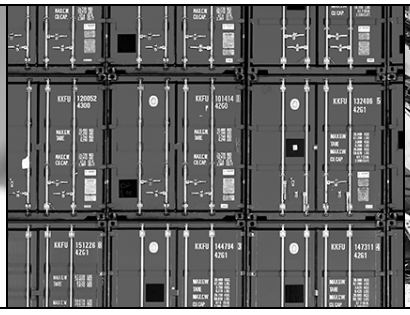
SEW EURODRIVE

Operating Instructions

MOVITRAC® LTP-B

Edition 03/2013

20091745 / EN



Contents

1 General Information

1.1 How to use this documentation

The documentation is an integral part of the product and contains important information on operation and service. The documentation is written for all employees who assemble, install, start up, and service this product.

The documentation must be accessible and legible. 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 documentation carefully and understood it. If you are unclear about any of the information in this documentation, or if you require further information, contact SEW-EURODRIVE.

1.2 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, warnings regarding potential risks of damage to property, and other notes.

Signal word	Meaning	Consequences if disregarded
⚠ **DANGER**	Imminent danger	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 the handling of the drive system.	

1.2.2 Structure of the section safety notes

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

This is the formal structure of a section safety note:

⚠ SIGNAL WORD

Type and source of danger.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the danger.

1.2.3 Structure of the embedded safety notes

Embedded safety notes are directly integrated in 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 danger.

  Possible consequence(s) if disregarded.

  – Measure(s) to prevent the danger.

1.3 Rights to claim under 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. Therefore read the documentation before you start working with the unit.

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 Product names and trademarks

All product names in this documentation are trademarks or registered trademarks of their respective titleholders.

1.6 Copyright

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 operator must ensure that the basic safety notes are read and adhered to. 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 transport, putting into storage, setting up/mounting, connection, startup, maintenance and repair may only be performed by trained personnel observing
  - The relevant detailed documentation
  - The warning and safety signs on the unit
  - All other relevant project planning documents, operating instructions and wiring diagrams
  - The specific regulations and requirements for the system, and
  - 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.

Removing covers without authorization, improper use or incorrect installation and operation may result in severe injuries to persons or damage to machinery.

Refer to the following chapters for more information.

2.3 Target group

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

- Training in mechanical engineering, e.g. as a mechanic or mechatronics technician (final examinations must have been passed).
- They are familiar with this documentation.

Any electronic work may only be performed by adequately qualified electricians. Qualified electricians in the context of this documentation are persons familiar with electrical installation, startup, troubleshooting and servicing of the product who possess the following qualifications:

- Training in electrical engineering, e.g. as an electrician or mechatronics technician (final examinations must have been passed).
- They are familiar with 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 authorization expressly issued by the company to operate, program, configure, label and ground units, systems and circuits in accordance with the standards of safety technology.

All work in further areas of transportation, storage, operation and waste disposal must only be carried out by persons who are trained appropriately.

2.4 Designated use

Frequency inverters are components for controlling asynchronous AC motors. Frequency inverters are intended for installation in electrical systems or machines. Never connect capacitive loads. Operation with capacitive loads results in overvoltages 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 (2004/108/EC) directive.
- The frequency inverters comply with the requirements of the Low Voltage Directive 2006/95/EC. 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.

2.4.1 Safety functions

MOVITRAC® LTP-B inverters must not take on safety functions without higher-level safety system.

Use higher-level safety systems to ensure protection of equipment and personnel.

2.5 Other applicable documentation

When using the function "STO – Safe Torque Off", you have to observe the following document:

- MOVITRAC® LTP-B Functional Safety

This documentation is available on the **SEW-EURODRIVE website** under "Documentation \ Software \ CAD".

2.6 Transport

Inspect the shipment for any damage that may have occurred in transit as soon as you receive the delivery. Inform the shipping company immediately about any damage. It may be necessary to preclude startup.

Observe the following notes when transporting the unit:

- Cover the connections with the supplied protective caps before transport.
- Place the unit only on the cooling fins or on the side without connectors.
- Make sure that the unit is not subject to mechanical impact during transport.

Use suitable, sufficiently rated handling equipment if necessary. Prior to startup, remove the securing devices used for transportation.

Observe the information on climatic conditions as given in chapter "Technical Data" (page 121).

2.7 Installation/assembly

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

Protect the unit from excessive strain. Ensure that components are not deformed and that insulation spaces are maintained, particularly during transportation. Electric components must not be mechanically damaged or destroyed.

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 chapter "Mechanical Installation" (page 17).

2.8 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).

Necessary preventive measures for mobile use:

Type of power transmission	Protective measure
Direct power supply	• Protective grounding

2.9 Safe disconnection

The unit meets all requirements for reliable isolation of power and electronics connections in accordance with EN 61800-5-1. All connected circuits must also comply with the requirements for reliable isolation so as to guarantee reliable isolation.

2.10 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 monitoring and protection devices even for a test run.

When in doubt, switch off the unit whenever changes occur in relation to normal mode (e.g. increased temperatures, noise, oscillation). Determine the cause of the fault and consult SEW-EURODRIVE, if necessary.

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 protective measures may be necessary for applications with increased potential risk. You have to check the effectiveness of protection devices each time you change the configuration.

Connections which 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 any connected cables and motor terminals. This also applies even when the unit is inhibited and the motor is at standstill.

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

Mechanical blocking or internal safety functions of the unit can cause a motor standstill. Eliminating the cause of the problem or performing a reset may result in the drive re-starting automatically. If this is not permitted for the driven machine for safety reasons, disconnect the unit from the supply system before correcting the fault.

2.11 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.

3 General Specification

3.1 Input voltage ranges

Depending on the model and power range, the inverters can be connected directly to the following supply systems:

MOVITRAC® LTP-B, size 2 (200 – 240 V):

200 V – 240 V ± 10%, 1-phase*, 50 – 60 Hz ± 5%

MOVITRAC® LTP-B, all sizes (200 – 240 V):

200 V – 240 V ± 10%, 3-phase, 50 – 60 Hz ± 5%

MOVITRAC® LTP-B, all sizes (380 – 480 V):

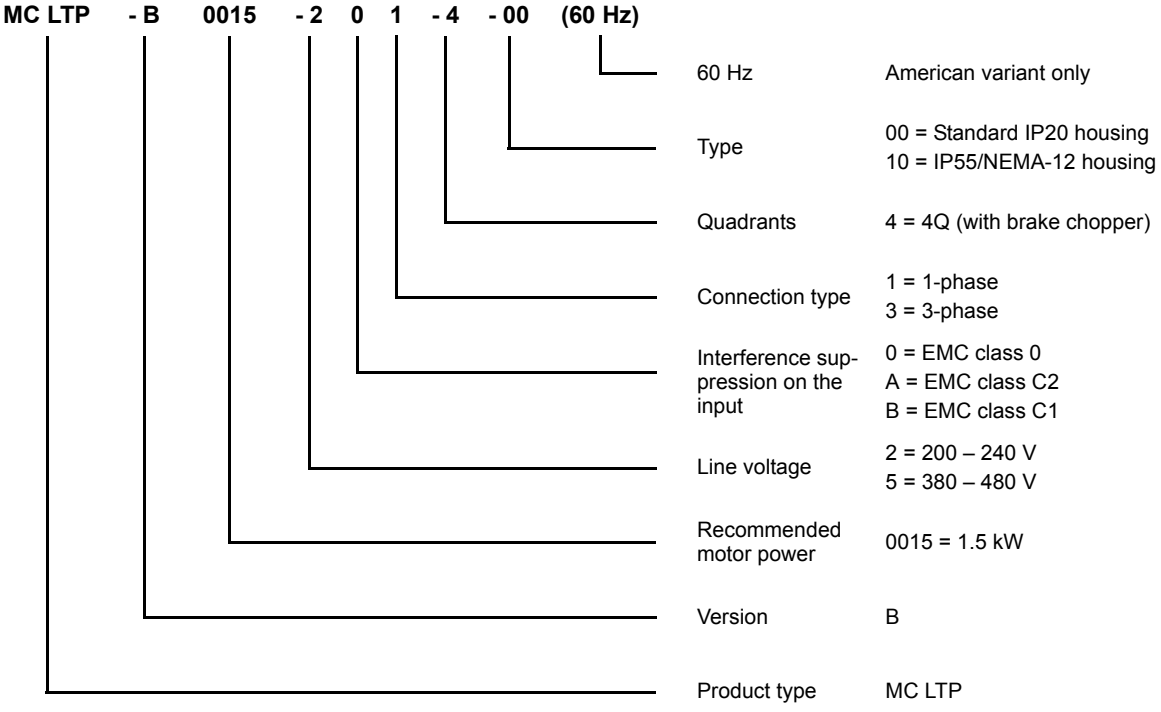
380 V – 480 V ± 10%, 3-phase, 50 – 60 Hz ± 5%

- **INFORMATION**

  * Single-phase MOVITRAC® LTP-B inverters can also be connected to two phases of a three-phase power supply system of 200 – 240 V.

Inverters 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.

3.2 Type designation



3.3 Overload capacity

Inverter:

Overload capacity based on nominal inverter current	60 seconds	2 seconds
MOVITRAC® LTP-B	150%	175%

Motors:

Overload capacity based on nominal motor current	60 seconds	2 seconds
Factory setting	150%	175%
CMP	200%	250%[1)]
Sync 250	200%	250%

1) Only 200% for size 3; 5.5 kW

Overload capacity based on nominal motor current	300 seconds
MGF2 with LTP-B, 1.5 kW MGF4 with LTP-B, 2.2 kW	200%

Motor overload adjustment is described using parameter *P1-08 Nominal motor current*.

3.4 Protection functions

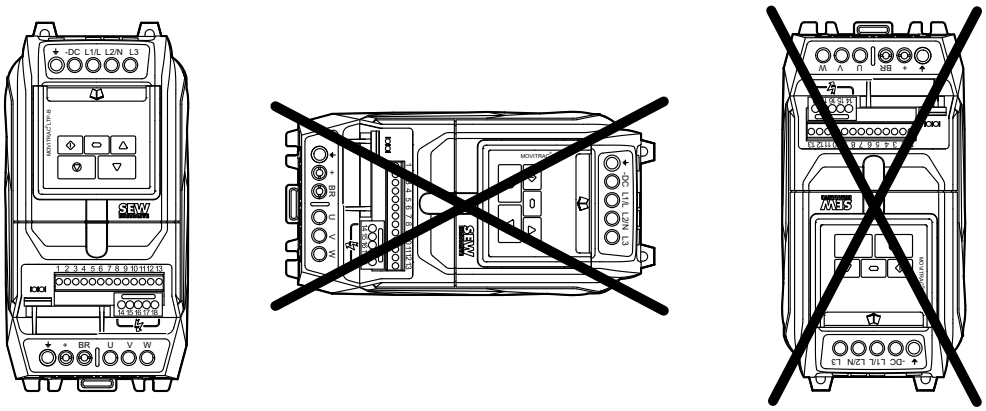
- Output short circuit, phase-to-phase, phase-to-ground
- Output overcurrent
- Overload protection
  - Inverter responds to overload as described under "Overload capacity".
- Overvoltage fault
  - Set to 123% of the maximum nominal line voltage of the inverter.
- Undervoltage fault
- Overtemperature fault
- Undertemperature fault
  - The inverter is shut down at a temperature under -10 °C.
- Line phase failure
  - A running inverter shuts down when one phase of a three-phase system fails for longer than 15 seconds.

4 Installation

4.1 General information

- Before installing MOVITRAC® LTP-B, carefully check the inverter for damage.
- Keep MOVITRAC® LTP-B stored in its packaging until you use it. The storage location must be clean and dry with an ambient temperature between -40 °C and +60 °C.
- Install MOVITRAC® LTP-B 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 inverter.
- Prevent the ingress of conductive or flammable foreign objects.
- The maximum permitted ambient temperature during operation is 50 °C for inverters with IP20, and 40 °C for inverters with IP55 degree of protection. The lowest permitted ambient temperature during operation is -10 °C.

  Observe the relevant information in the "Ambient conditions" chapter (page 121).
- The relative humidity must be kept below 95% (condensation is not permitted).
- MOVITRAC® LTP-B units can be installed directly next to one another. Doing so ensures sufficient ventilation space between the individual units. If MOVITRAC® LTP-B is to be installed above another inverter or another device that dissipates heat, then there must be a vertical minimum clearance of 150 mm. The control cabinet must either be cooled through forced ventilation, or has to be big enough to dissipate the heat itself (see section "IP20 housing: Installation and control cabinet dimensions" (page 21)).
- Support rail mounting is only possible for size 2 inverters (IP20).
- Protect the IP55 inverter from direct sunlight. Use a cover when using the inverter outdoors.
- Install the LTP-B inverter only as depicted in the following figure:



4.2 Mechanical installation

4.2.1 Tightening torques

Power terminals

Size	Tightening torque in Nm (lb in)
2	1 (9)
3	1 (9)
4	4 (35)
5	15 (133)
6	20 (177)
7	20 (177)

Control terminals The permitted tightening torque of the control terminals is 0.8 Nm (7 lb in).

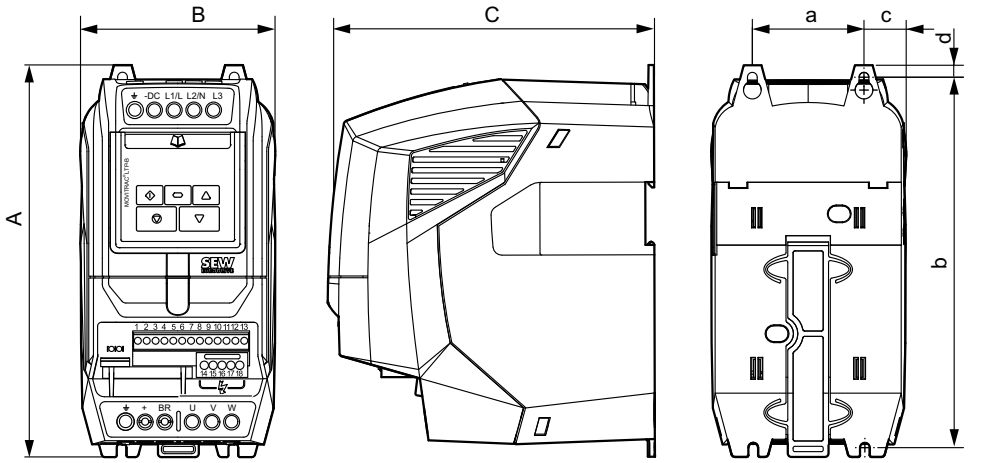
4.2.2 Housing variants and dimensions

Housing variants MOVITRAC® LTP-B is available with two housing variants:

- IP20 housing for use in control cabinets
- IP55 / NEMA 12K

The IP55/NEMA 12 K housing is protected against humidity and dust. This allows for operating the inverter indoors under difficult conditions. The electronics of the inverters does not differ. The only difference is in the dimensions of the housing and the weight.

Dimensions of the IP20 housing, sizes 2 and 3

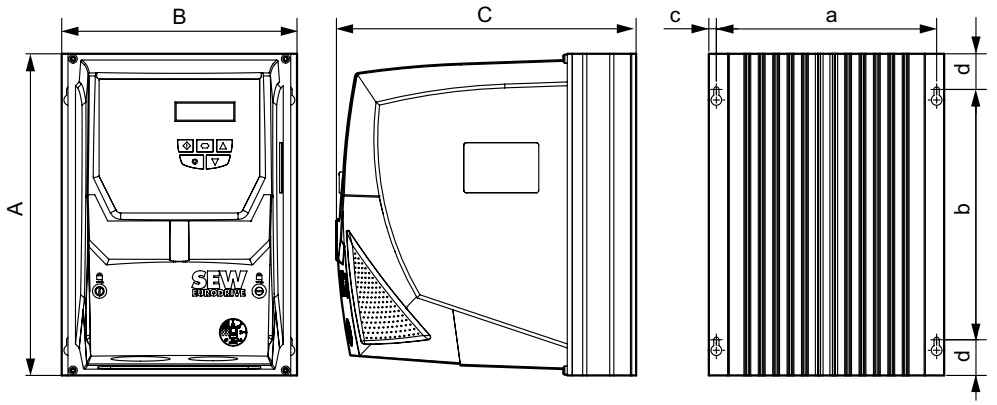


4765982731

Dimension		Size 2	Size 3
Height (A)	mm	220	261
	in	8.66	10.28
Width (B)	mm	110	132
	in	4.33	5.20
Depth (C)	mm	185	205
	in	7.28	8.07
Weight	kg	1.8	3.5
	lb	3.97	7.72
a	mm	63.0	80.0
	in	2.48	3.15
b	mm	209.0	247
	in	8.23	9.72
c	mm	23	25.5
	in	0.91	1.01
d	mm	7.00	7.75
	in	0.28	0.30
Recommended screw size		4 × M4	4 × M4

Dimensions of the IP55/NEMA-12 housing (LTP xxx–10)

Sizes 2 and 3

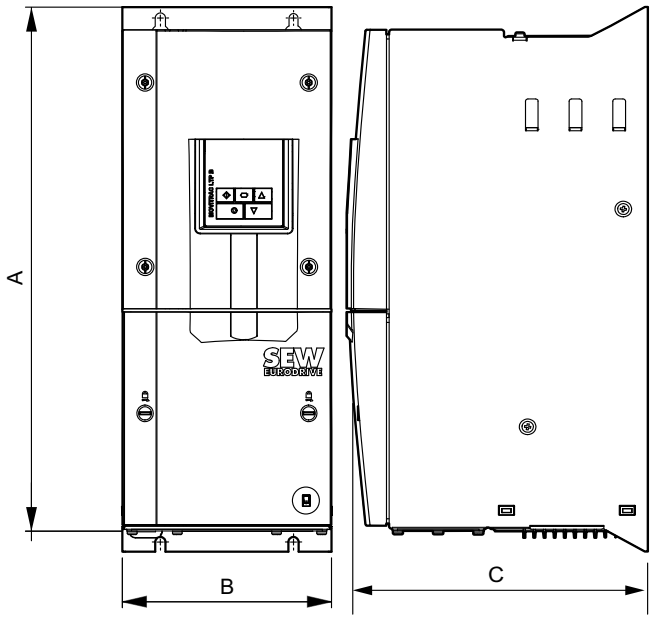


4766970251

Dimension		Size 2	Size 3
Height (A)	mm	257	310
	in	10.12	12.20
Width (B)	mm	188	210.5
	in	7.40	8.29
Depth (C)	mm	239	251
	in	9.41	2.88
Weight	kg	4.8	6.4
	lb	10.5	14.1
a	mm	176	197.5
	in	6.93	7.78
b	mm	200	251.5
	in	7.87	9.90
c	mm	6	6.5
	in	0.24	0.26
d	mm	28.5	25.1
	in	1.12	0.99
Recommended screw size		4 × M5	

Sizes 4 – 7

Inverter sizes 4 – 7 are each delivered with a base plate with and without bores for the cable bushing.



4656351243 4656355083 4656358027

Dimension		Size 4	Size 5	Size 6	Size 7
Height (A)	mm	440	540	865	1280
	in	17.32	21.26	34.06	50.39
Width (B)	mm	171	235	330	330
	in	6.73	9.25	12.99	12.99
Depth (C)	mm	235	268	335	365
	in	9.25	10.55	13.19	14.37
Weight	kg	11.5	22.5	50	80
	lb	25.35	49.60	110.23	176.37
a	mm	110	175	200	200
	in	4.33	6.89	7.87	7.87
b	mm	423	520	840	1255
	in	16.65	20.47	33.07	49.41
c	mm	61	60	130	130
	in	2.40	2.36	5.12	5.12
d	mm	8	8	10	10
	in	0.32	0.32	0.39	0.39
Recommended screw size		4 × M8		4 × M10	

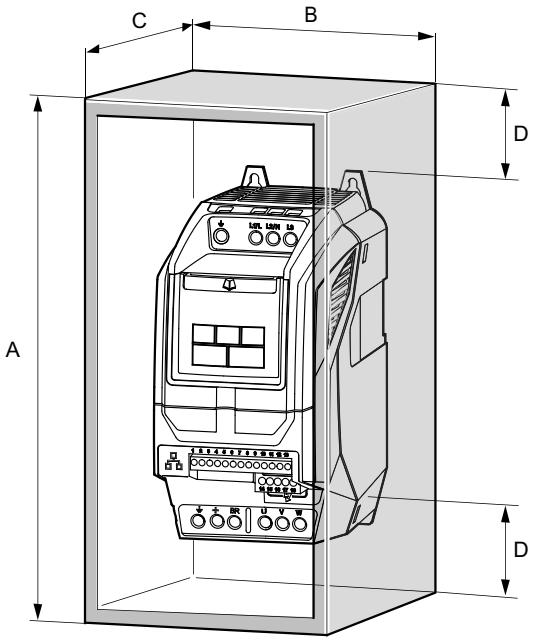
4.2.3 IP20 housing: Installation and control cabinet dimensions

For applications that require a higher IP protection level than IP20, the 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 cooling.
- When using a control cabinet with ventilation openings, the openings must be provided above and underneath the inverter to allow for unobstructed circulation of air. The air must be supplied underneath the inverter and dissipated above it.
- If the inverter is operated in environments with particles of dirt (such as dust), ventilation openings either have to be equipped with a suitable particle filter or forced 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.

Dimensions of metal cabinet without ventilation openings

Power rating		Sealed control cabinet							
		A		B		C		D	
		mm	in	mm	in	mm	in	mm	in
Size 2	**230 V**: 1.5 kW, 0.75 kW **400 V**: 1.5 kW, 2.2 kW, 0.75 kW	400	15.75	300	11.81	250	9.84	60	2.36
Size 2	**230 V**: 2.2 kW	600	23.62	450	17.72	300	11.81	100	3.94
Size 3	All power ranges	800	31.50	600	23.62	350	13.78	150	5.91



3080168459

Dimensions of control cabinet with ventilation openings

Power rating		Control cabinet with ventilation openings							
		A		B		C		D	
		mm	in	mm	in	mm	in	mm	in
Size 2	**230 V**: 1.5 kW, 0.75 kW **400 V**: 1.5 kW, 2.2 kW, 0.75 kW	400	15.75	300	11.81	250	9.84	60	2.36
Size 2	**230 V**: 2.2 kW	600	23.62	400	15.75	300	11.81	100	3.94
Size 3	All power ranges	800	31.50	600	23.62	350	13.78	150	5.91

Dimensions of control cabinet with forced cooling

Power rating		Control cabinet with forced cooling								
		A		B		C		D		Air flow rate
		mm	in	mm	in	mm	in	mm	in	
Size 2	**230 V**: 1.5 kW, 0.75 kW **400 V**: 1.5 kW, 2.2 kW, 0.75 kW	400	15.75	300	11.81	250	9.84	60	2.36	> 45 m^3/h
Size 2	**230 V**: 2.2 kW	400	15.75	300	11.81	250	9.84	100	3.94	> 45 m^3/h
Size 3	All power ranges	600	23.62	400	15.75	250	9.84	150	5.91	> 80 m^3/h

4.3 Electrical installation

It is essential to comply with the safety notes in chapter 2 during installation!

⚠ WARNING

Danger of electric shock. 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 isolate the unit from the power supply at least 10 minutes before starting work on MOVITRAC® LTP-B.

- MOVITRAC® LTP-B units may only be installed by electrical specialists in compliance with the applicable directives and regulations.
- MOVITRAC® LTP-B is classified according to IP20 degree of protection. For a higher IP degree of protection, a suitable enclosure or the IP55/NEMA-12 variant has to be used.
- If plug connectors are used for connecting the inverter with the supply system, do not disconnect the connection until at least 10 minutes after disconnection from the supply system.
- Make sure the inverters are properly grounded. Observe the wiring diagram in chapter "Inverter and motor connection" (page 28).
- 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.

⚠ WARNING

Danger of fatal injury due to falling hoist.

Severe or fatal injuries.

- MOVITRAC® LTP-B inverters may not be used as a safety device in hoist applications. Use monitoring systems or mechanical protection devices to ensure safety.

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 MOVITRAC® inverter on delivery.
- A disconnecting switch or similar disconnecting element must be installed between voltage supply and inverter.
- Never connect the power supply to the output terminals U, V or W of the MOVITRAC® LTP-B inverter.
- The cables are only protected by slow-blow high-power fuses or motor protection switch. You find more information in section "Permitted voltage supply systems" (page 26).
- Do not install automatic contactors between 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.
- Make sure that shieldings and sheaths of power cables are designed according to the wiring diagram in section "Connecting inverter and motor" (page 28).
- Make sure that all terminals have been tightened with the proper tightening torques (page 17).

Help card

In the IP55 housing, the help card is attached behind the removable front cover.

In the IP20 housing, the help card is inserted in a slot above the display.

Line contactors

- Use only line contactors of utilization category AC-3 (EN 60947-4-1).
- After power on, ensure a minimum time of 120 s before the next power on.

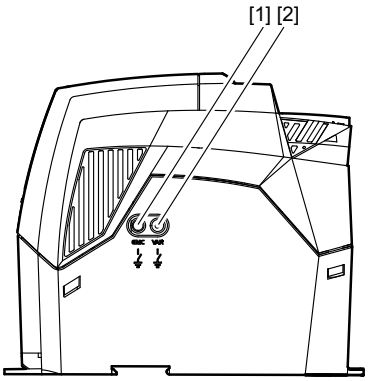
Input fuses

Fuse types:

- Line protection types in operation classes gL, gG:
  - Rated fusing voltage ≥ rated line voltage
  - The rated fusing current must be designed for 100% of the rated inverter current depending on the inverter utilization.
- Power circuit breaker with characteristics B, C:
  - Line protection rated voltage ≥ rated supply voltage
  - Rated power circuit breaker currents must be 10% above the rated inverter current.

Operation on IT systems

Only IP20 units can be operated on IT systems. For this purpose, you have to separate the connection of the components for overvoltage suppression by removing the VAR screw. Also disable the EMC filter by removing the EMC screw (see figure below):



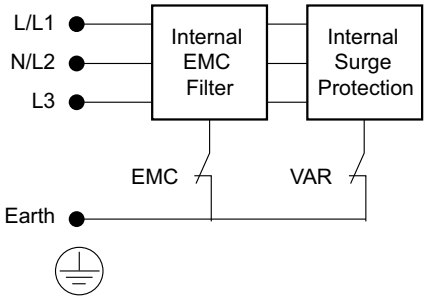
3034074379

[1] EMC screw

[2] VAR screw

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

Inverters with EMC filter basically have a higher ground-fault current.



5490852619

Connecting the 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.
- Protect the braking resistor with a bimetal relay with trip class 10 or 10A (wiring diagram).
- For braking resistors of the BW..-T series, you can connect the integrated thermostat using a 2-core, shielded cable as an alternative to a bimetal 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.

Installing the braking resistor

- ⚠ **WARNING** Danger of electric shock. The supply cables to the braking resistors carry a high voltage (approx. DC 900 V) during rated operation.

  Severe or fatal injuries.

  – Before removing the supply cable screw, disconnect MOVITRAC® LTP-B from the power supply and wait at least 10 minutes.
- ⚠ **CAUTION** Danger of burns. The surfaces of braking resistors get very hot when they are subject to a load with P_{rated}.

  Minor injuries.

  – Choose a suitable installation location.

  – Do not touch the braking resistors.

  – Install a suitable touch guard.

4.3.2 Installation

Connect the inverter as shown in the following wiring diagrams. Ensure proper wiring in the motor terminal box. Two basic connections are distinguished: Star connection and delta connection. It is essential that you make sure that the motor is connected with the voltage source in such a way that it is supplied with the proper operating voltage.

You find more information in the figure in section "Connection in the motor terminal box" (page 27).

It is recommended that you use a 4-core PVC-insulated and shielded cable as the power cable. Route this cable according to the applicable national regulations of the industry sector as well as the rules and standards. Conductor end sleeves are required for connecting the power cables to the inverter.

The grounding terminal of each MOVITRAC® LTP-B inverter must be connected individually and **directly** to the ground busbar (mass) of the installation site (via filter, if available). Do not loop the ground connections of MOVITRAC® LTP-B inverters from one inverter to the other. Neither 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 cable lugs.

Permitted voltage supply systems

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

  MOVITRAC® LTP-B inverters are designed for operation on TN and TT systems with directly grounded star point.
- **Voltage supply systems with non-grounded star point**

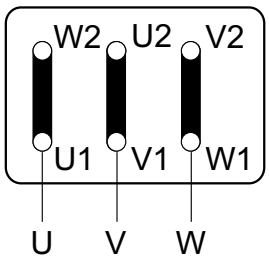
  Operation on voltage supply systems with non-grounded star point (for example IT systems) is also permitted. For this purpose, SEW-EURODRIVE recommends to use an earth-leakage monitor according to the pulse-code measurement principle. Using these devices avoids the earth-leakage monitor from tripping by mistake due to the missing capacitance to ground of the inverter.
- **Outer conductor grounded voltage networks**

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

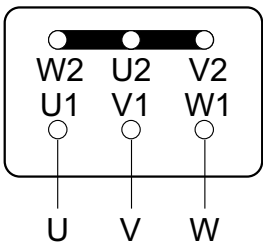
Connection in the motor terminal box

Motors are either connected in star, delta, double star or Nema star. The motor nameplate informs about the voltage range for the respective connection type that must correspond to the operating voltage of the MOVITRAC® LTP-B unit.

R13

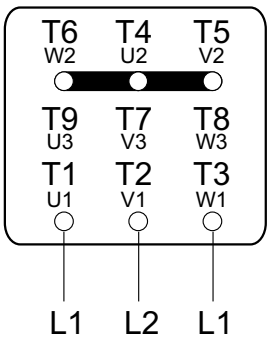


Low voltage Δ

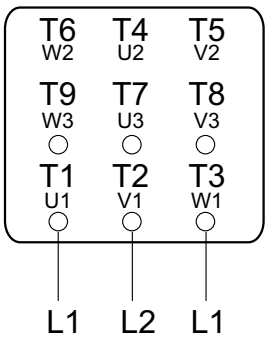


High voltage ⅄

R76

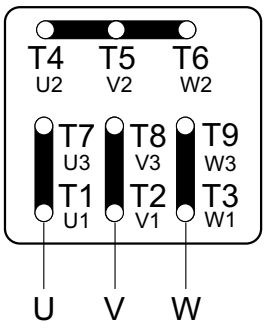


Low voltage ⅄ ⅄

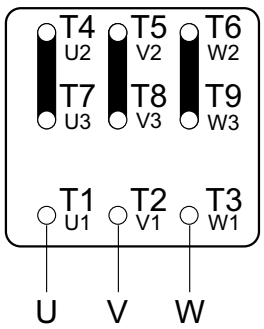


High voltage ⅄

DR/DT/DV



Low voltage ⅄ ⅄



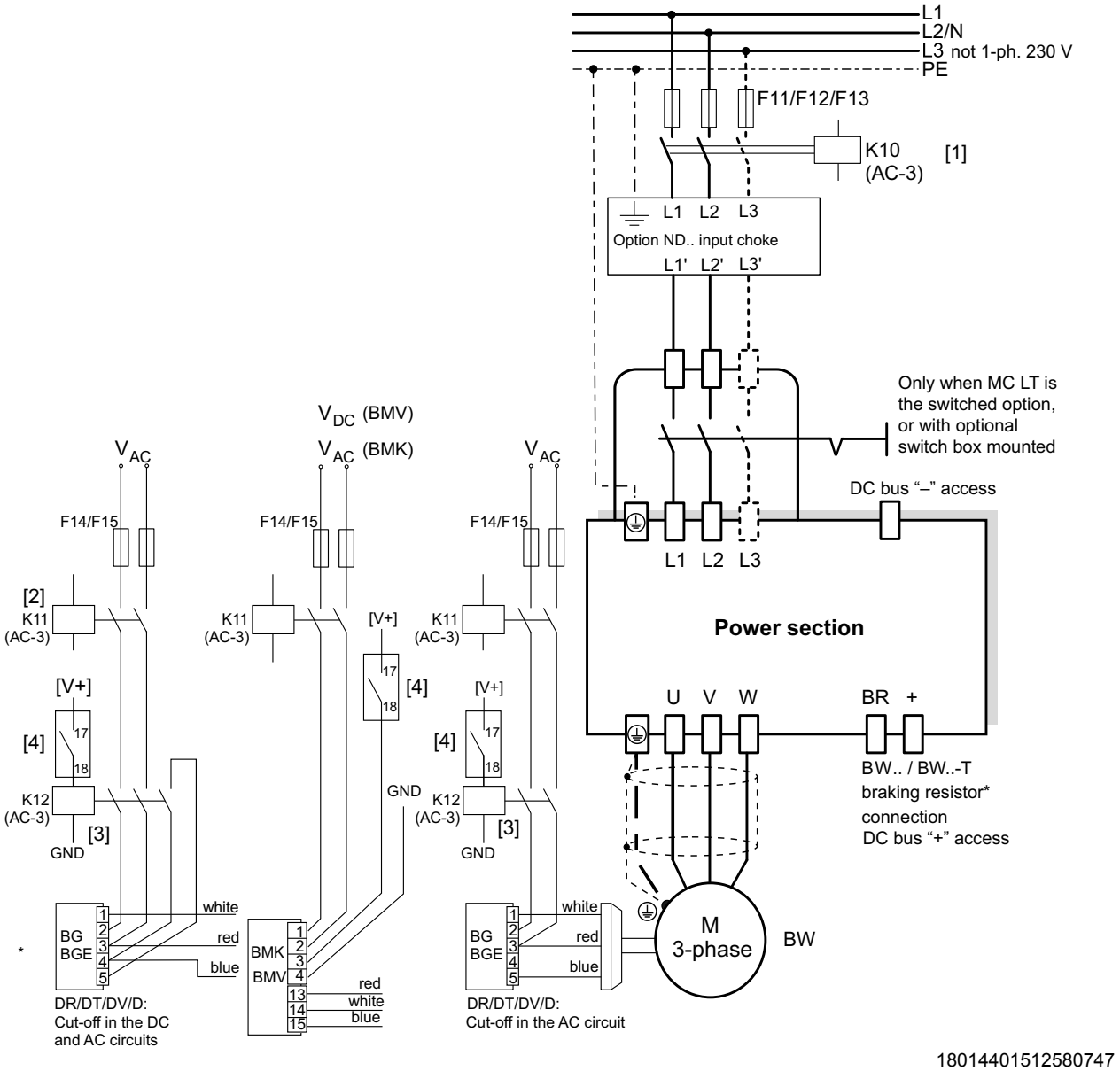
High voltage ⅄

Drive and motor connection

- ⚠ **WARNING** Risk of electrical shock. Risk of exposure to high voltage may occur if the unit is wired incorrectly.

  Severe or fatal injuries.

  – It is essential to observe the electrical connection sequence illustrated below.



18014401512580747

[1]	Mains supply contactor to drive
[2]	Mains supply to brake rectifier, switched simultaneously by K10
[3]	Control contactor / relay, energized via the relay contact [4] inside the drive and supplies the brake rectifier
[4]	Potential free relay contact of the drive
[V+]	External power supply AC 250 V / DC 30 V at max. 5 A
V_{DC} BMV	DC voltage supply for BMV
V_{AC} BMK	AC voltage supply for BMK

- **INFORMATION**
  - All LTP-B in IP55 have mains and motor cable entry at the bottom of the inverter
  - Connect the brake rectifier using a separate supply system lead.
  - **Supply via the motor voltage is not permitted!**

Always switch off the brake on the DC and AC sides for:

- All hoist applications
- Drives that require a rapid brake response time

Motor temperature protection (TF/TH)

Motors with internal temperature sensor (TF, TH or similar) can be directly connected to MOVITRAC® LTP-B inverters. The inverter then indicates a fault.

The temperature sensor is connected to terminal 1 (+24 V) and analog input 2. Parameter *P1-15* must be set to external fault input to being able to detect overtemperature error messages. The trigger threshold is 2.5 kΩ. For information on the motor thermistor, refer to chapter "*P1-15 Digital inputs function selection*" (page 117) and to the description of parameter *P2-33*.

Multi-motor drive / group drive

The total of the motor currents must not exceed the nominal current of the inverter. See chapter "Technical data of MOVITRAC® LTP-B" (page 121).

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

The group of motors is limited to five motors, and the motors of a group must not differ by more than 3 frame sizes.

The maximum cable length of a group is restricted to the values for the individual drives. See chapter "Technical Data" (page 121).

For groups with more than 3 motors, SEW-EURODRIVE recommends to use an output choke "HD LT xxx".

Connecting AC brakemotors

For detailed information about the SEW brake system, refer to the "AC Motors" catalog, which you can order from SEW-EURODRIVE.

SEW brake systems are disk brakes with a DC coil that release electrically and brake using spring force. A brake rectifier supplies the brake with DC voltage.

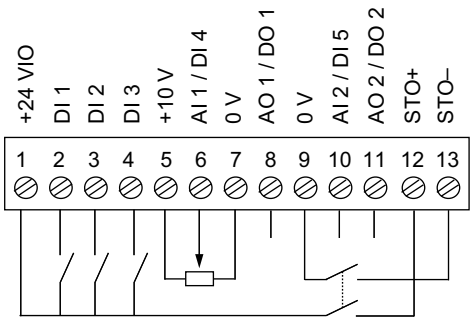
INFORMATION

The brake rectifier must have a separate supply system cable for inverter operation; it must not be powered using the motor voltage!

4.3.3 Overview of signal terminals

Main terminals

IP20 and IP55



18014401512657163

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

Terminal no.	Signal	Connection	Description
1	+24 VIO	+24 V reference voltage	Ref. for the activation of DI1–DI3 (max. 100 mA)
2	DI 1	Digital input 1	Positive logic "Logic 1" input voltage range: DC 8–30 V "Logic 0" input voltage range: DC 0–2 V Compatible with PLC requirement if 0 V is connected to terminal 7 or 9.
3	DI 2	Digital input 2	
4	DI 3	Digital input 3	
5	+10 V	Output +10 V reference voltage	10 V ref. for analog input (pot. supply +, 10 mA max., 1 kΩ – 10 kΩ)
6	AI 1 / DI 4	Analog input (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 (pot. supply -)
8	AO 1 / DO 1	Analog output (10 bit) Digital output 1	0–10 V, max. 20 mA analog 24 V, max. 20 mA digital
9	0 V	0 V reference potential	0 V reference potential
10	AI 2 / DI 5	Analog input 2 (12 bit) Digital input 5 / thermistor contact	0–10 V, 0–20 mA, 4–20 mA "Logic 1" input voltage range: DC 8–30 V
11	AO 2 / DO 2	Analog output 2 (10 bit) Digital output 2	0–10 V, 20 mA analog 24 V, 20 mA digital
12	STO+	Output stage enable	DC +24 V input, max. 100 mA current consumption STO safety contact, high = DC 18 – 30 V
13	STO-		GND reference potential for DC +24 V input STO safety contact

All digital inputs are enabled with an input voltage in the range of 8–30 V. This means they are +24 V compatible.

- **NOTICE** Possible damage to property.

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

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

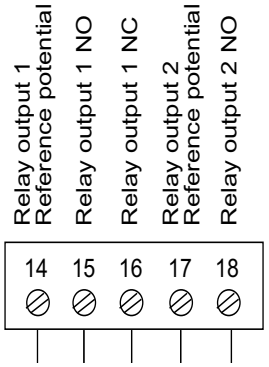
- **INFORMATION**

  Terminals 7 and 9 can be used as GND reference potential if MOVITRAC® LTP-B is to be controlled by a PLC. Connect STO+ to +24 V and STO- to 0 V to enable the power output stage; else the inverter indicates "inhibited". If STO is to be used as a safety-relevant mechanism, observe the information and circuits in the "Functional Safety MOVITRAC® LTP-B" manual.

⚠ WARNING

If terminal 12 is permanently supplied with 24 V, and terminal 13 is permanently connected to GND, then the "STO" function is permanently disabled.

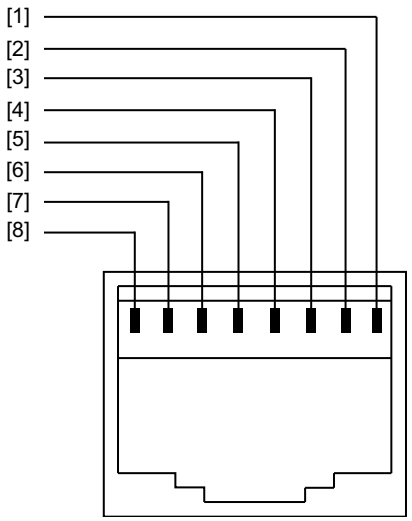
Overview of relay terminals



3003612555

Terminal no.	Signal	Description
14	Relay output 1 reference	Relay contact (AC 250 V / DC 30 V, max. 5 A)
15	Relay output 1 NO	
16	Relay output 1 NC	
17	Relay output 2 reference	
18	Relay output 2 NO contact	

4.3.4 Communication socket RJ45



2933413771

[1] RS485+ (Modbus)
[2] RS485- (Modbus)
[3] +24 V (supply of the remote display)
[4] RS485+ (engineering)
[5] RS485- (engineering)
[6] 0 V
[7] SBus+ (*P1-12* must be set to SBus communication)
[8] SBus- (*P1-12* must be set to SBus communication)

4.3.5 Safe stop function (STO)

The safe stop function (safe torque off) inhibits the output stage of the inverter. The inverter runs in normal operation, if a voltage of 24 V is applied between STO+ and STO- as shown on the drawing in chapter "Overview of signal terminals" (page 30). An external 24 V voltage supply can also be used. The STO function is enabled when the 24 V voltage supply is removed. As a result, the output of the inverter is inhibited and the motor coasts to a halt. The inverter does not generate any output torque. The inverter can only start again when a voltage of 24 V is applied between STO+ and STO-.

You can use the STO function whenever the output of the inverter has to be removed, for example in the event of an emergency stop or for machine maintenance purposes.

- ⚠ **WARNING** The supply current applied to the inverter is not disconnected by the STO function. Before carrying out maintenance work on electrical parts of the inverter or the driven motor, switch off the power supply for the inverter.

You find more detailed information on "STO" in the "MOVITRAC® LTP-B Functional Safety" manual.

4.3.6 UL-compliant installation

Note the following points for UL-compliant installation:

Ambient temperatures

- The inverters can be operated at the following ambient temperatures:

Degree of protection	Ambient temperature
IP20	-10 °C to 50 °C
IP55 / NEMA 12	-10 °C to 40 °C

- Use only copper connection cables suited for ambient temperatures up to 75 °C.

Tightening torques for power terminals

- The following permitted tightening torques apply to MOVITRAC® LTP-B power terminals:

Size	Tightening torque
2	1 Nm / 9 lb.in
3	1 Nm / 9 lb.in
4	4 Nm / 35 lb.in
5	15 Nm / 133 lb.in
6	20 Nm / 177 lb.in
7	20 Nm / 177 lb.in

Tightening torques for control terminals

The permitted tightening torque for control terminals is 0.8 Nm (7 lb. in).

External DC 24 V supply

Use only certified devices with a limited output voltage (U_{max} = DC 30 V) and limited output current (I ≤ 8 A) as external DC 24 V voltage source.

Voltage supply systems and fusing

MOVITRAC® LTP-B inverters are suitable for operation in voltage supply systems with earthed star point (TN and TT systems) that can supply a maximum line current and a maximum line voltage in accordance with the following table. The fuses listed in the following tables are the maximum permitted fuses for each inverter. Only use melting fuses.

UL certification does not apply to operation in voltage supply systems with a non-earthed star point (IT systems).

200 – 240 V units

MOVITRAC® LTP...	Max. supply short circuit current	Max. line voltage	Max. permitted fuse rating
0004	AC 5000 A	AC 240 V	AC 15 A / 250 V
0008	AC 5000 A	AC 240 V	AC 30A / 250 V
0015	AC 5000 A	AC 240 V	AC 20A / 250 V
0022, 0040	AC 5000 A	AC 240 V	AC 30 A / 250 V
0055, 0075	AC 5000 A	AC 240 V	AC 110 A / 250 V
0110	AC 5000 A	AC 240 V	AC 175 A / 250 V
0150	AC 5000 A	AC 240 V	AC 225 A / 250 V
0220	AC 10000 A	AC 240 V	AC 350 A / 250 V

380 – 480 V units

MOVITRAC® LTP...	Max. supply short circuit current	Max. line voltage	Max. permitted fuse rating
0008, 0015	AC 5000 A	AC 480 V	AC 15 A / 600 V
0022, 0040	AC 5000 A	AC 480 V	AC 20 A / 600 V
0055, 0075	AC 5000 A	AC 480 V	AC 60 A / 600 V
0110	AC 5000 A	AC 480 V	AC 110 A / 600 V
0150 / 0220	AC 5000 A	AC 500 V	AC 175 A / 600 V
0300	AC 5000 A	AC 500 V	AC 225 A / 600 V
0370, 0450	AC 10000 A	AC 500 V	AC 350 A / 600 V
0550, 0750	AC 10000 A	AC 500 V	AC 500 A / 600 V

Thermal motor protection

MOVITRAC® LTP-B is provided with thermal motor overload protection according to NEC (National Electrical Code, US).

Thermal motor overload protection shall be provided by one of the following means:

- NEC compliant installation of a motor temperature sensor, see also chapter "Motor temperature protection (TF/TH)".
- Using internal thermal motor overload protection by activating parameter *P4-17*.

4.3.7 Electromagnetic compatibility

The MOVITRAC® LTP-B frequency inverter series is suited for use in machines and systems. It complies with the EMC product standard EN 61800-3 for variable-speed inverters. Observe the specifications of Directive 2004/108/EC (EMC) for EMC compliant installation of the inverter system.

Interference immunity

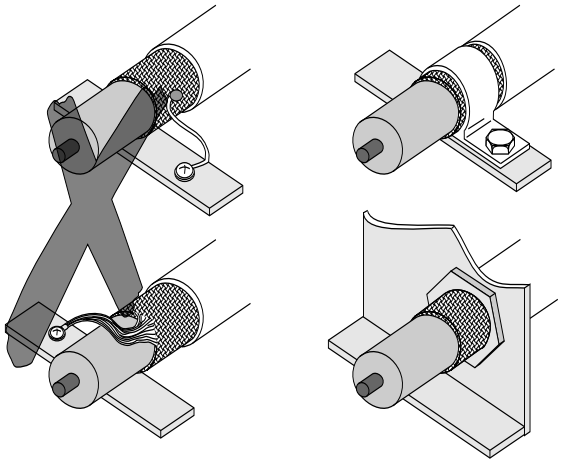
MOVITRAC® LTP-B meets the interference immunity requirements of the EN 61800-3 standard for industry and household applications (light industry).

Interference emission

With regard to interference emission, MOVITRAC® LTP-B meets the limit values of the standards EN 61800-3 and EN 55014 and can therefore be used in the industry and for household applications (light industry).

Install the inverters as described in chapter "Installation" (page 16) to ensure best possible electromagnetic compatibility. Ensure proper ground connections for the inverter system. Use shielded motor cables to comply with interference emission regulations.

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.



1406710667

The table below specifies the conditions for using MOVITRAC® LTP-B in inverter applications:

Inverter type	Cat. C1 (class B)	Cat. C2 (class A)	Cat. C3
230 V, 1-phase LTP-B xxxx 2B1-x-xx	No additional filtering required Use a shielded motor cable		
230 V / 400 V, 3-phase LTP-B xxxx 2A3-x-xx LTP-B xxxx 5A3-x-xx	Use an external filter of the type NF LT 5B3 0xx	No additional filtering required	
	Use a shielded motor cable		

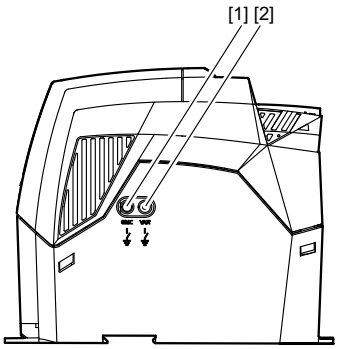
Disabling EMC filter and varistor (IP20)

IP20 inverters with integrated EMC filter (such as MOVITRAC® LTP-B xxxx xAxx 00 or MOVITRAC® LTP-B xxxx xBxx 00) have a higher ground-fault current than devices without EMC filter. If more than one MOVITRAC® LTP-B is operated at a ground fault monitoring unit, the monitoring unit might trigger an error, in particularly when shielded cables are used. You can disable the EMC filter by removing the EMC screw on the side of the unit.

- ⚠ **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.

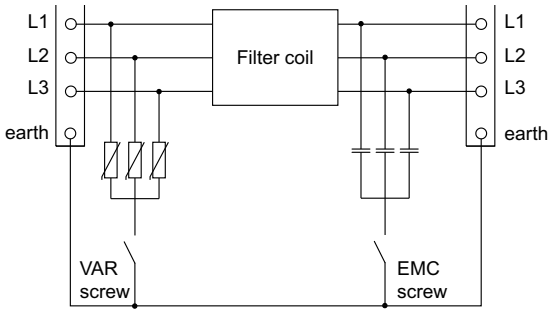
  – Before removing the EMC screw, disconnect MOVITRAC® LTP-B from the power supply and wait at least 10 minutes.



3034074379

[1] EMC screw

[2] VAR screw



3479228683

MOVITRAC® LTP-B inverters are equipped with components that suppress voltage surges in the input voltage. These components protect the supply circuits against voltage peaks that might be caused by lightning or other devices connected to the same power supply.

If you perform a high-voltage test for an inverter system, the components for voltage surge suppression might cause the test to fail. Remove both screws on the side of the unit to make high-voltage tests possible. Removing the screws will disable these components. After having performed the high-voltage test, tighten the two screws again and repeat the test. This test should fail as it indicates that the circuit is now protected from voltage surges again.

4.3.8 Cable gland plate

A suitable cable gland system is required to maintain the respective IP/NEMA degree of protection. Cable entry holes have to be drilled that correspond to this system. Following some recommended values:

Recommended hole sizes and hole types for the cable gland

	Hole size	Anglo-American	Metrical
Sizes 2 and 3	25 mm	PG16	M25

Hole sizes for flexible electrical installation ducts

	Hole size	Commercial size	Metrical
Sizes 2 and 3	35 mm	1 in	M25

- **NOTICE** Possible damage to property.

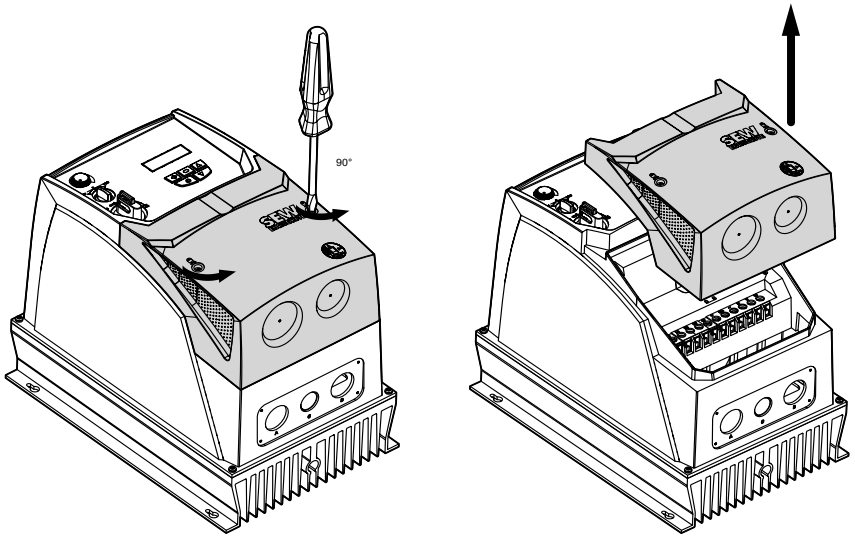
  Be careful when drilling the hole to prevent particles from remaining in the product.
- An IP degree of protection ("type") according to UL specifications is only ensured when cables are installed with a bushing or sleeve for a flexible electrical installation duct with the required degree of protection ("type").
- When installing electrical installation ducts, the insertion holes of the duct must have standard openings for the required sizes according to NEC specifications.
- Not intended for rigid electrical installation ducts.

4.3.9 Removing the terminal cover

Remove the front cover of the inverter as depicted in the figure to access the connection terminals.

The connection terminals can be accessed when the two screws on the front of the product are removed as shown below.

The front cover is attached by proceeding in reverse order.



9007204902578315

5 Startup

5.1 User interface

5.1.1 Keypad

Each MOVITRAC® LTP-B is equipped with a keypad as standard that allows for operating and setting up the drive without any further devices.

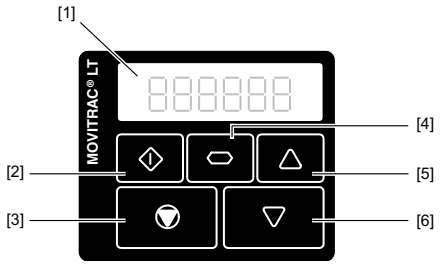
The keypad has five keys with the following functions:

Start (execute)	• Enables the motor. • Reverses the direction of rotation if bidirectional keypad mode is activated.
Stop/reset	• Stops the motor. • Acknowledges an error.
Navigate	• Shows real-time information. • Press and hold to enable/disable parameter edit mode. • Saves parameter changes.
Up	• Increases the speed in real-time mode. • Increases the parameter values in parameter edit mode.
Down	• Decreases the speed in real-time mode. • Decreases the parameter values in parameter edit mode.

If the parameters are set to the factory setting, the <Start> and <Stop> keys of the keypad are disabled. To enable the <Start> and <Stop> keys of the keypad, set parameter *P1-12* to "1" or "2", see section "Explanation of the parameters" (page 79).

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

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



2933664395

[1]	Display	[4]	Navigate
[2]	Start	[5]	Up
[3]	Stop/reset	[6]	Down

- **INFORMATION**

  To reset the unit to the factory setting, press the <Up>, <Down> and <Stop> keys simultaneously for 2 seconds. "P-deF" appears on the display. Press the <Stop> key again to confirm the change and to reset the inverter.

5.1.2 Further key combinations

Function	The device displays...	Press...	Result	Example
Quick parameter group selection[1)]	Px-xx	"Navigate" + "Up" keys	The next higher parameter group is selected.	• "P1-10" is displayed. • Press the "Navigate" + "Up" keys. • "P2-01" is now displayed.
	Px-xx	"Navigate" + "Down" keys	The next lower parameter group is selected.	• "P2-26" is displayed. • Press the "Navigate" + "Down" keys. • "P1-01" is now displayed.
Selection of the lowest group parameter	Px-xx	"Up" + "Down" keys	The first parameter of a group is selected.	• "P1-10" is displayed. • Press the "Up" + "Down" keys. • "P1-01" is now displayed.
Set the parameter to the lowest value	Numerical value (when changing a parameter value)	"Up" + "Down" keys	The parameter is set to the lowest value.	When changing P1-01: • "50.0" is displayed. • Press the "Up" + "Down" keys. • "0.0" is now displayed.
Changing individual digits of a parameter value	Numerical value (when changing a parameter value)	"Stop/reset" + "Navigate" keys	The individual parameter digits can be modified.	When changing P1-10: • "0" is displayed. • Press the "Stop/reset" + "Navigate" keys. • "_0" is now displayed. • Press the "Up" key. • "10" is now displayed. • Press the "Stop/reset" + "Navigate" keys. • "_10" is now displayed. • Press the "Up" key. • "110" is now displayed. etc.

1) Parameter group access must be activated by setting *P1-14* to "101".

5.1.3 Display

A six-digit 7-segment display is integrated in each drive. It can be used to monitor drive functions and to set parameters.

5.1.4 Software

The following software is available for the inverters.

LT Shell

Functions:

- Data backup
- Firmware update
- Parameter changes

PC inverter connection

- USB11A + cable set C or
- Bluetooth® parameter module (LTBP-C)

MotionStudio

Functions:

- Data backup
- Parameter changes

PC inverter connection

- SBus with CAN dongle + cable set C or
- SBus gateway or MOVI-PLC®

NOTICE

Possible inverter damage.

During "auto tune" (automatic motor calibration), the inverter must not be connected with the PC.

5.2 Simple startup

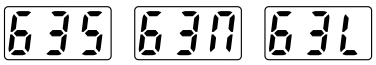
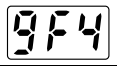
1. Connect the motor to the inverter. Observe the rated voltage of the motor when connecting it to the inverter.
2. Enter the motor data indicated on the motor nameplate:
   - *P1-07* = rated voltage of the motor
   - *P1-08* = rated current of the motor
   - *P1-09* = rated frequency of the motor
   - *(P1-10* = rated speed of the motor)
3. Set the maximum and minimum speed using *P1-01* and *P1-02*.
4. Set the acceleration and deceleration ramps using *P1-03* and *P1-04*.

5.2.1 Inverter settings for permanent magnets

MOVITRAC® LTP-B is suited for permanent magnets without encoders, such as LSPM. For CMP motors, AK1H and the LTX servo module are required.

Simple startup for preset motors from SEW-EURODRIVE

Simple startup can be performed if one of the following motors with speed class 4500 is connected to the inverter:

Motor type	Display format
CMP40M	
CMP50S / CMP50M /CMP50L	
CMP63S / CMP63M / CMP63L	
CMP71S / CMP71M / CMP71L	
MGF..-DSM, size 2	
MGF..-DSM, size 4	

For a detailed list, refer to chapter "Servo-specific parameters" (page 82).

Procedure

- Set *P1-14* to "1" for access to LTX-specific parameters.
- Set *P1-16* to the preset motor; see chapter "LTX-specific parameters (level 1)" in the "MOVITRAC® LTX" addendum to the operating instructions.

All the required parameters (voltage, current, etc.) are set automatically.

- **INFORMATION**

  If *P1-16* is set to "GF2" or "GF4", then overload protection is set to "200%" to provide for a high overload torque. For protecting the motor, the KTY temperature sensor must be connected to an external monitoring device. Ensure motor protection by means of an external protection device.

Simple startup for motors from SEW-EURODRIVE and third-party motors

- ⚠**WARNING** Hazard due to starting motor. Auto tune need not be enabled for execution. Auto tune runs automatically and the motor is switched on as soon as *P4-02* is set to "1". Motor might start running!

  Severe or fatal injuries.

  – Never remove the cable during running operation.

  – Do not touch the motor shaft.

  If *P1-16* is set to "In-Syn", overload capacity is set to "150%" depending on *P1-08*.

The following parameters have to be set if you connect another motor to MOVITRAC® LTP-B than a preset motor from SEW-EURODRIVE:

- *P1-14* = 101
- *P1-07* = phase-to-phase voltage of the permanent magnet motor at rated speed
- *P1-08* = rated current of the motor
- *P1-09* = rated frequency of the motor
- *P1-10* = rated speed of the motor
- *P4-01* = operating mode (PM motor speed or torque)
- *P4-05* = power factor
- *P4-02* = 1 enables auto tune
- **INFORMATION**

  Refer to the following operating instructions for more detailed information on parameters *P1-07*, *P1-08* and *P1-09*:

  – "Synchronous Servomotors CMP40–CMP100, CMPZ71–CMPZ100"

  The control behavior of the motor (PI controller) can be set using *P4-03 Proportional gain speed controller vector* and *P4-04 Integral time constant speed controller vector*.

5.2.2 Terminal mode (factory setting) *P1-12* = 0

For operation in terminal mode (factory setting):

- *P1-12* must be set to "0" (factory setting).
- Connect a switch between terminals 1 and 2 on the user terminal block.
- Connect a potentiometer (1 k–10 k) between terminals 5, 6 and 7, the sliding contact is connected to pin 6.
- Enable the drive by establishing a connection between terminals 1 and 2.
- Set the speed using the potentiometer.

5.2.3 Keypad mode (*P1-12* = 1 or 2)

For operation in keypad mode:

- Set *P1-12* to "1" (uni-directional) or "2" (bi-directional).
- Connect a jumper or switch between terminals 1 and 2 on the user terminal block to enable the drive.
- Press the <Start> key. The drive is enabled with 0.0 Hz.
- To increase the speed, press the <Up> key.
- To stop the drive, press the <Stop/reset> key.
- To resume to the original speed, press the "Start" key again. (If bi-directional mode is enabled (*P1-12* = 2), the direction is reversed by pressing the <Start> key.)

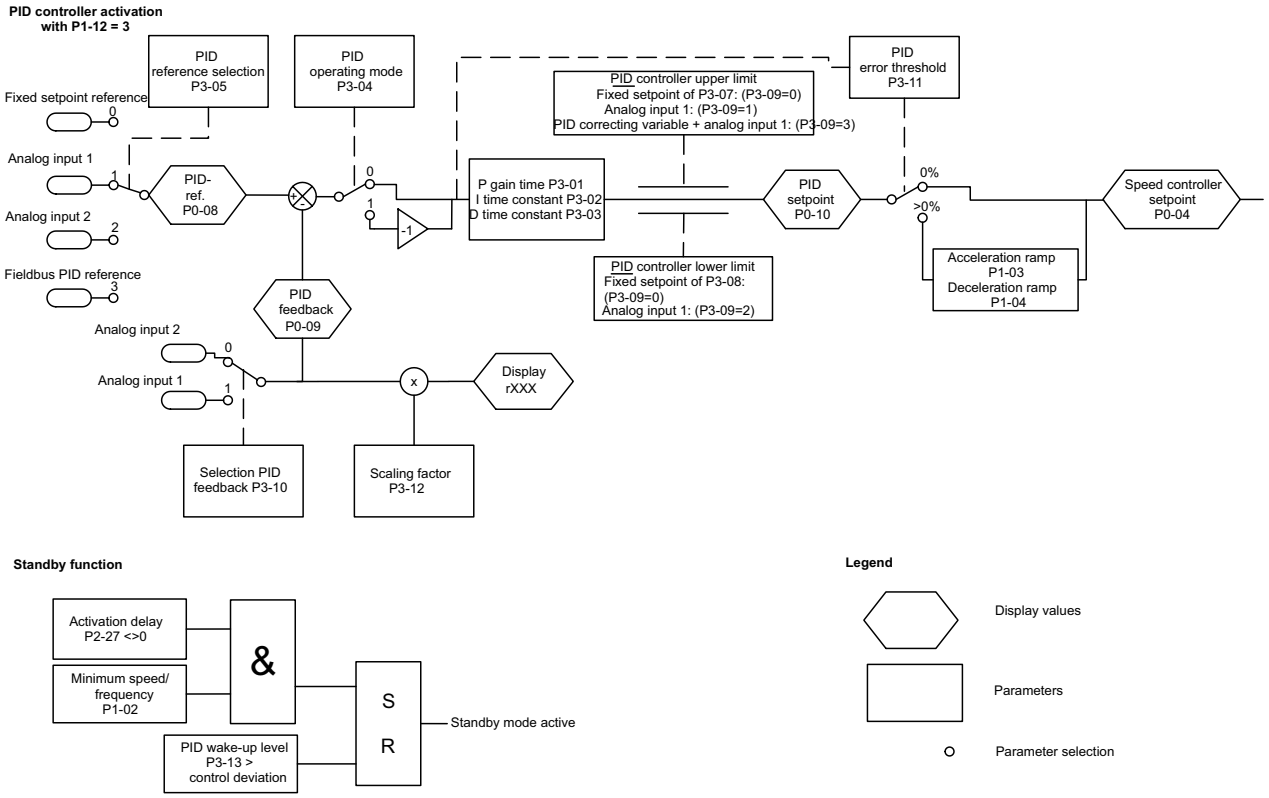
- **INFORMATION**

  You can preset the required target speed by pressing the <Stop/reset> key at standstill. Pressing the <Start> key then moves the drive along a ramp until it has reached the required speed.

5.2.4 PID controller mode (*P1-12* = 3)

The implemented PID controller can be used for temperature control, pressure control or other applications.

The following figure shows the configuration options for the PID controller.



9007202259028363

Connect the sensor for the controlled variable to analog input 1 or 2 depending on *P3-10*. You can scale the sensor value using parameter *P3-12* in such a way that the value is indicated on the inverter display with the proper quantity, for example 0-10 bar.

You can set the target reference for the PID controller using *P3-05*.

The setting of the speed ramp times has no effect when the PID controller is active. Acceleration and deceleration ramps can be activated depending on the control deviation (target value – actual value) using *P3-11*.

- **INFORMATION**

  The PID reference can also be specified via SBus (*P3-05* = *3*). For this purpose, the process data words in *P5-09* to *P5-11* must be defined accordingly. Additionally, the control signal source of the inverter must be set to SBus mode (*P1-12* = *5*).

5.2.5 Master-slave mode (*P1-12* = 4)

MOVITRAC® LTP-B has an integrated master-slave function. This is a specific protocol for the inverter that allows for master-slave communication. Up to 63 drives can be connected with one another in a communication network using RJ45 connectors. A drive must be configured as master, the other slaves are configured as the slaves. Each network may have only one master drive. This master drive sends its operating state (such as stopped, running) and output frequency every 30 ms. The slave drives then follow the state of the master drive (running/stopped). The output frequency of the master drive becomes the target frequency for all slave drives.

Configuring the master drive

The master drive of each network must have the communication address set to "1".

- Set *P5-01 Drive address (communication)* to "1".
- Set *P1-12* to a value other than 4.

Configuring the slave drives

- Each connected slave must have a unique slave communication address that is set in *P5-01*. You can assign slave addresses from 2 to 63.
- Set *P1-12* to "4".
- Set the type of speed scaling in *P2-28*.
- Set the scaling factor in *P2-29*.

5.3 Hoisting function

To activate the hoisting function, set parameter *P4-12 Motor brake control* to "1".

When the hoisting function is activated, all parameters relevant for this operating mode are enabled or disabled. These parameters are:

- *P2-07 Preset speed 7 becomes the brake release speed*
- *P2-08 Preset speed 8 becomes the brake application speed*
- *P2-18 Relay contact 2 for controlling the brake rectifier*
- *P4-12 Motor brake control = 1*
- *P2-23 Zero hold time speed = 0 s*

- *P4-13 Release time of the motor brake*
- *P4-14 Application time of the motor brake*
- *P4-15 Torque threshold for brake release*
- *P4-16 Torque threshold timeout*

- A single-phase motor phase failure cannot always be detected reliably.
- The motor brake must be controlled via inverter to ensure that the hoisting function is carried out properly.

5.3.1 Recommendations for startup

Following the recommendations for startup. These parameters are guide values and have to be adjusted depending on the application:

Parameter	Setting	Function
P4-12	= 1	Hoisting function
P4-01	= 0	VFC control
P2-07 = P2-08	= *P1-02*	Minimum speed about 15 rpm
P2-18	= 8	Relay 2 in hoisting mode
P4-13 = P4-14	= 0.1 – 0.3 s	Release time/application time of the motor brake
P4-15	≥ 10%	Brake release torque
P4-16	≠ 0	Torque threshold timeout
P7-07	= 1	Depends on lowering speed
P7-12	= 0.1 s	Pre-magnetization time
P7-14		Low-frequency torque increase • 10% for asynchronous motors • 20 – 30% for synchronous motors
P7-15	= 5 Hz	Frequency limit for torque increase

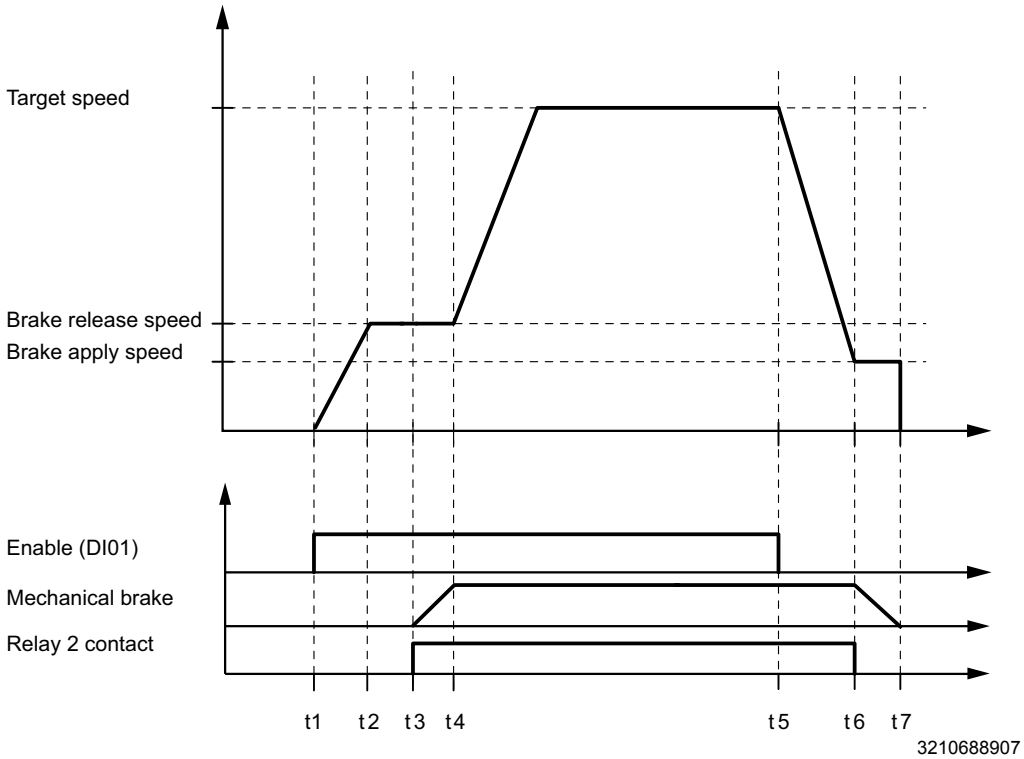
For initial startup, always perform an auto tune with *P4-02* = 1.

5.3.2 General information

- CW corresponds to upward direction.
- CCW corresponds to downward direction.
- Stop the motor to reverse the direction of rotation, that is the brake is applied. Before being able to reverse the direction of rotation, controller inhibit must be set.

5.3.3 Hoisting mode

The following diagram shows hoisting mode.



t_1 Drive enable
t_1 - t_2 The motor runs up to brake release speed (preset speed 7)
t_2 Brake release speed is reached
t_2 - t_3 Torque threshold *P4-15* proven. The inverter indicates a fault if the torque threshold exceeds the timeout set in *P4-16*.
t_3 Relay opens
t_3 - t_4 Brake opens within brake release time *P4-13*
t_4 Brake is released and drive runs up to target speed
t_4 - t_5 Normal operation
t_5 Drive inhibit
t_5 - t_6 Drive slows down to brake application speed (preset speed 8)
t_6 Relay closes
t_6 - t_7 Brake applied within brake release time *P4-14*
t_7 Brake is closed and drive stopped

5.4 Fire mode

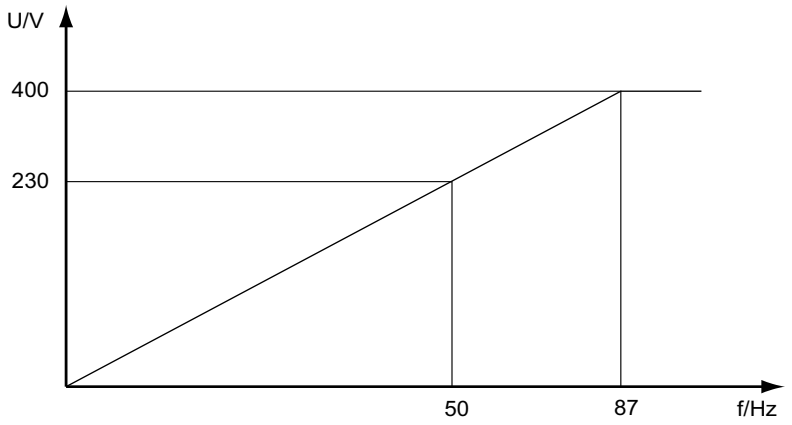
Enabling the fire mode input has the inverter drive the motor with the preset values. In this mode, the inverter ignores all faults and shutdowns and operates the motor until it is destroyed or even until the loss of voltage supply.

Set fire mode as follows:

- Perform a motor startup.
- Set parameter *P1-14* to "201" to being able to access further parameters.
- Set parameter *P1-15* to "0" to configure the digital inputs.
- Configure the inputs depending on the requirements in parameter group *P9-xx*. For control via terminals, set parameter *P9-09* to "9 = terminal control.
- Set parameter *P9-33 Fire mode input selection* to the required input.
- Set parameter *P6-13* to "0" or "1" depending on the wiring.
- Set parameter *P6-14* to a speed to be used in fire mode.

5.5 Operation at 87 Hz characteristic

The V/f ratio remains the same at 87 Hz operation. But higher speeds and power rating are generated that result in a higher current flow.



7362086411

Do the following to set "87 Hz characteristic" operation:

- Set parameter *P1-01* to the nominal speed × √3.
- Set parameter *P1-07* to star voltage.
- Set parameter *P1-08* to delta current.
- Set parameter *P1-09* to "87 Hz".

5.6 Motor potentiometer function – Crane application

The motor potentiometer works like an electromechanical potentiometer that increases or decreases the internal value depending on the signals at the inputs, and consequently increases or decreases the motor speed.

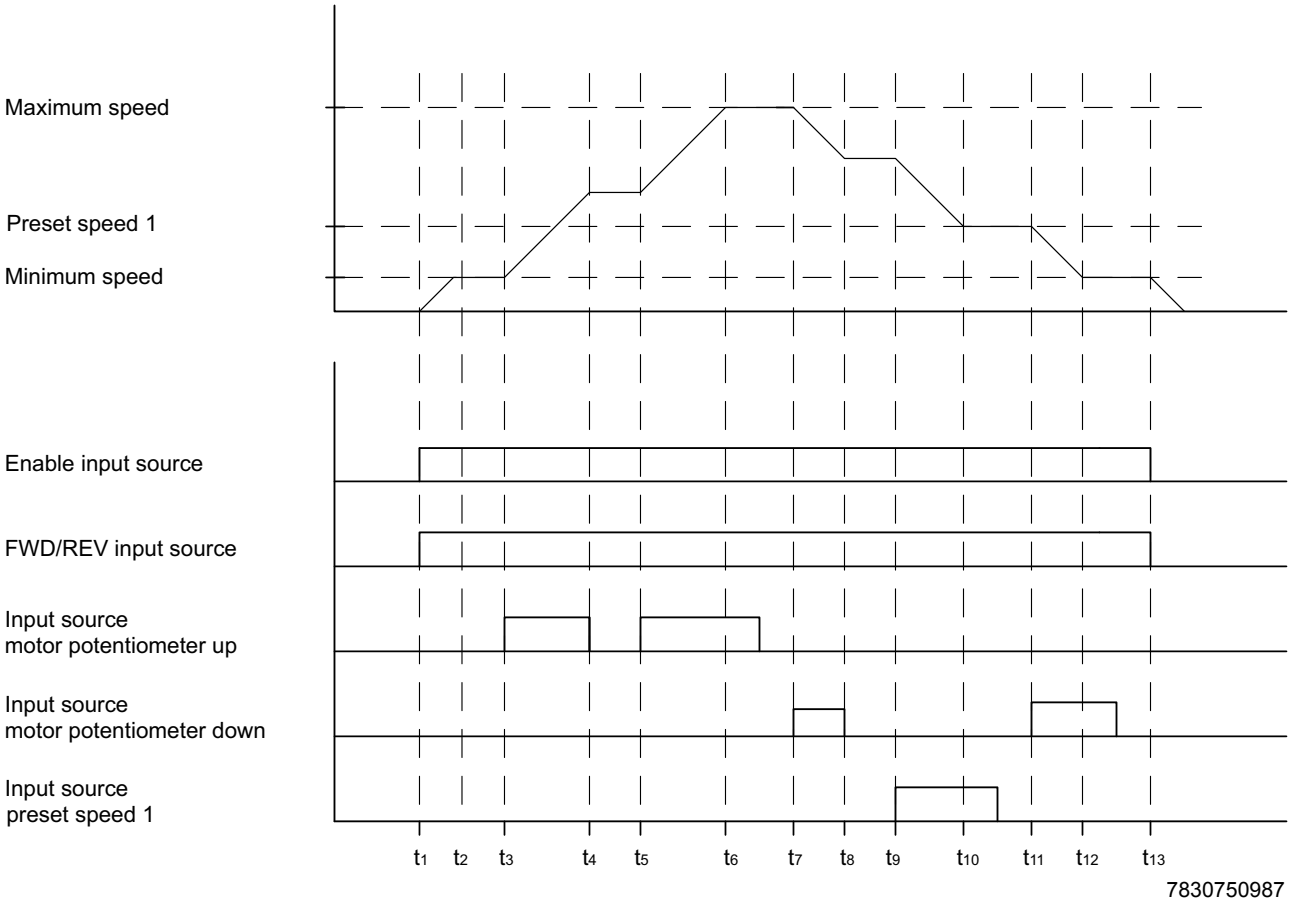
To obtain the same functionality as for the predecessor inverter LTP-A, perform startup as described below.

INFORMATION

The inputs can be configured individually if the terminal assignment differs.

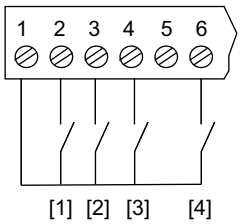
5.6.1 Motor potentiometer operation

The following diagram describes the basic function of the motor potentiometer. The description in chapter "Parameter settings" (page 52) is based on the frequently used crane function and works according to the terminal assignment in chapter "Terminal assignment" (page 52).



t_1	Drive enable
t_1 - t_2	Motor runs up to the set minimum speed (P1-02)
t_2 - t_3	Motor maintains minimum speed
t_3	Motor potentiometer up (P9-28) is activated
t_3 - t_4	As long as the signal is present at P9-28, the motor speed is increased along acceleration ramp P1-03
t_4 - t_5	If no signal is present any longer at P9-28, the actual speed is maintained
t_5	Motor potentiometer up (P9-28) is activated
t_5 - t_6	As long as the signal is present at P9-28, the motor speed is increased along the acceleration ramp (P1-03) until it reaches maximum speed (P1-01)
t_6 - t_7	The maximum speed is not exceeded and is maintained when the signal is no longer present at P9-28
t_7	Motor potentiometer down (P9-29) is activated
t_7 - t_8	As long as the signal is present at P9-29, the motor speed is decreased along acceleration ramp P1-04.
t_8 - t_9	If no signal is present any longer at P9-28, the actual speed is maintained
t_9	Preset speed is activated
t_9 - t_{11}	As long as the signal is present at preset speed, the motor speed is decreased along deceleration ramp P1-04 until it reaches the preset speed. This speed is then maintained.
t_{11}	Motor potentiometer down (P9-29) is activated
t_{11} - t_{12}	As long as the signal is present at P9-29, the motor speed is decreased along acceleration ramp P1-04 but not below the minimum speed (P1-02)

5.6.2 Terminal assignment



7834026891

[1] DI1 Enable/ramp down
[2] DI2 Ramp up
[3] DI3 Preset speed 1
[4] DI4 Direction of rotation reversal (forward/reverse)

5.6.3 Parameter settings

Start up the motor as described in chapter "Simple startup".

Make the following settings to being able to use the motor potentiometer:

- *P1-14* Advanced parameter access = 201
- *P1-15* Digital input function selection = 0
- *P2-37* Keypad restart speed = 6

Input configuration:

- *P9-01* Enable input source = din-1
- *P9-03* Input source for FWD direction of rotation = din-1
- *P9-06* Direction of rotation reversal = din-4
- *P9-09* Source for activating terminal control = on
- *P9-10* Speed source 1 = d-Pot
- *P9-11* Speed source 2 = PrE-1
- *P9-18* Speed selection input 0 = din-3
- *P9-28* Input source motor potentiometer up = din-2

User settings:

- *P1-02* Minimum speed
- *P1-03* Acceleration ramp time
- *P1-04* Deceleration ramp time
- *P2-01* Preset speed 1

6 Operation

The following information is displayed to being able to read off the operating state of the inverter at any time:

Status	Display
Drive OK	Static state of the inverter
Drive running	Operating state of the inverter
Fault / trip	Fault

6.1 Inverter status

6.1.1 Static inverter status

The list below shows the abbreviations that are displayed to indicate the inverter status when the motor is at standstill.

Abbreviation	Description
StoP	Power section of inverter disabled. This message is displayed when the inverter is at a standstill and no error is pending. The inverter is ready for normal operation.
P-deF	Preset parameters are loaded. This message appears when the user issues the command for loading the parameters set at the factory. You have to press the "Stop/reset" key before the inverter can resume operation.
Standby	The inverter is in standby mode. When *P2-27* > 0 s, this message appears when the inverter has stopped and the setpoint is also "0".
Inhibit	Is displayed when 24 V and GND are not present at the STO contacts. The output stage is inhibited.
ETL 24	External voltage supply is connected

6.1.2 Operating state of the inverter

The list below shows the abbreviations that are displayed to indicate the inverter status when the motor is running.

Pressing the "Navigate" key on the keypad lets you toggle between output frequency, output current and speed.

Abbreviation	Description
H xxx	The output frequency of the inverter is displayed in Hz. This message is displayed while the inverter is running.
A xxx	The output current of the inverter is displayed in amperes. This message is displayed while the inverter is running.
P xxx	The actual output power of the inverter is displayed in kW. This message is displayed while the inverter is running.
Auto-t	The motor parameters are measured automatically to configure the motor parameters. Auto tune runs automatically at the first enable after operation with the parameters set at the factory if the inverter is set to "vector control" (*P4-01*). No hardware enable is required for running auto tune.
Ho-run	Reference travel started. Wait until the inverter has reached the reference position. After successful reference travel, "Stop" appears on the display.
xxxx	The output speed of the inverter is displayed in rpm. This message appears while the inverter is running if the rated speed of the motor was entered in parameter *P1-10*.
C xxx	Speed scaling factor (*P2-21 / P2-22*).
. . . . . (flashing dots)	The output current of the inverter exceeds the current value entered in *P1-08*. MOVITRAC® LTP-B monitors the extent and duration of the overload. MOVITRAC® LTP-B indicates fault "I.t-trP" depending on the extent of the overload.

6.1.3 Fault reset

You can reset a fault by pressing the <Stop/reset> key or by opening and closing digital input 1. For more information, refer to chapter "Error codes" (page 132).

7 Fieldbus Mode

7.1 General information

7.1.1 Available controllers, gateways and cable sets

Fieldbus gateways

The fieldbus gateways convert standard fieldbuses to the SBus of SEW-EURODRIVE. This means that up to 8 inverters with 3 process data each can be triggered using one gateway.

The controller (PLC or PC) and the MOVITRAC® LTP-B frequency inverter exchange process data, such as control words or speed, using the fieldbus.

In general, you can also connect and operate other SEW-EURODRIVE devices (such as MOVIDRIVE® inverters) to the gateway using the SBus.

Available gateways

For fieldbus connection, gateways are available for the following bus systems:

Bus	Separate housing
PROFIBUS	DFP21B / UOH11B
EtherCAT®	DFE24 / UOH11B
DeviceNet	DFD11 / UOH11B
PROFINET	DFE32 / UOH11B
EtherNet/IP	DFE33B / UOH11B

Available controllers

Type	Fieldbus interfaces
DHE21B / 41B in UOH11B	• Ethernet TCP/IP • UDP
DHF21B / 41B in UOH21B	• Ethernet TCP/IP • UDP • PROFIBUS DP-V1 • DeviceNet
DHR21B / 41B in UOH21B	• Ethernet TCP/IP • UDP • PROFINET • EtherNet/IP • Modbus TCP/IP

Available cable sets

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

7.1.2 Structure of process data words of inverters with factory setting

Control and status word have a fixed assignment. All the other process data words can be configured as required using parameter group *P5-xx*.

Description		Bit		Settings
PO1	Control word	0	Output stage inhibit[1)]	0: Start 1: Stop
		1	Rapid stop along the second deceleration ramp/rapid stop ramp (*P2-25*)	0: Rapid stop 1: Start
		2	Stop along process ramp *P1-03* / *P1-04* or PO3	0: Stop 1: Start
		3–5	Reserved	0
		6	Fault reset	Edge 0 set to 1 = fault reset
		7–15	Reserved	0
PO2	Setpoint speed	Scaling: 0x4000 = 100% of the max. speed as set in *P1-01* Values above 0x4000 or below 0xC000 are limited to 0x4000 / 0xC000.		
PO3	No function			
PO4	No function (available only with Modbus RTU/CANopen)			

1) Output stage inhibit means the motor coasts to a halt

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	
		2	PO data enabled	1 if *P1-12* = 5	
		3–4	Reserved		
		5	Fault / warning	0: No error 1: Fault	
		6	Limit switch CW active[1)]	0: Disabled 1: Enabled	
		7	Limit switch CCW active[1)]	0: Disabled 1: Enabled	
		8-15	Inverter status if bit 5 = 0 0x01 = STO – Safe torque off active 0x02 = no enable 0x05 = speed control 0x06 = torque control 0x0A = technology function 0x0C = reference travel		High byte
		8-15	Inverter status if bit 5 = 1 See chapter "Error codes" (page 132).		
PI2	Actual speed	Scaling: 0x4000 = 100% of the max. speed as set in *P1-01*			
PI3	Actual current	Scaling: 0x4000 = 100% of the max. current as set in *P1-08*			
PI4	No function (available only with Modbus RTU/CANopen)				

1) Limit switch assignment can be set in *P1-15*, see addendum to the operating instructions "MOVITRAC® LTX Servo Module for MOVITRAC® LTP-B".

7.1.3 Communication example

The following information is sent to the inverter if

- the digital inputs have been configured and wired properly to enable the inverter.

Description		Value	Description
PO1	Control word	0x0000	Stop along the second deceleration ramp (*P2-25*)
		0x0001	Coasting
		0x0002	Stop along the process ramp (*P1-04)*
		0x0003 - 0x0005	Reserved
		0x0006	Accelerate along a ramp (*P1-03*) and run at setpoint speed (PO2)
PO2	Setpoint speed	0x4000	= 16384 = max. speed, e.g. 50 Hz (*P1-01*) CW
		0x2000	= 8192 = 50% of the max. speed, e.g. 25 Hz CW
		0xC000	= -16384 = max. speed, e.g. 50 Hz (*P1-01*) CCW
		0x0000	= 0 = min. speed, set in *P1-02*

The process 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 PO data enabled
PI2	Actual speed	Should correspond to PO2 (setpoint speed)	
PI3	Actual current	Depends on speed and load	

7.1.4 Parameter settings for the frequency inverter

- Take the inverter into operation as described in chapter "Simple startup (page 42).
- Set the following parameters depending on the bus system used:

Parameter	SBus	CANopen	Modbus RTU[1)]
P1-12 (control signal source)	5	6	7
P1-14 (advanced menu)	101	101	101
P1-15 (function selection digital inputs)	1[2)]	1[2)]	1[2)]
P5-01 (inverter address)	1-63	1-63	1-63
P5-02 (SBus baud rate)	Baud rate	Baud rate	--
P5-03 (Modbus baud rate)	--	--	Baud rate
P5-04 (Modbus data format)	--	--	Data format
P5-05[3)] (behavior in the event of communication failure)	0-1-2-3	0-1-2-3	0-1-2-3
P5-06[3)] (communication failure timeout)	0.0–1.0–5.0 s	0.0–1.0–5.0 s	0.0–1.0–5.0 s
P5-07[3)] (ramp specified via fieldbus)	0 = specified via P1-03/04 1 = specified via fieldbus[4)]	0 = specified via P1-03/04 1 = specified via fieldbus[4)]	0 = specified via P1-03/04 1 = specified via fieldbus[4)]
P5-XX (fieldbus parameters)	More setting options[5)]	More setting options[5)]	More setting options[5)]

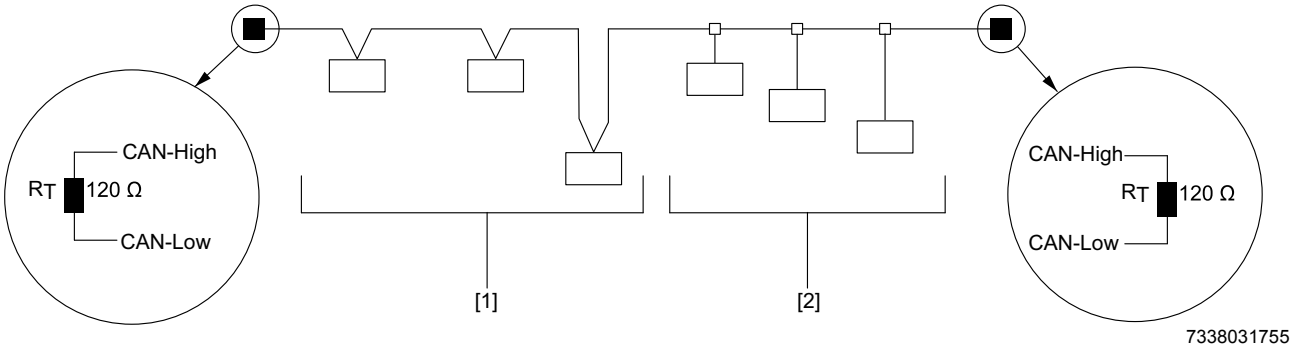
1) Modbus RTU is not available when the LTX encoder module is installed.
2) Default setting; for more setting options, refer to the description of parameter *P1-15*.
3) These parameters can remain set to their default values for the time being.
4) When specifying the ramp via fieldbus, *P5-10 =3* must be set (PO3 = ramp time).
5) You can make more fieldbus settings and define the process data in detail in parameter group *P5-xx*, see chapter "Parameter group 5" (page 99).

7.1.5 Connecting the signal terminals on the inverter

For bus mode, you can connect the terminals for example using the default setting of *P1-15* as described in chapter "Overview of signal terminals" (page 30). When changing the signal level of pin 3, changeover takes place between speed setpoint source fieldbus (low) and fixed setpoint 1 (high).

7.1.6 Establishing a CANopen/SBus network

A CAN network as depicted in the figure below should always have a linear bus structure without stub lines [1] or only with very short ones [2]. The network must have exactly one terminating resistor R_T = 120 Ω installed on both ends of the bus. The cable sets described in the "MOVITRAC® LTP-B" catalog are available for easily establishing such a network.



Cable length

- The permitted total cable length depends on the baud rate set in parameter *P5-02*:
  - 125 kBd: 500 m (1640 ft)
  - 250 kBaud: 250 m (820 ft)
  - 500 kBaud: 100 m (328 ft)
  - 1000 kBaud: 25 m (82 ft)

7.2 Connecting a gateway or a controller (SBus MOVILINK®)

7.2.1 Specification

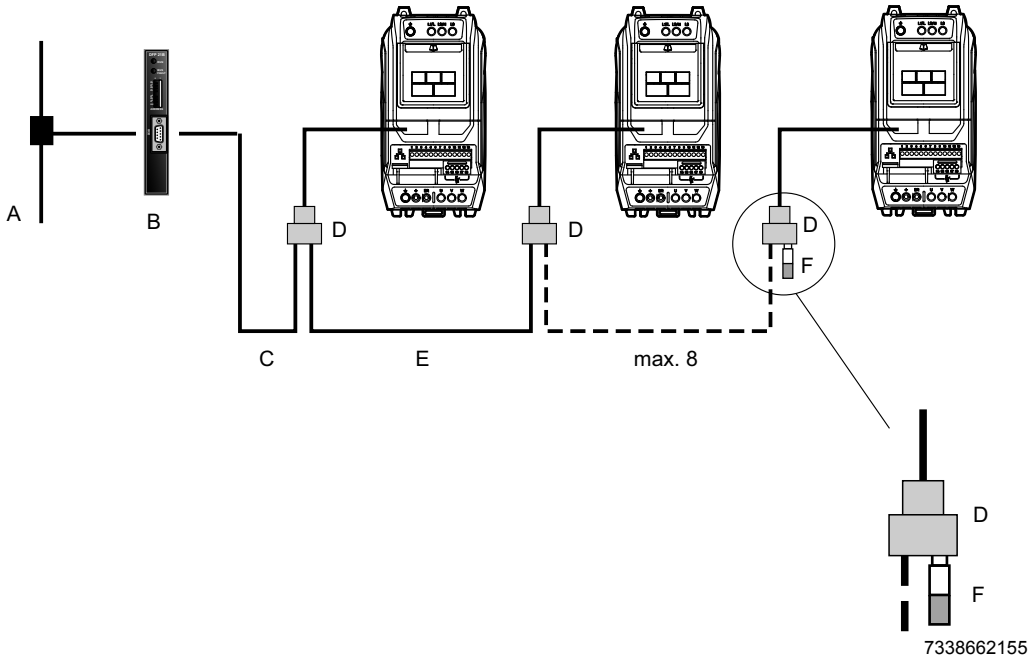
The MOVILINK® profile via CAN (SBus) is an application profile from SEW-EURODRIVE specifically adjusted to SEW inverters. For detailed information, refer to the "MOVIDRIVE ® MDX60B/61B communication and fieldbus unit profile" manual.

For using SBus, configure the inverter as described in chapter "Parameter settings for the frequency inverter" (page 58). Status and control word are fixed, all other process data words can be configured as required in parameter group *P5-xx*.

For detailed information on the structure of process data words, refer to chapter "Structure of process data words of inverters with factory setting" (page 56). You find a detailed list of all parameters including the necessary indexes as well as the scaling in chapter "Parameter register" (page 74).

7.2.2 Electrical installation

Connecting gateway and MOVI-PLC®



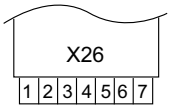
[A] Bus connection
[B] Gateway, e.g. DFx/UOH
[C] Connection cable
[D] Splitter
[E] Connection cable
[F] Y connector with terminating resistor

Instead of a terminating connector of cable set A, you can use the Y adapter of engineering cable set C. This set also includes a terminating resistor. You find detailed information on cable sets in the "MOVITRAC® LTP-B" catalog.

INFORMATION

The terminating connector [F] is equipped with 2 terminating resistors. This connector serves as the termination of CAN/SBus and Modbus RTU.

Wiring of controller and LTP-B communication socket RJ45:

Side view	Designation	Terminal at CCU/PLC	Signal	RJ45 socket[1] of FI (S29)	Signal
	MOVI-PLC® or gateway (DFX/UOH)	X26:1	CAN 1H	7	SBus/CANBus h
		X26:2	CAN 1L	8	SBus/CANBus l
		X26:3	DGND	6	GND
		X26:4	Reserved		
		X26:5	Reserved		
		X26:6	DGND		
		X26:7	DC 24V		
	Third party controller	X Modbus RTU+		1	RS485+ (Modbus RTU)
		X Modbus RTU-		2	RS485- (Modbus RTU)
		X Modbus GND		6	GND

1) Please observe: The terminal assignment is given for the socket of LTP-B, not for the plug

7.2.3 Startup at SEW gateway

- Connect the gateway as described in chapter "Electrical installation" (page 59).
- Reset all settings of the gateway to the factory setting.
- If applicable, set all connected inverters to SBus MOVILINK® mode as described in chapter -"Parameter settings for the frequency inverter" (page 58), assign unique SBus addresses (unequal 0!) and set a baud rate matching the gateway (default = 500 kBaud).
- Set DIP switch AS on the DFx/UOH gateway from "OFF" to "ON" to perform an autosetup 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 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.

Monitoring sent data

The data sent via gateway can be monitored as follows:

- Using MOVITOOLS® MotionStudio via the X24 engineering interface of the gateway or optionally via Ethernet®
- Via the website of the gateway, for example for DFE3x Ethernet® gateways.
- For the LTP-B inverter, you can check which process data are being sent by means of the corresponding parameters in parameter group 0.

7.2.4 Startup at a CCU

Before taking the inverter into operation with "Drive Startup" in MotionStudio, you have to set the following parameters directly on the inverter:

- Set parameter *P1-14* to "1" to obtain access to the LTX-specific parameter group *P1-01 – P1-20*.
- If a Hiperface® encoder is connected to the encoder card, then *P1-16* has to show the proper motor type. If not, select the proper motor type using the <Up> and <Down> keys.
- Assign a unique inverter address in *P1-19*[1)].
- Set the baud rate of the SBus (*P1-20*) to 500 kBaud.

7.2.5 MOVI-PLC® motion protocol (P1-12 = 8)

If you operate MOVITRAC® LTP-B with or without LTX encoder module in CCU mode together with MOVI-PLC®, the following parameters have to be set on the inverter:

- Set parameter *P1-14* to "1" to obtain access to the LTX-specific parameter group (parameters *P1-01 – P1-20* are then visible).
- If a Hiperface® encoder is connected to the encoder card, then *P1-16* should indicate the proper motor type. If not, select the respective motor type using the "Up" and "Down" keys.
- Assign a unique drive address in *P1-19*.
- Set the SBus baud rate (*P1-20*) to "1000 kBaud".

7.3 Modbus RTU

LTP-B inverters support communication via Modbus RTU. Holding registers (03) are used for reading, and single holding registers (06) for writing. For using Modbus RTU, configure the inverter as described in chapter "Parameter settings for the frequency inverter" (page 58).

Note: Modbus RTU is not available when the LTX encoder module is plugged.

7.3.1 Specification

Protocol	Modbus RTU
Error checking	CRC
Baud rate	9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps (default)
Data format	1 start bit, 8 data bits, 1 stop bit, no parity
Physical format	RS485 two-core
User interface	RJ45

1) Changing these parameters will directly affect parameters P5-01 and P5-02.

7.3.2 Electrical Installation

The structure is the same as for the CAN/SBus network. The maximum number of bus nodes is 32. The permitted cable length depends on the baud rate. With a baud rate of 115200 Bd/s 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 "RJ45 communication socket" (page 32).

7.3.3 Register allocation of the process data words

The process data words are allocated to the Modbus registers shown in the table. The status and control words have a fixed allocation. The other process data words can be configured as required in parameter group *P5-xx*.

The table shows the default allocation of process data words. All other registers are usually allocated in such a way that they correspond to the parameter number (101 = *P1-01*). However, this does not apply to parameter group 0.

Register	Upper byte	Lower byte	Command	Type
1	PO1 control word (fixed)		03,06	Read/Write
2	PO2 (default setting in *P5-09 =1*; speed setpoint)		03,06	Read/Write
3	PO3 (default setting in *P5-10 =7*; no function)		03,06	Read/Write
4	PO4 (default setting in *P5-11 =7*; no function)		03,06	Read/Write
5	Reserved	-	0,3	Read
6	PI1 status word (fixed)		0,3	Read
7	PI2 (defafult setting in *P5-12 =1*; actual speed)		0,3	Read
8	PI3 (default setting in *P5-13 =2*; actual current)		0,3	Read
9	PI4 (default setting in *P5-14 =4*; power)		0,3	Read
…	More registers in chapter "Parameter registers" (page 74).			

You find the complete allocation of parameters and registers as well as the scaling of data in the memory allocation plan in chapter "Parameter registers" (page 74).

INFORMATION

Note: Many bus masters address the first register as register 0. It might therefore be necessary to deduct the value "1" from the register number given below to obtain the correct register address.

7.3.4 Data flow example

Structure of process data

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

Example:

Data direction	Address	Function	Data	CRC check
–Tx	01	03	00 6B 00 02	B5 D7
–Rx	01	03	04 00 2B 00	32 0B EE

Explanation to the communication example

Tx – Send from perspective of the bus master

Address	Device address 0x01 = 1
Function	03 read / 06 write
Start address	Register start address = 0x006B = 107
Number of registers	Number of requested registers from start address = 0x02 = 2
2 × CRC bytes	CRC_high, CRC_low

Rx – Receive from perspective of the bus master

Address	Device address 0x01 = 1
Function	03 read / 06 write
Number of registers	0x04 = 4
Data bytes high	0x00 = 0
Data bytes low	0x2B = 43% of nominal inverter current
Data bytes high	0x00 = 0
Data bytes low	0x32 = 50 V
2 × CRC bytes	CRC_high, CRC_low

7.4 CANopen

LTP-B inverters support communication via CANopen. For using CANopen, configure the inverter as described in chapter "Parameter settings for the frequency inverter" (page 58).

Following a general overview of how to establish a communication connection via CANopen. Only process data communication is described not the CANopen configuration.

For detailed information on the CANopen profile, refer to the "MOVIDRIVE® MDX60B/61B communication and fieldbus unit profile" manual.

7.4.1 Specification

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

7.4.2 Electrical installation

See chapter "Structure of a CANopen/SBus network (page 58)".

7.4.3 COB IDs and functions in LTP-B

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[1)] (RX)	200h + device address	
PDO2[1)] (TX)	280h + device address	
PDO2[1)] (RX)	300h + device address	
SDO[2)] (TX)	580h + device address	SDO channel for parameter data exchange with the CANopen master
SDO[2)] (RX)	600h + device address	
Error control	700h + device control	Guarding and heartbeat functions are supported. COB ID can be set to another value.

1) LTP-B 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 LTP-B SDO channel supports only expedited transmission. The SDO mechanisms are described in detail in the CANopen specification DS301.

INFORMATION

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

INFORMATION

Transmitting speed, current, position or similar values that change quickly via Tx-PDO result in an extremely 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.

7.4.4 Supported transmission modes

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

The following transmission types are supported for Rx-PDOs:

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

The following transmission types are supported for Rx-PDOs:

Tx PDO transmission mode		
Transmission type	**Mode**	**Description**
0	Acyclic synchronous	Tx PDO is only transmitted when the process data have 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 only transmitted when the corresponding Rx PDO has been received.
255	Asynchronous	Tx PDOs are always transmitted as soon as PDO data have changed.

7.4.5 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	2001h	Unsigned 16	PO1 control word (fixed)	1
	2	2002h	Integer 16	PO2 (default setting in P5-09 =1; speed setpoint)	
	3	2003h	Unsigned 16	PO3 (default setting in P5-10 =7; no function)	
	4	2004h	Unsigned 16	PO4 (default setting in P5-11 =7; no function)	
TX PDO1	1	2101h	Unsigned 16	PI1 status word (fixed)	1
	2	2102h	Integer 16	PI2 (default setting in P5-12 =1; actual speed)	
	3	2103h	Unsigned 16	PI3 (default setting in P5-13 =2; actual current)	
	4	2104h	Integer 16	PI4 (default setting in P5-14 =4; power)	
RX PDO 2	1	2016h	Unsigned 16	Fieldbus analog output 1	1
	2	2017h	Unsigned 16	Fieldbus analog output 2	
	3	2015h	Unsigned 16	Fieldbus PID reference	
	4	0006h	Unsigned 16	Dummy	
TX PDO2	1	2118h	Unsigned 16	Analog input 1	1
	2	2119h	Integer 16	Analog input 2	
	3	211Ah	Unsigned 16	State of inputs and outputs	
	4	2116h	Unsigned 16	Inverter temperature	

INFORMATION

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

INFORMATION

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

7.4.6 Data flow example

Process data communication example with default setting:

				Word 1		Word 2		Word 3		Word 4		
Numerator	COB ID	D	DB	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 5	Byte 6	Description
1	0x701	Tx	1	"00"	-	-	-	-	-	-	-	BootUpMessage
2	0x000	Rx	2	"01"	"01"	-	-	-	-	-	-	Node start (operational)
3	0x201	Rx	8	"06"	"00"	"00"	"20"	"00"	"00"	"00"	"00"	Enable + setpoint speed
4	0x080	Rx	0	-	-	-	-	-	-	-	-	SYNC telegram
5	0x181	Tx	8	"C7"	"05"	"00"	"20"	"A2"	"00"	"28"	"00"	Process data object 1
6	0x281	Tx	8	"29"	"09"	"00"	"00"	"01"	"1F"	"AC"	"0D"	Process data object 2

After a byte swap, the table looks as follows:

				Word 4		Word 3		Word 2		Word 1		
Numerator	COB ID	D	DB	Byte 8	Byte 7	Byte 6	Byte 5	Byte 4	Byte 3	Byte 2	Byte 1	Description
1	0x701	Tx	1	-	-	-	-	-	-		"00"	BootUpMessage
2	0x000	Rx	2	-	-	-	-	-	-	"01"	"01"	Node start (operational)
3	0x201	Rx	8	"00"	"00"	"00"	"00"	"20"	"00"	"00"	"06"	Enable + setpoint speed (byte swap)
4	0x080	Rx	0	-	-	-	-	-	-	-	-	SYNC telegram
5	0x181	Tx	8	"00"	"28"	"00"	"A2"	"20"	"00"	"05"	"C7"	Process data object 1
6	0x281	Tx	8	"0D"	"AC"	"1F"	"01"	"00"	"00"	"09"	"29"	Process data object 2

Explanation of the data:

			Word 4		Word 3		Word 2		Word 1	
	COB ID	Explanation of the COB ID	Byte 8	Byte 7	Byte 6	Byte 5	Byte 4	Byte 3	Byte 2	Byte 1
1	0x701	BootUp message + device address 1	-	-	-	-	-	-	-	Placeholder
2	0x000	NMT service	-	-	-	-	-	-	Bus status	Device address
3	0x201	Rx-PDO1 + device address 1	-	-	Ramp specification		Setpoint speed		Control word	
4	0x080	SYNC telegram	-	-	-	-	-	-	-	-
5	0x181	Tx-PDO1 + device address	Output power		Output current		Actual speed		Status word	
6	0x281	Tx-PDO2 + device address	Inverter temperature		IO status		Analog input 2		Analog input 1	

Example of reading the index allocation by means of service device object (SDO):

Request controller → inverter: Index: 1A00h

Response inverter → controller: 10 00 01 21h → byte swap: 2101 00 10 h

Explanation of the response:

→ 2101 = index in the manufacturer-specific object table

→ 00h = subindex

→ 10h = data width = 16 bit x 4 = 64 bit = 8 byte mapping length

7.4.7 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
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	LTPB
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. 1.12)
100Ch	0	Guard time [1ms]	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 [100us]	RW	Unsigned 16	N	0
1017h	0	Producer heartbeat time [1ms]	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	Depends on inverter
	3	Revision number	RO	Unsigned 32	N	x.xx (IDL version: 0.33)
	4	Serial number	RO	Unsigned 32	N	e.g. 1234/56/789 1)[1)]
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	00000200h+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	00000300h+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	20010010h
	2	RX PDO1 2nd mapped object	RW	Unsigned 32	N	20020010h
	3	RX PDO1 3rd mapped object	RW	Unsigned 32	N	20030010h
	4	RX PDO1 4th mapped object	RW	Unsigned 32	N	20040010h
1601h	0	RX PDO2 mapping / no. of entries	RW	Unsigned 8	N	4
	1	RX PDO2 1st mapped object	RW	Unsigned 32	N	20160010h
	2	RX PDO2 2nd mapped object	RW	Unsigned 32	N	20170010h
	3	RX PDO2 3rd mapped object	RW	Unsigned 32	N	20150010h
	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 [100us]	RW	Unsigned 16	N	0

CANopen-specific objects						
Index	**Sub-index**	**Function**	**Access**	**Type**	**PDO map**	**Default value**
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 [100us]	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	21010010h
	2	TX PDO1 2nd mapped object	RW	Unsigned 32	N	21020010h
	3	TX PDO1 3rd mapped object	RW	Unsigned 32	N	21030010h
	4	TX PDO1 4th mapped object	RW	Unsigned 32	N	21040010h
1A01h	0	TX PDO2 mapping / no. of entries	RW	Unsigned 8	N	4
	1	TX PDO2 1st mapped object	RW	Unsigned 32	N	21180010h
	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

1) Output of the last 9 digits of the serial number

7.4.8 Table of manufacturer-specific objects

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

Manufacturer-specific objects						
Index	**Sub-index**	**Function**	**Access**	**Type**	**PDO map**	**Remark**
2000h	0	Reserved/No function	RW	Unsigned16	Y	Read as 0, writing not possible
2001h	0	PO1	RW	Integer 16	Y	Defined as command
2002h	0	PO2	RW	Integer 16	Y	Configured by *P5-09*
2003h	0	PO3	RW	Integer 16	Y	Configured by *P5-10*
2004h	0	PO4	RW	Integer 16	Y	Configured by *P5-11*
2010h	0	Control command register	RW	Unsigned 16	Y	
2011h	0	Speed reference (RPM)	RW	Integer 16	Y	1 = 0.2RPM
2012h	0	Speed reference (percentage)	RW	Integer 16	Y	4000HEX = 100% *P1-01*
2013h	0	Torque reference	RW	Integer 16	Y	1000DEC = 100%
2014h	0	User ramp reference	RW	Unsigned 16	Y	1 = 1ms (reference to 50 Hz)
2015h	0	Fieldbus PID reference	RW	Integer 16	Y	1000HEX = 100%
2016h	0	Fieldbus analog output 1	RW	Integer 16	Y	1000HEX = 100%
2017h	0	Fieldbus analog output 2	RW	Integer 16	Y	1000HEX = 100%
2100h	0	Reserved/No function	RO	Unsigned 16	Y	Read as 0
2101h	0	PI1	RO	Integer 16	Y	Defined as status
2102h	0	PI2	RO	Integer 16	Y	Configured by *P5-12*
2103h	0	PI3	RO	Integer 16	Y	Configured by *P5-13*
2104h	0	PI4	RO	Integer 16	Y	Configured by *P5-14*
2110h	0	Drive status register	RO	Unsigned 16	Y	
2111h	0	Motor speed (RPM)	RO	Integer 16	Y	1 = 0.2RPM
2112h	0	Motor speed (percentage)	RO	Integer 16	Y	4000HEX = 100% *P1-01*
2113h	0	Motor current	RO	Integer 16	Y	1000DEC = rated inverter current
2114h	0	Motor torque	RO	Integer 16	Y	1000DEC = rated motor torque
2115h	0	Motor power	RO	Unsigned 16	Y	1000DEC = rated inverter power

Manufacturer-specific objects						
Index	**Sub-index**	**Function**	**Access**	**Type**	**PDO map**	**Remark**
2116h	0	Inverter temperature	RO	Integer 16	Y	1DEC = 0.01°C
2117h	0	DC bus value	RO	Integer 16	Y	1DEC = 1V
2118h	0	Analog input 1	RO	Integer 16	Y	1000HEX = entire range
2119h	0	Analog input 2	RO	Integer 16	Y	1000HEX = entire range
211Ah	0	Digital input and output state	RO	Unsigned 16	Y	LB= input, HB = output
211Bh	0	Analog output 1	RO	Integer 16	Y	
211Ch	0	Analog output 2	RO	Integer 16	Y	
2121h	0	Scope channel 1	RO	Unsigned 16	Y	
2122h	0	Scope channel 2	RO	Unsigned 16	Y	
2123h	0	Scope channel 3	RO	Unsigned 16	Y	
2124h	0	Scope channel 4	RO	Unsigned 16	Y	
2AF8h[1)]	0	SBus parameter start index	RO	-	N	11000d
…	0	SBus parameters	RO/RW	-	N	…
2C6F	0	SBus parameter end index	RW	-	N	11375d

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

8 Parameters

8.1 Overview of parameters

8.1.1 Parameters for realtime monitoring (read only)

Parameter group 0 gives access to internal inverter parameters for monitoring purposes. These parameters cannot be changed.

Parameter group 0 is visible if *P1-14* is set to "101".

Parameter	SEW index	Description	Display range	Explanation
P0-01	11210	Value of analog input 1	0–100%	100% = max. input voltage
P0-02	11211	Value of analog input 2	0–100%	100% = max. input voltage
P0-03	11212	Digital input state	Binary value	Digital input state
P0-04	11213	Speed controller setpoint	-100.0–100.0%	100% = base frequency (*P1-09*)
P0-05	11214	Torque controller setpoint	0–100.0%	100 % = nominal motor torque
P0-06	11215	Digital speed setpoint in keypad mode	*-P1-01–P1-01* in Hz	Speed displayed in Hz / rpm
P0-07	11216	Speed setpoint via communication connection	*-P1-01–P1-01* in Hz	–
P0-08	11217	User PID setpoint	0–100%	PID controller setpoint
P0-09	11218	User PID feedback	0–100%	PID controller feedback value
P0-10	11219	User PID output	0–100%	Setpoint feedback
P0-11	11270	Present motor voltage	V rms	rms voltage value on the motor
P0-12	11271	Output torque	0–200.0%	Torque output in %
P0-13	11272 – 11281	Error log	Latest 4 error messages with time stamp	Shows the last 4 errors. You can toggle between sub-items by pressing the "Up"/"Down" keys.
P0-14	11282	Magnetization current (Id)	A rms	Magnetization current in A rms
P0-15	11283	Rotor current (Iq)	A rms	Rotor current in A rms
P0-16	11284	Magnetic field strength	0–100%	Magnetic field strength
P0-17	11285	Stator resistance (Rs)	Ω	Phase-to-phase stator resistance
P0-18	11286	Stator inductance (Ls)	H	Stator inductance in Henry
P0-19	11287	Rotor resistance (Rr)	Ω	Calculated rotor resistance
P0-20	11220	DC link voltage	V DC	Internal DC link voltage
P0-21	11221, 11222	Inverter temperature	°C	Internal temperature of the inverter
P0-22	11288	DC link voltage ripple	V rms	Internal DC link voltage ripple
P0-23	11289, 11290	Total time over 80 °C (heat sink)	Hours and minutes	Time during which the inverter was operated at > 80 °C
P0-24	11237, 11238	Total time over 60 °C (ambient)	Hours and minutes	Time during which the inverter was operated at > 60 °C, two entries
P0-25	11291	Rotor speed (estimated)	Hz	Applies only to vector mode
P0-26	11292, 11293	kWh meter	0.0–999.9 kWh	Cumulative energy consumption
P0-27	11294, 11295	MWh meter	0.0–65535 MWh	Cumulative energy consumption
P0-28	11247 – 11250	Software version and checksum	e.g. "1 1.00", "1 4F3C" "2 1.00", "2 Ed8A"	Version number and checksum, firmware
P0-29	11251 – 11254	Inverter type	e.g. "HP 2", "2 400", "3-PhASE"	Version number and checksum
P0-30	11255	Serial number of the inverter	000000–000000 (SN grp 1) 000-00–999-99 (SN grp 2, 3)	Fixed serial number

Parameter	SEW index	Description	Display range	Explanation
P0-31	11296, 11297	Operating hours since date of manufacture	Hours and minutes	Indicates the entire runtime (is not changed when restoring the factory settings)
P0-32	11298, 11299	Runtime since the last fault (1)	99999 hours	Runtime clock stopped by inverter inhibit (or fault); is only reset with the next enable in the event of a fault. Is also reset with the next enable in the event of a power failure.
P0-33	11300, 11301	Runtime since the last fault (2)	99999 hours	Runtime clock stopped by inverter inhibit (or fault); is only reset with the next enable in the event of a fault (undervoltage is not regarded a fault). Is not restored in the event of power failure/restoration of power unless a fault has occurred prior to the power failure. Is also reset with the next enable in the event of a power failure.
P0-34	11302, 11303	Runtime since the last inhibit	99999 hours	Runtime clock is reset after inverter inhibit
P0-35	11304, 11305	Runtime of inverter fan	Display in hours (resettable + non-resettable)	Runtime clock for internal fan
P0-36	11306 – 11313	DC link voltage log (256 ms)	The last 8 values prior to the fault	The last 8 values prior to the fault
P0-37	11314 – 11321	DC link voltage ripple log (20 ms)	The last 8 values prior to the fault	The last 8 values prior to the fault
P0-38	11322 – 11329	Heat sink temperature log (30 s)	The last 8 values prior to the fault	The last 8 values prior to the fault
P0-39	11239 – 11246	Ambient temperature log (30 s)	The last 8 values prior to the fault	The last 8 values prior to the fault
P0-40	11330 – 11337	Motor current log (256 ms)	The last 8 values prior to the fault	The last 8 values prior to the fault
P0-41	11338	Counter for critical faults -O-I Counter for overcurrent faults	–	Counter for certain critical faults
P0-42	11339	Counter for critical faults -O-Volts Counter for overvoltage faults	–	Counter for certain critical faults
P0-43	11340	Counter for critical faults -U-Volts Counter for undervoltage faults	–	Counter for certain critical faults
P0-44	11341	Counter for critical faults -O-Temp (heat sink) Counter for overtemperature faults of the heat sink	–	Counter for certain critical faults
P0-45	11342	Counter for critical faults -b O-I Counter for short-circuit faults of the brake chopper	–	Counter for certain critical faults
P0-46	11343	Counter for critical faults -O-Temp (ambient) Counter for overtemperature faults in the environment	–	Counter for certain critical faults
P0-47	11223	Counter for internal I/O communication errors	0–65535	–
P0-48	11344	Counter for internal DSP communication errors	0–65535	–
P0-49	11224	Counter for Modbus communication errors	0–65535	–
P0-50	11225	Counter for CAN bus communication errors	0–65535	–

Parameter	SEW index	Description	Display range	Explanation
P0-51	11256 – 11258	Incoming process data PI1, PI2, PI3	Internal value	Three entries hex value display
P0-52	11260 – 11262	Outgoing process data PO1, PO2, PO3	Internal value	Three entries hex value display
P0-53		Current phase offset and reference value for U	Internal value	Two entries First is reference value, second is measured value; no decimal place for both values
P0-54		Current phase offset and reference value for V	Internal value	Two entries First is reference value, second is measured value; no decimal place for both values
P0-55		Current phase offset and reference value for W	Internal value (might not apply to some inverters)	Two entries First is reference value, second is measured value; no decimal place for both values
P0-56		Max. switch-on time of braking resistor, operating cycle of braking resistor	Internal value	Two entries
P0-57		Ud/Uq	Internal value	Two entries
P0-58	11345	Encoder speed	Hz / rpm	Scaling with 3000 = 50.0 Hz with one decimal place 0.0 Hz ~ 999.0 Hz; 1000 Hz ~ 2000 Hz Can be displayed in rpm if P1-10 unequal 0.
P0-59	11226	Frequency input speed	Hz / rpm	Scaling with 3000 = 50.0 Hz with one decimal place 0.0 Hz ~ 999.0 Hz; 1000 Hz ~ 2000 Hz Can be displayed in rpm if P1-10 unequal 0.
P0-60	11346	Calculated slip speed value	Internal value (only with V/f control) Hz / rpm	Scaling with 3000 = 50.0 Hz with one decimal place 0.0 Hz ~ 999.0 Hz; 1000 Hz ~ 2000 Hz Can be displayed in rpm if P1-10 unequal 0.
P0-61	11227	Value for speed hysteresis relay control	Hz / rpm	Scaling with 3000 = 50.0 Hz with one decimal place 0.0 Hz ~ 999.0 Hz; 1000 Hz ~ 2000 Hz Can be displayed in rpm if P1-10 unequal 0.
P0-62	11347, 11348	Speed static	Internal value	Scaling with 3000 = 50.0 Hz with one decimal place 0.0 Hz ~ 999.0 Hz; 1000 Hz ~ 2000 Hz Can be displayed in rpm if P1-10 unequal 0.
P0-63	11349	Speed setpoint after ramp	Hz / rpm	Scaling with 3000 = 50.0 Hz with one decimal place 0.0 Hz ~ 999.0 Hz; 1000 Hz ~ 2000 Hz Can be displayed in rpm if P1-10 unequal 0.
P0-64	11350	Internal switching frequency	4 – 16 kHz	0 = 2 kHz 1 = 4 kHz 2 = 6 kHz 3 = 8 kHz 4 = 12 kHz 5 = 16 kHz
P0-65	11351, 11352	Inverter service life	Hour/min/sec	Two entries First for hour, second for minute and second
P0-66	11353	Reserve		
P0-67	11228	Fieldbus torque setpoint	Internal value	No decimal place
P0-68	11229	User ramp value	BG2…BG3: 0.00 to 600 s; BG4…BG7: 0.0 to 6000 s	BG2…BG3 1 = 0.01 s with 1dp display as 0.01 s ~ 0.09 s, 0.1 s ~ 9.9 s, 10 s ~ 600 s BG4…BG7 1 = 0.1 s with 2dp display as 0.1s ~ 9.9 s, 10 s ~ 6000 s
P0-69	11230	Counter for I2C faults	0 ~ 65535	No decimal place

Parameter	SEW index	Description	Display range	Explanation
P0-70	11231	Module identification code	List	PL-HFA: Hiperface encoder module PL-Enc: Encoder module PL-EIO: IO expansion module PL-BUS: HMS fieldbus module PL-UnF: no module connected PL-UnA: unknown module connected
P0-71		Fieldbus module ID / field-bus module status	List / value	N.A.: no fieldbus module connected Prof-b: Profibus module connected dE-nEt: DeviceNet module connected Eth-IP: Ethernet / IP module connected CAN-OP: CANopen module connected SErCOS: Sercos-III module connected bAc-nt: BACnet module connected nu-nEt: Module of a new type (not detected)
P0-72	11232	Room temperature	C	No decimal place
P0-73	11354	Encoder status / error code	Internal value	Displayed as decimal value
P0-74		L1 input	Internal value	No decimal place
P0-75		L2 input	Internal value	No decimal place
P0-76		L3 input	Internal value	No decimal place
P0-77		Position feedback	Internal value	Position feedback
P0-78		Position reference	Internal value	Position reference
P0-79	11355, 11356	Lib version and DSP boot-loader version for motor control	Example: L 1.00 Example: b 1.00	Two entries; first for lib version of the motor control, second for DSP bootloader version Two decimal places
P0-80	11233, 11357	Code for valid motor data Servo module version		Two entries First value is 1 if valid motor data were read to the servomotor via LTX module. Second value is the SW version of the LTX card.

8.1.2 Parameter register

The following table lists all parameters together with their factory settings (underlined). Numerical values are displayed with the complete setting range.

Modbus register	SEW index	Associated parameter	Range / factory setting
101	11020	*P1-01 Maximum speed*	*P1-02*–50.0 Hz–5 × *P1-09*
102	11021	*P1-02 Minimum speed*	0–P1-01 Hz
103	11022	*P1-03 Acceleration ramp time*	0–5.0–600 s
104	11023	*P1-04 Deceleration ramp time*	0–5.0–600 s
105	11024	*P1-05 Stop mode*	0 / stop ramp / 1 / coasting to stop
106	11025	*P1-06 Energy saving function*	0 / off / 1 / on
107	11012	*P1-07 Rated motor voltage*	
108	11015	*P1-08 Rated motor current*	20% of the rated current ... Rated current
109	11009	*P1-09 Rated motor frequency*	25–50/60–500 Hz
110	11026	*P1-10 Rated motor speed*	0–30000 rpm
111	11027	*P1-11 Voltage increase, boost*	0–30% (factory setting depends on inverter)
112	11028	*P1-12 Control signal source*	0 (terminal mode)
113	11029	*P1-13 Error history*	
114	11030	*P1-14 Extended parameter access*	0–30000
115	11031	*P1-15 Digital input function selection*	0–1–25
116	11006	*P1-16 Motor type*	In-Syn
117	11032	*P1-17 Servo module function selection*	1–8
118	11033	*P1-18 Motor thermistor selection*	0 / disabled
119	11105	*P1-19 Inverter address*	1–63
120	11106	*P1-20 SBus baud rate*	125, 250, 500, 1000 kBaud
121	11017	*P1-21 Stiffness*	
122	11149	*P1-22 Motor load inertia ratio*	0–1–30
201	11036	*P2-01 Preset speed 1*	-P1-01–5.0 Hz–P1-01
202	11037	*P2-01 Preset speed 1*	-P1-01–10.0 Hz–P1-01
203	11038	*P2-03 Preset speed 3*	-P1-01–25.0 Hz–P1-01
204	11039	*P2-04 Preset speed 4*	-P1-01–50.0 Hz–P1-01
205	11040	*P2-05 Preset speed 5*	-P1-01–0.0 Hz–P1-01
206	11041	*P2-06 Preset speed 6*	-P1-01–0.0 Hz–P1-01
207	11042	*P2-07 Preset speed 7*	-P1-01–0.0–P1-01
208	11043	*P2-08 Preset speed 8*	-P1-01–0.0–P1-01
209	11044	*P2-09 Skip center frequency*	P1-02–P1-01
210	11045	*P2-10 Skip bandwidth*	0.0 Hz–P1-01
211	11046	*P2-11 – P2-14 Analog outputs*	0–8–12
212	11047	*P2-12 Analog output 1 format*	0–10 V
213	11048	*P2-13 Analog output 2 function selection*	0–9–12
214	11049	*P2-14 Analog output 2 format*	0–10 V
215	11050	*P2-15 User relay output 1 function selection*	0–1–9
216	11051	*P2-16 Upper limit user relay 1 / analog output 1*	0.0–100.0–200.0%
217	11052	*P2-17 Lower limit user relay 1 / analog output 1*	0.0–200.0%
218	11053	*P2-18 User relay output 2 function selection*	0–3–9
219	11054	*P2-19 Upper limit user relay 2 / analog output 2*	0.0–100.0–200.0%
220	11055	*P2-20 Lower limit user relay 2 / analog output 2*	0.0–200.0%
221	11056	*P2-21 Display scaling factor*	-30.000–0.000–30000
222	11057	*P2-22 Display scaling source*	
223	11058	*P2-23 Zero speed holding time*	0.0–0.2–60.0 s
224	11003	*P2-24 Switching frequency, PWM*	2–16 kHz (depends on inverter)

Modbus register	SEW index	Associated parameter	Range / factory setting
225	11059	*P2-25 Second deceleration ramp, rapid stop ramp*	0.00–30.0 s
226	11060	*P2-26 Flying start enable*	0 / disabled
227	11061	*P2-27 Standby mode*	0.0–250 s
228	11062	*P2-28 Slave speed scaling*	0 / disabled
229	11063	*P2-29 Slave speed scaling factor*	-500–100–500%
230	11064	*P2-30 Analog input 1 format*	0–10 V
231	11065	*P2-31 Analog input 1 scaling*	0–100–500%
232	11066	*P2-32 Analog input 1 offset*	-500–0–500%
233	11067	*P2-33 Analog input 2 format*	0–10 V
234	11068	*P2-34 Analog input 2 scaling*	0–100–500%
235	11069	*P2-35 Analog input 2 offset*	-500–0–500%
236	11070	*P2-36 Start mode selection*	Auto–0
237	11071	*P2-37 Keypad restart speed*	0–7
238	11072	*P2-38 Mains loss stop control*	
239	11073	*P2-39 Parameter lock*	0 / disabled
240	11074	*P2-40 Extended parameter access code definition*	0–101–9999
301	11075	*P3-01 PID proportional gain*	0–1–30
302	11076	*P3-02 PID integral time constant*	0–1–30
303	11077	*P3-03 PID differential time constant*	0.00–1.00
304	11078	*P3-04 PID operating mode*	0 / direct operation
305	11079	*P3-05 PID reference selection*	
306	11080	*P3-06 PID fixed setpoint reference*	0.0–100.0%
307	11081	*P3-07 PID controller upper limit*	P3-08–100.0%
308	11082	*P3-08 PID controller lower limit*	0.0 %–P3-07%
309	11083	*P3-09 PID correcting variable limit*	
310	11084	*P3-10 PID feedback selection*	0 / analog input 2
311	11085	*P3-11 PID ramp activation error*	0.0–25.0%
312	11086	*P3-12 PID actual value display scaling factor*	0.000–50.000
313	11087	*P3-13 PID feedback wake-up level*	0.0–100.0%
401	11089	*P4-01 Control mode*	2 / speed control – advance V/f
402	11090	*P4-02 Auto tune*	0 / disabled
403	11091	*P4-03 Speed controller proportional gain*	0.1–50–400%
404	11092	*P4-04 Speed controller integral time constant*	0.001–0.100–1.000 s
405	11093	*P4-05 Motor power factor*	0.50–0.99 (depends on inverter)
406	11094	*P4-06 Torque setpoint source*	0 / maximum torque
407	11095	*P4-07 Max. motor torque limit*	P4-08–200–500%
408	11096	*P4-08 Min. torque limit*	0.0–P4-07%
409	11097	*P4-09 Max. regenerative torque limit*	P4-08–200–500%
410	11098	*P4-10 V/f characteristic adjustment frequency*	0.0–100.0% of P1-09
411	11099	*P4-11 V/f characteristic adjustment voltage*	0.0–100.0% of P1-07
412	11100	*P4-12 Motor brake control*	0 / disabled / 1 / Enabled
413	11101	*P4-13 Brake release time*	0.0–0.2–5.0 s
414	11102	*P4-14 Brake application time*	0.0–5.0 s
415	11103	*P4-15 Torque threshold for brake release*	0.0–1.0–200%
416	11104	*P4-16 Torque threshold timeout*	0.0–25.0 s
417	11357	*P4-17 Thermal motor protection to UL508C*	0 / disabled
501	11105	*P5-01 Inverter address*	1–63
502	11106	*P5-02 SBus baud rate*	
503	11107	*P5-03 Modbus baud rate*	
504	11108	*P5-04 Modbus data format*	n-1 / no parity, 1 stop bit

Modbus register	SEW index	Associated parameter	Range / factory setting
505	11109	*P5-05 Response to communication failure*	2 / stop ramp (without fault)
506	11110	*P5-06 Communication failure timeout*	0.0–1.0–5.0 s
507	11111	*P5-07 Ramp specified via fieldbus*	0 / disabled
508	11112	*P5-08 Synchronization duration*	0, 5–20 ms
509	11369	*P5-09 Fieldbus PO2 definition*	
510	11370	*P5-10 Fieldbus PO3 definition*	
511	11371	*P5-11 Fieldbus PO4 definition*	
512	11372	*P5-12 Fieldbus PI2 definition*	
513	11373	*P5-13 Fieldbus PI3 definition*	
514	11374	*P5-14 Fieldbus PI4 definition*	
515	11360	*P5-15 Expansion relay 3 function selection*	
516	11361	*P5-16 Relay 3 upper limit*	0.0–100.0–200.0%
517	11362	*P5-17 Relay 3 lower limit*	0.0–200.0%
518	11363	*P5-18 Expansion relay 4 function selection*	
519	11364	*P5-19 Relay 4 upper limit*	0.0–100.0–200.0%
520	11365	*P5-20 Relay 4 lower limit*	0.0–200.0%
601	11115	*P6-01 Firmware upgrade enable*	0 / disabled
602	11116	*P6-02 Automatic thermal management*	1 / enabled
603	11117	*P6-03 Auto-reset delay time*	1–20–60 s
604	11118	*P6-04 User relay hysteresis band*	0.0–0.3–25.0%
605	11119	*P6-05 Encoder feedback enable*	0 / disabled
606	11120	*P6-06 Encoder PPR*	0–65535 PPR
607	11121	*P6-07 Speed error trigger threshold*	1.0–5.0–100%
608	11122	*P6-08 Max. frequency for speed setpoint*	0; 5–20 kHz
609	11123	*P6-09 Speed droop control*	0.0–25.0
610	11124	*P6-10 Reserved*	
611	11125	*P6-11 Speed holding time on enable (preset speed 7)*	0.0–250 s
612	11126	*P6-12 Speed holding time on inhibit (preset speed 8)*	0.0–250 s
613	11127	*P6-13 Fire mode logic*	0 / open trigger: Fire mode
614	11128	*P6-14 Fire mode speed*	-P1-01–0–P1-01 Hz
615	11129	*P6-15 Analog output 1 scaling*	0.0–100.0–500.0%
616	11130	*P6-16 Analog output 1 offset*	-500.0–0.0–500.0%
617	11131	*P6-17 Max. torque limit timeout*	0.0–25.0 s
618	11132	*P6-18 DC braking voltage level*	Auto, 0.0–25.0%
619	11133	*P6-19 Braking resistor value*	0, Min-R–200 Ω
620	11134	*P6-20 Braking resistor power*	0–200 kW
621	11135	*P6-21 Brake chopper undertemperature duty cycle*	0.0–2.0–20.0%
622	11136	*P6-22 Reset fan runtime*	0 / disabled
623	11137	*P6-23 Reset kWh meter*	0 / disabled
624	11138	*P6-24 Parameter default settings*	0 / disabled
625	11139	*P6-25 Access code level*	0–201–9999
701	11140	*P7-01 Motor stator resistance (Rs)*	
702	11141	*P7-02 Motor rotor resistance (Rr)*	
703	11142	*P7-03 Motor stator inductance (Lsd)*	
704	11143	*P7-04 Motor magnetizing current (Id rms)*	
705	11144	*P7-05 Motor leakage loss coefficient (sigma)*	0.025–0.10–0.25
706	11145	*P7-06 Motor stator inductance (Lsq) − only for PM motors*	
707	11146	*P7-07 Enhanced generator control*	0 / disabled
708	11147	*P7-08 Parameter adjustment*	0 / disabled

Modbus register	SEW index	Associated parameter	Range / factory setting
709	11148	*P7-09 Overvoltage current limit*	0.0–1.0–100%
710	11149	*P7-10 Motor load inertia*	0–10–600
711	11150	*P7-11 Pulse width min. limit*	0–500
712	11151	*P7-12 Pre-magnetization time*	0–2000 ms
713	11152	*P7-13 Vector speed controller D gain*	0.0–400%
714	11153	*P7-14 Low-frequency torque boost*	0.0–100%
715	11154	*P7-15 Torque boost frequency limit*	0.0–50%
716	11155	*P7-16 Motor nameplate speed*	0.0–6000 rpm
801	11156	*P8-01 Simulated encoder scaling*	2^0–2^3
802	11157	*P8-02 Input pulse scaling value*	2^0–2^{16}
803	11158	*P8-03 Lag error low*	0–65535
804	11159	*P8-04 Lag error high*	0–65535
805	11160	*P8-05 Reference travel*	0 / disabled
806	11161	*P8-06 Position controller proportional gain*	0.0–1.0–400 %
807	11162	*P8-07 Touch probe trigger mode*	0 / TP1 P edge TP2 P edge
808	11163	*P8-08 Reserved*	
809	11164	*P8-09 Velocity feedforward gain*	0–100–400%
810	11165	*P8-10 Acceleration feedforward gain*	0–400%
811	11166	*P8-11 Reference offset low word*	0–65535
812	11167	*P8-12 Reference offset high word*	0–65535
813	11168	*P8-13 Reserved*	
814	11169	*P8-14 Reference enable torque*	0–100–500%
901	11171	*P9-01 Enable input source*	
902	11172	*P9-02 Rapid stop input source*	
903	11173	*P9-03 Run (FWD) input source*	
904	11174	*P9-04 Run (REV) input source*	
905	11175	*P9-05 Latch function enable*	
906	11176	*P9-06 Direction of rotation reversal*	
907	11177	*P9-07 Reset input source*	
908	11178	*P9-08 External fault input source*	
909	11179	*P9-09 Terminal control enable source*	
910	11180	*P9-10 Speed source 1*	
911	11181	*P9-11 Speed source 2*	
912	11182	*P9-12 Speed source 3*	
913	11183	*P9-13 Speed source 4*	
914	11184	*P9-14 Speed source 5*	
915	11185	*P9-15 Speed source 6*	
916	11186	*P9-16 Speed source 7*	
917	11187	*P9-17 Speed source 8*	
918	11188	*P9-18 Speed selection input 0*	
919	11189	*P9-19 Speed selection input 1*	
920	11190	*P9-20 Speed selection input 2*	
921	11191	*P9-21 Preset speed selection input 0*	
922	11192	*P9-22 Preset speed selection input 1*	
923	11193	*P9-23 Preset speed selection input 2*	
924	11194	*P9-24 Positive jog mode input*	
925	11195	*P9-25 Negative jog mode input*	
926	11196	*P9-26 Reference travel enable input*	
927	11197	*P9-27 Reference cam input*	

Modbus register	SEW index	Associated parameter	Range / factory setting
928	11198	*P9-28 Motor potentiometer up input source*	
929	11199	*P9-29 Motor potentiometer down input source*	
930	11200	*P9-30 Speed-limit switch FWD*	
931	11201	*P9-31 Speed-limit switch REV*	
932	11202	*P9-32 Enable second deceleration ramp, rapid stop ramp*	
933	11203	*P9-33 Fire mode input selection*	

8.2 Explanation of the parameters

8.2.1 Parameter group 1: Basic parameters (level 1)

P1-01 Maximum speed

Setting range: *P1-02* – 50.0 Hz – 5 × *P1-09* (max. 500 Hz)

Specifies the upper limit for the frequency (speed) that can be applied to the motor in any operating mode. This parameter is displayed in Hz in factory default state or when the parameter for the rated motor speed (*P1-10*) is set to zero. If the rated motor speed was entered in rpm in *P1-10*, this parameter will be displayed in rpm.

The maximum speed is also limited by the switching frequency set in *P2-24*. The limit is determined by the maximum output frequency to the motor = *P2-24 / 16*.

P1-02 Minimum speed

Setting range: 0 – P1-01 Hz

Specifies the lower limit for the frequency (speed) that can be applied to the motor in any operating mode. This parameter is displayed in Hz in factory default state or when the parameter for the rated motor speed (P1-10) is set to zero. If the rated motor speed was entered in rpm in *P1-10*, this parameter will be displayed in rpm.

The speed drops below this limit only when the inverter enable signal is removed and the inverter decreases the output frequency to zero.

P1-03 Acceleration ramp time

Setting range: 0 – 5.0 ... 600 s

Specifies the time in seconds during which the output frequency (speed) increases from 0 to 50 Hz. Note that the ramp time is not affected by changing either the maximum or minimum speed limit. The reason is that the ramp time refers to 50 Hz, not to *P1-01* / *P1-02.*

P1-04 Deceleration ramp time

Setting range: 0 – 5.0 ... 600 s

Specifies the time in seconds during which the output frequency (speed) decreases from 50 to 0 Hz. Note that the ramp time is not affected by changing either the maximum or minimum speed limit. The reason is that the ramp time refers to 50 Hz, not to *P1-01* / *P1-02.*

P1-05 Stop mode

Setting range: 0 / stop ramp / 1 / coast to stop

- 0 / Stop ramp: The speed is decreased to zero along the ramp set in *P1-04* when the inverter enable signal is removed. The output stage is only inhibited when the output frequency is zero. (If a zero speed holding time is set in P2-23, the inverter will hold zero speed during this time before it is disabled).
- 1 / Coast to stop: In this case, the inverter output is disabled as soon as the enable signal is removed. The motor then coasts to stop in a non-controlled manner.

P1-06 Energy saving function

Setting range: 0 / Off / 1 / On

When enabled, the inverter automatically reduces the applied motor voltage at light loads. This function is only available for asynchronous motors.

P1-07 Rated motor voltage

Setting range:

- 230 V motors: 0.20 – 230 ... 250 V
- 400 V motors: 0.20 – 400 – 500 V

Specifies the rated voltage of the motor connected to the inverter (according to the motor nameplate). The parameter value is used in V/f speed control for controlling the output voltage applied to the motor. In V/f speed control, the output voltage of the inverter

amounts to the value set in *P1-07* if the output speed corresponds to the motor base frequency set in *P1-09*.

"0V" = DC link compensation is disabled. During braking, the V/f ratio shifts due to the voltage increase in the DC link. Consequently, higher losses occur in the motor. The motor heats up more. The additional motor losses during braking might make a braking resistor redundant.

P1-08 Rated motor current

Setting range: 20 – 100% of the inverter output current. Is given as absolute value in ampere.

Specifies the rated current of the motor connected to the inverter (according to the motor nameplate). This allows the inverter to match its internal thermal motor protection (I x t protection) to the motor. The inverter shuts down in the event of motor overload (I.t-trP) so that no thermal damage occurs in the motor.

P1-09 Rated motor frequency

Setting range: 25 – 50/60[1] – 500 Hz

Specifies the rated frequency of the motor connected to the inverter (according to the motor nameplate). This is the frequency at which the maximum (rated) output voltage is applied to the motor. Above this frequency, the voltage applied to the motor remains constant at its maximum value.

P1-10 Rated motor speed

Setting range: 0 – 30 000 rpm

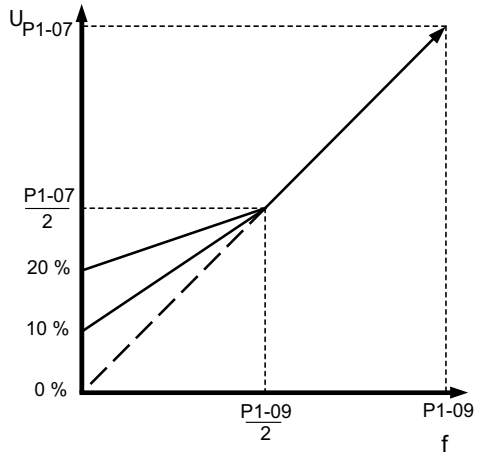
Specifies the rated speed of the motor. When the parameter is set to a value other than zero, all speed-related parameters, such as minimum and maximum speed are displayed in "rpm".

At the same time, slip compensation is enabled. The frequency or speed shown on the display of the inverter corresponds to the calculated rotor frequency or rotor speed.

P1-11 Voltage increase, boost

Setting range: 0–30% (default value depends on inverter voltage and power rating)

Specifies the voltage increase at low speed to facilitate starting jammed loads. Modifies the V/f limit values by ½ *P1-07* and ½ *P1-09*.



2933868939

1) 60 Hz (only American version)

P1-12 Control signal source

This parameter allows users to define whether the inverter is controlled via user terminals, via the keypad on the front of the unit, or via the internal PID controller.

See also chapter "Simple startup of MOVITRAC® LTP-B" (page 42).

- 0 (terminal mode)
- 1 (keypad mode, unipolar)
- 2 (keypad mode, bipolar)
- 3 (PID controller mode)
- 4 (slave mode)
- 5 (SBus MOVILINK®)
- 6 (CANopen)
- 7 (fieldbus/Modbus)
- 8 (MultiMotion)

P1-13 Error history

Includes the 4 most recent faults and/or events that have occurred. Each fault is displayed as abbreviated text. The most recent fault is displayed first. When a new fault occurs, it will be entered at the top of the list. All other faults are shifted downwards. The oldest fault will be deleted from the error history. If the latest fault in the error history is an undervoltage fault, no further undervoltage faults will be entered in the error history. The reason is to avoid that the error history is filled with undervoltage faults, which occur every time the MOVITRAC® LTP-B inverter is switched off.

P1-14 Extended parameter access

Setting range: 0 – 30000

This parameter allows users to access parameter groups other than the basic parameters (parameters *P1-01..P1-15*). Access is possible when the following values are valid.

- 0 / P1-01..P1-15 – Basic parameters
- 1 / P1-01..P1-22 – Basic + servo parameters
- 101 /P0-01..P5-20 – Extended parameters without servo parameters
- 201 /P0-01..P9-33 – Extended parameters with servo parameters

P1-15 Digital input function selection

Setting range: 0 – 1 – 25

Defines the function of the digital inputs. See chapter "P1-15 Digital inputs function selection" (page 117).

8.2.2 Servo-specific parameters (level 1)

P1-16 Motor type Setting the motor type

Display value	Motor type	Explanation
1n-54n	Induction motor	Default setting. Do not change if none of the selection options match. Choose induction motor or permanent magnet motor in parameter *P4-01*.
54n	Undefined servomotor	Undefined servomotor. You must set special servo parameters during startup. In this case, you have to set *P4-01* to PM motor control.
40M 2 40M 4	230 V / 400 V CMP40M	Preset CMP motors from SEW-EURODRIVE. Selecting one of those motor types will automatically set all the motor-specific parameters. The overload behavior is set to 200% for 60 s and to 250% for 2 s.
40M 2b 40M 4b	230 V / 400 V CMP40M with brake	
50S 2 50S 4	230 V / 400V CMP50S	
50S 2b 50S 4b	230 V / 400 V CMP50S with brake	
50M 2 50M 4	230 V / 400 V CMP50M	
50M 2b 50M 4b	230 V / 400 V CMP50M with brake	
50L 2 50L 4	230 V / 400 V CMP50L	
50L 2b 50L 4b	230 V / 400 V CMP50L with brake	
63S 2 63S 4	230 V / 400 V CMP63S	
63S 2b 63S 4b	230 V / 400 V CMP63S with brake	
63M 2 63M 4	230 V / 400 V CMP63M	
63M 2b 63M 4b	230 V / 400 V CMP63M with brake	
63L 2 63L 4	230 V / 400 V CMP63L	
63L 2b 63L 4b	230 V / 400 V CMP63L with brake	
71S 2 71S 4	230 V / 400 V CMP71S	
71S 2b 71S 4b	230 V / 400 V CMP71S with brake	
71M 2 71M 4	230 V / 400 V CMP71M	
71M 2b 71M 4b	230 V / 400 V CMP71M with brake	
71L 2 71L 4	230 V / 400 V CMP71L	
71L 2b 71L 4b	230 V / 400 V CMP71L with brake	
9F2	MGF2..DSM	Selection for MGF..DSM operation. Select the required size. All necessary parameters are set automatically. In this case, the overload is 300% for 5 seconds and 200% for 300 seconds.
9F4	MGF4..DSM	

Using this parameter lets you select preset motors (CMP and MGF..DSM). This parameter is set automatically if Hiperface encoder information is read-in via LTX encoder card.

When a permanent magnet motor is connected and the drive is operating in frequency inverter mode, *P1-16* does not have to be changed. In this case *P4-01* determines the motor type (auto tune required).

P1-17 Servo module function selection

Setting range: 1–8

Determines the function of the servo module I/O. See chapter "*P1-17* Servomodule function selection" in the addendum to the MOVITRAC® LTX operating instructions.

P1-18 Motor thermistor selection

0 / disabled

1 / KTY

If a motor is selected via *P1-16*, this parameter will change to 1. Only available with the LTX servomodule.

P1-19 Inverter address

Setting range: 1 – 63

Mirror parameter of *P5-01*. Changing *P1-19* will have an immediate effect on *P5-01*.

P1-20 SBus baud rate

Setting range: 125, 250, 500, 1000 kBd

This parameter is a mirror parameter of *P5-02*. Changing *P1-20* will have an immediate effect on *P5-02*.

P1-21 Stiffness

Setting range: 0.5–1.00–2.00

P1-22 Motor load inertia ratio

Setting range: 0.0–1.0–30.0

The inertia ratio between motor and connected load can be specified in the inverter. This value can usually remain set to the default value "1.0". However, it is used by the control algorithm as precontrol value for CMP/PM motors from P1-16 to provide the optimal torque/current for accelerating the load. This is why the exact setting of the inertia ratio improves the response characteristics and the dynamics of the system. In a closed control loop, the value is calculated as follows:

$$P1-22 = \frac{J_{ext}}{J_{mot}}$$

If you do not know the value, keep the default setting "1.0".

8.2.3 Parameter group 2: Extended parameter setting (level 2)

P2-01–P2-08

If parameter *P1-10* is set to 0, the following parameters *P2-01* to *P2-08* can be changed in steps of 0.1 Hz each.

If parameter *P1-10 ≠ 0*, the following parameters *P2-01* to *P2-08* can be changed in the following steps:

- 1 rpm if *P1-09* ≤ 100 Hz
- 2 rpm if 100 Hz < *P1-09* ≤ 200 Hz
- 4 rpm if *P1-09* > 200 Hz

P2-01 Preset speed 1

Setting range: *-P1-01* – 5.0 Hz – *P1-01*

P2-01 Preset speed 1

Setting range: -P1-01 – 10.0 Hz – P1-01

P2-03 Preset speed 3

Setting range: -P1-01 – 25.0 Hz – P1-01

P2-04 Preset speed 4

Setting range: -P1-01 – 50.0 Hz – P1-01

P2-05 Preset speed 5

Setting range: -P1-01 – 0.0 Hz – P1-01

Is also used as reference travel speed.

P2-06 Preset speed 6

Setting range: -P1-01 – 0.0 Hz – P1-01

Is also used as reference travel speed.

P2-07 Preset speed 7

Setting range: -P1-01 – 0.0 – P1-01

Used for brake release speed in hoist mode

P2-08 Preset speed 8

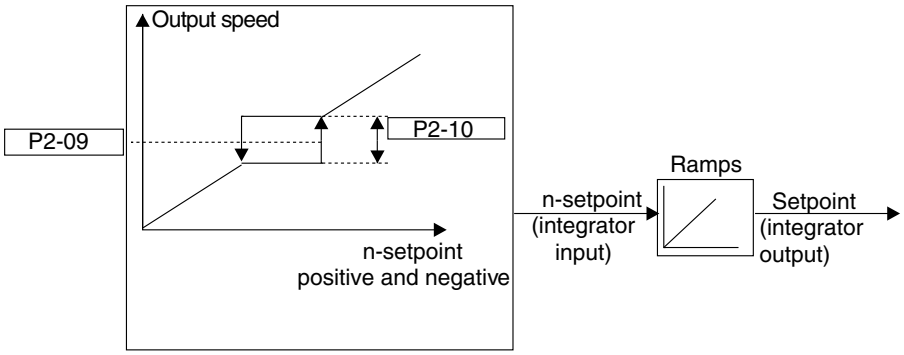
Setting range: -P1-01–0.0–P1-01

Used for brake application speed in hoist mode

P2-09 Skip center frequency

Setting range: *P1-02 – P1-01*

Skip center frequency and skip bandwidth are values and automatically have an effect on positive and negative setpoints when activated. The function is deactivated by setting the skip bandwidth to 0.



9007202718207243

P2-10 Skip bandwidth

Setting range: 0.0 Hz–P1-01

P2-11 – P2-14 Analog outputs

Digital output mode: (0V / 24V)

Setting	Function	Explanation
0	Inverter enabled	Logic 1 when inverter is enabled (running)
1	Inverter ok (digital)	Logic 1 when there is no inverter fault
2	Motor operates at setpoint speed (digital)	Logic 1 when motor speed corresponds to setpoint
3	Motor speed ≥ 0 (digital)	Logic 1 when motor runs above 0 speed
4	Motor speed ≥ limit value (digital)	Digital output enabled with level set in "User relay/analog output upper limit" and "User relay/analog output lower limit"
5	Motor current ≥ limit value (digital)	
6	Motor torque ≥ limit value (digital)	
7	Analog input 2 ≥ limit value (digital)	

Analog output mode: (0 – 10 V or 0/4 – 20 mA)

Setting	Function	Explanation
8	Motor speed (analog)	The amplitude of the analog output signal represents the motor speed. It is scaled from zero to the maximum speed limit defined in P1-01.
9	Motor current (analog)	The amplitude of the analog output signal represents the motor load current (torque). It is scaled from zero to 200% of the rated motor current defined in P1-08.
10	Motor torque (analog)	
11	Motor power (analog)	The amplitude of the analog output signal represents the output power of the inverter. It is scaled from zero to the rated power of the inverter.
12	SBus (analog)	Analog output value is controlled via SBus if P1-12 = 8

P2-11 Analog output 1 function selection

Setting range: 0 – 8 – 12

See table P2-11 – P2-14 (page 85).

P2-12 Analog output 1 format

0 – 10 V

10 – 0 V

0 – 20 mA, 20 – 0 mA

4 – 20 mA, 20 – 4 mA

P2-13 Analog output 2 function selection

Setting range: 0 – 9 – 12

See table P2-11 – P2-14 (page 85).

P2-14 Analog output 2 format

0 – 10 V:

10 – 0 V

0 – 20 mA, 20 – 0 mA

4 – 20 mA, 20 – 4 mA

P2-15 – P2-20 Relay outputs

Functions:

Setting	Function	Explanation
0	Inverter enabled	Relay contacts closed when inverter is enabled.
1	Inverter ok (digital) = no fault	Relay contacts closed when inverter is ok (no fault).
2	Motor runs at target speed (digital)	Relay contacts closed when output frequency = setpoint frequency ± 0.1 Hz.
3	Motor speed ≥ 0 (digital)	Relay contacts closed when output frequency is greater than "zero frequency" (0.3% of base frequency)
4	Motor speed ≥ limit value (digital)	Relay contacts closed when output frequency is greater than the value set in parameter "User relay upper limit". Relay contacts open when the value is smaller than the value set in parameter "User relay lower limit"
5	Motor current ≥ limit value (digital)	Relay contacts closed when motor current/torque is greater than the current limit set in parameter "User relay upper limit". Relay contacts open when the value is smaller than the value set in parameter "User relay lower limit"
6	Motor torque ≥ limit value (digital)	
7	Analog input 2 ≥ limit value (digital)	Relay contacts closed when second analog input value is greater than the value set in parameter "User relay upper limit". Relay contacts open when the value is smaller than the value set in parameter "User relay lower limit"
8	Hoist (only for *P2-18*)	This parameter is displayed when *P4-12* hoist function is set to 1. The inverter now controls the relay contact for hoist mode. (Value cannot be changed if *P4-12* = 1)
9	STO status	Relay contacts open if STO circuit is open (inverter indicates "inhibit")

P2-15 User relay output 1 function selection

Setting range: 0 – 1 – 9

See table *P2-15 – P2-20*

P2-16 Upper limit user relay 1 / analog output 1

Setting range: 0.0 – 100.0 – 200.0%

P2-17 Lower limit user relay 1 / analog output 1

Setting range: 0.0 – 200.0%

P2-18 User relay output 2 function selection

Setting range: 0 – 3 – 9

See table *P2-15 – P2-20*

P2-19 Upper limit user relay 2 / analog output 2

Setting range: 0.0–100.0–200.0%

P2-20 Lower limit user relay 2 / analog output 2

Setting range: 0.0–200.0%

P2-21 /22 Display scaling

P2-21 lets users scale the data from a selected source to provide a displayed value the better represents the controlled process. The source value to be used for scaling calculation is defined in *P2-22*.

If P2-21 is set to a value other than zero, the scaled value will be shown on the display in addition to motor speed, motor current, and motor power. Pressing the "Navigate" key toggles the display between real-time values. A lowercase letter "c" on the left side of the display indicates that the scaled value is being displayed. The scaled display value is calculated using the following equation:

Scaled display value = *P2-21* × scaling source

P2-21 Display scaling factor

Setting range: -30.000 – 0.000 – 30000

P2-22 Display scaling source

- 0 / Motor speed information is used as the scaling source.
- 1 / Motor current information is used as the scaling source.
- 2 / The value of the second analog input is used as the scaling source. In this case, the range of input values is 0 to 4096.

P2-23 Zero speed holding time

Setting range: 0.0 – 0.2 ... 60.0 s

You can use this parameter to have the motor hold zero speed (0 Hz) for a certain time before it is shut down whenever it receives a stop command and reduces the output speed to zero.

When *P2-23* = 0, the output of the inverter is disabled immediately once the output speed reaches zero.

When *P2-23* is set to a value unequal zero, the motor holds zero speed for a certain time (defined in P2-23 in seconds) before the output of the inverter is disabled. This function is usually used together with the relay output function to have the inverter issue a relay control signal before the inverter output is disabled.

P2-24 Switching frequency, PWM

Setting range: 2–16 kHz (depends on inverter)

Specifies the output switching frequency. A higher switching frequency means less motor noise, but also higher losses in the output stage. The maximum output switching frequency depends on the inverter power rating.

The inverter reduces the switching frequency automatically when the heat sink temperature is excessively high.

P2-25 Second deceleration ramp, rapid stop ramp

Setting range: 0.00 ... 30.0 s

Ramp time 2nd deceleration ramp, rapid stop ramp. Is selected automatically in the event of a power failure if *P2-38* = 2.

Can also be selected using digital inputs depending on other parameter settings. If set to "0", the motor decelerates as quickly as possible without overvoltage fault.

P2-26 Flying start enable

When this function is enabled, the motor starts from the detected rotor speed. A short delay is possible when the rotor is at standstill (only possible when *P4-01* = 0, 1 or 2).

0 / Disabled

1 / Enabled

P2-27 Standby mode

Setting range: 0.0 ... 250 s

When *P2-27* > 0, the inverter goes to standby mode (output disabled) if the minimum speed is maintained for the time specified in P2-27. This function is disabled when *P2-23* > 0 or *P4-12*=1.

P2-28/29 Master/slave parameters

The inverter uses parameter *P2-28/29* to scale the setpoint speed received from the master of the network.

This function is particularly suited for applications where all motors in a network are synchronized but run at different speeds based on a fixed scaling factor.

For example, if a slave motor is set in *P2-29* = 80% and *P2-28* = 1 and the master motor in the network runs at 50 Hz, then the slave motor will run at 40 Hz after being enabled.

P2-28 Slave speed scaling

0 / Disabled

1 / Actual speed = digitale speed x *P2-29*

2 / Actual speed = (digital speed x P2-29) + analog input 1 reference

3 / Actual speed = digital speed x P2-29 x analog input 1 reference

P2-29 Slave speed scaling factor

Setting range: -500 – 100 – 500%

P2-30–P2-35 Analog inputs

These parameters enable users to configure analog inputs 1 and 2 to suit the signal format present at the analog input control terminals. When set to 0 – 10 V, all negative input voltages result in zero speed. When set to -10 – 10 V, all negative voltages result in the inverter running at negative speed, which is proportional to the magnitude of the input voltage.

P2-30 Analog input 1 format

0 – 10 V, 10 – 0 V / unipolar voltage range

-10 – 10 V / bipolar voltage input

0 – 20 mA / current input

t4 – 20 mA, t20-4 mA

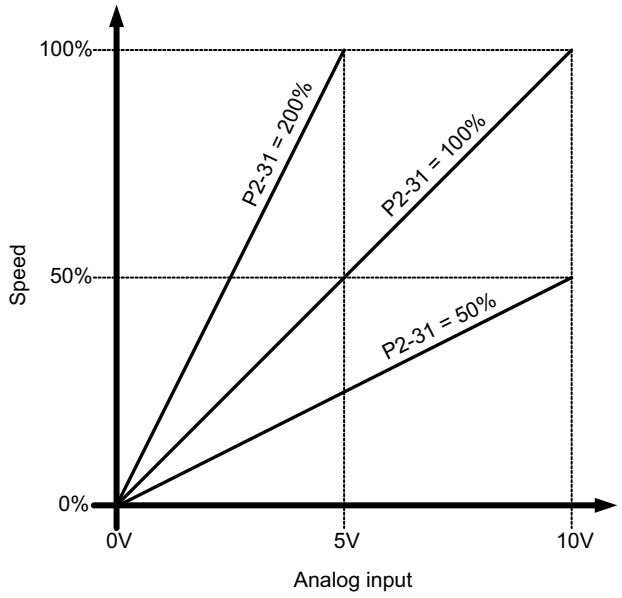
r4 – 20 mA, r20-4 mA

"t" indicates that the inverter shuts down when the signal is removed while the inverter is enabled. t4 – 20 mA, t20 – 4 mA

"r" indicates that the inverter moves along a ramp to *P1-02* when the signal is removed while the inverter is enabled. r4 – 20 mA, r20-4 mA

P2-31 Analog input 1 scaling

Setting range: 0 – 100 – 200%

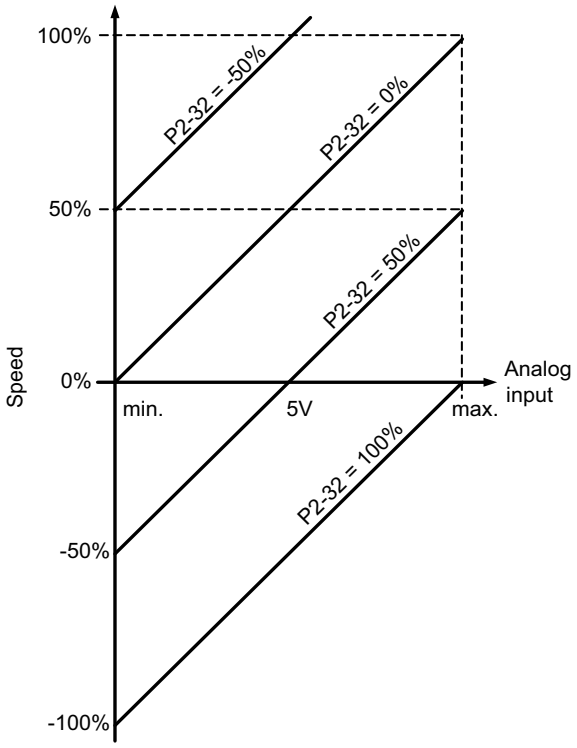


7370733451

P2-32 Analog input 1 offset

Setting range: -500 – 0 – 500%

Specifies an offset as a percentage of the entire input range applied to the analog input signal.



9007202188615947

P2-33 Analog input 2 format

0 – 10 V, 10 – 0 V / / unipolar voltage input

PTC-th / motor thermistor input

0 – 20 mA / current input

t4 – 20 mA, t20 – 4 mA

"t" indicates that the inverter shuts down when the signal is removed while the inverter is enabled.

r4 – 20 mA,r 20 – 4 mA

"r" indicates that the inverter moves along a ramp to *P1-02* when the signal is removed while the inverter is enabled. PTC-th has to be selected together with *P1-15* as response to an external fault to ensure thermal motor protection.

P2-34 Analog input 2 scaling

Setting range: 0 – 100 – 500%

P2-35 Analog input 2 offset

Setting range: -500 – 0 – 500%

Specifies an offset as a percentage of the entire input range applied to the analog input signal.

P2-36 Start mode selection

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

- **Edge-r**: The inverter does not start after switching-on or reset if digital input 1 remains closed. To start the inverter, the input must be closed **after** switching on or resetting the inverter.
- Auto-0: The inverter starts automatically after switching-on or reset if digital input 1 is closed.
- **Auto-1 – Auto-5**: After switch-off with fault (trip), the inverter makes up to 5 restart attempts at intervals of 20 seconds. To reset the counter, the inverter must be de-energized. The number of attempted restarts is counted. If the inverter fails to start with the final attempt, the inverter goes to error state and prompts the user to reset the fault manually.

P2-37 Keypad restart speed

This parameter is only active if *P1-12* = "1" or "2".

0 / Minimum speed. Following a stop or restart, the motor runs at the minimum speed set in *P1-02*.

1 / Last speed. Following a stop or restart, the inverter returns to the value prior to stopping that was last set using the keypad.

2 / Current speed. If the inverter is configured for several speed references (usually manual/automatic control or local/decentral control), the inverter continues to run at the last operating speed when keypad mode is changed via digital input.

3 / Preset speed 8. Following a stop or restart, the inverter always runs at preset speed 8 (*P0-08*).

4 / Minimum speed (terminal mode). Following a stop or restart, the inverter always runs at the minimum speed set in *P1-02*.

5 / Last speed (terminal mode). Following a stop or restart, the inverter returns to the value prior to stopping that was last set using the keypad.

6 / Current speed. If the inverter is configured for several speed references (usually manual/automatic control or local/decentral control), the inverter continues to run at the last operating speed when keypad mode is changed via digital input.

7 / Preset speed 8 (terminal mode). Following a stop or restart, the inverter always runs at preset speed 8 (*P0-08*).

Option 4 – 7 "Operation with terminal" applies to all operating modes.

P2-38 Mains loss stop control

Control behavior of the inverter as response to a power failure while the inverter is enabled.

0 / The inverter attempts to continue operation by recovering energy from the motor under load. If the power failure lasts only briefly and if sufficient energy can be recovered before control electronics shuts down, the inverter will restart as soon as the power supply is resumed.

1 / The inverter immediately disables the output to the motor resulting in coasting or freewheeling of the load. If you use this setting for loads with a high inertia, it might be necessary to activate the flying start fucntion (*P2-26*).

2 / The inverter stops along the rapid stop ramp set in *P2-25*.

P2-39 Parameter lock

Locking parameters means that no parameters can be changed (indicated by "L")

0 / Disabled

1 / Enabled

P2-40 Extended parameter access code definition

Setting range: 0 – 101 – 9999

Access to the advanced menu (parameter groups 2,3,4,5) is only possible when the value entered in *P1-14* is the same as the one in *P2-40*. In this way, users can change the default value "101" to any other value.

8.2.4 Parameter group 3: PID controller (level 2)

P3-01 PID proportional gain

Setting range: 0.0 – 1.0 – 30.0

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

P3-02 PID integral time constant

Setting range: 0.0 – 1.0 – 30.0

PID controller integral time constant. Higher values result in a damped response to systems in which the overall process responds slowly.

P3-03 PID differential time constant

Setting range: 0.00 – 1.00

P3-04 PID operating mode

0 / Direct operation – The motor speed increases with increasing feedback signal

1 / Inverse operation – The motor speed decreases with increasing feedback signal

P3-05 PID reference selection

Selects the source for the PID reference / setpoint

0 / Fixed setpoint reference (*P3-06*)

1 / Analog input 1

2 / Analog input 2

3 / Fieldbus PID reference

P3-06 PID fixed setpoint reference

Setting range: 0.0 – 100.0%

Sets the preset digital PID reference/setpoint.

P3-07 PID controller upper limit

Setting range: P3-08 – 100.0%

PID controller upper limit output. This parameter specifies the maximum output value of the PID controller. The upper limit is calculated as follows:

Upper limit = *P3-07* × *P1-01*

A value of 100% corresponds to the maximum speed limit defined in *P1-01*.

P3-08 PID controller lower limit

Setting range: 0.0% – P3-07%

This parameter specifies the minimum output value of the PID controller. The lower limit is calculated as follows:

Lower limit = *P3-08* × P1-01

P3-09 PID correcting variable limit

0 / Digital outputs limit – PID output range limited by *P3-07* and *P3-08*

1 / Analog input 1 variable upper limit – PID maximum output limited by the signal present at analog input 1.

2 / Analog input 1 variable lower limit – PID minimum output limited by the signal present at analog input 1.

3 / PID output + analog input 1 – PID output is added to the speed reference present at analog input 1.

P3-10 PID feedback selection

Selects the source for the PID feedback signal.

0 / Analog input 2

1 / Analog input 1

P3-11 PID ramp activation error

Setting range: 0.0 – 25.0%

Defines a PID error threshold. If the difference between setpoint and actual value is less than the threshold, the internal ramps of the inverter are disabled.

If the PID deviation is greater, the ramps are enabled to limit the the rate of change of the motor speed and to respond quickly to minor deviations.

P3-12 PID actual value display scaling factor

Setting range: 0.000 – 50.000

This parameter is used to scale the actual value of the PID display. This enables users to have displayed the current signal level of a transducer, for instance 0 - 10 bar, etc. Scaled display value = *P3-12* × PID output (= actual value), scaled display value (rxxx).

P3-13 PID feedback wake-up level

Setting range: 0.0 – 100.0%

Sets a programmable level. When the drive is in standby or PID mode, the selected feedback signal must fall below this threshold before the inverter returns to normal operation.

8.2.5 Parameter group 4: Motor control (level 2)

P4-01 Control mode

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 close the speed loop, this control mode effectively 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 (*P4-02*) should be carried out prior to first operation.

1/ VFC torque control

Instead of the motor speed, the motor torque is controlled directly. In this operating mode, the speed is not specified but changes depending on the load. The maximum speed is limited by *P1-01*. This operating mode is often used for winding applications where a constant torque is required to maintain cable tension. For optimal control, auto tune (P4-02) should be carried out prior to first operation.

2 / Speed control – Enhanced V/f

This operating mode basically corresponds to voltage control where the applied motor voltage is controlled rather than the torque-generating current. The magnetizing current is controlled directly, which means no voltage increase is required. The voltage characteristics can be selected using the energy saving function in parameter *P1-06*. The default setting provides a linear characteristic where the voltage is proportional to the frequency. The magnetizing current is controlled independently. Enabling the energy saving function selects a reduced voltage characteristics where the applied motor voltage is reduced at low speeds. The function is usually used for fans to save energy consumption. The auto tune function should also be enabled in this operating mode. In this case, the tuning process is less complex and can be carried out more quickly.

3 / PM motor speed control

Speed control for permanent magnet motors. The same properties apply as for VFC speed control.

4 / PM motor torque control

Torque control for permanent magnet motors. The same properties apply as for VFC torque control.

5 / PM motor position control

Position control for permanent magnet motors. Speed and torque setpoints are provided via process data in Motion Protocol *(P1-12 = 8*). An encoder is required for this purpose.

P4-02 Auto tune

0 / Disabled

1 / Enabled

When set to "1", the inverter immediately performs a static (without rotation of the rotor) motor parameter measurement to configure the motor parameters. Before enabling this function, *P1-07, P1-08* and *P1-09* must be set properly according to the motor nameplate.

Auto tune runs automatically with the first enable after operation with the factory set parameters and when *P1-08* was changed. No hardware enable is required for this purpose.

The inverter must not be in "inhibit" mode.

P4-03 Speed controller proportional gain

Setting range: 0.1 – 50 – 400%

Defines the proportional gain for the speed controller. Higher values provide for better output frequency regulation and response. If the value is too high, it can cause instability or even overcurrent errors. For applications that require the best possible regulation, you can adapt the value to the connected load by gradually increasing the value and observing the actual speed of the load. Continue this process until you have achieved the required dynamics without or with only slightly exceeding the control range, i.e. the setpoint value of the output speed.

In general, higher friction loads can tolerate higher values of proportional gain. It might be necessary to reduce the gain for loads with high inertia and low friction.

P4-04 Speed controller integral time constant

Setting range: 0.001 – 0.100 ... 1.000 s

Defines the integral time for the speed controller. Small values result in a faster response to changes in the motor load but bear the risk that they cause instability. For optimal dynamics, the value must be adjusted to match the connected load.

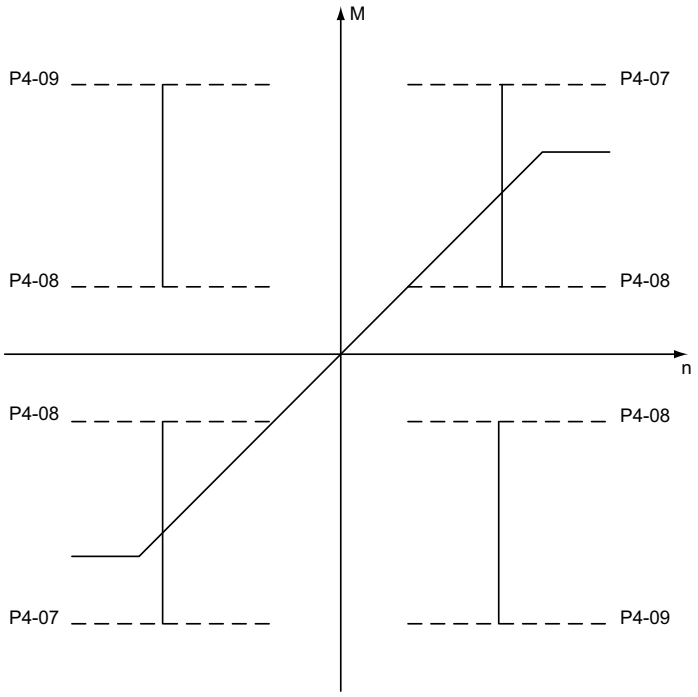
P4-05 Motor power factor

Setting range: 0.50 – 0.99 (depends on motor)

Power factor on the nameplate. Is required for vector control (*P4-01* = 0 or 1).

P4-06 – P4-09 Motor torque settings

These parameters are used to adjust the torque limits of the motor.



3473010955

P4-06 Torque setpoint source

For operation in vector mode or PM mode (*P4-01 ≠ 2*), this parameter defines the source of the torque reference/torque reference limit.

0 / Maximum torque

Fixed preset torque limit. The torque setpoint is preset in *P4-07*. When using this option, the motor torque setpoint is determined by the percentage of the rated motor torque set in parameter P4-07. The rated motor torque is determined automatically by auto tune.

1 / Analog input 1

2 / Analog input 2

Analog input torque limit. If a variable torque setpoint is required, the analog input can be used as the torque setpoint source. In this case, the setpoint can be changed in real time in proportion to the analog input signal. The proper analog input signal format must be set in parameter *P2-30 / P2-33*. The input signal format must be unipolar. Bipolar references are not possible for the torque limit. The scaling depends on the value set in *P4-07*. (0 – 10 V = 0 – *P4-07*% torque).

Analog input 2

3 / Modbus communication

Modbus torque setpoint. When this option is selected, the torque limit is provided by the Modbus master. You can enter a value from 0 to 200%.

4 / Master drive

The master drive in a master slave network provides the torque setpoint.

5 / PID output

The output of the PID controller provides the torque setpoint.

P4-07 Max. motor torque limit

Setting range: P4-08 – 200 – 500%

When *P4-01 = 1* or 4 and *P4-06 = 0*, the preset torque setpoint is set. When *P4-01 = 0* or 3, max. torque limit is set. The torque limit is based on the output current set in parameter *P1-08*.

P4-08 Min. torque limit

Setting range: 0.0 – P4-07%

Sets the minimum torque limit. The inverter attempts to maintain this motor torque at any time during operation.

INFORMATION

Use this parameter with the utmost care because the output frequency of the inverter will increase (to reach the torque) and the selected setpoint speed might be exceeded.

P4-09 Max. regenerative torque limit

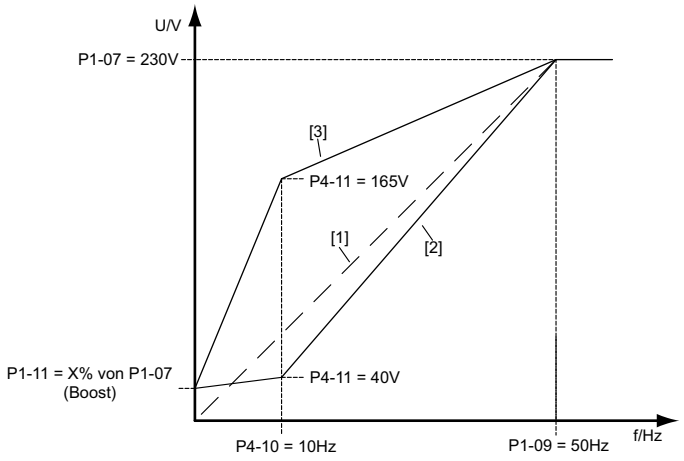
Setting range: P4-08 – <u>200</u> – 500%

Defines the current limit in regenerative mode. The value of this parameter represents the percentage value of the rated motor current defined in P1-08. The current limit specified in this parameter overrides the normal torque-generating current limit when the motor operates in regenerative mode. If the value is too high, the result is an excessive motor current distortion causing the motor to behave aggressively in regenerative mode. If the value is too small, the output torque of the motor might drop in regenerative mode.

P4-10/11 V/f characteristic settings

The voltage/frequency characteristic curve determines the voltage level applied to the motor at a given frequency. Parameters *P4-10* and *P4-11* let you change the V/f characteristic curve if required.

Parameter P4-10 can be set to any frequency between 0 and the base frequency (*P1-09*). It represents the frequency at which the percentage adjustment level set in *P4-11* is used. This function is only active when *P4-01* = 2.



9007202727750027

[1] Normal V/f characteristic curve
[2] Adjusted V/f characteristic curve
[3] Adjusted V/f characteristic curve

P4-10 V/f characteristic adjustment frequency

Setting range: <u>0.0</u> – 100.0 % of *P1-09*

P4-11 V/f characteristic adjustment voltage

Setting range: <u>0.0</u> – 100.0 % of *P1-07*

P4-12 Motor brake control

Enables the hoist function of the inverter.

Parameters *P4-13* through *P4-16* are enabled.

Relay contact 2 is set to hoist function. The function cannot be changed.

<u>0 / Disabled</u>

1 / Enabled

For examples, refer to chapter "Hoist function" (page 47).

P4-13 Brake release time

Setting range: 0.0 – 0.2 – 5.0 s

This parameter is used to specify how long the motor runs at preset speed 7 after successful premagnetization and how long the brake needs to release.

P4-14 Brake application time

Setting range: 0.0 – 5.0 s

This parameter is used to set the time required for the mechanical brake to apply. This parameter prevents a sagging of the drive in particular in hoists.

P4-15 Torque threshold for brake release

Setting range: 0.0 – 1.0 – 200%

Defines the torque in % of the maximum torque. This percentage torque must be generated before the motor brake is released.

This is to ensure that the motor is connected and torque is generated to prevent the load from dropping when the brake is released. In V/f mode, the torque prove is not enabled. This is only recommended for applications with horizontal movement.

P4-16 Torque threshold timeout

Setting range: 0.0 – 25 s

This parameter is used to set the time the inverter takes after a start command to attempt to generate enough motor torque to exceed the brake release threshold set in *P4-15*. If the torque threshold is not reached within this time (due to a mechanical fault or other malfunction), the inverter issues a fault.

P4-17 Thermal motor protection to UL508C

0 / Disabled

1 / Enabled

MOVITRAC® LTP-B inverters come equipped with a thermal motor protection function according to NEC to protect the motor from overload. The motor current is accumulated over time in an internal memory.

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

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

When *P4-17* is disabled, the thermal overload memory is reset when switching power off and on again.

When *P4-17* is enabled, the memory is maintained even after power off and on again.

8.2.6 Parameter group 5: Fieldbus communication (level 2)

P5-01 Inverter address

Setting range: 1–63

This parameter is used to set the inverter address for SBus, Modbus, fieldbus and master/slave.

P5-02 SBus baud rate

Sets the SBus baud rate. This parameter must be used for operation with SEW gateways or MOVI-PLC®.

125 / 125 kBd

250 / 250 kBd

500 / 500 kBd

1000 / 1000 kBd

P5-03 Modbus baud rate

Sets the expected Modbus baud rate.

9.6 / 9600 Bd

19.2 / 19200 Bd

38.4 / 38400 Bd

57.6 / 57600 Bd

115.2 / 115200 Bd

P5-04 Modbus data format

Sets the expected Modbus data format.

n-1 / No parity, 1 stop bit

n-2 / No parity, 2 stop bits

O-1 / Odd parity, 1 stop bit

E-1 / Even parity, 1 stop bit

P5-05 Response to communication failure

This parameter is used to specify the inverter behavior after a communication failure and the following timeout set in *P5-06*.

0 / Fault and coast to stop

1 / Stop ramp and fault

2 / Stop ramp (without fault)

3 / Preset speed 8

P5-06 Communication failure timeout

Setting range: 0.0–1.0–5.0 s

This parameter is used to specify the time in seconds after which the inverter performs the response set in *P5-05*. When set to "0.0 s", the inverter maintains the actual speed even if communication fails.

P5-07 Ramp specified via fieldbus

This parameter is used to enable internal or external ramp control. If enabled, the inverter follows the external ramps specified by MOVILINK® process data (PO3).

0 / Disabled

1 / Enabled

P5-08 Synchronization duration

Setting range: 0, 5–20 ms

Defines the duration of the sync message from MOVI-PLC®. This value must correspond to the one set in MOVI-PLC®. When *P5-08* = 0, the inverter ignores synchronization.

P5-09–P5-11 Fieldbus process output data (POx) definition

This parameter is used to define the process data words sent from the PLC/gateway to the inverter.

0 / Speed: rpm (1 = 0.2 rpm)

→ only possible when *P1-10* is set to a value unequal 0

1 / Speed % (4000 h = 100% *P1-01*)

2 / Torque % (1 = 0.1%)

→ the inverter must be set to *P4-06* = 3

3 / Ramp time (1 = 1 ms); acceleration ramp: higher byte, deceleration ramp: lower byte

4 / PID reference (1000 h = 100%)

→ see chapter P1-12 Control signal source (P1-12 = 3) (page 92)

5 / Analog output 1 (1000 h = 100%)

6 / Analog output 2 (1000 h = 100%)

7 / No function

P5-09 Fieldbus PO2 definition

Definition of output 2, 3, 4 for transmitted process data

Parameter description like *P5-0 9 – P5-11*

P5-10 Fieldbus PO3 definition

Definition of output 2, 3, 4 for transmitted process data

Parameter description like P5-0 9 – P5-11

P5-11 Fieldbus PO4 definition

Definition of output 2, 3, 4 for transmitted process data

Parameter description like P5-0 9 – P5-11

P5-12–P5-14 Fieldbus process input data (PIx) definition

Definition of process data words sent from the inverter to the PLC/gateway.

0[1] / Speed: rpm (1 = 0.2 rpm)

1 / Speed % (4000 h = 100% *P1-01*)

2 / Current % (1 = 0.1% I_{rated})

3 / Torque % (1 = 0.1%)

4 / Power % (1 = 0.1%)

5 / Temperature (1 = 0.01 °C)

6 / DC link voltage (1 = 1 V)

7 / Analog input 1 (1000 h = 100%)

8 / Analog input 2 (1000 h = 100%)

9 / IO status

1) Only possible when *P1-10* is set to a value unequal 0

HB								LB							
–	–	–	RL5	RL4	RL3	RL2	RL1	–	–	–	DI5	DI4	DI3	DI2	DI1

10[1] / LTX position low (one resolution)

11[1] / LTX position high (number of resolutions)

P5-12 Fieldbus PI2 definition

Definition of input 2, 3, 4 for transmitted process data

Parameter description like *P5-12 – P5-14*

P5-13 Fieldbus PI3 definition

Definition of input 2, 3, 4 for transmitted process data

Parameter description like P5-12 – P5-14

P5-14 Fieldbus PI4 definition

Definition of input 2, 3, 4 for transmitted process data

Parameter description like P5-12 – P5-14

P5-15 Expansion relay 3 function selection

INFORMATION

Only available and possible when IO expansion module is connected.

Defines the function of expansion relay 3.

0 / Inverter enabled

1 / Inverter ok

2 / Motor runs at setpoint speed

3 / Motor speed > 0

4 / Motor speed > limit value

5 / Motor current > limit value

6 / Motor torque > limit value

7 / Second analog input > limit value

8 / Fieldbus

9 / STO status

P5-16 Relay 3 upper limit

Setting range: 0.0–<u>100.0</u>–200.0%

P5-17 Relay 3 lower limit

Setting range: <u>0.0</u>–200.0%

P5-18 Expansion relay 4 function selection

Defines the function of expansion relay 4.

Parameter description like *P5-15*

1) Only with plugged LTX module

P5-19 Relay 4 upper limit

Setting range: 0.0–100.0–200.0%

P5-20 Relay 4 lower limit

Setting range: 0.0–200.0%

INFORMATION

The function of expansion relay 5 is fixed to "Motor speed > 0".

8.2.7 Parameter group 6: Extended parameters (level 3)

P6-01 Firmware upgrade enable

Enables firmware upgrade mode that lets the user upgrade the firmware of the user interface and/or firmware for output stage control. Is usually performed by the PC software.

0 / Disabled

1 / Enabled (DSP + IO)

2 / Enabled (IO only)

3 / Enabled (DSP only)

NOTE: This parameter should not be changed by the user. The firmware upgrade is performed automatically by the PC software.

P6-02 Automatic thermal management

Enables automatic thermal management. The inverter automatically reduces the output switching frequency at excessive heat sink temperature to reduce the risk of an overtemperature fault.

0 / Disabled

1 / Enabled

P6-03 Auto-reset delay time

Setting range: 1–20–60 s

Sets the delay time that elapses between consecutive reset attempts of the inverter, if auto reset is enabled in *P2-36*.

P6-04 User relay hysteresis band

Setting range: 0.0–0.3–25.0%

This parameter is used together with *P2-11* and *P2-13* = 2 or 3 to set a band around the setpoint speed (*P2-11* = *2*) or to set zero speed (*P2-11* = *3*). When the speed is within this band, the inverter runs at setpoint speed or at zero speed. This function prevents "chatter" on the relay output when the operating speed coincides with the value at which the state of the digital output/relay output changes. Example: When *P2-13* = 3, *P1-01* = 50 Hz and *P6-04* = 5%, the relay contacts close above 2.5 Hz.

P6-05 Encoder feedback enable

This parameter indicates a connected LTX module. Setting this parameter to "1" enables encoder control mode with connected LTX module. This parameter is enabled automatically as soon as an LTX module is connected.

0 / Disabled

1 / Enabled

P6-06 Encoder PPR

Setting range: 0 – 65535 PPR

Is used together with the LTX module. This parameter has to be set to the number of pulses per revolution for the connected encoder. This value must be set correctly to ensure proper operation of the drive when encoder feedback mode is enabled (*P6-05 = 1*). Improper setting of this parameter can result in loss of motor control and/or a fault. When set to 0, encoder feedback is disabled.

P6-07 Speed error trigger threshold

Setting range: 1.0–5.0–100%

This parameter specifies the maximum permitted speed error between the speed value of encoder feedback and the rotor speed calculated by the motor control algorithms. The inverter shuts down when the speed error exceeds this threshold.

P6-08 Max. frequency for speed setpoint

Setting range: 0; 5–20 kHz

If the motor speed setpoint is to be controlled by a frequency input signal (connected to digital input 3), then this parameter is used to define the input frequency that corresponds to the maximum motor speed (set in P1-01). The maximum frequency that can be set in this parameter must be within a range of 5 kHz and 20 kHz.

When set to 0, this function is disabled.

P6-09 Speed droop control

Setting range: 0.0–25.0

This parameter applies only when the inverter runs in vector speed control mode (*P4-01* = 0). When set to zero, the speed droop control function is disabled. When *P6-09* > 0, this parameter defines a slip speed at rated motor output torque.

Droop speed is the percentage value of *P1-09*. Depending on the motor load condition, the reference speed is reduced by a certain droop value before it enters the speed controller. Following the calculation:

Droop speed = *P6-09* × *P1-09*

Droop value = droop speed × (actual motor torque / rated motor torque)

Speed controller input = speed setpoint – droop value

Droop control can be used to achieve a slight reduction in motor speed in proportion to the applied load. This function can be useful when several motors drive a common load and the load is to be shared evenly among the motors.

P6-10 Reserved

P6-11 Speed holding time on enable (preset speed 7)

Setting range: 0.0–250 s

Defines the time during which the inverter runs at preset speed 7 (*P2-07*) when the enable signal is applied to the drive. The preset speed can be any value from the minimum to the maximum frequency and in either direction. This function can be useful in applications where controlled start behavior is required regardless of normal system operation. The function allows the user to program the inverter in such a way that it always starts at the same frequency and in the same direction of rotation for a specified period of time before returning to normal operation.

Setting this parameter to 0.0 disables the function.

P6-12 Speed holding time on inhibit (preset speed 8)

Setting range: 0.0–250 s

Defines the time during which the inverter runs at preset speed 8 (*P2-08*) after having removed the enable signal.

NOTICE: Setting this parameter to a value > 0 lets the inverter continue to run at the preset speed for the set time after having removed the enable signal. It is important that you make sure that this operating mode is safe before you use this function. Setting this parameter to 0.0 disables the function.

P6-13 Fire mode logic

Enables emergency fire mode. In this mode, the inverter ignores most faults. When the inverter is in fault condition, it attempts to reset itself every 5 s until total failure or lack of power.

Do not use this function for servo applications or hoist applications.

0 / Open trigger: Fire mode

1 / Close trigger: Fire mode

P6-14 Fire mode speed

Setting range: -P1-01–0–P1-01 Hz

Speed used in fire mode

P6-15 Analog output 1 scaling

Setting range: 0.0–100.0–500.0%

This parameter specifies the scaling factor in % used for analog output 1.

P6-16 Analog output 1 offset

Setting range: -500.0–0.0–500.0%

This parameter specifies the offset in % used for analog output 1.

P6-17 Max. torque limit timeout

Setting range: 0.0–25.0 s

Specifies the maximum time allowed for the motor to run at the torque limit for motor/generator mode (*P4-07 / P4-09*) before issuing a fault. This parameter is only enabled for operation with vector control.

P6-18 DC braking voltage level

Setting range: Auto, 0.0–25.0%

This parameter specifies the amount of DC voltage as a percentage of the rated voltage (*P1-07*) applied to the motor when a stop command is received. This parameter is only enabled for V/f control.

P6-19 Braking resistor value

Setting range: 0, Min-R–200 Ω

Sets the braking resistor value in ohms. This value is used for thermal protection of the braking resistor. Min-R depends on the inverter.

Setting this parameter to 0 disables the protection function for the braking resistor.

P6-20 Braking resistor power

Setting range: 0–200 kW

Sets the braking resistor power in kW with a resolution of 0.1 kW. This value is used for thermal protection of the braking resistor.

Setting this parameter to 0 disables the protection function for the braking resistor.

P6-21 Brake chopper undertemperature duty cycle

Setting range: 0.0–2.0–20.0%

This parameter is used to specify the duty cycle for the brake chopper when the inverter is in undertemperature fault state. A braking resistor can be mounted to the heat sink of the drive. The braking resistor can be used to heat the drive until it reaches the proper operating temperature. Use this parameter with the utmost care. An incorrect setting might result in exceeding the rated power capacity of the braking resistor. Always use external thermal protection for the braking resistor to avoid this risk.

P6-22 Reset fan runtime

0 / Disabled

1 / Reset runtime

Setting this parameter to "1" resets the internal runtime counter of the fan to "0" (as displayed in *P0-35*).

P6-23 Reset kWh meter

0 / Disabled

1 / Reset kWh meter

Setting this parameter to "1" resets the internal kWh meter to "0" (as displayed in *P0-26* and *P0-27*).

P6-24 Parameter default settings

Inverter factory settings

0 / Disabled

1 / Factory settings except for bus parameters

2 / Factory settings for all parameters

P6-25 Access code level

Setting range: 0–201–9999

User-defined access code that has to be entered in *P1-14* to allow access to the advanced parameters in groups 6 to 9.

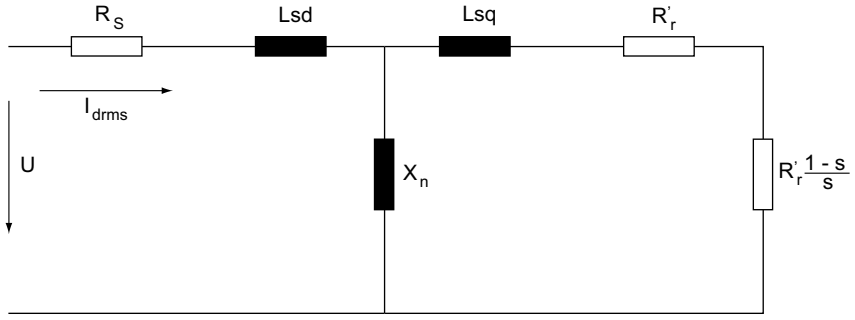
NOTICE

Possible inverter damage.

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.

8.2.8 Parameter group 7: Motor control parameters (level 3)

Equivalent wiring diagram for AC motors.



P7-01 Motor stator resistance (Rs)

Setting range: depends on the motor (Ω)

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

Instead, you can enter this value manually.

P7-02 Motor rotor resistance (Rr)

Setting range: depends on the motor (Ω)

For induction motors: Phase-to-phase rotor resistance value in ohms

P7-03 Motor stator inductance (Lsd)

Setting range: depends on the motor (µH)

For induction motors: Phase stator inductance value

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

P7-04 Motor magnetizing current (Id rms)

Setting range: 10 % × *P1-08*−80 % × *P1-08* (A)

For induction motors: Magnetizing current / no-load current. Before auto tune, this value is approximated to 60% of the rated motor current (*P1-08*) assuming a motor power factor of 0.8.

P7-05 Motor leakage loss coefficient (sigma)

Setting range: 0.025−<u>0.10</u>−0.25

For induction motors: Leakage loss coefficient of the motor

P7-06 Motor stator inductance (Lsq) − only for PM motors

Setting range: depends on the motor (H)

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

P7-07 Enhanced generator control

This parameter is used when stability problems occur in extremely regenerative applications. When this function is enabled, regenerative operation is possible at low speeds.

<u>0 / Disabled</u>

1 / Enabled

P7-08 Parameter adjustment

This parameter is used for small motors (P < 0.75 kW) with high impedance. When this function is enabled, the thermal motor model can adjust rotor and stator resistance during operation. In this way, impedance effects occurring with vector control and caused by heating are compensated.

0 / Disabled

1 / Enabled

P7-09 Overvoltage current limit

Setting range: 0.0–1.0–100%

This parameter is only applicable in vector speed control mode and takes effect when the DC link voltage of the inverter exceeds a preset limit. This voltage level is set internally exactly below the trigger threshold for overvoltage.

Setting this parameter to 0.0 disables the function.

Procedure:

- Motor with high mass moment of inertia is decelerated and regenerative energy flows back to the inverter.
- The DC link voltage increases and reaches the U_{Zmax} level.
- The inverter delivers current (*P7-09*) to discharge the DC link. As a result, the motor accelerates again.
- The DC link voltage drops below U_{Zmax} again.
- The motor is continued to be decelerated.

P7-10 Motor load inertia

Setting range: 0–10–600

The inertia ratio between motor and connected load can be specified in the inverter. This value can usually remain set to the default value 10. However, the value is used by the control algorithm as precontrol value for all motors in order to provide the optimum torque/current for accelerating the load. This is why accurate setting of the inertia ratio improves the response characteristics and the dynamics of the system. For a closed control loop, the value is calculated as follows:

$$P7-10 = \frac{J_{ext}}{J_{mot}}$$

P7-11 Pulse width min. limit

Setting range: 0–500

This parameter is used to limit the minimum output pulse width. The minimum output pulse width can be used for applications with long cables. Increasing the value of this parameter reduces the risk of overcurrent faults with long motor cables. The reason is that the number of voltage edges and consequently load peaks are reduced. At the same time, however, also the maximum available output motor voltage is reduced for a certain input voltage.

The factory setting depends on the inverter.

NOTE: Time = value × 16.67 ns

P7-12 Pre-magnetization time

Setting range: 0–2000 ms

This parameter is used to specify a minimum delay time for magnetizing current control in V/f mode once the the run signal is given for the drive. If the value is too small, the inverter might generate an overcurrent fault when the acceleration ramp is very short.

The factory setting depends on the inverter.

P7-13 Vector speed controller D gain

Setting range: 0.0–400%

This parameter is used to set the differntial gain (%) for the speed controller in vector mode operation.

P7-14 Low-frequency torque boost

Setting range: 0.0–100%

Boost current applied at start-up in % or the rated motor current (*P1-08*). The inverter provides a boost function that injects current into the motor at low speeds. The purpose is to ensure that rotor alignment is maintained and operation of the motor at low speeds is effective. For boost at low speed, have the inverter run at the lowest frequency required for the application and increase the values to provide the required torque and to ensure smooth operation.

P7-15 Torque boost frequency limit

Setting range: 0.0–50%

Frequency range for the applied boost current (*P7-14*) in % of the rated motor frequency (*P1-09*). This parameter is used to set the frequency limit above which boost current is no longer applied to the motor.

P7-16 Motor nameplate speed

Setting range: 0.0–6000 rpm

8.2.9 Parameter group 8: User-specific (only applicable to LTX) parameters (level 3)

INFORMATION

For further information, refer to the addendum to the operating instructions, chapter "LTX function parameter set (level 3)".

P8-01 Simulated encoder scaling
Setting range: $\underline{2^0}$–2^3

P8-02 Input pulse scaling value
Setting range: 2^0–$\underline{2^{16}}$

P8-03 Lag error low
Setting range: 0–<u>65535</u>

P8-04 Lag error high
Setting range: <u>0</u>–65535

P8-05 Reference travel
<u>0 / Disabled</u>
1 / Zero pulse for negative travel direction
2 / Zero pulse for positive travel direction
3 / End of reference cam negative travel direction
4 / End of reference cam positive travel direction
5/ No reference travel; only possible without enabled drive
6 / Fixed stop positive travel direction
7 / Fixed stop negative travel direction

P8-06 Position controller proportional gain
Setting range: 0.0–<u>1.0</u>–400%

P8-07 Touch probe trigger mode
<u>0 / TP1 P edge TP2 P edge</u>
1 / TP1 N edge TP2 P edge
2 / TP1 N edge TP2 N edge
3 / TP1 P edge TP2 N edge

P8-08 Reserved

P8-09 Velocity feedforward gain
Setting range: 0–<u>100</u>–400%

P8-10 Acceleration feedforward gain
Setting range: <u>0</u>–400%

P8-11 Reference offset low word
Setting range: <u>0</u>–65535

P8-12 Reference offset high word

Setting range: 0–65535

P8-13 Reserved

P8-14 Reference enable torque

Setting range: 0–100–500%

8.2.10 Parameter group 9: Digital inputs defined by the user (level 3)

The purpose of parameter group 9 is to give the user full flexibility to control the inverter behavior in complex applications that require specific parameter settings. Use the parameters of this group with utmost care. Only users that are absolutely familiar with the use of the inverter and its control functions should adjust the parameters of this group.

Overview of functions

Parameter group 9 allows for the advanced programming of the inverter including user defined functions for the digital and analog inputs of the inverter as well as control of the speed setpoint source.

The following rules apply to parameter group 9:

- The parameters of this group cannot be changed unless *P1-15* = 0.
- Changing the value P1-15 clears all the previous settings made in parameter group 9.
- Parameter group 9 has to be configured individually by the user.

INFORMATION

Write down your settings.

Logic source selection parameters

The parameters for selecting a logic source let users directly define the source for a control function in the inverter. These parameters can only be linked to digital values, which either enable or disable the function depending on their state.

Parameters defined as logic sources have the following range of possible settings:

Inverter display	Setting	Function
SAFE	STO input	Linked to the status of STO inputs, if allowed
OFF	Always OFF	Function permanently disabled
On	Always ON	Function permanently enabled
din-1	Digital input 1	Function linked to digital input 1 status
din-2	Digital input 2	Function linked to digital input 2 status
din-3	Digital input 3	Function linked to digital input 3 status
din-4	Digital input 4	Function linked to digital input 4 (analog input 1) status
din-5	Digital input 5	Function linked to digital input 5 (analog input 2) status
din-6	Digital input 6	Function linked to digital input 6 status (requires extended I/O option)
din-7	Digital input 7	Function linked to digital input 7 status (requires extended I/O option)
din-8	Digital input 8	Function linked to digital input 8 status (requires extended I/O option)

NOTE: The control sources for the inverter are handled in the following order of priority (from highest to lowest priority):

- STO circuit
- External fault
- Rapid stop
- Enable
- Terminal control override
- Run forward / run reverse / reverse
- Reset

Data source selection parameters

Parameters for selecting a data source define the signal source for speed source 1–8. Parameters defined as data sources have the following range of possible settings:

Inverter display	Setting	Function
A in-1	Analog input 1	Analog input 1 signal level (P0-01)
A in-2	Analog input 2	Analog input 2 signal level (P0-02)
PrESEt	Preset speed	Selected preset speed
d-Pot	Keypad (motorized potentiometer)	Keypad speed setpoint (P0-06)
P id	PID controller output	PID controller output (P0-10)
SUb-dr	Master speed setpoint	Master speed setpoint (master/slave operation)
F-bUS	Fieldbus speed setpoint	Fieldbus speed setpoint PI2
USEr	User defined speed set-point	User defined speed setpoint (PLC function)
PULSE	Frequency input	Pulse frequency input reference

P9-01 Enable input source

Setting range: SAFE, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8

Specifies the source of the inverter enable function. This function is usually assigned to digital input 1 and allows to use a hardware enable signal in situations where, for example, the commands for run forward or run reverse are applied from external sources, such as fieldbus control signals or a PLC program.

P9-02 Rapid stop input source

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8, On

Specifies the source of the rapid stop input. As response to a rapid stop command, the motor stops using the deceleration time set in P2-25.

P9-03 Run (FWD) input source

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8, On

This parameter is used to specify the source of the run forward command.

P9-04 Run (REV) input source

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8, On

This parameter is used to specify the source of the run reverse command.

INFORMATION

When the run forward and run reverse commands are applied to the drive simultaneously, the inverter executes a rapid stop.

P9-05 Latch function enable

Setting range: OFF, ON

Enables the latching function of the digital inputs.

The latching function makes it possible to use momentary start signals to start and stop the motor in any direction. In this case, the enable input source (*P9-01*) must be linked to a normally closed control source (open for stop). This control source must be logic "1" to allow the motor to start. The inverter then responds to momentary or pulse start and stop signals as defined in parameters *P9-03* and *P9-04*.

P9-06 Direction of rotation reversal

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8, On

This parameter is used to specify the source of the reverse command, which reverses the direction of motor rotation.

NOTICE: The reverse input only takes effect when the motor operates in forward direction. This means:

- Applying the "run forward" and "run reverse" inputs simultaneously = motor runs in reverse direction
- Applying the "run reverse" and "reverse" inputs simultaneously = motor runs in reverse direction

P9-07 Reset input source

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8, On

Specifies the source of the reset command.

P9-08 External fault input source

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8, On

This parameter is used to specify the source of the external fault command.

P9-09 Terminal control enable source

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8, On

Defines the source of the command used to select terminal control operation of the inverter. This parameter takes effect only when *P1-12* > 0. It allows terminal control to be selected in order to override the control signal source defined in *P1-12*.

P9-10–P9-17 Speed source

Up to 8 speed setpoint sources can be defined for the inverter and can be selected during operation using *P9-18 – P9-20*. When changing the setpoint source, the new source is applied immediately during ongoing operation. The inverter need not have to be stopped and restarted.

P9-10 Speed source 1

Setting range: Ain-1, Ain-2, preset speed 1–8, d-Pot, PID, Sub-dr, F-bus, user, pulse

Specifies the source of the speed.

P9-11 Speed source 2

Setting range: Ain-1, Ain-2, preset speed 1–8, d-Pot, PID, Sub-dr, F-bus, user, pulse

Specifies the source of the speed.

P9-12 Speed source 3

Setting range: Ain-1, Ain-2, preset speed 1–8, d-Pot, PID, Sub-dr, F-bus, user, pulse

Specifies the source of the speed.

P9-13 Speed source 4

Setting range: Ain-1, Ain-2, preset speed 1–8, d-Pot, PID, Sub-dr, F-bus, user, pulse

Specifies the source of the speed.

P9-14 Speed source 5

Setting range: Ain-1, Ain-2, preset speed 1–8, d-Pot, PID, Sub-dr, F-bus, user, pulse

Specifies the source of the speed.

P9-15 Speed source 6

Setting range: Ain-1, Ain-2, preset speed 1–8, d-Pot, PID, Sub-dr, F-bus, user, pulse

Specifies the source of the speed.

P9-16 Speed source 7

Setting range: Ain-1, Ain-2, preset speed 1–8, d-Pot, PID, Sub-dr, F-bus, user, pulse

Specifies the source of the speed.

P9-17 Speed source 8

Setting range: Ain-1, Ain-2, preset speed 1–8, d-Pot, PID, Sub-dr, F-bus, user, pulse

Specifies the source of the speed.

P9-18–P9-20 Speed selection input

The active speed setpoint can be selected during operation by means of the status of the above mentioned parameters for the logic source. The speed setpoints are selected according to the following logic:

P9-20	P9-19	P9-18	Speed setpoint source
0	0	0	1 (*P9-10*)
0	0	1	2 (*P9-11*)
0	1	0	3 (*P9-12*)
0	1	1	4 (*P9-13*)
1	0	0	5 (*P9-14*)
1	0	1	6 (*P9-15*)
1	1	0	7 (*P9-16*)
1	1	1	8 (*P9-17*)

P9-18 Speed selection input 0

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8, On

Bit 0 logic source for selecting the speed setpoint

P9-19 Speed selection input 1

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8, On

Bit 1 logic source for selecting the speed setpoint

P9-20 Speed selection input 2

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8, On

Bit 2 logic source for selecting the speed setpoint

P9-21–P9-23 Preset speed selection input

When a preset speed is to be used for the speed setpoint, you can select the active preset speed based on the status of these parameters. The following logic is used for selection:

P9-23	P9-22	P9-21	Preset speed
0	0	0	1 (*P2-01*)
0	0	1	2 (*P2-02*)
0	1	0	3 (*P2-03*)
0	1	1	4 (*P2-04*)
1	0	0	5 (*P2-05*)
1	0	1	6 (*P2-06*)
1	1	0	7 (*P2-07*)
1	1	1	8 (*P2-08*)

P9-21 Preset speed selection input 0

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8, On

Specifies input source 0 for the preset speed.

P9-22 Preset speed selection input 1

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8, On

Specifies input source 1 for the preset speed.

P9-23 Preset speed selection input 2

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8, On

Specifies input source 2 for the preset speed.

P9-24 Positive jog mode input

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8

Specifies the signal source for operation in positive jog mode.

P9-25 Negative jog mode input

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8

Specifies the signal source for operation in negative jog mode.

P9-26 Reference travel enable input

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8

Specifies the source of the enable signal for the reference travel function.

P9-27 Reference cam input

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8

Specifies the source of the cam input.

P9-28 Motor potentiometer up input source

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8

Specifies the source of the logic signal used to increase the speed setpoint with the keypad/motorized potentiometer. When the specified signal source is logic 1, the value increases by the ramp defined in *P1-03*.

P9-29 Motor potentiometer down input source

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8

Specifies the source of the logic signal used to decrease the speed setpoint with the keypad/motorized potentiometer. When the specified signal source is logic 1, the value decreases by the rate defined in *P1-04*.

P9-30 Speed-limit switch FWD

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8

Specifies the source of the logic signal used to limit the speed in forward direction. When the specified signal source is logic 1 and the motor is operated in forward direction, the speed is reduced to 0.0 Hz.

P9-31 Speed-limit switch REV

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8

Specifies the source of the logic signal used to limit the speed in reverse direction. When the specified signal source is logic 1 and the motor is operated in reverse direction, the speed is reduced to 0.0 Hz.

P9-32 Enable second deceleration ramp, rapid stop ramp

Setting range: OFF, din-1, din-2, din-3, din-4, din-5, din-6, din-7, din-8

Specifies the source of the logic signal used to enable the rapid deceleration ramp defined in P2-25.

P9-33 Fire mode input selection

Setting range: OFF, din-1, din-2, din-3, din-4, din-5. Specifies the source of the logic signal used to enable emergency fire mode. In this mode, the inverter ignores all faults or disconnections and operates until total failure or lack of power.

8.2.11 P1-15 Digital inputs function selection

Users can set the function of the digital inputs of MOVITRAC® LTP-B, that is the user can select functions required for the application.

The following tables list the functions of the digital inputs depending on the value set in parameters *P1-12 (terminal/keypad/SBus control)* and *P1-15 (selection of the digital input functions)*.

INFORMATION

Individual configuration of digital inputs:

To individually configure the digital input assignment, set parameter *P1-15* to "0". This setting means that the input terminals for DI1 – DI5 (with LTX option DI1 – DI8) are set to "no function".

In parameter group *P9-xx*, you can directly assign the functions to an input. Please write down your individual allocation settings.

Inverter operation

P1-15	Digital input 1	Digital input 2	Digital input 3	Analog input 1	Analog input 2	Remarks / preset value
0	No function P9-xx	No function P9-xx	No function P9-xx	No function P9-xx	No function P9-xx	–
1	O: Stop (controller inhibit) C: Start (enable)	O: Forward C: Reverse	O: Selected speed setpoint C: Preset speed 1, 2	Analog 1 Speed setpoint	O: Preset speed 1 C: Preset speed 2	–
2	O: Stop (controller inhibit) C: Start (enable)	O: Forward C: Reverse	Open	Open	Open	Preset speed 1
			Closed	Open	Open	Preset speed 2
			Open	Closed	Open	Preset speed 3
			Closed	Closed	Open	Preset speed 4
			Open	Open	Closed	Preset speed 5
			Closed	Open	Closed	Preset speed 6
			Open	Closed	Closed	Preset speed 7
			Closed	Closed	Closed	Preset speed 8
3	O: Stop (controller inhibit) C: Start (enable)	O: Forward C: Reverse	O: Selected speed setpoint C: Preset speed 1	Analog 1 speed setpoint	Analog torque reference	–
4	O: Stop (controller inhibit) C: Start (enable)	O: Forward C: Reverse	O: Selected speed setpoint C: Preset speed 1	Analog 1 Speed setpoint	O: Decel. ramp 1 C: Decel. ramp 2	–
5	O: Stop (controller inhibit) C: Start (enable)	O: Forward C: Reverse	O: Selected speed setpoint C: Analog input 2	Analog 1 speed setpoint	Analog 1 speed setpoint	–
6	O: Stop (controller inhibit) C: Start (enable)	O: Forward C: Reverse	O: Selected speed setpoint C: Preset speed 1	Analog 1 Speed setpoint	External fault[1)] O: Fault C: Start	–
7	O: Stop (controller inhibit) C: Start (enable)	O: Forward C: Reverse	Open	Open	External fault[1)] O: Fault C: Start	Preset speed 1
			Closed	Open		Preset speed 2
			Open	Closed		Preset speed 3
			Closed	Closed		Preset speed 4

P1-15	Digital input 1	Digital input 2	Digital input 3	Analog input 1	Analog input 2	Remarks / preset value
8	O: Stop (controller inhibit) C: Start (enable)	O: Forward C: Reverse	Open	Open	O: Decel. ramp 1 C: Decel. ramp 2	Preset speed 1
			Closed	Open		Preset speed 2
			Open	Closed		Preset speed 3
			Closed	Closed		Preset speed 4
9	O: Stop (controller inhibit) C: Start (enable)	O: Forward C: Reverse	Open	Open	O: Selected speed setpoint C: Preset speed 1 – 4	Preset speed 1
			Closed	Open		Preset speed 2
			Open	Closed		Preset speed 3
			Closed	Closed		Preset speed 4
10	O: Stop (controller inhibit) C: Start (enable)	O: Forward C: Reverse	N.O. contact The speed increases when closing	N.O. contact The speed decreases when closing	O: Selected speed setpoint C: Preset speed 1	–
11	O: Stop (controller inhibit) C: Forward movement	O: Stop (controller inhibit) C: Reverse movement	O: Selected speed setpoint C: Preset speed 1, 2	Analog 1 Speed setpoint	O: Preset speed 1 C: Preset speed 2	–
12	O: Stop (controller inhibit) C: Forward movement	O: Stop (controller inhibit) C: Reverse movement	Open	Open	Open	Preset speed 1
			Closed	Open	Open	Preset speed 2
			Open	Closed	Open	Preset speed 3
			Closed	Closed	Open	Preset speed 4
			Open	Open	Closed	Preset speed 5
			Closed	Open	Closed	Preset speed 6
			Open	Closed	Closed	Preset speed 7
			Closed	Closed	Closed	Preset speed 8
13	O: Stop (controller inhibit) C: Forward movement	O: Stop (controller inhibit) C: Reverse movement	O: Selected speed setpoint C: Preset speed 1	Analog 1 speed setpoint	Analog torque reference	–
14	O: Stop (controller inhibit) C: Forward movement	O: Stop (controller inhibit) C: Reverse movement	O: Selected speed setpoint C: Preset speed 1	Analog 1 speed setpoint	O: Decel. ramp 1 C: Decel. ramp 2	–
15	O: Stop (controller inhibit) C: Forward movement	O: Stop (controller inhibit) C: Reverse movement	O: Selected speed setpoint C: Analog input 2	Analog 1 speed setpoint	Analog 1 speed setpoint	–
16	O: Stop (controller inhibit) C: Forward movement	O: Stop (controller inhibit) C: Reverse movement	O: Selected speed setpoint C: Preset speed 1	Analog 1 Speed setpoint	External fault[1)] O: Fault C: Start	–
17	O: Stop (controller inhibit) C: Forward movement	O: Stop (controller inhibit) C: Reverse movement	Open	Open	External fault[1)] O: Fault C: Start	Preset speed 1
			Closed	Open		Preset speed 2
			Open	Closed		Preset speed 3
			Closed	Closed		Preset speed 4
18	O: Stop (controller inhibit) C: Forward movement	O: Stop (controller inhibit) C: Reverse movement	Open	Open	O: Decel. ramp 1 C: Decel. ramp 2	Preset speed 1
			Closed	Open		Preset speed 2
			Open	Closed		Preset speed 3
			Closed	Closed		Preset speed 4
19	O: Stop (controller inhibit) C: Forward movement	O: Stop (controller inhibit) C: Reverse movement	Open	Open	O: Selected speed setpoint C: Preset speed 1 – 4	Preset speed 1
			Closed	Open		Preset speed 2
			Open	Closed		Preset speed 3
			Closed	Closed		Preset speed 4

P1-15	Digital input 1	Digital input 2	Digital input 3	Analog input 1	Analog input 2	Remarks / preset value
20	O: Stop (controller inhibit) C: Forward movement	O: Stop (controller inhibit) C: Reverse movement	N.O. contact The speed increases when closing	N.O. contact The speed decreases when closing	O: Selected speed setpoint C: Preset speed 1	Used for motor potentiometer operation
21	O: Stop (controller inhibit) C: Forward movement (latching)	O: Stop (controller inhibit) C: Start	O: Stop (controller inhibit) C: Reverse movement (latching)	Analog 1 Speed setpoint	O: Selected speed setpoint C: Preset speed 1	Function enabled if *P1-12* = 0

1) The external fault is defined in parameter *P2-33*.

Selecting the speed setpoint

The "Speed setpoint source" mentioned in the previous chapter is determined by the value set in *P1-12* (terminals / keypad / SBus).

P1-12 (terminal / keypad / SBus control)		Digital input 2
0	Terminal mode	Analog input 1
1	Keypad mode (unidirectional)	Digital potentiometer
2	Keypad mode (bidirectional)	Digital potentiometer
3	User PID mode	PID controller output
4	Slave mode	Speed setpoint via internal bus
5	SBus (MOVILINK® protocol)	Speed setpoint via SBus
6	CAN bus	Speed setpoint via CAN bus
7	Modbus	Speed setpoint via Modbus
8	SBus (MOVI-PLC® motion protocol)	Speed setpoint via SBus

9 Technical Data

9.1 Conformity

All products meet the following international standards:

- CE marking according to low voltage directive
- UL 508C power converter
- EN 61800-3 Variable-speed electrical drives – part 3
- EN 61000-6 / -2, -3, -4 Generic standard for interference immunity/interference emission (EMC)
- Degree of protection according to NEMA 250, EN 60529
- Flammability class according to UL 94
- C-Tick
- cUL

9.2 Ambient conditions

Ambient temperature range during operation	-10 °C to +50 °C with standard PWM frequency (IP20) -10 °C to +40 °C with standard PWM frequency (IP55, NEMA 12 K)
Maximum derating depending on the ambient temperature	4% / °C to 55 °C for IP20 inverters 4% / °C to 50 °C for IP55, NEMA 12 K
Ambient temperature range for 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
Maximum relative humidity	95% (condensation not permitted)
Degree of protection of the standard housing	IP20
Higher degree of protection of the inverter housing	IP55, NEMA 12 K

9.3 Power rating and current

9.3.1 1-phase system AC 230 V for 3-phase AC 230 V motors

MOVITRAC® LTP-B – EMC filter class B					
IP20 housing	Type	MC LTP-B...	0008-2B1-4-00	0015-2B1-4-00	0022-2B1-4-00
	Part number		18251382	18251528	18251641
IP55 / NEMA-12 housing	Type	Type MC LTP-B...	0008-2B1-4-10	0015-2B1-4-10	0022-2B1-4-10
	Part number		18251390	18251536	18251668
INPUT					
Line voltage		U_{line}	1 × AC 200–240 V ± 10%		
Line frequency		f_{line}	50/60 Hz ±5%		
Power supply cable cross section		mm^2	2.5		4.0
		AWG	14		12
Line fuse		A	16	20	32 (35)[1)]
Rated input current		A	10.5	16.2	23.8
OUTPUT					
Recommended motor power		kW	0.75	1.5	2.2
		PS	1.0	2.0	3
Output voltage		U_{Motor}	3 × 20 - U_{line}		
Output current		A	4.3	7	10.5
Cross section of motor cable Cu 75C		mm^2	1.5	2.5	
		AWG	16	14	
Max. motor cable length	Shielded	m	100		
	Unshielded		150		
GENERAL INFORMATION					
Size			2		
Heat loss at nominal output power		W	45		66
Minimum braking resistance value		Ω	27		

1) Recommended values for UL compliance

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

Sizes 2 + 3

MOVITRAC® LTP-B – EMC filter class A								
IP20 housing	Type	MC LTP-B...	0008-2A3-4-00	0015-2A3-4-00	0022-2A3-4-00	0030-2A3-4-00	0040-2A3-4-00	0055-2A3-4-00
	Part number		18251358	18251471	18251617	18251722	18251765	18251846
IP55 / NEMA-12 housing	Type	MC LTP-B...	0008-2A3-4-10	0015-2A3-4-10	0022-2A3-4-10	0030-2A3-4-10	0040-2A3-4-10	0055-2A3-4-10
	Part number		18251366	18251498	18251625	18251730	18251773	18251854
INPUT								
Line voltage		U_{line}	3 × AC 200–240 V ± 10%					
Line frequency		f_{line}	50/60 Hz ±5%					
Power supply cable cross section		mm^2	1.5	2.5			4.0	6.0
		AWG	16	14			12	10
Line fuse		A	10	10	16	32 (35)[1]		50
Rated input current		A	5.7	8.4	13.1	16.1	20.7	25
OUTPUT								
Recommended motor power		kW	0.75	1.5	2.2	3	4	5.5
		PS	1.0	2.0	3.0	4.0	5.4	7.4
Output voltage		U_{Motor}	3 × 20 - U_{line}					
Output current		A	4.3	7	10.5	14	18	24
Cross section of motor cable Cu 75C		mm^2	1.5	2.5			4	6
		AWG	16	14			12	10
Max. motor cable length	Shielded	m	100					
	Unshielded		150					
GENERAL INFORMATION								
Size			2			3		3/4[2]
Heat loss at nominal output power		W	45		66	90	120	165
Minimum braking resistance value		Ω	27			22		12

1) Recommended values for UL compliance

2) IP20 housing – size 3 / IP55 housing – size 4

Sizes 4 & 5

MOVITRAC® LTP-B – EMC filter class A						
IP55 / NEMA-12 housing	Type	MC LTP-B...	0075-2A3-4-10	0110-2A3-4-10	0150-2A3-4-10	0185-2A3-4-10
	Part number		18251919	18251978	18252036	18252060
INPUT						
Line voltage		U_{line}	3 × AC 200–240 V ± 10%			
Line frequency		f_{line}	50/60 Hz ±5%			
Power supply cable cross section		mm^2	10	16	25	
		AWG	8	6	4	
Line fuse		A	50	63	80	
Rated input current		A	46.6	54.1	69.6	76.9
OUTPUT						
Recommended motor power		kW	7.5	11	15	18.5
		PS	10.1	14.8	20.1	24.8
Output voltage		U_{Motor}	3 × 20 - U_{line}			
Output current		A	39	46	61	72
Cross section of motor cable Cu 75C		mm^2	10	16	25	
		AWG	8	6	4	
Max. motor cable length	Shielded	m	100			
	Unshielded		150			
GENERAL INFORMATION						
Size			4		5	
Heat loss at nominal output power		W	225	330	450	555
Minimum braking resistance value		Ω	12		6	

Size 6

MOVITRAC® LTP-B – EMC filter class A						
IP55 / NEMA-12 housing	Type	MC LTP-B...	0220-2A3-4-10	0300-2A3-4-10	0370-2A3-4-10	0450-2A3-4-10
	Part number		18252087	18252117	18252141	18252176
INPUT						
Line voltage		U_{line}	3 × AC 200–240 V ± 10%			
Line frequency		f_{line}	50/60 Hz ±5%			
Power supply cable cross section		mm^2	35	50	70	90
		AWG	2	1/0	2/0	4/0
Line fuse		A	100	125	160	200
Rated input current		A	92.3	116	150	176
OUTPUT						
Recommended motor power		kW	22	30	37	45
		PS	30.0	40.2	49.6	60.3
Output voltage		U_{Motor}	3 × 20 - U_{line}			
Output current		A	90	110	150	180
Cross section of motor cable Cu 75C		mm^2	35	50	70	90
		AWG	2	1/0	2/0	4/0
Max. motor cable length	Shielded	m	100			
	Unshielded		150			
GENERAL INFORMATION						
Size			6			
Heat loss at nominal output power		W	660	900	1110	1350
Minimum braking resistance value		Ω	6	3		

Size 7

MOVITRAC® LTP-B – EMC filter class A					
IP55 / NEMA-12 housing	Type	MC LTP-B...	0550-2A3-4-10	0750-2A3-4-10	0900-2A3-4-10
	Part number		18252206	18252230	18252265
INPUT					
Line voltage		U_{line}	3 × AC 200–240 V ± 10%		
Line frequency		f_{line}	50/60 Hz ±5%		
Power supply cable cross section		mm^2	150	2 × 120	2 × 120
		AWG	–	–	–
Line fuse		A	250	315	400
Rated input current		A	217	255	312
OUTPUT					
Recommended motor power		kW	55	75	90
		PS	73.8	100.6	120.7
Output voltage		U_{Motor}	3 × 20 - U_{line}		
Output current		A	202	248	302
Cross section of motor cable Cu 75C		mm^2	150	2 × 120	2 × 120
		AWG	4/0	–	–
Max. motor cable length	Shielded	m	100		
	Unshielded		150		
GENERAL INFORMATION					
Size			7		
Heat loss at nominal output power		W	1650	2250	2700
Minimum braking resistance value		Ω	3		

9.3.3 3-phase system AC 400 V for 3-phase AC 400 V motors

Sizes 2 + 3

MOVITRAC® LTP-B – EMC filter class A									
IP20 housing	Type	MC LTP-B...	0008-5A3-4-00	0015-5A3-4-00	0022-5A3-4-00	0040-5A3-4-00	0055-5A3-4-00	0075-5A3-4-00	0110-5A3-4-00
	Part number		18251412	18251552	18251684	18251803	18251870	18251927	18251986
IP55 / NEMA-12 housing	Type	MC LTP-B...	0008-5A3-4-10	0015-5A3-4-10	0022-5A3-4-10	0040-5A3-4-10	0055-5A3-4-10	0075-5A3-4-10	0110-5A3-4-10
	Part number		18251420	18251560	18251692	18251811	18251889	18251935	18251994
INPUT									
Line voltage		U_{line}	3 × AC 380–480 V ± 10%						
Line frequency		f_{line}	50/60 Hz ±5%						
Power supply cable cross section		mm^2	1.5		2.5			4	6
		AWG	16		14			12	10
Line fuse		A	6	10	16	16 (15)[1]	20	25	32 (35)
Rated input current		A	3.1	4.8	7.2	10.8	17.6	22.1	28.2
OUTPUT									
Recommended motor power		kW	0.75	1.5	2.2	4	5.5	7.5	11
		PS	1	2	3	5.4	7.4	10.1	14.8
Output voltage		U_{Motor}	3 × 20 - U_{line}						
Output current		A	2.2	4.1	5.8	9.5	14	18	24
Cross section of motor cable Cu 75C		mm^2	1.5		2.5			4	6
		AWG	16		14			12	10
Max. motor cable length	Shielded	m	100						
	Unshielded		150						
GENERAL INFORMATION									
Size			2				3		3/4[2]
Heat loss at nominal output power		W	22	45	66	120	165	225	330
Minimum braking resistance value		Ω	82				47		

1) Recommended values for UL compliance

2) IP20 housing – size 3 / IP55 housing – size 4

Sizes 4 & 5

MOVITRAC® LTP-B – EMC filter class A							
IP55 / NEMA-12 housing	Type	MC LTP-B...	0150-5A3-4-10	0185-5A3-4-10	0220-5A3-4-10	0300-5A3-4-10	0370-5A3-4-10
	Part number		18252044	18252079	18252095	18252125	18252168
INPUT							
Line voltage		U_{line}	3 × AC 380–480 V ± 10%				
Line frequency		f_{line}	50/60 Hz ±5%				
Power supply cable cross section		mm^2	6	10	16	25	35
		AWG	10	8	6	4	2
Line fuse		A	50		63	80	
Rated input current		A	32.9	46.6	54.1	69.6	76.9
OUTPUT							
Recommended motor power		kW	15	18.5	22	30	37
		PS	20.1	24.8	30.0	40.2	49.6
Output voltage		U_{Motor}	3 × 20 - U_{line}				
Output current		A	30	39	46	61	72
Cross section of motor cable Cu 75C		mm^2	6	10	16	25	
		AWG	10	8	6	4	
Max. motor cable length	Shielded	m	100				
	Unshielded		150				
GENERAL INFORMATION							
Size			4			5	
Heat loss at nominal output power		W	450	555	660	900	1110
Minimum braking resistance value		Ω	27			12	

Size 6

MOVITRAC® LTP-B – EMC filter class A						
IP55 / NEMA-12 housing	Type	MC LTP-B...	0450-5A3-4-10	0550-5A3-4-10	0750-5A3-4-10	0900-5A3-4-10
	Part number		18252184	18252214	18252249	18252273
INPUT						
Line voltage		U_{line}	3 × AC 380–480 V ± 10%			
Line frequency		f_{line}	50/60 Hz ±5%			
Power supply cable cross section		mm^2	35	50	70	90
		AWG	2	1/0	2/0	4/0
Line fuse		A	100	125	160	200
Rated input current		A	92.3	116	150	176
OUTPUT						
Recommended motor power		kW	45	55	75	90
		PS	60.3	73.8	100.6	120.7
Output voltage		U_{Motor}	3 × 20 - U_{line}			
Output current		A	90	110	150	180
Cross section of motor cable Cu 75C		mm^2	35	50	70	90
		AWG	2	1/0	2/0	4/0
Max. motor cable length	Shielded	m	100			
	Unshielded		150			
GENERAL INFORMATION						
Size			6			
Heat loss at nominal output power		W	1350	1650	2250	2700
Minimum braking resistance value		Ω	12	6		

Size 7

MOVITRAC® LTP-B – EMC filter class A					
IP55 / NEMA-12 housing	Type	MC LTP-B...	1100-5A3-4-10	1320-5A3-4-10	1600-5A3-4-10
	Part number		18252303	18252311	18252346
INPUT					
Line voltage		U_{line}	3 × AC 380–480 V ± 10%		
Line frequency		f_{line}	50/60 Hz ±5%		
Power supply cable cross section		mm^2	150	2 × 120	2 × 120
		AWG	–	–	–
Line fuse		A	250	315	315
Rated input current		A	217	255	312
OUTPUT					
Recommended motor power		kW	110	132	160
		PS	147.5	177.0	214.6
Output voltage		U_{Motor}	3 × 20 - U_{line}		
Output current		A	202	240	302
Cross section of motor cable Cu 75C		mm^2	150	2 × 120	2 × 120
		AWG	–	–	–
Max. motor cable length	Shielded	m	100		
	Unshielded		150		
GENERAL INFORMATION					
Size			7		
Heat loss at nominal output power		W	3300	3960	4800
Minimum braking resistance value		Ω	4.7		

10 Service and Error Codes

To ensure fault-free operation, SEW-EURODRIVE recommends to check the ventilation openings in the housing at regular intervals and clean them if necessary.

10.1 Troubleshooting

Symptom	Cause and solution
Overload or overcurrent error of the unloaded motor during acceleration	Check the star/delta terminal connection in the motor. The nominal operating voltage of motor and inverter must match. Delta connection always yields the lower voltage of a multi-voltage motor.
Overload or overcurrent – motor does not turn	Check whether the rotor is blocked. Make sure that the mechanical brake is released (if installed).
No enable for the inverter – display shows "StoP"	• Check whether the hardware enable signal is present at digital input 1. • Ensure proper +10 V user output voltage (between terminals 5 and 7). • If faulty, check the wiring of the user terminal strip. • Check *P1-12* for terminal mode / keypad mode. • If keypad mode is selected, press the "Start" key. • The line voltage must correspond with the specified values.
The inverter does not start at extremely cold ambient conditions	The inverter might not start at ambient temperatures below –10 °C. Under such conditions, provide a heat source that keeps the ambient temperature on site above –10 °C.
No access to extended menus	*P1-14* must be set to extended access code. The value is "101" unless the user has changed the code in *P2-40*.

10.2 Error history

Parameter *P1-13* in parameter mode archives the 4 most recent errors and/or events. Each error is displayed in abbreviated form. The most recent error is shown first (when calling *P1-13*).

This means that any new error is entered at the top of the list followed by the subsequent errors in the order of their appearance. The oldest error will be deleted from the error history.

- **INFORMATION**

  If the latest error in the error history is an undervoltage fault, no further undervoltage faults will be entered in the error history. The reason is to avoid that the error history is filled with undervoltage faults, which occur every time the MOVITRAC® LTP-B inverter is switched off.

10.3 Error codes

Code (dec)	Error message	Explanation	Solution
01	"h-O-I" "O-I"	Overcurrent at inverter output to the motor Motor overload Overtemperature at the heat sink of the inverter	Fault during constant speed: • Check overload or fault Fault while enabling the drive: • Check the motor for stalling or blocking • Check for star-delta motor connection error • Check whether the length of the cable meets the requirements Fault during operation: • Check for sudden overload or malfunction • Check cable connection between inverter and motor • The acceleration/deceleration time might be too short and requires too much power. If you cannot increase *P1-03* or *P1-04*, use a larger MC LTP.
04	"OI-b"	Brake channel overcurrent; overcurrent in the braking resistor circuit	• Check cabling to the braking resistor • Check the braking resistance value • Observe the minimum resistance values given in the relevant tables
	"OL-br"	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 relevant tables
06	"P-LOSS"	Input phase failure error	An input phase failed in an inverter designed for operation on a three-phase system.
07	"O.Uolt"	DC link overvoltage	• Check whether the supply voltage is too high or too low • Increase the deceleration time in *P1-04* if the fault occurs during deceleration • Connect a braking resistor (if required)
	"Flt-dc"	DC link ripple too high	Check power supply
08	"I.t-trP"	An inverter overload fault occurs when the inverter has delivered > 100% of the rated current for a certain time (defined in *P1-08*). The display is flashing to indicate overload.	• Increase the acceleration ramp (*P1-03*) 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
11	"O-t" "O-HFAT"	Overtemperature at heat sink	• Check inverter cooling and housing dimensions • Provide additional room or cooling, if necessary • Decrease the switching frequency
14	"Enc 01"	Encoder feedback error (only visible if encoder module is connected and enabled)	Encoder communication failure
	"Enc 02"		Encoder feedback speed error, increase *P6-07*
	"Enc 03"		• Incorrect PPR count setting • Check *P1-10* for proper nameplate speed
	"Enc 04"		Hiperface® signal loss / encoder channel A error
	"Enc 05"		Encoder channel B error
	"Enc 06"		Encoder channel A or B error
	"Enc 07"		• Hiperface® data channel error • Motor turns when switching on
	"Enc 08"		Hiperface® I/O communication channel error
	"Enc 09"		Hiperface® type not supported
	"Enc 10"		KTY not connected

Code (dec)	Error message	Explanation	Solution
25	"dAtA-E"	Internal memory error	• Parameter not saved, factory settings restored • Retry; contact SEW-EURODRIVE Service if the error occurs again
	"data-F"	EEPROM error; parameter not saved, factory settings restored	EEPROM error; parameter not saved, factory setting restored; contact SEW-EURODRIVE Service if the error occurs again
26	"E-triP"	External fault (in connection with digital input 5).	• External fault at digital input 5; NC contact was opened • Check motor thermistor (if connected)
31	"F-PTC"	Motor thermistor fault	• Fault at digital input 5; NC contact was opened • Check motor thermistor • Check motor temperature
39	"Ho-trp"	Reference travel failed	• Check reference cam • Check limit switch connection • Check reference travel type setting and the parameters required for it
42	"Lag-Er"	Lag error	• Check encoder connection • Extend ramps • Set P component to higher value • Set speed controller parameters again • Increase lag error tolerance • Check wiring of encoder, motor and line phases • Make sure that the mechanical components can move freely and are not blocked
47	"Sc-Fxx"	Communication failure error	• Check communication connection between inverter and external devices • Make sure each inverter in the network is assigned a unique address
81	"At-F01"	Auto tune error	The measured stator resistance of the motor fluctuates between the phases. • Make sure that the motor is connected correctly and runs properly • Check the winding for correct resistance and symmetry
	"At-F02"		• The measured stator resistance of the motor is too high. • Make sure that the motor is connected correctly and runs properly • Check whether the power rating of the motor corresponds with the power rating of the connected inverter
	"At-F03"		• The measured motor inductivity is too low. • Make sure that the motor is connected correctly and runs properly
	"At-F04"		• The measured motor inductivity is too high. • Make sure that the motor is connected correctly and runs properly • Check whether the power rating of the motor corresponds with the power rating of the connected inverter
	"At-F05"		• The measured motor parameters are contradictory. • Make sure that the motor is connected correctly and runs properly • Check whether the power rating of the motor corresponds with the power rating of the connected inverter
113	"4-20 F"	Current at analog input not within defined range	• Check whether the input current in *P2-30* and *P2-33* lies within the defined range • Check connection cables
115	"STO-F"	STO circuit error	• Replacement as inverter is defective
117	"U-t"	Undertemperature	• Occurs at an ambient temperature below -10 °C. • Increase the temperature to above -10 °C to start the inverter
198	"U.Uolt"	DC link undervoltage	Usually occurs when switching off the inverter; check line voltage if the error occurs during inverter operation
200	"FAN-F"	Fan fault	Contact SEW-EURODRIVE Service
	"th-Flt"	Defective thermistor at heat sink	Contact SEW-EURODRIVE Service
–	"P-dEF"	The factory-set parameters were loaded	Press the <Stop> key, the inverter can now be configured for the required application.

Code (dec)	Error message	Explanation	Solution
–	"SC-FLt"	Internal inverter fault	Contact SEW-EURODRIVE Service
	"FAULtY"		
	"Prog_ _"		
–	"Out.F"	Internal inverter fault	Contact SEW-EURODRIVE Service
–	"U-torq"	Minimum torque limit timeout	• Torque threshold not exceeded in time • Increase the time in *P4-16*, or • increase the torque limit in *P4-15*
–	"O-torq"	Maximum torque limit timeout	• Check the motor load • Increase value in *P4-07*
–	"Etl-24"	External 24 V supply	Power supply not connected • Check supply voltage and connection

10.4 SEW Electronics Service

10.4.1 Sending in for repair

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

Provide the following information when sending the unit in for repair:

- Serial number (→ nameplate)
- Type designation
- Short description of the application (application, control via terminals or serial)
- Connected components (motor, etc.)
- Nature of the fault
- Accompanying circumstances
- Your own presumptions as to what has happened
- Any unusual events preceding the problem, etc.

11 Address list

Germany			
Headquarters **Production** **Sales**	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal P.O. Box Postfach 3023 • D-76642 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-1970 http://www.sew-eurodrive.de sew@sew-eurodrive.de
Production / Industrial Gear Units	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Christian-Pähr-Str.10 D-76646 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-2970
Service Competence Center	**Mechanics / Mechatronics**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 1 D-76676 Graben-Neudorf	Tel. +49 7251 75-1710 Fax +49 7251 75-1711 sc-mitte@sew-eurodrive.de
	Electronics	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal	Tel. +49 7251 75-1780 Fax +49 7251 75-1769 sc-elektronik@sew-eurodrive.de
Drive Technology Center	**North**	SEW-EURODRIVE GmbH & Co KG Alte Ricklinger Straße 40-42 D-30823 Garbsen (near Hannover)	Tel. +49 5137 8798-30 Fax +49 5137 8798-55 sc-nord@sew-eurodrive.de
	East	SEW-EURODRIVE GmbH & Co KG Dänkritzer Weg 1 D-08393 Meerane (near Zwickau)	Tel. +49 3764 7606-0 Fax +49 3764 7606-30 sc-ost@sew-eurodrive.de
	South	SEW-EURODRIVE GmbH & Co KG Domagkstraße 5 D-85551 Kirchheim (near München)	Tel. +49 89 909552-10 Fax +49 89 909552-50 sc-sued@sew-eurodrive.de
	West	SEW-EURODRIVE GmbH & Co KG Siemensstraße 1 D-40764 Langenfeld (near Düsseldorf)	Tel. +49 2173 8507-30 Fax +49 2173 8507-55 sc-west@sew-eurodrive.de
	Drive Service Hotline / 24 Hour Service		+49 800 SEWHELP +49 800 7394357
	Additional addresses for service in Germany provided on request!		

France			
Production **Sales** **Service**	**Haguenau**	SEW-USOCOME 48-54 route de Soufflenheim B. P. 20185 F-67506 Haguenau Cedex	Tel. +33 3 88 73 67 00 Fax +33 3 88 73 66 00 http://www.usocome.com sew@usocome.com
Production	**Forbach**	SEW-USOCOME Zone industrielle Technopôle Forbach Sud B. P. 30269 F-57604 Forbach Cedex	Tel. +33 3 87 29 38 00
Assembly **Sales** **Service**	**Bordeaux**	SEW-USOCOME Parc d'activités de Magellan 62 avenue de Magellan - B. P. 182 F-33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09
	Lyon	SEW-USOCOME Parc d'affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15
	Nantes	SEW-USOCOME Parc d'activités de la forêt 4 rue des Fontenelles F-44140 Le Bignon	Tel. +33 2 40 78 42 00 Fax +33 2 40 78 42 20

France			
	Paris	SEW-USOCOME Zone industrielle 2 rue Denis Papin F-77390 Verneuil l'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
	Additional addresses for service in France provided on request!		

Algeria			
Sales	**Algiers**	REDUCOM Sarl 16, rue des Frères Zaghnoune Bellevue 16200 El Harrach Alger	Tel. +213 21 8214-91 Fax +213 21 8222-84 info@reducom-dz.com http://www.reducom-dz.com

Argentina			
Assembly **Sales**	**Buenos Aires**	SEW EURODRIVE ARGENTINA S.A. Ruta Panamericana Km 37.5, Lote 35 (B1619IEA) Centro Industrial Garín Prov. de Buenos Aires	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 sewar@sew-eurodrive.com.ar http://www.sew-eurodrive.com.ar

Australia			
Assembly **Sales** **Service**	**Melbourne**	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au

Austria			
Assembly **Sales** **Service**	**Wien**	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 A-1230 Wien	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://www.sew-eurodrive.at sew@sew-eurodrive.at

Belarus			
Sales	**Minsk**	SEW-EURODRIVE BY RybalkoStr. 26 BY-220033 Minsk	Tel.+375 17 298 47 56 / 298 47 58 Fax +375 17 298 47 54 http://www.sew.by sales@sew.by

Belgium			
Assembly **Sales** **Service**	**Brussels**	**SEW-EURODRIVE n.v./s.a.** Researchpark Haasrode 1060 Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.be info@sew-eurodrive.be
Service Competence Center	**Industrial Gears**	**SEW-EURODRIVE n.v./s.a.** Rue de Parc Industriel, 31 BE-6900 Marche-en-Famenne	Tel. +32 84 219-878 Fax +32 84 219-879 http://www.sew-eurodrive.be service-wallonie@sew-eurodrive.be

Brazil			
Production **Sales** **Service**	**São Paulo**	SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaiolli, 152 - Rodovia Presidente Dutra Km 208 Guarulhos - 07251-250 - SP SAT - SEW ATENDE - 0800 7700496	Tel. +55 11 2489-9133 Fax +55 11 2480-3328 http://www.sew-eurodrive.com.br sew@sew.com.br

Brazil			
Assembly **Sales** **Service**	**Rio Claro**	SEW-EURODRIVE Brasil Ltda. Rodovia Washington Luiz, Km 172 Condomínio Industrial Conpark Caixa Postal: 327 13501-600 – Rio Claro / SP	Tel. +55 19 3522-3100 Fax +55 19 3524-6653 montadora.rc@sew.com.br
	Joinville	SEW-EURODRIVE Brasil Ltda. Rua Dona Francisca, 12.346 – Pirabeiraba 89239-270 – Joinville / SC	Tel. +55 47 3027-6886 Fax +55 47 3027-6888 filial.sc@sew.com.br
	Indaiatuba	SEW-EURODRIVE Brasil Ltda. Estrada Municipal Jose Rubim, 205 Rodovia Santos Dumont Km 49 13347-510 - Indaiatuba / SP	Tel. +55 19 3835-8000 sew@sew.com.br

Bulgaria			
Sales	**Sofia**	BEVER-DRIVE GmbH Bogdanovetz Str.1 BG-1606 Sofia	Tel. +359 2 9151160 Fax +359 2 9151166 bever@bever.bg

Cameroon			
Sales	**Douala**	Electro-Services Rue Drouot Akwa B.P. 2024 Douala	Tel. +237 33 431137 Fax +237 33 431137 electrojemba@yahoo.fr

Canada			
Assembly **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, ON L6T 3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca l.watson@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. Tilbury Industrial Park 7188 Honeyman Street Delta, BC V4G 1G1	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Lasalle, PQ H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 a.peluso@sew-eurodrive.ca
	Additional addresses for service in Canada provided on request!		

Chile			
Assembly **Sales** **Service**	**Santiago**	SEW-EURODRIVE CHILE LTDA. Las Encinas 1295 Parque Industrial Valle Grande LAMPA RCH-Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 75770-00 Fax +56 2 75770-01 http://www.sew-eurodrive.cl ventas@sew-eurodrive.cl

China			
Production **Assembly** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25323273 info@sew-eurodrive.cn http://www.sew-eurodrive.cn
Assembly **Sales** **Service**	**Suzhou**	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew-eurodrive.cn

China			
	Guangzhou	SEW-EURODRIVE (Guangzhou) Co., Ltd. No. 9, JunDa Road East Section of GETDD Guangzhou 510530	Tel. +86 20 82267890 Fax +86 20 82267922 guangzhou@sew-eurodrive.cn
	Shenyang	SEW-EURODRIVE (Shenyang) Co., Ltd. 10A-2, 6th Road Shenyang Economic Technological Development Area Shenyang, 110141	Tel. +86 24 25382538 Fax +86 24 25382580 shenyang@sew-eurodrive.cn
	Wuhan	SEW-EURODRIVE (Wuhan) Co., Ltd. 10A-2, 6th Road No. 59, the 4th Quanli Road, WEDA 430056 Wuhan	Tel. +86 27 84478388 Fax +86 27 84478389 wuhan@sew-eurodrive.cn
	Xi'An	SEW-EURODRIVE (Xi'An) Co., Ltd. No. 12 Jinye 2nd Road Xi'An High-Technology Industrial Development Zone Xi'An 710065	Tel. +86 29 68686262 Fax +86 29 68686311 xian@sew-eurodrive.cn
	Additional addresses for service in China provided on request!		

Colombia			
Assembly **Sales** **Service**	**Bogotá**	SEW-EURODRIVE COLOMBIA LTDA. Calle 22 No. 132-60 Bodega 6, Manzana B Santafé de Bogotá	Tel. +57 1 54750-50 Fax +57 1 54750-44 http://www.sew-eurodrive.com.co sew@sew-eurodrive.com.co

Croatia			
Sales **Service**	**Zagreb**	KOMPEKS d. o. o. Zeleni dol 10 HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@inet.hr

Czech Republic			
Sales **Assembly** **Service**	**Hostivice**	SEW-EURODRIVE CZ s.r.o. Floriánova 2459 253 01 Hostivice	Tel. +420 255 709 601 Fax +420 235 350 613 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz
	Drive Service Hotline / 24 Hour Service	HOT-LINE +420 800 739 739 (800 SEW SEW)	**Servis:** Tel. +420 255 709 632 Fax +420 235 358 218 servis@sew-eurodrive.cz

Denmark			
Assembly **Sales** **Service**	**Copenhagen**	SEW-EURODRIVEA/S Geminivej 28-30 DK-2670 Greve	Tel. +45 43 9585-00 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk

Egypt			
Sales **Service**	**Cairo**	Copam Egypt for Engineering & Agencies 33 EI Hegaz ST, Heliopolis, Cairo	Tel. +20 2 22566-299 +1 23143088 Fax +20 2 22594-757 http://www.copam-egypt.com/ copam@datum.com.eg

Estonia			
Sales	**Tallin**	ALAS-KUUL AS Reti tee 4 EE-75301 Peetri küla, Rae vald, Harjumaa	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee

Finland			
Assembly **Sales** **Service**	**Lahti**	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi
Production **Assembly**	**Karkkila**	SEW Industrial Gears Oy Valurinkatu 6, PL 8 FI-03600 Karkkila, 03601 Karkkila	Tel. +358 201 589-300 Fax +358 201 589-310 sew@sew.fi http://www.sew-eurodrive.fi

Gabon			
Sales	**Libreville**	ESG Electro Services Gabun Feu Rouge Lalala 1889 Libreville Gabun	Tel. +241 741059 Fax +241 741059 esg_services@yahoo.fr

Great Britain			
Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate Normanton West Yorkshire WF6 1QR	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk
	Drive Service Hotline / 24 Hour Service		Tel. 01924 896911

Greece			
Sales	**Athens**	Christ. Boznos & Son S.A. 12, K. Mavromichali Street P.O. Box 80136 GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr

Hong Kong			
Assembly **Sales** **Service**	**Hong Kong**	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 36902200 Fax +852 36902211 contact@sew-eurodrive.hk

Hungary			
Sales **Service**	**Budapest**	SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 http://www.sew-eurodrive.hu office@sew-eurodrive.hu

India			
Registered Office **Assembly** **Sales** **Service**	**Vadodara**	SEW-EURODRIVE India Private Limited Plot No. 4, GIDC POR Ramangamdi • Vadodara - 391 243 Gujarat	Tel. +91 265 3045200, +91 265 2831086 Fax +91 265 3045300, +91 265 2831087 http://www.seweurodriveindia.com salesvadodara@seweurodrivein-dia.com
Assembly **Sales** **Service**	**Chennai**	SEW-EURODRIVE India Private Limited Plot No. K3/1, Sipcot Industrial Park Phase II Mambakkam Village Sriperumbudur - 602105 Kancheepuram Dist, Tamil Nadu	Tel. +91 44 37188888 Fax +91 44 37188811 saleschennai@seweurodriveindia.com

Ireland			
Sales **Service**	**Dublin**	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458 info@alperton.ie http://www.alperton.ie

Israel			
Sales	**Tel-Aviv**	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 http://www.liraz-handasa.co.il office@liraz-handasa.co.il

Italy			
Assembly **Sales** **Service**	**Solaro**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 799781 http://www.sew-eurodrive.it sewit@sew-eurodrive.it

Ivory Coast			
Sales	**Abidjan**	SICA Société Industrielle & Commerciale pour l'Afrique 165, Boulevard de Marseille 26 BP 1173 Abidjan 26	Tel. +225 21 25 79 44 Fax +225 21 25 88 28 sicamot@aviso.ci

Japan			
Assembly **Sales** **Service**	**Iwata**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373855 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp

Kazakhstan			
Sales	**Almaty**	ТОО "СЕВ-ЕВРОДРАЙВ" пр.Райымбека, 348 050061 г. Алматы Республика Казахстан	Тел. +7 (727) 334 1880 Факс +7 (727) 334 1881 http://www.sew-eurodrive.kz sew@sew-eurodrive.kz

Kenya			
Sales	**Nairobi**	Barico Maintenances Ltd Kamutaga Place Commercial Street Industrial Area P.O.BOX 52217 - 00200 Nairobi	Tel. +254 20 6537094/5 Fax +254 20 6537096 info@barico.co.ke

Latvia			
Sales	**Riga**	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 6 7139253 Fax +371 6 7139386 http://www.alas-kuul.com info@alas-kuul.com

Lebanon			
Sales Lebanon	**Beirut**	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 510 532 Fax +961 1 494 971 ssacar@inco.com.lb
		After Sales Service	service@medrives.com

Lebanon			
Sales Jordan / Kuwait / Saudi Arabia / Syria	**Beirut**	Middle East Drives S.A.L. (offshore) Sin El Fil. B. P. 55-378 Beirut	Tel. +961 1 494 786 Fax +961 1 494 971 info@medrives.com http://www.medrives.com
		After Sales Service	service@medrives.com

Lithuania			
Sales	**Alytus**	UAB Irseva Statybininku 106C LT-63431 Alytus	Tel. +370 315 79204 Fax +370 315 56175 irmantas@irseva.lt http://www.sew-eurodrive.lt

Luxembourg			
Assembly **Sales** **Service**	**Brussels**	**SEW-EURODRIVE n.v./s.a.** Researchpark Haasrode 1060 Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.lu info@sew-eurodrive.be

Madagascar			
Sales	**Antananarivo**	Ocean Trade BP21bis. Andraharo Antananarivo. 101 Madagascar	Tel. +261 20 2330303 Fax +261 20 2330330 oceantrabp@moov.mg

Malaysia			
Assembly **Sales** **Service**	**Johor**	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my

Mexico			
Assembly **Sales** **Service**	**Quéretaro**	SEW-EURODRIVE MEXICO SA DE CV SEM-981118-M93 Tequisquiapan No. 102 Parque Industrial Quéretaro C.P. 76220 Quéretaro, México	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx

Morocco			
Sales **Service**	**Mohammedia**	SEW-EURODRIVE SARL 2 bis, Rue Al Jahid 28810 Mohammedia	Tel. +212 523 32 27 80/81 Fax +212 523 32 27 89 sew@sew-eurodrive.ma http://www.sew-eurodrive.ma

Namibia			
Sales	**Swakopmund**	DB Mining & Industrial Services Einstein Street Strauss Industrial Park Unit1 Swakopmund	Tel. +264 64 462 738 Fax +264 64 462 734 sales@dbmining.in.na

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	SEW-EURODRIVE B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 Service: 0800-SEWHELP http://www.sew-eurodrive.nl info@sew-eurodrive.nl

New Zealand			
Assembly **Sales** **Service**	**Auckland**	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz

Nigeria			
Sales	**Lagos**	EISNL Engineering Solutions and Drives Ltd Plot 9, Block A, Ikeja Industrial Estate (Ogba Scheme) Adeniyi Jones St. End Off ACME Road, Ogba, Ikeja, Lagos Nigeria	Tel. +234 (0)1 217 4332 team.sew@eisnl.com http://www.eisnl.com

Norway			
Assembly **Sales** **Service**	**Moss**	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 24 10 20 Fax +47 69 24 10 40 http://www.sew-eurodrive.no sew@sew-eurodrive.no

Pakistan			
Sales	**Karachi**	Industrial Power Drives Al-Fatah Chamber A/3, 1st Floor Central Commercial Area, Sultan Ahmed Shah Road, Block 7/8, Karachi	Tel. +92 21 452 9369 Fax +92-21-454 7365 seweurodrive@cyber.net.pk

Peru			
Assembly **Sales** **Service**	**Lima**	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe

Poland			
Assembly **Sales** **Service**	**Lodz**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Łódź	Tel. +48 42 676 53 00 Fax +48 42 676 53 49 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl
	Service	Tel. +48 42 6765332 / 42 6765343 Fax +48 42 6765346	Linia serwisowa Hotline 24H Tel. +48 602 739 739 (+48 602 SEW SEW) serwis@sew-eurodrive.pl

Portugal			
Assembly **Sales** **Service**	**Coimbra**	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt

Romania			
Sales **Service**	**Bucharest**	Sialco Trading SRL str. Brazilia nr. 36 011783 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro

Russia			
Assembly **Sales** **Service**	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 36 RUS-195220 St. Petersburg	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru

Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 338 494 770 Fax +221 338 494 771 senemeca@sentoo.sn http://www.senemeca.com

Serbia			
Sales	**Beograd**	DIPAR d.o.o. Ustanicka 128a PC Košum, IV sprat SRB-11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 office@dipar.rs

Singapore			
Assembly **Sales** **Service**	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com

Slovakia			
Sales	**Bratislava**	SEW-Eurodrive SK s.r.o. Rybničná 40 SK-831 06 Bratislava	Tel. +421 2 33595 202 Fax +421 2 33595 200 sew@sew-eurodrive.sk http://www.sew-eurodrive.sk
	Žilina	SEW-Eurodrive SK s.r.o. Industry Park - PChZ ulica M.R.Štefánika 71 SK-010 01 Žilina	Tel. +421 41 700 2513 Fax +421 41 700 2514 sew@sew-eurodrive.sk
	Banská Bystrica	SEW-Eurodrive SK s.r.o. Rudlovská cesta 85 SK-974 11 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk
	Košice	SEW-Eurodrive SK s.r.o. Slovenská ulica 26 SK-040 01 Košice	Tel. +421 55 671 2245 Fax +421 55 671 2254 sew@sew-eurodrive.sk

Slovenia			
Sales **Service**	**Celje**	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 SLO - 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net

South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 http://www.sew.co.za info@sew.co.za

South Africa			
	Cape Town	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 bgriffiths@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaco Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 cdejager@sew.co.za
	Nelspruit	SEW-EURODRIVE (PTY) LTD. 7 Christie Crescent Vintonia P.O.Box 1942 Nelspruit 1200	Tel. +27 13 752-8007 Fax +27 13 752-8008 robermeyer@sew.co.za

South Korea			
Assembly **Sales** **Service**	**Ansan**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate #1048-4, Shingil-Dong, Danwon-Gu, Ansan-City, Kyunggi-Do Zip 425-839	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-korea.co.kr master.korea@sew-eurodrive.com
	Busan	SEW-EURODRIVE KOREA Co., Ltd. No. 1720 - 11, Songjeong - dong Gangseo-ku Busan 618-270	Tel. +82 51 832-0204 Fax +82 51 832-0230 master@sew-korea.co.kr

Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 Fax +34 94 43184-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es

Swaziland			
Sales	**Manzini**	C G Trading Co. (Pty) Ltd PO Box 2960 Manzini M200	Tel. +268 2 518 6343 Fax +268 2 518 5033 engineering@cgtrading.co.sz

Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442 00 Fax +46 36 3442 80 http://www.sew-eurodrive.se jonkoping@sew.se

Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch

Thailand			
Assembly **Sales** **Service**	**Chonburi**	SEW-EURODRIVE (Thailand) Ltd. 700/456, Moo.7, Donhuaroh Muang Chonburi 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com

Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service Zone Industrielle Mghira 2 Lot No. 39 2082 Fouchana	Tel. +216 79 40 88 77 Fax +216 79 40 88 66 http://www.tms.com.tn tms@tms.com.tn

Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri Sanayi Ticaret Limited Şirketi Gebze Organize Sanayi Bölgesi 400.Sokak No:401 TR-41480 Gebze KOCAELİ	Tel. +90-262-9991000-04 Fax +90-262-9991009 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr

Ukraine			
Assembly **Sales** **Service**	**Dnipropetrovsk**	ООО «СЕВ-Евродрайв» ул.Рабочая, 23-В, офис 409 49008 Днепропетровск	Тел. +380 56 370 3211 Факс. +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua

United Arab Emirates			
Sales **Service**	**Sharjah**	Copam Middle East (FZC) Sharjah Airport International Free Zone P.O. Box 120709 Sharjah	Tel. +971 6 5578-488 Fax +971 6 5578-499 copam_me@eim.ae

USA			
Production **Assembly** **Sales** **Service**	**Southeast Region**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manufacturing +1 864 439-9948 Fax Assembly +1 864 439-0566 Fax Confidential/HR +1 864 949-5557 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly **Sales** **Service**	**Northeast Region**	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Midwest Region	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 332-0038 cstroy@seweurodrive.com
	Southwest Region	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Western Region	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, CA 94544	Tel. +1 510 487-3560 Fax +1 510 487-6433 cshayward@seweurodrive.com
	Additional addresses for service in the USA provided on request!		

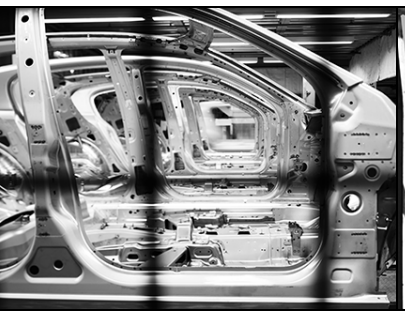
Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 http://www.sew-eurodrive.com.ve ventas@sew-eurodrive.com.ve sewfinanzas@cantv.net

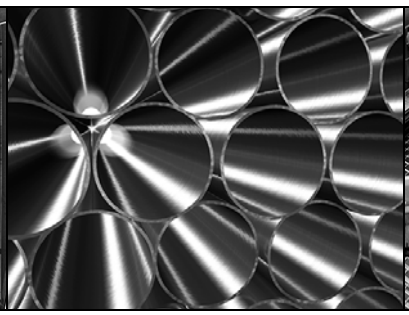
Vietnam			
Sales	**Ho Chi Minh City**	**All sectors except harbor, steel, coal power and offshore:** Nam Trung Co., Ltd 250 Binh Duong Avenue, Thu Dau Mot Town, Binh Duong Province HCM office: 91 Tran Minh Quyen Street District 10, Ho Chi Minh City	Tel. +84 8 8301026 Fax +84 8 8392223 namtrungco@hcm.vnn.vn truongtantam@namtrung.com.vn khanh-nguyen@namtrung.com.vn
		Harbor and offshore: DUC VIET INT LTD Industrial Trading and Engineering Services A75/6B/12 Bach Dang Street, Ward 02, Tan Binh District, 70000 Ho Chi Minh City	Tel. +84 8 62969 609 Fax +84 8 62938 842 totien@ducvietint.com
		Coal power and steel: Thanh Phat Co Ltd DMC Building, L11-L12, Ward3, Binh Thanh Dist, Ho Chi Minh City	Tel. +84 835170381 Fax +84 835170382 sales@thanh-phat.com
	Hanoi	Nam Trung Co., Ltd R.205B Tung Duc Building 22 Lang ha Street Dong Da District, Hanoi City	Tel. +84 4 37730342 Fax +84 4 37762445 namtrunghn@hn.vnn.vn

Zambia			
Sales	**Kitwe**	EC Mining Limited Plots No. 5293 & 5294,Tangaanyika Road, Off Mutentemuko Road, Heavy Industrial Park, P.O.BOX 2337 Kitwe	Tel. +260 212 210 642 Fax +260 212 210 645 sales@ecmining.com http://www.ecmining.com

Index

R






SEW-EURODRIVE
Driving the world

SEW-EURODRIVE GmbH & Co KG
P.O. Box 3023
76642 BRUCHSAL
GERMANY
Phone +49 7251 75-0
Fax +49 7251 75-1970
sew@sew-eurodrive.com

➞ www.sew-eurodrive.com