SEW EURODRIVE

Operating Instructions

Frequency Inverters

MOVITRAC® LTE-B+

Edition 04/2016

22511067/EN

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1 General information

1.1 About this documentation

This documentation is an integral part of the product. The documentation is intended for all employees who perform assembly, installation, startup, and service work on the product.

Make sure this documentation is accessible and legible. Ensure 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. If you are unclear about any of the information in this documentation or require further information, contact SEW-EURODRIVE.

1.2 Structure of the safety notes

1.2.1 Meaning of signal words

The following table shows the grading and meaning of the signal words for safety notes.

Signal word	Meaning	Consequences if disregarded
⚠ **DANGER**	Imminent hazard	Severe or fatal injuries.
⚠ **WARNING**	Possible dangerous situation	Severe or fatal injuries.
⚠ **CAUTION**	Possible dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the drive system or its environment.
INFORMATION	Useful information or tip: Simplifies handling of the drive system.	

1.2.2 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.

1.2.3 Structure of embedded safety notes

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

This is the formal structure of an embedded safety note:

- ⚠ **SIGNAL WORD** Type and source of hazard.

  Possible consequence(s) if disregarded.

  – Measure(s) to prevent the hazard.

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1.3 Rights to claim under limited warranty

A requirement of fault-free operation and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the documentation. Read the documentation before you start working with the product.

1.4 Exclusion of liability

You must comply with the information contained in this documentation to ensure safe operation and to achieve the specified product characteristics and performance features. SEW-EURODRIVE assumes no liability for injury to persons or damage to equipment or property resulting from non-observance of these operating instructions. In such cases, any liability for defects is excluded.

1.5 Copyright notice

1.6 Product names and trademarks

The brands and product names in this documentation are trademarks or registered trademarks of their respective titleholders.

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2 Safety notes

2.1 Preliminary information

The following basic safety notes must be read carefully to prevent injury to persons and damage to property. The user must ensure that the basic safety notes are read and observed. Make sure that persons responsible for the system and its operation, as well as persons who work independently on the unit, have read through the operating instructions carefully and understood them. If you are unclear about any of the information in this documentation, or if you require further information, please contact SEW-EURODRIVE.

Please also observe the supplementary safety notes in the individual chapters of this documentation.

2.2 General information

⚠ WARNING

Depending on its enclosure, the unit may have live, uninsulated as well as moving or rotating parts and hot surfaces during operation.

Severe or fatal injuries.

- All work related to transportation, storage, installation, setup/assembly, connection, startup, maintenance and repair may only be carried out by specialists, in strict observance of
  - The relevant detailed documentation
  - The warning and safety signs on the unit
  - All other relevant project planning documents, startup instructions and wiring diagrams
  - The specific regulations and requirements for the system
  - The national/regional regulations governing safety and the prevention of accidents.
- Never install damaged products.
- Submit a complaint to the shipping company immediately in the event of damage.

Unauthorized removal of required covers, improper use, or incorrect installation and operation may result in severe injury to persons, or damage to machinery.

Refer to the following chapters for more information.

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2.3 Target group

Mechanical work of any kind may be carried out only by trained 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 have the following qualifications:

- Training in mechanical engineering (for example, as a machinist or mechatronics technician) and the successful completion of final examinations.
- Knowledge of this documentation.

Electrical work of any kind may be carried out only by skilled persons. In the context of this documentation, skilled persons are persons who are familiar with the electrical installation, startup, troubleshooting and maintenance of the product and who have the following qualifications:

- Training in electrical engineering, e.g. as an electrician or mechatronics technician (final examinations must have been passed).
- Knowledge of this documentation.

In addition to that, they must be familiar with the relevant safety regulations and laws, especially with the requirements of the performance levels according to DIN EN ISO 13849-1 and all other standards, directives and laws specified in this documentation. The above-mentioned persons must have the express authorization of the company to operate, program, parameterize, identify and ground units, systems and circuits in accordance with safety technology standards.

All work in the areas of transportation, storage, operation and waste disposal must be performed by suitably trained personnel.

2.4 Designated use

Frequency inverters are components for controlling asynchronous AC motors. Frequency inverters are components intended for installation in electrical systems or machines. Never connect capacitive loads. Operation with capacitive loads results in over voltages and may destroy the unit.

The following standards apply, if the frequency inverters are marketed in the EU/EFTA:

- In case of installation in machines, startup of the inverters (meaning the start of designated use) is prohibited until it is determined that the machine meets the requirements stipulated in Directive 2006/42/EC (Machinery Directive); observe EN 60204.
- Startup (i.e. the start of designated use) is only permitted under observance of the EMC Directive (2014/30/EU).
- The frequency inverters comply with the requirements of the Low Voltage Directive 2014/35/EU. The harmonized standards of the EN 61800-5-1/DIN VDE T105 series in connection with EN 60439-1/VDE 0660 part 500 and EN 60146/VDE 0558 are applied to these frequency inverters.

Observe the technical data and the connection requirements specified on the nameplate and the operating instructions.

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2.5 Transportation

Inspect the shipment for transport damage as soon as you receive the delivery. Inform the shipping company immediately of any damage. If necessary, put startup on hold.

Note the following points regarding transport:

- Before transportation, cover the connections with the supplied protection caps.
- Place the unit only on the cooling fins or on a side without connectors during transportation.
- Ensure that the unit is not subjected to mechanical impact during transportation.

If necessary, use suitable, sufficiently rated handling equipment. Prior to startup, remove the transport protection.

Observe the information on climatic conditions as stated in chapter "Technical Data".

2.6 Installation/assembly

Ensure that the unit is installed and cooled according to the regulations in the related documentation.

Protect the unit from excessive strain. Especially during transportation and handling, do not allow the components to be deformed or insulation spaces altered. Electrical components must not be mechanically impaired or irreparably damaged.

The following applications are prohibited unless explicitly permitted:

- Use in potentially explosive atmospheres,
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, radiation, etc.
- Use in applications that are subject to mechanical vibration and shock loads in excess of the requirements in EN 61800-5-1.

Observe the notes in the "Mechanical Installation" chapter.

2.7 Electrical connection

Observe the applicable national accident prevention regulations when working on a live drive controller.

Perform electrical installation according to the pertinent regulations (e.g. cable cross sections, fusing, protective conductor connection). The documentation contains additional notes.

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

Required preventive measures:

Type of energy transfer	Preventive measure
Direct power supply	• Ground connection

2.8 Protective separation

The unit meets all requirements for protective separation of power and electronics connections in accordance with EN 61800-5-1. To ensure protective separation, all connected circuits must also meet the requirements for protective separation.

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2.9 Startup/operation

⚠ CAUTION

The surfaces of the unit and any connected components, e.g. braking resistors, can reach high temperatures during operation.

Danger of burns.

- Let the unit and external options cool down before you start working on them.

Do not deactivate the monitoring and protection devices, even during the test run.

When in doubt, switch off the unit whenever changes occur compared with normal operation (e.g. increased temperatures, noise, oscillation). Determine the cause of the fault and, if necessary, contact SEW-EURODRIVE.

Where required, systems in which such units are installed must be equipped with additional monitoring and protection devices in accordance with the respective applicable safety regulations, e.g. the law governing technical equipment, accident prevention regulations, etc.

Additional preventive measures may be necessary for applications with increased hazard potential. You must check the functionality of protection devices each time you change the configuration.

Connections that are not being used must be covered with the supplied protection caps during operation.

Do not touch live components or power connections immediately after disconnecting the unit from the voltage supply because some capacitors may still be charged. Adhere to a minimum switch-off time of 10 minutes. Observe the corresponding labels on the unit.

When the unit is switched on, dangerous voltages are present at all power connections as well as at connected cables and motor terminals. This applies even when the unit is not running and the motor is at standstill.

The fact that the operation LED and other display elements are no longer illuminated does not indicate that the unit has been disconnected from the supply system.

Mechanical blocking or internal safety functions within the unit can cause the motor to stop. Eliminating the cause of the problem or performing a reset may help to restart the drive automatically. If, for safety reasons, this is not permitted for the drive-controlled machine, disconnect the unit from the supply system before you start troubleshooting.

2.10 Inspection/maintenance

⚠ WARNING

Danger of electric shock due to exposed, live parts in the unit.

Severe or fatal injuries.

- Never open the unit.
- Only SEW-EURODRIVE is authorized to carry out repairs.

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3 General specifications

3.1 Input voltage ranges

Depending on the model and the nominal power, the frequency inverters are designed for direct connection to the following voltage sources:

MOVITRAC® LTE-B			
Nominal voltage	**Size**	**Connection type**	**Rated frequency**
110 – 115 V ± 10%	1, 2	1-phase	50 – 60 Hz ± 5%
200 – 240 V ± 10%	1, 2 and 3	1-phase* / 3-phase	50 – 60 Hz ± 5%
380 – 480 V ± 10%	1, 2 and 3 s	3-phase	50 – 60 Hz ± 5%

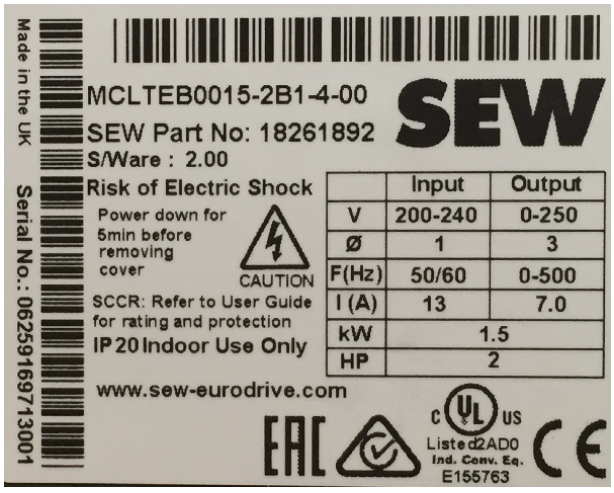
Units that are connected to a 3-phase supply system are designed for a maximum power grid imbalance of 3% between the phases. For supply systems with a power grid imbalance of more than 3% (for example, in India and parts of the Asia-Pacific region including China), SEW-EURODRIVE recommends that you use input chokes.

INFORMATION

*Single-phase frequency inverters can also be connected to 2phases of a 3-phase power supply system of 200 – 240 V.

3.2 Nameplate

The following figure shows a nameplate.



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3.3 Type designation

Example: MCLTE-1-B 0015-201-1-00		
Product name	MCLTE	MOVITRAC® LTE-B
Version	B	Version status of the unit series
Motor	1	Only single-phase motors
Recommended motor power	0015	0015 = 1.5 kW
Supply voltage	2	• 1 = 115 V • 2 = 200 – 240 V • 5 = 380 – 480 V
Interference suppression on the input	0	• 0 = Class 0 • A = Class A • B = Class B
Connection type	1	• 1 = 1-phase • 3 = 3-phase
Quadrants	1	1 = 1-quadrant operation without brake chopper 4 = 4-quadrant operation with brake chopper
Design	00	• 00 = Standard IP20 housing • 10 = IP55/NEMA-12K housing without switch • 20 = IP55/NEMA-12K housing with switch • 30 = IP66/NEMA-4X housing without switch • 40 = IP66/NEMA-4X housing with switch
Country-specific variant	(60 Hz)	60 Hz = 60 Hz design

3.4 Speed setting range

Control mode	Speed setting range
V/f	1:10
IM Vector	1:20
PM Vector	1:10

3.5 Overload capacity

All MOVITRAC® LTE-B products have the following overload capacity:

- 150% for 60 seconds
- 175% for 2 seconds

With an output frequency of < 10 Hz, the overload capacity is reduced to 150% for 7.5 seconds.

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3.6 Protection functions

- Short circuit output, phase-phase, phase-ground
- Output overcurrent
- Overload protection
- Overvoltage shutdown
- Undervoltage shutdown
- Shutdown caused by overtemperature
- Shutdown caused by undertemperature

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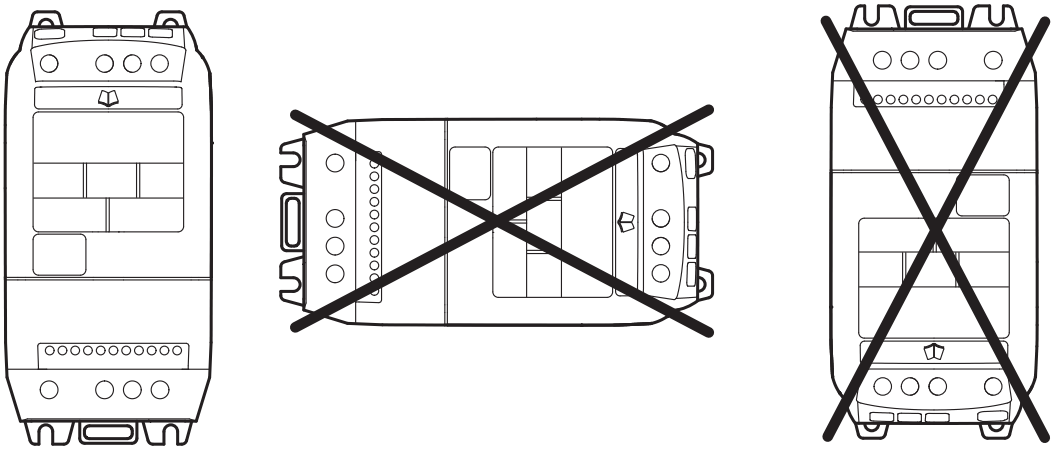
4 Installation

The next chapter describes the installation.

4.1 General information

- Carefully check the frequency inverter for damage before installation.
- Store the frequency inverter in its original packaging until it is used. The storage location must be clean and dry with an ambient temperature between -40 °C and +60 °C.
- Install frequency inverter in a suitable housing on a level, vertical, non-flammable, and vibration-free surface. If a certain IP degree of protection is required, observe EN 60529.
- Keep flammable materials away from the frequency inverter.
- Prevent the ingress of conductive or flammable foreign objects.
- The relative humidity must be kept below 95 % (condensation is not permitted).
- Protect the IP66 frequency inverter from direct sunlight. Use a cover when using the inverter outdoors.
- Frequency inverters can be installed next to each other. Ensure sufficient ventilation space between the individual devices. If the frequency inverter is to be installed above another frequency inverter or another device that dissipates heat, then there must be a vertical minimum clearance of 150 mm. To enable self-cooling, the control cabinet must either be cooled through forced ventilation, or dimensioned accordingly. See chapter "IP20 housing: Installation and installation space" (→ 🗎 19).
- The maximum permitted ambient temperature during operation is +50 °C for IP20 frequency inverters, and +40 °C for IP55 and IP66 frequency inverters. The minimum permitted ambient temperature during operation is -10 °C.

  Note the special degrees of protection in section "Information on ambient conditions" (→ 🗎 98).
- A device for installing DIN support rails is only available for size 1 and 2.
- Install the frequency inverter only as depicted in the following figure:



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4.2 Mechanical installation

4.2.1 Housing variants and dimensions

Housing variants

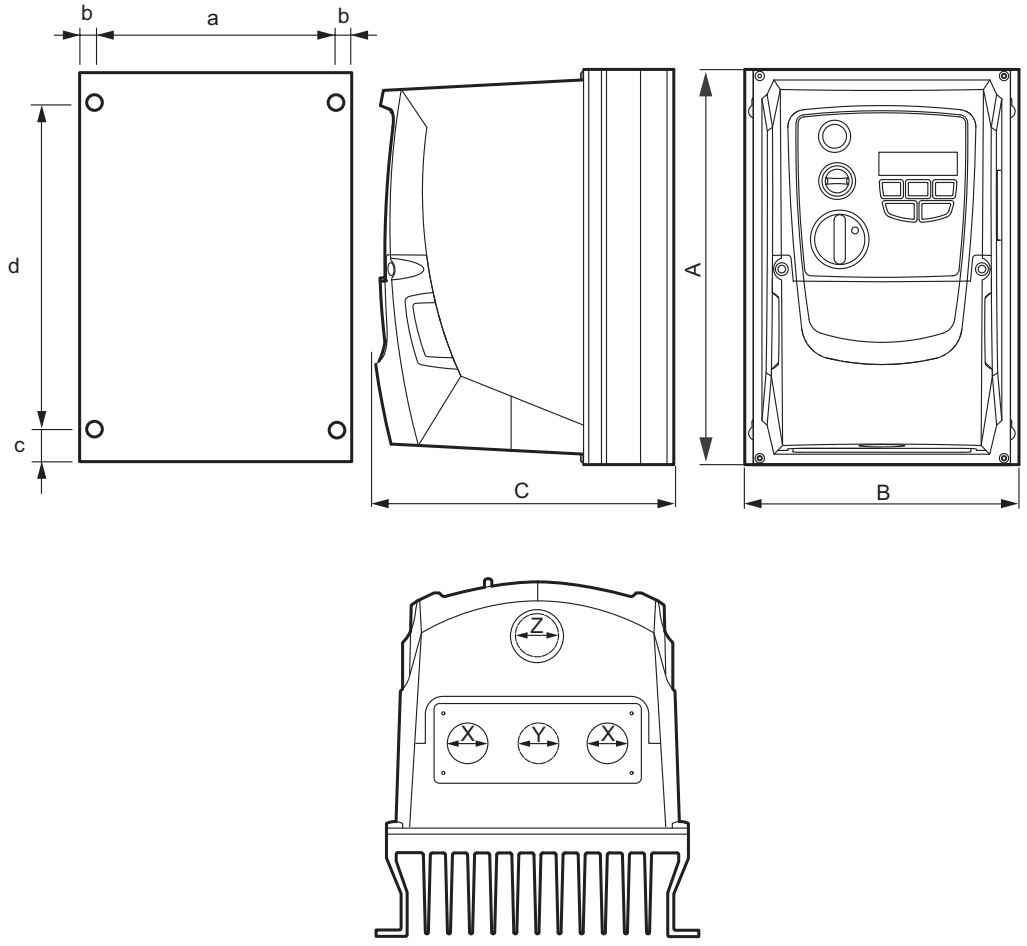
MOVITRAC® LTE-B+ is available with 3 housing variants:

- IP66/NEMA 4X
- IP55/NEMA 12K
- IP20 housing for installation in control cabinets

IP55/NEMA-12K and IP66/NEMA-4X housings are protected against humidity and dust. These frequency inverters can be operated indoors in a dusty or damp environment. The electronics of the IP66 frequency inverter are identical to frequency inverters in IP20 design. The only difference is in the housing dimensions and the weight.

In degree of protection IP66, the frequency inverters are also available with switch options, such as main switch, direction of rotation switch, and potentiometer.

Dimensions of IP66/NEMA-4X housings (LTE xxx -30 and -40)



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Dimension table

Dimensions		Size 1	Size 2	Size 3
Height (A)	mm	232	257	310
Width (B)	mm	161	188	210.5
Depth (C)	mm	179	186.5	252
Weight	kg	2.8	4.6	7.4
a	mm	148.5	176	197.5
b	mm	6.25	6	6.5
c	mm	25	28.5	33.4
d	mm	189	200	251.5
Tightening torque for power terminals	Nm	1	1	1
Tightening torque for control terminals	Nm	0.5	0.5	0.5
Recommended screw size		4 × M4	4 × M4	4 × M4

IP66 cable openings

Use suitable cable glands to achieve the corresponding IP/NEMA classification.

The required cable bushings can be broken out with suitable tools.

Dimensions		Size 1	Size 2	Size 3
X	mm	22	28.2	28.2
	PG/M[1)]	PG13.5/M20	PG21/M25	PG21/M25
Y[2)]	mm	22	22	22
	PG/M[1)]	PG13.5/M20	PG13.5/M20	PG13.5/M20
Z[2)]	mm	22	22	22
	PG/M[1)]	PG13.5/M20	PG13.5/M20	PG13.5/M20

1) The data above refers to plastic screws.

2) Cable bushings Y and Z are pre-punched

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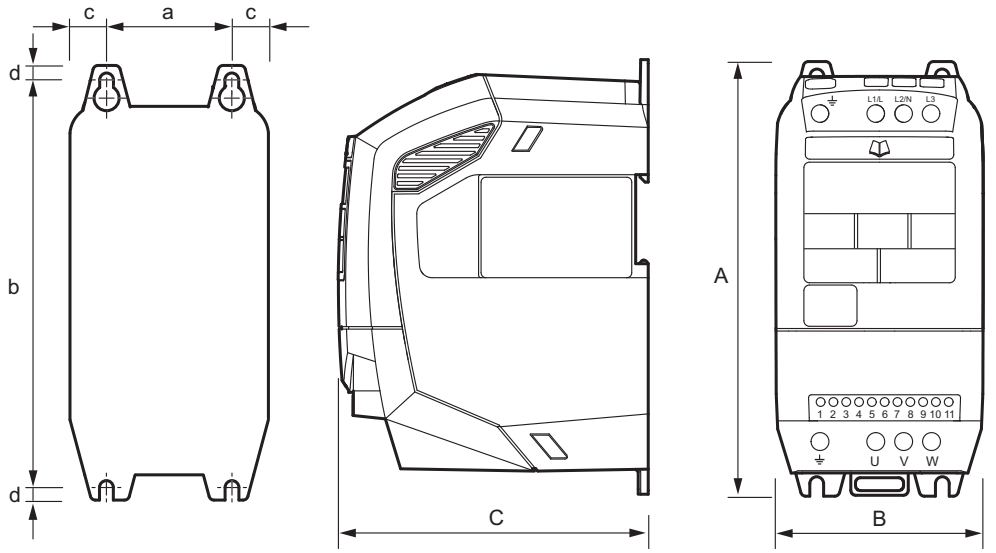
Dimensions of the IP20 housing



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Dimensions	Unit	Size 1	Size 2	Size 3
Height (A)	mm	174	220	261
Width (B)	mm	82	109	131
Depth (C)	mm	122.6	150	178
Weight	kg	1.1	2	4.5
a	mm	50	63	80
b	mm	162	209.0	247
c	mm	16	23	25.5
d	mm	5	5.25	7.25
Tightening torques for power terminals	Nm	1	1	1
Tightening torques for control terminals	Nm	0.5	0.5	0.5
Recommended screws		4 × M4	4 × M4	4 × M4

4.2.2 Mounting position

The frequency inverter may only be installed vertically.

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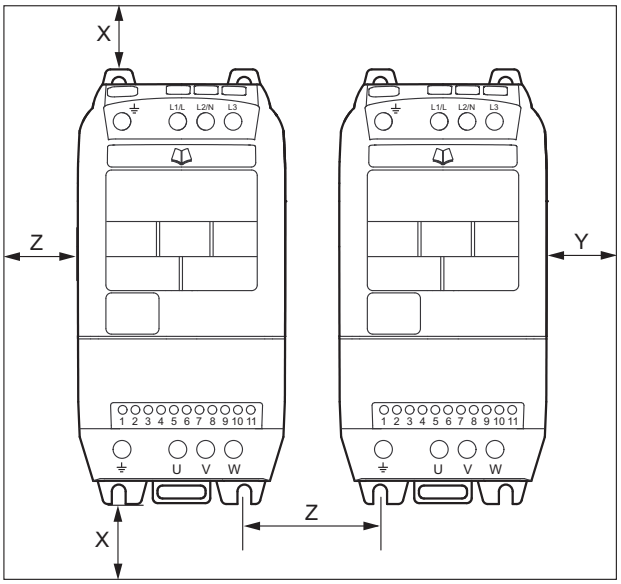
4.2.3 IP20 housing: assembly and installation space

For applications that require a higher IP degree of protection than IP20, the frequency inverter must be installed in a control cabinet. Observe the following requirements:

- The control cabinet must be made of a heat conductive material unless it has forced air cooling.
- When using a control cabinet with ventilation openings, the openings must be provided above and below the frequency inverter to allow for unobstructed circulation of air. The air must be supplied below the frequency inverter and dissipated above it.
- If the frequency inverter is operated in external environments with particles of dirt (such as dust), ventilation openings either have to be equipped with a suitable particle filter or forced air cooling has to be used. The filter has to be serviced and cleaned.
- In environments with a high level of humidity, salt or chemicals, a suitable enclosed control cabinet (without ventilation openings) must be used.
- The IP20 frequency inverter can be assembled directly next to one another without clearance.

Minimum clearances during installation



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Size	X	Y	Z	Air flow rate
	mm	mm	mm	m³/h
1	50	50	33	11
2	75	50	47	11
3	100	50	52	26

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4.3 Electrical installation

Adhere to the safety instructions in chapter 2 during installation.

⚠ WARNING

Electric shock due to charged capacitors. Dangerous voltage levels may still be present inside the unit and at the terminals up to ten minutes after disconnection from the power supply.

Severe or fatal injuries.

- Wait ten minutes after disconnecting the frequency inverter from the power supply as well as disconnecting the line voltage and the DC 24 V voltage. Then, establish that the unit has been de-energized. Only then, start to work on the unit.

- The frequency inverter may only be installed by electrical specialists in compliance with the relevant directives and regulations.
- The grounding cable must be designed for the maximum fault current of the voltage source that is usually limited by fuses or motor protection switches.
- The frequency inverter has the degree of protection IP20. If higher degrees of protection are required, use a suitable housing or the IP55/NEMA-12K or IP66/NEMA-4X version.
- Make sure the frequency inverters are properly grounded. See wiring diagram in section Connecting inverter and motor.

4.3.1 Before installation

- Make sure that supply voltage, frequency, and number of phases (single- or three-phase) correspond with the nominal values of the frequency inverter on delivery.
- A disconnecting switch or similar disconnecting element must be installed between voltage supply and frequency inverter.
- Never connect the power supply to the output terminals U, V or W of the frequency inverter.
- Do not install automatic contactors between frequency inverter and motor. Adhere to a minimum clearance of 100 mm at points where control cables and electric power lines are installed close to each other, and an angle of 90° for crossing cables.
- The cables are only protected by slow-blow high-power fuses or motor circuit breaker. You find more information in section "Permitted voltage supply systems" (→ 🗎 23).
- Make sure that shielding and sheaths of power cables are designed according to the wiring diagram in section "Connecting frequency inverter and motor" (→ 🗎 26).
- Make sure that all terminals have been tightened with the proper tightening torques.
  - Control terminals: 0.5 Nm
  - Power terminals: 1 Nm

Line contactors

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

Make sure to observe a minimum time interval of 120 seconds between two cycles.

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Line fuses

Fuse types:

- Line protection types in utilization categories gL, gG:
  - Nominal fuse voltage ≥ nominal line voltage
  - The nominal fuse current must be designed for 100% of the nominal frequency inverter current, depending on the use of the frequency inverter.
- Miniature circuit breaker with characteristic B:
  - Nominal circuit breaker voltage ≥ nominal line voltage
  - The nominal currents of the miniature circuit breakers must be 10% higher than the nominal frequency inverter current.

Residual current device

⚠ WARNING

No protection against electric shock if an incorrect type of residual current device is used.

Severe or fatal injuries.

- Use only universal current sensitive residual current devices of type B for 3-phase frequency inverters.

- A 3-phase frequency inverter creates a DC component in the leakage current and may greatly reduce the sensitivity of a type-A residual current device. A type-A residual current device is therefore not permitted as a protection device.

  Use only a type-B residual current device.
- If the use of a residual current device is not stipulated in the standards, SEW-EURODRIVE recommends not using a residual current device.

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Operation on IT system

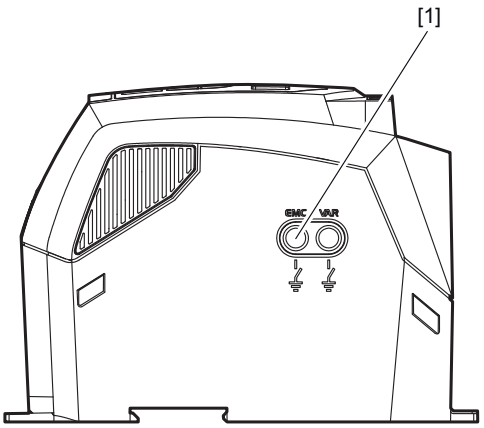
Only IP20 units can be operated at the IT system. To operate a MOVITRAC® LTE-B+ on the IT system, the integrated EMC filter must be deactivated. To do so, screw out the EMC screw on the side of the device.

⚠ WARNING

Danger of electric shock. Dangerous voltage levels may still be present inside the unit and at the terminals up to 10 minutes after disconnection from the power supply.

Severe or fatal injuries.

- Disconnect the frequency inverter from the power supply at least 10 minutes before you screw out the EMC screw.



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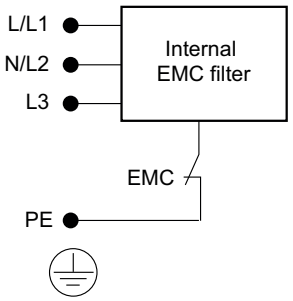
[1] EMC screw



17511225099

SEW-EURODRIVE recommends using earth-leakage monitors with pulse code measurement in voltage supply systems with a non-grounded star point (IT systems). The use of such devices prevents the earth-leakage monitor mis-tripping due to the earth capacitance of the frequency inverter.

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Operation on TN system with FI switch (IP20)

IP20 frequency inverters with integrated EMC filter (e.g., MOVITRAC® LT xxxx xAx-x-00 or MOVITRAC® LT xxxx xBx-x-00) have a higher leakage current than units without an EMC filter. The EMC filter can trigger faults when operated with residual current devices. Deactivate the EMC filter to reduce the leakage current. To do so, remove the EMC screw on the side of the unit. See figure in chapter "Operation on IT systems".

4.3.2 Installation

Connect the frequency inverter as shown in the wiring diagrams below. Ensure proper wiring in the motor terminal box. A distinction is made between the following two basic connections: star connection and delta connection. Make sure that the motor is connected with the voltage source in such a way that it is supplied with the correct operating voltage.

You find more information in the figure in section "Connection in the motor terminal box" (→ 🗎 25).

It is recommended that you use a 4-core PVC-insulated and shielded cable as the power cable. Route this cable in accordance with the relevant national regulations of the industry sector as well as the rules and standards. Conductor end sleeves are required in order to connect the power cables to the frequency inverter.

The power connections of frequency inverters in size 3 must be designed with crimp ring cable lugs to ensure safe contact.

The grounding terminal of each frequency inverter must be connected individually and **directly** to the ground busbar (mass) of the installation site (via a filter, if available).

See section "Connecting frequency inverter and motor" (→ 🗎 26).

Do not loop the ground connections of the MOVITRAC® LT inverter from one inverter to the other. Furthermore, do not route the ground connections to the inverters from other inverters.

The impedance of the ground circuit must comply with the local safety regulations of the industry sector.

To comply with UL regulations, all earth connections must be designed with UL-listed crimping ring cable lugs.

Permitted voltage supply systems

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

  The frequency inverter is intended for operation on TN and TT systems with directly grounded star point.

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

  Operation on voltage supply systems with non-grounded star point (for example IT systems) is only permitted for frequency inverters with degree of protection IP20.

- **Voltage systems with grounded outer conductor**

  On voltage supply systems, the frequency inverters may only be operated with a maximum phase-to-ground AC voltage of 300 V.

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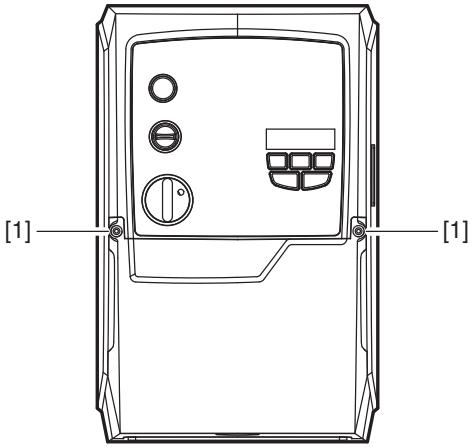
Opening the front cover

IP66 for all sizes

Remove the 2 screws on the inverter front to open the front cover.



2933384203

[1] Screws of the front cover

Connecting a braking resistor

- Shorten the cables to the required length.
- Use 2 tightly twisted leads or a 2-core shielded power cable. The cross section corresponds to the rated current of the inverter.
- Secure the bimetallic relays against overload 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. Do not use electronic or electromagnetic fuses because these can be triggered even in case of short-term excess currents that are still within the tolerance range.
- For braking resistors in the BW..-...T series, you can connect the integrated thermostat using a 2-core, shielded cable as an alternative to a bimetallic relay.
- The flat-type braking resistors have internal thermal overload protection (fuse cannot be replaced). Install the flat-design braking resistors together with the appropriate touch guard.

⚠ WARNING

Dangerous voltage levels can still be present inside the unit and at the terminals up to 10 minutes after disconnection from the power supply.

Severe or fatal injuries.

- Disconnect and insulate the frequency inverter from the power supply for at least 10 minutes before removing the braking resistance.

- Brake out the touch protection installed at the factory.

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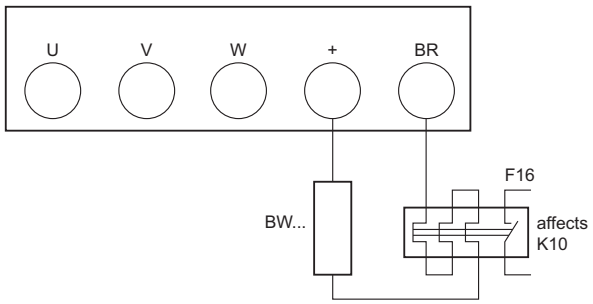
The following figure shows the wiring diagram for the braking resistor.

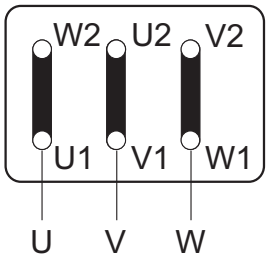


9682404363

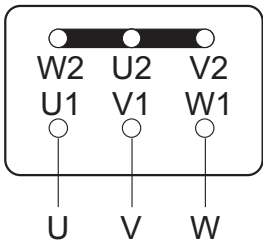
Connection in the motor terminal box

Connection types for motors: star, delta, double star, or star according to NEMA. The nameplate of the motor indicates the nominal voltage for the connection type that has to match the operating voltage of the frequency inverter.

R13

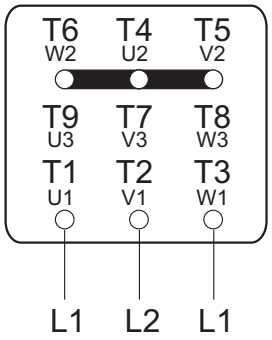


Low voltage Δ

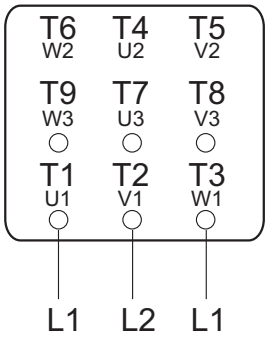


High voltage ⅄

R76



Low voltage ⅄⅄



High voltage ⅄

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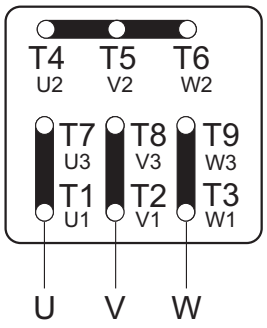
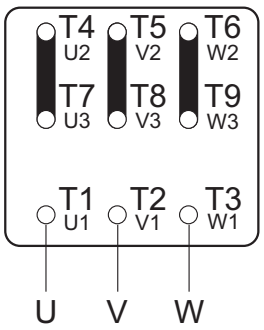
DR/DT/DV



Low voltage ⅄⅄



High voltage ⅄

Connecting frequency inverter and motor

⚠ WARNING

Danger of electric shock. Incorrect wiring can lead to dangerously high voltages.

Severe or fatal injuries.

- Adhere to the connection sequence depicted below.

In the following applications, always cut-off the brake in the AC and DC circuits:

- All lifting applications.
- Applications that require a quick brake reaction time.

INFORMATION

In case of a new device, the terminal slots DC+ and BR have a cover installed that can be broken out if required.

Connect the brake rectifier using a separate supply system lead.

Supply via the motor voltage is not permitted!

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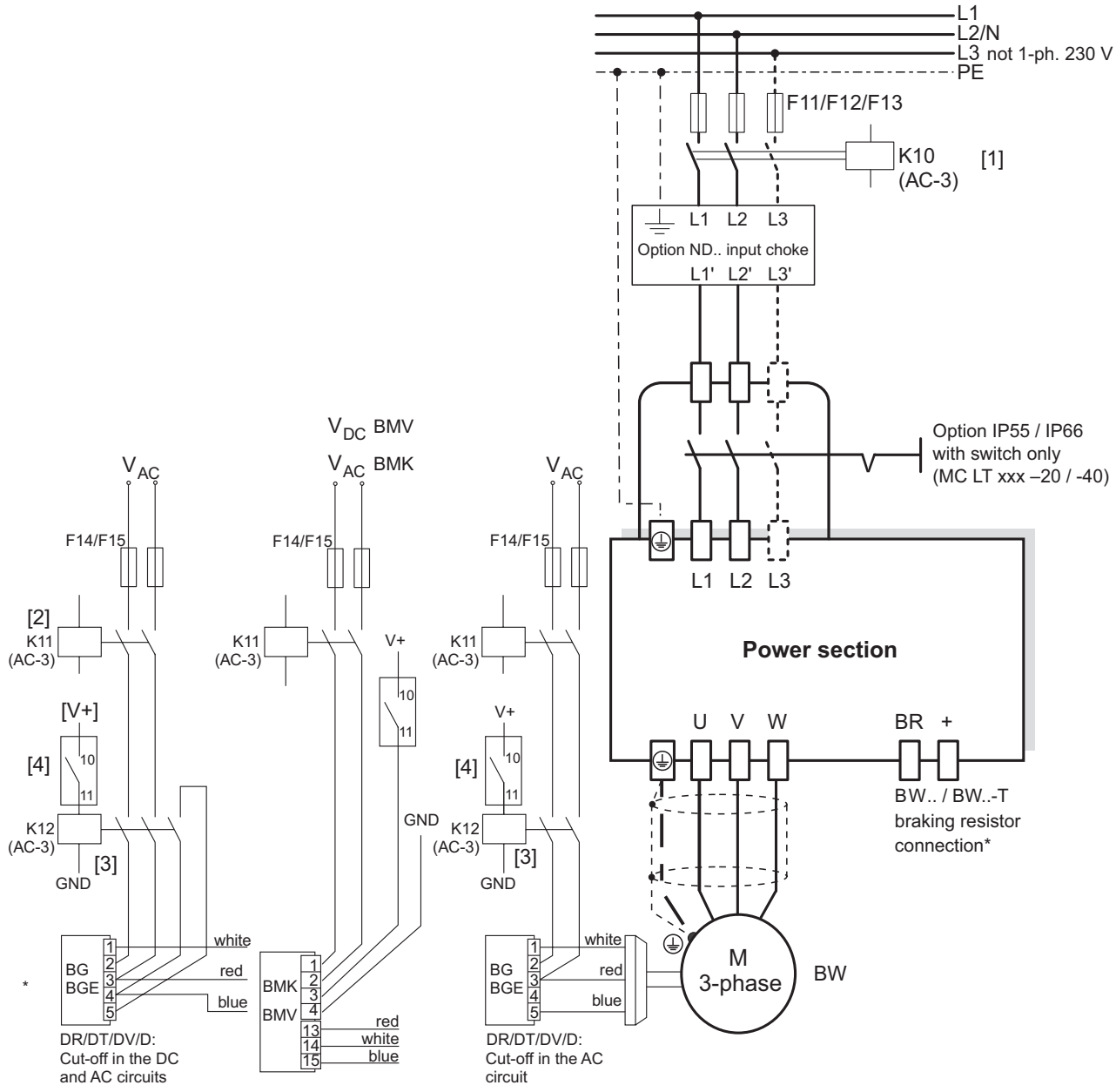

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* Only sizes 2 and 3

[1] Power supply contactor at the frequency inverter

[2] Power supply at the brake rectifier, switched via K10

[3] Control contactor/relay for supplying the brake rectifier with current. Control via relay contact [4] in the frequency inverter.

[4] Isolated relay contacts
Set in parameter *P-18* = 0

V+ External current supply AC 250 V/DC 30 V at max. 5 A

V_{DC} BMV DC voltage supply BMV

V_{AC} BMK AC voltage supply BMK

Motor temperature protection (TF/TH)

Motors with an internal temperature sensor (TF, TH or similar) can be connected directly to the frequency inverter.

If the thermal protection is triggered, the frequency inverter displays the error "E-triP".

The sensor is connected to terminal 1 (+24 V) and terminal 4 (digital input DI3 / analog input AI2) see section Overview of signal terminals. To receive overtemperature shutdown, the following must additionally be set at the parameters:

Parameter	Setting
P-15	Select the program that contains the TF/TH evaluation on DI3 (e.g. *P-15* = 3)
P-48	PTC-th

The shutdown level is set to 2.5 kΩ.

Multi-motor drive/group drive

The total of the motor currents must not exceed the nominal current of the frequency inverter. The maximum permitted cable length for the group is limited to the values of single connection. See chapter "Technical data" (→ 🗎 98).

The motor group is limited to five motors and must not differ by more than 3 frame sizes.

Multi-motor operation is only possible with AC asynchronous motors, not with synchronous motors.

SEW-EURODRIVE recommends to use an output choke "HD LT xxx", additionally unshielded cables, and a maximum permitted output frequency of 4 kHz for groups of more than 3 motors.

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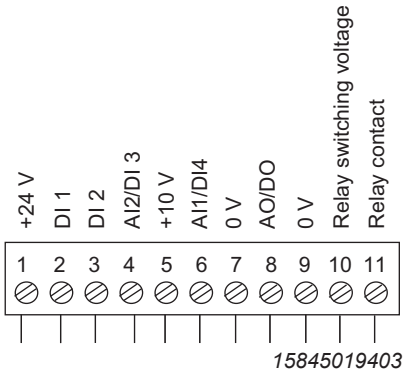
4.3.3 Overview of signal terminals

⚠ CAUTION

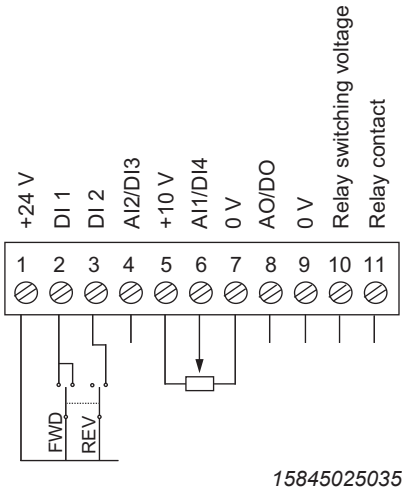
Applying voltages of more than 30 V to the signal terminals can damage the controller.

Possible damage to property.

- The voltage applied to the signal terminals must not exceed 30 V.



IP20 and IP55



IP55 and IP66 with switch option

The signal terminal block is equipped with the following signal terminals:

Terminal no.	Signal	Connection	Description
1	+24 V ref out	Output +24 V: Reference voltage	Reference voltage for activating DI1 – DI3 (max. 100 mA)
2	DI 1	Digital input 1	Positive logic
3	DI 2	Digital input 2	"Logic 1" input voltage range: DC 8 – 30 V "Logic 0" input voltage range: DC 0 – 2 V
4	AI/DI	Analog input 2 (12 bit) Digital input 3	0 – 10 V, 0 – 20 mA, 4 – 20 mA "Logic 1" input voltage range: DC 8 – 30 V
5	+10 V	Output +10 V: Reference voltage	10 V reference voltage for analog input (Pot. supply +, 10 mA max., 1 k Ω min.)
6	AI/DI	Analog input 1 (12 bit) Digital input 4	0 – 10 V, 0 – 20 mA, 4 – 20 mA "Logic 1" input voltage range: DC 8 – 30 V
7	0 V	0 V: Reference potential	0 V: Reference potential for analog input (potential shift)
8	AO/DO	Analog output (10 bits) Digital output	0 – 10 V, max. 20 mA analog 0/24 V, max. 20 mA digital
9	0 V	0 V: Reference potential	0 V: Reference potential for analog output
10	Relay switching voltage	Input relay switching voltage	NO contact (AC 250 V / DC 30 V at 5 A)
11	Relay contact	Relay contact	

If 0 V is present at terminal 7 or 9, all digital inputs and multi-functional inputs (binary operated) are compatible with the PLC requirement of IEC 61131.

The following switching threshold applies to all digital inputs and multi-functional inputs (binary operated):

Logic "1" input voltage range: 8 – 30 V

Logic "0" input voltage range: 0 – 4 V

INFORMATION

Terminals 7 and 9 can be used as GND reference potential if the frequency inverter is controlled via PLC.

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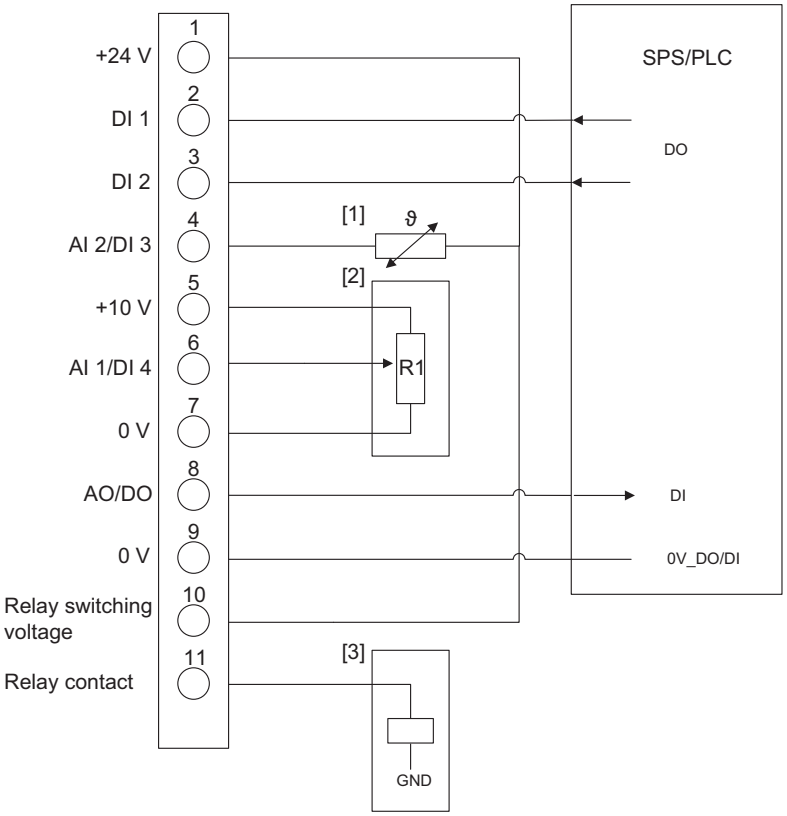
4.3.4 Signal terminal connection example

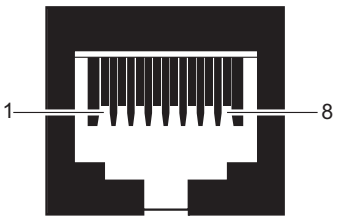


15845578507

[1] Motor temperature sensor TF/TH
[2] Analog velocity control/potentiometer
[3] Control contactor/relay for supplying the brake rectifier with current

4.3.5 Communication socket RJ45

Socket at unit



13515899787

[1] SBus-/CAN bus-
[2] SBus+/CAN bus+
[3] 0 V
[4] RS485- (engineering)
[5] RS485+ (engineering)
[6] +24 V (output voltage)
[7] RS485- (Modbus RTU)
[8] RS485+ (Modbus RTU)

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4.3.6 Information Regarding UL

INFORMATION

Due to UL requirements, the following chapter is always printed in English independent of the language of the documentation.

Ambient Temperature

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

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

Field Wiring Power Terminals

- Use 60/75 °C copper wire only – Models with suffix 0003 to 0300.

  Use 75 °C copper wire only – Models with suffix 0370 to 0750.
- Tighten terminals to in-lbs (Nm) as follows:

Series	Frame 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:
  - 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

Series		Models	max. Fuse Rating
230 V, 1-phase	MOVITRAC®	0003/0004/0005/0008	15 A / 250 V
		0011/0015/0022	30 A / 250 V
230 V, 3-phase	MOVITRAC®	0003/0004/0005/0008	15 A / 250 V
		0011/0015/0022	20 A / 250 V
		0037	30 A / 250 V
		0055/0075	110 A / 250 V
		0110	175 A / 250 V
		0150	225 A / 250 V
		0220/0300	350 A / 250 V
400 V, 3-phase	MOVITRAC®	0003/0004/0005/0008/0011/0015	15 A / 600 V
		0022/0030/0040	20 A / 600 V
		0055/0075	60 A / 600 V
		0110	110 A / 600 V
		0150/0220	175 A / 600 V
		0300	225 A / 600 V
		0370/0450	350 A / 600 V
		0550/0750	500 A / 600 V

Motor Overload Protection

The units are provided with motor overload protection with a trip current adjusted to 150 % of the rated motor current.

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4.3.7 Electromagnetic compatibility (EMC)

Frequency inverters with an EMC filter are designed for use in machines and drive systems. They meet the EMC product standard EN 61800-3 for drives with variable speed. For an EMC-compliant installation of the drive system, observe the specifications of Directive 2004/108/EC (EMC) of the European Council.

Interference immunity

With regard to interference immunity, the frequency inverter with an EMC filter meets the limit values defined in the standard EN 61800-3 and can therefore be used for both industrial and domestic (light industrial) applications.

Interference emission

With regard to interference emission, the frequency inverter meets the EMC limit values of the standards EN 61800-3 and EN 55014. The frequency inverter is suitable for industrial as well as household applications (light industry).

Install the frequency inverter as specified in chapter "Installation" (→ 🗎 15) to ensure best possible electromagnetic compatibility. Ensure proper ground connections for the frequency inverter. Use shielded motor cables to comply with the specifications on interference emission.

The conditions for use in drive applications are defined in the following tables.

<table>
<tr><th>Inverter type with filter</th><th>Cat. C1 (class B)</th><th>Cat. C2 (class A)</th><th>Cat. C3</th></tr>
<tr><td>230 V, 1-phase
LTE-B xxxx 2B1-x-xx</td><td colspan="3">No additional filtering required.
Use a shielded motor cable.</td></tr>
<tr><td rowspan="2">230 V/400 V, 3-phase
LTE-B xxxx 2A3-x-xx
LTE-B xxxx 5A3-x-xx</td><td>Use an external filter of the type NF LT 5B3 0xx.</td><td colspan="2">No additional filtering required.</td></tr>
<tr><td colspan="3">Use a shielded motor cable.</td></tr>
</table>

Use an external filter and a shielded motor cable to comply with the specifications on frequency inverters without internal filter.

<table>
<tr><th>Inverter type without filter</th><th>Cat. C1 (class B)</th><th>Cat. C2 (class A)</th><th>Cat. C3</th></tr>
<tr><td>230 V, 1-phase
LTE-B xxxx 201-x-xx</td><td colspan="3">Use an external filter of the type NF LT 2B1 0xx.
Use a shielded motor cable.</td></tr>
<tr><td>230 V, 3-phase
LTE-B xxxx 203-x-xx
400 V, 3-phase
LTE-B xxxx 503-x-xx</td><td colspan="3">Use an external filter of the type NF LT 5B3 0xx.
Use a shielded motor cable.</td></tr>
</table>

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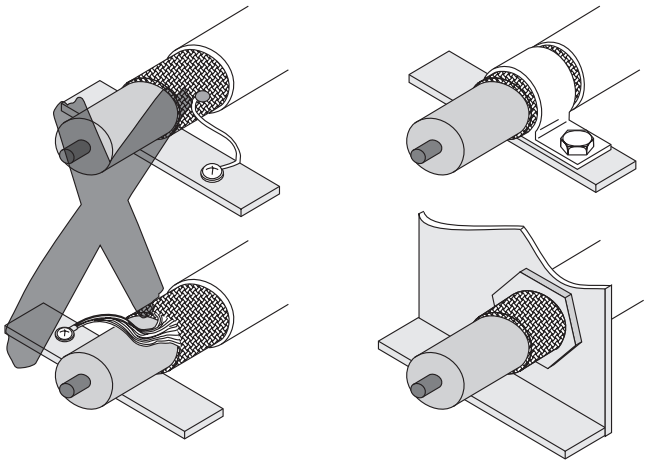
General specifications for connection of the motor shield

For all applications with a expectedly higher EMC load, using shielded cables is recommended. The shield must be connected as follows:

Connect the shield by the shortest possible route and make sure it is grounded over a wide area at both ends. This also applies to cables with several shielded core strands.



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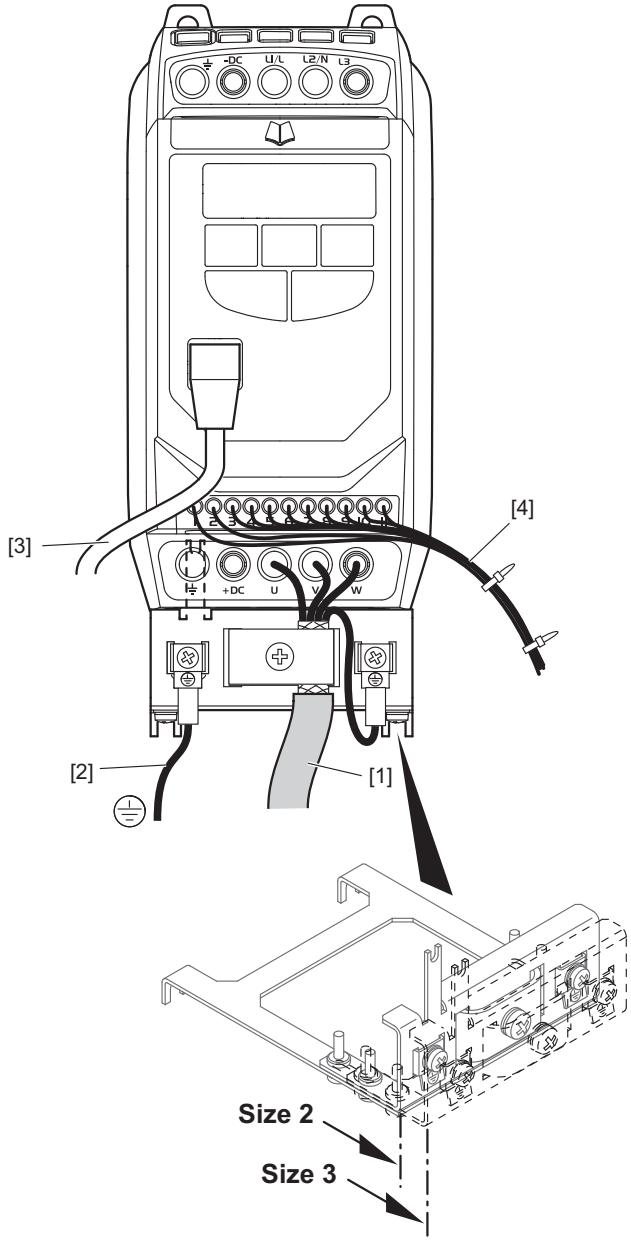
Recommendation for connecting the motor shield with an IP20 frequency inverter

Sizes 2 and 3



17304181003

[1] Motor cable
[2] Additional PE connection
[3] Encoder cable
[4] Communication cable RJ45
[5] Control cables

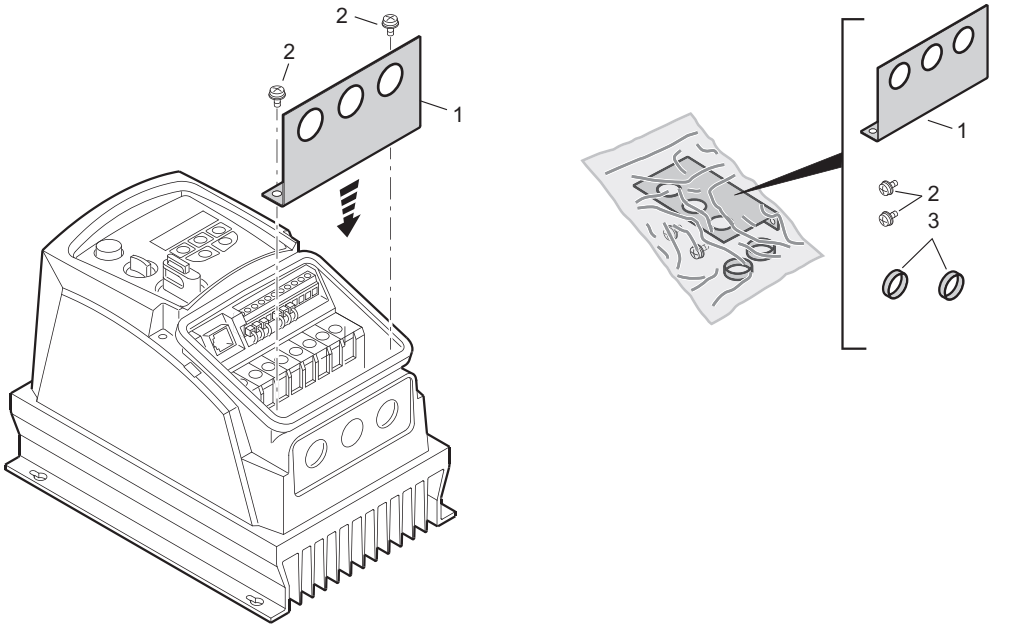
The shield plate can be used optionally for size 2 and 3 of the IP20 design. Proceed as follows to adjust:

1. Loosen the 4 screws on the slotted holes.
2. Move the plate up to the stop according to the required size.
3. Tighten the screws again.

Make sure that the plate is correctly attached to the PE connection.

Recommendation for motor shield connection at frequency inverters with IP66

Install the additional internal shield plate (included in the delivery of each LTE-B-IP66) at the designated position of the inverter.



17304186379

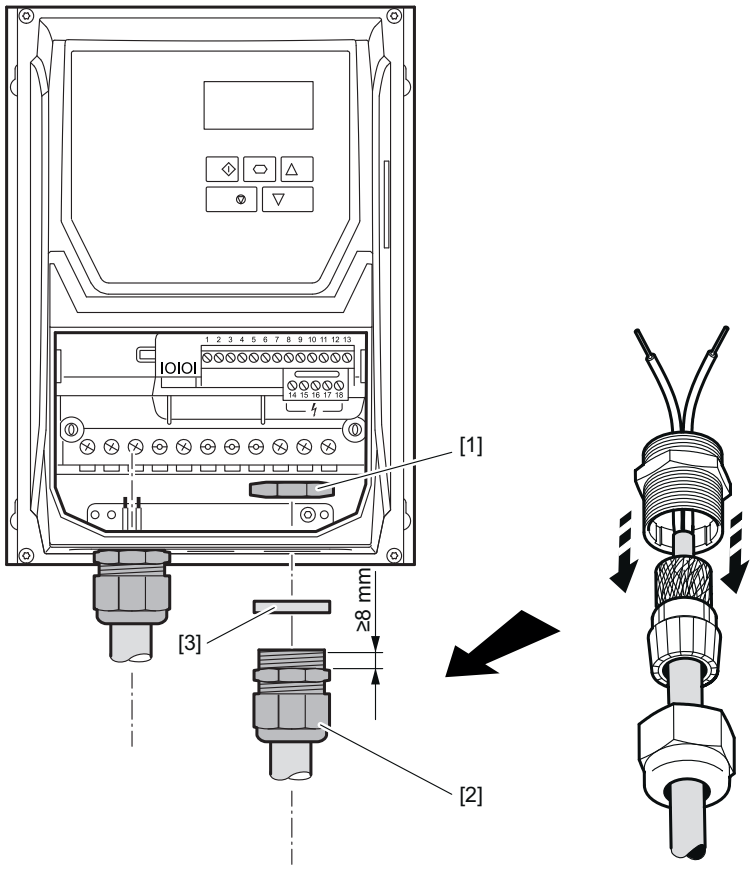
[1] Shield plate

[2] Retaining screws

[3] Cable gland seals

The use of metal screw fittings is recommended to connect the motor shield to the device. For size 2, the threads must be at least 8 mm.

Cable gland installation (example: Size 2)



17304190731

[1] Shield plate
[2] Retaining screws
[3] Cable gland seals

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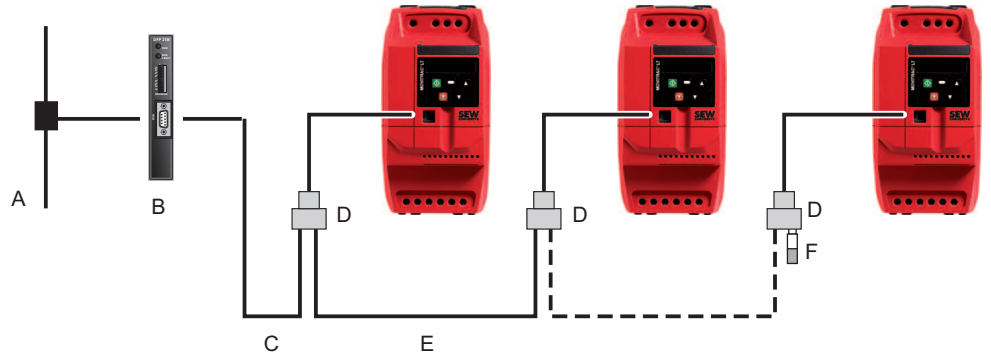
4.3.8 Fieldbus configuration

This topology applies to the installation of the frequency inverters at an SBus gateway, as well as at a Modbus RTU or CANopen master.



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[A] Bus connection

[B] CANopen (SBus gateway e.g. DFx/ UOH) or Modbus RTU master

[C] Connection cable

[D] Splitter

[E] Connection cable

[F] Y connector with terminating resistor

Available cable sets

Cable sets with the matching components are available for connecting controllers, gateways and LT inverters. Refer to the "MOVITRAC® LTE-B" catalog for further information.

Sbus/CANopen cable length

The permitted total cable length depends on the baud rate set in parameter *P-36*:

- 125 kBd: 500 m
- 250 kBd: 250 m
- 500 kBd: 100 m
- 1000 kBd: 25 m

5 Startup

5.1 Brief instructions

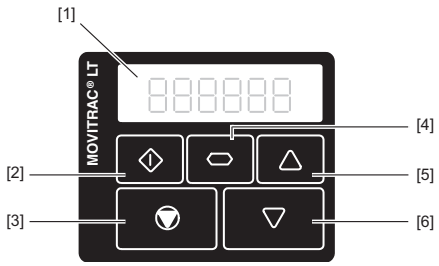
A brief instruction for startup is available in the IP20 housing in a separate tray above the display. In IP55/IP66 housings, the brief instruction for startup is attached inside the front cover.

This brief instruction contains a wiring diagram for the signal terminals.

5.2 User interface

5.2.1 Keypad

Each MOVITRAC® LT inverter is equipped with a keypad that allows for operating and setup of the frequency inverter without any further devices.



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[1]	6-digit 7-segment display	[4]	Navigate button
[2]	Start button	[5]	Up button
[3]	Stop/Reset button	[6]	Down button

The keypad has 5 keys with the following functions:

Key	Navigate [4]	• Switch menu • Save parameter values • Display real time information
Key	Up [5]	• Increase speed • Increase parameter values
Key	Down [6]	• Decrease speed • Decrease parameter values
Key	Stop [3]	• Stop drive • Acknowledge error
Key	Start [2]	• Enable drive • Changing the direction of rotation

If the parameters are set to the factory settings, the <Start> and <Stop> keys of the keypad are disabled. To enable using the <Start>/<Stop> buttons on the keypad, set the parameter *P-12* for LTE-B or *P1-12* for LTP-B to "1" or "2".

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The parameter edit menu can only be accessed by pressing the <Navigate> key [4].

- To switch between the menu for changing parameters and real-time display (operating speed/operating current): keep the key pressed for longer than 1 second.
- Switch between operating speed and operating current of the running frequency inverter: press the key briefly (< 1 second).

5.2.2 Parameterization

Proceed as follows to change the parameter values:

1. Check the frequency inverter connection.

   See chapter "Electrical Installation" (→ 🗎 20).

2. Make sure a the motor cannot start, e.g. by disconnecting terminal 1 from terminal 2.

3. Switch on the line voltage.

   After the initialization, "StoP" is displayed.

   INFORMATION: To allow for changing the parameters, the frequency inverter enable must be deactivated, e.g. by disconnecting terminal 1 from terminal 2.

   S t o P

4. Use the  key to activate the parameter mode.

   (Press the  key for more than 1 s)

   P 1 - 0 1

5. Use the  key and the  key to select the desired parameter.

   P 1 - 0 3

6. Use the  key to activate the setting mode.

   5.0

7. Use the  key and the  key to set the required parameter value.

   2.0

8. Use the  key to quit the setting mode.

   P 1 - 0 3

9. Use the  key to quit the parameter mode.

   (Press the  key for more than 1 s)

   The operator terminal shows "StoP", "H ", "A ", or "P ".

   S t o P

Refer to chapter "Parameters" (→ 🗎 67) for a detailed description of the parameters.

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5.2.3 Resetting parameters to default settings

To reset the parameters to their default value, proceed as follows:

1. The frequency inverter must not be enabled and "Inhibit" must be shown on the display.
2. Press the 3 keys  ,  , and  simultaneously for at least 2 s.

   "P-deF" is shown on the display.
3. Press the  key to acknowledge the "P-deF" message.

5.3 Simple startup

1. Connect the motor to the frequency inverter. Note the nominal voltage of the motor when establishing the connection.
2. Enter the nominal values specified on the motor nameplate:
   - Use *P-01* and *P-02* to set the limit values for the minimum and maximum speed.
   - Use *P-03* and *P-04* to set the acceleration and deceleration times.
   - Use *P-07* to set the nominal motor voltage.
   - Use *P-08* to set the nominal motor current.
   - Use *P-09* to set the rated motor frequency.

5.3.1 Terminal mode (factory setting)

To activate the operation in terminal mode (factory setting), perform the following steps:

- Make sure that *P-12* is set to "0" (factory setting).
- Install a switch between terminals 1 and 2 on the user terminal block. See chapter Overview of signal terminals.
- Connect a potentiometer (1 k – 10 k) between Terminal 5, 6 and 7, with the sliders connected to terminal 6. See chapter Overview of signal terminals.

⚠ WARNING

Automatic motor run-up during startup

Severe or fatal injuries.

- Make sure that an automatic restart of the machine represents no danger to people or equipment.
- Set the potentiometer to 0.

- Clos the switch to enable the frequency inverter.
- Set the speed using the potentiometer.

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5.3.2 Keypad mode

In keypad mode, the drive can be controlled via the integrated operator terminal.

To activate operation in keypad mode, proceed as follows:

- Change parameter *P-12* to "1" (unidirectional) or "2" (bidirectional).
- Connect terminals 1 and 2 on the user terminal block with wire or a switch in order to enable the frequency inverter.
- Press the <Start> key. The frequency inverter is activated as 0 Hz.
- To increase the speed, press the <Up> key.
- Press the <Stop> key to stop the frequency inverter.
- If you now press the <Start> key, the frequency inverter returns to its original speed.

  When bidirectional mode is activated (*P-12* = 2), pressing the <Start> key changes the direction of rotation.
- **⚠ CAUTION!**
  If you set the desired speed via the keypad during operation and subsequently press the <Stop/Reset> key, the frequency inverter resumes the previously set speed if you press the <Start> key again.

5.4 Startup in VFC vector control

The operation of motors with VFC vector control enables a better motor control behavior, and better torque performance, especially in the lower speed range. Operation in VFC vector control is mandatory for synchronous motors.

5.4.1 Startup of asynchronous motors

INFORMATION

During the connection, adhere to the nominal motor voltage.

1. Connect the motor to the frequency inverter.
2. Enter the motor data indicated on the motor nameplate:
   - *P-07* = nominal voltage of the motor
   - *P-08* = rated current of the motor
   - *P-09* = rated frequency of the motor
   - *P-10* = rated speed of the motor
3. Set the required VFC vector control.
   - *P-14* = 101 (extended menu)
   - *P-51* = 0 (VFC – ASM speed control)
4. Set the maximum and minimum speed using *P-01* and *P-02*.
5. Set the acceleration and deceleration ramps using *P-03* and *P-04*.
6. Start the automatic motor measurement procedure auto tune.
   - *P-52* = 1 (Start auto tune)

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⚠ WARNING

When parameter *P-52* is set to "1" (auto tune) the motor may start up automatically.

Severe or fatal injuries

- Do not touch the motor shaft

7. To optimize the control behavior, adjust the motor parameters (*P-53* – *P-57*), if necessary.

5.4.2 Startup of synchronous motors

INFORMATION

The operation of synchronous motors without encoder must be checked in a test application. Stable operation in this operating mode cannot be ensured for all application cases. Using this operating mode is thus in the sole responsibility of the user.

INFORMATION

During the connection, adhere to the nominal motor voltage.

1. Connect the motor to the frequency inverter. During the connection, adhere to the nominal motor voltage.
2. Enter the motor data indicated on the motor nameplate:
   - *P-07* = EMF → For synchronous motors, *P-07* is not used to set the system voltage, but the internal voltage for nominal speed.
   - *P-08* = rated current of the motor
   - *P-09* = rated frequency of the motor
   - *P-10* = rated speed of the motor
3. Set the required VFC vector control.
   - *P-14* = 101 (extended menu)
4. *P-51* = 2, 3 or 4, depending on the motor type (see "Advanced parameter description" (→ 🗎 71))
5. Set the maximum and minimum speed using *P-01* and *P-02*.
6. Set the acceleration and deceleration ramps using *P-03* and *P-04*.
7. Start the automatic motor measurement procedure auto tune.
   - *P-52* = 1 (Start auto tune)

⚠ WARNING

When parameter *P-52* is set to "1" (auto tune) the motor may start up automatically.

Severe or fatal injuries.

- Do not touch the motor shaft.

8. To optimize the control behavior, adjust the motor parameters (*P-53* – *P-57*), if necessary.

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9. If a higher torque is required in the lower speed range, the torque boost *P-11* can be adjusted. The torque boost has the factor *4* × *P-11* × *P-08*. Note that the motor may heat up significantly due to the increased current flow.

5.4.3 Startup of LSPM motors

To operate an LSPM motor by SEW-EURODRIVE at the LTE-B+ inverter, proceed as follows:

INFORMATION

During the connection, adhere to the nominal motor voltage.

1. Connect the motor to the frequency inverter.
2. Enter the motor data indicated on the motor nameplate:
   - *P-07* = nominal voltage of the motor
   - *P-08* = rated current of the motor
   - *P-09* = rated frequency of the motor
   - *P-10* = rated speed of the motor
3. Set the required VFC vector control.
   - *P-14* = 101 (extended menu)
   - *P-51* = 5 (LSPM motor control)
4. Set the maximum and minimum speed using *P101* and *P-02*.
5. Set the acceleration and deceleration ramps using *P-03* and *P-04*.
6. Start the automatic motor measurement procedure auto tune.
7. *P-52* = 1 (Start “Auto Tune“)

⚠ WARNING

When parameter *P-52* is set to "1" (auto tune) the motor may start up automatically.

Severe or fatal injuries

- Do not touch the motor shaft

8. To optimize the control behavior, adjust the motor parameters (*P-53* – *P-57*), if necessary.
9. If a higher torque is required in the lower speed range, the torque boost *P-11* can be adjusted. This has the factor *4* × *P-11* × *P-08*. Note that the motor may heat up significantly due to the increased current flow.

5.5 Startup with PC

For startup using a PC the software "LT Shell V4.0" is available for download on www.sew-eurorive.com.

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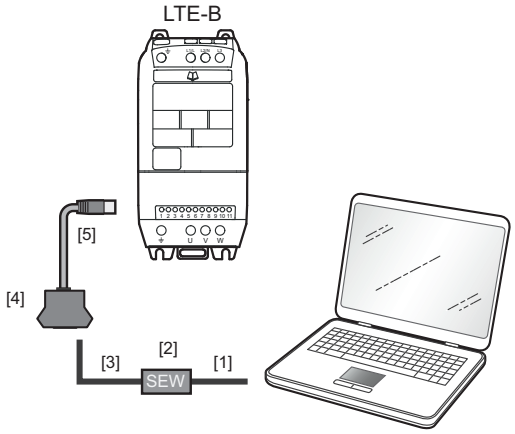
5.5.1 PC connection

The diagnostic interface can be connected to a conventional PC/laptop with the following accessories:

- Interface adapter USB11A
- PC engineering set (cable set C) for the frequency inverter.



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[1] Cable USB A-B
[2] USB11A
[3] RJ10 to RJ10 cable
[4] RJ adapter (2 x RJ45, 1 x RJ10)
[5] RJ45 to RJ45 cable

Type	Part number	Scope of delivery
USB11A	08248311	• Interface adapter USB11A • USB cable • Cable with RJ10 – RJ10 plug connectors
PC engineering set	18243681	• Adapter OP LT 003 C with voltage converter DC 24 V → DC 5 V • Cable with RJ45 – RJ45 plug connectors

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5.6 Startup via fieldbus

5.6.1 SBus startup

Install the SBus network according to the figure in chapter Fieldbus configuration.

- Startup the inverter as described in section "Easy startup" (→ 🗎 42).
- Set parameter *P-12* to "3" or "4" to control the frequency inverter via SBus.
  - 3 = Control word and speed setpoint via SBus, ramp times as specified in *P-03*/ *P-04*.
  - 4 = Control word, speed setpoint and ramp time via SBus.
- Set *P-14* to "101" to obtain access to the advanced menu.
- Set the values in *P-36* as follows:
  - Set a unique SBus address between "1" and "63".
  - The SBus baud rate is set to 500 baud at the factory (factory setting). To set a different baud rate, set it in *P-36*. Note that the baud rate of SBus gateway and frequency inverter must always be identical.
  - Determine the frequency inverter's response to timeout, when the communication is interrupted:
  - 0: Continue with the data used last (factory setting).
  - t_xxx: Error after delay of xxx milliseconds. The error must be reset.
  - r_xxx: The frequency inverter is stopped along a ramp when the time of xxx milliseconds is exceeded. An automatic restart is performed when new data is received.
- Connect the frequency inverter to the DFx/UOH gateway via SBus as described in section Communication socket RJ45.
- Set DIP switch "AS" on the DFx/UOH gateway from "OFF" to "ON" to perform an auto-setup for the fieldbus gateway. The "H1" LED on the gateway lights up repeatedly and then goes off completely. When the "H1" LED is lit, the gateway or one of the frequency inverters at the SBus has not been wired properly or has not been taken into operation properly.
- Refer to the relevant DFx manual for information on how to establish fieldbus communication between DFx/UOH gateway and bus master.

Permitted cable lengths

The permitted total cable length depends on the baud rate setting of the SBus:

- 125 kBd: 500 m
- 250 kBd: 250 m
- 500 kBd: 100 m (factory setting)
- 1000 kBaud: 25 m

Use only shielded cables.

Monitoring sent data

The data transmitted via the gateway can be monitored by one of the following methods:

- Using MOVITOOLS® MotionStudio via the X24 engineering interface of the gateway or optionally via Ethernet
- Via the website of the gateway (e.g. on DFE3x Ethernet gateways)

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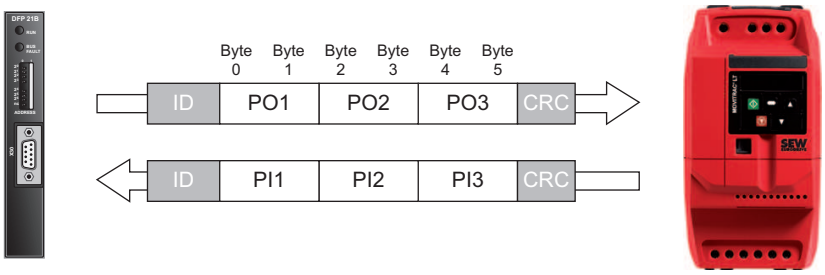
Structure of SBus telegram



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5.6.2 CANopen startup

Set up the CANopen network according to figure in chapter "Fieldbus configuration" (→ 🗎 39).

- Startup the inverter as described in chapter "Simple startup" (→ 🗎 42).
- Set parameter *P-12* to "7" or "8" to control the frequency inverter via CANopen.
  - 7 = Control word and speed setpoint via CANopen, ramp times as specified in *P-03/P-04*.
  - 8 = Control word, speed setpoint and ramp time via CANopen.
- Set parameter *P-14* to "101" to obtain access to the advanced menu.
- Set the values in *P-36* as follows:
  - Set a unique address between "1" and "63".
  - The baud rate is set to "500 kBd" at the factory (factory setting). To set a different baud rate, set it in *P-36*. Note that the baud rate of master and frequency inverter must always be identical.
  - Determine the frequency inverter's response to timeout, when the communication is interrupted:
  - 0: Continue with the data used last (factory setting).
  - t_xxx: Error after delay of xxx milliseconds. The error must be reset.
  - r_xxx: The frequency inverter is stopped along a ramp when the time of xxx milliseconds is exceeded. An automatic restart is performed when new data is received.
- Connect the frequency inverter to a CANopen master as described in section "Communication socket RJ45" (→ 🗎 31) and chapter "Fieldbus configuration" (→ 🗎 39).

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Specification

CANopen communication is implemented in accordance with the specification DS301 version 4.02 of CAN in automation (see www.can-cia.de). A specific unit profile, such as DS 402, is not implemented.

COB IDs and functions in the frequency inverter

The CANopen profile provides the following COB ID (Communication Object Identifier) and functions:

Messages and COB IDs		
Type	**COB ID**	**Function**
NMT	000h	Network management
Sync	080h	Synchronous message with dynamically configurable COB ID
Emergency	080h + device address	Emergency message with dynamically configurable COB ID
PDO1[1] (Tx)	180h + device address	PDO (Process Data Object) PDO1 is pre-mapped and activated by default. PDO2 is pre-mapped and activated by default. Transmission mode (synchronous, asynchronous, event), COB ID and mapping can be configured as required.
PDO1 (Rx)	200h + device address	
PDO2 (Tx)	280h + device address	
PDO2 (Rx)	300h + device address	
SDO[2]	580h + device address	SDO channel for parameter data exchange with the CANopen master
SDO (Rx)[2]	600h + device address	
Error control	700h + device control	Guarding and heartbeat functions are supported. COB ID can be set to another value.

1) The frequency inverter supports up to 2 process data objects (PDO). All PDOs are pre-mapped and active with transmission mode 1 (cyclical and synchronous). This means that the TX-PDO is sent after every SYNC pulse regardless of whether the content of the TX-PDO has changed or not.
2) The frequency inverter SDO channel supports only expedited transmission. The SDO mechanisms are described in detail in the CANopen specification DS301.

INFORMATION

Transmitting speed, current or similar values that change quickly via Tx-PDO results in a very high load on the bus.

To limit the bus load to predictable values, you can use the inhibit time, see section "Inhibit time" in the "MOVIDRIVE® MDX60B/61B Communication and Fieldbus Device Profile" manual.

- Tx (transmit) and Rx (receive) are depicted from perspective of the slave.

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Supported transmission modes

The various transmission types can be selected for every process data project (PDO) in network management (NMT).

The following transmission types are supported for Rx PDOs:

Rx PDO transmission mode		
Transmission type	**Mode**	**Description**
0 – 240	Synchronous	The received data is transmitted to the frequency inverter as soon as the next synchronization message is received.
254, 255	Asynchronous	The received data is transmitted to the frequency inverter without delay.

The following transmission types are supported for Tx PDOs:

Tx PDO transmission type		
Transmission type	**Mode**	**Description**
0	Acyclic synchronous	Tx PDO is transmitted only if the process data has changed and a SYNC object has been received.
1 – 240	Cyclic synchronous	Tx PDOs are transmitted synchronously and cyclically. The transmission type indicates the number of the SYNC object required for triggering transmission of the Tx PDO.
254	Asynchronous	Tx PDOs are transmitted only when the corresponding Rx PDO has been received.
255	Asynchronous	Tx PDOs are always transmitted as soon as the PDO data has changed.

Default allocation plan of process data objects (PDO)

The following table shows the default mapping of the PDOs:

PDO default mapping					
	Object no.	**Mapped object**	**Length**	**Mapping with default setting**	**Transmission type**
Rx PDO1	1	2010h	Unsigned 16	PO1 control word	1
	2	2012h	Integer 16	PO2 setpoint speed	
	3	0006	Unsigned 16	Reserved	
	4	2014h	Unsigned 16	PO3 ramp time	
Tx PDO1	1	2110h	Unsigned 16	PI1 status word	1
	2	2112h	Integer 16	PI2 actual speed	
	3	2113h	Unsigned 16	PI3 actual current	
	4	2114h	Integer 16	PI4 motor torque	
Rx PDO 2	1	0006h	Unsigned 16	Reserved	1
	2	0006h	Unsigned 16	Reserved	
	3	0006h	Unsigned 16	Reserved	
	4	0006h	Unsigned 16	Reserved	
Tx PDO2	1	2118h	Unsigned 16	Status analog input 1	1
	2	2119h	Integer 16	Status analog input 2	
	3	211Ah	Unsigned 16	Status of digital inputs and outputs	
	4	2116h	Unsigned 16	Frequency inverter temperature	

INFORMATION

Tx (transmit) and Rx (receive) are depicted from perspective of the slave.

Note: Modified default settings are lost after power off and on again. This means the settings are restored to default values after power off.

Table of CANopen-specific objects

CANopen-specific objects						
Index	**Sub index**	**Function**	**Access**	**Type**	**PDO map**	**Default value**
1000h	0	Device type	RO	Unsigned 32	N	0

CANopen-specific objects						
Index	**Sub index**	**Function**	**Access**	**Type**	**PDO map**	**Default value**
1001h	0	Error register	RO	Unsigned 8	N	0
1002h	0	Manufacturer status register	RO	Unsigned 16	N	0
1005h	0	COB-ID Sync	RW	Unsigned 32	N	00000080h
1008h	0	Manufacturer device name	RO	String	N	“LTEB” or “LT1B”
1009h	0	Manufacturer hardware version	RO	String	N	x.xx (e.g. 1.00)
100Ah	0	Manufacturer software version	RO	String	N	x.xx (e.g. 2.00)
100Ch	0	Guard time [1 ms]	RW	Unsigned 16	N	0
100Dh	0	Life time factor	RW	Unsigned 8	N	0
1014h	0	COB-ID EMCY	RW	Unsigned 32	N	00000080h+Node ID
1015h	0	Inhibit time emergency [100 µs]	RW	Unsigned 16	N	0
1017h	0	Producer heart beat time [1 ms]	RW	Unsigned 16	N	0
1018h	0	Identity object no. of entries	RO	Unsigned 8	N	4
	1	Vendor ID	RO	Unsigned 32	N	0x00000059
	2	Product code	RO	Unsigned 32	N	Drive depended
	3	Revision number	RO	Unsigned 32	N	x.xx
	4	Serial number	RO	Unsigned 32	N	e.g. 1234/56/789
1200h	0	SDO parameter no. of entries	RO	Unsigned 8	N	2
	1	COB-ID client -> server (RX)	RO	Unsigned 32	N	00000600h+Node ID
	2	COB-ID server -> client (TX)	RO	Unsigned 32	N	00000580h+Node ID
1400h	0	RX PDO1 comms param no. of entries	RO	Unsigned 8	N	2
	1	RX PDO1 COB-ID	RW	Unsigned 32	N	40000200h+Node ID
	2	RX PDO1 transmission type	RW	Unsigned 8	N	1
1401h	0	RX PDO2 comms param no. of entries	RO	Unsigned 8	N	2
	1	RX PDO2 COB-ID	RW	Unsigned 32	N	40000300h+Node ID
	2	RX PDO2 transmission type	RW	Unsigned 8	N	1
1600h	0	RX PDO1 mapping / no. of entries	RW	Unsigned 8	N	4
	1	RX PDO1 1st mapped object	RW	Unsigned 32	N	20100010h
	2	RX PDO1 2nd mapped object	RW	Unsigned 32	N	20120010h
	3	RX PDO1 3rd mapped object	RW	Unsigned 32	N	00060010h
	4	RX PDO1 4th mapped object	RW	Unsigned 32	N	20140010h
1601h	0	RX PDO2 mapping / no. of entries	RW	Unsigned 8	N	4
	1	RX PDO2 1st mapped object	RW	Unsigned 32	N	00060010h
	2	RX PDO2 2nd mapped object	RW	Unsigned 32	N	00060010h
	3	RX PDO2 3rd mapped object	RW	Unsigned 32	N	00060010h
	4	RX PDO2 4th mapped object	RW	Unsigned 32	N	00060010h
1800h	0	TX PDO1 comms param no. of entries	RO	Unsigned 8	N	3
	1	TX PDO1 COB-ID	RW	Unsigned 32	N	40000180h+Node ID
	2	TX PDO1 transmission type	RW	Unsigned 8	N	1
	3	TX PDO1 Inhibit time [100 µs]	RW	Unsigned 16	N	0
1801h	0	TX PDO2 comms param no. of entries	RO	Unsigned 8	N	3
	1	TX PDO2 COB-ID	RW	Unsigned 32	N	40000280h+Node ID
	2	TX PDO2 transmission type	RW	Unsigned 8	N	1
	3	TX PDO2 Inhibit time [100 µs]	RW	Unsigned 16	N	0
1A00h	0	TX PDO1 mapping / no. of entries	RW	Unsigned 8	N	4
	1	TX PDO1 1st mapped object	RW	Unsigned 32	N	21100010h
	2	TX PDO1 2nd mapped object	RW	Unsigned 32	N	21120010h
	3	TX PDO1 3rd mapped object	RW	Unsigned 32	N	21130010h
	4	TX PDO1 4th mapped object	RW	Unsigned 32	N	21140010h
1A01h	0	TX PDO2 mapping / no. of entries	RW	Unsigned 8	N	4
	1	TX PDO2 1st mapped object	RW	Unsigned 32	N	21180010h

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CANopen-specific objects						
Index	**Sub index**	**Function**	**Access**	**Type**	**PDO map**	**Default value**
	2	TX PDO2 2nd mapped object	RW	Unsigned 32	N	21190010h
	3	TX PDO2 3rd mapped object	RW	Unsigned 32	N	211A0010h
	4	TX PDO2 4th mapped object	RW	Unsigned 32	N	21160010h

Table of manufacturer-specific objects

The manufacturer-specific objects of the frequency inverter are defined as follows:

Manufacturer-specific objects						
Index	**Sub index**	**Function**	**Access**	**Type**	**PDO map**	**Note**
2000h	0	Reserved	RW	Unsigned 16	Y	Read as 0, writing not possible
2001h – 200Fh	0	Reserved	RW	Unsigned 16	Y	Read as 0, writing not possible
2010h	0	Control command register	RW	Unsigned 16	Y	S-Bus control word format
2011h	0	Speed reference (RPM)	RW	Integer 16	Y	1 = 0.2 1/min
2012h	0	Speed reference (percentage)	RW	Integer 16	Y	4000HEX = 100 % P1-01
2013h	0	Reserved	RW	Integer 16	Y	Read as 0, writing not possible
2014h	0	User ramp reference	RW	Unsigned 16	Y	1 = 1 ms (reference to 50 Hz)
2015h – 2100h	0	Reserved	RW	Unsigned 16	Y	Read as 0, writing not possible
2101h – 210Fh	0	Reserved	RO	Unsigned 16	Y	Read as 0
2110h	0	Drive status register	RO	Unsigned 16	Y	S-Bus status word format
2111h	0	Motor speed (RPM)	RO	Integer 16	Y	1 = 0.2 1/min
2112h	0	Motor speed (percentage)	RO	Integer 16	Y	4000HEX = 100 % von P-01
2113h	0	Motor current	RO	Unsigned 16	Y	4000HEX = 100 % von P-08
2114h	0	Motor torque	RO	Integer 16	Y	1000DEC = Motor rated torque
2115h	0	Motor power	RO	Unsigned 16	Y	1000DEC = Drive rated power
2116h	0	Drive temperature	RO	Integer 16	Y	1DEC = 0.01 °C
2117h	0	DC bus value	RO	Unsigned 16	Y	1DEC = 1 V
2118h	0	Analog input 1	RO	Integer 16	Y	1000HEX = Full scale
2119h	0	Analog input 2	RO	Integer 16	Y	1000HEX = Full scale
211Ah	0	Digital input & output status	RO	Unsigned 16	Y	LB = input, HB = output
211Bh	0	Analog output 1 (percentage)	RO	Unsigned 16	Y	1000 DEC = 100.0 %
211Ch – 2120h	0	Reserved	RO	Unsigned 16	Y	Read as 0
2121h	0	Scope channel 1 (internal format)	RO	Unsigned 16	Y	
2122h	0	Scope channel 2 (internal format)	RO	Unsigned 16	Y	
2123h	0	Scope channel 3 (internal format)	RO	Unsigned 16	Y	
2124h	0	Scope channel 4 (internal format)	RO	Unsigned 16	Y	
2AF8h[1)]	0	S-Bus parameter start index	RO	–	N	11000d
–	0	S-Bus parameters	RO/RW	–	N	–
2C6Fh[1)]	0	S-Bus parameter end index	RW	–	N	11375d

1) Objects 2AF8h – 2C6EF correspond with SBus parameter indexes 11000d – 11375d, some of them are read-only.

5.6.3 Startup of modbus RTU

Protocol	Modbus RTU (Remote Terminal Unit)
Error checking	CRC
Baud rate	9600 bps, 19,200 bps, 38,400 bps, 57,600 bps, 76,800 bps, 115,200 bps (standard)
Data format	1 start bit, 8 data bits, 1 stop bit, no priority
Physical format	RS485 (2-core)
User interface	RJ45

Electrical installation

Install the Modbus network according to the figure in chapter Fieldbus configuration. The maximum number of bus nodes is 32. The permitted cable length depends on the baud rate. With a baud rate of 115 200 bps and a 0.5 mm^2 cable, the maximum cable length is 1200 m. For the connection assignment for the RJ45 communication socket, refer to chapter Communication socket RJ45.

- Startup the frequency inverter as described in section "Easy startup" (→ 🗎 42).
- Set parameter *P-12* to "5" or "6" to control the frequency inverter via Modbus RTU.
  - 5 = Control word and speed setpoint via Modbus RTU, ramp times as specified in *P-03*/*P-04*.
  - 6 = Control word, speed setpoint and ramp time via Modbus RTU.
- Set *P-14* to "101" to obtain access to the advanced menu.
- Set the values in *P-36* as follows:
  - Set a unique Modbus address between "1" and "64".
  - The Modbus baud rate is set to "115.2 kBd" at the factory (factory setting). To set a different baud rate, set it in *P-36*. Note that the baud rate of modbus master and frequency inverter must always be identical.
  - Determine the frequency inverter's response to timeout, when the communication is interrupted.
  - 0: Continue with the data used last (factory setting).
  - t_xxx: Error after a delay of xxx milliseconds, error must be reset.
  - r_xxx: The frequency inverter is stopped along a ramp when the time of xxx milliseconds is exceeded. An automatic restart is performed when new data is received.
- Connect the frequency inverter to a suitable Modbus master as described in section Communication socket RJ45. For startup of the Modbus master, refer to the relevant chapter in the manufacturer's operating instructions.

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Register allocation of the process data words

The following table shows the most important registers for easy control.

For the structure of the process data words PI and PO, refer to chapter "Description of transmitting process data (PD)" (→ 🗎 57).

Register	Process data	Command	Type
1	PO1 control word (fixed; data byte assignment, see Process data words (16 bit) from gateway to inverter (PA))	03, 06	Read/write
2	PO2 setpoint speed (data byte assignment, see Process data words (16 bit) from gateway to inverter (PA))	03, 06	Read/write
3	PO3 ramp (if *P-12* = *6*; data byte assignment, seeProcess data words (16 bit) from gateway to inverter (PA))	03, 06	Read/write
4	Reserved	03, 06	Read/write
5	Reserved	0, 3	Read
6	PI1 status word (fixed; data byte assignment, see "Process data words (16 bit) from inverter to gateway (PI)" (→ 🗎 57))	0, 3	Read
7	PI2 actual speed (data byte assignment, see "Process data words (16 bit) from inverter to gateway (PI)" (→ 🗎 57))	0, 3	Read
8	PI3 actual current (data byte assignment, see "Process data words (16 bit) from inverter to gateway (PI)" (→ 🗎 57))	0, 3	Read

You find the complete allocation of parameters and registers as well as the scaling of data in the memory allocation plan in chapter "Overview of parameters" (→ 🗎 67).

INFORMATION

Note: Many bus masters address the first register as register 0. Thus it may be necessary to subtract the value "1" from the register number listed below, to obtain the correct register address.

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Structure of Modbus telegram

Structure of process data

For a read request

Request master → slave

Address	Function	Data				CRC check
		Start address		Number of registers		
addr	03_H	High byte	Low byte	High byte	Low byte	crc16

Response slave → master

Address	Function	Data		CRC check
		Number of data bytes	Information	
addr	03_H	n (8 bit)	n/2 register	crc16

For a write command

Request master → slave

Address	Function	Data				CRC check
		Register number		Process data		
addr	06_H	High byte	Low byte	High byte	Low byte	crc16

Response slave → master

Address	Function	Data				CRC check
		Register number		Process data		
addr	06_H	High byte	Low byte	High byte	Low byte	crc16

Communication example

Sending of setpoints

- Enable
- Motor speed = 100%
- Ramp = 5 s

As a response, the slave sends confirmation of the sent information in a corresponding telegram.

Enable

Data direction	Address	Function	Data	CRC check
−Tx	01	06_H	00010006	09C8
−Rx	01	06_H	00010006	09C8

Motor speed

Data direction	Address	Function	Data	CRC check
−Tx	01	06_H	00024009	29CC
−Rx	01	06_H	00024009	29CC

Acceleration ramp

Data direction	Address	Function	Data	CRC check
−Tx	01	06_H	00031388	255C
−Rx	01	06_H	00031388	255C

Tx – Send from perspective of the bus master

Rx – Receive from perspective of the bus master

Explanation of write command using example of enable

Address	01_H – unit address
Function	06_H − write
Data	00010006_H − write to register 01, value 06_H = enable
CRC check	CRC_high, CRC_low

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5.6.4 Description of transferred process data (PD)

Structure of process data words

This chapter describes the structure of the process data words for the fieldbus communication with SBus and Modbus RTU.

Process data words (16 bit) from gateway to inverter (PA)

Description		Bit		Settings
PO1	Control word	0	Controller inhibit	0: Start 1: Stop
		1	Rapid stop along the second deceleration ramp (*P-24*)	0: Rapid stop 1: Start
		2	Stop along process ramp *P-03*/*P-04* or PO3	0: Stop 1: Start
		3 – 5	Reserved	0
		6	Error reset	Edge 0 set to 1 = error reset
		7 – 15	Reserved	0
PO2	Setpoint speed	Signed percentage value / 0.0061% Example: -80%/0.0061% = -13115 = CCC5 (Hex)		
PO3	Ramp time (if *P-12* = 4, 6 or 8)	Time from 0 – 50 Hz in ms (range 100 – 65535 ms). 1 digit = 1 ms Example: 1.0 s = 1000 ms = $03E8_{hex}$		
	No function (if *P-12* = 3, 5 or 7)	Ramp time set as in *P-03* and *P-04*.		

Process data words (16 bit) from inverter to gateway (PI)

Description		Bit		Settings	Byte
PI1	Status word	0	Output stage enable	0: Disabled 1: Enabled	Low byte
		1	Inverter ready	0: Not ready 1: Ready for operation	
		2	PO data enabled	1 if *P-12* = 3 or 4	
		3 – 4	Reserved		
		5	Fault/warning	0: No fault 1: Fault	
		6 – 7	Reserved		
		8 – 15	Inverter status, if bit 5 = 0 0x01 = Output stage inhibited 0x02 = Not enabled/not running 0x04 = Enabled/running 0x05 = Factory setting activated		High byte
		8 – 15	Inverter status, if bit 5 = 1 0x01 = Output stage inhibited 0x04 = Not enabled/not running 0x06 = Error phase asymmetry input/input-phase failure 0x07 = Overvoltage at the DC bus 0x08 = Motor overload 0x09 = Parameter to factory settings 0x0B = Switch-off due to overtemperature 0x1A = external error 0x2F = Error communication connection failure (SBus) 0x71 = Error analog input, current below 2.5 mA 0x75 = Switch-off due to undertemperature 0x07 = Undervoltage at the DC bus 0xC8 = General error/output stage error		
PI2	Actual speed	Scaling equals PO2			
PI3	Actual current	Scaling: 0x4000 = 100% of the maximum speed as set in *P-08*			

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Example

The information listed in the following table are transmitted to the inverter if the following conditions are met:

- To enable the inverter, the digital inputs must be correctly configured and connected.
- If the inverter is operated via SBus, the parameter *P-12* must be set to 3 or 5.

Description		Value	Description
PO1	Control word	0	Rapid stop along the second deceleration ramp (*P-24*).
		1	Coast to a stop
		2	Stop along the process ramp (*P-04)*
		3 – 5	Reserved
		6	Startup along a ramp (P-03) and with rotating setpoint speed (PO2).
PO2	Speed setpoint	0x4000	= 16 384 = max. speed, e.g. 50 Hz (*P-01*) CW rotation
		0x2000	= 192 = 50% of the max. speed, e.g. 25 Hz CW rotation
		0xC000	= -16 384 = max. speed, e.g. 50 Hz *(P-01)* CCW rotation
		0x0000	= 0 = min. speed, set in *P-02*

The data sent by the inverter should look as follows during operation:

Description		Value	Description
PI1	Status word	0x0407	Status = running Output stage enabled Inverter ready Enable PO data
PI2	Actual speed	Set according to PO2 (speed setpoint)	
PI3	Actual current	Depending on speed and load	

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5.7 Startup with 87 Hz characteristic curve

The following parameters have to be set:

- P-01: 87 Hz
- P-07: 400 V
- P-08: Motor current for Δ operation (see nameplate)
- P-09: 87 Hz

5.8 Additional functions for startup

5.8.1 Fire mode/emergency mode

Enabling the fire mode input has the frequency inverter drive the motor with the preset values. In this mode, the frequency inverter ignores all faults and shutdowns and operates the motor until the frequency inverter is destroyed or even until the loss of voltage supply.

Set the fire mode as follows:

1. Perform a motor startup.
2. Set parameter *P-14* to "101" to being able to access further parameters.
3. Select parameter *P-15* = 13 to activate the fire mode function.

INFORMATION

A detailed description of the binary file configuration when *P-15* = 13, see chapter "P-15 Binary input function selection" (→ 🗎 90). The input functions in *P-15* depend on the settings in *P-12*.

4. Set parameter *P-60* to the speed that is to be used in fire mode.

5.8.2 PI controller mode

The integrated PI controller allows for realizing a simple sensor actuator closed loop system. For example, the pressure of a unit can be regulated, when the drive controls a pump and the PI controller receives feedback via a pressure transducer.

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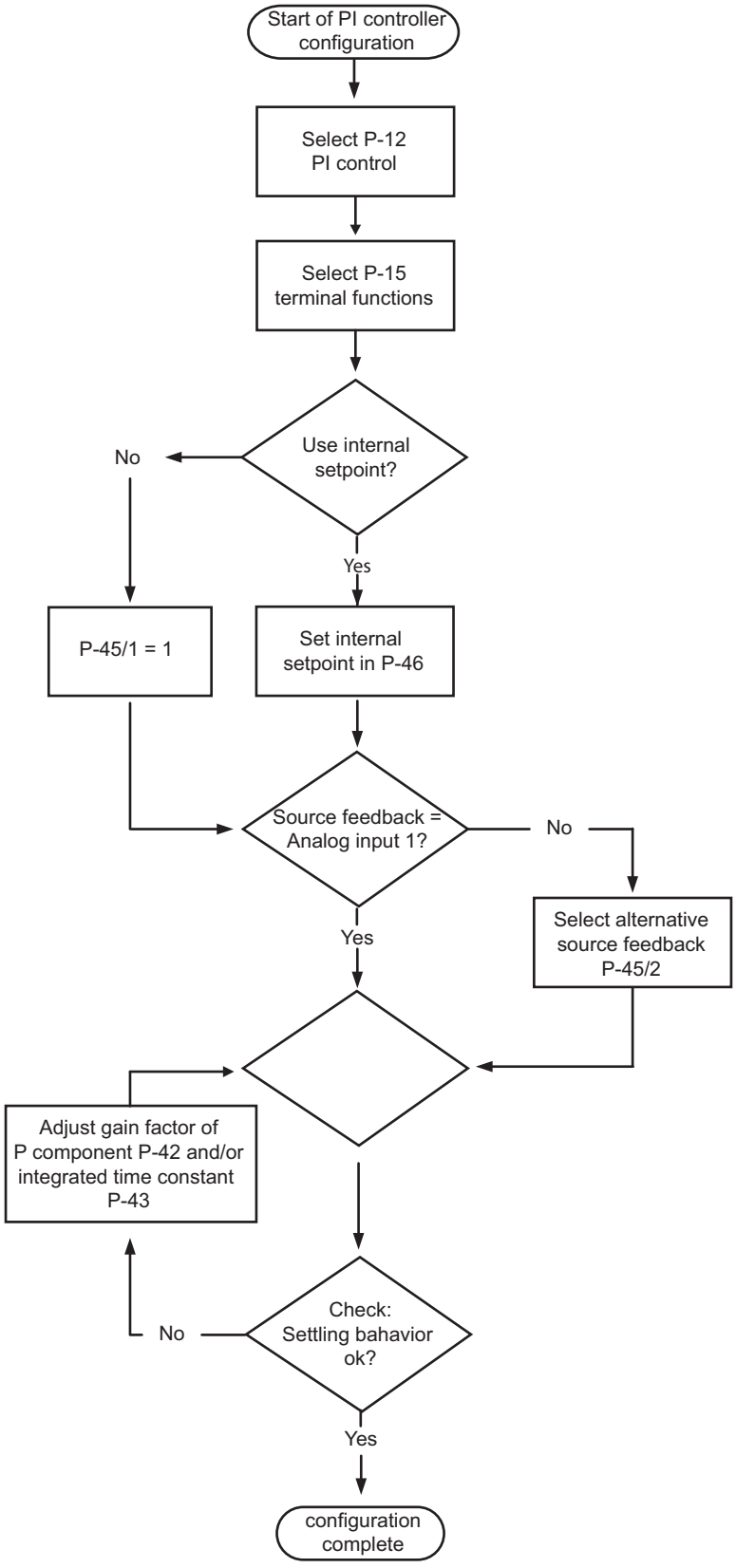
The following diagram shows the basic startup procedure of the integrated PI controller. For further information on the individual parameters, refer to chapter "Advanced parameter description" (→ 🗎 71).



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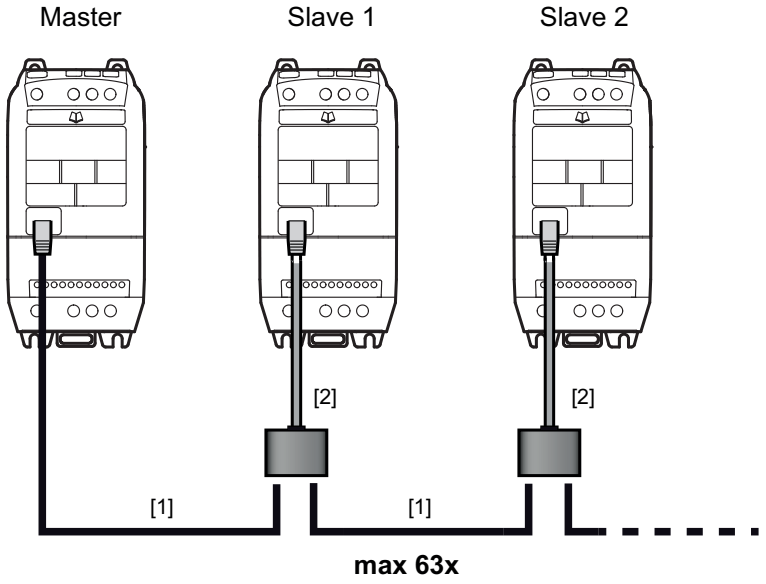
5.8.3 Master-slave mode

Master-slave mode (P-12 = 11)



16873961867

[1] RJ45 to RJ45 cable

[2] Cable splitter

The frequency inverter has an integrated master slave function. The master-slave communication is obtained via a special protocol. In this case, the frequency inverter communicates via the RS485 engineering interface. Up to 63 frequency inverters can be connected with one another in a communication network using RJ45 connectors. One frequency inverter is configured as master, the remaining frequency inverters as slaves. Each network may have only one master frequency inverter. This master frequency inverter sends its operating state (such as stopped, running) and output frequency every 30 ms. The slave frequency inverters then follow the state of the master frequency inverter.

Configuring the master frequency inverter

The master frequency inverter of each network must have the communication address "1". Set:

- *P-12* ≠ 11
- *P-14* = 101
- *P-36/1* = 1 (inverter address 1 = factory setting)

Configuring the slave frequency inverters

Each connected slave must have a unique slave communication address that is set in *P-36*. You can assign slave addresses from 2 to 63. Set:

- *P-12* = 11
- *P-14* = 101
- in *P-35* the slave scaling factor

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6 Operation

6.1 Status of the inverter

6.1.1 Display for inhibited inverter

The following table shows the messages relating to the inverter status that are displayed when the motor is at standstill.

Message	Description
StoP	Power section of inverter disabled. This message is displayed when the motor is at standstill and no error is present. The inverter is ready for normal operation.
P-deF	Parameter factory settings have been loaded. This message appears when the user issues the command for loading the parameter factory settings. To take the inverter into operation again, press the <Reset> key.
Standby	Inverter is in standby mode. This message is displayed when the inverter reports a speed of 0 for 30 seconds and the speed setpoint is also 0.

6.1.2 Display for enabled inverter

The following table shows the messages relating to the frequency inverter status that are displayed when the motor is running.

You can toggle between output frequency, output current, and speed by briefly pressing the <Navigate> key on the keypad.

Message	Description
H xxx	The output frequency of the frequency inverter is displayed in Hz. Displayed, when the frequency inverter is enabled.
A xxx	The output current of the frequency inverter is displayed in amperes. Displayed, when the frequency inverter is enabled.
xxxx	The frequency inverter output speed is displayed in 1/min, when a value > 0 was entered in *P-10*.
C xxx	The scaled speed (*P-40*).
. . . . . . (flashing dots)	The output current of the frequency inverter exceeds the current value entered in *P-08*. The frequency inverter monitors load and duration of the overload. The frequency inverter triggers error message "I.t-trP" depending on the overload.

6.1.3 Error reset

You can reset an error in the event of an error response (see section "Error codes" (→ 🗎 63)) by pressing the <Stop> key or by enabling or disabling digital input 1.

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7 Service and error codes

7.1 Fault memory

In parameter mode, parameter *P00-28* contains a data set with the last four events that have occurred. The relevant messages are only displayed in brief form, with the latest message first (when *P00-28* is opened). Older messages are moved downward.

Once a new message is issued, the oldest message is deleted from the error log.

INFORMATION

If the last shutdown was caused, for example, by undervoltage, no further undervoltage errors will be entered in the error log. The purpose is to avoid that the error log is flooded with undervoltage errors, which occur every time the inverter is switched off.

7.2 Error codes

Error message	Error code Status word, when bit Xy = 1		CANopen Emergency Code	Meaning	Measure
Inverter display	dec	hex	hex		
"O-I"	1	0x1	0x2303	Overcurrent at inverter output to the motor Motor overload Overtemperature at the heat sink of the inverter	Error during constant speed: • Check overload or fault Fault while enabling the inverter: • Check the motor for stalling or blocking • Check for star-delta motor connection error • Check whether the length of the cable meets the requirements Error during operation: • Check for sudden overload or malfunction • Check the cable connection between inverter and motor • The acceleration/deceleration time might be too short and requires too much power. If you cannot increase *P-03* or *P-04*, use a larger inverter.
"h-OI"	1	0x1	0x230F	Hardware overcurrent error at the inverter output (IGBT self-protection in case of overload).	
"I.t-trP"	8	0x08	0x1004	Overload error. This error occurs when the inverter has delivered more than 100 % of the nominal current for a certain time (defined in *P-08*). The display is flashing to indicate overload.	• Increase the acceleration ramp *P-03* or reduce the motor load. • Check whether the length of the cable meets the requirements. • Mechanically check the load to make sure it can be moved freely and no blockage or other mechanical problems are present.
"OI-b"	4	0x04	0x2301	Brake channel overcurrent Overcurrent in the braking resistor circuit	• Check supply cable to the braking resistor • Check braking resistance value • Observe the minimum resistance values given in the respective tables.
"OL-br"	4	0x04	0x1002	Braking resistor overload	• Increase deceleration time, reduce load moment of inertia or switch further braking resistors in parallel. • Observe the minimum resistance values given in the respective tables.

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Error message	Error code Status word, when bit Xy = 1		CANopen Emergency Code	Meaning	Measure
Inverter display	dec	hex	hex		
“PS-trP“	200	0xC8	0x1005	Internal output stage error	Fault while enabling the inverter: • Check for incorrect wiring or short circuit. • Check for phase short circuits or ground faults. Error during operation: • Check for sudden overload or overtemperature. • Provide an additional room or cooling, if necessary.
"O.Uolt"	7	0x07	0x3206	DC link overvoltage	• Check whether the supply voltage is too high or too low. • If the error occurs during deceleration, increase the deceleration time in *P-04*. • Connect a braking resistor, if required. • If a braking resistor is already installed, make sure that *P-34* is set to 1 or 2.
"U.Uolt"	198	0xC6	0x3207	DC link undervoltage	Occurs routinely when switching off the inverter. Check line voltage if this occurs while the motor is running.
"O-hEat"	124	0x7C	0x4117	Ambient temperature too high	• Check inverter cooling and housing dimensions. • Provide an additional room or cooling, if necessary. • Check internal fan function.[1)]
"O-t"	11	0x0B	0x4208	Overtemperature at heat sink	• Check inverter cooling and housing dimensions. • Provide an additional room or cooling, if necessary. • Check internal fan function[1)]. • Decrease the switching frequency. • Reduce the motor load.
"U-t"	117	0x75	0x4209	Undertemperature	• Occurs at an ambient temperature below -10 °C. • Increase the temperature to above -10 °C to start the inverter.
"E-triP"	26	0x1A	0x100B	External error (in conjunction with digital input 3).	• External error at digital input 3. NC contact was opened. • Check motor thermistor (if connected).
"SC-trP"	46	0x2E	0x100C	Communication failure error	• Check communication connection between inverter and external devices. • Make sure each inverter in the network is assigned a unique address.
“P-LOSS“	6	0x06	0x310E	Input phase failure error	An input phase failed in an inverter designed for operation on a three-phase system.
"dAtA-F"	98	0x62	0x1011	Internal memory error	• Parameter not saved, factor settings restored. • Try again. If this problem reoccurs, contact SEW-EURODRIVE Service.
"SC-FLt"	–	–	–	Internal inverter fault	Contact SEW-EURODRIVE Service if you have any questions.
"FAULtY"					
"Prog_ _"					
“Flt-dc“	7	0x07	0x320D	DC link ripple too high	Check the current supply.
“th-Flt“	31	0x1F	0x1010	Defective thermistor at heat sink	Contact SEW-EURODRIVE Service.
“4-20 F“	113	0x71	0x1012	Signal loss 4 – 20 mA	• Check whether the input current in *P-16* and *P248* lies within the defined range. • Check the signal cable
“F-Ptc“	31	0x1F	0x1015	PTC triggered	The connected PTC thermistor has triggered an inverter switch-off.
“FAn-F“	50	0x32	0x1016	Internal fan error.	Contact SEW-EURODRIVE Service.

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Error message	Error code Status word, when bit Xy = 1		CANopen Emergency Code	Meaning	Measure
Inverter display	dec	hex	hex		
“AtF01“	81	0x51	0x1028	The measured stator resistance fluctuates between the phases.	The measured stator resistance of the motor is asymmetrical. Check to see, if: • The motor is connected correctly and without error. • The winding has the correct resistance and symmetry.
“AtF02“	81	0x51	0x1029	The measured stator resistance is too high.	The measured stator resistance of the motor is too high. Check to see, if: • The motor is connected correctly and without error. • The power rating of the motor corresponds with the power rating of the connected inverter.
“AtF03“	81	0x51	0x102A	Measured motor inductance too low.	The measured motor inductance is too low. Make sure that the motor is connected correctly and without error.
“AtF04“	81	0x51	0x102B	Measured motor inductance too high.	The measured motor inductance is too high. Check to see, if: • The motor is connected correctly and without error. • The power rating of the motor corresponds with the power rating of the connected inverter.
“AtF05“	81	0x51	0x102C	Timeout of inductance measurement	
“SC-F01“	43	0x2B	0x1032	Modbus communication error	Check the communication settings.
“SC-F02“	47	0x2F	0X1033	SBus/CANopen communication error	Check: • The communication connection between inverter and external devices. • The clearly assigned address per inverter in the network.

1) Press all keys of the integrated keypad simultaneously to check the frequency inverter function from 0.75 kW on.

7.3 SEW-EURODRIVE Electronics Service

If you are unable to rectify a fault, contact SEW-EURODRIVE Electronics Service.

Please provide the following information when sending the device in for repair:

- Serial number (→ nameplate)
- Type designation
- Short description of the application (application, control via terminals or serial)
- Connected components (motor, and so on)
- Type of error
- Circumstances
- Your own assumptions as to what has happened
- Any unusual events preceding the problem, and so on

7.4 Extended storage

If the unit is stored for a long time, connect it to the power supply for at least 5 minutes every 2 years. Otherwise, the unit's service life may be reduced.

Procedure when maintenance has been neglected:

Electrolytic capacitors are used in the frequency inverters. They are subject to aging effects when de-energized. This effect can damage the capacitors if the unit is connected directly to the nominal voltage after an extended storage period.

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If you have not performed maintenance regularly, SEW-EURODRIVE recommends that you increase the line voltage slowly up to the maximum voltage. This can be done, for example, by using a variable transformer for which the output voltage has been set according to the following overview.

The following stages are recommended:

AC 230 V units:

- Stage 1: AC 170 V for 15 minutes
- Stage 2: AC 200 V for 15 minutes
- Stage 3: AC 240 V for 1 hour

AC 400 V units:

- Stage 1: AC 0 V to AC 350 V within a few seconds
- Stage 2: AC 350 V for 15 minutes
- Stage 3: AC 420 V for 15 minutes
- Stage 4: AC 480 V for 1 hour

After you have completed the regeneration process, the unit can be used immediately or stored again for an extended period with maintenance.

7.5 Waste disposal

Please observe current regulations. Dispose of the following materials in accordance with the regulations in force:

- Electronics scrap (printed circuit boards)
- Plastic (housing)
- Sheet metal
- Copper
- Aluminum

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8 Parameters

8.1 Overview of parameters

8.1.1 Standard parameters

Modbus registers	SBus/ CANopen Index	Parameters/description	Range of values/factory settings	Brief description
Speed limitations				
129	11020	**P-01** Maximum speed	If *P-10* = 0: *P-02* - **50Hz** - (5 × *P-09*) If *P-10* > 0: *P-02* - (5 × *P-10*)	The upper speed limit is in Hz or 1/min (if P-10 > 0) Maximum values: 500 Hz or 30000 1/min
130	11021	**P-02** Minimum speed	**0** – *P-01*	Upper speed limit in Hz or 1/min, see *P--10*
Ramps				
131	11022	**P-03** Acceleration ramp	0 – **5** – 600 s	Acceleration ramp time in seconds. The ramp time refers to a setpoint step change of 0 – 50 Hz (1 500 1/min).
132	11023	**P-04** Deceleration ramp	0 – **5** – 600 s	Deceleration ramp time in seconds. The ramp time is based on a setpoint step change of 50 Hz (1 500 1/min) − 0 Hz.
133	11024	**P-05** Stop mode selection	**0** – 3	Defines the delay behavior of the drive for normal operation and power failure. See "Extended parameter description" (→ 🗎 71).
134	11025	**P-06** Energy-saving function	**0** – 1	*P-06* = 1 activates the function. If active, the function automatically reduces the applied motor voltage for small loads. In this case, the smallest possible motor voltage is 50% of the nominal voltage.
Nominal motor data				
135	11012	**P-07** Nominal motor voltage	0 – **230**[2)] – 250 V 0 – **400**[1)] – 500 V	Nominal voltage according to motor nameplate. With *P-07* = 0, voltage compensation is deactivated. See "Extended parameter description" (→ 🗎 71).
136	11015	**P-08** Nominal motor current	25 – 100% of the frequency inverter output current.	Rated current of the motor according to nameplate. DRN.. motor data specified as factory setting.
137	11009	**P-09** Rated motor frequency	25 – **50** – 500 Hz	Nominal frequency of the motor according to nameplate.
138	11026	**P-10** Nominal motor speed	**0** – 3000 1/min	The slip compensation is activated and all parameters are displayed in 1/min when *P-10* > 0. See "Extended parameter description" (→ 🗎 71).
139	11027	**P-11** Additional voltage boost/ torque boost	0 − 20% of the max. output voltage (resolution 0.1 %) • Size 1: max. 20% • Size 2: max. 15% • Size 3: max. 10%	Increases the output voltage of the inverter by a scalable value (in case of low speed) to obtain a higher motor torque generation in this speed range. See "Advanced parameter description" (→ 🗎 71)
140	11028	**P-12** Control signal source	**0** – 12	
141	11029	**P-13** – Res.	–	Reserved
142	11030	**P-14** Access code extended parameters	0 − 9999	101: (Standard) for advanced menu access. Change the code in *P-37* to prevent unauthorized access to the advanced parameter set.

1) 460 V (only American variant)

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8.1.2 Advanced parameters

Modbus registers	SBus/ CANopen Index	Parameters/description	Range of values/factory settings	Brief description
143	11031	**P-15** Digital input function selection	**0** − 13	Specifies the functions of the digital inputs. See section "P-15 Binary input function selection" (→ 🗎 90).
144	11064	**P-16** Analog input 1	0 − 10 V, b 0 −10 V, 0 − 20 mA t 4 − 20 mA, r 4 − 20 mA t 20 − 4 mA, r 20 − 4 mA	Configures the format of the analog input 1. See "Extended parameter description" (→ 🗎 73).
145	11003	**P-17** PWM frequency	2 – **4** – 16 kHz[1)]	See "Extended parameter description" (→ 🗎 73).

1) Depending on rated inverter power

User relay				
146	11050	**P-18** User relay selection	0 – **1** – 8	Selects the function of the user relay output. See "Extended parameter description" (→ 🗎 80).
147	11051	**P-19** Relay switching threshold	0 – **100** – 200% of maximum speed *P-01* or nominal motor current *P-08*	Specifies the limit value for *P-18* and *P-25*.
Setpoint speeds				
148	11036	**P-20** Setpoint speed 1	P-02 – P-01 Default: **0 Hz**	Internal setpoint for speed 1 if *P-10* > 0 Input in 1/min
149	11037	**P-21** Setpoint speed 2	P-02 – P-01 Default: **0 Hz**	Internal setpoint for speed 2 if *P-10* > 0 Input in 1/min
150	11038	**P-22** Setpoint speed 3	P-02 – P-01 Default: **0 Hz**	Internal setpoint for speed 3 if *P-10* > 0 Input in 1/min
151	11039	**P-23** Setpoint speed 4	P-02 – P-01 Default: **0 Hz**	Internal setpoint for speed 4 if *P-10* > 0 Input in 1/min
152	11059	**P-24** Deceleration ramp 2	0 – 25 s	Via digital input or in the event of power failure according to *P-05*.
AO/DO				
153	11046	**P-25** Analog output function selection	0 – **8** – 9	Selects the function of the analog output. See "Extended parameter description" (→ 🗎 77).
Speed skip function				
154	11045	**P-26** Speed skip function frequency range	0 – P-01 [Hz]	Determines the frequency range to be skipped. See "Extended parameter description" (→ 🗎 78).
155	11044	**P-27** Skip center	P-02 – P-01 Default: **0 Hz**	Skip center See "Extended parameter description" (→ 🗎 78).
Adjustment of V/f characteristic				
156	11099	**P-28** Adjustment of V/f characteristic curve (voltage value)	**0** – *P-07* [V]	Adjustment of the V/f characteristic curve – voltage value of the new operating point. See "Extended parameter description" (→ 🗎 79).
157	11098	**P-29** Adjustment of V/f characteristic curve (frequency value)	0 – P-09 [Hz]	Adjustment of the V/f characteristic curve – frequency value of the new operating point. See "Extended parameter description" (→ 🗎 79).
Inverter behavior in case of enable/restart				
158	11070	**P-30** Restart function for terminal mode	Edge – R, **Auto-0** – Auto-5	Defines the inverter behavior with reference to the enable digital input and configures the automatic restart function. See "Extended parameter description" (→ 🗎 81).
159	11071	**P-31** Restart function for keypad/fieldbus mode	0 – **1** – 7	Defines the inverter enable behavior when controlled via the integrated keypad. See "Extended parameter description" (→ 🗎 73).

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HVAC functions				
160	11132	**P-32 Level 1** Direct current holding function, cyclic duration factor	**0** – 25 s	Can also be used for DC braking. Therefore the speed must be defined in *P-59*. See "Extended parameter description" (→ 🗎 83).
	11133	**P-32 Level 2** Direct current holding function, operating mode	**0** – 2	
161	11060	**P-33** Flying start function	**0** – 2	Flying start function. See "Extended parameter description" (→ 🗎 73).
162	11131	**P-34** Brake chopper activation	**0** – 2	Setting *P-34* > 0 activates the integrated brake chopper. **P-34 = 1**, activated with software protection (only for BWLT 100 002). An error message is issued when the maximum current is exceeded. **P-34 = 2**, activated for other BW with external protection.
163	11065	**P-35** Analog input/slave scaling	0 – **100** – 2000%	Scaling factor of analog input and slave speed. See "Extended parameter description" (→ 🗎 76).

Fieldbus settings				
164	11105	**P-36 Level 1** Fieldbus settings, slave address	0 – **1** – 63	See "Extended parameter description" (→ 🗎 76).
	11106	**P-36 Level 2** Fieldbus settings, baud rate	0 – **1** – 5	
	11107	**P-36 Level 3** Fieldbus settings, Timeout response	**0** – 8	

Parameter locking function				
165	11074	**P-37** Definition access code	0 – **101** – 9999	Defines the access code for *advanced parameter set* in *P-14*.
166	11073	**P-38** Locks parameter access	**0** – 1	Controls user access to the parameters.
167	11066	**P-39** Analog input offset	-500 – **0** – 500%	See "Extended parameter description" (→ 🗎 77).
168	11056	**P-40 Level 1** Display scaling, source	**0** – 2	See "Advanced parameter description" (→ 🗎 71).
	11057	**P-40 Level 2** Display scaling, scaling factor	**0** – 16 000	
169	–	**P-41** Thermal motor protection to UL 508C	**0** – 1	See "Extended parameter description" (→ 🗎 86).

PI controller parameter				
170	11075	**P-42** PI controller P gain	0 – **1** – 30	Settings for the integrated PI controller. In factory settings: **Actual value source** = analog input 2 **Setpoint source** = Fixed value for 0 – 100% of analog input 2, can be digitally set via *P-46* If operation ≠ factory settings, see "Extended parameter description" (→ 🗎 86).
171	11076	**P-43** PI controller Integral time constant	0 – **1** – 30 s	
172	11078	**P-44** PI controller Run mode	**0** – 1	
173	11079	**P-45 Level 1** PI controller input signal, setpoint source selection	**0** – 1	
	11080	**P-45 Level 2** PI controller input signal, actual value source selection	**0** – 5	
174	11081	**P-46** PI controller setting of digital setpoint	**0** – 100%	
175	11067	**P-47** Analog input 2	0 – 10 V, b 0 – 10 V, 0 – 20 mA t4 – 20 mA, r4 – 20 mA t20 – 4 mA, r20 – 4 mA, Ptc – th	Configures the format of the analog input 2. See "Extended parameter description" (→ 🗎 86).

PI controller parameter				
176	11061	**P-48** Timer for standby mode	**0** – 25 s	Activating the timer via *P-48* > 0 s; with n = 0 1/min and controller enable, the inverter goes to standby mode after the time set in *P-48*.
177	11087	**P-49** PI control difference wake-up level	**0** – 100%	See "Extended parameter description" (→ 🗎 86).
178	11052	**P-50** User relay hysteresis band	**0** – 100%	Activation via *P-50* > 0 Percentage of maximum speed *P-01* or nominal motor current *P-08*, depending of settings in *P-18*. See "Extended parameter description" (→ 🗎 86).

Motor control parameters				
179	11089	**P-51** Selection of motor control procedure	0 – **1** – 5	At factory setting, the inverter is in V/f control mode. See "Extended parameter description" (→ 🗎 86).
180	11091	**P-52** Auto tune	**0** – 1	*P-52* = 1 enables auto tune measurement. Manual activation of auto tune measurement. ⚠ **DANGER!** The motor may turn after activation.
181	11091	**P-53 Level 1** Vector operation control parameter, gain factor (P component)	0 – 250%	Manual fine-tuning control parameter
	11092	**P-53 Level 2** Vector operation control parameter, Integral time constant (I component)	0 – 250 ms	
182	11095	**P-54** Current limit	0 – **150** – 175%	Maximum current emitted by the inverter. Percentage of *P-08*
183	11140	**P-55** Motor stator resistance	0 – 655.35 Ω	Manual adjustment of stator resistance value. Assigned automatically by auto tune.
184	11142	**P-56** Motor stator inductance d axis (Lsd)	0 – 6553.5 mH	Manual adjustment of Lsd value. Assigned automatically by auto tune.
185	11145	**P-57** Motor stator inductance q axis (Lsq)	0 – 6553.5 mH	Manual adjustment of Lsq value. Assigned automatically by auto tune.
186	11134	**P-58** Speed of DC braking	**0** – *P-01*	Speed for start of DC braking To activate the DC braking , *P-32* must be changed. See "Extended parameter description" (→ 🗎 86).
187	11135	**P-59** Current strength of DC holding function	0 – **20** – 100%	Also for DC braking See "Extended parameter description" (→ 🗎 86).
188	11146	**P-60** Fire mode speed	**0** – 250 Hz	Speed in fire mode. To activate the fire mode, select **function 13** in *P-15*.

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8.2 Advanced parameter description

8.2.1 Standard parameters

P-05 stop mode selection

Defines the deceleration behavior of the drive for normal operation and power failure.

Range of values:

0 – 2

In the event of power failure:

- 0: Operation continues
- 1: Motor coasts to a halt
- 2: Rapid stop along *P-24*

Normal stop:

- 0: Stop along ramp *P-04*
- 1: Motor coasts to a halt
- 2: Stop along ramp *P-04*

If *P-05* = 0, the frequency inverter attempts to continue operation in the case of a power failure by reducing the motor speed and using the load as a generator.

P-07 nominal motor voltage

Range of values:

- 0 – **230** – 250 V
- 0 – **400 (460** → Only American variant) – 500 V

Nominal voltage of the motor according to nameplate. For low-voltage drives, this value is limited to 250 V.

Voltage compensation

P-07 > 0 V: activated

If this function is activated, pulse width modulated output voltage of the frequency inverter is kept constant by variable adjustment of the pulses. This way, negative effects, such as decrease of the input voltage on the line side can be stopped and the motor can maintain its nominal torque. Furthermore, thermal losses at the motor, caused by regenerative energy in brake operation, are reduced.

P-07 = 0 V: deactivated

When the voltage compensation is deactivated, higher thermal losses are generated in the motor during braking operation, and the motor torque can be affected by outer influences, such as dropping of the line voltage. The load on the frequency inverter DC link is reduced by this setting.

P-10 nominal motor speed

Range of values:

0 – 30 000 1/min

- 0: Slip compensation (--- FEHLENDER LINK ---) deactivated, all parameters displayed in Hz
- 1: Slip compensation (--- FEHLENDER LINK ---) activated, all parameters displayed in 1/min

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P-11 Additional voltage/boost

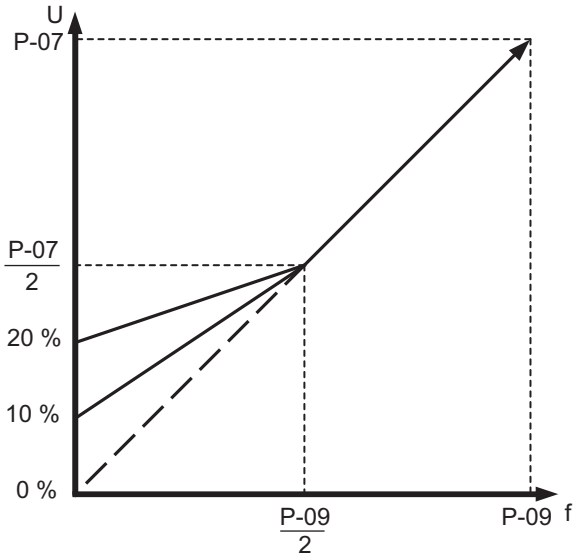
Range of values:

0 – 20% of the max. output voltage. Resolution 0.1%

- Size 1: max. 20%
- Size 2: max. 15%
- Size 3: max. 10%

Increases the output voltage of the frequency inverter by a scalable value (in case of low speed) to obtain a higher motor torque generation in this speed range.

Vector operation (*P51* ≠ 1): *P-11* is automatically filled by the auto tune process, if one of the vector control modes was selected in *P-51*.



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A motor with forced cooling fan must be used for continuous duty at low speeds.

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P-12 control signal source

Range of values:

0 – 11

0	Terminal control
1	Control via keypad (only forward)
2	Control via keypad (to toggle between forward/reverse, press the <Start> key)
3	SBus network control with internal acceleration/deceleration ramps
4	SBus network control with adjusted acceleration/deceleration ramp via bus.
5	Modbus RTU network control with internal acceleration/deceleration ramps
6	Modbus RTU network control with adjusted acceleration/deceleration ramp via bus.
7	CANopen network control with internal acceleration/deceleration ramps
8	CANopen network control with adjusted acceleration/deceleration ramp via bus
9	Standard PI controller mode
10	Advanced PI controller mode
11	Master-slave operation

8.2.2 PWM

P-17 PWM switching frequency

Specifies the pulse width modulated switching frequency. A higher switching frequency means less motor noise, but also higher losses in the output stage. The following table shows the PMW switching frequency values in dependency of the performance class.

Input voltage V	Performance class kW	PWM factory settings kHz	min. PWM kHz	max. PWM kHz
1 × 110	0.37 – 1.1	4	2	16
1 × 230 3 × 230	0.37 – 2.2			16
1 × 230 3 × 230	4			12
3 × 400	0.75 – 4			16
3 × 400	5.5 – 7.5			12
3 × 400	11			8

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8.2.3 Analog inputs

P-16, P-48 analog input

(Description also applies to analog input 2)

Range of values:

Display		Range of values	Explanation
U	0 – 10	0 – 10 V	Unipolar mode (voltage input)
b	0 – 10	-10 – 10 V	Bipolar mode (voltage input)
A	0 – 20	0 – 20 mA	Unipolar mode (current input)
t	4 – 20	4 – 20 mA	Unipolar mode (current input)
r	4 – 20	4 – 20 mA	Unipolar mode (current input)
t	20 – 4	4 – 20 mA (inv.)	Inverted unipolar mode (current input)
r	20 – 4	4 – 20 mA (inv.)	Inverted unipolar mode (current input)
–	Ptc-th (only *P-48*)	–	Select the setting for operation of PTC motor thermistor

b = Bipolar mode

t = Frequency inverter switches off if signal is revoked when frequency inverter is enabled.

r = Indicates that the inverter moves along the ramp to the speed set in *P-20*.

Bipolar mode

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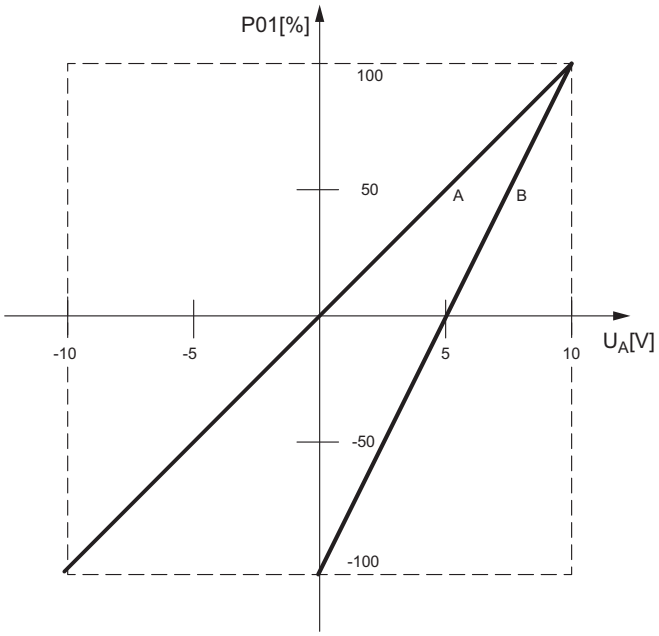
This function allows for infinitely variable speeds in the speed range of -100% to +100% via *P-01* without changing the digital input. As an alternative, a curve toward [B] can be realized.



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Curve A

When using an analog input signal with voltage range -10 V to +10 V (bipolar mode)

P-16 = 0 − 10b

Curve B

Can be operated according to this curve with the following settings in the frequency inverter:

P-16 = 0 − 10 V (factory settings)

P-35 = 200%

P-39 = 50%

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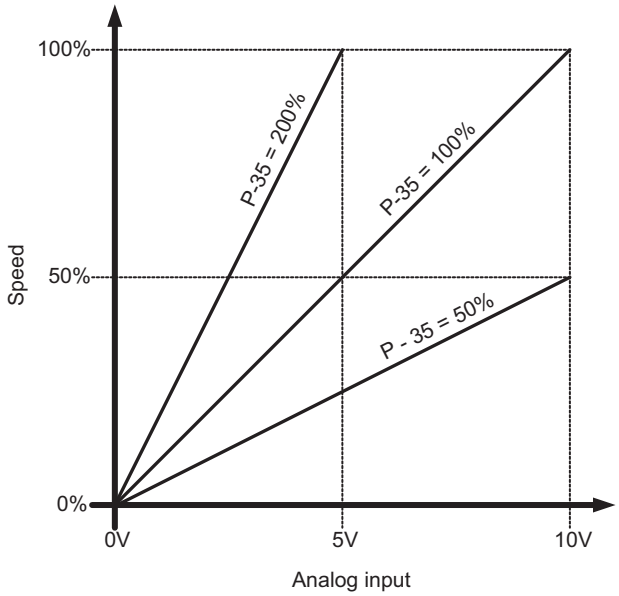
P-35 Analog input/slave scaling

Range of values: See 0 – **100** – 2000

Analog input scaling



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Scaling of slave, if

P-12 = 11

P-35 = $(n_{slave}/n_{master}) \times 100\%$

Example

Master speed = 1500 1/min

Desired slave speed = 750 1/min

P-35 = 750 / 1500 × 100% = 50

The slave speed is limited by *P-01* and *P-02*

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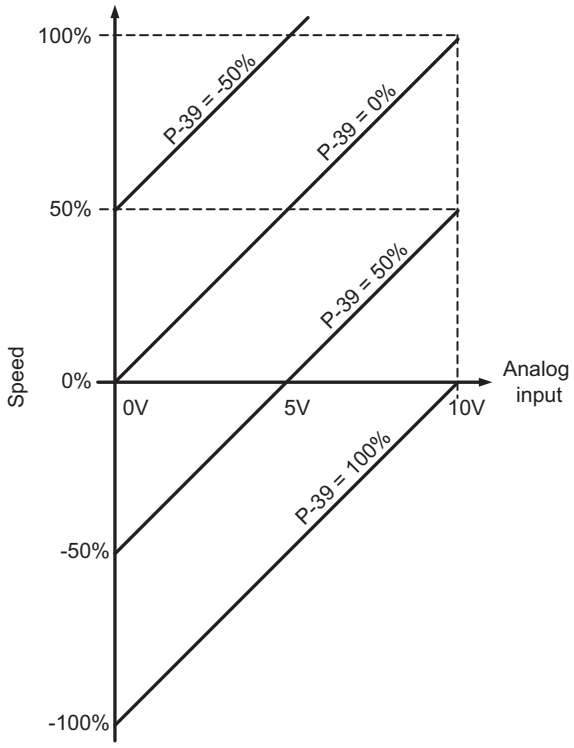
P-39 analog input offset

Range of values:

-500 – **0** – 500%

Analog input offset, resolution 0.1%.



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8.2.4 Analog output

P-25 analog output function selection

Range of values:

0 – **8** – 10

0	Frequency inverter is enabled (digital)
1	Frequency inverter is ready for operation (digital)
2	Motor at setpoint speed (digital)
3	Frequency inverter is in fault status (digital)
4	Motor speed ≥ limit value *P-19* (digital)
5	Motor current ≥ limit value *P-19* (digital)
6	Motor speed < limit value *P-19* (digital)
7	Motor current < limit value *P-19* (digital)
8	Motor speed (analog)
9	Motor current (analog)
10	Motor power (analog)

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Setting as digital output

Deactivated: 0 V

Activated: +24 V (20 mA limit value)

Setting as analog output

- Selection 8: Motor speed signal range

  0 – 10 V = 0 – 100% of *P-01*
- Selection 9: Motor current signal range

  0 – 10 V = 0 – 200% of *P-08*

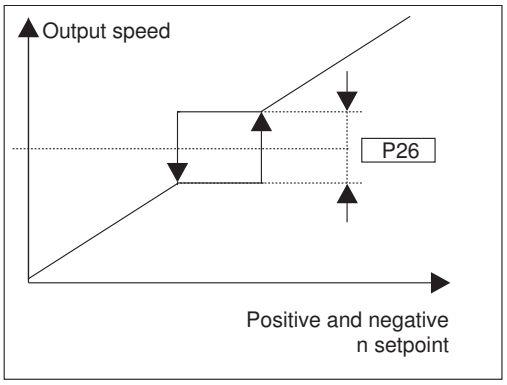
8.2.5 Speed skip function

P-26, P-27 speed skip function

Range of values:

0 – *P-01*

In some applications, mechanical resonance vibrations may occur in certain speed ranges. This may have a negative effect on the machine behavior. The speed skip function can be used to skip the interfering speed range. The drive speed performs the depicted hysteresis with the ramps specified in *P-03* and *P-04*.



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P-26 Describes the extend of the frequency range
P-27 Describes the center of the frequency range

Example:

Skipping the speed range 27 Hz – 37 Hz

Start frequency = 27 Hz; end frequency = 37 Hz

P-26 = 37 Hz - 27 Hz = **10 Hz**

P-27 = Start frequency + *P-26*/2 = 27 Hz + 5 Hz = **32 Hz**

If the setpoint speed is within the skipped frequency range, the input speed remains on the upper or lower limit of the frequency range, depending on the direction of acceleration.

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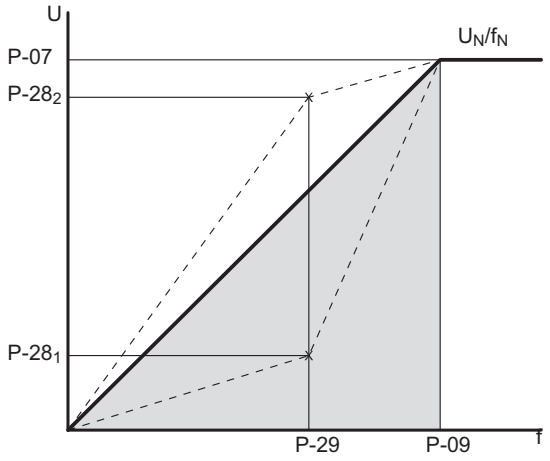
8.2.6 Adjustment of V/f characteristic

P-28, P-29 V/f characteristic curve adjustment

In this function, an additional operating point of the frequency inverter V/f characteristic can be created.

- If this operating point is below the standard characteristic (operating point 1), the motor consumes less energy for all speeds below the nominal working point. But in this case the motor has a lower torque. This setting is suitable for pump and fan applications, among others.
- If the operating point is above the standard characteristic (operating point 2), the motor generates a higher torque for all speeds below the nominal working point. But this results in the motor generating more heat. This setting is suitable when a motor instability occurs in certain frequencies. In this case, increase or reduce the voltage (*P-28*) at the instable speed (*P-29*).



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P-07 = Nominal motor voltage

P-09 = Rated motor frequency

P-28 = Voltage value of adjustment of the V/f characteristic curve

P-29 = Frequency value of adjustment of the V/f characteristic curve

Example:

Operating point 1 = *P-28*$_1$/*P-29*

Operating point 2 = *P-28*$_2$/*P-29*

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8.2.7 User relay

P-18 selection of user relay output

Range of values:

0 – **1** – 7

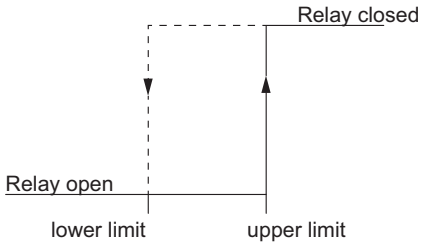
0	Frequency inverter is enabled. Select this function to control the electromechanical motor holding brake. For brake control installation, see chapter "Installation" (→ 🗎 23).
1	Frequency inverter is ready for operation
2	Motor at setpoint speed
3	Frequency inverter in fault status
4	Motor speed ≥ limit value *P-19*
5	Motor current ≥ limit value *P-19*
6	Motor speed < limit value *P-19*
7	Motor current < limit value *P-19*
8	Analog input 2 > limit value *P-19*

The switching threshold of the limit value is defined in *P-19*.

The relay contact is designed as NO contact.

P-51 User relay hysteresis band

Range of values: **0** – 100%



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Upper limit: Speed defined by *P-19*

Lower limit: Upper limit minus value defined in *P-51*

Application example:

P-01 = 50 Hz

P-18 = 4 → „Relay closes when inverter speed ≥ value in *P-19*“

P-19 = 50% = 25 Hz

The actual motor speed fluctuates around the setpoint 25 Hz by ± 2 Hz (value is *P-19*). Unwanted instable relay states occur ("clicking"). To avoid this, you can set *P-51* = 5% = 2.5 Hz. The speed fluctuations are now within the hysteresis, the relay maintains its state.

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8.2.8 Inverter behavior in case of enable/restart

P-30 terminal mode restart function

Defines the frequency inverter behavior with regard to the enable digital input and configures the automatic restart function.

Range of values:

Edge-R, **Auto-0**, Auto-1 – Auto-5

- **Edge-R:**

  After activation or resetting of an error, the frequency inverter does not start automatically, even if an enable signal is still present at the relevant digital input. To start the frequency inverter after activation or resetting, the signal must first be deleted (open switch) and then reset (close switch).

- **Auto-0:**

  After activation or resetting, the frequency inverter starts automatically if an enable signal is still present at the relevant digital input.

- **Auto-1 – Auto-5:**

  Following an error shutdown (trip), the frequency inverter makes up to 5 attempts to restart at intervals of 20 seconds. To reset the counter, the frequency inverter must be de-energized. The number of attempted restarts is counted. If the frequency inverter is unable to start the drive with the final attempt, a permanent error shutdown occurs, which can only be reset by pressing the "Reset" key.

P-31 Restart function for keypad/fieldbus

Defines the frequency inverter enable behavior when controlled via the integrated keypad or fieldbus.

Range of values:

0 – **1** – 7

Mode	Designation	Explanation
0	Minimum speed	Press the <Start> key to start.
1	Most recently used speed	Press the <Start> key to start.
2	Minimum speed (Auto run)	To start the hardware enable via digital inputs.
3	Most recently used speed (auto run)	To start the hardware enable via digital inputs.
4	Current speed	Press the <Start> key to start.
5	Preset speed 4	Press the <Start> key to start.
6	Current speed (Auto run)	To start the hardware enable or digital inputs.
7	Preset speed 4 (Auto run)	To start the hardware enable or digital inputs.

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8.2.9 HVAC functions

DC braking and holding function (P-32, P-59, P-60)

Direct current injection into the motor winding enables a homogenous magnetic field to be generated during the time set in *P-32*. When an external force applies torque to the rotor, the magnetic field generates a braking torque.

The direct current braking and holding function allow for the following drive-specific tasks:

Responsibilities	Task	Parameters
HVAC	Fan rotor restart inhibit due to air flow.	P-32, P-59
HVAC, materials handling technology	DC braking from a defined speed with subsequent holding brake (max. 25 s in total)	P-32, P-58, P-59
HVAC	Defined start of speed "0" for a fan rotor in the air flow.	P-32, P-59

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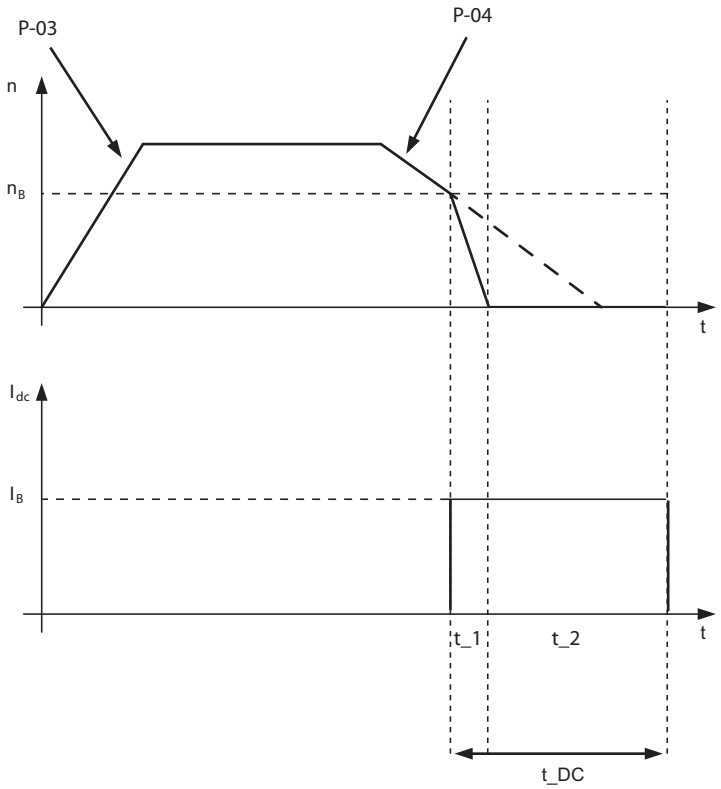
Application example

DC holding function with DC braking



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t_1 = Time of DC braking
t_2 = Time of DC holding braking
t_DC = Time of DC holding function [P-32]
n_B = Start speed of DC braking [P-59]
I_B = Injected direct current [P-60]

P-32 DC hold function

Level	Program no.	Range of values	Default value	Function
1	–	0 – 25 s	0 s	Direct current injection, time Direct current injection activated, if *P-32*/1 > 0 s
2	0	0 – 2	0	Direct current injection at STOP
	1			Direct current injection at START
	2			Direct current injection at STOP and START

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P-59 DC braking speed

Range of values: **0** – P-01

Speed for start of DC braking

To activate the DC braking, *P-32/1* must be set to > 0 s.

P-60 Current strength of DC holding function

Range of values: 0 – 100%

Value in [%] of *P-08*. Determined the strength of the direct current injection.

P-33 flying start function

Range of values: **0** – 2

In case of an activated flying start function, the frequency inverter starts the motor control based on the latest measured rotor speed. If the rotor is at speed "0", startup may have a brief delay.

Setting P-33	Description
0	Flying start function disabled
1	Flying start function enabled
2	Flying start function only activated if the following conditions are met: • Switch off with error • Voltage drop • Freewheel stop

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8.2.10 Fieldbus settings

P-36 fieldbus settings

P-36 is distinguished into levels in the frequency inverter keypad. Press the <Navigate> button to get to the next level.

The frequency inverter display shows program numbers on level 2 of *P-36*. Depending on the setting in *P-12*, different values are valid for these numbers. The following table shows the assignment of program number and related value depending on *P-12*.

Level	Program no.	Value	
		SBus (*P-12* = 3/4) CAN (*P-12* = 5/6)	Modbus RTU (*P-12* = 7/8)
1 – Slave address		**1** − 63	**1** − 63
2 – Baud rate	0	500 kb/s	9.6 kb/s
	1	**500 kb/s**	**115.2 kb/s**
	2	125 kb/s	19.2 kb/s
	3	250 kb/s	38.4 kb/s
	4	500 kb/s	57.6 kb/s
	5	1 Mb/s	76.8 kb/s
3 – Timeout reaction in ms	**0**	**0 (no error)**	
	1	t 30	
	2	t 100	
	3	t 1000	
	4	t 3000	
	5	r 30	
	6	r 100	
	7	r 1000	
	8	r 3000	

The setting "0" deactivates the communication switch-off.

$\mathbf{t}_x$: The frequency inverter immediately switches off when the time **x** [ms] is exceeded.

$\mathbf{r}_x$: The motor is stopped along a ramp when the time **x** [ms] is exceeded.

8.2.11 Display scaling

P-40 Display scaling

P-40 is distinguished into levels in the frequency inverter keypad. Press the <Navigate> button to get to the next level.

Level	Program no.	Value
1 – Source	0	Motor speed
	1	Motor current
	2	Value of analog input 2
2 – Factor	–	0 – 16000

Appears on the operating state display (cXXX) in real time.

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8.2.12 Thermal motor protection to UL508C

P-41 thermal motor protection according to UL508C

- **0/deactivated**
- 1/activated

The frequency inverters come equipped with a thermal motor protection function according to NEC (National Electrical Code) to protect the motor from overload. In an internal memory, the motor current is accumulated over time.

The frequency inverter goes to fault state as soon as the thermal limit is exceeded (I.t-trP).

Once the output current of the frequency inverter is less than the set rated motor current, the internal memory is decremented depending on the output current.

When *P-41* is disabled, the thermal overload memory is reset when switching power off and on again.

When *P-41* is enabled, the memory is maintained even after power off and on again.

8.2.13 PI controller

P-42 PI proportional gain

Range of values: 0 – **1** – 30

Controller proportional gain. Higher values result in a greater change of the frequency inverter output frequency as response to minor changes of the feedback signal. If the value is too high, it can cause instability.

P-43 PI integrated time constant

Range of values: 0 – **1** – 30 s

Higher values result in a damped A too high value can lead to unwanted inertia of the control system.

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P-44 PI controller operating mode

Range of values: **0** – 1

Setting P-44	Response of speed to negative control difference (actual value decreases)
0: Standard	Rising
1: Inverted	Falling

P-45 Controller input signal

Range of values: **0** – 1

Level	Description	Program no.	Source
1	Setpoint source	0	Digital = value in *P-46*
		1	Analog = analog input 1
2	Actual value source	0	Analog input 2
		1	Analog input 1
		2	Motor current, *P-08*
		3	DC link voltage
		4	Analog input 1 – analog input 2 Comparison of 2 analog actual values. The value difference is compared to the setpoint. Connect the actual values to analog input 1 and analog input 2. *P-45/1* must be set to “0“.
		5	Maximum value (analog input 1; analog input 2) Comparison of the values from both analog inputs. The maximum value is used as PI actual value.

P-46 Setting a digital setpoint

Range of values: **0** – 100% of the feedback signal

Example: Feedback signal 0 – 10 V, P – 46 = 50% = 5 V

P-49 PI control difference

Range of values: **0** – 100%

When the inverter is in standby during PI controller mode, the selected feedback signal (actual value of the controlled system) must fall below this threshold defined in *P-49* before the inverter returns to normal operation.

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8.2.14 Motor control parameter

P-51 Selection of motor control procedure

Range of values: 0 – **1** – 5

Settings in *P-51*	Motor control mode	Motor types
0	VFC-ASM speed control	Asynchronous machines
1	V/f control	Asynchronous machines
2	VFC-PM speed control	Permanent-field synchronous machine
3	BLDC speed control	Brushless DC motors
4	Sync. Magnetic reluctance motor control	Synchronous reluctance motors
5	LSPM motor control	SEW LSPM motors

Annotations

0/VFC speed control

Vector speed control for induction motors with calculated rotor speed feedback control. Field oriented control algorithms are used for motor speed control. As the calculated rotor speed is used to internally, virtually close the speed loop, this control mode provides a closed loop control without physical encoder. With a properly tuned speed controller, the static speed change is usually better than 1%. For optimal control, auto tune (*P-52*) can be carried out prior to first operation.

1/Extended V/f controller (default)

During V/f control mode, the motor speed is set by linear varying of voltage and frequency at the inverter output. This setting is sufficient for most applications. If a better performance is required in regard of control mode, torque stability and speed range, the VFC control mode should be used.

Slip compensation

The MOVITRAC® LTE-B frequency inverter uses an extended V/f control. This means, with active slip compensation (*P-10* > 0) the load-dependent speed drop is compensated by the frequency inverter increasing the output frequency f_A in the relevant operating point by the load-dependently calculated component Δ_f.

2/VFC-PM Speed control

Analog characteristics of the VFC speed control, but with PM speed control the machine model of a permanent-field synchronous motor is used for calculating the initial size.

3/BLDC Speed control

Analog characteristics of the VFC speed control, but with BLDC speed control the machine model of a "brushless DC motor" (BLDC motor) is used for calculating the initial size. The resulting current output curve differentiates compared to the PM motor control.

4/Sync Reluctance motor control

Analog characteristics of the VFC speed control, but with synchronous magnetic reluctance speed control the machine model of a synchronous magnetic reluctance motor is used for calculating the initial size.

5/LSPM motor control

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Use this setting when a Line Start Permanent Magnet motor (LSPM motor) by SEW-EURODRIVE is connected to the MOVITRAC® LTE-B inverter.

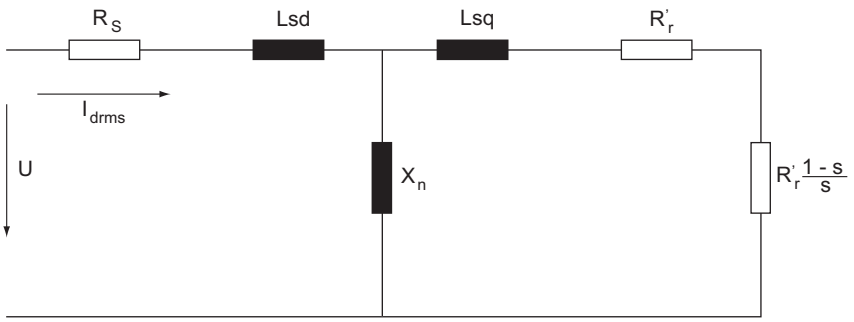
P-54 Vector operation gain factor

NOTICE

Possible damage to the frequency inverter.

The following parameters are used internally by the inverter to provide for optimum motor control. Incorrect settings of the parameters can result in poor performance and unexpected behavior of the motor. Adjustments should be made only by experienced users who fully understand the functions of these parameters.

Equivalent wiring diagram for AC motors.



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P-56 Motor stator resistance [RS]

Setting range: depends on the motor (Ω)

The stator resistance value is the ohmic phase-phase resistance of the copper winding. This value can be determined and set automatically during auto tune.

Instead, you can enter this value manually.

P-57 Motor stator inductance of d-axis (Lsd)

Range of values: 0 – 6553.5 mH

Motor stator inductance (Lsd)

Setting range: depends on the motor (H)

For induction motors: Phase stator inductance value

For permanent magnet motors: Phase d-axis stator inductance in Henry

P-58 Motor stator inductance of q-axis (Lsq)

Range of values: 0 – 6553.5 mHz

Motor stator inductance (Lsq) − only for PM motors

Setting range: depends on the motor (H)

For permanent magnet motors: Phase q-axis stator inductance in Henry

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8.3 P-15 Binary input function selection

The functions of the digital inputs in the frequency inverter can be programmed. You can select the functions required for your application.

The following tables show the functions of the digital inputs depending on the value of parameter *P-12* and *P-15*.

8.3.1 Terminal mode

When parameter *P-12* = 0 (terminal mode), the following table applies:

P-15 Selection	Digital input 1	Digital input 2	Digital input 3 / analog input 2	Digital input 4 / analog input 1	Comments
0	**0**: Stop/controller inhibit **1**: Enable/start	**0**: CW rotation **1**: CCW rotation	**0**: (0 V) Analog speed value reference **1**: (10 – 24 V) Preset speed 1	Speed reference	–
1	**0**: Stop/controller inhibit **1**: Enable/start	**0**: Analog speed value reference **1**: Preset speed 1 or 2	**0**: (0 V) Preset speed **1:** (10 – 24 V) Preset speed 1	Speed reference	–
2	**0**: Stop/controller inhibit **1**: Enable/start	**0**: Released	**0**: (0 V) released	**0**: Preset speed 1 – 4 **1**: Max. speed (*P-01*)	Preset speed 1
		1: Applied	**0**: (0 V) released		Preset speed 2
		0: Released	**1**: (10 – 24 V) applied		Preset speed 3
		1: Applied	**1**: (10 – 24 V) applied		Preset speed 4
3	**0**: Stop/controller inhibit **1**: Enable/start	**0**: Analog speed value reference **1**: Preset speed 1	**0**: (0 V) Disconnection TF/TH **1**: (10 – 24 V) Motor temperature OK	Speed reference	Connect external temperature sensor to digital input 3.
4	**0**: Stop/controller inhibit **1**: Enable/start	**0**: CW rotation **1**: CCW rotation	**0**: (0 V) Analog speed value reference **1**: (10 – 24 V) Preset speed 1	Speed reference	–
5	**0**: CW rotation stop **1**: CW rotation	**0**: CCW rotation stop **1**: CCW rotation	**0**: (0 V) Analog speed value reference **1**: (10 – 24 V) Preset speed 1	Speed reference	Integrated rapid stop function via digital inputs 1 and 2.
	To stop the motor using the rapid stop ramp, connect the digital inputs 1 and 2 with each other.				
6	**0**: Stop/controller inhibit **1**: Enable/start	**0**: CW rotation **1**: CCW rotation	**0**: (0 V) Disconnection TF/TH **1**: (10 – 24 V) Motor temperature OK	Speed reference	Connect external temperature sensor to digital input 3.
7	**0**: CW rotation stop **1**: CW rotation	**0**: CCW rotation stop **1**: CCW rotation	**0**: (0 V) Disconnection TF/TH **1**: (10 – 24 V) Motor temperature OK	Speed reference	Integrated rapid stop function via digital inputs 1 and 2. Connect external temperature sensor to digital input 3.
	To stop the motor using the rapid stop ramp, connect the digital inputs 1 and 2 with each other.				
8	**0**: Stop/controller inhibit **1**: Enable/start	**0**: CW rotation **1**: CCW rotation	**0**: (0 V) released	**0**: Released	Preset speed 1
			1: (10 – 24 V) applied	**0**: Released	Preset speed 2
			0: (0 V) released	**1**: Applied	Preset speed 3
			1: (10 – 24 V) applied	**1**: Applied	Preset speed 4
9	**0**: CW rotation stop **1**: CW rotation	**0**: CCW rotation stop **1**: CCW rotation	**0**: (0 V) released	**0**: Released	Preset speed 1
			1: (10 – 24 V) applied	**0**: Released	Preset speed 2
			0: (0 V) released	**1**: Applied	Preset speed 3
			1: (10 – 24 V) applied	**1**: Applied	Preset speed 4
10	**Button function**, NO contact **Positive edge**: Enable	**Button function**, NC contact **Negative edge**: Stop	**0**: (0 V) Analog speed value reference **1**: (10 – 24 V) Preset speed 1	Speed reference	Function for operation with buttons (pulse control)

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P-15 Selection	Digital input 1	Digital input 2	Digital input 3 / analog input 2	Function	Digital input 4 / analog input 1	Comments
11	0	1	**1** (10 – 24 V)	CCW rotation	Speed reference	Function for operation with buttons (pulse control)
	0	0	**1** (10 – 24 V)	Backward stop		
	1	1	**0** (0 V)	CW rotation		
	1	0	**0** (0 V)	CW rotation stop		
	1	0	**1** (10 – 24 V)	Rapid stop along *P-24*		

P-15 Selection	Digital input 1	Digital input 2	Function	Digital input 3	Analog input	Comments
12	0	0	Stop/controller inhibit	**0**: (0 V) Analog speed value reference **1:** (10 – 24 V) Preset speed 1	Speed reference	–
	1	0	Stop with ramp 1 (*P-04*)			
	0	1	Stop with ramp 2 (*P-24*)			
	1	1	Enable/start			

P-15 Selection	Digital input 1	Digital input 2	Digital input 3 / analog input 2	Digital input 4 / analog input 1	Comments
13	**0**: Stop/controller inhibit **1**: Enable/start	**0**: Preset speed **1**: Analog input 1	**0**: (0 V) Fire mode **1**: (10 – 24 V) Normal operation	Speed reference	Fire mode function

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8.3.2 Keypad mode

When parameter *P-12* = 1 or 2 (keypad mode), the following table applies.

P-15	Digital input 1	Digital input 2	Digital input 3 / analog input 2	Digital input 4 / analog input 1	Comments	Key 5 △	Key 6 ▽
0, 1, 5, 8−12	**0**: Stop/controller inhibit **1**: Enable/start	**0**: No function **1**: Speed up	**0** (0 V) no function **1** (10 – 24 V) speed down	**0** (0 V): CW rotation **1** (10 − 24 V): CCW rotation	Notice: When digital input 2 and 3 are disabled together the motor may startup immediately.	Increase speed	Reduce speed
		When digital input 2 and 3 are disabled together, the START button is ignored.					
1	0: Stop/ controller enable 1: Enable/start	No function	Speed reference [1]	No function	Speed reference, can be selected via *P-45*		
2	**0**: Stop/controller inhibit **1**: Enable/start	**0**: No function **1**: Speed up	**0**: (0 V) no function **1**: (10 – 24 V) speed down	**0:** (0 V) Speed reference keypad **1:** (10 – 24 V) Fixed setpoint speed 1	Notice: When digital input 2 and 3 are disabled together the motor may startup immediately.	Increase speed	Reduce speed
		When digital input 2 and 3 are disabled together, the START button is ignored.					
3	**0**: Stop/controller inhibit **1**: Enable/start	**0**: No function **1**: Speed up	**0**: (0 V) Disconnection TF/TH **1**: (10 – 24 V) Motor temperature OK	**0**: (0 V) no function **1:** (10 – 24 V) speed down	Connect external temperature sensor to digital input 3. Notice: When digital input 2 and 4 are disabled together, the START button is ignored. This may result in immediate motor startup.	Increase speed	Reduce speed
4	**0**: Stop/controller inhibit **1**: Enable/start	**0**: No function **1**: Speed up	**0**: (0 V) Speed reference keypad **1**: (10 – 24 V) Analog input speed reference	Speed reference	–	Increase speed	Reduce speed
6	**0**: Stop/controller inhibit **1**: Enable/start	**0**: CW rotation **1**: CCW rotation	**0**: (0 V) Disconnection TF/TH **1:** (10 – 24 V) Motor temperature OK	**0** (0 V): Speed reference keypad **1** (10 − 24 V): Fixed setpoint speed 1	Connect external temperature sensor to digital input 3.	Increase speed	Reduce speed
7	**0**: Stop/controller inhibit **1**: Enable/start	**0**: Stop **1**: CW rotation	**0:** (0 V) Disconnection TF/TH **1:** (10 – 24 V) Motor temperature OK	**0** (0 V): Speed reference keypad **1** (10 − 24 V): Fixed setpoint speed 1	Integrated rapid stop function via digital inputs 1 and 2. Connect external temperature sensor to digital input 3.	Increase speed	Reduce speed
	To stop the motor using the rapid stop ramp, connect the digital inputs 1 and 2 with each other.						
13	**0**: Stop/ controller enable **1**: Enable/start	**0**: Activate velocity control fixed setpoint **1**: Speed reference keypad	**0**: (0 V) Fire mode **1**: (10 – 24 V) Normal operation	**0**: (0 V) Fixed setpoint speed 1 **1**: (10 – 24 V) Fixed setpoint speed 2	Fire mode function	Increase speed	Reduce speed

1) in factory setting analog input 2

8.3.3 SBus, CANopen and slave control mode

When parameter *P-12* = 3 or 4 (SBus control mode), the following table applies:

P-15	Digital input 1	Digital input 2	Digital input 3 / analog input 2	Digital input 4 / analog input 1	Comments
0, 2, 4, 8 – 12	**0**: Controller inhibit **1**: Enable	No effect	No effect	No effect	Enable via DI1 and gateway/master[1].

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P-15	Digital input 1	Digital input 2	Digital input 3 / analog input 2	Digital input 4 / analog input 1	Comments
1	**0**: Controller inhibit **1**: Enable	No function	Speed reference [2]	No effect	Enable via DI1 and gateway/master [1] Speed reference, can be selected via *P-45*
3	**0**: Controller inhibit **1**: Enable	**0**: Master speed reference **1**: Preset speed 1	**0**: (0 V) Disconnection TF/TH **1**: (10 – 24 V) Motor temperature OK	No effect	Enable via DI1 and gateway/master [1] Connect external temperature sensor to digital input 3.
5	**0**: Controller inhibit **1**: Start	**0**: Master speed reference **1**: Preset speed	**0**: (0 V) Preset speed 1 **1**: (10 – 24 V) Preset speed	No effect	When DI2 = 0, enable via DI1 and gateway/master
6	**0**: Controller inhibit **1**: Enable	**0**: Master speed reference **1**: Analog input 1 speed reference	**0**: (0 V) Disconnection TF/TH **1**: (10 – 24 V) Motor temperature OK	Speed reference	Enable via DI1 and gateway/master [1] Connect external temperature sensor to digital input 3.
7	**0**: Controller inhibit **1**: Enable	**0**: Master speed reference **1**: Speed reference on keypad	**0**: (0 V) Disconnection TF/TH **1**: (10 – 24 V) Motor temperature OK	No effect	Enable via DI1 and gateway/master [1] Connect external temperature sensor to digital input 3.
13	**0**: Controller inhibit **1**: Enable	**0**: Velocity control fixed setpoint activated **1**: Master speed reference	**0**: (0 V) Fire mode **1**: (10 – 24 V) Normal operation	**0**: (0 V) Preset speed 1 **1**: (10 – 24 V) Preset speed 2	Enable DI1 and gateway/master [1] Fire mode function

1) If P-31 = 2, 3, 6 or 7, enable only via DI1 (does not apply to Sbus)

2) in factory setting analog input 2

8.3.4 Modbus RTU control mode

When parameter *P-12* = 5 or 6 (Modbus RTU control mode), the following table applies:

P-15	Digital input 1	Digital input 2	Digital input 3 / analog input 2	Digital input 4 / analog input 1	Comments
0, 2, 4, 8 – 12	**0**: Controller inhibit **1**: Enable	No effect	No effect	No effect	Enable via DI1 and Modbus master[1] .
1	**0**: Controller inhibit **1**: Enable	No effect	Speed reference [2]	No effect	Enable via DI1 and Modbus master [1] Speed reference, can be selected via *P-45*
3	**0**: Controller inhibit **1**: Enable	**0**: Master speed reference **1**: Preset speed 1	**0**: (0 V) Disconnection TF/TH **1**: (10 – 24 V) Motor temperature OK	No effect	Enable via DI1 and Modbus master [1] Connect external temperature sensor to digital input 3.
5	**0**: Controller inhibit **1**: Enable	**0**: Master speed reference **1**: Preset speed	**0**: (0 V) Preset speed 1 **1**: (10 – 24 V) Preset speed 2	No effect	When DI2 = 0, enable via DI1 and gateway. When DI2 = 1, enable only via DI1.
6	**0**: Controller inhibit **1**: Enable	**0**: Master speed reference **1**: Analog input speed reference	**0**: (0 V) Disconnection TF/TH **1**: (10 – 24 V) Motor temperature OK	Speed reference	When DI2 = 0, enable via DI1 and gateway When DI2 = 1, enable only via DI1 Connect external temperature sensor to digital input 3.
7	**0**: Controller inhibit **1**: Enable	**0**: Master speed reference **1**: Speed reference on keypad	**0**: (0 V) Disconnection TF/TH **1**: (10 – 24 V) Motor temperature OK	No effect	
13	**0**: Controller inhibit **1**: Enable	**0**: Preset speed **1**: Master speed reference	**0**: (0 V) Preset speed 1 **1**: (10 – 24 V) Normal operation	0: (0 V) Preset speed 1 1: (10 – 24 V) Preset speed 2	Enable via DI1 and Modbus master [1] Fire mode function

1) If P-31 = 2, 3, 6 or 7, enable only via DI1

2) in factory setting analog input

8.3.5 PI control mode

P-15	Digital input 1	Digital input 2	Digital input 3 / analog input 2	Digital input 4 / analog input 1	Comments
0, 2, 7 – 12	**0**: Controller inhibit **1**: Enable	**0**: PI controller mode **1**: Preset speed 1	Input actual value	No effect	Can be used with *P-45* = 1.
1	**0**: Controller inhibit **1**: Enable	**0**: PI controller mode **1**: Preset speed 1	Input actual value	Input setpoint value	
3	**0**: Controller inhibit **1**: Enable	**0**: PI controller mode **1**: Preset speed 1	**0**: (0 V) Disconnection TF/TH **1**: (10 – 24 V) Motor temperature OK	Input actual value	Connect external temperature sensor to digital input 3.
4	Button function NO contact Positive edge: Enable	Button function NC contact Negative edge: Stop	No effect	No effect	Functions when internal actual source *P-45/2* > 0
5	Button function NO contact Positive edge: Enable	Button function NC contact Negative edge: Stop	**0**: (0 V) PI controller mode **1**: (10 – 24 V) Preset speed 1	No effect	
6	Button function NO contact Positive edge: Enable	Button function NC contact Negative edge: Stop	**0**: (0 V) Disconnection TF/TH **1**: (10 – 24 V) Motor temperature	No effect	Connect external temperature sensor to digital input 3. Function when internal actual source *P-45/2* > 0
7	**0**: Controller inhibit **1**: Enable	**0**: PI controller mode **1**: Preset speed 1	**0**: (0 V) Disconnection **1**: (10 – 24 V) Motor temperature OK	Input actual value	Connect external temperature sensor to digital input 3.
8	**0**: Controller inhibit **1**: Enable	**0**: CW rotation **1**: CCW rotation	Input actual value	No effect	
13	**0**: Controller inhibit **1**: Enable	**0**: Preset speed 1 **1**: PI controller mode	**0**: (0 V) Fire mode **1**: (10 – 24 V) Normal operation	Input actual value	Fire mode function

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8.4 Parameters for monitoring operating data in real time (read only)

You can monitor the internal operating data of the inverter using parameter group *P00*. These parameters cannot be changed.

8.4.1 Access to parameter group 0

Access to parameter group 0

When *P-14* = *P-37* (factory set to 101), all parameters are visible.

You can switch to *P-00* by pressing the <Navigate> key. "P00-z" is displayed, "z" represents the second number within *P-00* (meaning 1 – 50). You can then go the required parameter *P-00*.

Pressing the <Navigate> key again then displays the value of this specific parameter group "0".

The various values of parameters with several values (such as software ID), can be displayed by pressing the <Up>/<Down> keys.

To go to the next higher level, quickly press the <Navigate> key. By pressing the <Navigate> key quickly again (without pressing the <Up>/<Down> keys), the display shows the next higher level (main level of the parameters, that is *P-00*).

When you are on the lower level (e.g. *P00-05*) and press the key <UP>/<DOWN> to change the directory *P-00*, this parameter value is displayed by pressing the key <Navigate>.

8.4.2 Description of parameter group 0

Parameters	CANopen/Sbus index	Parameters/description	Display range	Explanation
20	11210	**P00-01** value of analog input 1	0 – 100%	100% = max. input current/voltage
21	11211	**P00-02** value of analog input 2	0 – 100 %	100% = max. input current/voltage
22, 40	11213	**P00-03** input speed – setpoint	P-01 (min) – P-01 (max)	Speed display in Hz when *P-10* = 0, else in 1/min.
11	11212	**P00-04** Status of digital inputs	Binary value	
39	11232	**P00-05** Internal temperature of inverter	-25 °C – 125 °C	
	11288	**P00-06** DC link voltage ripple	0 – 1000 V	
43	11270	**P00-07** Present motor voltage	AC 0 – 600 V	Inverter output voltage r.m.s. value
23	11220	**P00-08** Current DC link voltage	DC 0 – 1000 V	
24	11221	**P00-09** Heat sink temperature	-20 °C – 100 °C	
25, 26	11296 – 11297	**P00-10** Operating hours counter	0 – 99999 h	Value is permanently saved. Factory setting does not apply.
–	11298 – 11299	**P00-11** Operating time since the last fault 1	0 – 99999 h	Operating time since the last fault (TRIP) or disconnection (mains off). The timer is reset when another fault is triggered or the device is disconnected gain.
–	11300 – 11301	**P00-12** Operating time since the last fault 2	0 – 99999 h	Operating time since the last fault (TRIP) The timer is reset when another fault is triggered or the device is disconnected gain.

Parameters	CANopen/Sbus index	Parameters/description	Display range	Explanation
28	11302 – 11303	**P00-13** Operating time since the last activation	0 – 99999 h	Displays the operating time of an enable interval. The timer is reset at each following enable
–	11350	**P00-14** Current PWM switching frequency	2 – 16 kHz	The value may be below the settings in *P-17*, as it is automatically reduced in case of thermal overload
–	11305 – 11313	**P00-15** DC link voltage protocol	0 – 1000 V	Displays the last 8 values prior to the switch off with error
–	11322 – 11329	**P00-16** Heat sink temperature protocol	-20 °C – 120 °C	Displays the last 8 values prior to the switch off with error
–	11330 – 11337	**P00-17** Motor current protocol	0 – 2 × IN	Displays the last 8 values prior to the switch off with error
15, 16	11247 – 11250	**P00-18** Software ID, I/O and motor control	e.g. „1.00“, 47 AE	Left value= I/O processor, right value = motor control
34 – 37	11251 – 11254	**P00-19** Inverter serial number	A/B/C A= 0 – 999999, B = 0 – 99 C =0 – 99999	Unique serial number of the inverter
12 – 14, 17	11255	**P00-20** Inverter ID	e.g. LTE-B+ 1ph/0.37/2.00	Type/performance/FW version
–	11256 – 11258	**P00-21** Incoming process data (CANopen, Sbus)	–	PE1 – PE3, gateway -> inverter
–	11259 – 11261	**P00-22** Outgoing process data (CANopen, Sbus)	–	PA1 – PA3, inverter -> gateway
–	11289 – 11290	**P00-23** Total time of heat sink temperature > 85 °C	0 – 65000 h	Time during which a temperature of > 85 °C was measured at the heat sink
–	11237 – 11238	**P00-24** Total time of internal inverter temperature > 80 °C	0 – 65000 h	Time during which the inverter was operated at > 80 °C
–	11291	**P00-25** Rotor speed (calculated via motor model)	-P01 – P01	Applies only to vector mode
32, 33	11292 – 11293	**P00-26** kWh counter/MWh counter	xxxx	
–	11304 – 11305	**P00-27** Runtime of inverter fan	0 - 65000	Runtime clock for internal fan
–	11272 – 11281	**P00-28** Error log	xxxx	Shows the last 4 errors
–	11219	**P00-29** PI controller output	0 – 100 %	PI output
–	11314 – 11321	**P00-30** DC link voltage ripple protocol	0 – 1000 V	Displays the last 8 values prior to the switch off with error
–	11282 – 11283	**P00-31** Magnetization current und torque current Id/ Iq	0 – 100.0 A	Current specification in A_{rms} Using the keypad: Use the <UP> button to display the Iq
–	11239 – 11246	**P00-32** Protocol of internal temperature of inverter	-25 °C – 125 °C	Displays the last 8 values prior to the switch off with error
–	11338	**P00-33** Counter for critical O-I errors	0 – 65000	Counter for overcurrent faults
–	11339	**P00-34** Counter for critical O-Volt errors	0 – 65000	Counter for overvoltage faults
–	11340	**P00-35** Counter for critical U-Volt errors	0 – 65000	Counter for undervoltage faults
–	11341	**P00-36** Counter for critical O-t errors	0 – 65000	Counter for overtemperature faults of the heat sink

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Parameters	CANopen/Sbus index	Parameters/description	Display range	Explanation
–	11342	**P00-37** Counter for critical bO-I errors	0 – 65000	Counter for short-circuit faults at the brake chopper
–	11343	**P00-38** Counter for critical O-heat errors	0 – 65000	Counter for overtemperature faults – ambient temperature
–	11224	**P00-39** Counter for Modbus communication errors	0 – 65000	
–	11225	**P00-40** Counter for CANopen communication errors	0 – 65000	
–	11223	**P00-41** Counter for internal I/O communication errors	0 – 65000	
–	11344	**P00-42** Counter for internal µC power section communication errors	0 – 65000	Counter for communication errors between the processors of the power electronics
–	11351 – 11352	**P00-43** Inverter operating time		Total operating time of the inverter since manufacturing in h
–	–	**P00-44** Current phase offset and reference value for U	Internal value	Entries: First is reference value, second is measured value – no decimal place for both values
–	–	**P00-45** Current phase offset and reference value for V	Internal value	Entries: First is reference value, second is measured value – no decimal place for both values
–	–	**P00-46** Current phase offset and reference value for W	Internal value	Entries: First is reference value, second is measured value – no decimal place for both values
–	11294 –11295	**P00-47** Total cyclic duration factor of fire mode		Total cyclic duration factor of the fire mode in h
18, 19	11226 – 11227	**P00-48** Display values channel 1 and 2 internal oscilloscope	1: Value 2: Value	Current value of the latest oscilloscope measurement. Unit refers to the set size
–	11228 – 11229	**P00-49** Display values channel 3 and 4 internal oscilloscope	3: Value 4: Value	Current value of the latest oscilloscope measurement. Unit refers to the set size
–	11355 – 11356	**P00-50** Lib version and DSP bootloader version for motor control	Example: L 1.00 Example: b 1.00	2 entries: First for lib version of the motor control, second for DSP bootloader version. 2 decimal positions

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9 Technical data

The next chapter contains the technical data.

9.1 Conformity

All products meet the following international standards:

- CE marking according to the Low Voltage Directive
- IEC 664-1 Insulation coordination for electrical equipment within low-voltage systems
- UL 508C Power conversion equipment
- EN 61800-3 Variable-speed electrical drives – part 3
- EN 61000-6 / -2, -3, -4 Interference immunity / Interference emission (EMC)
- Housing protection classes according to NEMA 250, EN 55011:2007
- Classification of flammability according to UL 94
- RCM
- cUL
- EAC

9.2 Information on ambient conditions

	Permitted conditions
Ambient temperature during operation	-10 to +50 °C for PWM frequency of 2 kHz (IP20) -10 to +40 °C for PWM frequency of 2 kHz (IP66 NEMA 4X / IP55 NEMA 12K)
Maximum derating depending on the ambient temperature	4 %/1 °C to 55 °C for IP20 frequency inverters 4 %/1 °C to 45 °C for IP66/IP55 frequency inverter
Ambient temperature during storage	-40 °C to +60 °C
Maximum installation altitude for nominal operation	1000 m
Derating above 1000 m	1 %/100 m to max. 2000 m
Relative humidity	< 95 % (condensation not permitted)
Degree of protection of control cabinet inverter	IP20 NEMA 1
Frequency inverter with high degree of protection	IP66 NEMA 4X/IP55 NEMA 12K

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9.3 Output power and current carrying capacity without EMC filter

Whether the MOVITRAC® LTE-B frequency inverters are used with or without filters depends on the regulations applicable in the various countries where the product is used.

- **Without filter: permitted in America, Asia, and Africa**.
- With filter: suited for use worldwide.

The specification "horsepower" (HP) is defined as follows.

- 200 – 240 V units: NEC2002, table 430-150, 230 V
- 380 – 480 V units: NEC2002, table 430-150, 460 V

9.3.1 1-phase system AC 115 V for 3-phase AC 230 V motors (voltage doubler)

MOVITRAC® LTE-B – EMC filter class 0					
IP20	Type	MC LTE B...	0004-101-1-00	0008-101-1-00	0011-101-4-00
	Part number		18261663	18261671	18261868
IP66/NEMA-4X housing without switches	Type	MC LTE B...	0004-101-1-30	0008-101-1-30	0011-101-4-30
	Part number		18262171	18262198	18262287
IP66/NEMA-4X housing with switches	Type	MC LTE B...	0004-101-1-40	0008-101-1-40	0011-101-4-40
	Part number		18262422	18262430	18262538
INPUT					
Line voltage V_{line}		V	1 × AC 110 − 115 ± 10%		
Line frequency f_{line}		Hz	50/60 ± 5%		
Line fuse		A	10	16 (15)[1)]	20
Nominal input current		A	6.7	12.5	16.8
OUTPUT					
Recommended motor power		kW	0.37	0.75	1.1
Output voltage V_{motor}		V	3 × 0 – 250		
Output current		A	2.3	4.3	5.8
Maximum output frequency		Hz	500		
Cross section of motor cable Cu 75C		mm^2	1.5		
		AWG	16		
Max. motor cable length	Shielded	m	50		100
	Unshielded		75		150
GENERAL INFORMATION					
Size		Size	1		2
Heat loss at nominal output power		W	11	22	33
Minimum braking resistance value		Ω	−		47

1) Recommended values for UL compliance

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9.3.2 1-phase system AC 230 V for 3-phase AC 230 V motors

MOVITRAC® LTE-B – EMC filter class 0								
IP20[1]	Type	MC LTE B...	0004-201-1-00	0008-201-1-00	0015-201-1-00	0015-201-4-00	0022-201-4-00	0040-201-4-00
	Part number		18261698	18261736	18261760	18261876	18261906	18262120
INPUT								
Line voltage V_{line}		V	1 × AC 200 – 240 ± 10%					
Line frequency f_{line}		Hz	50/60 ± 5%					
Line fuse		A	10	16	20		32 (35)[2]	40
Nominal input current		A	6.7	12.5	14.8		22.2	31.7
OUTPUT								
Recommended motor power		kW	0.37	0.75	1.5		2.2	4
Output voltage V_{motor}		V	0 – V_{line}					
Output current		A	2.3	4.3	7		10.5	16
Maximum output frequency		Hz	500					
Cross section of motor cable Cu 75C		mm^2	1.5					2.5
		AWG	16					18
Max. motor cable length	Shielded	m	50			100		
	Unshielded		75			150		
GENERAL INFORMATION								
Size		Size	1			2		3
Heat loss at nominal output power		W	11	22	45		66	120
Minimum braking resistance value		Ω	–			47		

1) Device for America, Asia, and Africa

2) Recommended values for UL compliance

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9.3.3 3-phase system AC 230 V for 3-phase AC 230 V motors

MOVITRAC® LTE-B – EMC filter class 0								
IP20[1]	Type	MC LTE B...	0004-203-1-00	0008-203-1-00	0015-203-1-00	0015-203-4-00	0022-203-4-00	0040-203-4-00
	Part number		18261701	18261744	18261779	18262023	18261914	18262031
INPUT								
Line voltage V_{line}		V	3 × AC 200 – 240 ± 10%					
Line frequency f_{line}		Hz	50/60 ± 5%					
Line fuse		A	6	10	16 (15)[2]		20	32 (35)[2]
Nominal input current		A	3	5.8	9.2		13.7	20.7
OUTPUT								
Recommended motor power		kW	0.37	0.75	1.5		2.2	4
Output voltage V_{motor}		V	0 – V_{line}					
Output current		A	2.3	4.3	7		10.5	18
Maximum output frequency		Hz	500					
Cross section of motor cable Cu 75C		mm^2	1.5					2.5
		AWG	16					12
Max. motor cable length	Shielded	m	50			100		
	Unshielded		75			150		
GENERAL INFORMATION								
Size		Size	1			2		3
Heat loss at nominal output power		W	11	22	45		66	120
Minimum braking resistance value		Ω	–			47		

1) Device for America, Asia, and Africa

2) Recommended values for UL compliance

9.3.4 3-phase system AC 400 V for 3-phase AC 400 V motors

Sizes 1 and 2

MOVITRAC® LTE-B – EMC filter class 0							
IP20[1]	Type	MC LTE B...	0008-503-1-00	0015-503-1-00	0015-503-4-00	0022-503-4-00	0040-503-4-00
	Part number		18261795	18261817	18261949	18261965	18261981
INPUT							
Line voltage V_{line}		V	3 × AC 380 – 480 ± 10%				
Line frequency f_{line}		Hz	50/60 ± 5%				
Line fuse		A	5	10			16 (15)[2]
Nominal input current		A	2.9	5.4		7.6	12.4
OUTPUT							
Recommended motor power		kW	0.75	1.5		2.2	4
Output voltage V_{motor}		V	0 – V_{line}				
Output current		A	2.2	4.1		5.8	9.5
Maximum output frequency		Hz	500				
Cross section of motor cable Cu 75C		mm^2	1.5				
		AWG	16				
Max. motor cable length	Shielded	m	50		100		
	Unshielded		75		150		
GENERAL INFORMATION							
Size		Size	1		2		
Heat loss at nominal output power		W	22	45		66	120
Minimum braking resistance value		Ω	–		100		

1) Device for America, Asia, and Africa

2) Recommended values for UL compliance

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Size 3

MOVITRAC® LTE-B – EMC filter class 0					
IP20[1]	Type	MC LTE B...	0055-503-4-00	0075-503-4-00	0110-503-4-00
	Part number		18262066	18262082	18262104
INPUT					
Line voltage V_{line}		V	3 × AC 380 – 480 ± 10%		
Line frequency f_{line}		Hz	50/60 ± 5%		
Line fuse		A	20	25	32 (35)[2]
Nominal input current		A	16.1	20.7	27.1
OUTPUT					
Recommended motor power		kW	5.5	7.5	11
Output voltage V_{motor}		V	0 – V_{line}		
Output current		A	14	18	24
Maximum output frequency		Hz	500		
Cross section of motor cable Cu 75C		mm^2	2.5		4
		AWG	12		10
Max. motor cable length	Shielded	m	100		
	Unshielded		150		
GENERAL INFORMATION					
Size		Size	3		
Heat loss at nominal output power		W	165	225	330
Minimum braking resistance value		Ω	47		

1) Device for America, Asia, and Africa

2) Recommended values for UL compliance

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9.4 Output power and current carrying capacity with EMC filter

Whether the MOVITRAC® LTE-B frequency inverters are used with or without filters depends on the regulations applicable in the various countries where the product is used.

- **With filter: suited for use worldwide**.
- Without filter: permitted in America, Asia, and Africa.

The specification "horsepower" (HP) is defined as follows.

- 200 – 240 V units: NEC2002, table 430-150, 230 V
- 380 – 480 V units: NEC2002, table 430-150, 460 V

9.4.1 1-phase system AC 230 V for 3-phase AC 230 V motors

MOVITRAC® LTE-B – EMC filter class B								
IP20[1]	Type	MC LTE B...	0004-2B1-1-00	0008-2B1-1-00	0015-2B1-1-00	0015-2B1-4-00	0022-2B1-4-00	0040-2B1-4-00
	Part number		18261728	18261752	18261787	18261892	18261930	18262139
IP66/ NEMA-4X housing without switches	Type	MC LTE B...	0004-2B1-1-30	0008-2B1-1-30	0015-2B1-1-30	0015-2B1-4-30	0022-2B1-4-30	0040-2B1-4-30
	Part number		18262201	18262228	18262236	18262295	18262309	18262384
IP66/ NEMA-4X housing with switches	Type	MC LTE B...	0004-2B1-1-40	0008-2B1-1-40	0015-2B1-1-40	0015-2B1-4-40	0022-2B1-4-40	0040-2B1-4-40
	Part number		18262503	18262511	18251048	18262570	18262589	18262597
INPUT								
Line voltage V_{line}		V	1 × AC 200 – 240 ± 10%					
Line frequency f_{line}		Hz	50/60 ± 5%					
Line fuse		A	10	16	20		32 (35)[2]	40
Nominal input current		A	6.7	12.5	14.8		22.2	31.7
OUTPUT								
Recommended motor power		kW	0.37	0.75	1.5		2.2	4
Output voltage V_{motor}		V	0 – V_{line}					
Output current		A	2.3	4.3	7		10.5	16
Maximum output frequency		Hz	500					
Cross section of motor cable Cu 75C		mm^2	1.5					2.5
		AWG	16					18
Max. motor cable length	Shielded	m	50			100		
	Unshielded		75			150		
GENERAL INFORMATION								
Size		Size	1			2		3
Heat loss at nominal output power		W	11	22	45		66	120
Minimum braking resistance value		Ω	-			47		

1) Device for Europe, Australia, and New Zealand

2) Recommended values for UL compliance

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9.4.2 3-phase system AC 230 V for 3-phase AC 230 V motors

MOVITRAC® LTE-B – EMC filter class A					
IP20[1]	Type	MC LTE B...	0015-2A3-4-00	0022-2A3-4-00	0040-2A3-4-00
	Part number		18261884	18261922	18262058
IP66/NEMA-4X housing without switches	Type	MC LTE B...	0015-2A3-4-30	0022-2A3-4-30	0040-2A3-4-30
	Part number		18262317	18262325	18262392
IP66/NEMA-4X housing with switches	Type	MC LTE B...	0015-2A3-4-40	0022-2A3-4-40	0040-2A3-4-40
	Part number		18262600	18262619	18262635
INPUT					
Line voltage V_{line}		V	3 × AC 200 – 240 ± 10%		
Line frequency f_{line}		Hz	50/60 ± 5%		
Line fuse		A	16 (15)[2]	20	32 (35)
Nominal input current		A	9.2	13.7	20.7
OUTPUT					
Recommended motor power		kW	1.5	2.2	4.0
Output voltage V_{motor}		V	0 – V_{line}		
Output current		A	7	10.5	18
Maximum output frequency		Hz	500		
Cross section of motor cable Cu 75C		mm^2	1.5		2.5
		AWG	16		12
Max. motor cable length	Shielded	m	100		
	Unshielded		150		
GENERAL INFORMATION					
Size		Size	2		3
Heat loss at nominal output power		W	45	66	120
Minimum braking resistance value		Ω	47		

1) Device for Europe, Australia, and New Zealand

2) Recommended values for UL compliance

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9.4.3 3-phase system AC 400 V for 3-phase AC 400 V motors

Sizes 1 and 2

MOVITRAC® LTE-B – EMC filter class A							
IP20[1]	Type	MC LTE B...	0008-5A3-1-00	0015-5A3-1-00	0015-5A3-4-00	0022-5A3-4-00	0040-5A3-4-00
	Part number		18261809	18261825	18261957	18261973	18262007
IP66/NEMA-4X housing without switches	Type	MC LTE B...	0008-5A3-1-30	0015-5A3-1-30	0015-5A3-4-30	0022-5A3-4-30	0040-5A3-4-30
	Part number		18262244	18262252	18262333	18262341	18262368
IP66/NEMA-4X housing with switches	Type	MC LTE B...	0008-5A3-1-40	0015-5A3-1-40	0015-5A3-4-40	0022-5A3-4-40	0040-5A3-4-40
	Part number		18251145	18251153	18262546	18262554	18262562
INPUT							
Line voltage V_{line}		V	3 × AC 380 – 480 ± 10%				
Line frequency f_{line}		Hz	50/60 ± 5%				
Line fuse		A	5	10			16 (15)[2]
Nominal input current		A	2.9	5.4		7.6	12.4
OUTPUT							
Recommended motor power		kW	0.75	1.5		2.2	4
Output voltage V_{motor}		V	0 – V_{line}				
Output current		A	2.2	4.1		5.8	9.5
Maximum output frequency		Hz	500				
Cross section of motor cable Cu 75C		mm^2	1.5				
		AWG	16				
Max. motor cable length	Shielded	m	50		100		
	Unshielded		75		150		
GENERAL INFORMATION							
Size		Size	1		2		
Heat loss at nominal output power		W	22	45		66	120
Minimum braking resistance value		Ω	-		100		

1) Device for Europe, Australia, and New Zealand

2) Recommended values for UL compliance

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Size 3

MOVITRAC® LTE-B – EMC filter class A					
IP20[1]	Type	MC LTE B...	0055-5A3-4-00	0075-5A3-4-00	0110-5A3-4-00
	Part number		18262074	18262090	18262112
IP66/NEMA-4X housing without switches	Type	MC LTE B...	0055-5A3-4-30	0075-5A3-4-30	-
	Part number		18262406	18262414	-
IP66/NEMA-4X housing with switches	Type	MC LTE B...	0055-5A3-4-40	0075-5A3-4-40	-
	Part number		18262643	18262651	-
INPUT					
Line voltage V_{line}		V	3 × AC 380 – 480 ± 10%		
Line frequency f_{line}		Hz	50/60 ± 5%		
Line fuse		A	20	25	32 (35)[2]
Nominal input current		A	16.1	20.1	27.1
OUTPUT					
Recommended motor power		kW	5.5	7.5	11
Output voltage V_{motor}		V	0 – V_{line}		
Output current		A	14	18	24
Maximum output frequency		Hz	500		
Cross section of motor cable Cu 75C		mm^2	2.5		4
		AWG	12		10
Max. motor cable length	Shielded	m	100		
	Unshielded		150		
GENERAL INFORMATION					
Size		Size	3		
Heat loss at nominal output power		W	165	225	330
Minimum braking resistance value		Ω	47		

1) Device for Europe, Australia, and New Zealand

2) Recommended values for UL compliance

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10 Declaration of Conformity

EU Declaration of Conformity

SEW EURODRIVE

Translation of the original text **900720110/EN**

SEW-EURODRIVE GmbH & Co. KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal
declares under sole responsibility that the following products

Frequency inverters of the series	**MOVITRAC® LTE B**	
are in conformity with		
Low Voltage Directive	**2006/95/EC (valid until April 19, 2016)** **2014/35/EU (valid as of April 20, 2016)** **(L 96, 29.03.2014, 357-374)**	
EMC Directive	**2004/108/EC (valid until April 19, 2016)** **2014/30/EU (valid as of April 20, 2016)** **(L 96, 29.03.2014, 79-106)**	**4)** **4)**
Applied harmonized standards:	**EN 61800-5-1:2003** **EN 61800-3:2004/A1:2012**	

4) According to the EMC Directive, the listed products are not independently operable products. EMC assessment is only possible after these products have been integrated in an overall system. For the assessment, the product was installed in a typical plant configuration.

Bruchsal	**12.04.2016**	Johann Soder	
Place	Date	Managing Director Technology	a) b)

a) Authorized representative for issuing this declaration on behalf of the manufacturer
b) Authorized representative for compiling the technical documents

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SEW EURODRIVE

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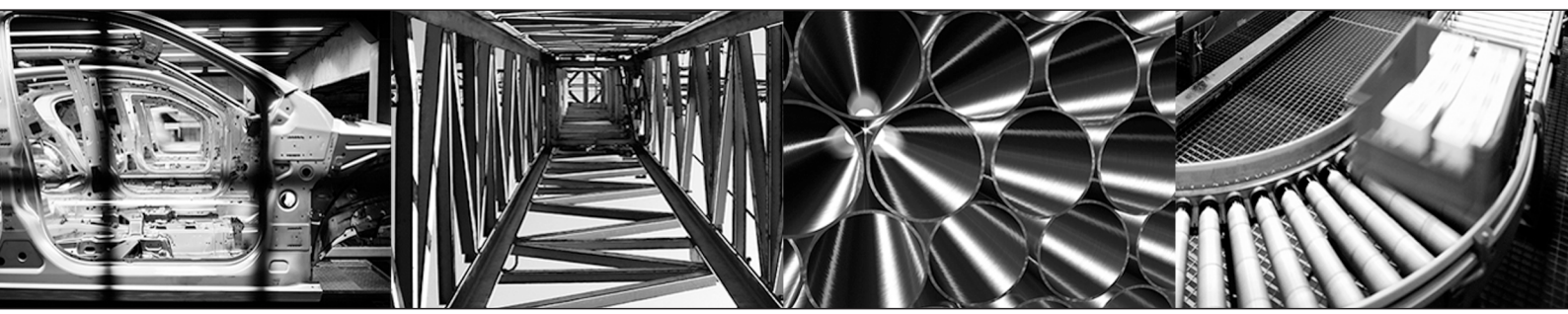

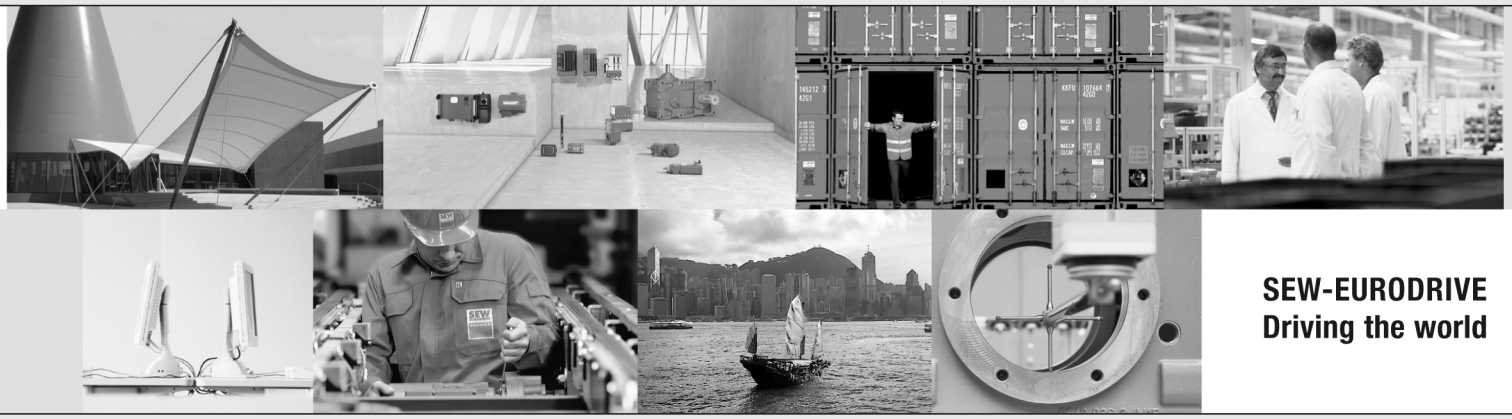

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