MOTORS	
12. Enter the following motor nameplate data: • C10* Nominal motor current, observe connection type (⅄ or △). • C11* Nominal motor power • C12* Power factor cos φ • C13* Nominal motor speed Use the context menu button to select the next parameter.	C10 – C13 "Value"
13. Choose between 4Q or 2Q operation: select the next parameter using the context menu button.	C47*4Q OPERATION **NO** YES
14. Enter the nominal voltage of the supply system (C05* for SEW motor, C14* for third-party motor). Use the context menu button to select the next parameter.	C05*/C14* V NOMINAL SUPPLY VOLT. 400 000
15. If no TF/TH is connected to X10:1/2 or X15 → set "NO RESPONSE". If a TF/TH is connected, set the desired error response. To select the sensor, you must set *P530 Sensor type 1* after startup.	835* RESP.TF-MESS **NO RESPONSE** DISPLAY ERRORS
16. Start the calculation of the startup data with "YES". The process takes a few seconds.	C06*CALCULATION **NO** YES
FOR SEW-MOTORS	
17. The calculation is performed. Once the calculation has been completed, the system automatically switches to the next menu item.	C08*SAVE **NO** YES
FOR THIRD-PARTY MOTORS	
17. For third-party motors, a calibration process is necessary for the calculation: • When prompted, send a "1" signal to terminal X13:1 (DIØØ "/CONTROLLER INHIBIT"). • After the calibration process has been completed, return the "0" signal to terminal X13:1. • Once the calculation has been completed, the system automatically switches to the next menu item.	C46*Calibration procedure?→ Skip? Cxx*Calibrate?→ All DI to 0

18. Set "SAVE" to "YES". The data (motor parameters) are copied to the non-volatile memory of the MOVIDRIVE®.

STARTUP
DATA BEING
COPIED...

19. The startup is complete. Use the DEL key to return to the context menu.

MANUAL MODE
STARTUP
COPY TO DBG
COPY TO MDX

20. Scroll down using the ↓ button until the "EXIT" menu item is selected.

SIGNATUR.
EXIT
BASIC DISPLAY

21. Confirm with the OK button. The basic display appears.

0.00rpm
0.000Amp
CONTROLLER INHIBIT

Starting up the speed controller

Startup is performed without the speed controller first (→ section "Startup procedure, steps 1 through 17").

1. The selected operating mode is displayed. If the setting is correct, go to the next menu item.

C00*STARTUP
PARAMETER SET 2
VFC n-control

2. Select the correct encoder type.

C15*ENCODER TYPE
INCREM. ENCOD. TTL
SINE ENCODER
RESERVED

3. Set the correct encoder resolution.

C16*ENC. RESOLUT.
512 inc
1024 inc
2048 inc

FOR MOTORS FROM SEW-EURODRIVE

4. Enter whether the motor has a brake.

C17*BRAKE
WITHOUT
WITH

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5. Set the stiffness of the closed-loop control system. If the drive tends to oscillate → setting < 1 Transient recovery time is too long → setting > 1 Recommended setting range: 0.90 – **1** – 1.10	C18* STIFFNESS 1.000
6. Enter whether the motor has a flywheel fan (Z fan).	C19*Z FAN **WITHOUT** WITH
FOR THIRD-PARTY MOTORS	
4. Enter the moment of inertia of the motor.	D00* J0 OF THE MOTOR 4.600
5. Set the stiffness of the closed-loop control system. If the drive tends to oscillate → setting < 1 Transient recovery time is too long → setting > 1 Recommended setting range: 0.90 – **1** – 1.10	C18* STIFFNESS 1.000
6. Enter the moment of inertia of the brake and fan.	D00* J BRAKE+FAN 1.000
7. Enter the mass moment of inertia of the load (gear unit + driven machine) extrapolated for the motor shaft.	C20* 10e–4kgm^2 LOAD MOMENT OF INERTIA 0.200
8. Enter the time for the shortest ramp you want.	C21* s SHORTEST RAMP 0.100
9. Start the calculation for the startup data by choosing "YES". The process lasts a few seconds.	C06*CALCULA-TION **NO** YES
10. The calculation is performed. After calculation, the next menu item appears automatically.	C06*SAVE **NO** YES
11. Set "SAVE" to "YES". The data (motor parameters) are copied to the non-volatile memory of MOVIDRIVE®.	STARTUP DATA IS BEING COPIED...

12. The startup procedure is now complete. Use the DEL key to return to the context menu.

MANUAL MODE
STARTUP
COPY TO DBG
COPY TO MDX

13. Press the ↓ key to scroll down until the menu item "EXIT" is selected.

SIGNATURE
QUIT
BASIC VIEW

14. Confirm your selection using the OK key. The basic display appears.

0.00rpm
0.000Amp
CONTROLLER IN-HIBIT

- Once startup is complete, copy the parameter set from MOVIDRIVE® to the DBG60B keypad. You have the following options:
  – In the context menu, select the menu item "COPY TO DBG". Confirm your selection using the OK key. The parameter set is copied from MOVIDRIVE® to the DBG60B.
  – In the context menu, select the menu item "PARAMETER MODE". Select parameter P807 "MDX → DBG". The parameter set is copied from MOVIDRIVE® to the DBG60B.
- The parameter set can now be copied to other MOVIDRIVE® devices using the DBG60B. Plug the DBG60B keypad into the other inverter. You have the following options to copy the parameter set from DBG60B to another inverter:
  – In the context menu of the new inverter, choose the "COPY TO MDX" menu item and confirm your entry using the OK key. The parameter set is copied from DBG60B to MOVIDRIVE®.
  – In the context menu, select the menu item "PARAMETER MODE". Select parameter P806 "DBG → MDX". The parameter set is copied from DBG60B to MOVIDRIVE®.

⚠ WARNING

Parameter settings incorrect due to unsuitable data sets.

Severe or fatal injuries.

- In the case of third-party motors, set the correct brake application time (P732 / P735).
- Observe the notes for starting the motor in the section "Starting the Motor" (→ page 102).
- Activate encoder monitoring for TTL and sin/cos encoders (P504 = "ON"). **Encoder monitoring is not a safety function**.

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Starting up the speed controller

Startup is performed without the speed controller first (→ section "Startup procedure, steps 1 through 17").

1. The selected operating mode is displayed. If the setting is correct, go to the next menu item.	C00*STARTUP PARAMETER SET 2 **VFC n-control**
2. Select the correct encoder type.	C15*ENCODER TYPE INCREM. ENCOD. TTL **SINE ENCODER** RESERVED
3. Set the correct encoder resolution.	C16*ENC. RESOLUT. 512 inc **1024 inc** 2048 inc
FOR MOTORS FROM SEW-EURODRIVE	
4. Enter whether the motor has a brake.	C17*BRAKE **WITHOUT** WITH
5. Set the stiffness of the closed-loop control system. If the drive tends to oscillate → setting < 1 Transient recovery time is too long → setting > 1 Recommended setting range: 0.90 – **1** – 1.10	C18* STIFFNESS 1.000
6. Enter whether the motor has a flywheel fan (Z fan).	C19*Z FAN **WITHOUT** WITH
FOR THIRD-PARTY MOTORS	
4. Enter the moment of inertia of the motor.	D00* J0 OF THE MOTOR 4.600
5. Set the stiffness of the closed-loop control system. If the drive tends to oscillate → setting < 1 Transient recovery time is too long → setting > 1 Recommended setting range: 0.90 – **1** – 1.10	C18* STIFFNESS 1.000

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6. Enter the moment of inertia of the brake and fan.	D00* J BRAKE+FAN 1.000
7. Enter the mass moment of inertia of the load (gear unit + driven machine) extrapolated for the motor shaft.	C20* 10e–4kgm^2 LOAD MOMENT OF INERTIA 0.200
8. Enter the time for the shortest ramp you want.	C21* s SHORTEST RAMP 0.100
9. Start the calculation for the startup data by choosing "YES". The process lasts a few seconds.	C06*CALCULA-TION **NO** YES
10. The calculation is performed. After calculation, the next menu item appears automatically.	C06*SAVE **NO** YES
11. Set "SAVE" to "YES". The data (motor parameters) are copied to the non-volatile memory of MOVIDRIVE®.	STARTUP DATA IS BEING COPIED...
12. The startup procedure is now complete. Use the [DEL] key to return to the context menu.	MANUAL MODE **STARTUP** COPY TO DBG COPY TO MDX
13. Press the [↓] key to scroll down until the menu item "EXIT" is selected.	SIGNATURE **QUIT** BASIC VIEW
14. Confirm your selection using the [OK] key. The basic display appears.	0.00rpm 0.000Amp CONTROLLER IN-HIBIT

- Once startup is complete, copy the parameter set from MOVIDRIVE® to the DBG60B keypad. You have the following options:
  - In the context menu, select the menu item "COPY TO DBG". Confirm your selection using the [OK] key. The parameter set is copied from MOVIDRIVE® to the DBG60B.

  - In the context menu, select the menu item "PARAMETER MODE". Select parameter P807 "MDX → DBG". The parameter set is copied from MOVIDRIVE® to the DBG60B.
- The parameter set can now be copied to other MOVIDRIVE® devices using the DBG60B. Plug the DBG60B keypad into the other inverter. You have the following options to copy the parameter set from DBG60B to another inverter:
  - In the context menu of the new inverter, choose the "COPY TO MDX" menu item and confirm your entry using the key. The parameter set is copied from DBG60B to MOVIDRIVE®.
  - In the context menu, select the menu item "PARAMETER MODE". Select parameter P806 "DBG → MDX". The parameter set is copied from DBG60B to MOVIDRIVE®.

⚠ WARNING

Parameter settings incorrect due to unsuitable data sets.

Severe or fatal injuries.

- In the case of third-party motors, set the correct brake application time (P732 / P735).
- Observe the notes for starting the motor in the section "Starting the Motor" (→ page 102).
- Activate encoder monitoring for TTL and sin/cos encoders (P504 = "ON"). **Encoder monitoring is not a safety function**.

Setting parameters

Proceed in this order to set the parameters:

- Use the key to call up the context menu. In the context menu, select the "PARAMETER MODE" menu item. Press the key to confirm your selection. The flashing cursor under the parameter number indicates that the keypad is in parameter mode.
- Use the key to switch to edit mode. The flashing cursor disappears.
- Pressing the or key, you can select or set the correct parameter value.
- Press the key to confirm the selection or setting.
- Press the key to switch back to parameter mode again. The flashing cursor appears again.
- Press the key to choose the next parameter.

Manual mode

The manual mode function is used to control the inverter via the DBG60B/ MOVITOOLS® MotionStudio keypad (Context menu → Manual mode). During manual mode, the 7-segment display on the device shows "H".

The digital inputs, with the exception of X13:1 (DIØØ "/Controller inhibit"), are then ineffective for the duration of manual mode. The digital input X13:1 (DIØØ "/Controller inhibit") must receive a "1" signal so that the drive can be started in manual mode. With X13:1 = "0", the drive can also be stopped in manual mode.

The direction of rotation is not determined by the digital inputs "CW/stop" or "CCW/stop", but by selecting the direction of rotation via the DBG60B/MOVITOOLS® MotionStudio keypad. To do this, enter the desired speed and the desired direction of rotation (+ = CW / - = CCW) using the sign button (+/-).

Manual mode remains active even after power off and power on, but the inverter is then disabled. Press the "Run" button to enable and start with n_{min} in the selected direction of rotation. You can increase or decrease the speed using the ↑ and ↓ buttons.

INFORMATION

If manual mode is ended, the signals at the digital inputs are effective immediately; the digital input X13:1 (DIØØ) /Controller inhibit does not have to be switched "1"-"0"-"1". The drive can start according to the signals at the digital inputs and setpoint sources.

⚠ WARNING

Risk of crushing if the motor starts up unintentionally.

Severe or fatal injuries.

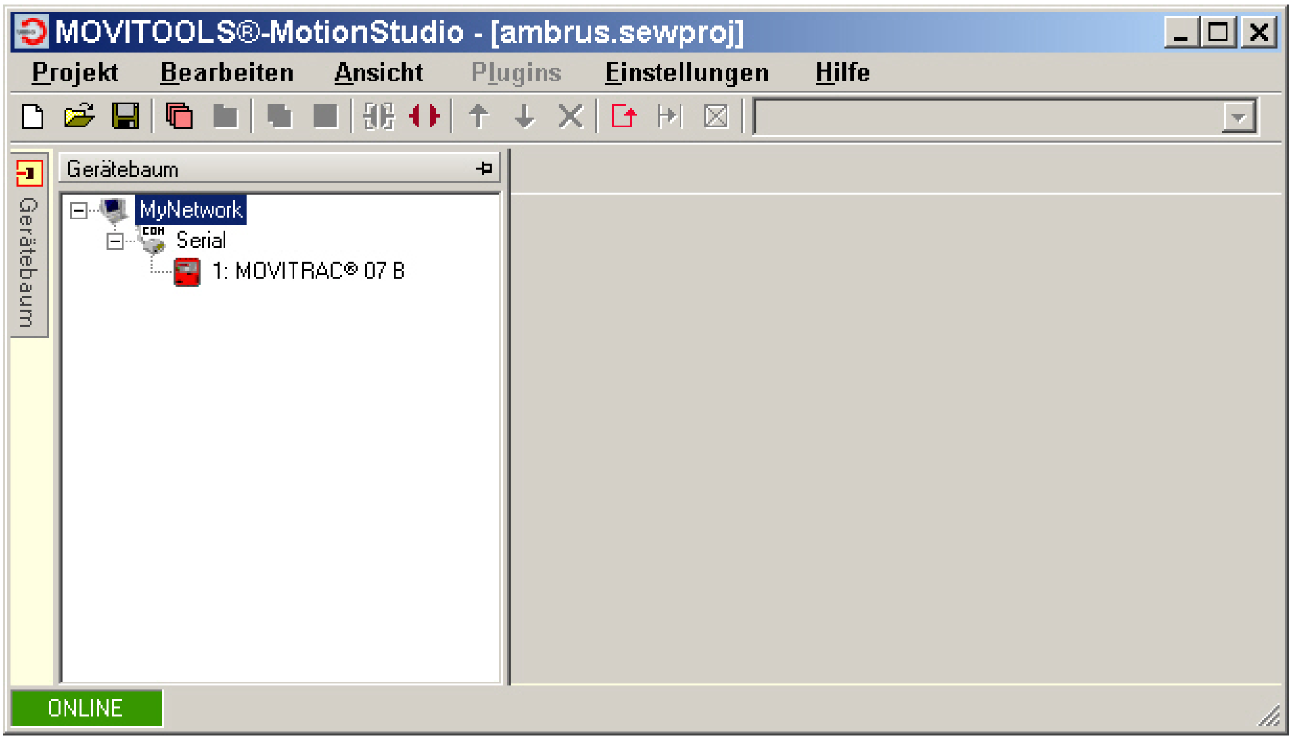
- Ensure that the motor cannot start unintentionally, by removing the X13 signal terminal block for example.
- Depending on the application, additional safety precautions must be taken to avoid injury to personnel and damage to machines.

11.4 MOVITOOLS® MotionStudio engineering software

Start MOVITOOLS® MotionStudio via the Windows start menu:

`Programs / SEW / MOVITOOLS MotionStudio / MotionStudio`

You can use the [Scan] button to list all connected devices in the device tree with MOVITOOLS® MotionStudio.



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By clicking the right mouse button on one of the devices, for example, you can carry out the startup. Further information can be found in the online help.

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11.5 Short description of important startup steps

You can connect the MOVITRAC® B frequency inverter directly to a motor with the same power. For example: A motor with 1.5 kW power can be connected directly to an MC07B0015.

11.5.1 Procedure

1. Connect the motor to the MOVITRAC® B (terminal X2).
2. Connect an optional braking resistor (terminal X2/X3).
3. The following signal terminals must be controlled by your controller:
   - Enable DIØ3
   - Optionally CW/hold DIØ1 or CCW/hold DIØ2
   - Setpoint:
     - Analog input (X10) and/or
     - DIØ4 = n11 = 150 1/min and/or
     - DIØ5 = n12 = 750 1/min and/or
     - DIØ4 + DIØ5 = n13 = 1500 1/min
   - With a brakemotor:

     DOØ2 = brake control via brake rectifier
4. Optionally connect the following signal terminals:
   - DIØØ = error reset
   - DOØ1 = /failure (designed as relay contact)
   - DOØ3 = ready for operation
5. Check the controller for the desired functionality.

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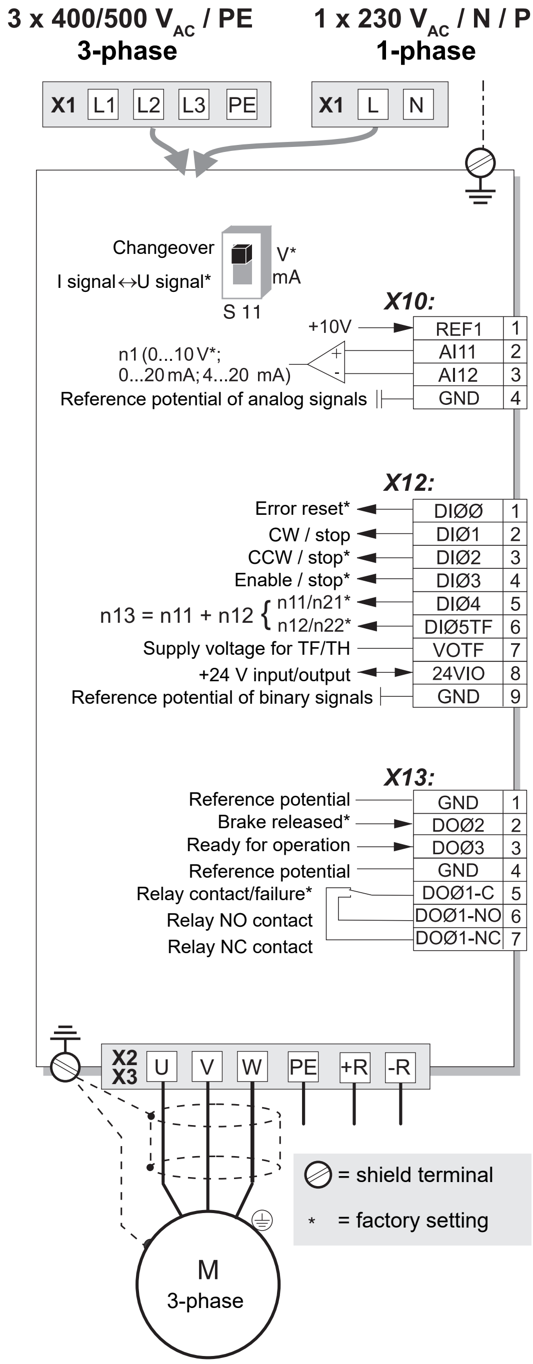
6. Connect the frequency inverter to the supply system (X1).



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11.5.2 Notes

Changes to the functions of the signal terminals and the setpoint settings can be made via the FBG11B operator panel or via a PC. The FSC11B front module and one of the following interface adapters are required for a PC connection: UWS21B / UWS11A / USB11A.

11.5.3 Restoring the factory settings (P802)

You can use *P802 Factory setting* to reset the factory setting stored in the EPROM for almost all parameters.

11.5.4 Adjusting the PWM frequency (P86x)

You can use *P860 / P861* to set the nominal clock frequency at the inverter output. If *P862 / P863* is set to "Off", the clock frequency can change automatically depending on device utilization.

11.5.5 Parameterizing the inverter address (SBus / RS485 / fieldbus) (P81x)

Use *P810* to set the address of the MOVITRAC® B for communication via the serial interface.

11.5.6 Setting the control mode (P700)

This parameter is used to set the basic operating mode of the inverter. Setting on the operator panel.

V/f characteristic curve (standard)

The default setting for the operating mode is V/f. Use this operating mode if you have no special speed quality requirements and for applications where a maximum output frequency above 150 Hz is required.

VFC characteristic curve (vector control)

You must commission the inverter in VFC or VFC and DC braking operating mode for:

- High torque
- Continuous duty at low frequencies
- Accurate slip compensation
- More dynamic behavior

To do this, you must select the operating mode VFC or VFC& DC braking in point P01 during startup.

11.5.7 Application type specification

Speed control

Hoist

The hoist function automatically provides all the functions required for the operation of an unbalanced hoist. For safety reasons, activate monitoring functions in particular that can prevent the drive from starting unintentionally.

DC braking

With DC braking, the asynchronous motor brakes via current injection. The motor brakes without a braking resistor on the inverter.

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Flying start function

The flying start function enables the inverter to be connected to a rotating motor. Especially for drives that are not actively braked, phase out for a long time or are also moved by the flowing medium, such as pumps and fans. The maximum flying start time is approx. 200 ms.

11.5.8 Selection of operating mode (4-quadrant operation P82x)

You can use *P820 / P821* to switch 4-quadrant operation on and off. If you connect a braking resistor to the MOVITRAC® B, 4-quadrant operation is possible. If no braking resistor is connected to the MOVITRAC® B and therefore no generator mode is possible, you must set *P820 / P821* to "Off". In this operating mode, the MOVITRAC® B attempts to extend the deceleration ramp. As a result, the generator mode performance is not too high and the DC link voltage remains below the switch-off threshold.

11.5.9 Setpoint specification (P10x)

With P100 "Setpoint source" and P101 "Control signal source", you can also select a communication interface as the setpoint or control signal source. However, the interfaces are not automatically deactivated with these parameters, as the frequency inverter must remain ready to receive via all interfaces at all times.

Fixed setpoints always have a higher priority than other setpoints. A complete list of the selection options can be found in the description of parameter P100.

Specification via fieldbus/SBus

To set the setpoint source to fieldbus or SBus, select the value "SBus1/fixed setpoint" for P100. The sign of the setpoint value determines the direction of rotation.

Specification via analog value

The following selection options are available for P100 to set the setpoint source to an analog value:

- Bipolar (signed processing of analog input 1 or fixed setpoint)
- Unipolar (absolute value-based processing of analog input 1 or fixed setpoint)
- Motor potentiometer (virtual potentiometer)
- Fixed setpoint + AI1 (sum of selected fixed setpoint and value of analog input AI1 → P112 AI1 operating mode also applies)
- Fixed setpoint × AI1 (weighting factor for analog input AI1→ 0 – 10 V = 0 – 100%)
- Bipolar AI2 (analog input 2 or fixed setpoint)

Specification via fixed setpoint (digital control)

To define the setpoint source on digital inputs, set P100 to the value "Frequency setpoint input / fixed setpoint" (frequency at digital input DI04 specifies setpoint). You can use P102 "Frequency scaling" to set the input frequency at which the system setpoint reaches 100%.

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11.5.10 Protection functions

Parameterization of current limit (P303)

The internal current limitation refers to the apparent current, i.e. the output current of the inverter. In the field weakening range, the inverter automatically reduces the current limit internally. This enables the inverter to implement stall protection for the motor.

Parameterization of speed monitoring (P50x)

The drive only reaches the speed required by the setpoint if it has sufficient torque. If the inverter reaches *P03 Current limit*, it assumes that it will not reach the desired speed. If the inverter exceeds the current limit for longer than *P501 Delay time*, the speed monitoring system responds.

Parameterization of fault responses (P83x)

The error "EXT. ERROR" only triggers in inverter status "ENABLED". With *P830* you can program the error response, which is triggered via an input terminal programmed to "/EXT. ERROR".

Parameterization of motor protection (P340)

MOVITRAC® B takes over the thermal protection of the connected motor electronically when this function is activated. In most cases, the motor protection function is comparable to standard thermal protection (motor circuit breaker) and, in addition, it takes account of speed-dependent cooling by the integrated fan. The motor utilization is determined via the inverter output current, type of cooling, motor speed and time. The thermal motor model is based on the motor data entered during startup (MOVITOOLS® MotionStudio/DBG60B) and compliance with the operating conditions specified for the motor.

11.5.11 Specification of system limits

Minimum speed (P301)

Speed value that cannot be undershot even if the setpoint input is zero. The minimum speed is also valid if $n_{min} < n_{Start/Stop}$ has been set.

Maximum speed (P302)

A setpoint input cannot exceed the value set here. If you set $n_{min} > n_{max}$, the value set in n_{max} applies to the minimum speed and the maximum speed.

Speed ramps (P13x)

The ramp times refer to a setpoint change of Δn = 3000 1/min. The ramps t11 / t21 up and t11 / t21 down are effective when the setpoint is changed. When the enable signal is removed with the STOP/RESET button or via terminals, the stop ramp t13 / t23 is effective.

11.5.12 Activating the energy-saving function (P770)

The energy-saving function can be activated for the VFC / VFC & FLYING START / V/f CHARACTERISTIC operating modes. In no-load operation, the power consumption of the motor can be reduced by up to 70%.

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Energy savings can be achieved in the operation of pumps, fans, conveyor belts, etc. With this method, the magnetization of the asynchronous motor is controlled depending on the load by adjusting the voltage-frequency ratio, the motor is undermagnetized.

11.5.13 Activating the technology functions

In addition to the features of the standard version, you can use the software module available in the MOVITOOLS® MotionStudio engineering software with the devices in the technology version. You can recognize the technology function by the digits "0T" at the end of the type designation or in the MOVITOOLS® MotionStudio under "Device data" as "Unit design: Technology".

The "simple positioning" software module currently exists in combination with SEW-EURODRIVE built-in encoders as a replacement for rapid/creep speed switching using initiators.

Enabling can also be done retrospectively in an emergency. In this case, the correct TAN must be entered in MOVITOOLS® MotionStudio via the "Working with the device" / "Technology enable" menus.

11.5.14 Settings for low motor speeds (P32x)

Only use the function *P320 / P330 Automatic adjustment* for single-motor operation. You can use this function for all motors and control modes. The inverter measures the motor during premagnetization and sets parameter *P322 / P332 IxR adjustment*. The values are stored in volatile memory.

11.5.15 Defining the assignment of the digital inputs (P60x)

Information can be found in the section "Parameter group 6.. Terminal assignment" (→ 🗎 330).

11.5.16 Setting the brake function (P73x)

The MOVITRAC® B inverters are able to control a brake attached to the motor. The brake function acts on the digital output assigned with the function "/BRAKE" (24 V = brake released). Use DO02 for brake control.

11.6 Starting the motor in manual mode

Note that you must exit manual mode before you can enable the motor via terminals.

11.6.1 Analog setpoint specification

The following table shows which signals must be present at terminals X11:2 (AI1) and X12:1 – X12:4 (DIØØ – DIØ3) for setpoint preselection "Unipolar / fixed setpoint" (*P100*) in order for the drive to be operated with analog setpoint input. The terminal assignment here is to be understood as an example and can be changed on request via the parameters *P601 – 608*. However, CW/stop DIO1 is permanently assigned.

Function	X10:2 (AI11) Analog input n1	X12:1 (DIØØ) /Controller inhibit[1]	X12:2 (DIØ1) CW / stop [2]	X12:3 (DIØ2) CCW / stop	X12:4 (DIØ3) Enable / stop	X12:5 (DIØ4) n11 / n21	X12:6 (DIØ5) n12 / n22
Controller inhibit	X	0	X	X	X	0	0
Stop	X	1	X	X	0	0	0

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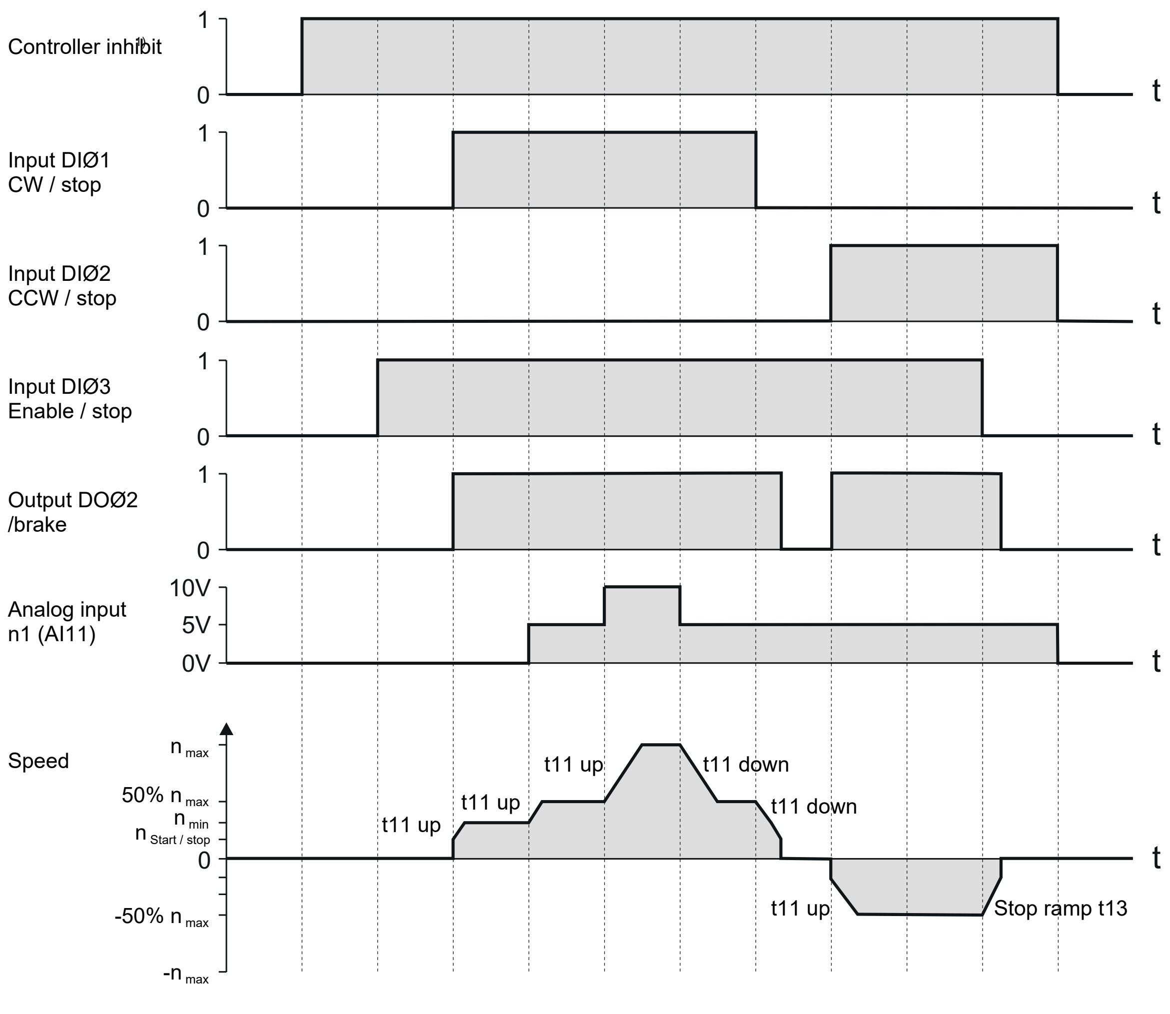
Function	X10:2 (AI11) Analog input n1	X12:1 (DIØØ) /Controller inhibit[1)]	X12:2 (DIØ1) CW / stop [2)]	X12:3 (DIØ2) CCW / stop	X12:4 (DIØ3) Enable / stop	X12:5 (DIØ4) n11 / n21	X12:6 (DIØ5) n12 / n22
Enable and stop	X	1	0	0	1	0	0
CW rotation at 50% n_{max}	5 V	1	1	0	1	0	0
CW rotation at n_{max}	10 V	1	1	0	1	0	0
CCW rotation at 50% n_{max}	5 V	1	0	1	1	0	0
CCW rotation at n_{max}	10 V	1	0	1	1	0	0

1) No default setting

2) Permanently assigned

0 = 0 signal
1 = 1 signal
X = not relevant

The following travel diagram shows an example of how the motor is started with the connection of terminals X12:1 – X12:4 and analog setpoints. The digital output X10:2 (DOØ2 "/Brake") is used to switch the braking contactor K12.



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1) If a terminal is programmed to controller inhibit.

INFORMATION

The motor is not energized during controller inhibit. A motor without brakes then coasts to a halt.

11.6.2 Fixed setpoints

The following table shows which signals must be present at terminals X12:1 – X12:6 (DIØØ – DIØ5) for the "Unipolar / fixed setpoint" setpoint preselection (*P100*) in order for the drive to be operated with the fixed setpoints. The terminal assignment here is to be understood as an example and can be changed on request via the parameters *P601 – 608*. However, CW/stop DIO1 is permanently assigned.

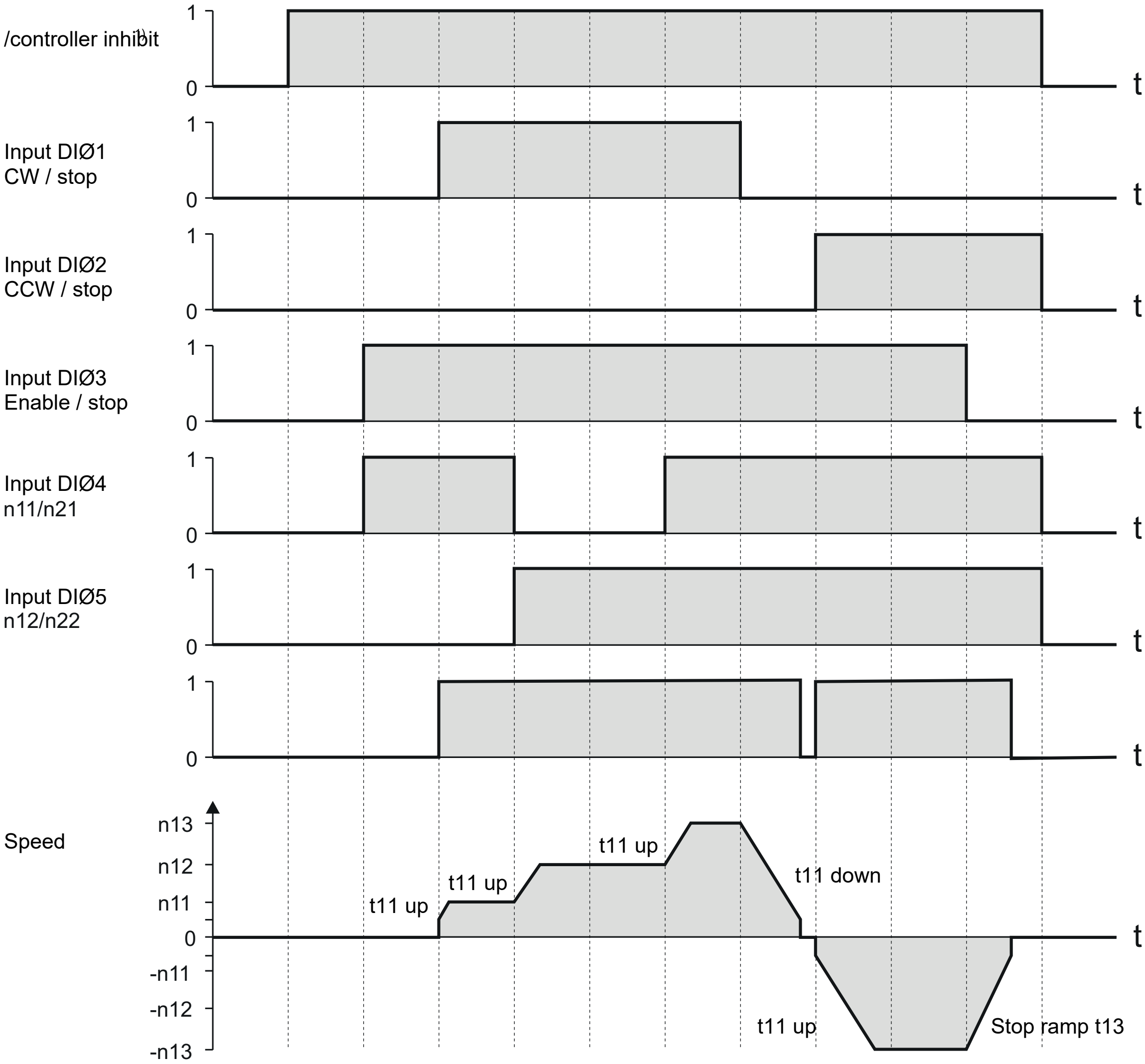
Function	X12:1 (DIØØ) /Controller inhibit 1)	X12:2 (DIØ1) CW / stop 2)	X12:3 (DIØ2) CCW / stop	X12:4 (DIØ3) Enable / stop	X12:5 (DIØ4) n11 / n21	X12:6 (DIØ5) n12 / n22
Controller inhibit	0	X	X	X	X	X
Stop	1	X	X	0	X	X
Enable and stop	1	0	0	1	X	X
CW rotation at n11	1	1	0	1	1	0
CW rotation at n12	1	1	0	1	0	1
CW rotation at n13	1	1	0	1	1	1
CCW rotation at n11	1	0	1	1	1	0

1) No default setting

2) Permanently assigned

0 = 0 signal
1 = 1 signal
X = not relevant

The following travel diagram shows an example of how the drive is started with the internal fixed setpoints using the connection of terminals X12:1 – X12:6. The digital output X10:2 (DOØ2 "/Brake") is used to switch the braking contactor K12.



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1) If a terminal is programmed to controller inhibit.

INFORMATION

The motor is not energized during controller inhibit. A motor without brakes then coasts to a halt.

11.7 PI controller (P25x)

Information on the PI controller can be found in the chapter "Project planning/PI controller" (→ 🗎 150).

11.8 Master-slave operation (P750)

The master-slave function offers the option of automatically implementing functions such as speed synchronism. The RS485 interface or the system bus interface can be used as the communication connection.

On the slave, *P100 Setpoint source* = master SBus or *P100 Setpoint source* = master RS485 must then be set. The process output data PO1 – PO3 (*P870, P871, P872*) are set automatically by the firmware.

Via a programmable terminal function "Slave freewheel" *P60x Basic device digital inputs* it is possible to disconnect the slave from the control setpoint of the master and switch it to a local control mode (such as bipolar/fixed setpoint control signal source).

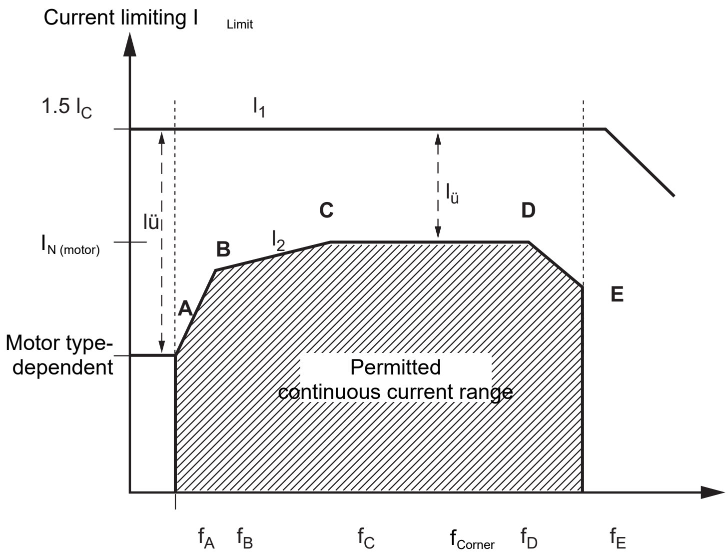
11.9 Group drive

Information on the group drive can be found in the chapter "Project planning/.../Multi-axis drive, group drive" (→ 🗎 132).

11.10 Startup of explosion-proof AC asynchronous motors of category 2 (94/9/EC)

Explosion-protected three-phase AC motors from SEW-EURODRIVE that are put into operation with MOVITRAC® B must be approved for this operation according to the nameplate and EC type examination certificate.

Protection for operation in Ex areas is provided by a certified safety device in connection with temperature sensors in the motor. The current limiting function in MOVITRAC® B prevents the safety device from responding, i.e. the motor is protected against unauthorized overheating (→ following figure).



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Use the MOVITOOLS® MotionStudio software for startup. During startup, the parameters *P560* – *P566* are automatically activated for SEW motors selected and approved for Ex operation.

After startup, you can only activate *P560* if a motor approved for Ex operation has previously been put into operation.

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After the motor has started up, current limiting I_1 is active. The current limit I_2 describes the permanently permitted current (shaded area).

You can document the startup parameters and values with MOVITOOLS® MotionStudio. This is displayed in the "ATEX information" field.

INFORMATION

Further information can be found in the operating instructions "Explosion-proof AC motors EDR.71 – 225".

11.11 Communication and unit profile

MOVITRAC® B offers you digital access to all drive parameters and functions via the communication interfaces.

The frequency inverter is controlled via the fast cyclical process data. Via this process data channel, you have the option of specifying setpoints, such as setpoint speed, integrator time for acceleration/deceleration, as well as triggering various drive functions such as enable, controller inhibit, stop, rapid stop, etc. At the same time you can also use this channel to read back actual values from the frequency inverter, such as actual speed, current, device status, error number or reference signals.

In combination with the IPOS$^{plus®}$ sequence and positioning control integrated in the frequency inverter, the process data channel can also be used as a direct connection between the PLC and IPOS$^{plus®}$. In this case, the process data is not evaluated by the frequency inverter, but directly by the IPOS$^{plus®}$ program.

While the process data exchange is usually cyclical, the drive parameters can be read or written acyclically using functions such as READ and WRITE. This exchange of parameter data allows the implementation of applications in which all important drive parameters are stored in the higher-level automation device, so that no manual parameterization has to be carried out on the frequency inverter itself.

The use of a fieldbus system requires additional monitoring functions for the drive technology, such as time monitoring of the fieldbus (fieldbus timeout) or special emergency-off concepts.

You can tailor the monitoring functions of the MOVITRAC® B specifically to your application. For example, you can determine which error response the frequency inverter should trigger in the event of a bus error. A rapid stop will be useful for many applications, but you can also freeze the last setpoints.

As the functionality of the control terminals is also guaranteed in fieldbus operation, you can still implement fieldbus-independent emergency off concepts via the terminals of the frequency inverter.

The MOVITRAC® B frequency inverter offers you numerous diagnostics methods for startup and service. You can use the DBG60B keypad to check both the setpoints sent by the higher-level controller and the actual values. You also receive a wealth of additional information about the status of the communication interfaces.

The MOVITOOLS® MotionStudio engineering software offers you an even more convenient diagnostics method, which allows you to set all drive and communication parameters as well as a detailed display of the interfaces and device status information.

11.11.1 Process data

The term *process data (PD)* refers to all time-critical (real time) data of a process that needs to be processed or transferred quickly. It is characterized by its high dynamics and immediate relevance.

Process data includes, for example, setpoints and actual values of the frequency inverter, but also peripheral states of limit switches. It is exchanged cyclically between the automation device and the frequency inverter.

The MOVITRAC® B frequency inverter is actually controlled via process data.

In general, the process input data (PI) and process output data (PO) are treated separately. This allows you to define specifically for your application which process output data (setpoints) should be sent from the controller to the frequency inverter or which process input data (actual values) the MOVITRAC® B frequency inverter should transfer in the opposite direction to the higher-level controller.

To control the frequency inverter via a communication interface, it must first be switched to the corresponding control signal source and setpoint source. The distinction between control signal and setpoint source allows a wide variety of combinations, so that the drive is controlled via the fieldbus, for example, and uses the analog setpoint as the setpoint. The parameters for describing the process output data are then used to determine how the frequency inverter should interpret the process data received.

The parameter *P100 Setpoint source* is used to specify the communication interface via which the setpoint is processed by the frequency inverter.

Parameter	Communication interface
P100 Setpoint source	RS485
	Fieldbus
	SBus
	...

The parameter *P101 Control signal source* is used to define how the frequency inverter is to be controlled. The inverter expects the control word from the source set here.

Parameter	Control of the inverter via
P101 Control signal source	Terminals
	RS485
	Fieldbus
	SBus

Setting: TERMINALS

In this setting, the frequency inverter is only controlled via the digital inputs and, if necessary, via the IPOSplus® control program.

Setting: RS485, FIELDBUS, SBus

In this setting, the control word defined in the process output data channel is updated by the set control signal source (RS485 / FIELDBUS / system bus).

The digital inputs and the IPOSplus® control program are still involved in the control.

⚠ CAUTION

For safety technology reasons, the frequency inverter must also **always** be enabled on the terminal side for control via the process data. As a result, the terminals must be connected or programmed so that the inverter is enabled via the digital inputs.

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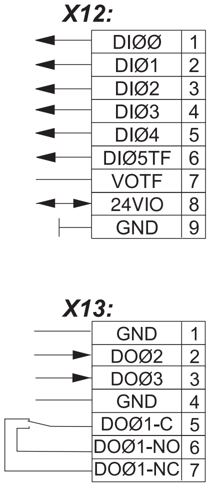
The following figure shows an example of the terminal-side wiring and parameterization for exclusive control of the frequency inverter via the process data.



X12
DI00 = Error reset
DI01 = CW/stop
DI02 = CCW/stop
DI03 = Enable/stop
DI04 = n11/n21
DI05TF = n12/n22
VOTF = Supply voltage for TF/TH
24VIO4 = +24 V input/output
GND = Reference potential of binary signals
X13
GND = Reference potential of binary signals
DO02 = Brake on
DO03 = ready for operation
GND = Reference potential
DO01-C = Relay contact/failure
DO01-NO = Relay NO contact
DO01-NC = Relay NC contact

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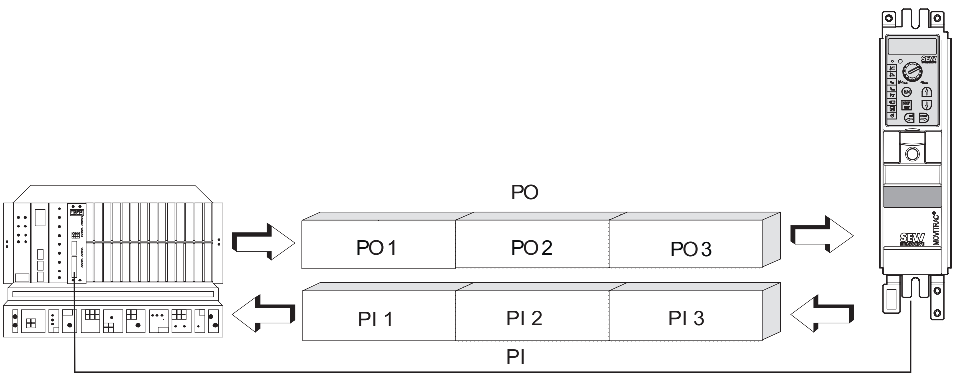
11.11.2 Process data configuration

The MOVITRAC® B frequency inverter can be controlled via the communication interfaces with 1 to 10 (with RS485 with 1 to 3) process data words. The number of process input data (PI) and process output data (PO) is identical.



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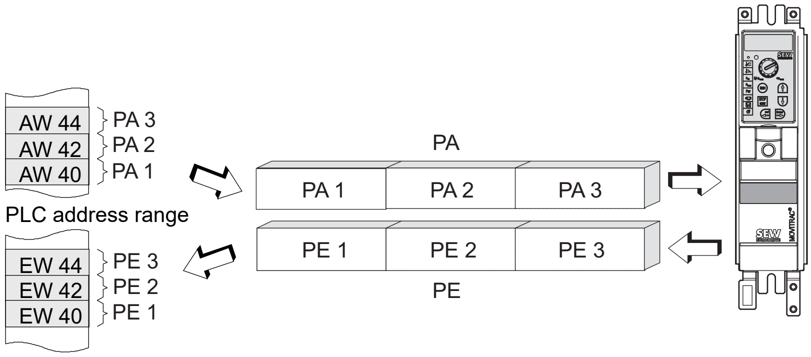
The process data configuration is set either via DIP switches on the option card or via the bus master in the startup of the bus system (e.g. PROFIBUS-DP or RS485). In this way, the frequency inverter automatically receives the correct setting. You can use the keypad or the fieldbus monitor in MOVITOOLS® MotionStudio to check the current process data configuration under the menu item *P090 Fieldbus PD configuration*.

Depending on the fieldbus interface used, process data configurations can become effective according to the following table.

P090 PD configuration	
1 process data word + parameter channel	1PD+PARAM
1 process data word	1PD
2 process data words + parameter channel	2PD+PARAM
2 process data words	2PD
....	....
10 process data words + parameter channel	10PD+PARAM
10 process data words	10PD

Information: 3 PD for bus cards, 10 PD for FSE24B in the front module design.

Only the number of process data (i.e. 1PD – 10PD) is of interest for the frequency inverter's process data control. If programmable logic controllers are used as fieldbus masters, the process data is usually mapped directly into the I/O or peripheral area. As a result, the I/O or peripheral area of the PLC must provide sufficient memory space for the frequency inverter's process data (see figure below). The address assignment between the process data of the frequency inverter and the PLC address range is usually carried out on the fieldbus master module.



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11.11.3 Process data description

The process data description defines the content of the process data to be transferred. All process data words can be individually assigned by the user.

The following six fieldbus parameters are available for the definition of the first three process data words:

- P870 Setpoint description PO1
- P871 Setpoint description PO2
- P872 Setpoint description PO3
- P873 Actual value description PI1
- P874 Actual value description PI2
- P875 Actual value description PI3

Changing one of the above parameters automatically locks the acceptance of the process output data for setpoint processing via the fieldbus. Only by reactivating the fieldbus parameter

- P876 Enable PO data = ON

is the received process output data processed according to the new actual value and setpoint descriptions.

Process data words 4 to 10 can only be read and written via IPOS$^{plus®}$.

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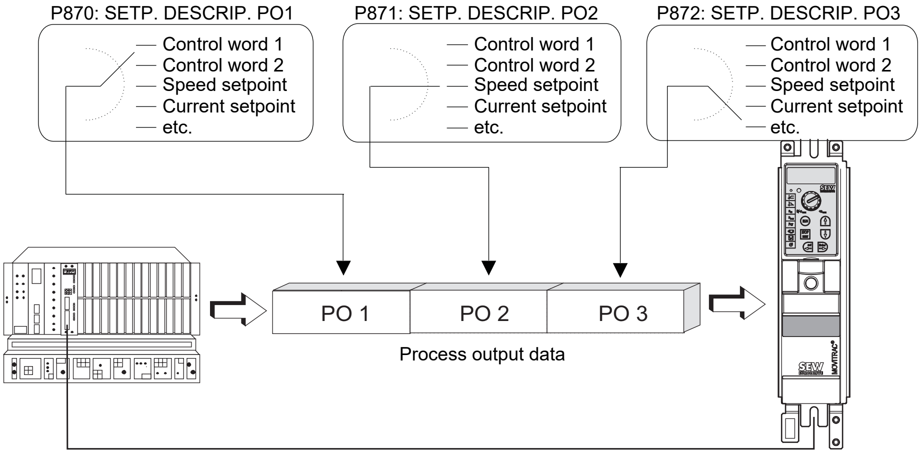
Setpoint description of the PO data

The parameters *Setpoint description POx* define the content of the process output data words that are sent from the higher-level automation device via the fieldbus system (see figure below).



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With the process output data words PO1, PO2 and PO3, the listed setpoints can be transferred via the process output data channel. You can decide yourself in which process data word the higher-value part (High) or the lower-value part (Low) is transmitted.

Assignment	Meaning	Scaling
NO FUNCTION	The setting *NO FUNCTION* means that the frequency inverter does not use this process output data word for setpoint processing. The content of the process output data word programmed to *NO FUNCTION* is ignored, although the controller might specify a real setpoint via the fieldbus system. The NO FUNCTION setting only blocks the processing of this process output data word in the inverter system. However, you can access the process output data at any time via IPOS$^{plus®}$.	
SPEED	With the setting *SPEED*, the MOVITRAC® B frequency inverter interprets the setpoint value transferred in this process data word as a speed setpoint, provided the set operating mode (*P700 Operating mode 1*, *P701 Operating mode 2*) permits a speed setpoint. If no speed setpoint is programmed, although a communication interface (FIELDBUS, RS485, system bus) is set as the setpoint source, the frequency inverter runs with speed setpoint = 0.	1 digit = 0.2/min
MAX. SPEED	With the setting *MAX. SPEED*, the MOVITRAC® B frequency inverter interprets the transferred setpoint as a speed limitation. The speed limitation is specified in the unit 1/min and is interpreted as an absolute value for both directions of rotation. The supported range of values of the speed limitation via fieldbus corresponds to the range of values of the parameter *P302 Maximum speed 1*. When the speed limitation is set via the fieldbus, the parameters *P302 Maximum speed 1, P312 Maximum speed 2* are automatically deactivated.	1 digit = 0.2/min
RAMP	With the setting *RAMP*, the MOVITRAC® B frequency inverter interprets the transferred setpoint as a run-up or run-down ramp. The specified numerical value corresponds to a time in milliseconds and refers to a speed change of 3000 1/min. The rapid stop and emergency stop function is not affected by this process ramp. When the process ramp is transmitted via the fieldbus system, the ramps t11, t12, t21 and t22 become ineffective.	1 digit = 1 ms
CONTROL WORD 1 / CONTROL WORD 2	The assignment of control word 1 or control word 2 to the process output data enables almost all drive functions to be activated via the fieldbus system. The description of control word 1 and 2 can be found in the chapter "Control word definition".	
SPEED [%]	With the setting *SPEED [%]*, the MOVITRAC® B frequency inverter interprets the setpoint transferred in this process data word as a percentage speed setpoint. The relative speed setpoint always refers to the currently valid maximum speed limit, i.e. either P302/312 or MAX. SPEED or PO speed limitation.	4000_{hex} = 100% n_{max}

Assignment	Meaning	Scaling
IPOSplus® PO-DATA	The *IPOSplus® PO-DATA* setting means that the frequency inverter does not use this process output data word for setpoint processing. The content of the process output data word programmed on *IPOSplus®-PO-DATA* is ignored by the inverter system and is available for exclusive processing in the IPOS$^{plus®}$ control program. Within IPOS$^{plus®}$, you can use the command *GetSys PO-Data* to directly access the process output data of the communication interfaces. Further information can be found in the IPOS$^{plus®}$ sequence and positioning control manual.	3 words can each be individually coded with 16 bits and exchanged between the higher-level automation device and IPOS$^{plus®}$.

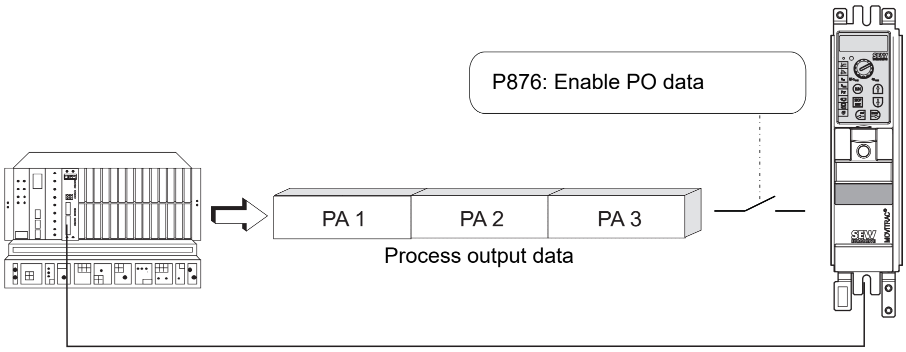
Special cases of PO data processing

The separate setting of the process output data description allows a large number of combinations, although not all of them make technical sense.

In addition to the process output data, the digital input terminals and, in special cases, the analog setpoint of the MOVITRAC® B frequency inverter are generally also used.

Setpoint input via fieldbus missing	If a communication interface is entered as the setpoint source and no setpoint is programmed in the process output data description, setpoint = zero is generated internally by the inverter.
No control word input via fieldbus	If a communication interface is entered as the control signal source and no control word is programmed in the process output data description, the control command ENABLE is set internally by the inverter.
Double assignment of the process output data channel	If several process output data words receive the same setpoint description, only the process output data word read first becomes valid. The processing sequence in the frequency inverter is PO1 – PO2 – PO3, i.e. if, for example, PO2 and PO3 have the same setpoint description, only PO2 will take effect. The content of PO3 is ignored.

Enable PO data



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Changing the parameters *Setpoint description PO1 – PO3* automatically locks the process output data with *Enable PO data = no*. The process output data channel is only re-enabled for processing with the parameterization *Enable PO data = YES* (e.g. from the higher-level controller).

NO	Process output data locked. The frequency inverter's setpoint processing continues to operate with the last valid (frozen) process output data until the fieldbus setpoints are reactivated.
YES	Process output data enabled. The frequency inverter works with the process output data specified by the master.

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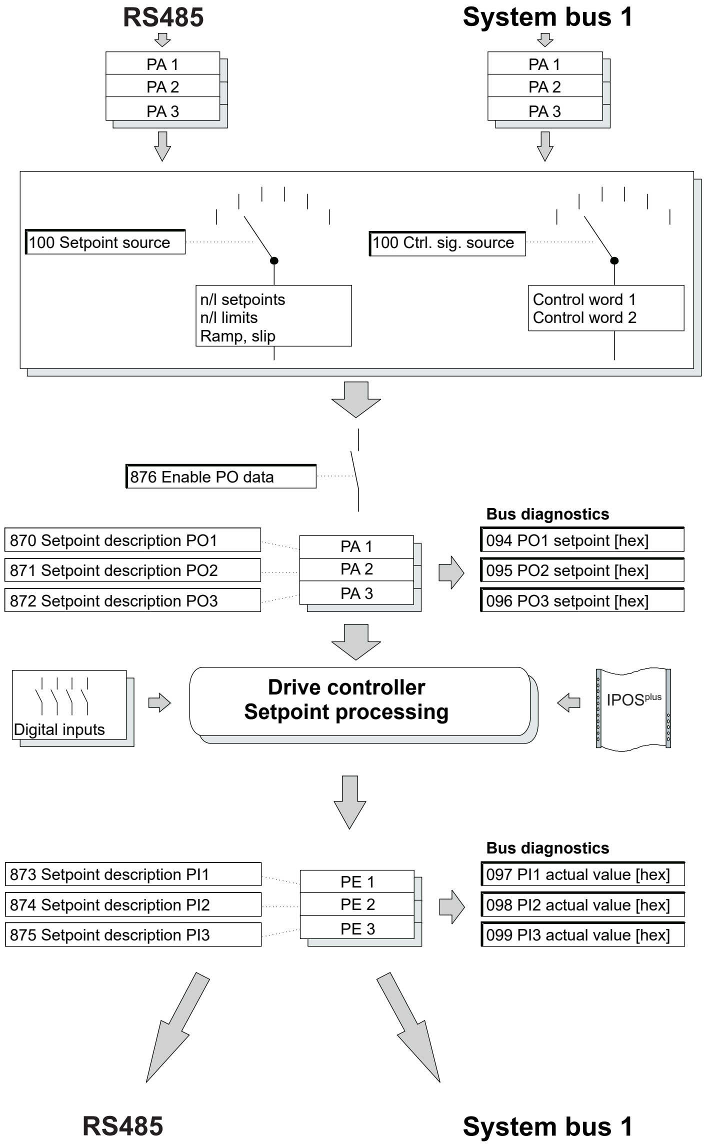
PO/PI data processing

The process input data of the inverter (actual values, status information, etc.) can be read via all communication interfaces of the inverter and are therefore not linked to the control signal and setpoint source.



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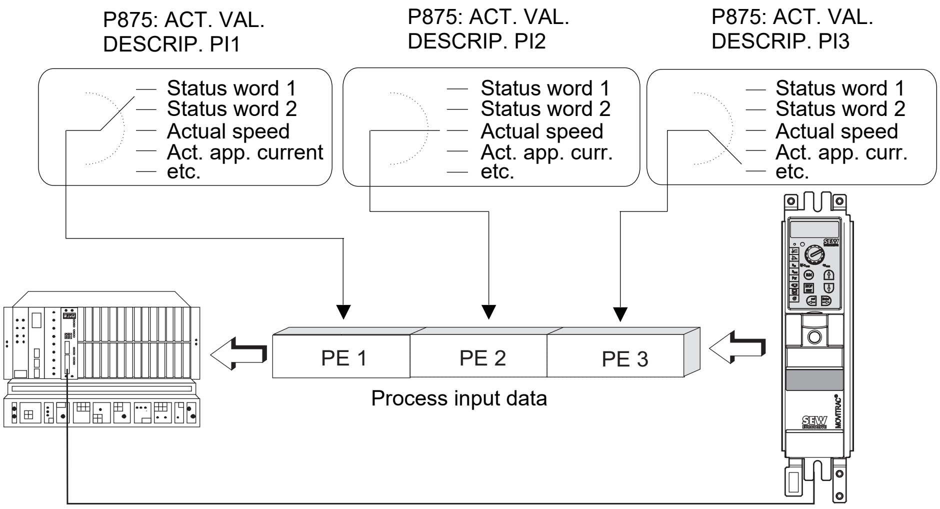
Actual value description of PI data

The parameters *Actual value description PI1 – PI3* define the content of the process input data words that are transferred from the frequency inverter to the higher-level automation device (see following figure). Each process data word is defined with a separate parameter, meaning that three parameters are required to describe the process input data.



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The following parameters can be transferred via the process data channel using the process input data words PI1 to PI3. 32-bit values, such as the actual position, are transmitted in 2 process data words. You can decide yourself in which process data word the higher-value part (High) and the lower-value part (Low) is transmitted.

Assignment	Meaning	Scaling
NO FUNCTION	The assignment of a process input data word with *NO FUNCTION* means that the inverter system does not update this process input data word. In this case, MOVITRAC® B generally returns the value 0000hex to the higher-level controller.	
SPEED	With the setting *SPEED*, the frequency inverter returns the current actual speed value with the unit 1/min to the higher-level automation system. The exact actual speed value can only be returned if the frequency inverter can determine the actual motor speed via speed feedback. For applications with slip compensation, the deviation from the real motor speed depends on the accuracy of the user-adjusted slip compensation.	1 digit = 0.2/min
OUTPUT CURRENT	With the setting *OUTPUT CURRENT*, the frequency inverter returns the current actual value of the output current with the unit [% In] (as a percentage, in relation to the nominal current of the frequency inverter) to the higher-level automation system.	1 digit = 0.1% I_N
ACTIVE CURRENT	With the assignment of a process input data word with *ACTIVE CURRENT*, the frequency inverter returns the current active actual current value with the unit % I_n to the higher-level automation system.	1 digit = 0.1% I_N
STATUS WORD 1 / STATUS WORD 2	The assignment of status word 1 or status word 2 to the process input data enables access to numerous status information items, failure and reference messages.	
SPEED [%]	With the setting *SPEED [%]*, the frequency inverter returns the current relative actual speed value with the unit % n_{max} / P302 to the higher-level automation system.	4000_{hex} = 100% n_{max}
IPOSplus® PI-DATA	With the setting *IPOSplus® PI* (IPOSplus® Process Input Data), an individual actual value can be transferred from the IPOS$^{plus®}$ program to the higher-level controller via the process input data. This setting thus allows the exchange of up to 48 bits individually coded between the IPOS$^{plus®}$ program and the higher-level controller via the process data channel. Within IPOS$^{plus®}$ you can use the command *SetSys PI-Data* to write directly to the process input data. Further information can be found in the IPOS$^{plus®}$ sequence and positioning control manual.	3 words, each individually coded with 16 bits, can be exchanged between the higher-level automation device and IPOS$^{plus®}$.

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Scaling of process data

The process data is always transmitted as fixed-point values so that it can be calculated as easily as possible during the ongoing system process. Parameters with the same unit of measurement are given the same scaling, so that direct comparisons of setpoint and actual values are possible in the application program of the higher-level automation device. A distinction is made between three process data types:

- Speed in 1/min
- Current in % I_N (nominal current)
- Ramp in ms

The different variants of the control or status word are coded as a bit field and are dealt with in a separate chapter.

Process data	Type	Resolution	Reference	Range
Speed setpoint / Actual speed value / Speed limitation slip compensa-tion	Integer 16	1 digit = 0.2 min^{-1}		Negative: $C000_{hex}$ – $FFFF_{hex}$- 49152_{dec} – 65535_{dec} Positive: 0000_{hex} – 4000_{hex} 0_{dec} – 16384_{dec}
Relative speed setpoint [%] / Relative actual speed value [%]	Integer 16	1 digit = 0.0061% (4000_{hex} = 100%)	Maximum speed of the inverter	-100-0%: $C000_{hex}$ – $FFFF_{hex}$- 49152_{dec} – 65535_{dec} 0-100%: 0000_{hex} – 4000_{hex} 0_{dec} – 16384_{dec}
Apparent current actual value / Active actual current value / Current setpoint Current limiting	Integer 16	1 digit = 0.1% I_N	Nominal current of the frequency in-verter	-3276.8% – 0 – +3276.7% 8000_{hex} – 0 – $7FFF_{hex}$
Process ramp up / Process ramp down /	Unsigned 16	1 digit = 1 ms	delta-f = 100 Hz	0 ms – 65535 ms 0000_{hex} – $FFFF_{hex}$

Positive speed values correspond to the direction of rotation CW when the motor is connected correctly.

Examples

Process data	Value	Scaling	Transferred process data item
Speed	CW 400 min^{-1}	400/0.2 = 2000_{dec} = $07D0_{hex}$	2000_{dec} or $07D0_{hex}$
	CCW 750 min^{-1}	- (750/0.2) = 3750_{dec} = $F15A_{hex}$	-3750_{dec} or $F15A_{hex}$
Relative speed	CW 25% f_{max}	25 x (16384/100) = 4096_{dec} = 1000_{hex}	4096_{dec} or 1000_{hex}
	CCW 75% f_{max}	-75 x (16384/100) = -12288_{dec} = $D000_{hex}$	-12288_{dec} or $D000_{hex}$
Current	45% I_N	(45/0.1) = 450_{dec} = $01C2_{hex}$	450_{dec} or $01C2_{hex}$
	115.5% I_N	(115.5/0.1) = 1155_{dec} = 0483_{hex}	1155_{dec} or 0483_{hex}
Ramp	300 ms	300 ms → 300_{dec} = $012C_{hex}$	300_{dec} or $012C_{hex}$
	1.4 s	1.4 s = 1400 ms 400_{dec} = 0578_{hex}	1400_{dec} or 0578_{hex}

11.11.4 Sequence control

Definition of the control word

The control word is 16 bits wide. Each bit is assigned a function of the frequency inverter. The low byte consists of 8 fixed function bits that are always valid. The assignment of the higher-order control bits varies for the different control words.

Functions that are generally not supported by the frequency inverter cannot be activated via the control word. In this case, the individual control word bits must be regarded as reserved and set to logic 0 by the user.

Basic control block

In the lower-order part of the control word (bits 0 to 7), 8 function bits are permanently defined for the most important drive functions. The following overview shows the assignment of the basic control block.

Bit	Function
0	Controller inhibit = "1" / enable = "0"
1	Enable = "1" / rapid stop = "0"
2	Enable = "1" / stop = "0"
3	Reserved
4	Integrator switching: Integrator 1 = "1" / integrator 2 = "0"
5	Parameter set changeover: Parameter set 2 = "1" / parameter set 1 = "0"
6	Reset: reset pending failure = "1" / not active = "0"
7	Reserved
8	Depending on the control word
9	
10	
11	
12	
13	
14	
15	

Linking the safety-relevant control commands

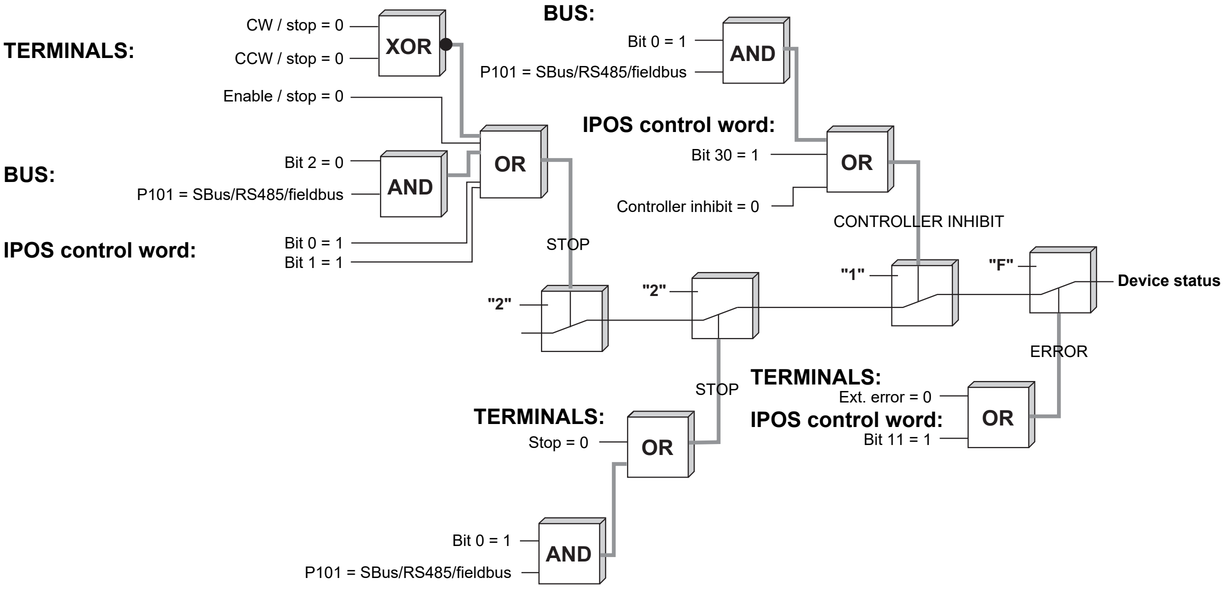
In general, the control commands

- CONTROLLER INHIBIT
- RAPID STOP/STOP
- STOP
- ENABLE

can be activated simultaneously via the set control signal source, the digital inputs and by the IPOS$^{plus®}$ control program. The safety-relevant linking of these control functions is achieved by prioritizing the individual control commands. The following figure shows, for example, that all three processing blocks (terminal processing, control word processing and IPOS$^{plus®}$ program) must generate the enable signal to enable the frequency inverter. However, as soon as one of the three processing blocks triggers a higher-priority control command (e.g. *STOP* or *CONTROLLER INHIBIT*), this becomes effective.

After the frequency inverter is switched on, IPOS$^{plus®}$ generally supplies the control command *ENABLE* so that the drive can be controlled immediately even without the IPOS$^{plus®}$ program.

In general, the digital inputs remain active even when controlling the frequency inverter via the process data (*P101 Control signal source = RS485/FIELDBUS/SBus*). Safety-relevant functions such as controller inhibit and enable are processed equally by both the terminal strip and the fieldbus, i.e. the frequency inverter must first be enabled on the terminal side for control via the fieldbus. All other functions that can be activated both via terminals and via the control word are processed with OR linking. The following figure shows the device status depending on the various control signal sources (terminals, bus or IPOSplus®® control word)



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For safety reasons, the basic control block is defined in such a way that the frequency inverter with the control word specification 0000_{hex} assumes the status *No enable*, as all common fieldbus master systems reset the outputs to 0000_{hex} in the event of an error. In this case, the frequency inverter performs a rapid stop and then activates the mechanical brake.

Control commands

Controlling the frequency inverter with bits 0 - 2

If the frequency inverter has been enabled on the terminal side, it can be controlled with bit 0 – bit 2 for applications with speed feedback of the basic control block.

						Bit 2: Enable / stop
						Bit 1: Enable / rapid stop
						Bit 0: Controller inhibit / enable
Priority		**Control command:**	Bit 2	Bit 1	Bit 0	
High	.	**Controller inhibit:**	X	X	1	e.g. 01_{hex}, 03_{hex}, 05_{hex}, 07_{hex},
	.					
	.	**Rapid stop:**	X	0	0	e.g. 00_{hex}, 04_{hex}
	.					
	.	**Stop:**	0	1	0	e.g. 02_{hex}
	.					
Low	.	**Enable:**	1	1	0	06_{hex}
			X = irrelevant			

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Control command "Controller inhibit"

You can use the *Controller inhibit* control command to disable the power output stages of the frequency inverter and thus switch them to high impedance. At the same time, the frequency inverter activates the application of the mechanical motor brake so that the drive immediately comes to an idle state due to the mechanical braking. Motors that do not have a mechanical brake will coast to a stop when this control command is used.

Setting *bit 0* is sufficient to trigger the control command *Controller inhibit*: *Controller inhibit/enable* in the control word, as all other bits are irrelevant. This control bit therefore has the highest priority in the control word.

Control command "Rapid stop"

Use the *Rapid stop* control command to cause the frequency inverter to perform a deceleration at the currently valid rapid stop ramp. The following parameterized rapid stop ramps are generally effective:

- P136 T13 Stop ramp (with active parameter set 1)
- P146 T23 Stop ramp (with active parameter set 2)

The process ramp that might be specified via fieldbus has no influence on the rapid stop.

This control command is activated by resetting *bit 1*: *Enable/rapid stop*.

Control command "Stop"

Use the *Stop* control command to cause the frequency inverter to perform a deceleration. If the process ramp is transmitted via the fieldbus system, this control command uses the currently specified ramp value as the deceleration ramp. Otherwise, the frequency inverter uses the typical integrator ramp for this control command depending on the set parameter and integrator set.

The control command *Stop* is triggered with *bit 2: Enable/stop*.

Control command "Enable"

Use the *Enable* control command to enable the frequency inverter via the fieldbus system. If the process ramp is also transmitted via the fieldbus system, this control command uses the currently specified ramp value as the acceleration ramp. Otherwise, the frequency inverter uses the typical integrator *Ramp up* for this control command, depending on the set parameter and integrator set.

For the control command *Enable*, all three bits must be switched to *Enable* (110_{bin}).

Selecting the valid parameter set

The valid parameter set is selected via bit 5 in the control word. The parameter set changeover is generally only possible in the *Controller inhibit* state.

This bit is OR-linked with the input terminal function *Parameter set changeover*, i.e. the logical state "1" of the input terminal OR of the control word bit activates parameter set 2.

Reset after a fault

Bit 6 of the control word is used to execute a reset via the process data channel in the event of an error. A reset can only be triggered with a 0/1 edge in the control word.

Control word 1

In addition to the most important drive functions of the basic control block, control word 1 contains function bits for internal setpoint functions that are generated within the MOVITRAC® B frequency inverter in the higher-order byte.

Bit	Functionality	Assignment
0	Permanently defined	Controller inhibit "1" / enable "0"
1		Enable "1" / rapid stop "0"
2		Enable "1" / stop "0"
3		Reserved
4		Integrator changeover
5		Parameter set changeover
6		Reset
7		Reserved
8	Direction of rotation for motor potentiometer	0 = CW direction of rotation 1 = CCW direction of rotation
9 10	Motor potentiometer run-up Motor potentiometer run-down	10 9 0 0 = no change 1 0 = down 0 1 = up 1 1 = no change
11 12	Selection of the internal fixed setpoints n11 – n13 or n21 – n23	12 11 0 0 = Speed setpoint via process output data word 2 0 1 = Internal setpoint n11 (n21) 1 0 = Internal setpoint n12 (n22) 1 1 = Internal setpoint n13 (n23)
13	Fixed setpoint changeover	0 = fixed setpoints of the active parameter set can be selected via bits 11/12 1 = fixed setpoints of the other parameter set can be selected via bit 11/12
14	Reserved	Reserved bits must always be set to zero.
15	Reserved	Reserved bits must always be set to zero.

These internal setpoint functions are activated by setting parameter P100 accordingly to fixed setpoint or motor potentiometer and setting the corresponding bits in control word 1. The specification of a speed setpoint via an SBus process output data word is then no longer effective.

Motor potentiometer via fieldbus

The motor potentiometer setpoint function is controlled via the fieldbus interface in the same way as via the standard input terminals. The process ramp, which might be specified via an additional process output data word, has no influence on the motor potentiometers. Only the following motor potentiometer integrators are generally used.

- P150 T3 Ramp up
- P151 T4 Ramp down

Control word 2

Control word 2 contains function bits for the most important drive functions in the basic control block and the virtual input terminals in the higher-order part. These are freely programmable input terminals, but are not physically available due to a lack of hardware (option cards). These input terminals are thus mapped to the virtual input terminals of the fieldbus. Each virtual terminal is assigned to an optional and **physically unavailable** input terminal and its functionality can be freely programmed.

Bit	Function	Definition
0	Controller inhibit "1" / enable "0"	Permanently defined
1	Enable "1" / rapid stop "0"	
2	Enable "1" / stop "0"	
3	Reserved	
4	Integrator changeover	
5	Parameter set changeover	
6	Reset	
7	Reserved	
8	Virtual terminal 1 = P610 / digital input DI10	Virtual input terminals
9	Virtual terminal 2 = P611 / digital input DI11	
10	Virtual terminal 3 = P612 / digital input DI12	
11	Virtual terminal 4 = P613 / digital input DI13	
12	Virtual terminal 5 = P614 / digital input DI14	
13	Virtual terminal 6 = P615 / digital input DI15	
14	Virtual terminal 7 = P616 / digital input DI16	
15	Virtual terminal 8 = P617 / digital input DI17	

⚠ CAUTION

If the FIO21B option is also plugged into the frequency inverter in addition to the fieldbus interface, the inputs of the FIO21B option have priority. The virtual inputs are not evaluated in this case.

Status word definition

The status word is 16 bits wide. The lowest value byte, known as the basic status block, consists of 8 fixed status bits that reflect the most important drive states. The assignment of the higher-value status bits varies between the different status words.

Basic status block

The basic status block of the status word contains status information that is required for almost all drive applications.

Bit	Function / assignment	Definition
0	Output stage enabled "1" / output stage disabled "0"	Permanently defined
1	Inverter ready for operation "1" / inverter not ready for operation "0"	
2	PO data enabled "1" / PO data disabled "0"	
3	Current integrator set: Integrator 2 "1" / integrator 1 "0"	
4	Current parameter set: Parameter set 2 "1" / parameter set 1 "0"	
5	Failure / warning: Failure/warning present "1" / no failure "0"	
6		
7		

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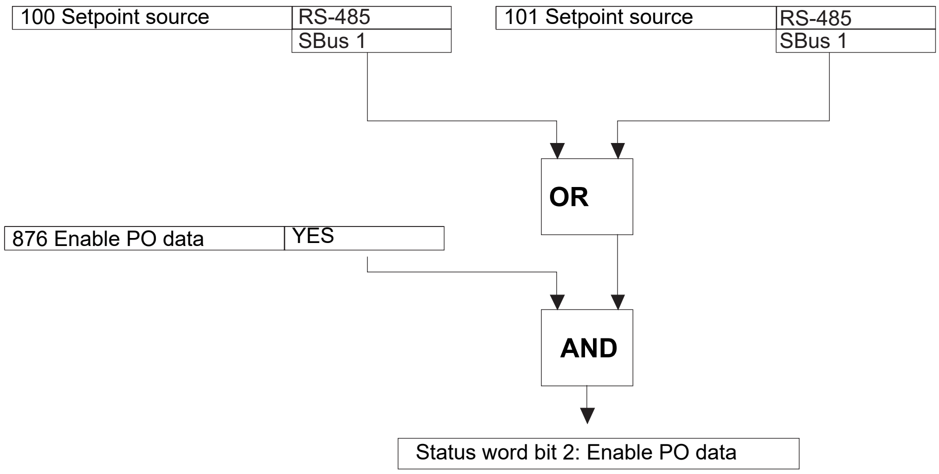
Message "Inverter ready for operation"

Bit 1 in the status word reports that the frequency inverter is ready to respond to control commands of an external controller with the value *Inverter ready for operation = 1*. The frequency inverter is not ready for operation if

- MOVITRAC® B reports an error
- The factory setting is active (setup)
- No line voltage is present

Message "PO data enabled"

Bit 2 signals with *PO data enabled = 1* that the frequency inverter is responding to control or setpoint values from the communication interfaces. The following image shows which conditions must be met for the PO data to be enabled:



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Fault/warning

With bit 5 in the status word, the frequency inverter reports a failure or warning that might have occurred. A failure generally means that the frequency inverter is no longer operational. However, a warning can occur temporarily without affecting the operating behavior of the frequency inverter. You should therefore evaluate bit 1 – *Inverter ready for operation* in addition to this fault bit for exact filtering of a failure (prerequisite: Line voltage ON).

Bit 1: Ready	Bit 5: Failure / warning	Meaning
0	0	Inverter not ready for operation
0	1	Failure
1	0	Inverter is ready for operation
1	1	Warning

Status word 1

In addition to the status information in the basic status block, status word 1 contains either the *device status* or the *fault number* in the high-order status byte. Depending on the fault bit, the device status is displayed if the fault bit = 0 and the fault number is displayed in the event of a fault (fault bit = 1). Resetting the failure also resets the fault bit and the current device status is displayed again. For the meaning of the fault numbers and the device status, refer to the system manual or the MOVITRAC® B operating instructions.

<table>
<tr><th>Bit</th><th>Function</th><th>Definition</th></tr>
<tr><td>0</td><td>Output stage enabled</td><td rowspan="8">Permanently defined</td></tr>
<tr><td>1</td><td>Inverter ready for operation</td></tr>
<tr><td>2</td><td>PO data enabled</td></tr>
<tr><td>3</td><td>Current integrator set</td></tr>
<tr><td>4</td><td>Current parameter set</td></tr>
<tr><td>5</td><td>Failure / warning</td></tr>
<tr><td>6</td><td>Reserved</td></tr>
<tr><td>7</td><td>Reserved</td></tr>
<tr><td>8</td><td rowspan="8">Failure / warning?
Bit 5 = 1 → Fault number:
01 Overcurrent
02 ...
Bit 5 = 0 → Device status:
0x1 Controller inhibit
0x2 ...</td><td rowspan="8">Device status / fault number</td></tr>
<tr><td>9</td></tr>
<tr><td>10</td></tr>
<tr><td>11</td></tr>
<tr><td>12</td></tr>
<tr><td>13</td></tr>
<tr><td>14</td></tr>
<tr><td>15</td></tr>
</table>

Status word 2

In addition to the status information in the basic status block, status word 2 contains the virtual output terminals DO10 – DO17 in the higher-order status byte. By programming the terminal functions for the output terminals, all conventional signals can be processed via the fieldbus system.

<table>
<tr><th>Bit</th><th>Function</th><th>Definition</th></tr>
<tr><td>0</td><td>Output stage enabled</td><td rowspan="8">Permanently defined</td></tr>
<tr><td>1</td><td>Inverter ready for operation</td></tr>
<tr><td>2</td><td>PO data enabled</td></tr>
<tr><td>3</td><td>Current integrator set</td></tr>
<tr><td>4</td><td>Current parameter set</td></tr>
<tr><td>5</td><td>Failure / warning</td></tr>
<tr><td>6</td><td>Reserved</td></tr>
<tr><td>7</td><td>Reserved</td></tr>
<tr><td>8</td><td>Virtual terminal 1 = P630 / digital output DO10</td><td rowspan="8">Virtual output terminals</td></tr>
<tr><td>9</td><td>Virtual terminal 2 = P631 / digital output DO11</td></tr>
<tr><td>10</td><td>Virtual terminal 3 = P632 / digital output DO12</td></tr>
<tr><td>11</td><td>Virtual terminal 4 = P633 / digital output DO13</td></tr>
<tr><td>12</td><td>Virtual terminal 5 = P634 / digital output DO14</td></tr>
<tr><td>13</td><td>Virtual terminal 6 = P635 / digital output DO15</td></tr>
<tr><td>14</td><td>Virtual terminal 7 = P636 / digital output DO16</td></tr>
<tr><td>15</td><td>Virtual terminal 8 = P637 / digital output DO17</td></tr>
</table>

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⚠ CAUTION

If the FIO21B option is also plugged into the frequency inverter in addition to the fieldbus interface, the inputs of the FIO21B option have priority. The virtual inputs are not evaluated in this case.

Fault number and unit status

INFORMATION

An up-to-date list of fault numbers and device statuses can be found in the parameter list corresponding to the firmware of your devices. For more information, refer to the operating instructions and the MOVITRAC® B system manual.

Device status

With the status word, the operating status of the MOVITRAC® B is displayed and, in the event of a fault, a fault or warning code is displayed.

Device status (high byte in status word 1)	Meaning	Status LED
0	24 V operation (inverter not ready)	Flashing yellow
1	Controller inhibit active	Steady yellow
2	No enable	Steady yellow
3	Standstill current	Lights up green
4	Enable	Lights up green
5	Control	Lights up green
8	Factory setting	
13	Flying start	Lights up green
14		
Fault number is displayed in the status word	Error display (flashing)	Flashing red
The actual device status is displayed	Manual mode	Lights up green
16	Inverter waiting for data	Flashing green/yellow
17	Safe Torque Off" active	Flashing yellow

⚠ WARNING

Incorrect interpretation of the display U = "Safe Torque Off" active.

Severe or fatal injuries.

11.11.5 Monitoring functions

For safe operation of the MOVITRAC® B frequency inverter via the communication interfaces, additional monitoring functions are implemented which, for example, trigger a user-configurable drive function in the event of a bus error. There are two independent parameters for each communication interface.

- Timeout interval
- Timeout response

These parameters enable application-dependent drive behavior in the event of a communication error.

Timeout error message / timeout interval / timeout response

The frequency inverter generates a timeout if no new telegrams are received via the bus system within a set time window (timeout time). The adjustable timeout response defines the failure variant (error/warning) and the error response of the drive.

Timeout error message

MOVITRAC® B generates a separate **timeout error message** for each communication interface:

Communication interface	Error number	Timeout error message
RS485	F 43	RS485 TIMEOUT
SBus	F 47	SBUS 1 TIMEOUT

Timeout interval

The **timeout** can be set separately for each communication interface.

Communication interface	Parameter number	Parameter name	Timeout interval
RS485	812	RS485 timeout interval	0.00 seconds
SBus	883	SBus 1 timeout interval	0.10 seconds

Timeout response

The **timeout response** can be set separately for each communication interface.

Parameter number	Parameter name	Timeout response
833	Response RS485-TIMEOUT	RAPID ST./WARN.
836	Response SBus1-TIMEOUT	RAPID ST./WARN.

The **timeout monitoring** is useful for all communication interfaces, but can vary considerably between the individual bus systems.

Fieldbus timeout interval parameter	Range of values
Unit	Seconds
Range	0.01 s to 650.00 s in 10 ms steps
Special case	0 or 650.00 = fieldbus timeout switched off
Factory setting	0.5 s

INFORMATION

For MOVILINK® via RS485 and SBus, the timeout interval must be set manually in P812 or P883. For control via CANopen or the FSE24B, the timeout interval is set automatically in parameter P883.

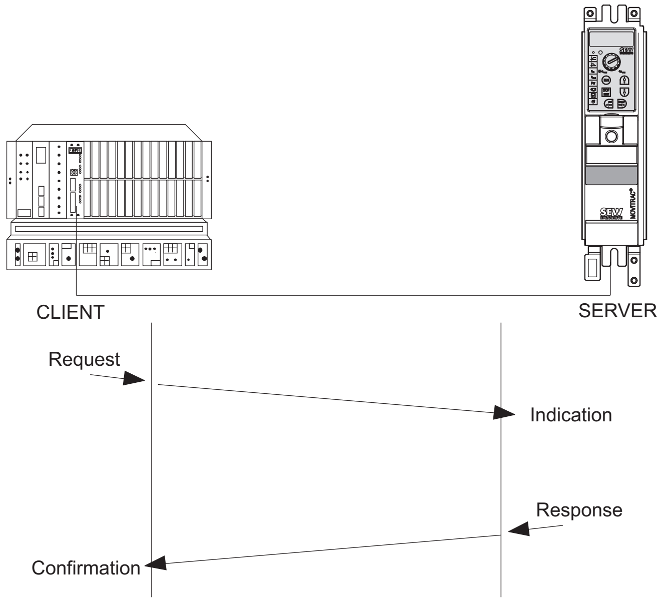
11.11.6 Setting the inverter parameters

The drive parameters of the inverter are usually accessed via the bus-specific READ and WRITE services. Additional services can be executed for all bus systems via the MOVILINK® parameter channel. This parameter channel is available for all bus systems and is explained in more detail below.

In addition, you will find further programming information on using the MOVILINK® parameter channel via the various bus systems in the documentation for the fieldbus interface.

Parameter setting procedure

The parameterization of the MOVITRAC® B frequency inverter is generally carried out according to the client-server model, i.e. the frequency inverter only supplies the requested information when requested by the higher-level automation device. MOVITRAC® B therefore generally only has server functionality (see figure below).



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Structure of the MOVILINK® parameter channel

The MOVILINK® parameter channel enables bus-independent access to all drive parameters of the frequency inverter. Special services are available within this parameter channel to read various parameter information. In principle, it is made up of a management byte, a reserved byte, an index word and four data bytes.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Manage-ment	Subindex	Index High	Index Low	MSB data	Data	Data	LSB data
		Parameter index		4 byte data			

Management of the parameter channel (byte 0)

The entire parameterization sequence is coordinated with byte 0 "Management". This byte is used to provide important service parameters such as service identification, data length, execution and status of the executed service.

Index addressing (bytes 1 – 3)

Byte 2 "Index-High", byte 3 "Index-Low" and byte 1 "Subindex" are used to determine the parameter that is to be read or written via the fieldbus system. All parameters of the MOVITRAC® B frequency inverter are listed in the MOVITRAC® B system manual. Each parameter is assigned a special number (index) under which this parameter can be read or written.

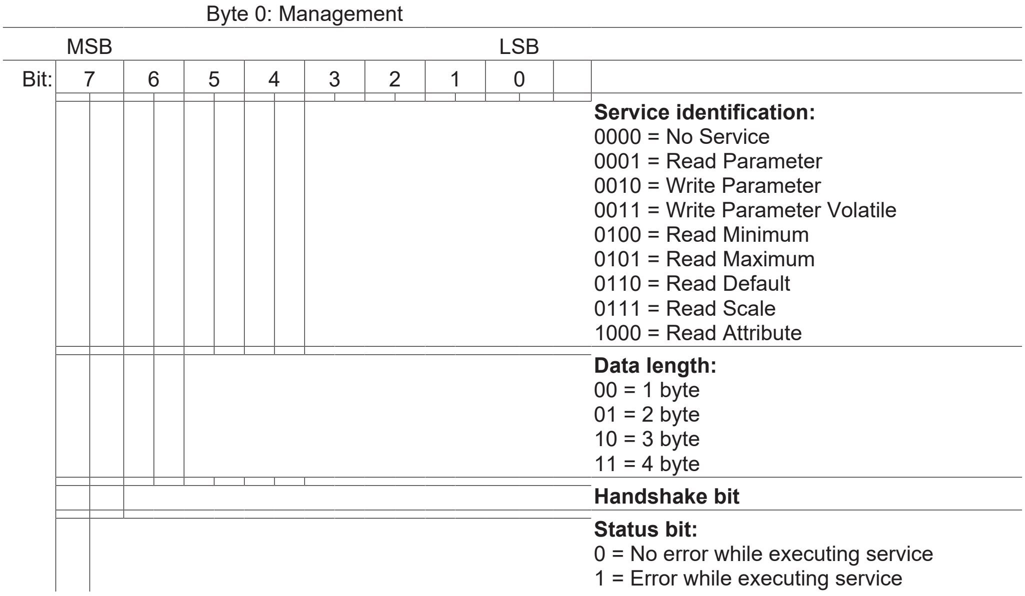
Data range (bytes 4 – 7)

The data is located in byte 4 to byte 7 of the parameter channel. This means 4 bytes of data can be transmitted per service. The data is always entered right-aligned, i.e. byte 7 contains the least significant data byte (data LSB), byte 4 the most significant data byte (data MSB).

Management byte

The **bits 0 – 3** contain the service identification, i.e. define which service is being executed.

With **bit 4 and bit 5** the data length is specified in bytes, which is generally set to 4 bytes for SEW-EURODRIVE frequency inverters.



Bit 6 is the handshake bit. It has a different meaning depending on the bus system:

- With SBus (CAN), the response telegram is only sent after the synchronization message if the handshake bit is set (= 1).
- With RS485 and fieldbus, the handshake bit serves as an acknowledgment bit between client and server in the cyclical transmission variant. As the parameter channel is transmitted cyclically in this variant, possibly with the process data, the service execution in the inverter must be initiated edge-controlled via handshake bit 6. To do this, the value of this bit is changed (toggled) for each new service to be executed. The inverter uses the handshake bit to signal whether the service has been executed or not. The service is executed as soon as the received handshake bit in the controller matches the sent one.

Status bit 7 indicates whether the service was executed properly or whether it was faulty.

Response

The response to a parameterization request is structured as follows:

- The management byte of the response message is structured in the same way as in the request telegram.
- The status bit indicates whether the service execution was successful:
  - If the status bit is "0", bytes 4 to 7 of the response telegram contain the requested data.
  - If the status bit is "1", a fault code is reported in the data range (bytes 4 to 7), see section "Incorrect service execution" (→ 🗎 283).

Description of the parameter services

The individual parameter adjustment services are defined via bits 0 – 3 of the management byte. The following parameter adjustment services are supported by MOVITRAC® B.

No service

This coding signals that there is no parameter adjustment service.

Read parameter

This parameter adjustment service is used to read a drive parameter.

Write parameter

This parameter adjustment service is used for non-volatile writing of a drive parameter. The written parameter value is stored in a non-volatile memory (e.g. in an EEPROM). This service should not be used for cyclical write accesses, as the memory modules only allow a limited number of write cycles.

Write parameter volatile

This parameter adjustment service is used for the volatile writing of a drive parameter, provided the parameter allows this. The written parameter value is only stored in volatile memory in the inverter's RAM and is lost when the inverter is switched off. When the inverter is switched on again, the last value written with Write Parameter is available again.

Read minimum

This service can be used to determine the smallest configurable value (minimum) of a drive parameter. The coding is done in the same way as the parameter value.

Read maximum

This service can be used to determine the largest configurable value (maximum) of a drive parameter. The coding is done in the same way as the parameter value.

Read default

This service can be used to determine the factory setting (default) of a drive parameter. The coding is done in the same way as the parameter value.

Read scale

This service can be used to determine the scaling of a parameter. The inverter returns a measurement index and conversion index.

Byte 4	Byte 5	Byte 6	Byte 7
MSB data	Data	Data	LSB data
Reserved		Measurement index	Conversion index

Measurement index:

The measurement index is used for coding physical variables. This index is used to transmit information to a communication partner about the physical variable of the associated parameter value. Coding is carried out in accordance with the PROFIBUS user organization (PNO) sensor technology/actuator profile. The entry FF_{hex} means that no measurement index is specified. You can also find the measurement index in the parameter list of the inverter.

Conversion index:

The conversion index is used to convert the transferred parameter value into an SI basic unit. Coding is carried out in accordance with the PROFIBUS user organization (PNO) sensor technology/actuator technology profile.

Example:

Drive parameters: P131 Ramp t11 down CW

Measurement index: 4 (= time with the unit second)

Conversion index: 3 (10^{-3} = milli)

Transmitted numerical value: 3000 dec

The numerical value received via the bus is interpreted by the frequency inverter as follows: 3000 s × 10^{-3} = 3 s

Read attribute

This service can be used to read the access attributes and the index of the next parameter. The following table shows the coding of the data for this parameter adjustment service.

Byte 4	Byte 5	Byte 6	Byte 7
MSB data	Data	Data	LSB data
Next available index		Access attributes	

The access attributes are coded device-specifically. The attribute definition for MOVITRAC® B frequency inverters is shown in the following table.

Byte 6	Byte 7	
Bit	**Bit**	**Meaning**
	0	1 = parameter allows write access
	1	1 = parameter is stored resident on EEPROM
	2	1 = factory setting overwrites RAM value
	3	1 = factory setting overwrites EEPROM value
	4	1 = after initialization EEPROM value valid
	5	1 = controller inhibit status not required for write access
	6	1 = password required
8	7	00 = parameter is generally valid 01 = parameter is assigned to parameter set 1 10 = parameter is assigned to parameter set 2 11 = parameter is assigned to both parameter sets
9 – 15		Reserved

Parameter list

Detailed information on coding and access attributes of all parameters can be found in the parameter list.

Incorrect service execution

If the received handshake bit is identical to the transmitted handshake bit, the inverter has executed the service.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Manage-ment	Subindex	Index High	Index Low	**Error class**	**Error code**	**Add. Code High**	**Add. Code Low**

↓

Status bit = 1: Incorrect service execution

Return codes for parameterization

In the event of faulty parameterization, the frequency inverter returns various return codes to the parameterizing master, which provide detailed information about the cause of the error. In general, these return codes are structured according to EN 50170. A distinction is made between the elements

- Error class
- Error code
- Additional code

These return codes apply to all communication interfaces of the MOVITRAC® B.

Error class

The Error-Class element is used to classify the error type more precisely. According to EN 50170, a distinction is made between the following error classes.

Class (hex)	Designation	Meaning
1	vfd state	Status error of the virtual field unit
2	application-reference	Error in control program
3	definition	Definition error
4	resource	Resource error
5	service	Error during service execution
6	access	Access error
7	ov	Error in the object directory
8	other	Other error (see additional code)

The error class is generated by the communication software of the fieldbus interface if there is faulty communication. This does not apply to *Error class 8 = Other error*, however. Return codes supplied by the frequency inverter system all fall under *Error-Class 8 = other error*. A more detailed breakdown of the error is provided by the Additional-Code element. The Ethernet error code is then "0".

Error code

The error code element allows you to clearly identify the cause for the error within the Error class. It is generated by the communication software of the fieldbus interface in the event of faulty communication.

Additional code

The additional code contains SEW-EURODRIVE-specific return codes for faulty parameterization of the frequency inverters. They are sent back to the master under *Error-Class 8 = other error*. The following table shows all possible codings for the additional code.

MOVILINK®			
	Additional Code		
Error Class	**High**	**Low**	**Description**
0x05	00	0x00	Unknown Error
		0x01	Illegal Service
		0x02	No Response
		0x03	Different Address
		0x04	Different Type
		0x05	Different Index
		0x06	Different Service
		0x07	Different Channel
		0x08	Different Block
		0x09	No Scope Data
		0x0A	Illegal Length
		0x0B	Illegal Address
		0x0C	Illegal Pointer
		0x0D	Not enough memory
		0x0E	System Error
		0x0F	Communication does not exist
		0x10	Communication not initialized
		0x11	Mouse Conflict
		0x12	Illegal Bus
		0x13	FCS Error
		0x14	PB Init
		0x15	SBUS – Illegal Fragment Count
		0x16	SBUS – Illegal Fragment Type
		0x17	Access denied
			Not Used

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MOVILINK®			
	Additional Code		
Error Class	High	Low	Description
0x08	00	0x00	No Error
		0x10	Illegal Index
		0x11	Not yet implemented
		0x12	Read Only
		0x13	Parameter blocking
		0x14	Setup runs
		0x15	Value too large
		0x16	Value too small
		0x17	Required hardware does not exist
		0x18	Internal Error
		0x19	Access only via RS485 (via X13)
		0x1A	Access only via RS485 (via XT)
		0x1B	Parameter protected
		0x1C	"Controller inhibit" required
		0x1D	Value invalid
		0x1E	Setup started
		0x1F	Buffer overflow
		0x20	"No Enable" required
		0x21	End of File
		0x22	Communication Order
		0x23	"IPOSplus® Stop" required
		0x24	Autosetup
		0x25	Encoder Nameplate Error
		0x29	PLC State Error

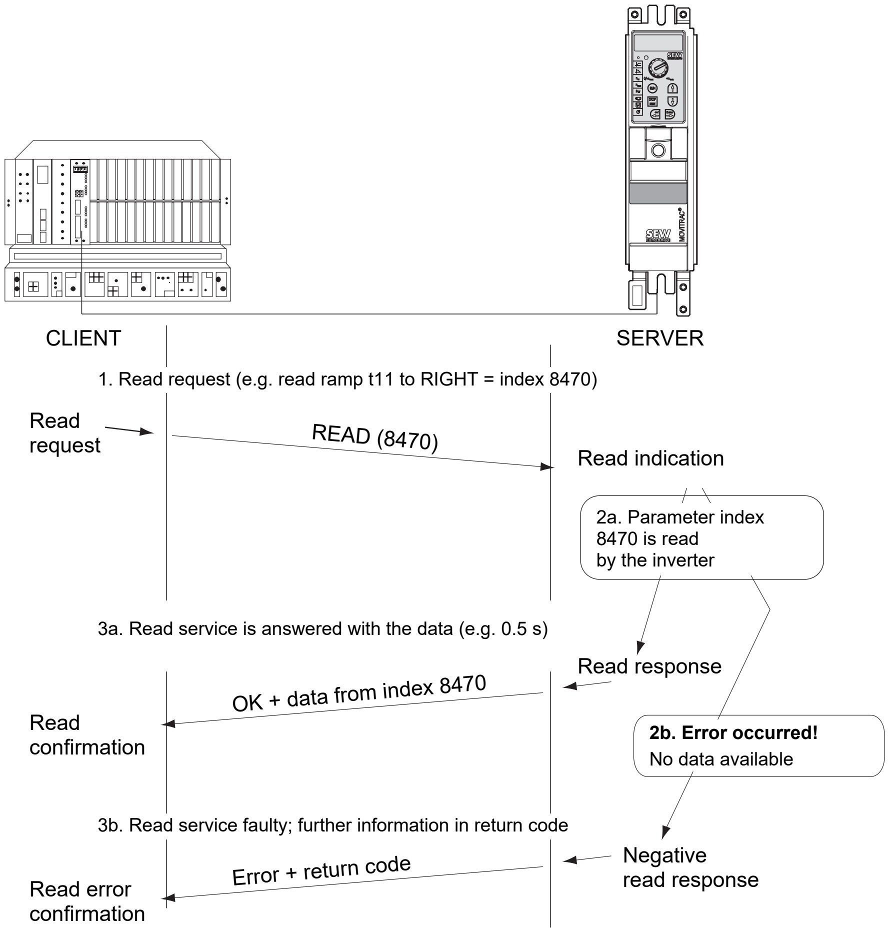
Example: Parameterization error

An incorrect index was entered when executing a read or write service.

	Code (hex)	Meaning
Error class	0x08	Other
Error code	0x00	–
Add. code high	0x00	–
Add. code low	0x10	Illegal Index

Example: Reading a parameter (READ)

A parameter is read via the communication interface with the read request (*Read-Request*) from the automation device to the MOVITRAC® B frequency inverter (see following figure).



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If it is not possible to execute the read service in the frequency inverter, this is reported back to the automation device in a negative response (*negative read response*). The automation device thus receives a negative confirmation (*Read-Error-Confirmation*) with a precise breakdown of the error.

Reading a parameter cyclically

With the cyclical transmission variant, the handshake bit must be changed in order to activate service processing (read service execution). When using the acyclical PDU types, the inverter processes each request message and thus always executes the parameter channel.

The parameterization is carried out as follows:

1. Enter the index of the parameter to be read in byte 2 (index high) and byte 3 (index low).
2. Enter the service identification for the read service in the management byte (byte 0).

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3. With cyclical PDU types, you only transfer the read service to the inverter by changing the handshake bit. With acyclical PDU types, the parameter channel is always evaluated.

Since this is a read service, the sent data bytes (bytes 4 – 7) and the data length (in the management byte) are ignored and do not need to be set.

The inverter now processes the read service and returns the service confirmation by setting the handshake bits to the same value.

Byte 0: Management

7	6	5	4	3	2	1	0
0	0/1	1	1	0	0	0	1

Service identification:
0001 = Read

Data length:
11 = 4 byte

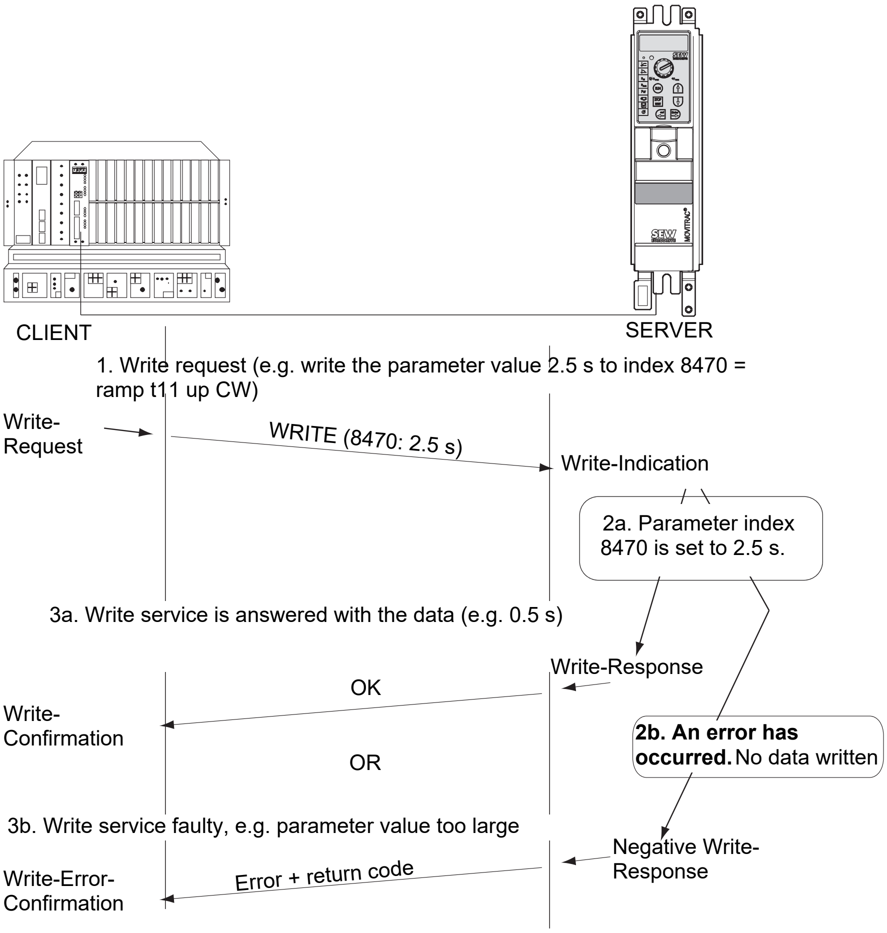
Handshake bit:
Must be changed with every new order.

Status bit:
0 = No error while executing service
1 = Error while executing service

X = not relevant
0/1 = value of the bit is changed

Example: Writing a parameter (WRITE)

A parameter is written in the same way as a parameter is read via the fieldbus interface (see figure below).



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If it is not possible to execute the write service in the frequency inverter, e.g. because incorrect parameter data was transferred, this is reported back to the automation device in a negative response (*negative write response*). The automation device thus receives a negative confirmation (*Write-Error-Confirmation*) with an exact breakdown of the error.

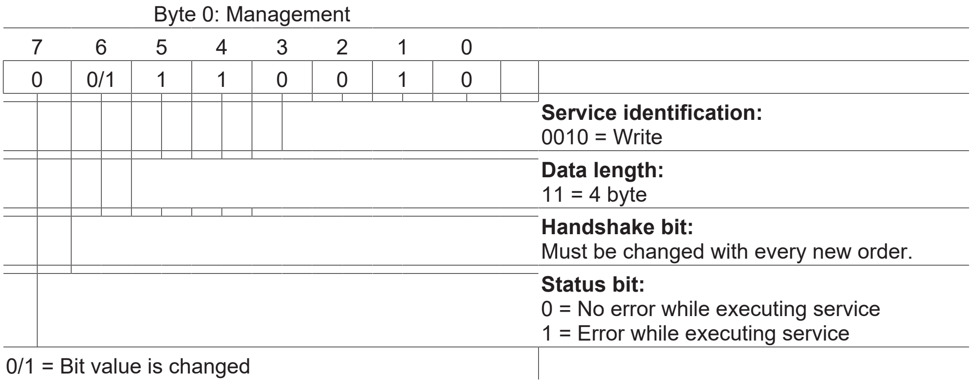
Writing a parameter cyclically

With the cyclical transmission variant, the handshake bit must be changed so that the service processing (execution of WRITE service) is activated. When using the acyclical PDU types, the inverter processes each request message and thus always executes the parameter channel.

The parameterization is carried out as follows:

1. Enter the index of the parameter to be written in byte 2 (index high) and byte 3 (index low).
2. Enter the data to be written in bytes 4 – 7.
3. Enter the service identification and the data length for the Write service in the management byte (byte 0).
4. With cyclical PDU types, you only transfer the WRITE service to the inverter by changing the handshake bit. With acyclical PDU types, the parameter channel is always evaluated.

The inverter now processes the write service and returns the service confirmation by setting the handshake bits to the same value.



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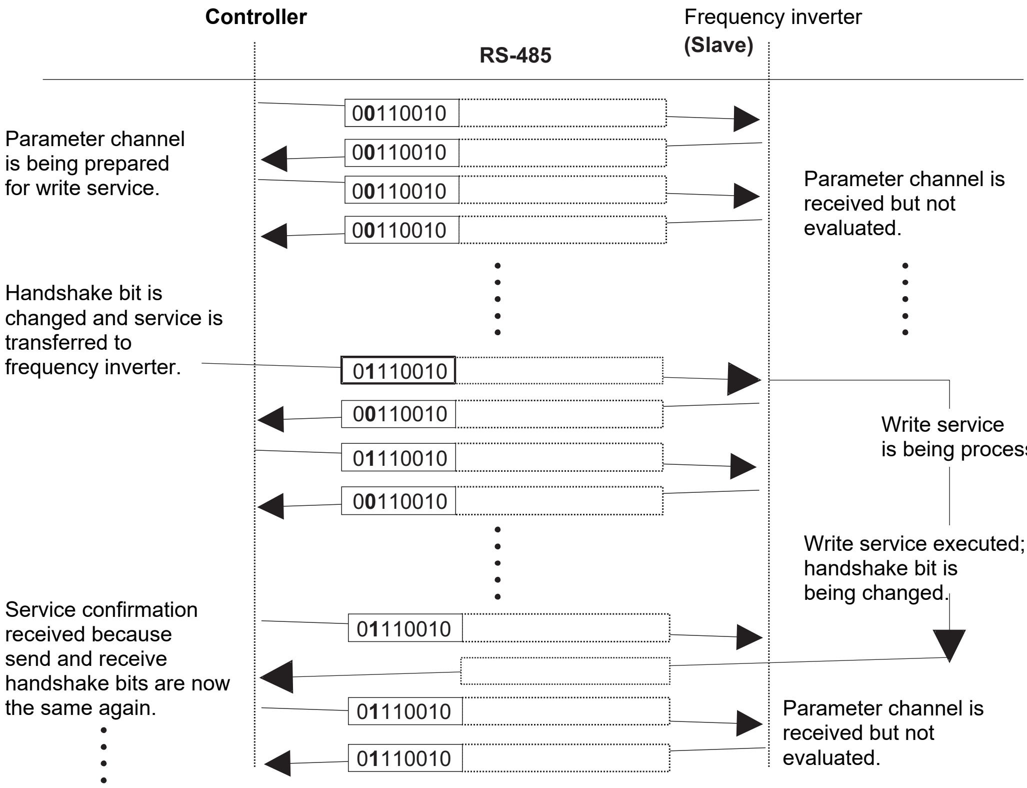
The data length is 4 bytes for all parameters of SEW-EURODRIVE frequency inverters.

Using the WRITE service as an example, the following figure illustrates a parameter setting procedure between the controller and inverter via a cyclical PDU type. To simplify the process, only the management byte of the parameter channel is displayed.



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While the master prepares the parameter channel for the write service, the parameter channel is only received and sent back by the frequency inverter. The service is not activated until the moment when the handshake bit is changed (in this example, when it changes from 0 to 1). The frequency inverter now interprets the parameter channel and processes the write service; however, it continues to respond to all telegrams with handshake bit = 0. Confirmation that the service has been executed occurs when the handshake bit in the response telegram of the frequency inverter is set to the same value. The master now recognizes that the received handshake bit matches the sent one and can now prepare a new parameterization.

11.11.7 Notes on parameterization

Parameterization of the MOVITRAC® B frequency inverter via the fieldbus system generally allows you to access all drive parameters. However, as some drive parameters are directly related to communication via the fieldbus system, you should observe the following information during parameterization.

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Parameter setting in CONTROLLER INHIBIT status

Some parameters can only be changed (written) in the drive status *CONTROLLER INHIBIT*. The inverter signals this with a negative confirmation of the Write service. You can find out which parameters have this restriction in the parameter list. In general, however, these parameters can also be changed during an error or in *24 V operation* status.

Factory setting

When executing the factory setting, almost all parameters are reset to the default value. For bus operation, this means that the control signal source and the setpoint source are reset to the default value.

INFORMATION

The frequency inverter must be enabled for control via the process data on the terminal side. This means that the drive is enabled after the factory setting under certain conditions. Therefore, before activating the factory setting, make sure that the signals of the digital inputs do not trigger an enable of the frequency inverter after the factory setting. Switch on the line voltage only after completing parameterization of the inverter by way of precaution.

Parameter lock

When activated via *P803 Parameter lock* = *Yes*, the parameter lock blocks any adjustment of adjustable parameters. It makes sense to activate the parameter lock if the frequency inverter has been fully parameterized and no further changes are required. You can use this parameter, for example, to disable a change to the drive parameters, e.g. via the frequency inverter's keypad.

INFORMATION

The parameter lock generally blocks the writing of parameters. This means that write access via the communication interfaces is also blocked when the parameter lock is active.

11.12 External setpoint selection

11.12.1 Setpoint direction

You can specify the set direction of rotation via:

- "CW/stop" and "CCW/stop" at *P101 Control signal source* = *terminals* or *P101 Control signal source* = *3 Wire control*.
- The polarity of the setpoint in the process data word for *P101 Control signal source* = *RS485 or SBus* **and** *P100 Setpoint source* = *RS485 or SBus*.

11.12.2 Setpoint speed

You can specify the setpoint speed with:

- Setpoint adjuster if *P121 Addition FBG setpoint adjuster* is set to ON
- *P100 Setpoint source*
  - Fixed setpoints

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– Fixed setpoints with analog input
– Process data word from SBus or RS485
– Motor potentiometer

11.12.3 Enabling the direction of rotation with RS485 or SBus

Unipolar setpoint sources:

Unipolar/fixed setpoint
Motor potentiometer/fixed setpoint
Fixed setpoint + AI1
Fixed setpoint * AI1
Frequency setpoint input/fixed setpoint

The direction of rotation is specified by the CW or CCW terminals.

Bipolar setpoint sources:

Bipolar/fixed setpoint
RS485/fixed setpoint
SBus 1/fixed setpoint

The direction of rotation is determined by the setpoint. CW or CCW terminal is required for enable.

11.12.4 Startup for MBG11A setpoint adjuster

It is not possible to establish communication between MOVITRAC® B/MBG11A and MOVITRAC® B/PC via RS485 at the same time.

The MBG11A can specify a setpoint for up to 31 MOVITRAC® B devices at the same time.

Parameter settings

The following parameters must be set differently from the factory setting in MOVITRAC® B. If you are using an FBG11B for parameterization, set the bracket value:

- *P100 Setpoint source:* RS485 (2)
- *P101 Control signal source:* RS485 (1)
- *P871 Setpoint description PO2*: to "Speed %", then *P876 Enable PO data* to "Yes"

The speed is now displayed: -100% to +100% correspond to $-n_{max}$ to $+n_{max}$.

Input terminals

The following input terminals must be connected to 24 V:

- DI01 CW/stop: positive + negative direction of rotation possible by selecting the sign on the MBG11A
- DI03 Enable/stop

Settings for process data word

If the process data word PO2 is not changed, the MBG11A can also be used. Then the conversion is 1% = 32 1/min. This results from the relationship 4000 hex = 100% speed. You can see the respective values in the following tables.

The setpoint speed is specified via the MBX keypads as a percentage. The scaling changes according to the tables below depending on the PO2 setting (speed in percent or speed in revolutions):

PO2 = speed (standard parameterization *P871* = speed)

Percentage	Hex	Decimal	Speed
1%	A4 hex	164 dec	32
10%	666 hex	1638 dec	328
25%	1000 hex	4096 dec	819.2
33%	1555 hex	5461 dec	1092.3
50%	2000 hex	8192 dec	1638.4
75%	3000 hex	12288 dec	2457.6
100%	4000 hex	16384 dec	3276.8

PO2 = speed % (changed parameterization *P871* = speed %)

Percentage	Hex	Decimal	Speed
1%	A4 hex	164 dec	n_max / 100
10%	666 hex	1638 dec	n_max / 10
25%	1000 hex	4096 dec	n_max / 4
33%	1555 hex	5461 dec	n_max / 3
50%	2000 hex	8192 dec	n_max / 2
75%	3000 hex	12288 dec	n_max / 1333
100%	4000 hex	16384 dec	n_max

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12 Parameters

The parameter menu is usually only required for startup and when servicing is performed. You can set the MOVITRAC® B parameters in various ways:

- With the keypad
- Using the MOVITOOLS® MotionStudio programs on a PC via RS485 interface
- Copying the parameters using the keypad

You can download the latest version of the MOVITOOLS® MotionStudio engineering software from the SEW homepage (www.sew-eurodrive.com).

12.1 Overview of parameters

The following table shows all parameters with factory settings (highlighted in bold). Numerical values are displayed with the complete setting range.

"Parameter group 0.. Display value " (→ 🗎 300)	
"Parameter group 00. process values" (→ 🗎 300)	
"P000 speed (signed)" (→ 🗎 300)	
"P001 user display for DBG11B" (→ 🗎 300)	
"P002 Frequency (signed)" (→ 🗎 300)	
"P004 Output current (absolute value)" (→ 🗎 300)	
"P005 Active current (signed)" (→ 🗎 300)	
"P008 DC link voltage" (→ 🗎 300)	
"P009 Output current" (→ 🗎 300)	
"Parameter group 01. Status displays" (→ 🗎 301)	
"P010 Inverter status" (→ 🗎 301)	
"P011 Operating state" (→ 🗎 301)	
"P012 Fault status" (→ 🗎 301)	
"P013 Current parameter set" (→ 🗎 301)	
"P014 Heat sink temperature" (→ 🗎 301)	
"P015 effective power" (→ 🗎 301)	
"Parameter group 02. analog setpoints" (→ 🗎 301)	
"P020 Analog input AI1" (→ 🗎 301)	
"P021 Analog input AI2 (optional)" (→ 🗎 301)	
"Parameter group 03. Digital inputs" (→ 🗎 302)	
"P030 Digital input DI00" (→ 🗎 302)	**Fault reset**
"P031 Digital input DI01" (→ 🗎 302)	**CW/stop**
"P032 Digital input DI02" (→ 🗎 302)	**CCW/stop**
"P033 Digital input DI03" (→ 🗎 302)	**Enable**
"P034 Digital input DI04" (→ 🗎 302)	**n11/n21**
"P035 Digital input DI05" (→ 🗎 302)	**n12/n22**
"P039 Digital inputs DI00 – DI05" (→ 🗎 302)	
"Parameter group 04. Digital inputs option" (→ 🗎 302)	
"P040 Digital input DI10" (→ 🗎 302)	**No function**
"P041 Digital input DI11" (→ 🗎 302)	**No function**
"P042 Digital input DI12" (→ 🗎 302)	**No function**
"P043 Digital input DI13" (→ 🗎 302)	**No function**
"P044 Digital input DI14" (→ 🗎 302)	**No function**
"P045 Digital input DI15" (→ 🗎 302)	**No function**
"P046 Digital input DI16" (→ 🗎 303)	**No function**
"P047 Virtual digital input DI17" (→ 🗎 303)	**No function**
"P048 Digital inputs DI10 – DI17" (→ 🗎 303)	
"Parameter group 05. Digital outputs" (→ 🗎 303)	

"P051 Digital output DO01" (→ 🗎 303)	**/FAILURE**
"P052 Digital output DO02" (→ 🗎 303)	**BRAKE ON**
"P053 Digital output DO03" (→ 🗎 303)	**READY**
"P059 Digital outputs DO01 – DO03" (→ 🗎 303)	
"Parameter group 07. unit data" (→ 🗎 303)	
"P070 Device type" (→ 🗎 303)	
"P071 nominal output current" (→ 🗎 303)	
"P072 Front module" (→ 🗎 303)	
"P073 Front module firmware" (→ 🗎 303)	
"P076 Basic unit firmware" (→ 🗎 303)	
"P077 DBG firmware" (→ 🗎 303)	
"Parameter group 08. error memory" (→ 🗎 304)	
"P080 – P084 faults t-0 – t-4" (→ 🗎 304)	
"Parameter group 09. bus diagnostics" (→ 🗎 304)	
"P090 PD configuration" (→ 🗎 304)	
"P091 Fieldbus type " (→ 🗎 304)	
"P092 Fieldbus baud rate" (→ 🗎 304)	
"P093 Fieldbus address" (→ 🗎 304)	
"P094 PO1 setpoint" (→ 🗎 304)	
"P095 PO2 setpoint" (→ 🗎 304)	
"P096 PO3 setpoint" (→ 🗎 304)	
"P097 PI1 actual value" (→ 🗎 304)	
"P098 PI2 actual value" (→ 🗎 305)	
"P099 PI3 actual value" (→ 🗎 305)	
"Parameter group 1.. Setpoints/ramp generators" (→ 🗎 306)	
"Parameter group 10. Setpoint selection / frequency input" (→ 🗎 306)	
"P100 Setpoint source" (→ 🗎 306)	**1 / Unipolar / fixed setpoint**
"P101 Control signal source" (→ 🗎 307)	**0 / Terminals**
"P102 frequency scaling fFI1max" (→ 🗎 308)	0.1 – **10** – 120.00 kHz
"P103 FI1 reference" (→ 🗎 308)	**0 / n_{max}**
"P104 Setpoint reference speed and analog inputs" (→ 🗎 308)	0 – **3000** – 6000 1/min
"P105 AI1 wire break detection" (→ 🗎 309)	**7 / Rapid stop/warning**
"P106 FI1 characteristic x1" (→ 🗎 309)	**0** – 100%
"P107 FI1 characteristic y1" (→ 🗎 309)	-100 – **0** – +100%
"P108 FI1 characteristic x2" (→ 🗎 309)	0 – **100**%
"P109 FI1 characteristic y2" (→ 🗎 310)	-100 – 0 – **+100**%
"Parameter group 11. analog input 1 (0 – 10 V)" (→ 🗎 310)	
"P112 AI1 Operating mode" (→ 🗎 311)	**1 / 10 V, reference maximum speed**
"P116 AI1 characteristic x1" (→ 🗎 311)	**0** – 100%
"P117 AI1 characteristic y1" (→ 🗎 311)	-100 – **0** – +100%
"P118 AI1 characteristic x2" (→ 🗎 311)	0 – **100**%
"P119 AI1 characteristic y2" (→ 🗎 311)	-100 – 0 – **+100**%
"Parameter group 12. Analog input AI2/FBG setpoint adjuster (option)" (→ 🗎 312)	
"P120 AI2 operating mode" (→ 🗎 312)	**0 / No function**
"P121 Addition FBG setpoint adjuster" (→ 🗎 312)	**0 / Off**
"P122 Direction of rotation FBG manual mode" (→ 🗎 312)	**0 / Unipolar CW**
"P126 AI2 characteristic curve x1" (→ 🗎 313)	**-100** – 0 – +100% (-10 – **0** – +10 V)
"P127 AI2 characteristic curve y1" (→ 🗎 313)	**-100** – 0 – +100% (-n_{max} – **0** – +n_{max} / **0** – I_{max})
"P128 AI2 characteristic curve x2" (→ 🗎 313)	-100 – 0 – **+100%** (-10 – 0 – **+10 V**)

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"P127 AI2 characteristic curve y2" (→ 🗎 313)	-100 – 0 – **+100%** ($-n_{max}$ – 0 – **$+n_{max}$** / 0 – **I_{max}**)
"Parameter group 13. / 14. speed ramps 1 / 2" (→ 🗎 314)	
"P130 / P140 ramp t11 / t21 up" (→ 🗎 314)	0 – **2** – 2000 s
"P131 / P141 ramp t11 / t21 down" (→ 🗎 314)	0 – **2** – 2000 s
"P134 / P144 ramp t12 / t22 up = down" (→ 🗎 314)	0 – **10** – 2000 s
"P135 / P145 S pattern t12 / t22" (→ 🗎 315)	**0** / 1 / 2 / 3
"P136 / P146 stop ramp 13 / t23 up = down" (→ 🗎 315)	0 – **2** – 20 s
"P139 / P149 Ramp monitoring 1 / 2" (→ 🗎 315)	**Yes** / No
"Parameter group 15. motor potentiometer function" (→ 🗎 315)	
"P150 ramp t3 up = down" (→ 🗎 315)	0.2 – **20** – 50 s
"P152 Save last setpoint" (→ 🗎 316)	**Off / Aus**
"Parameter group 16. / 17. Fixed setpoints 1 / 2" (→ 🗎 316)	
"P160 / P170 Internal setpoint n11 / n21" (→ 🗎 316)	-5000 – **150** – 5000 1/min
"P161 / P171 Internal setpoint n12 / n22" (→ 🗎 316)	-5000 – **750** – 5000 1/min
"P162 / P172 Internal setpoint n13 / n23" (→ 🗎 316)	-5000 – **1500** – 5000 1/min
"P163 / P173 n11 / n21 PI controller" (→ 🗎 316)	0 – **3** – 100%
"P164 / P174 n12 / n22 PI controller" (→ 🗎 316)	0 – **15** – 100%.
"P165 / P175 n13 / n23 PI controller" (→ 🗎 316)	0 – **30** – 100%
"Parameter group 2.. Controller parameters" (→ 🗎 317)	
"P207 Hoist preload" (→ 🗎 317)	-150%...0...150%
"Parameter group 25. PI controller" (→ 🗎 317)	
"P250 PI controller" (→ 🗎 318)	**0 / Off**
"P251 P-gain" (→ 🗎 318)	0 – **1** – 64
"P252 I-component" (→ 🗎 318)	0 – **1** – 2000 s
"Parameter group 3.. Motor parameters" (→ 🗎 318)	
"Parameter group 30. / 31. limits 1 / 2" (→ 🗎 318)	
"P300 / P310 Start/stop speed 1/2" (→ 🗎 318)	0 – 150 1/min
"P301 / P311 Minimum speed 1 / 2" (→ 🗎 319)	0 – **15** – 5500 1/min
"P302 / P312 Maximum speed 1 / 2" (→ 🗎 319)	0 – **1500** – 5500 1/min
"P303 / P313 Current limit 1/2" (→ 🗎 319)	0 – **150**% I_N
"Parameter group 32. / 33. motor adjustment 1 / 2" (→ 🗎 320)	
"P320 / P330 Automatic adjustment 1/2" (→ 🗎 320)	**On / Ein**
"P321 / P331 Boost 1/2" (→ 🗎 320)	**0** – 100%
"P322 / P332 IxR compensation 1/2" (→ 🗎 320)	0 – 100%
"P323 / P333 Premagnetization time 1/2" (→ 🗎 320)	0 – 2 s
"P324 / P334 Slip compensation 1/2" (→ 🗎 321)	0 – 500 1/min
"Parameter group 34. motor protection" (→ 🗎 322)	
"P340/P342 Motor protection 1/2" (→ 🗎 322)	**OFF** / ON ASYNCHRONOUS
"P341/P343 Type of cooling 1/2" (→ 🗎 322)	**SELF-VENTILATION**
"P345/P346 IN UL monitoring" (→ 🗎 323)	0.1 – 500 A
"Parameter group 4.. Reference signals" (→ 🗎 323)	
"Parameter group 40. Speed reference signal" (→ 🗎 323)	
"P400 Speed reference value" (→ 🗎 323)	0 – **750** – 5000 1/min
"P401 Hysteresis" (→ 🗎 323)	0 – **100** – 500 1/min
"P402 Delay time" (→ 🗎 323)	0 – **1** – 9 s
"P403 signal = "1" if" (→ 🗎 324)	**0 / n < n_{ref}**
"Parameter group 43. Current reference signal" (→ 🗎 324)	
"P430 Current reference value" (→ 🗎 324)	0 – **100** – 150% I_N
"P431 Hysteresis" (→ 🗎 324)	0 – **5** – 30% I_N

"P432 Delay time" (→ 🗎 324)	0 – **1** – 9 s
"P433 Signal = "1" if" (→ 🗎 324)	**0 / I < I_{ref}**
"Parameter group 44. Imax signal" (→ 🗎 324)	
"P440 Hysteresis" (→ 🗎 324)	0 – **5** – 50% I_N
"P441 delay time" (→ 🗎 325)	0 – **1** – 9 s
"P442 Signal = "1" if" (→ 🗎 325)	**0 / I = I_{max}**
"Parameter group 45.. PI controller_reference signal" (→ 🗎 325)	
"P450 PI actual value reference" (→ 🗎 325)	**0.0** – 100.0%
"P451 Signal = "1" if" (→ 🗎 325)	**1 / PI actual value > PI ref**
"Parameter group 5.. Monitoring functions" (→ 🗎 325)	
"Parameter group 50. speed monitoring 1 / 2" (→ 🗎 325)	
"P500/P502 Speed monitoring 1/2" (→ 🗎 325)	**On / motor mode / generator mode**
"P501/P503 Delay time 1/2" (→ 🗎 325)	0 – **1** – 10 s
"Parameter group 54. Gear unit/motor monitoring" (→ 🗎 326)	
"P540 Drive vibration response/warning" (→ 🗎 326)	**Display errors**
"P541 Drive vibration response/fault" (→ 🗎 327)	**Rapid stop/warning**
"P542 Oil aging response/warning" (→ 🗎 327)	**Display errors**
"P543 Oil aging response/fault" (→ 🗎 327)	**Display errors**
"P544 Oil aging/overtemperature" (→ 🗎 327)	**Display errors**
"P545 Oil aging/ready" (→ 🗎 327)	**Display errors**
"P549 Brake wear response" (→ 🗎 327)	**Display errors**
"Parameter group 56. Ex-e motor current limitation" (→ 🗎 328)	
"P560 Ex-e motor current limitation" (→ 🗎 328)	On/**Off**
"P561 Frequency A" (→ 🗎 328)	0 – **5** – 60 Hz
"P562 Current limit A" (→ 🗎 328)	0 – **50** – 150%
"P563 Frequency B" (→ 🗎 329)	0 – **10** – 104 Hz
"P564 Current limit B" (→ 🗎 329)	0 – **80** – 200%
"P565 Frequency C" (→ 🗎 329)	0 – **25** – 104 Hz
"P566 Current limit C" (→ 🗎 329)	0 – **100** – 200%
"P567 frequency D" (→ 🗎 329)	0 – **50** – 104 Hz
"P568 current limit D" (→ 🗎 329)	0 – **100** – 200%
"Parameter group 57. Ex-e motor current limitation" (→ 🗎 329)	
"P570 frequency E" (→ 🗎 329)	0 – **87** – 104 Hz
"P571 current limit E" (→ 🗎 329)	0 – **100** – 200%
"Parameter group 6.. Terminal assignment" (→ 🗎 330)	
"Parameter group 60. Digital inputs" (→ 🗎 330)	
"P601 Digital input DI02" (→ 🗎 330)	**CCW/stop**
"P602 Digital input DI03" (→ 🗎 330)	Enable
"P603 Digital input DI04" (→ 🗎 330)	n11/n21
"P604 Digital input DI05" (→ 🗎 331)	**n12/n22**
"P608 Digital input DI00" (→ 🗎 331)	**Fault reset**
"Parameter group 61. Digital inputs option" (→ 🗎 331)	
"P610 Digital input DI10" (→ 🗎 331)	**No function**
"P611 Digital input DI11" (→ 🗎 331)	**No function**
"P612 Digital input DI12" (→ 🗎 331)	**No function**
"P613 Digital input DI13" (→ 🗎 331)	**No function**
"P614 Digital input DI14" (→ 🗎 331)	**No function**
"P615 Digital input DI15" (→ 🗎 331)	**No function**
"P616 Digital input DI16" (→ 🗎 331)	**No function**
"P617 Virtual digital input DI17" (→ 🗎 331)	**No function**

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"Parameter group 62. Digital outputs of basic device" (→ 🗎 332)	
"P620 Digital output DO01" (→ 🗎 332)	**/FAILURE**
"P621 Digital output DO02" (→ 🗎 332)	**BRAKE ON**
"P622 Digital output DO03" (→ 🗎 332)	**READY**
"Parameter group 63. Digital outputs DO" (→ 🗎 333)	
"P630 Virtual digital outputs" (→ 🗎 333)	
"Parameter group 64. Analog outputs AO1 (optional)" (→ 🗎 333)	
"P640 AO1 analog output" (→ 🗎 334)	**0 / No function**
"P641 AO1 reference" (→ 🗎 334)	**0 / 3000 1/min, 100 Hz, 150%**
"P642 AO1 operating mode" (→ 🗎 334)	**0 / No function**
"P646 AO1 characteristic curve x1" (→ 🗎 335)	-100 – **0** – +100%
"P647 AO1 characteristic curve y1" (→ 🗎 335)	**-100** – +100%
"P648 AO1 characteristic curve x2" (→ 🗎 335)	-100 – 0 – **+100%**
"P649 AO1 characteristic curve y2" (→ 🗎 335)	**-100** – +100%
"Parameter group 7.. Control functions" (→ 🗎 335)	
"Parameter group 70. Operating mode 1/2" (→ 🗎 336)	
"P700/P701 Operating mode 1/2" (→ 🗎 338)	**21 / V/f characteristic**
"P703 Dynamic response" (→ 🗎 338)	**Off / Aus**
"Parameter group 71. Standstill current 1/2" (→ 🗎 339)	
"P710/P711 Standstill current 1/2" (→ 🗎 339)	**0** – 50% I_{Mot}
"Parameter group 72. setpoint stop function 1 / 2" (→ 🗎 339)	
"P720 / P723 setpoint stop function 1 / 2" (→ 🗎 339)	**Off / Aus**
"P721/P724 Stop setpoint 1/2" (→ 🗎 339)	0 – **30** – 500 1/min
"P722/725 Start offset 1/2" (→ 🗎 339)	0 – **30** – 500 1/min
"Parameter group 73. Brake function 1/2" (→ 🗎 340)	
"P731/P734 Brake release time 1/2" (→ 🗎 340)	**0** – 2 s
"P732/P735 Brake application time 1/2" (→ 🗎 340)	0 – 2 s
"Parameter group 74. Speed skip function" (→ 🗎 341)	
"P740/P742 Skip center 1/2" (→ 🗎 341)	0 – **1500** – 5000 1/min
"P741/P743 Skip bandwidth 1/2" (→ 🗎 341)	**0** – 300 1/min
"Parameter group 75. Master-slave function" (→ 🗎 341)	
"P750 Slave setpoint" (→ 🗎 343)	**0: MASTER-SLAVE OFF**
"P751 Scaling of slave setpoint" (→ 🗎 343)	-10 – **0** – 1 – 10
"Parameter group 76. Manual mode" (→ 🗎 343)	
"P760 Lock RUN / STOP keys" (→ 🗎 343)	**Off / Aus**
"Parameter group 77. Energy saving function" (→ 🗎 343)	
"P770 Energy saving function" (→ 🗎 344)	**Off / Aus**
"Parameter group 8.. Device functions" (→ 🗎 344)	
"Parameter group 80. setup" (→ 🗎 344)	
"P800 Short menu (FBG11B only)" (→ 🗎 344)	Short
"P801 Language (DBG60B)" (→ 🗎 344)	
"P802 Factory setting" (→ 🗎 344)	**No / Nein**
"P803 Parameter lock" (→ 🗎 344)	**Off / Aus**
"P804 Reset statistic data" (→ 🗎 345)	No action
"P805 Nominal line voltage" (→ 🗎 345)	50 to 500 V
"P806 Copy DBG to MOVITRAC B" (→ 🗎 345)	Yes/**No**
"P807 Copy MOVITRAC B to DBG " (→ 🗎 345)	Yes/**No**
"P808 24VIO auxiliary voltage output X12:8" (→ 🗎 345)	**1 / On**: 24 V are switched on
"P809 IPOS activation" (→ 🗎 345)	

"Parameter group 81. Serial communication" (→ 🗎 345)	
"P810 RS485 Address" (→ 🗎 345)	**0** – 99
"P811 RS485 group address" (→ 🗎 346)	**100** – 199
"P812 RS485 timeout interval" (→ 🗎 346)	**0** – 650 s
"P819 Fieldbus timeout interval" (→ 🗎 346)	
"Parameter group 82. Brake operation 1 / 2" (→ 🗎 346)	
"P820/P821 4-quadrant operation 1/2" (→ 🗎 346)	On / Ein
"Parameter group 83. Fault responses" (→ 🗎 346)	
"P830 "External fault" terminal response" (→ 🗎 347)	**4 / Rapid stop/failure (stop with interlocking)**
"P833 Response to RS485 timeout" (→ 🗎 347)	**7 / Rapid stop/warning**
"Parameter group 84. Reset behavior" (→ 🗎 347)	
"P840 Manual reset" (→ 🗎 347)	**No**
"P841 Auto reset" (→ 🗎 348)	Off
"P842 Restart time" (→ 🗎 348)	1 – **3** – 30 s
"Parameter group 85. actual speed value scaling" (→ 🗎 348)	
"P850 Scaling factor numerator" (→ 🗎 348)	**1** – 65535
"P851 scaling factor denominator" (→ 🗎 348)	**1** – 65535
"P852 User unit" (→ 🗎 349)	**1/min**
"P853 Scaled speed FBG" (→ 🗎 349)	
"Parameter group 86. modulation 1 / 2" (→ 🗎 349)	
"P860/P861 PWM frequency 1/2" (→ 🗎 349)	**4 kHz**
"P862/P863 PWM fix 1/2" (→ 🗎 350)	Off / Aus
"Parameter group 87. Process data parameter setting" (→ 🗎 350)	
"P870 Setpoint description PO1" (→ 🗎 350)	**Control word 1**
"P871 Setpoint description PO2" (→ 🗎 350)	**Speed**
"P872 Setpoint description PO3" (→ 🗎 351)	**No function**
"P873 Actual value description PI1" (→ 🗎 351)	**STATUS WORD 1**
"P874 Actual value description PI2" (→ 🗎 351)	**SPEED**
"P875 Actual value description PI3" (→ 🗎 351)	**OUTPUT CURRENT**
"P876 PO data enable" (→ 🗎 351)	**Yes / Ja**
"Parameter group 88. Serial communication SBus" (→ 🗎 352)	
"P880 SBus protocol" (→ 🗎 352)	**0 / MoviLink®**
"P881 SBus address" (→ 🗎 352)	**0** – 63
"P882 SBus group address" (→ 🗎 352)	**0** – 63
"P883 SBus timeout delay" (→ 🗎 352)	**0** – 650 s
"P884 SBus baud rate" (→ 🗎 353)	**500 / 500 kB**
"P886 CANopen address" (→ 🗎 353)	1 – **2** – 127
"Parameter group 9.. IPOS parameters" (→ 🗎 353)	
"P938 Speed for task 1" (→ 🗎 353)	**0** – 9
"P939 Speed for task 2" (→ 🗎 353)	**0** – 9

12.2 Explanation of the parameters

If a selection option exists, the factory setting is highlighted in **bold**.

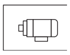
The parameters for motor startup are described in the chapter "Startup with the FBG keypad".

You can select the parameters on the FBG11B keypad as follows:

Selection in the FBG11B long menu

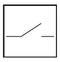
Selection in the FBG11B quick menu and in the FBG11B complete menu


Direct selection in the FBG11B keypad and in the FBG11B long menu


Selection within FBG motor startup

The following symbols explain the parameters:

These parameters are switchable and available in parameter set 1 and 2.


These parameters can only be changed if the inverter status is "LOCKED" (= output stage high impedance).

The startup function changes this parameter automatically.

12.2.1 Parameter group 0.. Display value

Parameter group 00. process values

P000 – Speed (signed)

The displayed speed is the calculated actual speed in 1/min

P001 User display for DBG11B

The user display is determined by the following parameters:

- *P850 Numerator scaling factor*
- *P851 Denominator scaling factor*
- *P852 User unit*

P002 Frequency (signed)

Output frequency of the inverter in Hz

P004 Output current (absolute value)

Apparent current in % I_N of the nominal unit current

P005 Active current (signed)

Displayed in % I_N

Active current in the range 0 – 200% of the nominal unit current. The display value is positive for torque in the positive rotation direction and negative for torque in the negative rotation direction.

P008 DC link voltage Short

DC link voltage in V

P009 output current

Apparent current at the output of the inverter, displayed in AC A

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Parameter group 01. Status displays

P010 Inverter status

Status of the device output stage:

- LOCKED
- ENABLED

P011 Operating state

The following operating states are possible:

- 24 V OPERATION
- CONTROLLER INHIBIT
- NO ENABLE
- STANDSTILL CURRENT
- ENABLE
- FACTORY SETTING
- FAULT
- SAFE TORQUE OFF

P012 Fault status

Error number and error in plain text

P013 Current parameter set

Parameter set 1 or 2

P014 Heat sink temperature

Heat sink temperature of the inverter in °C

P015 effective power

Actual electrical active power in watts.

Parameter group 02. analog setpoints

P020 Analog input AI1

Voltage 0 – 10 V at analog input AI1.

If S11 = "On" and *P112 AI1 operating mode:*

- = *NMAX, 0 – 20 mA*: Display 0 – 10 V = = 0 – 20 mA
- = *NMAX, 4 – 20 mA*: Display 2 – 10 V = ≙ 4 – 20 mA

P021 Analog input AI2 (optional)

Voltage in V (-10 to +10 V)

Parameter group 03. Digital inputs

P030 Digital input DI00

Status of digital input DI00 (**error reset**)

P031 Digital input DI01

Status of digital input DI01 (fixed assignment: CW/stop)

P032 Digital input DI02

Status of digital input DI02 (**CCW / stop**)

P033 Digital input DI03

Status of digital input DI03 (**enable**)

P034 Digital input DI04

Status of digital input DI04 (**n11 / n21**)

P035 Digital input DI05

Status of digital input DI05 (**n12 / n22**)

P039 Digital inputs DI00 – DI05 

Collective display of the digital inputs

Parameter group 04. Digital inputs option

P040 Digital input DI10

Status of digital input DI10 (**no function**)

P041 Digital input DI11

Status of digital input DI11 (**no function**)

P042 Digital input DI12

Status of digital input DI12 (**no function**)

P043 Digital input DI13

Status of digital input DI13 (**no function**)

P044 Digital input DI14

Status of digital input DI14 (**no function**)

P045 Digital input DI15

Status of digital input DI15 (**no function**)

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P046 Digital input DI16

Status of digital input DI16 (**no function**)

P047 Virtual digital input DI17

Status of virtual digital input DI17

P048 Digital inputs DI10 – DI17

Collective display of the digital inputs

Parameter group 05. Digital outputs

P051 Digital output DO01

Status of digital output DO01 (**/FAILURE**)

P052 Digital output DO02

Status of digital output DO02 (**BRAKE ON**)

P053 Digital output DO03

Status of digital output DO03 (**READY FOR OPERATION**)

P059 Digital outputs DO01 – DO03

Collective display of the digital outputs

Parameter group 07. unit data

P070 Device type

Display of the device type, e.g. MC07B0008-2B1

P071 nominal output current

Display of the nominal unit current in A

P072 Front module

Display of the front module

P073 Front module firmware

Part number and firmware version for front module

P076 Basic unit firmware

Part number and firmware version

P077 DBG firmware

Part number and firmware version

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Parameter group 08. error memory

P080 – P084 Faults t-0 to t-4

FBG11B operator panel: only error t-0 (*P080*)

The device stores the following information at the time of the error. MOVITOOLS® MotionStudio can display this information if required:

- *P036 / P053 Status of the digital inputs / digital outputs*
- *P013 Current parameter set*
- *P011 Operating state of inverter*
- *P010 Inverter status*
- *P014 Heat sink temperature*
- *P000 Speed*
- *P004 output current*
- *P005 Active current*
- Device utilization
- *P008 DC link voltage*

Parameter group 09. bus diagnostics

P090 PD configuration

Display of the process data configuration, only applies to FSE24

P091 Fieldbus type

Display of the fieldbus type, only applies to FSE24

P092 Fieldbus baud rate

Baud rate in kB, only applies to FSE24

P093 Fieldbus address

Display of the address, only applies to FSE24

P094 PO1 setpoint

Process data output word 1, setpoint in hex

P095 PO2 setpoint

Process data output word 2, setpoint in hex

P096 PO3 setpoint

Process data output word 3, setpoint in hex

P097 PI1 actual value

Process data input word 1, actual value in hex

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P098 PI2 actual value

Process data input word 2, actual value in hex

P099 PI3 actual value

Process data input word 3, actual value in hex

–

Bus status display, only applies to FSE24

–

Display of device identification, only applies to FSE24

12.2.2 Parameter group 1.. Setpoints/ramp generators

Parameter group 10. Setpoint selection / frequency input

P100 Setpoint source

0 / Bipolar / fixed setpoint

The setpoint comes from the analog input or from the fixed setpoints. The device processes the fixed setpoints on a signed basis.

In the event of a wire break, the speed is limited by the set maximum speed *P302 / P312*.

1 / Unipolar / fixed setpoint

The setpoint comes from the analog input or from the fixed setpoints. The device processes the fixed setpoints on an **absolute value basis**. The digital inputs specify the direction of rotation.

2 / RS485 / fixed setpoint

The setpoint comes from the RS485 interface. The sign of the setpoint value determines the direction of rotation.

4 / Motor potentiometer / fixed setpoint

Set the setpoint value by programming the terminals *Motor potentiometer up/motor potentiometer down* accordingly. This motor potentiometer is a virtual potentiometer and does not correspond to the setpoint potentiometer on the device.

6 / Fixed setpoint + AI1

The sum of the selected fixed setpoint and analog input AI1 forms the setpoint. The digital inputs specify the direction of rotation. Furthermore, *P112 AI1 operating mode* applies.

7 / Fixed setpoint × AI1

The value at analog input AI1 serves as a weighting factor for the selected fixed setpoint (0 – 10 V = 0 – 100%). If no fixed setpoint is selected, n_{min} is effective. The digital inputs specify the direction of rotation.

8 / MASTER-SBus

The setpoint comes from the master in master/slave operation via the system bus. See *P75x Master-slave function*.

9 / MASTER-RS485

The setpoint comes from the master in master/slave operation via the RS485 interface. See *P75x Master-slave function*.

10 / SBus1 / fixed setpoint

The system bus specifies the setpoint. The sign of the setpoint value determines the direction of rotation.

11 / Frequency setpoint input / fixed setpoint

The frequency at digital input DI04 specifies the setpoint.

The duty cycle (pulse width of the high and low signals) is optimally 1:1. Both the rising and falling edges of the input signal are detected. You can use "P102 Frequency scaling" (→ 🗎 236) to set the input frequency at which the system setpoint is reached at 100%. The direction of rotation is specified via the digital inputs CW/stop and CCW/stop.

Frequency scaling	Minimum response time (delay)	Frequency input resolution
25 – 120 kHz	20 ms	50 Hz
12.5 – 24.99 kHz	40 ms	25 Hz

Frequency scaling	Minimum response time (delay)	Frequency input resolution
10 – 12.49 kHz	60 ms	16.7 Hz
1 – 9.99 kHz	500 ms	2 Hz

14 / Bipolar AI2 / fixed setpoint

The setpoint comes from the optional analog input AI2 or from the fixed setpoints. The device processes the fixed setpoints on a signed basis.

P101 Control signal source

0 / Terminals

The digital inputs determine the control.

1 / RS485

The RS485 interface and the digital inputs determine the control.

3 / SBus

The system bus and the digital inputs determine the control.

4 / 3-wire control

The 3-wire control principle determines the control.

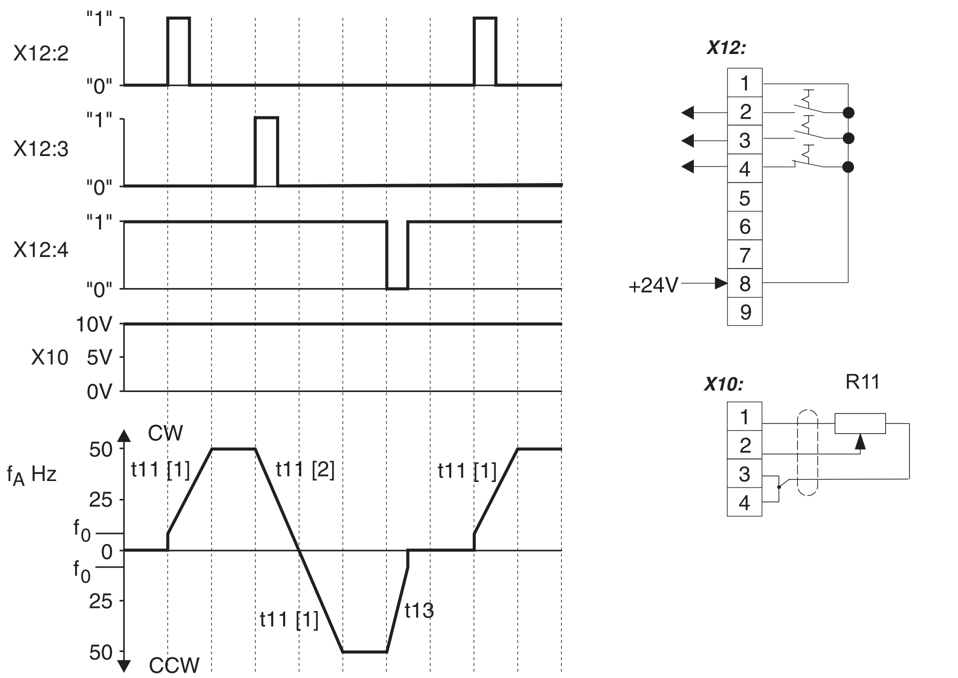
The enable and direction of rotation signals of the inverter then respond in an edge-controlled way.

If you switch CW and CCW at the same time, the drive starts to decelerate on the downward ramp *P131 / P141*.

If the control signal source *3-wire-control* is active and the drive is started by a start edge: You can stop the drive with the STOP button when the RUN-STOP buttons are enabled. You can then restart the drive with the RUN button without the need for another start edge.

If you stop the drive with the stop button, the device saves a start edge. If you then press the RUN button, the device immediately enables the drive.

3-wire control signal source



18014398556843019

X12:2 CW/stop CW Clockwise rotation

X12:3	CCW/stop	CCW	Counterclockwise rotation
X12:4	Enable/stop	t11 [1]	t11 up
X10	Setpoint input AI	t11 [2]	t11 down
f_A	Output frequency	t13	Stop ramp
f_0	Start/stop frequency		

P102 Frequency scaling f_{FI1max}

Setting range: 0.1 – **10** – 120.00 kHz

P103 FI1 reference

0 / n_{max}

1 / $n_{Reference}$

P104 Setpoint reference speed and analog inputs

Setpoint reference speed $n_{Reference}$ for frequency input FI1 and analog inputs AI1 and AI2

Setting range: 0 – **3000** – 6000 1/min

P105 AI1 wire break detection

Wire break detection is only available in the 4 – 20 mA operating mode.

0 / No response

2 / Immediate stop / failure

The inverter performs an immediate switch-off with an error message. The inverter disables the output stage and the brake engages. The inverter resets the ready signal and sets the programmed fault output. A restart is only possible after a fault reset has been performed during which the inverter is reinitialized.

4 / Rapid stop / failure

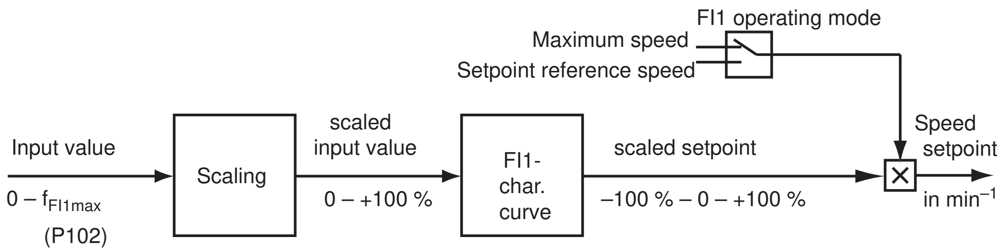
The inverter brakes the drive on the set stop ramp (*P136 / P146*). In 2-quadrant operation, the inverter brakes with DC braking. Once the stop speed is reached, the inverter disables the output stage and the brake engages. The error is reported immediately. The inverter resets the ready signal and sets the programmed fault output. A restart is only possible after a fault reset has been performed during which the inverter is reinitialized.

7 / Rapid stop / warning

The error response corresponds to that of rapid stop/failure with the difference that the inverter does not reset the ready signal and sets the fault output.

Frequency input FI1 characteristic

The frequency input can be parameterized with a characteristic:



18014398808756491

P106 FI1 characteristic x1

Setting range: **0** – 100%

P107 FI1 characteristic y1

Setting range: -100 – **0** – +100%

P108 FI1 characteristic x2

Setting range: 0 – **100**%

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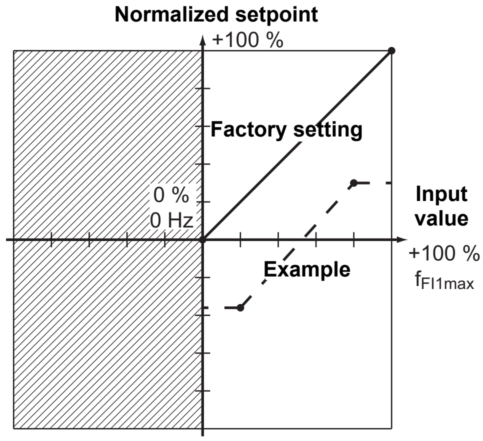
P109 FI1 characteristic y2

Setting range: -100 – 0 – **+100**%

The two coordinates x1/y1 and x2/y2 are used to describe a 2-point characteristic that evaluates the frequency input FI1.



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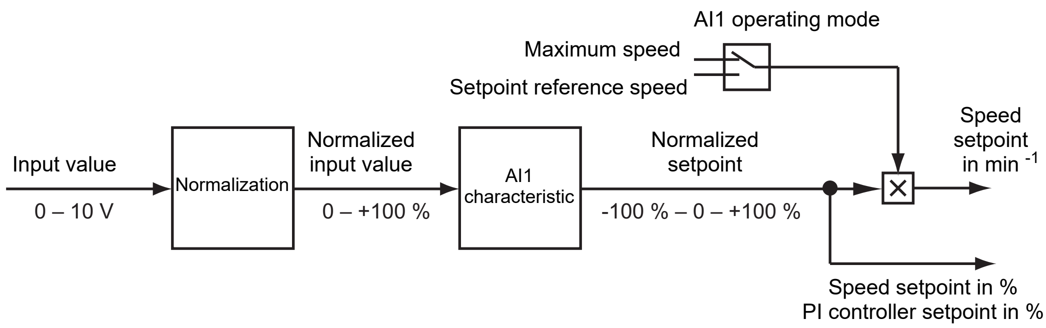
Parameter group 11. analog input 1 (0 – 10 V)

The analog input can be parameterized with a characteristic.



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P112 AI1 operating mode

1 / 10 V, reference maximum speed

Voltage input with reference n_{max} (0 – 10 V = 0 – n_{max}). You can adjust the characteristic curve with *AI1 Scaling*.

Switch S11 = V.

5 / 0 – 20 mA, reference maximum speed

Current input 0 – 20 mA = 0 – n_{max}. *P110 AI1 scaling* has no effect.

Switch S11 = mA.

6 / 4 – 20 mA, reference maximum speed

Current input 0 – 20 mA = 0 – n_{max}. *P110 AI1 scaling* has no effect.

Switch S11 = mA.

7 / 0 – 10 V, n-reference

8 / 0 – 20 V, n-reference

9 / 4 – 20 V, n-reference

P116 AI1 characteristic x1

Setting range: **0** – 100%

P117 AI1 characteristic y1

Setting range: -100 – **0** – +100%

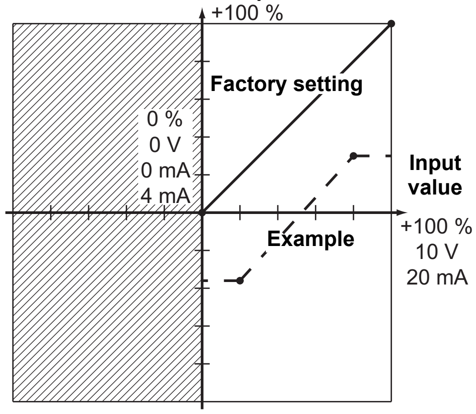
P118 AI1 characteristic x2

Setting range: 0 – **100**%

P119 AI1 characteristic y2

Setting range: -100 – 0 – **+100**%

The two coordinates x1/y1 and x2/y2 are used to describe a 2-point characteristic that evaluates the analog input AI1.



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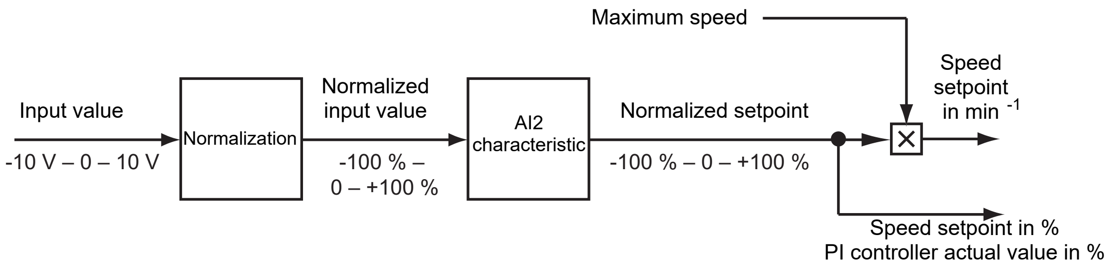
Parameter group 12. Analog input AI2/FBG setpoint adjuster (option)

The analog input AI2 is only available with the optional analog module FIO11B.



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P120 AI2 operating mode

0 / No function

The setpoint at analog input AI2 is not used.

1 / 0 – ±10 V + setpoint / 100% corresponds to n_{max}

The evaluated setpoint value at AI2 is added to setpoint value 1 (= AI1) with the correct sign.

2 / 0 – 10 V current limitation / 100% corresponds to I_{max}

The input serves as an external current limiter.

P121 Addition of FBG setpoint adjuster

0 / Off

The device does not take the value from the setpoint adjuster of the FBG11 operator panel into account.

1 / On

The value from the setpoint adjuster of the FBG11 operator panel is added to the set setpoint source of bipolar/fixed setpoint, unipolar/fixed setpoint, RS485/fixed setpoint, frequency input/fixed setpoint or SBus/fixed setpoint. The addition also affects fixed setpoints.

2 / On (without fixed setpoint)

The value from the setpoint adjuster of the FBG11 operator panel is added to the set setpoint source of bipolar/fixed setpoint, unipolar/fixed setpoint, RS485/fixed setpoint, frequency input/fixed setpoint or SBus/fixed setpoint. The addition does **not** affect **fixed setpoints**.

P122 Direction of rotation of FBG manual mode

Setting the setpoint with the setpoint adjuster of the FBG11 operator panel in FBG manual mode.

0 / Unipolar CW

Adjustable speed: 0 to $+n_{max}$.

1 / Unipolar CCW

Adjustable speed: 0 to $-n_{max}$.

2 / Bipolar CW and CCW

Adjustable speed: $-n_{max}$ to $+n_{max}$.

P126 AI2 characteristic x1

Setting range: **-100** – 0 – +100% (-10 – **0** – +10 V)

P127 AI2 characteristic y1

Setting range: **-100** – 0 – +100% ($-n_{max}$ – **0** – $+n_{max}$ / **0** – I_{max})

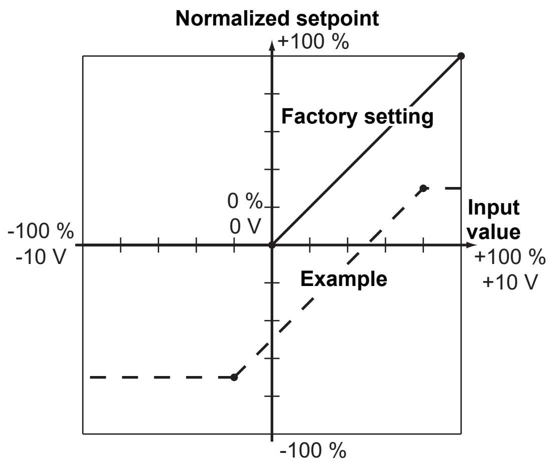
P128 AI2 characteristic x2

Setting range: -100 – 0 – **+100%** (-10 – 0 – **+10 V**)

P127 AI2 characteristic y2

Setting range: -100 – 0 – **+100%** ($-n_{max}$ – 0 – $\mathbf{+n}_{max}$ / 0 – $\mathbf{I}_{max}$)

The two coordinates x1/y1 and x2/y2 describe the characteristic with which the analog input is evaluated.



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Parameter group 13. / 14. speed ramps 1 / 2

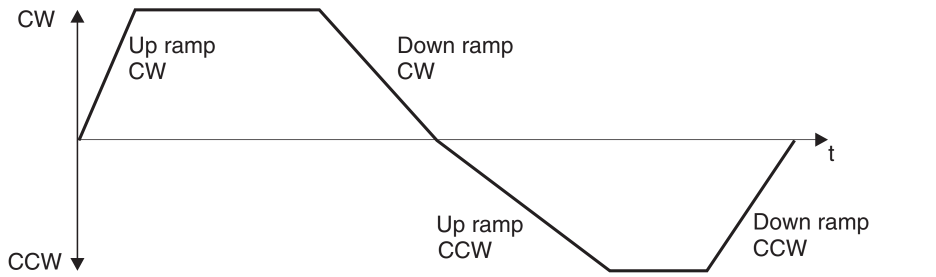
The ramp times refer to a setpoint change of Δn = 3000 1/min. The ramps t11 / t21 up and t11 / t21 down are effective when the setpoint is changed. When the enable signal is removed with the STOP/RESET button or via terminals, the stop ramp t13 / t23 is effective.

P130 / P140 Ramp t11 / t21 up

P130 Ramp t11 up CW / *P140 Ramp t21 up CW*

Setting range: 0 – **2** – 2000 s

The ramp times refer to a setpoint step change of Δn = 3000 1/min. The ramp takes effect when the speed setpoint is changed and the enable signal is revoked via the CW/CCW terminal.



277883403

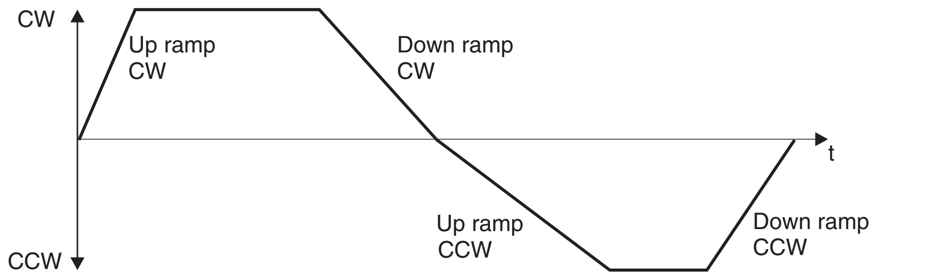
Setting range: 0 – **2** – 2000 s; acceleration ramp

P131 / P141 ramp t11 / t21 down

P131 Ramp t11 down CW / *P141 Ramp t21 down CW*

Setting range: 0 – **2** – 2000 s

The ramp times refer to a setpoint step change of Δn = 3000 1/min. The ramp takes effect when the speed setpoint is changed and the enable signal is revoked via the CW/CCW terminal.



277883403

Setting range: 0 – **2** – 2000 s; deceleration ramp

P134 / P144 Ramp t12 / t22 up = down

Setting range: 0 – **10** – 2000 s

The following applies to this ramp: up = down and CW = CCW.

The ramps t12 / t22 are activated by a binary input (→ *P601* – *P608*), which is programmed with the "speed ramp changeover" function.

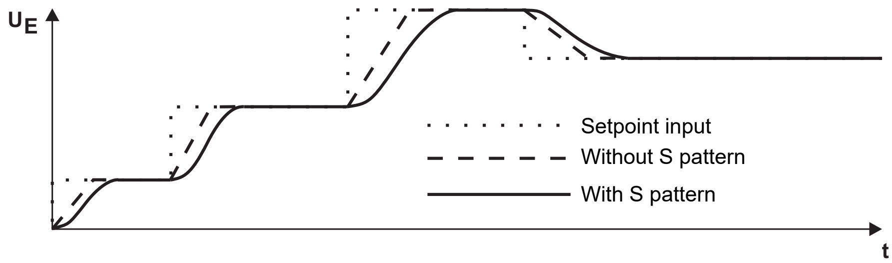
P135 / P145 S pattern t12 / t22

Function is only active when t12 / t22 is selected.

Setting range: **0** / 1 / 2 / 3 (0 = Off, 1 = weak, 2 = medium, 3 = strong)

The 2nd Ramp (t12 / t22) of parameter set 1 and 2 can be rounded with 3 degrees of smoothing to achieve a smoother acceleration of the drive.

Effect of the S pattern:



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A started S pattern is interrupted by the stop ramp t13 / t23 and a changeover to ramp t11 / t21. Revoking the setpoint or a stop via the input terminals causes the started S curve to be completed. The drive can therefore still accelerate despite the setpoint withdrawal.

P136 / P146 Stop ramp t13 / t23 up = down

Setting range: 0 – **2** – 20 s

Stop ramp on changeover to the "NO ENABLE" operating state.

P139 / P149 Ramp monitoring 1 / 2

Setting range: **Yes** / No

If you set the deceleration ramps much shorter than can be physically achieved in the system, the still rotating drive will be stopped after the monitoring time has elapsed. In addition to the error message F34, this also leads to increased brake wear.

Furthermore, the setting of the respective ramp must be increased if the ramp timeout definitively occurs due to an unfeasible ramp specification.

This parameter is an additional monitoring function for speed monitoring. It can monitor, e.g if speed monitoring is not desired, the down, stop or emergency stop ramp t11/t12 and t13.

Parameter group 15. motor potentiometer function

Also see *P100 Setpoint source*.

The ramp times refer to a setpoint change of Δn = 3000 1/min.

P150 Ramp t3 up = down

Setting range: 0.2 – **20** – 50 s

The ramp is effective when using the terminal functions *Motor potentiometer up* and *Motor potentiometer down*.

P152 Save last setpoint

Off / Aus

The inverter starts with n_{min}:

If you use the motor potentiometer for continuous speed adjustment, you must set *P152 Save last setpoint* to "Off". Otherwise the error message *F25 EEPROM* will appear after approx. 100 000 memory operations.

Saving only on setpoint change. After a fixed setpoint has been deselected, the fixed setpoint is adopted as the motor potentiometer value.

On / Ein

The inverter starts with the last set motor potentiometer setpoint:

After a fixed setpoint has been deselected, the old motor potentiometer setpoint is adopted again.

Parameter group 16. / 17. Fixed setpoints 1 / 2

You can activate the fixed setpoints via the digital inputs with the arguments n11 / n21 or n12 / n22 and FIXED SETP. CHNG. (parameter *P60_*). Activate the fixed setpoints n13 / n23 by assigning the functions n11 / n21 and n12 / n22 to 2 digital inputs and applying a 1 signal to both.

P160 / P170 Internal setpoint n11 / n21

Setting range: -5000 – **150** – 5000 1/min

P161 / P171 Internal setpoint n12 / n22

Setting range: -5000 – **750** – 5000 1/min

P162 / P172 Internal setpoint n13 / n23

Setting range: -5000 – **1500** – 5000 1/min

P163 / P173 n11 / n21 PI controller

Setting range: 0 – **3** – 100%. See chapter "PI controller" (→ 🗎 150).

P164 / P174 n12 / n22 PI controller

Setting range: 0 – **15** – 100%. See chapter "PI controller" (→ 🗎 150).

P165 / P175 n13 / n23 PI controller

Setting range: 0 – **30** – 100%. See chapter "PI controller" (→ 🗎 150).

12.2.3 Parameter group 2.. Controller parameters

Parameter group 20. Speed control

P207 Hoist preload

Setting range: -150% – 150%; **Set value.**

INFORMATION

This parameter is only included in firmware (part number 18225632) versions 17 and 18. It is essential that you set this parameter. If you leave this setting unchanged at "Set value", fault *F09* (Startup fault) is immediately issued when the drive is enabled

This parameter is only effective in the operating mode *P700*: *VFC&hoist* and determines the initial value of the slip control on enable.

The slip control is pretensioned to a signed, preset value. This setting can, for example, prevent the unwanted sagging of hoists when the brake is released.

A positive value must be entered for applications that lift loads with CW rotation of the motor.

A negative value must be entered for applications that lift loads with CCW rotation of the motor.

When parameter values are set to > 150% or < -150% via MOVITOOLS® MotionStudio, the settings are reset to the value "Set value".

Values between 151% and 199%, that have been set via the parameter access (FBG11B or fieldbus) will be accepted by the software and displayed on the interface, but they will be limited to 150%.

The values +200% and -200% will reset the function to the value "Set value". Using the direct parameter access, no text is displayed, but only values.

Recommended settings:

$$P207 = \frac{\text{Required torque to hold the load}}{\text{Nominal motor torque}} * 100$$

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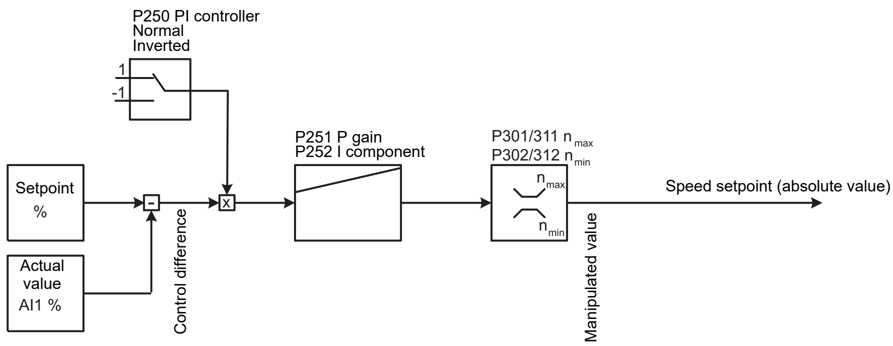
Parameter group 25. PI controller

Explanations of the parameters can be found in the chapter "PI controller" (→ 150).

PI controller



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P250 PI controller

0 / Off

PI controller switched off.

1 / Normal

PI controller switched on normally.

2 / Inverted

PI controller switched on inverted.

P251 P gain

Setting range: 0 – **1** – 64

P252 I component

Setting range: 0 – **1** – 2000 s

12.2.4 Parameter group 3.. Motor parameters

Use this parameter group to adapt the inverter to the motor.

Parameter group 30. / 31. limits 1 / 2

P300 / P310 Start/stop speed 1 / 2 1 2 AUTO

Setting range: 0 – 150 1/min

If the setpoint speed is higher than the start/stop speed, the start/stop speed is enabled. The transition to the setpoint speed takes place with the active speed ramp. If the setpoint speed is below the start/stop speed, the setpoint is activated immediately.

Notice:

- When using operating mode P700: "VFC&hoist" is set to 1.5 times the nominal slip speed of the connected motor. The minimum stop speed is 15 1/min.
- In all other operating modes, the start/stop speed is set at 50% of the nominal slip speed of the connected motor.

When a stop command is executed, this setting also determines the lowest speed at which the motor power is then switched off or the post-magnetization triggered and the brake applied.

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P301 / P311 Minimum speed 1 / 2

Setting range: 0 – **15** – 5500 1/min

Speed value that cannot be undershot even if the setpoint input is zero. The minimum speed is also valid if $n_{min} < n_{Start/Stop}$ has been set.

Notice:

- When using operating mode P700: VFC&hoist is set to 1.5 times the nominal slip speed of the connected motor. The lowest possible speed is 15 1/min, even if n_{min} has been set lower.
- For all other operating modes, the minimum speed is set to 15 1/min during startup. However, a smaller value is possible.

P302 / P312 Maximum speed 1 / 2

Setting range: 0 – **1500** – 5500 1/min

A setpoint input cannot exceed the value set here. If you set $n_{min} > n_{max}$, the value set in n_{max} applies to the minimum speed and the maximum speed.

In VFC and VFC + DC-BRAKING operating mode, you are allowed to enter the following values as maximum speeds depending on the number of poles:

If higher values are entered, the error *F08 Speed monitoring* might appear.

When you perform the startup, the device automatically sets the maximum speed to the base speed.

P303 / P313 Current limit 1 / 2

Setting range: 0 – **150**% I_N

The internal current limitation refers to the apparent current, i.e. the output current of the inverter. In the field weakening range, the inverter automatically reduces the current limit internally. This enables the inverter to implement stall protection for the motor.

When the hoist function is activated, a current limit that is less than the rated motor current is ignored.

Parameter group 32. / 33. motor adjustment 1 / 2

Only use the function *P320 / P330 Automatic adjustment* for single-motor operation. You can use this function for all motors and control modes. The inverter measures the motor during premagnetization and sets parameter *P322 / P332 IxR adjustment*. The values are stored in volatile memory.

The motor is not calibrated if:

- *P320 / P330 Automatic adjustment* = "Off".
- VFC & flying start operating mode is activated.
- The set premagnetization time is more than 30 ms shorter than the premagnetization time calculated during startup.

If you switch off the automatic adjustment, the last measured values are saved in non-volatile memory.

The factory setting of the parameters *P321 – P324 / P331 – P334* depends on the motor.

P320 / P330 Automatic adjustment 1 / 2

Off / Aus

No automatic adjustment: The inverter does not calibrate the motor.

On / Ein

Automatic adjustment: The inverter calibrates the motor into the "ENABLE" operating state each time it is changed.

P321 / P331 Boost 1 / 2

Setting range: **0** – 100%

The value is calculated during startup. For VFC operating modes, the value is "0". Manual adjustment is not normally necessary. In special cases, manual adjustment might be necessary to increase the breakaway torque; setting values up to a maximum of 30% of IxR are useful here. For V/f operating modes, 1/3 of IxR is set. In special cases, manual adjustment might be necessary to increase the breakaway torque; setting values up to a maximum of 60% of IxR are useful here.

P322 / P332 IxR adjustment 1 / 2

Setting range: 0 – 100%

With *P320 / P330 Automatic adjustment* = "On", the inverter sets the value automatically. Manual changes to this parameter are reserved for optimization by specialists.

P323 / P333 Premagnetization time 1 / 2

Setting range: 0 – 2 s

When you enable the inverter, the premagnetization ensures that a magnetic field is built up in the motor.

P324 / P334 Slip compensation 1 / 2 Long 1 2 AUTO

Setting range: 0 – 500 1/min

The slip compensation increases the speed accuracy of the motor. For manual input, enter the nominal slip of the connected motor. Enter a value that does not deviate from the nominal slip by more than 20% to compensate for motor production deviations.

The slip compensation is designed for a ratio of load moment of inertia to motor moment of inertia of < 10. If the ratio is greater and the drive vibrates, the slip compensation must be reduced and possibly even set to "0".

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Parameter group 34. motor protection

P340 / P342 Motor protection 1 / 2 1 2

Setting range: **OFF** / ON ASYNCHRONOUS

OFF: Function not active

ON ASYNCHRONOUS:

MOVITRAC® B takes over the thermal protection of the connected motor electronically when this function is activated. In most cases, the motor protection function is comparable to standard thermal protection (motor circuit breaker) and, in addition, it takes account of speed-dependent cooling by the integrated fan. The motor utilization is determined via the inverter output current, type of cooling, motor speed and time. The thermal motor model is based on the motor data entered during startup (MOVITOOLS® MotionStudio/DBG60B) and compliance with the operating conditions specified for the motor.

- **INFORMATION**

  If the motor also has to be protected against failure of the fan, blockage of air ducts, etc., it is also necessary to employ protection in the form of a TF PTC thermistor or TH bimetallic switch.

The following message and display functions are available in connection with motor protection:

Parameter	Message and display function
P006 / P007 Motor utilization 1 / 2	Display of motor utilization for parameter set 1 / 2
	Error response of the inverter when P006 / P007 Motor utilization 1 / 2 reaches 110%. **Emergency stop/failure**

The following parameters must be set for this purpose:

Parameter	Setting/meaning
P341 / P343 Type of cooling 1 / 2	Self-cooling or external cooling
Binary output programmable to: • /Motor utilization 1 • /Motor utilization 2	Prewarning if the *P006 / P007 Motor utilization 1 / 2* exceeds the value of 100%. In this case, the programmed digital output is set to "0" = 0 V.

Notice: When the inverter is switched off (supply system and 24 V external), the motor utilization is always reset to "0", i.e. any existing motor heating is **not** taken into account when the inverter is switched on again.

The motor protection function processes the capacity utilization of the connected motors separately for both parameter sets. If only one motor is permanently connected to the inverter and the "parameter set changeover" function is only used for control technology purposes, the motor protection function must not be used. The motor protection function should also not be used with group drives, as not every individual motor can be reliably protected.

P341 / P343 Type of cooling 1 / 2 1 2

Setting range: **SELF-VENTILATION**/FORCED AIR COOLING

In order to calculate the thermal load of the motor as accurately as possible, as described under *P340 / P342 Motor protection 1 / 2*, it is necessary to know the type of cooling of the motor.

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P345 / P346 I_N UL monitoring

Setting range: 0.1 – 500 A

The function cannot be switched off. The factory setting depends on the rated power of the MOVITRAC® B and is set to the rated current of the SEW-EURODRIVE motor of the same power.

At 150% rated motor current, the inverter shuts down after 5 minutes.

At 500% rated motor current, the inverter shuts down after 20 seconds.

12.2.5 Parameter group 4.. Reference signals

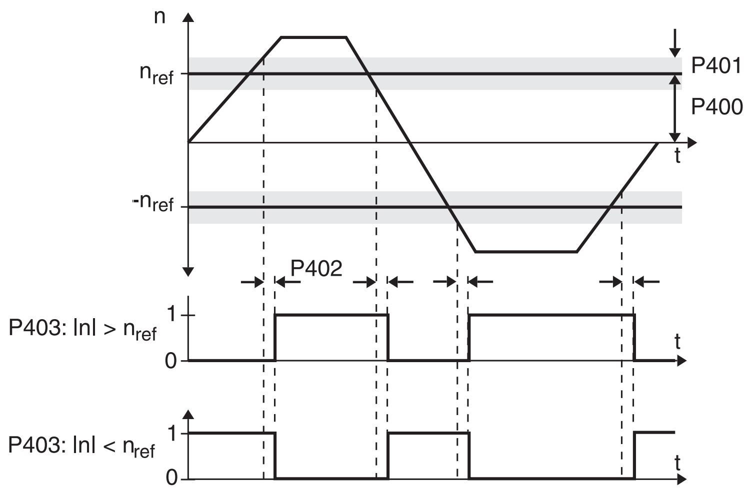
The following reference values are used to detect and report certain operating states. You can output all messages of parameter group 4.. via digital outputs.

If the inverter has reported *Ready for operation* after switching on and there is no error display, the messages are valid.

Parameter group 40. Speed reference signal

If the speed is less than or greater than the set reference speed, the inverter issues the message "1" at *P403*.

Speed reference message



9007199272625931

P400 Speed reference value

Setting range: 0 – **750** – 5000 1/min

P401 Hysteresis

Setting range: 0 – **100** – 500 1/min

P402 Deceleration time

Setting range: 0 – **1** – 9 s

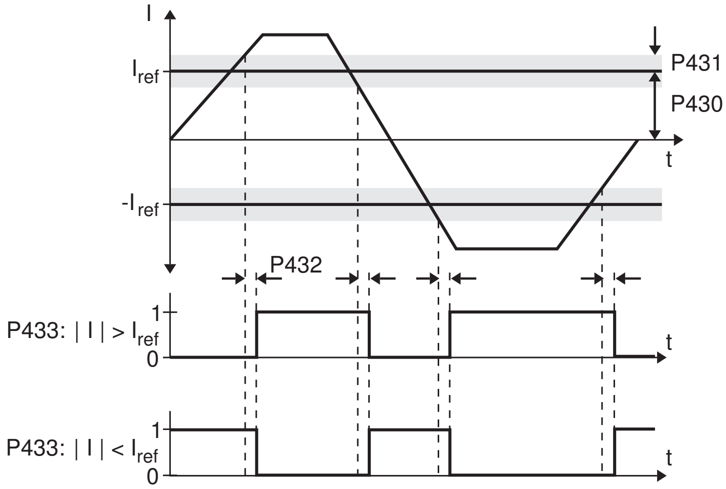
P403 Message = "1" for

0 / n < n_{ref}

1 / n > n_{ref}

Parameter group 43. Current reference signal

Message if output current is greater or less than the reference value.



9007199902738315

P430 Current reference value

Setting range: 0 – **100** – 150% I_N

P431 Hysteresis

Setting range: 0 – **5** – 30% I_N

P432 Deceleration time

Setting range: 0 – **1** – 9 s

P433 Message = "1" for

0 / I < I_{ref}

1 / I > I_{ref}

Parameter group 44. Imax signal

Message when the inverter has reached the current limit. An external current limiter (e.g. P120) is also taken into account.

P440 Hysteresis

Setting range: 0 – **5** – 50% I_N

P441 Deceleration time

Setting range: 0 – **1** – 9 s

P442 Message = "1" for

0 / I = I_{max}

1 / I < I_{max}

Parameter group 45.. PI controller_reference signal

See also chapter "PI controller/reference message".

These parameters determine whether and how the PI reference message responds

P450 PI actual value reference

0.0 – 100.0%

P451 Message = "1" for

0 / PI actual value < PI ref

1 / PI actual value > PI ref

12.2.6 Parameter group 5.. Monitoring functions

Parameter group 50. speed monitoring 1 / 2

The drive only reaches the speed required by the setpoint if it has sufficient torque. If the inverter reaches *P03 Current limit*, it assumes that it will not reach the desired speed. If the inverter exceeds the current limit for longer than *P501 Delay time*, the speed monitoring system responds.

P500 / P502 Speed monitoring 1 / 2

Off / Aus

On / motor mode / generator mode

Speed monitoring function in motor and generator mode of the motor.

P500 cannot be shutdown in the "VFC hoist" operating mode.

P501 / P503 Delay time 1 / 2

Setting range: 0 – **1** – 10 s

The set current limit can be reached briefly during acceleration, deceleration, or load peaks. You prevent an unintentionally sensitive response of the speed monitoring by setting the delay time. The monitoring responds when the current limit is reached for the length of the delay time.

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Parameter group 54. Gear unit/motor monitoring

These parameters are used to set the response that is triggered in the event of a motor or gear unit problem. To do this, the corresponding programming of the digital inputs must be carried out. The error responses are triggered in the inverter state *Controller inhibit* or *No enable*.

The digital input messages are filtered with a time constant of 10 s. The signal must therefore be present for at least 10 s.

Response	Description
0 / No response	No error is displayed and no error response is executed. The reported error is completely ignored.
1 / Display error	The error is displayed and the fault output is set (if programmed). The device performs no other error responses otherwise. The error can be reset (terminal, RS485, fieldbus, SBus, auto reset).
2 / Immediate stop / failure	There is an immediate switch-off of the inverter with an error message. The output stage is disabled and the brake is applied. The ready signal is canceled and the fault output is set, if programmed. A restart is only possible after a fault reset has been performed during which the inverter is reinitialized.
4 / Rapid stop / failure	The drive is braked with the set stop ramp t13 / t23. Once the stop speed is reached, the output stage is disabled and the brake is applied. The error message is displayed immediately. The ready signal is canceled and the fault output is set, if programmed. A restart is only possible after a fault reset has been performed during which the inverter is reinitialized.
7 / Rapid stop / warning	The drive is braked with the set stop ramp t13 / t23. When the stop speed is reached, the output stage is disabled and the brake is applied. The error message is displayed immediately. A fault message is sent via the terminal, if programmed. The ready signal is not taken away. The drive restarts without device re-initialization if the error is rectified by an internal procedure or by an error reset.

P540 Response to drive vibration / warning 

Display errors

If the drive vibration sensor signals a warning, the inverter carries out the set response.

P541 Response to drive vibration / error

Rapid stop / warning

If the drive vibration sensor signals an error, the inverter carries out the set response.

P542 Response oil aging / warning

Display errors

If the oil aging sensor signals a warning, the inverter carries out the set response.

P543 Response oil aging / fault

Display errors

If the oil aging sensor signals an error, the inverter carries out the set response.

P544 Oil aging / overtemperature

Display errors

If the oil aging sensor signals overtemperature, the inverter carries out the set response.

P545 Oil aging / ready signal

Display errors

If the oil aging sensor withdraws the ready signal, the inverter carries out the set response.

P549 Response to brake wear

Display errors

If the brake wear sensor trips, the inverter carries out the set response.

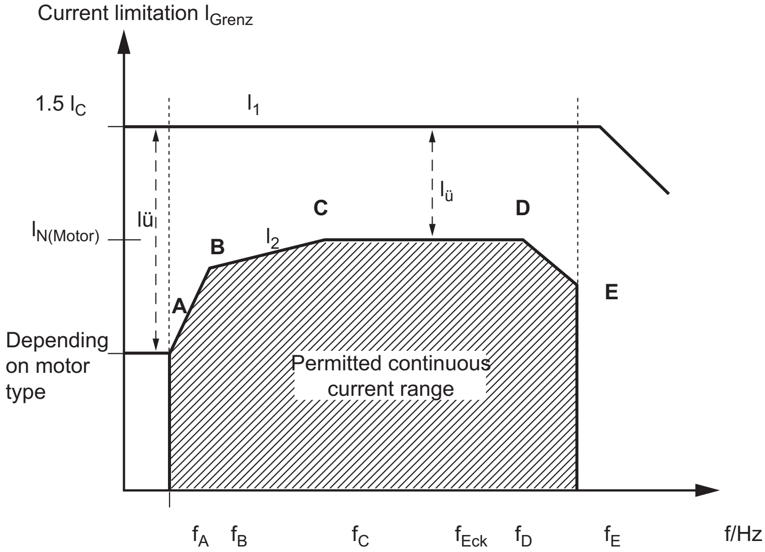
Parameter group 56. Ex-e motor current limitation

Parameter group *P56. Current limitation Ex-e motor* contains display and setting values that are specific to the function "Current limitation in the Ex-e motor on the inverter". The factory setting is highlighted in **bold** in each case. The factory settings apply to the delivery state.

Frequencies lower than frequency A are permanently impermissible. The following always applies:

- Frequency A < Frequency B < Frequency C < Frequency D < Frequency E
- Current limit A < current limit B < current limit C

For third-party Ex motors, the settings must be made manually.



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P560 Current limit of Ex-e motor AUTO

This function is automatically active if an Ex-e motor was previously put into operation.

Setting range: On / **Off**

On: Current limitation for Ex-e motors active

Startup activates the current limitation for Ex-e motors for the motors selected and approved for Ex-e operation.

P561 Frequency A AUTO

Setting range: 0 – **5** – 60 Hz

Value for minimum operating frequency f_A. The duration of operation at operating frequency A, regardless of the absolute current value, is 60 seconds. After this time has elapsed, the inverter shuts down and issues the error message *F110 Ex-e protection*.

P562 Current limit A AUTO

Setting range: 0 – **50** – 150%

Current limit that is permitted with operating frequency f_A. The curve between current limit A and current limit B is linear.

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P563 Frequency B AUTO

Setting range: 0 – **10** – 104 Hz

Value for the operating frequency f_B.

P564 Current limit B AUTO

Setting range: 0 – **80** – 200%

Current limit that is permitted with operating frequency f_B. The curve between current limit B and current limit C is linear.

P565 Frequency C AUTO

Setting range: 0 – **25** – 104 Hz

Value for the operating frequency f_C.

P566 Current limit C AUTO

Setting range: 0 – **100** – 200%

Current limit that is permitted with operating frequency f_C. The curve between current limit C and current limit D is linear.

P567 Frequency D AUTO

Setting range: 0 – **50** – 104 Hz

Value for the operating frequency f_D.

P568 Current limit D AUTO

Setting range: 0 – **100** – 200%

Current limit that is permitted with operating frequency f_D. The curve between current limit D and current limit E is linear.

Parameter group 57. Ex-e motor current limitation

P570 Frequency E AUTO

Setting range: 0 – **87** – 104 Hz

P571 Current limit E AUTO

Setting range: 0 – **100** – 200%

Current limit that is permitted with operating frequency f_E.

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12.2.7 Parameter group 6.. Terminal assignment

Parameter group 60. Digital inputs

DI01 is permanently assigned to CW/stop.

Function	Effect with		Effective with inverter status	
	0 signal	**1 signal**	**Locked**	**Released**
0: No function	–	–	–	–
1: Enable/stop	Stop at stop ramp *P136 / P146*	Enable	No	Yes
2: CW/stop	Stop at t11 / t21	Enable CW rotation	No	Yes
3: CCW/stop	Stop at t11 / t21	Enable CCW rotation	No	Yes
4: n11 / n21	External setpoints only	Fixed setpoint selected	No	Yes
5: n12 / n22	External setpoints only	See below	No	Yes
6: Fixed setpoint changeover	Fixed setpoints of the active parameter set selected	Fixed setpoints of the non-active parameter set selected	Yes	Yes
7: Parameter set changeover	Parameter set 1	Parameter set 2	Yes	No
8: Ramp changeover	t11 / t21 active	t12 / t22 active	Yes	Yes
9: Motor potentiometer up	–	Increase setpoint	No	Yes
10: Motor potentiometer down	–	–	No	Yes
11: /External fault	External error (*F26*)	–	No	Yes
12: Fault reset	Reset on positive edge ("0" to "1")	–	Yes	Yes
19: Slave freewheel	Master/slave operation	Slave freewheel	No	Yes
20: Setpoint acceptance active	Do not accept	Apply setpoint	No	Yes
26: TF message (only for DI05)	Motor overtemperature	–	No	Yes
27: Vibration/warning	Sensor reports warning	–	Yes	Yes
28: Vibration/error	Sensor reports error	–	Yes	Yes
29: Brake wear	Brake is worn	–	Yes	Yes
30: /Controller inhibit	Locked	Enable	Yes	Yes
33: Oil aging/warning	Sensor reports warning	–	Yes	Yes
34: Oil aging/fault	Sensor reports error	–	Yes	Yes
35: Oil aging/overtemperature	Sensor reports overtemperature	–	Yes	Yes
36: Oil aging/ready	Sensor is not ready	–	Yes	Yes

Fixed setpoints

Fixed setpoints	Description
n11 / n21 = "0" and n12 / n22 = "0":	External setpoints only
n11 / n21 = "1" and n12 / n22 = "0":	n11 / n21
n11 / n21 = "0" and n12 / n22 = "1":	n12 / n22
n11 / n21 = "1" and n12 / n22 = "1":	n13 / n23

P601 Digital input DI02 Short

CCW/stop

P602 Digital input DI03 Short

Enable

P603 Digital input DI04 Short

n11 / n21

P604 Digital input DI05

n12 / n22

P608 Digital input DI00

Fault reset

Parameter group 61. Digital inputs option

P610 Digital input DI10

No function

P611 Digital input DI11

No function

P612 Digital input DI12

No function

P613 Digital input DI13

No function

P614 Digital input DI14

No function

P615 Digital input DI15

No function

P616 Digital input DI16

No function

P617 Virtual digital input DI17

No function

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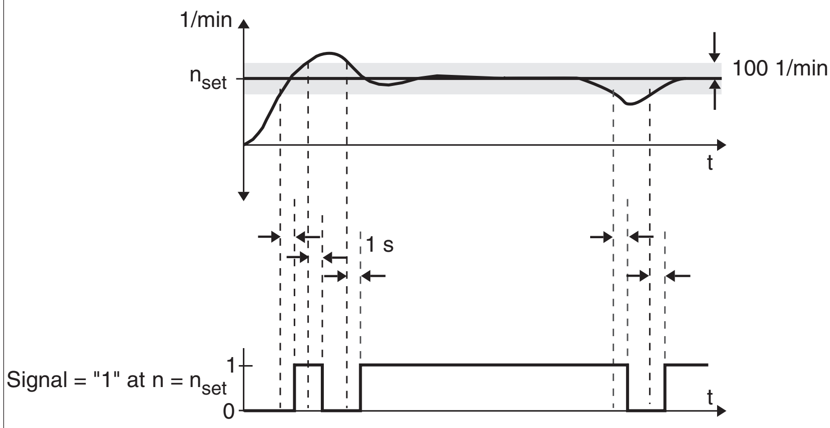
Parameter group 62. Digital outputs of basic device

Only use the digital output DO02 for control of the brake rectifier.

Function	Significance for	
	0 signal	**1 signal**
0: No function	–	–
1: /Failure	Collective fault message	–
2: Ready	Not ready for operation	Ready
3: Output stage on	Device inhibited	Device enabled and motor energized
4: Rotating field on	No rotating field	Rotating field
5: Brake on	Brake is applied	Brake is released
8: Parameter set	1 active	2 active
9: Speed reference message	$n > n_{ref}$ / $n < n_{ref}$*(P403)*	$n < n_{ref}$ / $n > n_{ref}$*(P403)*
11: Set/actual comparison message	$n \neq n_{setpoint}$	$n = n_{setpoint}$
	Message if the speed is equal to or unequal to the setpoint speed  *3856903435.*	
12: Current reference message	$I > I_{ref}$ / $I < I_{ref}$*(P433)*	$I < I_{ref}$ / $I > I_{ref}$*(P433)*
13: Imax message	$I < I_{max}$ / $I = I_{max}$*(P442)*	$I = I_{max}$ / $I < I_{max}$*(P442)*
21: IPOSplus® output	–	Depending on the IPOSplus® program
22: /IPOSplus® failure	IPOSplus® fault message	–
23: PI controller actual value reference	–	Actual value for PI control has exceeded the set threshold
24: Ex-e current limit active	Current limit not active	Current limit active
26: S pattern is generated	S pattern is not calculated	S pattern is calculated
27: Safe torque off	The "Safe Torque Off" display is **not safety-related** and must not be used for safety-related purposes.	
30: /Ixt warning	Normal operation	Ixt > 115%
31: /Ixt failure	Normal operation	Ixt > 125%

P620 Digital output DO01

/FAILURE

P621 Digital output DO02

BRAKE ON

P622 Digital output DO03

READY (selection 5 (BRAKE ON) not possible)

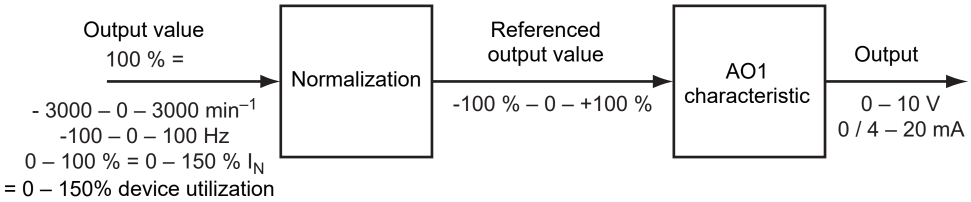
Parameter group 63. Digital outputs DO

P630 Virtual binary outputs

This describes how to assign the virtual digital outputs, see also P620. Assignment is only possible with the help of MOVITOOLS® MotionStudio.

Parameter group 64. Analog outputs AO1 (optional)

The analog output AO1 is only available with optional analog module FIO11B.



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P640/AO1 Analog output

0 / No function

The value 0% is output.

1 / Ramp generator input (absolute value)

Setpoint speed at the input of the internal ramp generator

100% corresponds to 3000 1/min

2 / Setpoint speed (absolute value)

Valid setpoint speed (ramp generator output or manipulated value of the higher-level controller)

100% corresponds to 3000 1/min

3 / Actual speed (absolute value)

100% corresponds to 3000 1/min

4 / Actual frequency (absolute value)

Rotating field frequency

100% corresponds to 100 Hz

5 / Output current (absolute value)

Apparent current

100% corresponds to 150% I_N

6 / Active current (absolute value)

100% corresponds to 150% I_N

7 / Device utilization

Current device utilization

100% corresponds to 150% device utilization

11 / Actual speed (signed)

±100% corresponds to ±3000 1/min

12 / Actual frequency (signed)

Rotating field frequency

±100% corresponds to ±100 Hz

P641 AO1 reference

0 / 3000 1/min, 100 Hz, 150%

1 / n_{max}

2 / $n_{Set\ reference}$

P642 AO1 operating mode

0 / No function

Edition: Always 0 V or 0 mA

2 / 0 – 20 mA / 100% corresponds to 20 mA

3 / 4 – 20 mA / 100% corresponds to 20 mA

4 / 0 – 20 mA / 100% corresponds to 10 mA

P646 AO1 characteristic x1

-100 – **0** – +100%

-3000 1/min – 0 – +3000 1/min

-100 Hz – 0 – 100 Hz

0 – 100% I_N

0 – 100% = 0 – 150% device utilization

P647 AO1 characteristic y1

-100 – +100%

P648 AO1 characteristic x2

-100 – 0 – **+100%**

-3000 1/min – 0 – +3000 1/min

-100 Hz – 0 – 100 Hz

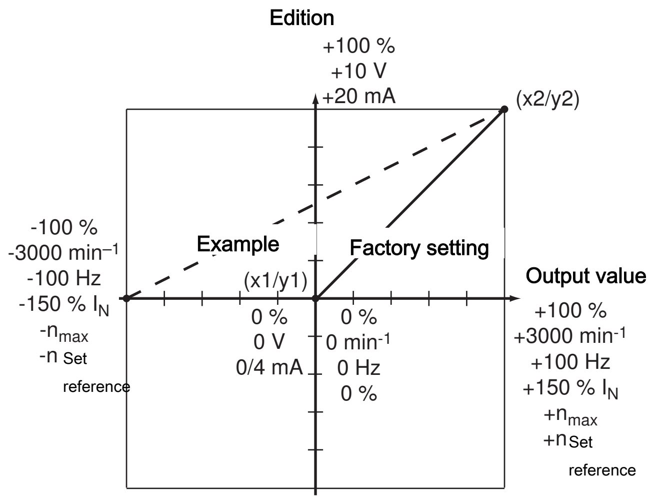
0 – 100% I_N

0 – 100% = 0 – 150% device utilization

P649 AO1 characteristic y2

-100 – +100%

The two coordinates x1 / y1 and x2 / y2 describe the characteristic with which the analog output is evaluated.



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12.2.8 Parameter group 7.. Control functions

Within the parameter group 7.. you define all settings relating to the fundamental control properties of the inverter. The parameter group includes functions that the inverter executes automatically when activated.

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Parameter group 70. Operating mode 1/2

This parameter is used to set the basic operating mode of the inverter. Setting on the operator panel.

VFC / V/f characteristic curve:

Default setting for asynchronous motors. Suitable for general users such as conveyor belts, horizontal drives and hoists with counterweights.

VFC & hoist:

The hoist function automatically provides all the functions required for the operation of an unbalanced hoist. For safety reasons, activate monitoring functions in particular that can prevent the drive from starting unintentionally. Monitoring functions are:

- Monitoring of the output current during the premagnetization phase
- Prevention of sagging when the brake is released

The device recognizes the following faulty constellations and displays them with the following errors:

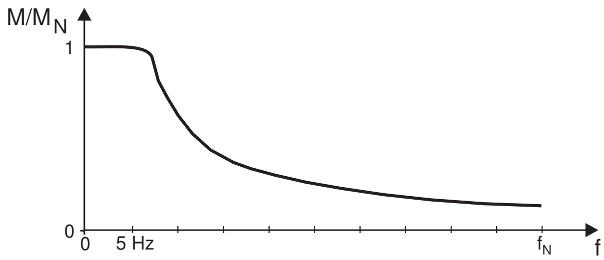
- 2 or 3-phase motor phase interruption: Error *F82 Output open*
- Premagnetization time too short or incorrect motor/inverter combination: Error *F81 Start condition*
- Failure of a motor phase due to active speed monitoring (*P500 / P502*): Error F08 *Speed monitoring*

Notice.

- The control system must be designed in such a way that a **change in the direction of rotation** of the drive can only take place **from an idle state**.
- A 1-phase motor phase failure cannot always be recognized with certainty.
- SEW-EURODRIVE strongly recommends setting the speed monitoring short.
- Prerequisite for the correct operation of the hoist function: Control of the motor brake via the inverter.
- Speed monitoring is set by changing the parameter *P501 / P503*. The sagging of hoists cannot be avoided safely if the delay time is set to an excessively high value.

VFC & DC braking / V/f characteristic & DC braking:

With DC braking, the asynchronous motor brakes via current injection. The motor brakes without a braking resistor on the inverter. The following graph shows the path of the braking torque when the braking current equals the rated motor current.



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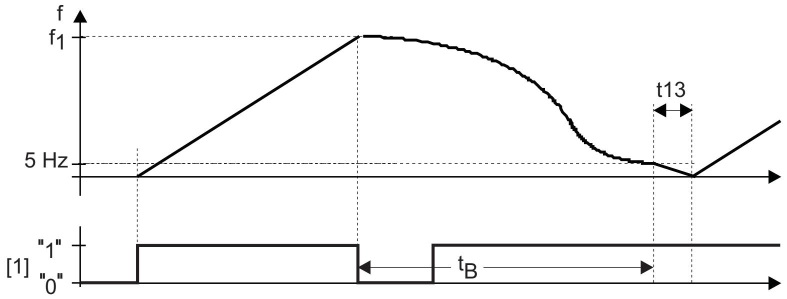
During braking, the inverter injects a constant current with a rotating field frequency of 5 Hz. The braking torque is "0" at idle state. A large braking torque acts at low speeds, while the braking torque is reduced at higher speeds. The braking time and thus the duration of the braking current depends on the load on the motor. The DC braking stops at a rotating field frequency of the motor of 5 Hz. The motor stops along the stop ramp. The current injection is carried out with the rated motor current. The inverter always limits the current to a maximum of 125% I_N. For brake control, see "Brake function" (→ 🗎 340).

Notice.

With DC braking, no guided stop or adherence to a specific ramp is possible. The main application is to drastically reduce the coast to a stop in motors.

The following diagram shows the braking process.



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n_1 = setpoint speed

[1] = enable

t13 = stop ramp

t_B = braking phase

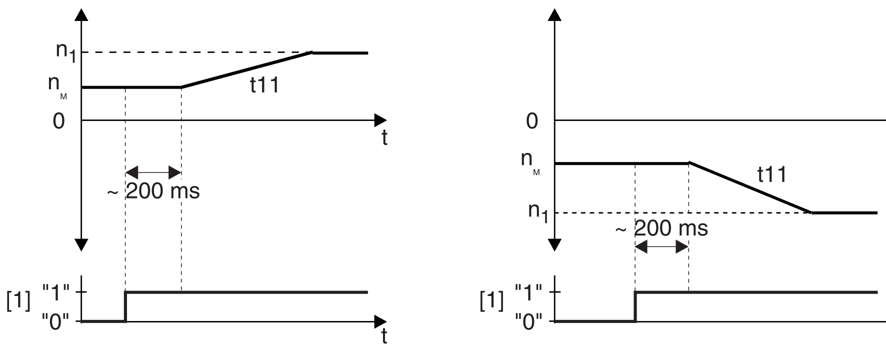
VFC & flying start function:

The flying start function enables the inverter to be connected to a rotating motor. Especially for drives that are not actively braked, phase out for a long time or are also moved by the flowing medium, such as pumps and fans. The maximum flying start time is approx. 200 ms.

In the "Flying start" operating mode, *P320 Automatic adjustment* is deactivated. For the flying start function to work, it is important that the IxR value *P322* (stator resistance) is set correctly.

Startup of an SEW-EURODRIVE motor: The IxR value is set for an SEW-EURODRIVE motor at operating temperature. If the flying start is done with a cold motor, you must reduce this value.

During startup of a third-party motor with MOVITOOLS® MotionStudio, the IxR value is measured during startup.



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n_1 = setpoint speed

n_M = motor speed

[1] = enable

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If an output filter is connected to the inverter, the flying start function will not work.

Notice.

Do not use the flying start function for hoist applications.

P700 / P701 Operating mode 1 / 2

0 / VFC (field-oriented control mode Voltage Mode Flux Control)

2 / VFC & hoist (field-oriented control mode for hoist applications)

3 / VFC & DC braking (field-oriented control mode with DC braking)

4 / VFC & flying start function (field-oriented control mode with flying start function)

21 / V/f characteristic (voltage/frequency-controlled control mode)

22 / V/f & DC braking (voltage/frequency-controlled control mode with DC braking)

P703 Dynamic response

Setting range: **0 (standard)**/1 (increased)

This parameter is effective in all operating modes and affects the control mode.

SEWEURODRIVE recommends to always set this parameter to "Increased".

Additionally for *P700* = "VFC&hoist" and the use of firmware (part number 18225632) version 17 and 18:

In the "Standard" setting, the internal filters are initialized with "0".

In the "Increased" setting, the internal filters are initialized with the nominal motor data.

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Parameter group 71. Standstill current 1/2

The inverter uses the standstill current function to inject a current into the motor during standstill.

- The standstill current prevents condensation and freezing (especially of the disk brake) when the ambient temperature of the motor is low. Set the current level so that the motor does not overheat. **Recommendation:** Motor housing warm to the touch.
- If you activate the standstill current, you can start the motor without premagnetization time. **Recommendation:** For hoists, set to "45 – 50%".
- A rapid start only takes place if the set standstill current is greater than or equal to the rated magnetizing current.
- In VFC & hoist operating mode, the rated magnetizing current is always injected if *P710 Standstill current* is activated.

You can deactivate the standstill current function via *P710* = "0". Set the standstill current as a % of the rated motor current. The standstill current cannot exceed the current limit (*P303*).

If the standstill current function is activated, the output stage remains enabled for injection of the motor standstill current even in the "no enable" state.

The standstill current is not shutdown by pressing the stop/reset button.

The standstill current can only be switched off by "/CONTROLLER INHIBIT" = "0" or Safe Torque Off.

You must program an input terminal to controller inhibit before the standstill current function is activated. Otherwise, the output stage is energized immediately.

P710 / P711 Standstill current 1 / 2

0 – 50% I_{Mot}

Parameter group 72. setpoint stop function 1 / 2

With the *P720 / P723 Stop by setpoint function*, you automatically enable the inverter depending on the main setpoint. The inverter is enabled with all necessary functions such as premagnetization and brake control. In any case, additionally enable the drive via terminals.

P720 / P723 Stop by setpoint function 1 / 2

Off / Aus

On / Ein

P721 / P724 Stop setpoint 1 / 2

0 – **30** – 500 1/min

P722/P725 Start offset 1 / 2

0 – **30** – 500 1/min

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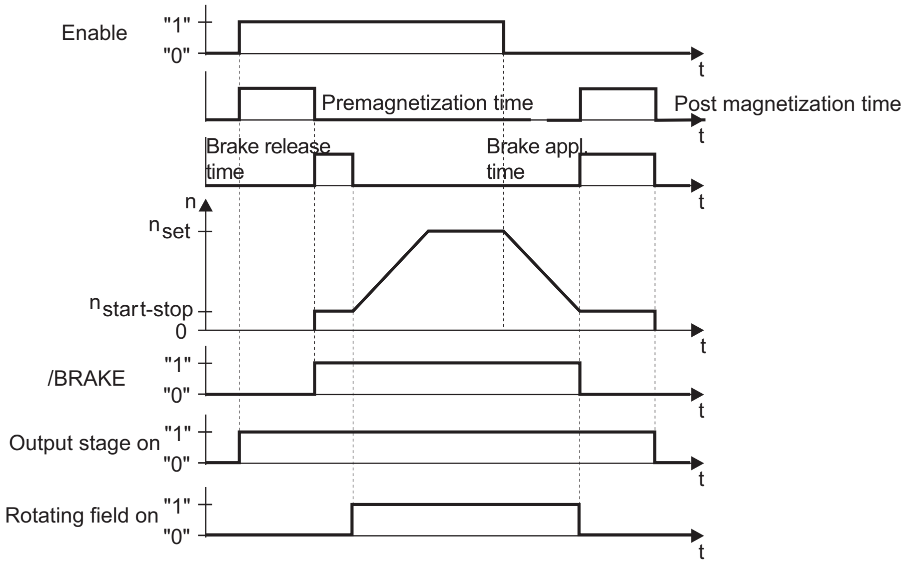
Parameter group 73. Brake function 1/2

The MOVITRAC® B inverters are able to control a brake attached to the motor. The brake function acts on the digital output assigned with the function "/BRAKE" (24 V = brake released). Use DO02 for brake control.

If "/CONTROLLER INHIBIT" = "0", the brake is applied immediately.



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P731/P734 Brake release time 1 / 2

Setting range: **0** – 2 s

This parameter is used to specify how long the motor remains stationary after the premagnetization time has elapsed, giving the brake time to open.

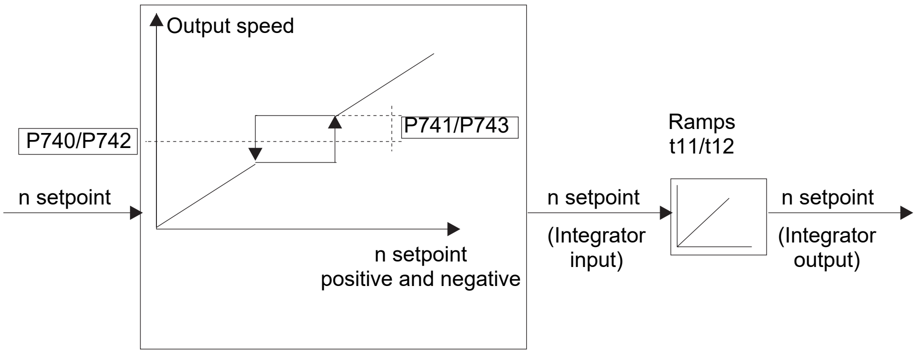
P732/P735 Brake application time 1 / 2

Setting range: 0 – 2 s

Set the time required for the mechanical brake to engage here. This parameter prevents the drive from sagging, especially with hoists.

Parameter group 74. Speed skip function

The skip center and skip bandwidth are absolute values and automatically act on positive and negative setpoints when activated. The function is deactivated if "Skip bandwidth" is set to "0".



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The "speed skip function" prevents the motor speed from remaining within a certain speed window. This function is particularly useful for machines with strong mechanical resonance because it helps suppress vibrations and noise.

P740 / P742 Skip center 1 / 2

Setting range: 0 – **1500** – 5000 1/min

P741 / P743 Skip bandwidth 1 / 2

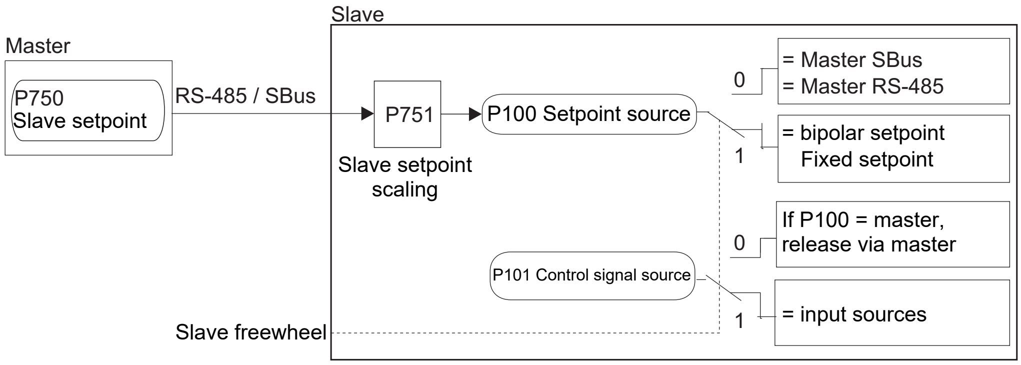
Setting range: **0** – 300 1/min

Parameter group 75. Master-slave function

The master-slave function offers the option of automatically implementing functions such as speed synchronism. The RS485 interface or the system bus interface can be used as the communication connection. On the slave, *P100 Setpoint source* = master SBus or *P100 Setpoint source* = master RS485 must then be set. The process output data PO1 – PO3 (*P870, P871, P872*) are set automatically by the firmware. Using a programmable terminal function "Slave freewheel" *P60x Digital inputs of basic device* it is possible to disconnect the slave from the master setpoint of the master and switch it to a local control mode (such as control signal source bipolar/fixed setpoint).

The process data (*P87x)* of the slave are automatically assigned as follows:

- PO1 = Control word 1
- PO2 = Speed
- PO3 = IPOS^plus®^ PO data
- PI1 = Status word 1
- PI2 = Speed
- PI3 = IPOS^plus®^ PI data



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P811 RS485 group address or *P882 SBus group address* must be set to the same value for master and slave. For master/slave operation via the RS485 interface, set *P811 RS485 group address* greater than 100. For operation via system bus (e.g. master/slave operation), the bus terminating resistors must be activated at the physical start and end of the system bus.

- **INFORMATION**

  Input of the setpoint via RS485:

  If the setpoint is specified by the master to the slaves via the RS485, the MOVITRAC® B takes over the master function on the RS485 interface after setting the parameter *P750 Slave setpoint* to the value "Speed RS485". As MOVITRAC® B only has one RS485 interface, communication with MOVITOOLS® MotionStudio is canceled after activation as the RS485 master.

  To re-establish the connection to MOVITOOLS® MotionStudio, *P750 Slave setpoint* must be set to "MASTER-SLAVE OFF" again. To do this, both the 24 V backup voltage and the line voltage on the MOVITRAC® B must be shut down. The 24 V backup voltage or the line voltage must then be switched on again. After switching back on, *P750 Slave setpoint* can be reparameterized via MOVITOOLS® MotionStudio within a time window of 30 seconds. The FBG11B keypad can be used to change the parameters of *P750* at any time (without switching the voltage off and on). After parameterization of the parameter *P750* to "MASTER-SLAVE OFF", MOVITOOLS® MotionStudio can once again work as a master on the RS485 interface. The MOVITOOLS® MotionStudio can also be connected via a UOH / DFxxxx fieldbus gateway. In this combination, MOVITRAC® B can operate as a master on the RS485 interface.

Connection control

- System bus (SBus): For communication connection via the SBus, *P883 SBus timeout interval* is effective. If *P883 SBus timeout interval* is set to "0", there is no monitoring of data transmission via the SBus.
- RS485 interface: A connection check is always effective for communication connections via the RS485 interface, *P812 RS485 timeout interval* has no function. The slave inverters must receive a valid RS485 telegram within the fixed time interval of t = 500 ms. If the time is exceeded, the slave drives are stopped at the stop ramp with error message *F43 RS485 Timeout*.

Function overview of master/slave operation

Speed synchronism:	Master	Slave
Master controlled Slave controlled	*P750 Slave setpoint*:	*P100 Setpoint source:*
	SPEED (RS485+SBus)	MASTER-SBus MASTER-RS485
	P700 Operating mode 1:	*P700 Operating mode 1*:
	VFC VFC & hoist V/f characteristic curve V/f & DC braking	VFC VFC & hoist V/f characteristic curve V/F & DC braking

P750 Slave setpoint

The master is used to determine the setpoint transmitted to the slave. The "MASTER-SLAVE OFF" setting must be retained on the slave.

- **0: MASTER-SLAVE OFF**
- 1: SPEED (RS485)
- 2: SPEED (SBus1)
- 3: SPEED (RS485 + SBus)

P751 Slave setpoint scaling

Setting range: -10 – **0** – 1 – 10

With this setting in the slave, the setpoint transmitted by the master is multiplied by this factor.

Parameter group 76. Manual mode

P760 Interlocking of RUN/STOP buttons

Off / Aus (RUN/STOP buttons are activated and can be used to start and stop the motor)

On (RUN/STOP buttons are interlocked and therefore have no function)

See also chapter "External setpoint input" (→ 🗎 290).

If the speed is specified via a bus or terminals, the frequency inverter can be started or stopped at any time using the buttons on the FBG when P760 = 0. If P760 = 1, the buttons are deactivated. Local manual operation via FBG cannot be blocked with this function.

Parameter group 77. Energy saving function

The energy-saving function can be activated for the VFC / VFC & FLYING START / V/f CHARACTERISTIC operating modes. In no-load operation, the power consumption of the motor can be reduced by up to 70%. Observe the following restrictions:

- The energy-saving function only brings advantages in the partial load range.
- There should be no major step changes in load during operation.

Energy savings can be achieved in the operation of pumps, fans, conveyor belts, etc. With this method, the magnetization of the asynchronous motor is controlled depending on the load by adjusting the voltage-frequency ratio, the motor is undermagnetized.

P770 Energy-saving function

Off / Aus

On / Ein

12.2.9 Parameter group 8.. Device functions

Parameter group 80. setup

P800 Quick menu (FBG11B only)

Long

Short

You can use *P800 Quick menu* to switch between the factory-set quick menu and the detailed parameter menu.

P801 Language (DBG60B)

Language setting only for DBG60B keypad.

P802 Factory setting

No / Nein (do not perform factory setting)

Std / Standard (perform factory setting)

The "Std" factory setting does not reset all parameters. For example, the communication parameters remain unchanged. For exact details, see the MOVIDRIVE® MDX60B/61B system manual.

All/delivery state (for startup of IEC motors)

With the "All" factory setting, the inverter is reset to the factory setting, but some motor parameters such as start-stop speed/frequency/voltage... are adapted to an IEC motor with the same power.

nEMA / delivery status NEMA (for startup of NEMA motors)

With the "nEMA" factory setting, the inverter is reset to the factory setting, but some motor parameters such as start-stop speed/frequency/voltage... are adapted to a NEMA motor with the same power.

You can use *P802 Factory setting* to reset the factory setting stored in the EEPROM for almost all parameters.

Activating the factory setting overwrites almost all parameter values. Save the set values using MOVITOOLS® MotionStudio before performing a factory setting. After the factory setting, you must readjust the parameter values and terminal assignments in accordance with the requirements.

You must reset the statistics data separately with *P804 Reset statistics data*. If you set the parameter to "Yes", you are performing the factory setting. During this time, the display shows `SEt`. After completing the factory setting, the inverter displays the previous operating state again. *P802 Factory setting* automatically resets to "No".

Selecting delivery state resets all parameters.

P803 Parameter lock

Off / Aus (you can change all parameters)

On / Ein (you can only change *P803* and *P840*)

You can prevent all parameters from being changed by setting *P803 Parameter lock* to "On". Exceptions are *P840* Manual reset and *P803* itself. The parameter lock is useful, for example, after the MOVITRAC® B has been optimized. You can enable parameter adjustment again by setting *P803 Parameter lock* to "Off".

The parameter lock also applies to parameter changes via the RS485 and SBus interfaces.

P804 Reset statistic data

No action (no reset is performed)

Fault memory (the contents of the fault memory are reset)

With *P804 Reset statistics data* you can reset the statistics data (fault memory) stored in the EEPROM. A factory setting does not affect this data. After completing the reset, the parameter automatically resets itself to "No".

P805 Nominal line voltage

Setting range: 50 to 500 V

Limits the output voltage of the inverter.

Always set this value lower than the line voltage being supplied.

P806 Copy DBG to MOVITRAC® B

Yes / **No**

The parameter data available in the DBG60B is transferred to the MOVITRAC® B.

P807 Copy MOVITRAC® B to DBG

Yes / **No**

The parameter data available in the MOVITRAC® B is transferred to the DBG60B.

P808 24VIO auxiliary voltage output X12:8

0 / Off: 24 V are shut off

1 / On: 24 V are switched on

P809 IPOS[plus®] enable

This parameter can be used to activate the integrated sequence control.

Parameter group 81. Serial communication

P810 RS485 address

Setting range: **0** – 99

Use *P810* to set the address of the MOVITRAC® B for communication via the serial interface.

On delivery, the MOVITRAC® B always has the address "0". SEW-EURODRIVE recommends not using the address "0" to avoid collisions during data transmission in serial communication with several inverters.

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P811 RS485 group address

Setting range: **100** – 199

P812 RS485 timeout interval

Setting range: **0** – 650 s

P819 Fieldbus timeout interval

Display parameter for the EtherCAT® master timeout interval setting in s. Only applies when using the EtherCAT® module FSE24B.

Parameter group 82. Brake operation 1 / 2

You can use *P820 / P821* to switch 4-quadrant operation on and off. If you connect a braking resistor to the MOVITRAC® B, 4-quadrant operation is possible. If no braking resistor is connected to the MOVITRAC® B and therefore no generator mode is possible, you must set *P820 / P821* to "Off". In this operating mode, the MOVITRAC® B attempts to extend the deceleration ramp. As a result, the generator mode performance is not too high and the DC link voltage remains below the switch-off threshold.

If the generator mode performance becomes too high despite extended deceleration ramps, the MOVITRAC® B might shut down with error *F07 DC link overvoltage*. In this case, you must extend the deceleration ramps manually (*P131*).

Therefore, do not set an unrealistically short deceleration ramp.

If you set the ramp too short and the realizable ramp significantly exceeds the set value, the device responds with the error message *F34 Ramp timeout*.

P820/P821 4-Quadrant operation 1 / 2 1 2

Off / Aus

On / Ein

Parameter group 83. Fault responses

The error "EXT. ERROR" only triggers in inverter status "ENABLED". With *P830* you can program the error response, which is triggered via an input terminal programmed to "/EXT. ERROR".

P830 Terminal response "External error"

2 / Immediate stop / failure (immediate switch-off with interlocking)

This error response leads to immediate interlocking of the output stage with simultaneous control of the brake output, so that an existing brake is applied. The inverter sets the fault message and resets the ready for operation message.

This state can only be exited by an explicit error reset.

4 / Rapid stop / failure (stop with interlocking)

(Factory setting for *P830*)

This error response leads to a stop at the set stop ramp (*P136/P146*). This error stop is time-monitored. If the drive does not reach the start-stop speed within a specified time interval, the error status is denied, the output stage is disabled and an existing brake is applied. The error message *F34 Ramp timeout* is generated and the original error message is overwritten.

When the drive reaches the start-stop speed, it branches to the error state, the brake is applied and the output stage is disabled. The fault message is set and the ready for operation message is canceled.

This state can only be exited by an explicit error reset.

7 / Rapid stop / warning

(Factory setting for *P833/P836*)

With RS485/SBus timeout (stop without interlocking):

If the inverter is controlled via a communication interface (RS485 or SBus) and power off and power on have been performed, the enable remains ineffective until the inverter receives valid data again via the timeout-monitored interface.

For other errors (stop with interlocking):

The error response corresponds to that of rapid stop/failure, with the difference that the inverter does not reset the ready signal and sets the fault output.

P833 Timeout response RS485

Description: See parameter P830 *Terminal response "External error"*.

P836 SBus missing timeout response

Factory setting: Emergency stop/failure

P836 is used to program the error response that is triggered via the system bus timeout monitoring. The response time of the monitoring can be set with P836 SBus timeout interval. .

Parameter group 84. Reset behavior

P840 Manual reset

Yes

The MOVITRAC® B resets the existing error. After a reset has been carried out, *P840* is automatically set to "No" again. If all the required signals are present after the reset has been carried out, the motor immediately returns to the specified setpoint. Activating the manual reset does not have any effect if there is no error present.

No

No reset.

The parameter *P840* corresponds to the STOP/RESET button.

P841 Auto reset

On

The auto reset function is activated. In the event of an error, this function automatically resets the device after *P842 Restart time*. A maximum of 5 auto resets are possible during an auto reset phase. If 5 errors occur that are reset by an auto-reset, no more auto-resets are possible until one of the following situations occurs:

After that, 5 auto resets are possible again.

- Risk of crushing due to automatic startup of the motor by auto reset.

  Severe or fatal injuries.

  - Do not use auto reset on drives whose automatic startup poses a danger to persons or devices.
  - Perform a manual reset.

Off

No auto reset.

P842 Restart time

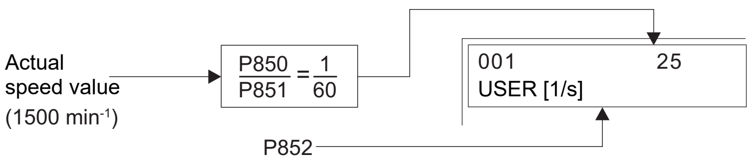
Setting range: 1 – **3** – 30 s

P842 Restart time is used to set the waiting time that should elapse before an auto reset is executed after an error occurs.

Parameter group 85. actual speed value scaling

A user-specific display parameter *P001 User display* is defined with *Actual speed value scaling*. The user display should be shown in 1/s, for example. This requires a scaling factor of 1/60. The scaling factor numerator must therefore be set to "1" and the scaling factor denominator to "60". The scaling unit 1/s is entered in *P852 User unit*.

The following figure shows an example of the scaling of the actual speed value:



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P850 Numerator scaling factor

Setting range: **1** – 65535

P851 Denominator scaling factor

Setting range: **1** – 65535

P852 User unit

1/min

Maximum 8 ASCII characters, displayed in *P001 User display*.

P853 Scaled speed FBG

Use *P853* to define what is shown on the FBG's basic display.

0 / Speed = motor speed

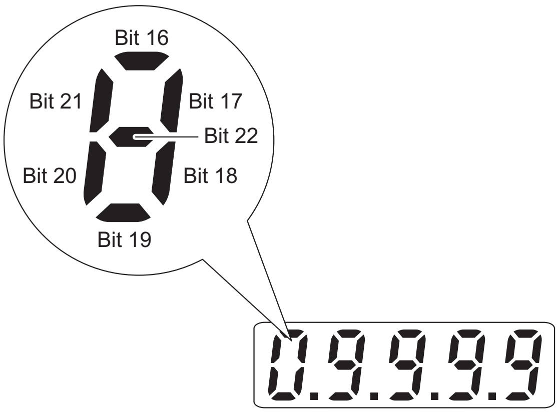
1 / Scaled speed = motor speed × *P850* / *P851*

2 / H0 [0 – 99999] = positive values 0 to 99999. With this setting, the direction of rotation is displayed with a running decimal point

3 / H0 [-9999 – 9999] = signed values -9999 to 9999

4 / H0 = special format 09999

Settings 2 to 4 can only be made via MOVITOOLS® MotionStudio and only if P809 *IPOSplus® enable* is set to "On".



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The display can be controlled via variable H0:

- Low word 0 – 9999: 7-segment digits (digits 2 – 5)
- High word (bit 16 – 22): Individual control of the segments from digit 1 (counterclockwise)

With setting values 2 – 4, all 4 decimal points also light up.

Parameter group 86. modulation 1 / 2

You can use *P860 / P861* to set the nominal clock frequency at the inverter output. If *P862 / P863* is set to "Off", the clock frequency can change automatically depending on device utilization.

P860/P861 PWM frequency 1 / 2 1 2

4 kHz

8 kHz

12 kHz

16 kHz

The use of higher clock frequencies can have a positive influence on noise development. It should be noted here that higher clock frequencies cause an increase in switching losses in the output stage of the inverter. The maximum permissible length of the motor cable is also reduced.

P862 / P863 PWM fixed 1 / 2 Long 1 2

On / Ein (no independent changing of the clock frequency by the inverter)

Off / Aus (independent, utilization-dependent change of the clock frequency by the inverter)

If the clock frequency for parameter set 1 / 2 is not fixed to the set value with P862/ P863 PWM fixed 1 / 2, the inverter automatically switches back to lower clock frequencies once a certain device utilization has been reached. This reduces the switching losses in the output stage and thus the device utilization.

If the clock frequency is set to a fixed value, the maximum permissible nominal output current must be observed for higher clock frequencies. Refer to the chapter "Overload capacity" (→ 🗎 122).

Parameter group 87. Process data parameter setting

For more information, refer to the "MOVITRAC® B communication" manual.

You can use *P870 – P872* to define the content of the process output data words PO1 – PO3. This definition is necessary so that the MOVITRAC® B can assign the corresponding setpoints.

The following assignments of the POs are available:

Response	Description
0 / No function	The content of the process output data word is ignored
1 / Setpoint speed	Speed setpoint input in 1/min (1 dec = 0.2 1/min)
5 / Max. speed	Maximum speed (*P302*)
8 / Ramp	Ramp time for setpoint input (*P130/P131*)
9 / Control word 1	Control signals for start/stop ...
10 / Control word 2	Control signals for start/stop ...
11 / Setpoint speed %	Specification of a speed setpoint in % from *P302*
12 / IPOSplus® PO data	Specification of a 16-bit coded value for IPOSplus®
13 / PI controller setpoint %	PI controller setpoint

P870 Setpoint description PO1 Long

Control word 1

P871 Setpoint description PO2 Long

Speed

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P872 Setpoint description PO3

No function

You can use *P873 – P875* to define the content of the process input data words PI1 – PI3. This definition is necessary so that the MOVITRAC® B can assign the corresponding actual values.

The following assignments of the PIs are available:

Assignment	Description
0 / No function	The content of the process input data word is 0000_{hex}
1 / Actual speed	Actual speed value in 1/min
2 / Output current	Current active current of the inverter in % of I_N
3 / Active current	Current output current of the inverter in % of I_N
6 / Status word 1	Status information of the inverter
7 / Status word 2	Status information of the inverter
8 / Actual speed %	Current actual speed value in % from *P302*
9 / IPOS$^{plus®}$ PI data	IPOS$^{plus®}$ process input data
10 / PI controller actual value %	Actual value of the PI controller

P873 Actual value description PI1

STATUS WORD 1

P874 Actual value description PI2

SPEED

P875 Actual value description PI3

OUTPUT CURRENT

P876 PO data enable

No / Nein

The last valid process output data remains effective.

Yes / Ja

The last process output data sent by the master via the communication interface becomes effective.

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Parameter group 88. Serial communication SBus

P880 SBus protocol Long

SBus setting range

0 / MoviLink®

1 / CANopen

With FSE24B, the setting is automatically set to MOVILINK®.

With FSC12B, the setting via the DIP switch has priority.

P881 SBus address Short

Setting range: **0** – 63

Use *P881* to set the system bus address of the MOVITRAC® B. The MOVITRAC® B can use this address to communicate with a PC, PLC or MOVIDRIVE® via the system bus, for example.

With FSE24B, the address is set to "0".

On delivery, the MOVITRAC® B always has the address "0". SEW-EURODRIVE recommends not using the address "0" to avoid collisions during data transmission in serial communication with several inverters.

With FSC12B, the setting via the DIP switch has priority.

P882 SBus group address

Setting range: **0** – 63

With *P882* it is possible to combine several MOVITRAC® B devices into a group with regard to communication via the SBus interface. You can address all MOVITRAC® B devices with the same SBus group address and thus with a multicast telegram via this address. The MOVITRAC® B does not acknowledge the data received via the group address. Using the SBus group address, it is possible, for example, to send setpoint inputs to a MOVITRAC® B inverter group at the same time. An inverter with the group address "0" is not assigned to a group.

P883 SBus timeout interval Long

Setting range: **0** – 650 s

Use *P883* to set the monitoring time for data transmission via the system bus. If there is no data traffic via the system bus for the time set in *P883*, the MOVITRAC® B executes the error response according to P836. If you set *P883* to the value "0", there is no monitoring of data transmission on the system bus.

P884 SBus baud rate

Use *P816* to set the transmission speed of the system bus.

125 / 125 kB

250 / 250 kB

500 / 500 kB

1000 / 1000 kB

With FSC12B, the setting via the DIP switch has priority.

With FSE24B, the baud rate is set to 500 kB.

P886 CANopen address

Setting range: 1 – **2** – 127

The address for serial communication with the SBus is set with *P886*.

With FSC12B, the setting via the DIP switch has priority.

12.2.10 Parameter group 9.. IPOS$^{plus®}$ parameters

P938 Speed for task 1

Setting range: **0** – 9 additional assembler commands/ms

The default setting for Task 1 is 1 assembler command/ms. With *P938* the speed can be increased by up to 9 additional assembler instructions/ms. The resources for the speed increase are shared *P938* with *P939*, i.e. Task 1 and Task 2 are allowed to be assigned 9 additional assembler instructions/ms **together**. Example:

Task 1 **+ 2 additional assembler commands/ms** = 3 assembler commands/ms

Task 2 **+ 7 additional assembler commands/ms** = 9 assembler commands/ms

P939 Speed for task 2

Setting range: **0** – 9 additional assembler commands/ms

The default setting for Task 2 is 2 assembler commands/ms. With *P939* the speed can be increased by up to 9 additional assembler instructions/ms. The resources for the speed increase are shared *P939* with *P938*, i.e. Task 1 and Task 2 are allowed to be assigned 9 additional assembler instructions/ms **together**. Example:

Task 1 **+ 2 additional assembler commands/ms** = 3 assembler commands/ms

Task 2 **+ 7 additional assembler commands/ms** = 9 assembler commands/ms

12.3 Operating modes

INFORMATION

- In VFC operating modes, the maximum output frequency is 150 Hz.

12.3.1 VFC 1/2 and V/f characteristic curve

Default setting for asynchronous motors. Suitable for general users such as conveyor belts, horizontal drives and hoists with counterweights. A flux-oriented motor model (not for V/f characteristic operating mode) is used that is optimally matched to the motor after the startup function has been executed in MOVITOOLS® MotionStudio or in the FBG11B keypad. The startup function requires the input of the motor type (SEW-EURODRIVE motor) or the nameplate data (third-party motor), the following parameters are preset (parameter set 1 / 2):

Settings after the startup function	
"P303 / P313" (→ 🗎 319)	I_{max} (inverter) = 150% I_{N_Mot}
"P302 / P312" (→ 🗎 319)	Depending on the number of poles and rated motor frequency e.g. 2-pole / 50 Hz -> 3000 1/min e.g. 4-pole / 60 Hz -> 1800 1/min
"P301 / P311" (→ 🗎 319)	15 1/min
"P130 – P133 / P140 – P143" (→ 🗎 314)	2 s
"P136 / P146" (→ 🗎 315)	2 s
"P137 / P147"	2 s
"P500 / P502" (→ 🗎 325)	MOTOR/GENERATOR MODE
"P501 / P503" (→ 🗎 325)	1 s
"P100" (→ 🗎 306)	UNIPOLAR / FIXED SETPOINT
"P101" (→ 🗎 307)	TERMINALS
"P730 / P733"	ON
"P731 / P734" (→ 🗎 340) "P732 / P735"	For SEW-EURODRIVE motors: Setting according to motor data. **For third-party motors: Set the correct value manually.**
"P300 / P310" (→ 🗎 318)	15 1/min
"P820 / P821" (→ 🗎 346)	ON
"P324 / PP334" (→ 🗎 321)	Setting according to specified motor data
"P321 / P331" (→ 🗎 320)	0
"P322 / P332" (→ 🗎 320)	Setting according to specified motor data
"P320 / P330" (→ 🗎 320)	ON
"P323 / P333" (→ 🗎 320)	Setting according to specified motor data

INFORMATION

- SEW-EURODRIVE recommends using "P320 / P330 Automatic adjustment 1 / 2" (→ 🗎 320) activated in the factory setting. As a result, the "P322 / P332 IxR adjustment 1 / 2" (→ 🗎 320) is set automatically during the premagnetization phase by calibrating the motor.
- SEW-EURODRIVE recommends leaving the parameters "P321 / P331 Boost 1 / 2" (→ 🗎 320) unchanged from the factory setting (= 0).

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12.3.2 VFC 1/2 & hoist

VFC hoist in parameter set 1 and 2. Switching off 4-quadrant operation ("P820" (→ 🗎 346)) is ignored.

The start/stop speed ("P300 / P310" (→ 🗎 318)) is set to the slip speed of the motor in the "VFC&hoist" operating mode and limited to at least 15 1/min in the "VFC&hoist" operating mode.

The minimum speed ("P301 / P311" (→ 🗎 319)) in the "VFC&hoist" operating mode is internally limited to 15 1/min.

The hoist function automatically provides all the functions required for the operation of an unbalanced hoist. For safety reasons, monitoring functions are activated in particular, which prevent the drive from starting if necessary. In particular this is:

- Monitoring of the output current during the premagnetization phase.
- Prevention of sagging when the brake is released by load precontrol.

Constellations recognizable as faulty	Triggered error
2 or 3-phase motor phase interruption	F82 = Output open
Premagnetization time too short or incorrect motor/inverter combination.	F81 = Start condition fault
Failure of a motor phase due to active speed monitoring (factory setting) "P500 / P502 Speed monitoring 1 / 2" (→ 🗎 325), "P501 / P503 Deceleration time 1 / 2" (→ 🗎 325)	F08 = n-monitoring fault

INFORMATION

- A single-phase motor phase failure cannot always be recognized with certainty.
- Speed monitoring is always active.
- For the hoist function to run correctly, the motor brake must be controlled via the inverter.
- The control system must be designed so that the direction of rotation can only be reversed from an idle state.

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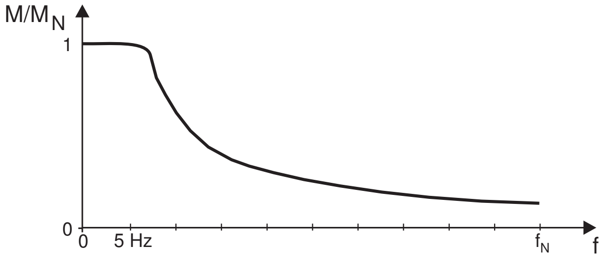
12.3.3 VFC 1 / 2 & DC BRAKE and V/f DC BRAKING

The DC braking function allows the asynchronous motor to be braked via a current injection. In this case, the motor can be braked without a braking resistor on the inverter.



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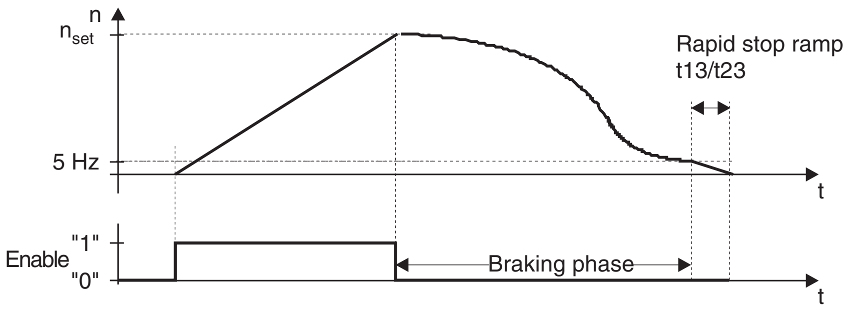
During braking, a constant current with a rotating field frequency of 5 Hz is injected. The braking torque at idle state = 0. A large braking torque acts at low speeds, while the braking torque is reduced at higher speeds. The braking time and thus the duration of the braking current depends on the load on the motor. If the rotating field frequency of the motor reaches 5 Hz, the DC braking is aborted and the motor is stopped along the rapid stop ramp. The current injection is performed with the nominal motor current according to the startup function. The inverter always limits the current to a maximum of 125% I_N. For control of the brake, see brake function.

NOTICE

No guided stop.

The system might be damaged.



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INFORMATION

- If the "Enable" digital input receives a "1" signal again during the braking phase, the **braking process is not interrupted**. The DC braking is completed and only then does the drive accelerate again.
- If a digital input is programmed to the "CW/stop (CCW/stop)" function in the "VFC 1/2 & DC-BRAKING" operating mode and "CW/stop (CCW/stop)" receives a "0" signal, the drive executes a stop at ramp t11/t21 or t12/t22. If during the ramp time, the digital input "Enable" is switched from "1" to "0", the stop is continued and **DC braking is not initiated**. To **start DC braking**, **"Enable" must first be switched from "1" to "0"**, and this must happen at least 10 ms before "CW/stop (CCW/stop)" is switched from "1" to "0".

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12.3.4 VFC 1 / 2 & flying start

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

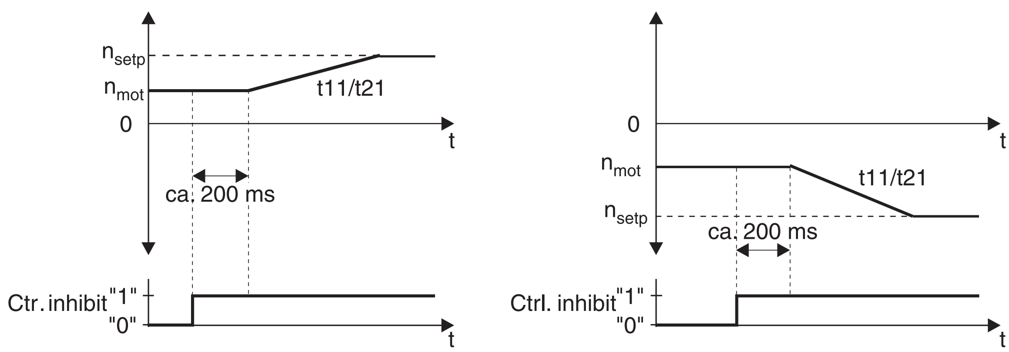
Severe or fatal injuries.

- **You must not use the flying start function for hoist applications.**
- Prevent unintentional startup of the motor.

INFORMATION

- The flying start function does not work if an output filter is connected to the inverter.
- The correct execution of the flying start function has only been tested with SEW-EURODRIVE motors due to exact motor data. Reliable flying starts cannot be guaranteed with third-party motors.

The flying start function enables the inverter to be connected to a rotating motor. Especially for drives that are not actively braked, run out for a long time or are moved by the flowing medium, such as pumps and fans. The maximum flying start time is approx. 200 ms.



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If the inverter does not detect a flying start point, it assumes that the motor is stationary and starts the integrator from n = 0. This results in the motor decelerating to n = 0 and then running up to $n_{setpoint}$. This behavior can occur in particular with very low-impedance motors in the speed range below n = 300 1/min (4-pole motor).

13 Operation

13.1 IT security

13.1.1 Hardening measures

Perform the following hardening measures:

- Regularly check if updates are available for your products.
- Report incidents concerning IT security by e-mail to cert@sew-eurodrive.com.
- Regularly check which Security Advisories are available in the Online Support of SEW-EURODRIVE.
- Evaluate the fault memories and diagnostics information of your products regularly and check whether there are entries that affect IT security.

13.1.2 Guidelines for secure operation

The engineering protocol from SEW-EURODRIVE allows authorized personnel to activate various service accesses on the device. Authentication is implemented by using static access data. This data is not used to defend against attacks on IT security but to protect against unintentional modification. This is the reason why it cannot be changed.

To prevent misuse of these service accesses, network access must be restricted according to the state of the art. For more information, refer to section "IT security of the environment" (→ 🗎 10).

13.1.3 Guidelines for user account management

The device has no user accounts.

13.2 Data backup

13.2.1 Data backup with FBG11B

You can use the FBG11B keypad to save parameter data from the MOVITRAC® B to the keypad or retrieve it from the keypad to the MOVITRAC® B.

Check that the desired data set has been copied to the inverter.

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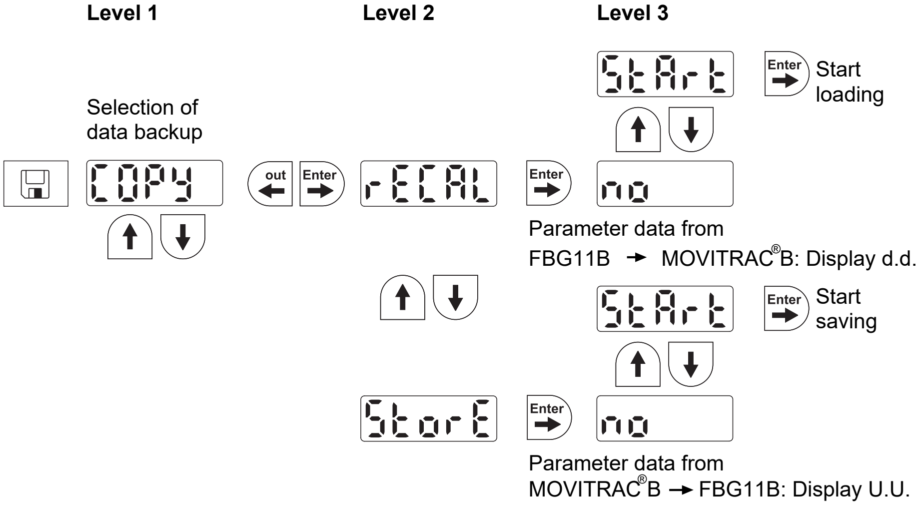
Data backup with FBG11B



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After copying data, the MOVITRAC® B is locked. The locked state is indicated in the status display by a flashing STOP. In addition, the status LED flashes yellow slowly.

You can remove the lock by doing one of the following:

- Push the RUN button on the FBG11B.
- Switch off the supply system, wait 10 seconds and then switch the supply system back on.

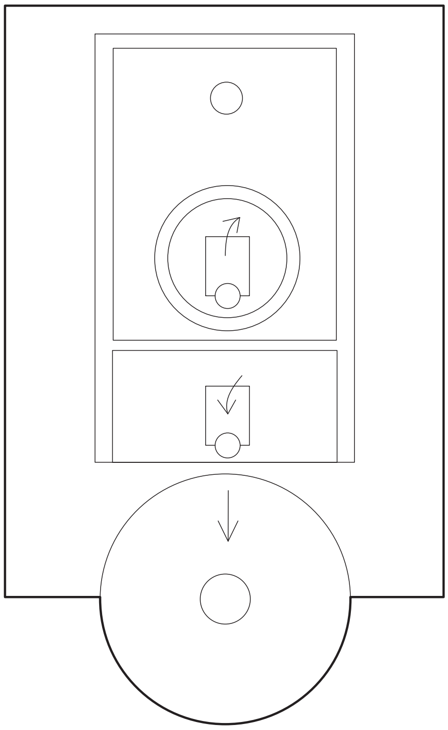
13.2.2 Data backup using DBG60B

Copy the parameter set from the MOVITRAC® B to the DBG60B keypad. You have the following options:

- Call up the menu item "COPY TO DBG" in the context menu. Confirm with the OK button. The parameter set is copied from MOVITRAC® B to the DBG60B.
- Call up the "PARAMETER MODE" menu item in the context menu. Select the parameter *P807 Copy MOVITRAC® B → DBG*. The parameter set is copied from MOVITRAC® B to the DBG60B.
- Press the Run button on the FB11B or DBG60B, or switch the device off and on again.

13.2.3 Data backup using UBP11A

Copy the parameter set from MOVITRAC® B to the UBP11A parameter module. To do this, push the button at the bottom of the module, which can only be pressed with a pointed object.



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When you restore the data to the inverter, press the <arrow up> button on the UBP11A parameter module.

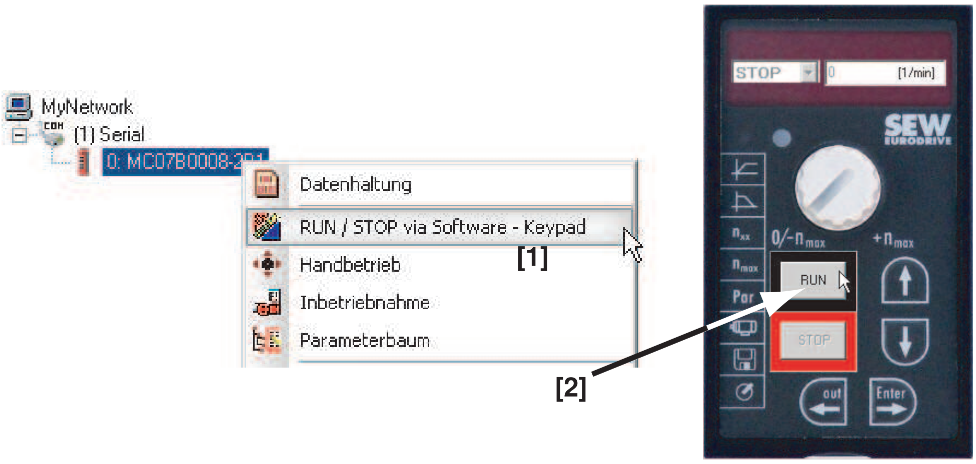
Press the Run button on the FBG11B or DBG60B, or switch the device off and on again.

13.2.4 Data backup with MOVITOOLS® MotionStudio

If data is transferred to the MOVITRAC® B frequency inverter using MOVITIOOLS® MotionStudio, the inverter must then be enabled again as follows:

- Select the device in the network.
- Open the context menu with the right mouse button.
- Select the menu [RUN/STOP via software keypad] [1].
- In the software keypad, select [RUN] [2], or

Alternatively, you can enable the inverter by switching it off and on again or by pressing the <RUN> button on the FBG11B.



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13.3 Status displays

13.3.1 FBG11B basic device / keypad

The status displays on the device are as follows:

State	Display (optionally with FBG11B keypad)	Flashing code of status LED in the basic device	Device status (high byte in status word 1)
"ENABLE"	Speed	Green, steady light	4
"ENABLE" at current limit	Speed flashing	Green, fast flashing	
"STANDSTILL CURRENT"	dc	Green, slow flashing	3
"NO ENABLE"	Stop	Yellow, steady light	2
"FACTORY SETTING"	SEt	Yellow, fast flashing	8
"CONTROLLER INHIBIT"	oFF	Yellow, fast flashing	1
"24 V operation"	24U Flashing	Yellow, slow flashing	0
"SAFE TORQUE OFF"1)	U Flashing or 24U flashing	Yellow, slow flashing	17
FBG manual mode active or inverter stopped using STOP button	FBG manual mode symbol or "stop" flashing	Yellow, long on, short off	
Timeout	Error 43 / 47	Green / yellow, flashing	
Copy	Fault 97	Red / yellow, flashing	
System error	Errors 10 / 17 – 24 / 25 / 32 / 37 / 38 / 45 / 77 / 80 / 94	Red, steady light	
Overvoltage / phase failure	Errors 4 / 6 / 7	Red, slow flashing	
Overload	Errors 1 / 3 / 11 / 44 / 84	Red, fast flashing	
Monitoring	Errors 8 / 26 / 34 / 81 / 82	Red, 2 x flashing	
Motor protection	Errors 31 / 84	Red, 3 x flashing	
Waiting for data	t	Yellow, steady light	16

1) "U" flashing (status 17) when connected to the supply system, "24U" flashing (status 0) when in backup mode.

Saving the parameter set to the FBG11B → display u. u.

Saving the parameter set to the device → display d. d.

- ⚠ **WARNING!** Incorrect interpretation of the display U = "Safe Torque Off" active

  Severe or fatal injuries.

  – The display U = "Safe Torque Off" is not safety-related and must not be used for safety-related purposes.

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Causes for controller inhibit (OFF)

The possible causes of controller inhibit (OFF) are:

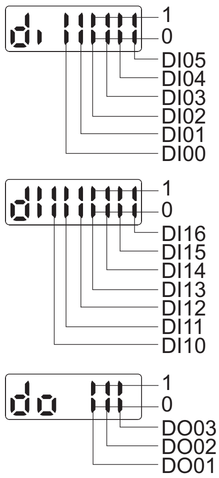
- Binary input terminal programmed to controller inhibit and active.
- Controller inhibit through PC manual mode via MOVITOOLS® MotionStudio.
- Temporary controller inhibit: Is triggered if an enable would occur directly when the parameter *P100 Setpoint source* is changed. The temporary controller inhibit is deleted as soon as the enable signal is reset for the first time.
- Controller inhibit set via IPOSplus® control word H484.

13.3.2 Status of the digital inputs / digital outputs

The following parameters are available as display parameters in the parameter menu:

- *P039 Digital inputs of basic device*
- *P048 Digital inputs option*
- *P059 Digital outputs*

The status display is digital. Each digital input or output is assigned 2 vertically overlapping segments of the 7-segment display. The upper segment lights up when the digital input or output is set and the lower segment lights up when the digital input or output is not set. The two 7-segment displays on the right show whether *P039* (di = digital inputs of basic device), *P048* (dI = digital inputs option) or *P059* (do = digital outputs) is being output.



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If there is no FIO21B with digital inputs, `dl - - -` is displayed.

13.4 Return codes (r19 – r38)

Return codes when entering / changing a device parameter in the FBG11B:

No.	Designation	Meaning
	Read access only	Parameter cannot be changed
19	Parameter lock activated	No change of parameters possible
	Factory setting running	No change of parameters possible
	Option card missing	Option card required for function is missing
	Option card missing	Option card required for function is missing
	Controller inhibit necessary	Controller inhibit necessary

No.	Designation	Meaning
	Value for parameter not permitted	• Value for parameter not permitted • Selection of FBG manual mode not permitted, as PC manual mode is active
	Enable	You cannot execute the function in the ENABLE state
	Processing error	• Error during saving to FBG11B • Startup with FBG did not take place. Perform startup with MOVITOOLS®MotionStudio or select another motor or third-party motor
	FBG11B incorrect data set	Saved data set does not match the device

13.5 DBG60B keypad

Basic displays:

0.00rpm 0.000Amp CONTROLLER IN- HIBIT	Display when X13:1 (DIØØ "/controller inhibit") = "0".
0.00rpm 0.000Amp NO ENABLE	Display when X13:1 (DIØØ "/controller inhibit") = "1" and inverter is not enabled ("enable/stop" = "0").
950.00rpm 0.990Amp ENABLE (VFC)	Display for enabled inverter.
INFORMATION 6: VALUE TOO HIGH	Information message
(DEL)=Quit ERROR 9 STARTUP	Error info

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13.6 Information messages

Information messages on the DBG60B (ca. 2 s in duration) or in MOVITOOLS® MotionStudio (message that can be acknowledged):

No.	Text DBG60B/ MotionStudio	Description
1	ILLEGAL INDEX	Index addressed via interface not available.
2	NOT IMPLEMENT.	• Attempt to execute a non-implemented function. • An incorrect communication service has been selected. • Manual operation selected via invalid interface (e.g. fieldbus).
3	READ ONLY VALUE	Attempt to edit a read-only value.
4	PARAM. INHIB-ITED	Parameter lock P 803 = "ON", parameter cannot be altered.
5	SETUP ACTIVE	Attempt to alter parameters during active factory setting.
6	VALUE TOO HIGH	Attempt to enter a value that is too high.
7	VALUE TOO LOW	Attempt to enter a value that is too low.
8	REQ. CARD MISS-ING	The option card required for the selected function is miss-ing.
10	ONLY VIA ST1	Manual mode must be completed using X13:ST11/ST12 (RS485).
11	ONLY TERMINAL	Manual operation must be exited via TERMINAL (DBG60B or USB11/UWS21B).
12	NO ACCESS	Access to selected parameter denied.
13	REG. INHIBIT MISSING	Set terminal DIØØ "/Controller inhibit" = "0" for the selected function.
14	INVALID VALUE	Attempt to enter an invalid value.
16	PARAM. NOT SAVED	Overflow of EEPROM buffer, e.g. through cyclic write ac-cess. Parameter not stored in non-volatile EEPROM.
17	INVERTER EN-ABLED	• Parameter to be changed can only be set in the state "CONTROLLER INHIBIT". • You tried to change to manual mode during live opera-tion.

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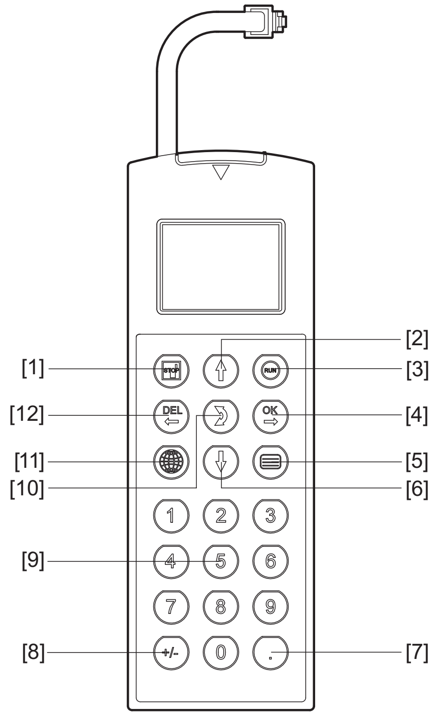
13.7 Functions of the DBG60B keypad

13.7.1 Key assignments for DBG60B



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[1]	Key	STOP	Stop
[2]	Key	↑	Up arrow, moves up to the next menu item
[3]	Key	RUN	Start
[4]	Key	OK	OK, confirms the entry
[5]	Key	☰	Activate the context menu
[6]	Key	↓	Down arrow, moves down to the next menu item
[7]	Key	·	Decimal point
[8]	Key	+/-	Sign reversal
[9]	Key	0 – 9	Digits 0 – 9
[10]	Key	⤸	Change menu
[11]	Key	🌐	Select language
[12]	Key	DEL	Delete previous entry

13.7.2 Copy function of the DBG60B

The DBG60B keypad can be used for copying complete parameter sets from one MOVIDRIVE® device to other MOVIDRIVE® devices. Proceed as follows:

- In the context menu, select the menu item "COPY TO DBG". Confirm your selection using the OK key.

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- After the copying process has finished, plug the keypad in the other inverter.
- In the context menu, select the menu item "COPY TO MDX". Confirm your selection using the OK key.

13.7.3 Parameter mode

Proceed as follows to set the parameters in parameter mode:

1. Press the ☰ key to activate the context menu.	BASIC VIEW **PARAMETER MODE** VARIABLE MODE WAKE UP PARAMETER
2. Press the OK key to start PARAMETER MODE. The first display parameter P000 "SPEED" is displayed. Use the ↑ or ↓ key to select main parameter groups 0 to 9.	P **0**00 1/min SPEED 0.0 CONTROLLER INHIBIT
3. Use the ↑ or ↓ key to select the desired main parameter group. The flashing cursor is positioned under the number of the main parameter group.	P **1**.. SETPOINTS/ RAMP GENERATORS CONTROLLER INHIBIT
4. Press the OK key to activate the parameter subgroup selection in the required main parameter group. The flashing cursor moves one position to the right.	P 1**.**. SETPOINTS/ RAMP GENERATORS CONTROLLER INHIBIT
5. Use the ↑ or ↓ key to select the desired parameter subgroup. The flashing cursor is positioned under the number of the parameter subgroup.	\ 1**3**. SPEED RAMPS 1 CONTROLLER INHIBIT
6. Press the OK key to activate the parameter selection in the required parameter subgroup. The flashing cursor moves one position to the right.	\ 13**.** SPEED RAMPS 1 CONTROLLER INHIBIT
7. Use the ↑ or ↓ key to select the desired parameter. The flashing cursor is positioned under the third digit of the parameter number.	\ 13**2** s T11 UP CCW 0.13 CONTROLLER INHIBIT

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8. Press the key to activate the setting mode for the selected parameter. The cursor is positioned under the parameter value.	\ 132 s T11 UP CCW 0.13_ CONTROLLER INHIBIT
9. Use the or key to set the required parameter value.	\ 132 s T11 UP CCW 0.20_ CONTROLLER INHIBIT
10. Press the key to confirm the setting. To exit the setting mode, press the key. The flashing cursor is positioned under the third digit of the parameter number again.	\ 13**2** s T11 UP CCW 0.20 CONTROLLER INHIBIT
11. Use the or key to select another parameter, or press the key to switch to the menu of the parameter subgroups.	\ 13**.** SPEED RAMPS 1 CONTROLLER INHIBIT
12. Use the or key to select another parameter subgroup or press the key to switch to the menu of the main parameter groups.	P **1**.. SETPOINTS/ RAMP GENERATORS CONTROLLER INHIBIT
13. Use the key to return to the context menu.	BASIC VIEW **PARAMETER MODE** VARIABLE MODE WAKE UP PARAMETER

13.7.4 Variable mode

H... variables are displayed in the variable mode. To call up the variable mode, proceed as follows:

- Press the key to call up the context menu. Select the "VARIABLE MODE" menu item and confirm with the key The variable mode display appears.
- Use the key to edit the variables.

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13.7.5 User menu

The DBG60B keypad has a standard user menu containing the parameters that are used most often. The parameters in the user menu are displayed with a "\" before the parameter number (→ chapter "Complete parameter list"). You can add or delete parameters. You can save a maximum of 50 parameter entries. The parameters are displayed in the order in which they are stored in the inverter. The parameters are not sorted automatically.

- Press the key to call up the context menu. Select the menu item "USER MENU" and press the OK key to confirm. The user menu with the most frequently used parameters appears.

Adding parameters to the user menu

Proceed in this order to add parameters to the user menu:

- Press the key to call up the context menu. Select the "PARAMETER MODE" menu item.
- Select desired parameter and press the OK key to confirm.
- Use the key to return to the context menu. In the context menu, select the menu item "ADD Pxxx". "xxx" is the parameter you selected previously. Confirm your selection using the OK key. The selected parameter is stored in the user menu.

Deleting parameters from the user menu

Proceed in this order to delete parameters from the user menu:

- Press the key to call up the context menu. Select the menu item "USER MENU".
- Select the parameter that is to be deleted. Confirm your selection using the OK key.
- Use the key to return to the context menu. In the context menu, select the "DELETE Pxxx" menu item. "xxx" is the parameter you selected previously. Confirm your selection using the OK key. The selected parameter is deleted from the user menu.

13.7.6 Wake-up parameter

The wake up parameter is the parameter that is displayed when the DBG60B is switched on. The factory setting for the wake up parameter is the basic display. You can select which parameter should be the wake up parameter. The following options can be used as the wake up parameter:

- Parameter (→ parameter mode)
- Parameter from the user menu (→ user menu)
- H variable (→ variable mode)
- Basic display

Proceed as follows to save a wake-up parameter:

- First select the required parameter in parameter mode.
- In the context menu, select the "XXXX WAKE-UP PARAM." menu item. "XXXX" is the selected wake-up parameter. Confirm your selection using the OK key.

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13.7.7 IPOS^PLUS®

MOVITOOLS® MotionStudio is required for programming IPOS^PLUS®. You can only use the DBG60B keypad to edit or change IPOS^PLUS® variables (H__).

The IPOS^PLUS® program is also stored in the DBG60B keypad when it is saved and is consequently also transferred when the parameter set is copied to another MOVIDRIVE® unit.

Parameter P931 can be used to start and stop the IPOS^PLUS® program from the DBG60B keypad.

13.8 List of faults (F00 – F113)

No.	Designation	Response	Possible cause	Measure
00	No fault	–	–	–
01	Overcurrent	Immediate switch-off with interlocking	• Short circuit at the output	• Remove the short circuit
			• Switching at the output	• Switching only when the output stage is disabled
			• Motor too large	• Connect a smaller motor
			• Defective output stage	• Contact the SEW Service for advice if the fault still cannot be reset
03	Ground fault	Immediate switch-off with interlocking	• Ground fault in the motor	• Replace motor
			• Ground fault in the inverter	• Replace MOVITRAC® B
			• Ground fault in the motor cable	• Eliminate ground fault
			• Overcurrent (see *F01*)	• See *F01*
04	Brake chopper	Immediate switch-off with interlocking	• Too much regenerative power	• Extend deceleration ramps
			• Braking resistor circuit interrupted	• Check supply cable to braking resistor
			• Short circuit in the braking resistor circuit	• Remove the short circuit
			• Braking resistance too high	• Check the technical data of the braking resistor
			• Brake chopper defective	• Replace MOVITRAC® B
			• Ground fault	• Eliminate ground fault
06	Supply system phase failure	Immediate switch-off with interlocking (only with 3-phase inverter)	• Phase failure	• Check the supply system cable
			• Line voltage too low	• Check line voltage
07	DC link overvoltage	Immediate switch-off with interlocking	• DC link voltage too high	• Extend deceleration ramps • Check supply cable to braking resistor • Check the technical data of the braking resistor
			• Ground fault	• Eliminate ground fault
08	Speed monitoring	Immediate switch-off with interlocking	Current controller operates at the control limit due to:	–
			• Mechanical overload	• Reduce the load • Check current limitation • Extend deceleration ramps • Increase the set deceleration time *P501*[1)]
			• Phase failure on supply system	• Check line phases
			• Phase failure on the motor	• Check motor cable and motor
			• Maximum speed for VFC operating modes exceeded	• Reduce the maximum speed
09	Startup	Immediate switch-off with interlocking	• Inverter startup not yet performed	• Perform inverter startup
			• Unknown motor selected	• Select a different motor
			• VFC&Hoist selected and *P207* not set	• Set *P207*

No.	Designation	Response	Possible cause	Measure
10	IPOSplus®-ILLOP	Stop with interlocking Only with IPOSplus®	• Incorrect command during program execution	• Check program
			• Faulty conditions during program execution	• Check the program sequence
			• Function not available / implemented in the inverter	• Use another function
11	Overtemperature	Stop with interlocking	• Thermal overload of the inverter	• Reduce load and/or ensure adequate cooling • If braking resistor integrated in the heat sink: Mount the braking resistor externally
17 – 24	System fault	Immediate switch-off with interlocking	• Malfunction of inverter electronics, possibly due to EMC influence	• Check grounding and shielding and improve, if necessary • Consult SEW-EURODRIVE Service if the error occurs again
25	EEPROM	Stop with interlocking	• Error when accessing EEPROM	• Activate factory settings, perform reset and re-parameterize • If this happens again, consult SEW-EURODRIVE Service
26	External terminal	Programmable	• External failure signal read via programmable input	• Eliminate the cause of the error, reprogram the terminal if necessary
31	TF/TH trigger	Stop without interlocking • Message "Ready for operation" is retained	• Motor too hot, TF has triggered	• Allow motor to cool down and reset error
			• TF of the motor not connected or not connected correctly • Connection of MOVITRAC® B and TF on motor interrupted	• Check connections between MOVITRAC® B and TF
32	IPOSplus® index overflow	Stop with interlocking	• Programming principles violated, leading to internal stack overflow	• Check and correct the user program
34	Ramp timeout	Immediate switch-off with interlocking	• Exceeding of the set deceleration ramp times of the down ramp, stop ramp or emergency stop ramp	• Extend the ramp time
			• If you remove the enable and the drive exceeds the stop ramp time t13 by a certain time, the inverter will signal *F34* error message	• Extend stop ramp time
35	Ex-e protection operating mode	Immediate switch-off with interlocking	• Wrong operating mode selected	Permitted modes: • V/f, VFC, VFC hoist Impermissible process: • Flying start function • DC braking • Group operation
			• Non-permitted parameter set	• Only use parameter set 1
			• Ex-e motor startup not performed	• Perform startup of Ex-e motor
			• Incorrect parameterization of the frequency points	• Frequency A < frequency B • Frequency B < frequency C
			• Incorrect parameterization of the current limits	• Current limit A < current limit B • Current limit B < current limit C
36	Option missing	Immediate switch-off with interlocking	• Option card type not permitted	• Use the correct option card
			• Setpoint source, control signal source or operating mode not permitted for this option card	• Set the correct setpoint source • Set the correct control signal source • Set the correct operating mode • Check parameters *P120* and *P121*
			• Required option missing	• Check the following parameters: • *P121* for FBG11B • *P120* and *P642* for FIO12B
			• Front module FIO21B not supplied	• *P808* set to "On" or supply basic device with external 24 V
37	System watchdog	Immediate switch-off with interlocking	• Error while executing system software	• Check grounding and shielding and improve, if necessary • Consult SEW-EURODRIVE Service if the error occurs again

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No.	Designation	Response	Possible cause	Measure
38	System software	Immediate switch-off with interlocking	• System fault	• Check grounding and shielding and improve, if necessary • Consult SEW-EURODRIVE Service if the error occurs again
43	RS485 timeout	Stop without interlocking[2]	• Communication between inverter and PC interrupted	• Check connection between inverter and PC
			• Communication to FSE24B interrupted	• Check voltage supply • Check parameter *P808*
44	Device utilization	Immediate switch-off with interlocking	• Device utilization (I × t value) too high	• Reduce power output • Extend ramps • If the above points are not possible: Use a larger inverter
45	Initialization	Immediate switch-off with interlocking	• Initialization error	• Contact SEW Service for advice
47	System bus 1 timeout	Stop without interlocking[2]	• Error during communication via system bus	• Check system bus connection • Check P808 • Check voltage supply of FSE24B • Check EtherCAT® communication with connected FSE24B
77	IPOSplus® control word	Stop with interlocking	• System fault	• Contact SEW Service for advice
80	RAM test	Immediate switch-off	• Internal device fault, random access memory defective	• Contact SEW Service for advice
81	Start condition	Immediate switch-off with interlocking	**Only in "VFC hoist" operating mode:** The inverter could not be supplied with the correct amount of current during the pre-magnetizing time:	
			• Rated motor power too small in relation to rated inverter power	• Check connection between inverter and motor • Check startup data and repeat startup if necessary
			• Motor cable cross section too small	• Check the cross section of the motor cable and increase if necessary
82	Open output	Immediate switch-off with interlocking	**Only in "VFC hoist" operating mode:**	
			• 2 or all output phases are interrupted	• Check connection between inverter and motor
			• Rated motor power too small in relation to rated inverter power	• Check startup data and repeat startup if necessary
84	Motor protection	Stop with interlocking	• Motor capacity utilization too high	• Check *P345* / *P346* I_N UL monitoring • Reduce the load • Extend ramps • Longer pause times
94	Checksum EEPROM	Immediate switch-off with interlocking	• EEPROM defective	• Contact SEW Service for advice
97	Copy error	Immediate switch-off with interlocking	• Removing the parameter module during the copying process • Switching off/on during the copying process	Prior to fault confirmation: • Load factory setting or complete data set from the parameter module
98	CRC flash error	Immediate switch-off	• Internal device fault, flash memory defective	• Send in device for repair
100	Vibration/warning	Display errors	• Vibration sensor warning (see "DUV10A diagnostic unit" operating instructions)	• Determine cause of vibration, operation still possible until *F101* occurs
101	Vibration error	Rapid stop	• Vibration sensor reports error	• SEW-EURODRIVE recommends eliminating the cause of the vibration immediately
102	Oil aging/warning	Display errors	• Oil aging sensor issues a warning	• Schedule oil change
103	Oil aging/fault	Display errors	• Oil aging sensor reports error	• SEW-EURODRIVE recommends changing the gear unit oil immediately
104	Oil aging/overtemperature	Display errors	• Oil aging sensor signals overtemperature	• Allow the oil to cool • Check that the gear unit cooling system is working properly

No.	Designation	Response	Possible cause	Measure
105	Oil aging/ready signal	Display errors	• Oil aging sensor is not operational	• Check the voltage supply of the oil aging sensor • Check the oil aging sensor, replace if necessary
106	Brake wear	Display errors	• Brake lining worn down	• Replace brake lining (see "Motors" operating instructions)
110	Ex-e protection	Emergency stop	• Duration of operation below 5 Hz exceeded	• Check the project planning • Shorten the duration of operation below 5 Hz
111	System bus (SBus) error	This error number signals the EtherCAT® or fieldbus master that the communication between FSE24B and MOVITRAC® B is interrupted. MOVITRAC® B device would detect error 47.		• Check FSE24B plug-in connection
113	Analog input wire break	Programmable	• Analog input wire break AI1	• Check the wiring
116	Software module error *Subfault:* 14: Encoder fault 29: Limit switch hit 42: Lag error 78: Software limit switch hit			

1) To set speed monitoring, change parameter P500 / P502 and P501 / P503. The sagging of hoists cannot be avoided safely if the delay time is set to an excessively high value.

2) No reset required, error message disappears after communication is reestablished.

14 Service

14.1 Device information

14.1.1 Fault memory

The inverter saves the error message in the fault memory *P080*. The inverter does not save a new error until the error message has been acknowledged. The local operating unit displays the last error that occurred. As a result, the value stored in *P080* and the value displayed on the control plate are different in the event of duplicate errors. This occurs, for example, with *F07 DC link overvoltage* and then *F34 Ramp timeout*.

At the time of the failure, the inverter stores the following information:

- Error that has occurred
- Status of the digital inputs / digital outputs
- Operating state of the inverter
- Inverter status
- Heat sink temperature
- Speed
- Output current
- Active current
- Device utilization
- DC link voltage

14.1.2 Switch-off responses

Depending on the failure, there are 3 switch-off responses:

Immediate stop/malfunction (immediate switch-off with locking)

This error response leads to immediate interlocking of the output stage with simultaneous control of the brake output, so that an existing brake is applied. The inverter sets the "Fault message" and cancels the "Ready for operation message".

This state can only be exited by an explicit error reset.

Rapid stop/malfunction (stop with locking)

This error response leads to a stop at the set stop ramp t13 (*P136* / *P146*). This error stop is time-monitored. If the drive does not reach the start/stop speed within a specified time interval, it branches to the error state, the output stage is disabled and an existing brake is applied. The error message *F34 Ramp timeout* is generated. The original error message is overwritten. When the drive reaches the start-stop speed, it branches to the error state, the brake is applied and the output stage is disabled. The "Fault message" is set and the "Ready for operation message" is canceled.

This state can only be exited by an explicit error reset.

Rapid stop/warning (stop without locking)

The error response is the same as for rapid stop / failure, with the difference that the inverter does not reset the ready signal, but only sets the fault output.

With RS485/SBus timeout:

If the inverter is controlled via a communication interface (RS485 or SBus) and power off and power on have been performed, the enable remains ineffective until the inverter receives valid data again via the interface monitored for timeout. Once communication is restored, the error message itself is reset.

14.1.3 Reset

Reset basic device

An error message can be reset by:

- Reset via input terminals with a correspondingly assigned digital input. DIØØ is assigned an error reset by default.

Reset keypad

An error message can be acknowledged by a manual reset on the control section (STOP/RESET button).

The STOP/RESET button has priority over a terminal enable or an enable via interface.

After an error has occurred and the error response has been programmed, you can perform a reset using the STOP/RESET button. The drive is disabled after the reset. You must enable the drive with the RUN button.

Interface reset

An error message can be acknowledged by:

- Manual reset in MOVITOOLS® MotionStudio / *P840 Manual reset* = *Yes* or in the status window of the reset button.

14.2 SEW electronics service

14.2.1 Hotline

You can reach a service specialist from SEW-EURODRIVE Service around the clock, 365 days a year, by calling the Drive Service Hotline.

Simply dial the code **0800** and then enter the key combination for **SEWHELP**. Or simply dial **0800-739-4357**.

14.2.2 Send in for repair

If you are unable to rectify an error, contact the **SEW-EURODRIVE Electronics Service**.

Always specify the digits of the device status when contacting the SEW-EURODRIVE Electronics Service team. The SEW-EURODRIVE Service can then help you more effectively.

Provide the following information when sending the device in for repair:

- Serial number (see nameplate)
- Type designation
- Brief application description (application, control via terminals or serial)
- Connected motor (motor voltage, star or delta connection)
- Type of fault

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- Accompanying circumstances
- Your own presumptions
- Any unusual events preceding the problem

14.3 Extended storage

If the device is in extended storage, connect it to the line voltage for maintenance at least 5 minutes every 2 years. Otherwise, the device's service life might be reduced.

Procedure in the event of failure to perform maintenance:

Electrolytic capacitors are used in the inverters. They are subject to aging effects when de-energized. This effect can damage the electrolytic capacitors if the device is connected directly to the nominal voltage after a longer period of storage.

In the event of failure to perform maintenance, SEW-EURODRIVE recommends that you slowly increase the line voltage up to the maximum voltage. This can be done, for example, using a variable transformer whose output voltage is set according to the following overview. SEW-EURODRIVE recommends increasing the voltage from 0 V to the first stage within a few seconds.

SEW-EURODRIVE recommends the following graduations:

AC 400/500 V devices:

- Stage 1: AC 350 V for 15 minutes
- Stage 2: AC 420 V for 15 minutes
- Stage 3: AC 500 V for 1 hour

AC 230 V devices:

- Stage 1: AC 170 V for 15 minutes
- Stage 2: AC 200 V for 15 minutes
- Stage 3: AC 240 V for 1 hour

Following this regeneration, the device can be used immediately or, with maintenance, remain in extended storage.

14.4 Disposal

Observe the current national regulations.

Dispose of materials separately in accordance with the nature of the materials and the regulations currently in force, for example:

- Waste electrical and electronic products (printed circuit boards)
- Plastic
- Sheet metal
- Copper
- Aluminum.

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14.5 IT security guidelines for secure disposal

14.5.1 Removing the product from its intended environment

If the data stored on the product is considered relevant for IT security, remove it as described in the section "Secure removal of data stored in the product." (→ 376)

14.5.2 Removing reference and configuration data in the environment

Reference files, configuration files, log files, and other data belonging to the product can be stored in the environment on other devices, such as a higher-level controller or a local OPC-UA client. If the stored data is considered relevant for IT security, remove it from the corresponding devices.

14.5.3 Secure removal of data stored in the product

You can reset the data saved in the product to the factory settings using the MOVISUITE® engineering software.

This encompasses the following data, if present on the device variant:

- Configuration of the device
- Scope recording of the device
- Fault memory
  - Fault number
  - Timestamp
  - Fault code, subfault code, descriptive text
  - Process data
  - States of the digital inputs/outputs
  - Control word and status word
- Device name
- IP address
- Safety-relevant data

The following data is not reset with this procedure and can be changed individually, if present on the device variant:

- Enabled functions
- AS-Interface address
- Data set of the safety option
- EtherCAT® device designation
- PROFINET name
- Last detected options

14.5.4 Removing a customer data backup

The product does not create local customer data backups.

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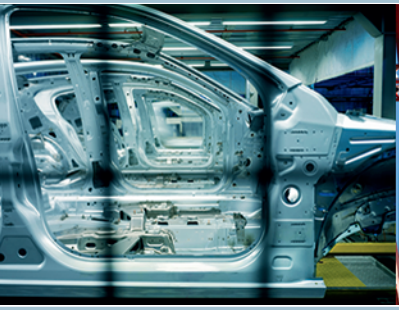

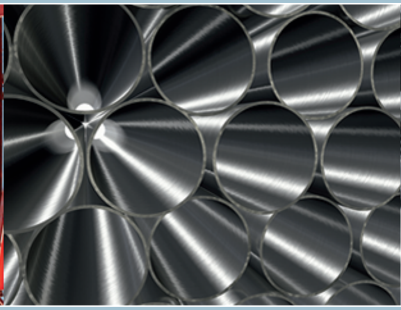


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