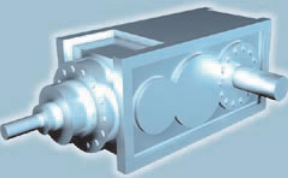
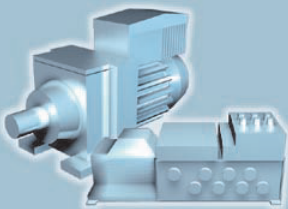
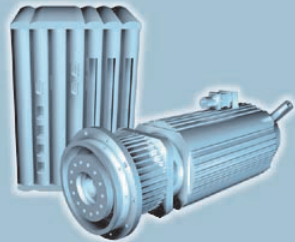
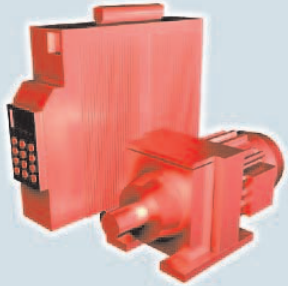




**SEW**  
**EURODRIVE**



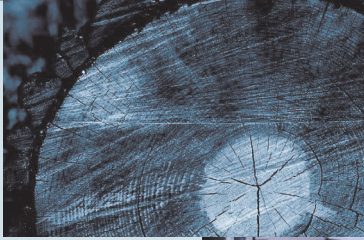
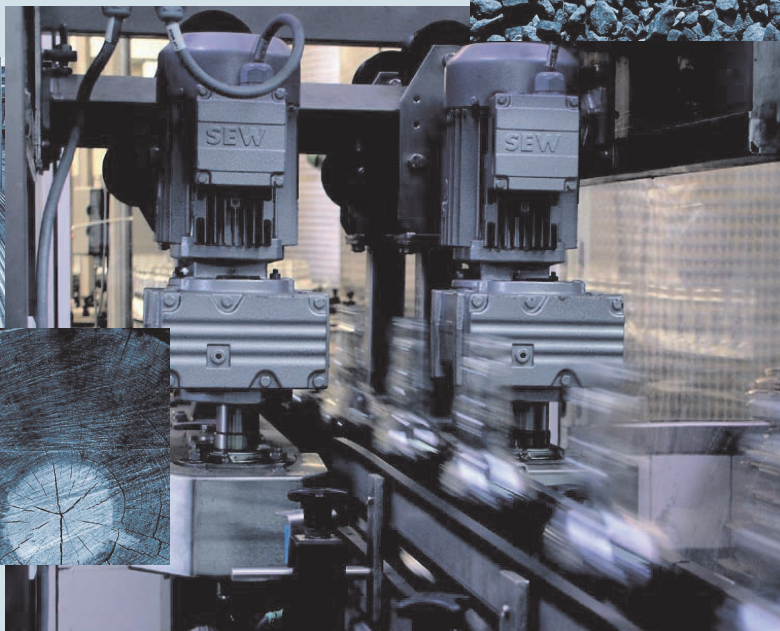
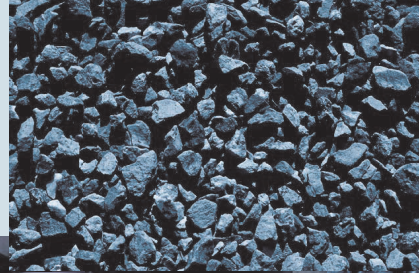
**MOVIDRIVE<sup>®</sup> MDX60B / 61B**

EA430000















Edition 09/2006

11427817 / EN

**System Manual**





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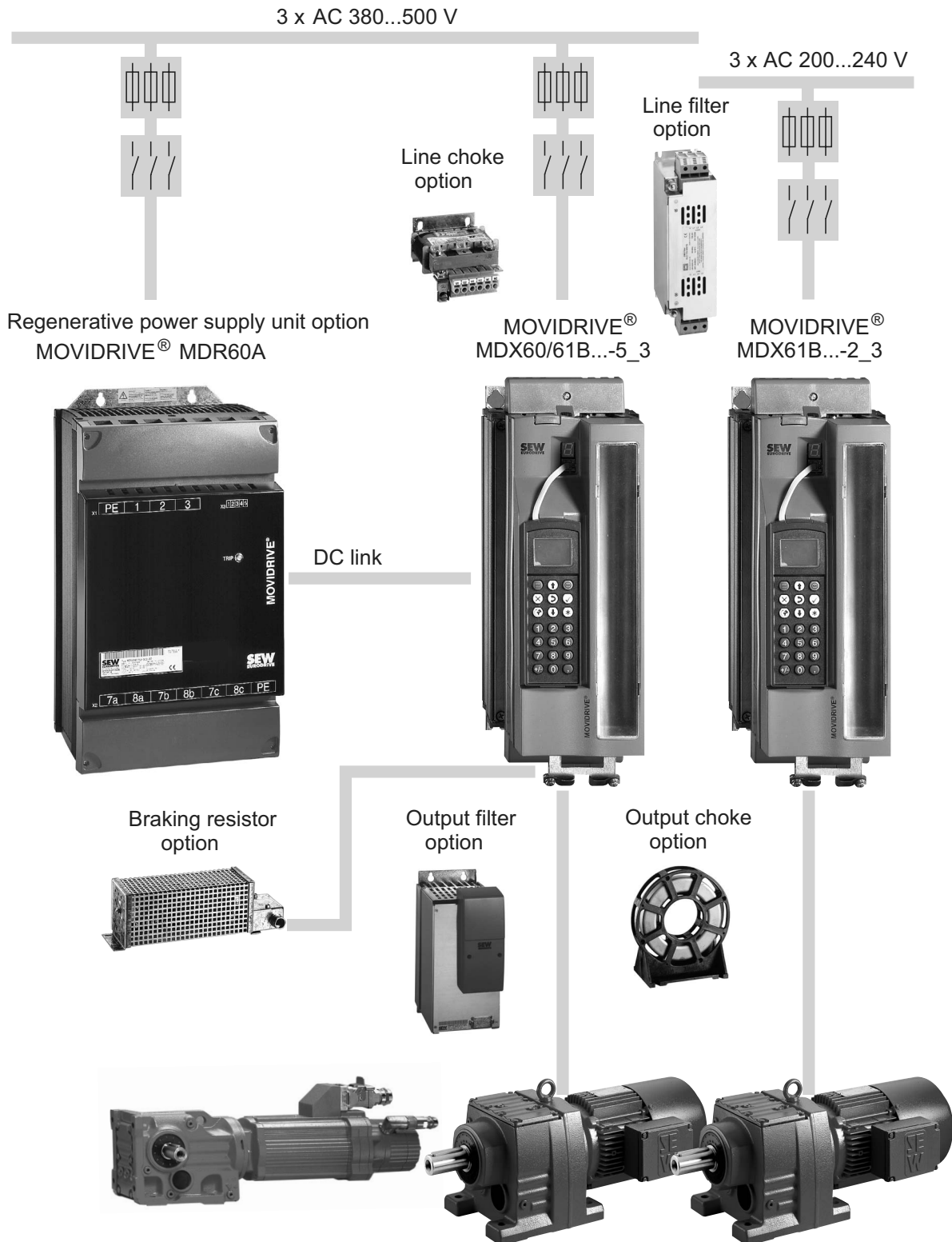
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# 1 System Description

## 1.1 System overview of MOVIDRIVE® MDX60B/61B

### Power components



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# System Description

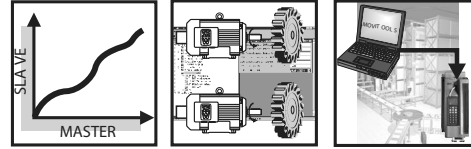
## System overview of MOVIDRIVE® MDX60B/61B

### Encoder and communication options

MDX60/61B standard version IPOS plus® as standard



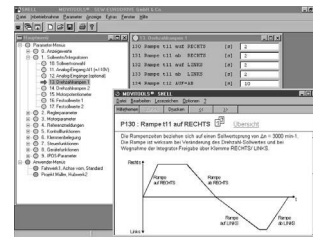
MDX60/61B application version for using "Electronic cam", "Internal synchronous operation" or the application modules.



Keypad option



MOVITOOLS® operating software



Encoder connection options



HIPERFACE® (sin/cos, TTL) Resolver

Interface adapter option



UWS 21B

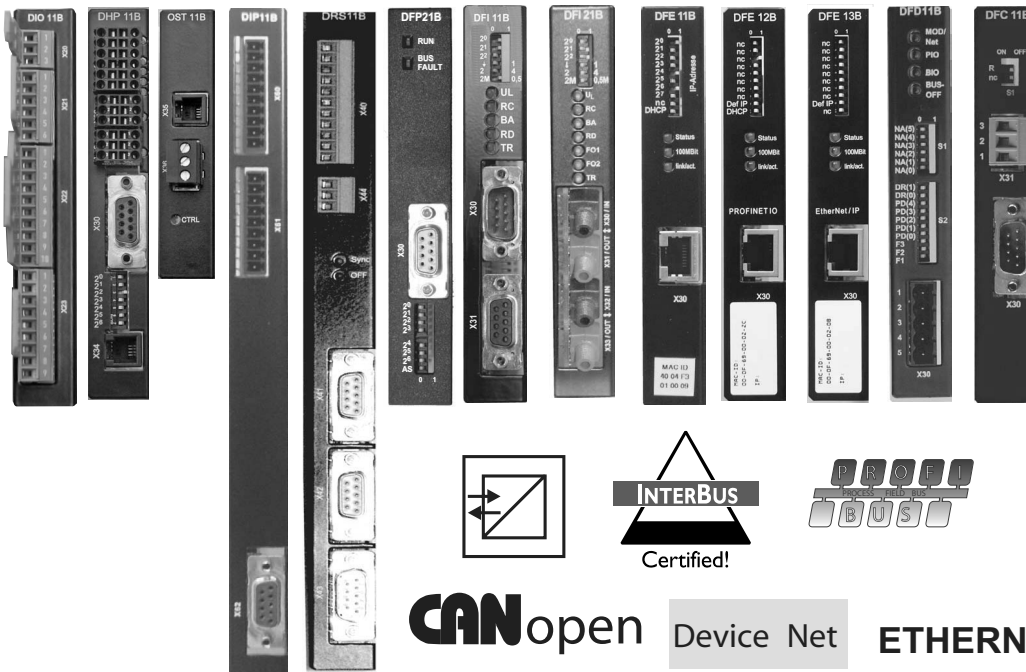


UWS 11A



USB 11A

Input/output card / MOVI-PLC® / Fieldbus interface options



**CANopen**



Device Net



**ETHERNET**



**General description**

**MOVIDRIVE® MDX60B/61B** is the new generation of drive inverters from SEW-EURODRIVE. The new series B MOVIDRIVE® drive inverters feature a modular design, provide enhanced functions in the lower power range, more basic functions and greater overload capacity.

AC drives with the latest digital inverter technology can now be used without restrictions in the 0.55 to 160 kW power range. The levels of dynamic performance and control quality that can now be achieved with MOVIDRIVE® for asynchronous AC motors were previously only possible using servo drives or DC motors. The integrated control functionality and the option to extend the drive using technology and communication options creates drive systems that are designed to be particularly cost-effective with regards to the application range, project planning, startup and operation.

**Low-emission**

The MOVIDRIVE® MDX60B/61B drive inverters are produced according to particularly low-emission regulations, but with the usual high level of quality. One particular feature is the consistent use of lead-free soldering materials in the production of electronics products. These lead-free processes are in line with the RoHS EU Directive and the law on electronic equipment.

**Unit range**

The **MOVIDRIVE®** unit range includes three series:

- **MOVIDRIVE® MDX60B:** Drive inverter for asynchronous AC motors without encoder feedback. The units are not option-capable.
- **MOVIDRIVE® MDX61B:** Drive inverter for asynchronous AC motors with or without encoder feedback, or for asynchronous and synchronous servo-motors. The units are option-capable.
- **MOVIDRIVE® MDR60A:** Regenerative power supply unit; MOVIDRIVE® drive inverters (400/500 V units) operate in regenerative mode to feed energy back into the supply system.

**Unit versions**

MOVIDRIVE® MDX60B/61B drive inverters are each available in two versions, namely the standard version and the application version.

**Standard version**

The units are equipped with the integrated IPOS<sup>plus</sup>® positioning and sequence control system as standard. MOVIDRIVE® MDX61B can be expanded with the available options.

The standard version is indicated by the "00" digits at the end of the unit designation.

**Application version**

In addition to the features of the standard version, these units include the technology functions "electronic cam" and "internal synchronous operation." You can also use all the application modules available in the MOVITOLS® software package with the application versions.

The application version is indicated by the "0T" digits at the end of the unit designation.



## System Description

### System overview of MOVIDRIVE® MDX60B/61B

#### Modular unit concept

The option-capable MOVIDRIVE® MDX61B units have the following option slots:

- Size 0 (0005 ... 0014) → 2 option slots
  - 1 option slot for encoder connection
  - 1 option slot for a communication option
- Sizes 1 ... 6 (0015 ... 1320) → 3 option slots
  - 1 option slot for encoder connection
  - 1 option slot for a communication option
  - 1 option slot for an expansion option

#### NOTES



- **Option cards can only be installed and removed later by customers for MDX61B sizes 1 to 6. The firmware of the option cards and the basic unit must be compatible.**
- **For MDX61B size 0 units, option cards can only be installed and removed later by SEW-EURODRIVE.** Please take this aspect into account when you place your order/perform project planning.

Size 0 (0005 ... 0014)

Sizes 1 ... 6 (0015 ... 1320)

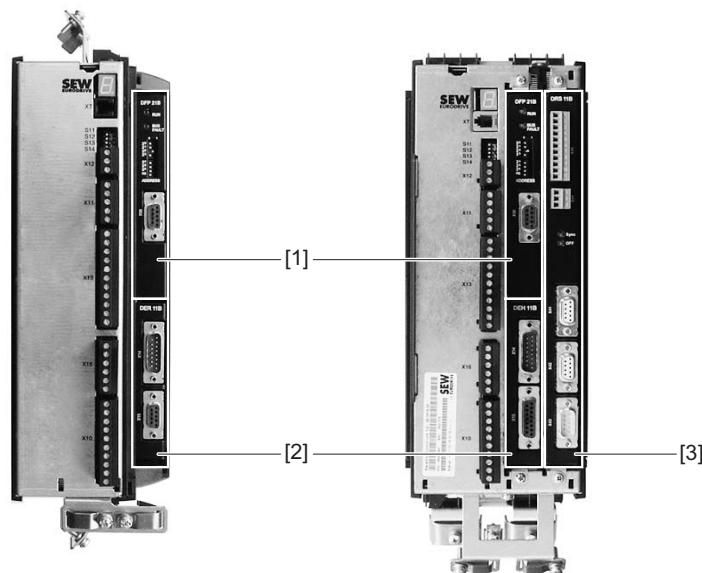


Figure 1: Options slots for MOVIDRIVE® MDX61B

60004AXX

- [1] Fieldbus slot for communication option
- [2] Encoder slot for encoder option
- [3] Expansion slot for communication option (only sizes 1 - 6)

The modular unit concept allows you to choose the right option according to your application. For example, when you have an asynchronous AC motor with encoder feedback (HIPERFACE®, sin/cos or TTL), you would need the HIPERFACE® encoder card type option DEH11B.



Application	Required option	Option slot
<b>Encoder option</b>		
Asynchronous AC motor with encoder feedback (HIPERFACE®, sin/cos, TTL)	HIPERFACE® encoder card DEH11B	1
Asynchronous or synchronous servomotor with HIPERFACE® encoder		
Synchronous servomotor with resolver	Resolver card type DER11B	
<b>Communication option</b>		
User-programmable MOVI-PLC® controller	MOVI-PLC® <i>basic</i> DHP11B controller	2 (3 only if slot 2 is occupied)
Additional RS485 interface (only in combination with option DHP11B)	DHP11B + OST11B	<ul style="list-style-type: none"> <li>• DHP11B in 2, OST11B in 1</li> <li>• If 1 is occupied: DHP11B + OST11B in 3</li> </ul>
Additional analog and binary inputs/outputs are required	Input/output card type DIO11B	2 (3 only if slot 2 is occupied)
Integration into a PROFIBUS system	PROFIBUS interface? type DFP21B	2
Integration into an INTERBUS system	INTERBUS interface type DF111B / DF121B	
Integration into an Ethernet system	Ethernet interface type DFE11B, DFE12B, DFE13B	
Integration into a DeviceNet system	DeviceNet interface type DFD11B	
Integration into a CANopen system	CANopen interface type DFC11B	
<b>Expansion option</b>		
SSI encoder interface	DIP11B absolute encoder card	3
Phase-synchronous operation	Synchronous operation board DRS11B	

**Control modes**

The VFC (Voltage Flux Control) and CFC (Current Flux Control)/SERVO control modes are features of MOVIDRIVE® MDX60B/61B drive inverters. The continuous calculation of the complete motor model forms the basis for both control modes.

VFC (Voltage Flux Control) control mode	CFC (Current Flux Control)/SERVO control mode
Voltage-controlled control mode for asynchronous AC motors with and without encoder feedback. <ul style="list-style-type: none"> <li>• With encoder feedback                             <ul style="list-style-type: none"> <li>– At least 150 % torque, even with the motor stopped</li> <li>– Characteristics similar to servo operation</li> </ul> </li> <li>• Without encoder feedback                             <ul style="list-style-type: none"> <li>– at least 150 % torque up to 0.5 Hz</li> </ul> </li> </ul>	Current-controlled control mode for asynchronous and synchronous servomotors. Encoder feedback is always required. <ul style="list-style-type: none"> <li>• At least 160 % torque, even with the motor stopped</li> <li>• Maximum precision and concentric running characteristics right down to standstill.</li> <li>• Servo characteristics and torque control even for asynchronous AC motors</li> <li>• Reacts to load changes within a few milliseconds</li> </ul>

**System bus (SBus)**

The system bus (SBus) is available as standard. It allows several MOVIDRIVE® drive inverters to be networked together. This system bus enables fast data exchange between the units. The MOVILINK® unit profile is used for communication via the SBus. MOVILINK® is the uniform SEW-EURODRIVE standard for serial communication. The SBus can be switched to CANopen.



## System Description

### System overview of MOVIDRIVE® MDX60B/61B

#### MOVILINK®


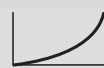
MOVILINK® always uses the same message format independent of the selected interface (SBus, RS232, RS485, fieldbus interfaces). As a result, the control software is independent of the selected interface.

#### IPOS<sup>plus</sup>®

A significant feature of MOVIDRIVE® drive inverters is that the IPOS<sup>plus</sup>® positioning and sequence control system is integrated as standard. IPOS<sup>plus</sup>® enables you to control sequences of motion directly in the inverter close to the machine. This way, load is taken off the master controller and modular concepts can be implemented more easily.

#### Overview of the units

MOVIDRIVE® MDX60/61B for 3 × AC 380 ... 500 V supply voltage (400/500 V units):

Recommended motor power (VFC)		Continuous output current (CFC)	MOVIDRIVE® type		Size (Techn. data)
			MDX60B not option-capable	MDX61B option-capable	
0.55 kW	0.75 kW	AC 2.0 A	0005-5A3-4..	0005-5A3-4..	0 (→ page 33)
0.75 kW	1.1 kW	AC 2.4 A	0008-5A3-4..	0008-5A3-4..	
1.1 kW	1.5 kW	AC 3.1 A	0011-5A3-4..	0011-5A3-4..	
1.5 kW	2.2 kW	AC 4.0 A	0014-5A3-4..	0014-5A3-4..	
1.5 kW	2.2 kW	AC 4.0 A	–	0015-5A3-4..	1 (→ page 35)
2.2 kW	3.0 kW	AC 5.5 A	–	0022-5A3-4..	
3.0 kW	4.0 kW	AC 7.0 A	–	0030-5A3-4..	
4.0 kW	5.5 kW	AC 9.5 A	–	0040-5A3-4..	
5.5 kW	7.5 kW	AC 12.5 A	–	0055-5A3-4..	2S, 2 (→ page 37)
7.5 kW	11 kW	AC 16 A	–	0075-5A3-4..	
11 kW	15 kW	AC 24 A	–	0110-5A3-4..	
15 kW	22 kW	AC 32 A	–	0150-503-4..	3 (→ page 39)
22 kW	30 kW	AC 46 A	–	0220-503-4..	
30 kW	37 kW	AC 60 A	–	0300-503-4..	
37 kW	45 kW	AC 73 A	–	0370-503-4..	4 (→ page 41)
45 kW	55 kW	AC 89 A	–	0450-503-4..	
55 kW	75 kW	AC 105 A	–	0550-503-4..	5 (→ page 43)
75 kW	90 kW	AC 130 A	–	0750-503-4..	
90 kW	110 kW	AC 170 A	–	0900-503-4..	6 (→ page 45)
110 kW	132 kW	AC 200 A	–	1100-503-4..	
132 kW	160 kW	AC 250 A	–	1320-503-4..	



MOVIDRIVE® MDX60/61B for 3 × AC 200 ... 240 V supply voltage (230 V units):

Recommended motor power (VFC)		Continuous output current (CFC)	MOVIDRIVE® type MDX61B option-capable	Size (Technical data)
1.5 kW	2.2 kW	AC 7.3 A	0015-2A3-4..	1 (→ page 47)
2.2 kW	3.7 kW	AC 8.6 A	0022-2A3-4..	
3.7 kW	5.0 kW	AC 14.5 A	0037-2A3-4..	
5.5 kW	7.5 kW	AC 22 A	0055-2A3-4..	2 (→ page 49)
7.5 kW	11 kW	AC 29 A	0075-2A3-4..	
11 kW	15 kW	AC 42 A	0110-203-4..	3 (→ page 51)
15 kW	22 kW	AC 54 A	0150-203-4..	
22 kW	30 kW	AC 80 A	0220-203-4..	4 (→ page 53)
30 kW	37 kW	AC 95 A	0300-203-4..	

MOVIDRIVE® MDR60A regenerative power supply units for 400/500 V units:

MOVIDRIVE® MDR60A regenerative power supply units		Size (technical data)	MOVIDRIVE® MDX60B/61B...-5_3
0370-503-00	$I_{\text{mains}} = \text{AC } 66 \text{ A}, I_{\text{DC link}} = \text{DC } 70 \text{ A}$	3 (→ page 70)	0005 ... 0370
0750-503-00	$I_{\text{mains}} = \text{AC } 117 \text{ A}, I_{\text{DC link}} = \text{DC } 141 \text{ A}$	4 (→ page 70)	0005 ... 0750
1320-503-00	$I_{\text{mains}} = \text{AC } 260 \text{ A}, I_{\text{DC link}} = \text{DC } 340 \text{ A}$	6 (→ page 70)	0005 ... 1320

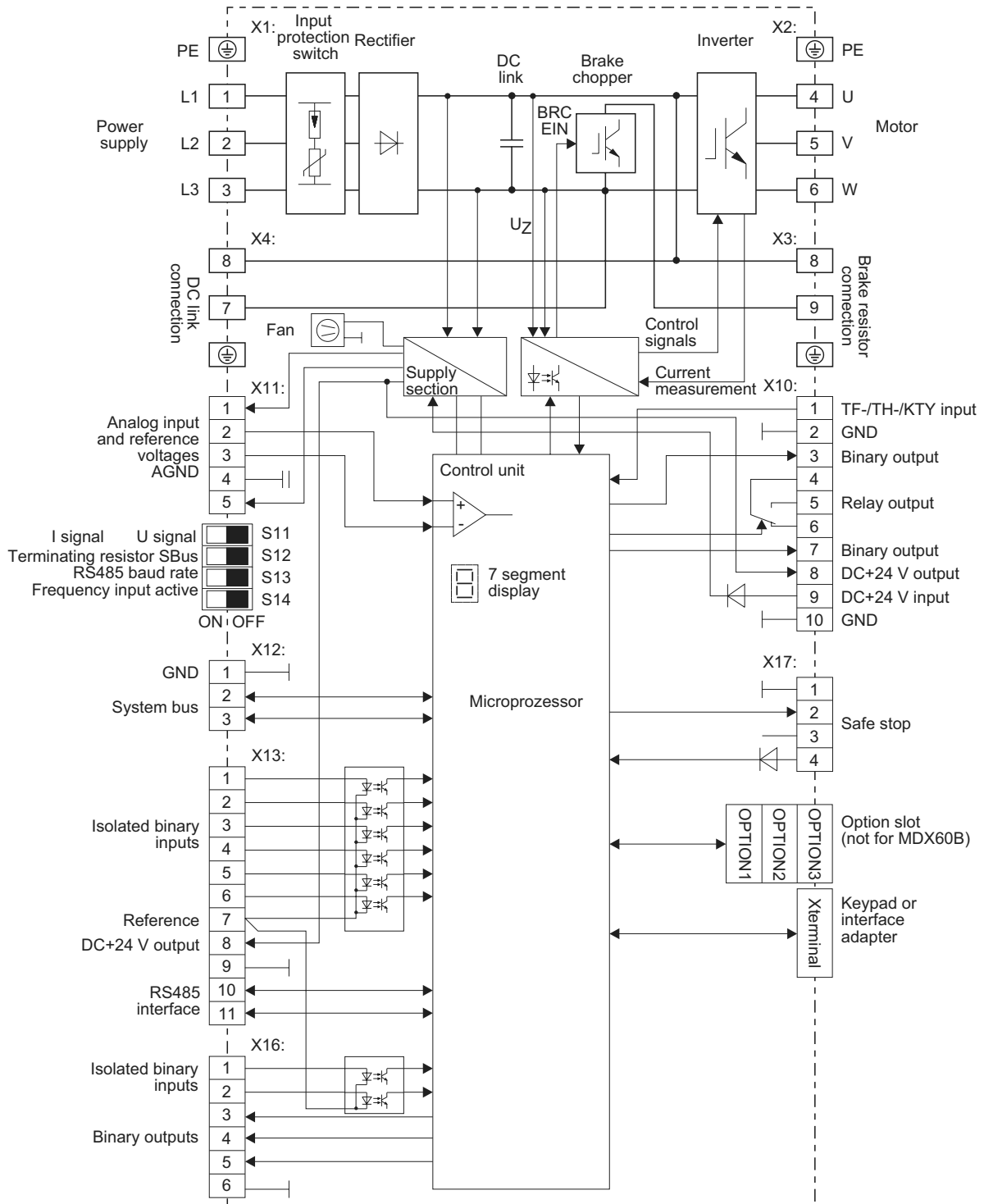


# System Description

## System overview of MOVIDRIVE® MDX60B/61B

### Block circuit diagram

The following block circuit diagram shows the basic structure and theory of operation of MOVIDRIVE® MDX60B/61B drive inverters.



55994BEN



## 1.2 Functions

### Unit features

- Wide voltage range
  - 400 / 500 V units for the voltage range  $3 \times AC$  380 ... 500 V
  - 230 V units for the voltage range  $3 \times AC$  200 ... 240 V
- High overload capacity
  - Size 0: 200 %  $I_N$  for at least 60 s
  - Sizes 1 ... 6: 150 %  $I_N$  for at least 60 s
  - All sizes: 125 %  $I_N$  for sustained operation without overload (pumps, fans)
- With 4 kHz switching frequency,  $I_N$  is permitted for an ambient temperature  $\vartheta = 50$  °C
- 4Q capability due to integrated brake chopper installed as standard
- Compact unit mounting position for minimum control cabinet space requirement and optimum utilization of control cabinet volume
- Integrated input filter fitted as standard in sizes 0, 1, 2S and 2, adherence to class A limit on the input side without any additional measures
- Eight isolated binary inputs and six binary outputs, one of which is a relay output; programmable inputs/outputs
- One TF / TH / KTY input for motor protection using a PTC thermistor or thermocontact
- 7-segment display for operating and fault states
- Separate DC 24 V voltage input for powering the inverter electronics (parameter setting, diagnostics and data storage even when the supply system is switched off)
- Separable electronic terminals
- Separable power terminals for size 0 and 1 units

### Control functionality

- VFC or CFC control modes for field-oriented operation (asynchronous servo)
- IPOS<sup>plus</sup>® positioning and sequence control system integrated as standard
- Two complete parameter sets
- Automatic motor calibration
- Automatic brake control by the inverter
- DC braking to decelerate the motor even in 1Q mode
- Energy-saving function for optimizing the magnetization current automatically
- Slip compensation for high static speed accuracy, even without encoder feedback
- Flying restart circuit for synchronizing the inverter to an already rotating motor
- Hoist capability with all motor systems that can be connected
- Motor stall protection through sliding current limitation in the field weakening range
- Function to hide speed window to avoid mechanical resonances
- Heating current for avoiding condensation in the motor
- Parameter lock for protection against changes to parameters
- Speed controller and encoder input with the option cards DEH11B (incremental or Hiperface<sup>®</sup> encoder) and DER11B (resolver); user-friendly controller setting tool in the user interface
- Protective functions for complete protection of the inverter and motor (short-circuit, overload, overvoltage/undervoltage, low-impedance ground fault, overtemperature in the inverter, motor stall prevention, overtemperature in the motor)
- Speed monitoring and monitoring of the motor and regenerative limit power



- Programmable signal range monitoring (speed, current, maximum current)
- Memory for displaying x/t diagrams using SCOPE process data visualization (8 channels, real-time capable)
- Fault memory (5 memory locations) with all relevant operating data at time of the fault
- Elapsed-time counter for hours of operation (unit connected to supply system or DC 24 V) and enable hours (output stage energized)
- Modular option technology for application-specific unit configuration
- Uniform operation, identical parameter setting and the same unit connection technology for the entire MOVIDRIVE® unit series

#### **Setpoint technology**

- Ramp switchover (total of 4 ramps)
- Motor potentiometer, can be combined with analog setpoint and internal fixed setpoints
- External setpoint selections: DC (0 ... +10 V, -10 V ... +10 V, 0 ... 20 mA, 4 ... 20 mA)
- S pattern for jerk-free speed changes
- Programmable input characteristic for flexible setpoint processing
- 6 bipolar fixed setpoints which can be mixed with external setpoints and motor potentiometer function
- Primary frequency input
- Adjustable jerk limitation

#### **Communication / operation**

- System bus for networking max. 64 MOVIDRIVE® units to one another
- RS485 interface for communication between one PLC / IPC and up to 31 inverters
- Simple startup and parameter setting using the keypad or PC
- Pluggable memory module for quick unit replacement during service

#### **System expansion**

- Extensive expansion options, for example:
  - Removable plain text keypad with parameter memory
  - USB11A, RS232 ↔ RS485 interface adapter
  - Fieldbus interface, either PROFIBUS, INTERBUS, Ethernet, DeviceNet, CAN / CANopen
  - Input/output card
  - Braking resistors, line filters, line chokes, output chokes, output filters
- MOVITOOLS® operating software with SCOPE process data visualization
- Application version with access to technology functions and application modules for specific applications
- MOVIDRIVE® MDR60A regenerative power supply unit. Regenerative energy is fed back into the supply system, which removes the thermal load from the control cabinet and saves costs.

#### **Standards / certificates**

- UL, cUL, C-Tick approval. The MOVIDRIVE® MDR60A1320-503-00 unit does not have UL or cUL or C-Tick approval.
- Safe disconnection of power and electronic connections according to EN 61800-5-1.
- Fulfills all the requirements for CE certification of machines and plants equipped with MOVIDRIVE® units on the basis of the EC Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC. Complies with the EMC product standard EN 61800-3.
- Complies with the safety requirement "Safe stop" according to EN 954-1, category 3




### 1.3 Additional functions of the application version

SEW-EURODRIVE offers additional functions for special applications. You can use these additional functions with MOVIDRIVE® units in the application version (...-0T).

The following additional functions are available:

- Electronic cam
- Internal synchronous operation

	<b>NOTE</b>
	Refer to the "Electronic Cam" and "Internal Synchronous Operation" manuals for detailed information about the additional functions.

#### Electronic cam;



You can use the MOVIDRIVE® range of units with "electronic cam" whenever you need to harmonize complex sequences of motion in cyclical machines. This solution gives you much greater flexibility in comparison to the mechanical cam. As a result, it meets the needs of modern production and processing lines.

A user-friendly cam editor supports you during startup. You also have the option of importing existing cam data. You can also set application-specific parameters for the engagement and disengagement phases using the cam editor.

Note the following points:

- The "electronic cam" can only be implemented with MOVIDRIVE® MDX61B units in application version (...-0T).
- Encoder feedback is mandatory. This is why the "electronic cam" can only be realized in "CFC," "SERVO" and "VFC-n control" operating modes with master/slave connection via X14-X14 or with an SBus connection.
- The "electronic cam" is only available in parameter set 1.
- The "synchronous operation board type DRS11B" option cannot be used together with the "electronic cam" function.

#### Motors and encoders

Use the following motor types:

- For operation with MOVIDRIVE® MDX61B...-4-0T:
  - CT/CV asynchronous servomotor, high-resolution sin/cos encoder installed as standard or HIPERFACE® encoder
  - DT/DV/D AC motors with incremental encoder, preferably high-resolution sin/cos encoder or HIPERFACE® encoder.
  - DS/CM/CMD/CMP synchronous servomotors, resolver (installed as standard) or HIPERFACE® encoder.

High-resolution speed measurement is required for optimum operation of the electronic cam. The encoder installed as standard in the CT/CV and DS/CM/CMD/CMP motors meets the requirements. SEW-EURODRIVE recommends using high-resolution sin/cos encoders as incremental encoders if DT/DV/D motors are used.



## System Description

Additional functions of the application version

### Example

The figure below shows a typical application for the "electronic cam." Filled yogurt pots are transported for further processing. The "electronic cam" function allows for smooth movement, which is an important requirement for this application.

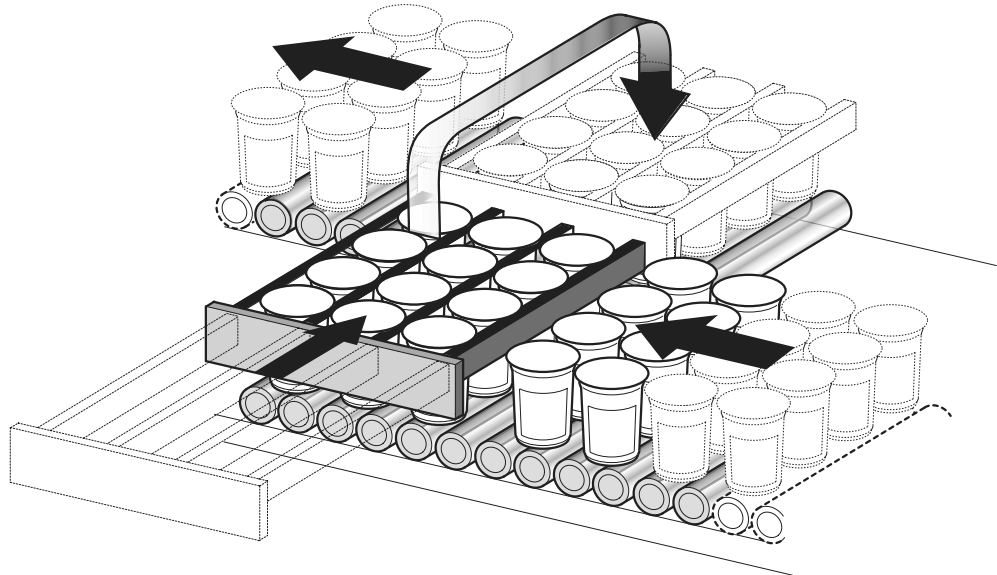
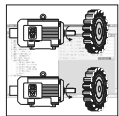


Figure 2: Application example for the "electronic cam."

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### Internal synchronous operation



You can use the MOVIDRIVE® range of units with "internal synchronous operation" whenever a group of motors has to be operated at a synchronous angle in relation to one another or with an adjustable proportional ratio (electronic gear). A user-friendly editor guides you through the startup procedure.

Note the following points:

- "Internal synchronous operation" can only be implemented with MOVIDRIVE® MDX61B units in application version (...-0T).
- Encoder feedback is mandatory. This is why "internal synchronous operation" can only be realized in "CFC," "SERVO" and "VFC-n control" operating modes with master/slave connection via X14-X14 or with an SBus connection.
- "Internal synchronous operation" is only available in parameter set 1.
- The "synchronous operation board DRS11B" option cannot be used together with "internal synchronous operation."

### Motors and encoders

Use the following motor types:

- For operation with MOVIDRIVE® MDX61B...-4-0T:
  - CT/CV asynchronous servomotor, high-resolution sin/cos encoder installed as standard or HIPERFACE® encoder
  - DT/DV/D AC motors with incremental encoder, preferably high-resolution sin/cos encoder or HIPERFACE® encoder.
  - DS/CM/CMD/CMP synchronous servomotors, resolver (installed as standard) or HIPERFACE® encoder.



High-resolution speed measurement is required for optimum operation of the "internal synchronous operation." The encoder installed as standard in the CT/CV and DS/CM/CMD/CMP motors meets the requirements. SEW-EURODRIVE recommends using high-resolution sin/cos encoders as incremental encoders if DT/DV/D motors are used.

*Example*

The figure below shows a typical application for the "internal synchronous operation." Extruder material must be cut to length. The saw receives a start signal and synchronizes with the material. During the sawing process, the saw moves synchronously with the material. At the end of the sawing process the saw moves back to its starting position.

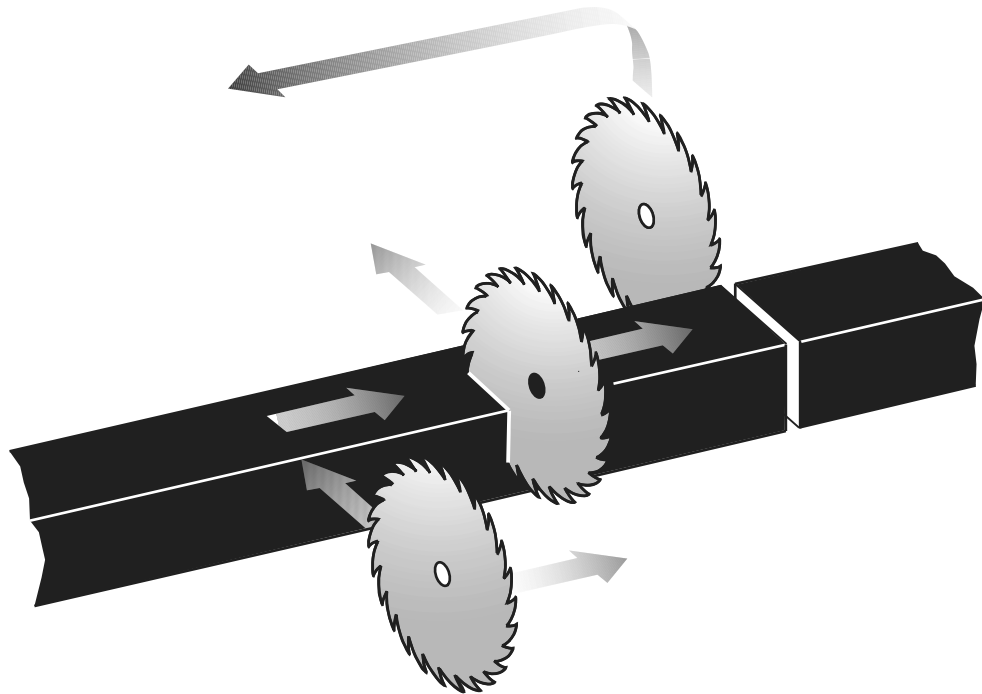


Figure 3: Typical application for the "internal synchronous operation" function

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#### 1.4 Application modules for MOVIDRIVE® MDX61B

##### **The drive application**

The drive application often involves more than just adjusting the speed of a motor. The inverter often has to control motion sequences and take on typical PLC tasks. More and more complex drive applications have to be solved, without this resulting in lengthy project planning and startup.

##### **The solution with MOVIDRIVE®**

SEW-EURODRIVE offers various standardized control programs specifically for "positioning," "winding" and "controlling" applications. These programs are called application modules. The application modules are part of the MOVITOOLS® operating software and can be used with units in application version.

A user-friendly user interface guides you through the process of setting the parameters. All you have to do is enter the parameters you need for your application. The application module uses this information to create the control program and loads it into the inverter. MOVIDRIVE® takes over complete control of the motion processes, the load is taken off the machine control and decentralized concepts are easier to implement.

##### **The advantages at a glance**

- Wide range of functions
- User-friendly user interface
- You only have to enter the parameters needed for the application
- Guided parameter setting process instead of complicated programming
- No programming know-how required
- No lengthy training, therefore quick project planning and startup
- All movement functions are controlled directly in MOVIDRIVE®
- Decentralized concepts can be implemented more easily

##### **Scope of delivery and documentation**

The application modules are part of the MOVITOOLS® operating software and can be used with MOVIDRIVE® MDX61B units in application version (...-0T). The individual application manuals can also be downloaded as PDFs from the SEW homepage.

##### **Available application modules**

The application modules currently available are listed below. These application modules are explained in the following pages.

##### *Positioning*

Linear movement; the inverter manages the movement records:

- Table positioning via terminal or fieldbus

Linear movement; the PLC manages the movement records:

- Positioning via bus
- Extended positioning via bus
- Absolute positioning (Rapid / creep speed positioning)

Rotary motion:

- Module positioning via terminals: The inverter manages the movement records
- Module positioning via fieldbus: The PLC manages the movement records

##### *Winding*

- Center winder

##### *Controlling*

- Flying saw
- DriveSync via fieldbus
- Sensor-based positioning



**Application**

The following illustration shows an example of how the various SEW application modules are used in a high-bay warehouse.

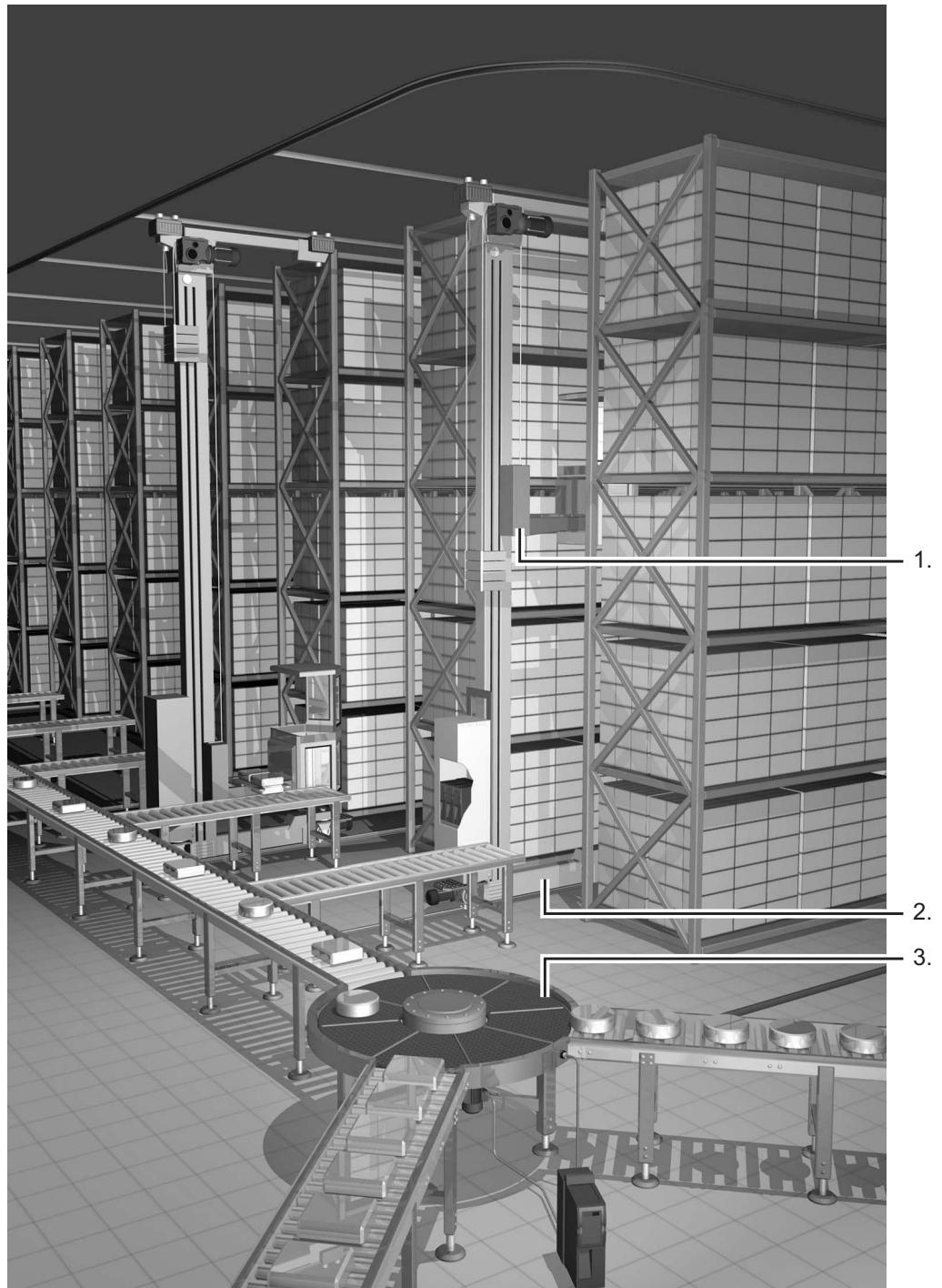


Figure 4: Use in a high-bay warehouse

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1. Hoist: Table positioning
2. Travel axis: Absolute or bus positioning
3. Rotary distributor: Modulo positioning



## System Description

### Application modules for MOVIDRIVE® MDX61B

#### **Positioning**

The application modules for the "Positioning" application are suited to all applications where target positions are specified and movement then takes place to those positions. Movement can either be linear or rotatory.

For example, trolleys, hoists, gantries, rotary tables, swiveling devices as well as storage and retrieval units.

#### **Linear positioning**

In the case of linear positioning application modules, SEW-EURODRIVE distinguishes between whether the movement records are managed in the inverter or in the master PLC.

#### *Movement records in the inverter*

- **Table positioning via terminals**
- **Table positioning via fieldbus**

These application modules are suited to applications in which movement only has to take place to a limited number of different target positions and in which the highest possible degree of independence from the machine control is required.

Up to 32 movement records can be managed in the inverter in these application modules. A movement record comprises target position, speed and ramp. The target position to which movement is to take place is selected using binary code, by means of the binary inputs of the inverter or via the virtual terminals (fieldbus, system bus). These application modules come with the following range of features:

- Up to 32 table positions can be defined and selected.
- The travel speed can be selected for each positioning movement.
- The ramp can be set separately for each positioning movement.
- Software limit switches can be defined and evaluated.
- Either increment or absolute encoders can be evaluated.
- Guided startup and diagnosis.

Four operating modes are available for controlling the machine:

- Jog mode: The machine can be moved manually.
- Reference travel: The machine zero is determined automatically for incremental position measurement.
- Teach-In: The saved position can be corrected without a programming device.
- Automatic mode: Higher-level PLC controls the process automatically.

#### *Movement records in the PLC*

- **Positioning via bus**
- **Extended positioning via bus**

These application modules are suited to applications with a large number of different target positions.

The movement records are managed in the PLC for these application modules. The target position and travel speed are specified via the fieldbus or system bus. These application modules come with the following range of features:

- Any number of target positions can be defined and selected via fieldbus / system bus.
- The travel speed can be selected as required via the fieldbus / system bus for each positioning movement.
- Software limit switches can be defined and evaluated.
- Either increment or absolute encoders can be evaluated.
- Straightforward connection to the higher-level controller.



- Guided startup and diagnosis.

Three operating modes are available for controlling the machine:

- Jog mode: The machine can be moved manually.
- Reference travel: The machine zero is determined automatically for incremental position measurement.
- Automatic mode: Higher-level PLC controls the process automatically.

- **Absolute positioning (Rapid / creep speed positioning)**

This application module is suitable for applications in which there is a high tendency to vibrate, for example storage and retrieval units for high-bay warehouses or heavy trolleys.

In this application module, the movement records are also managed in the PLC and specified via the fieldbus or system bus. No motor encoder is required. The absolute encoder mounted on the travel path is used for positioning. This application module comes with the following range of features:

- Any number of target positions can be defined and selected via fieldbus / system bus.
- Software limit switches can be defined and evaluated.
- Only absolute encoders are used for position measurement.
- No motor encoder is required.
- Straightforward connection to the higher-level controller.
- Guided startup and diagnosis.

The following operating modes are available for controlling the machine:

- Jog mode: The machine can be moved manually.
- Automatic mode: Higher-level PLC controls the process automatically.

**Rotational positioning**

- **Modulo positioning**

A large number of movements have to be controlled in automated conveyor and logistics applications to transport the material. Linear movements in the form of trolleys or hoists, and rotary movements via rotary tables play an important role in these applications.

Rotary movements are often synchronized (circular transfer tables); the material is fed at a specific degree value. However, there are also many rotational applications in which the material should be moved to its destination by the shortest possible route (distance-optimized positioning) or in which it is only permitted to move to the target position in a defined direction of rotation (positioning with fixed direction of rotation).

The position axis is represented on a numbered circle from 0 ° to 360 ° to meet these requirements. The actual position is always in this range.

The "modulo positioning" application module accomplishes these tasks using various operating modes which are selected via binary inputs (16 table positions) or virtual terminals (control via fieldbus, variable positions).

The following operating modes are available for controlling the machine:

- Jog mode
- Teach mode (terminal control only)
- Referencing mode
- Automatic mode with position optimization
- Automatic mode with direction of rotation inhibit (clockwise - counterclockwise)
- Synchronous automatic mode

**The "modulo positioning" module offers the following advantages:**

- User-friendly user interface
- Only the parameters required for Modulo positioning (number of teeth in the gear unit, speed) have to be entered
- Guided parameter setting instead of complicated programming
- Monitor mode for optimum diagnosis
- Users do not need any programming experience
- Rapid familiarization with the system



## Winding

- **Center winder**

The "Central winder" application module is suitable for applications in which endless material, such as paper, plastic, fabrics, sheet metal or wire, must be wound, unwound or rewound continuously.

Control takes place either via the binary inputs of the inverter or using the virtual terminals (fieldbus, system bus).

The "Central winder" application module comes with the following range of features:

- Constant tensile force or web speed independent of the diameter.
- Automatic calculation of the speed-dependent friction factors via a teach-in run.
- Winding characteristics to prevent the winding material from becoming loose.
- Binary selection of 4 different winding cores.
- Diameter can be determined using a diameter calculator (master encoder required) or an analog input (distance sensor required).
- Free-running function (jog).
- CW / CCW winding, winding / unwinding.
- Simple connection to the master controller (PLC).
- Guided startup and diagnosis.

Four operating modes are available for controlling the machine:

- Jog mode: The machine can be moved to the right or the left manually.
- Teach-in run: The speed-dependent friction factors are determined automatically.
- Automatic mode with constant tension.
- Automatic mode with constant velocity.



## System Description

### Application modules for MOVIDRIVE® MDX61B

#### Controlling

- **Flying saw**

The "Flying saw" application module is suited to applications in which endless material has to be cut, sawn or pressed, for example in diagonal saws or flying punches.

This application module is used to control the sequence of motion according to specific values. This application module comes with the following range of features:

- Choice of fieldbus or terminal control.
- Cut edge protection or sorting using the "pulling a gap" function.
- Immediate cut function by manual interrupt.
- Counter for material length.
- Straightforward connection to the higher-level controller.
- Guided startup and diagnosis.

Four operating modes are available for controlling the machine:

- Jog mode: The machine can be moved manually.
- Reference travel: The system reference point is determined.
- Positioning mode
- Automatic operation

- **DriveSync via fieldbus**

The "DriveSync via fieldbus" application module makes it possible to implement conveyor systems and machinery with drives that have to move at a synchronous angle to one another occasionally or permanently.

The program can be used for the master drive and the slave drive. The master works in the "Jog" and "Positioning" operating modes, while the slave drives are operated in "synchronous operation" mode.

If the "Synchronous operation" mode is deselected for the slave drives, they can be operated with free-running in "Jog" and "Positioning" operating modes.

The "DriveSync via fieldbus" application module comes with the following range of features:

- Guided startup as well as extensive diagnostic functions.
- High degree of similarity with "Extended positioning via bus."
- One program module for the master and slave drive.
- The selected IPOS<sup>plus</sup>® encoder source is also effective in synchronous operation.
- The master value for the "synchronous operation" mode can be adjusted.
- A mechanical vertical shaft can be replaced by transferring the virtual master value via an SBus connection.
- Endless rotation is supported by the modulo function.



Four operating modes are available for controlling the application:

- Jog mode
- Reference travel
- Positioning mode
- Synchronous operation
  - The electrical connection of the master/slave can be made using the X14 encoder connection or an SBus connection.
  - If the SBus connection is used, the content of the send object can be adjusted.
  - Time or position-related sequence of motion for synchronization processes.
  - The startup cycle process can also be started with interrupt control.

- **Sensor-based positioning**

This application module is used to position the drive using an external sensor signal plus an adjustable remaining distance. This application module is especially suitable for applications in the following industrial sectors:

- Materials handling
  - Trolleys
  - Hoists
  - Rail vehicles
- Logistics
  - Storage and retrieval units
  - Transverse carriages



### 1.5 MOVITOOLS® operating software

#### Description

MOVITOOLS® is a program package comprising SHELL, SCOPE and the IPOS<sup>plus</sup>® Compiler. You can use MOVITOOLS® to address either of the unit series: MOVIDRIVE® MDX60B/61B, MOVIDRIVE® *compact* and MOVITRAC® 07A.

- SHELL can be used to start up the drive and set its parameters quickly and easily.
- SCOPE provides extensive oscilloscope functions for drive diagnostics.
- IPOS<sup>plus</sup>® Compiler provides a convenient way of writing programs for applications in a high-level language.
- The assembler enables you to write programs directly on the machine.
- The device status shows you the status of the connected unit.

Various application modules, such as table positioning, are already stored in MOVITOOLS® as IPOS<sup>plus</sup>® programs and can be activated using the application version units.

MOVITOOLS® is supplied on a CD-ROM and can also be downloaded from the SEW homepage (<http://www.sew-eurodrive.de>). MOVITOOLS® can be operated with the following operating systems:

- Windows® 95
- Windows® 98
- Windows NT® 4.0
- Windows® 2000
- Windows® Me
- Windows® XP

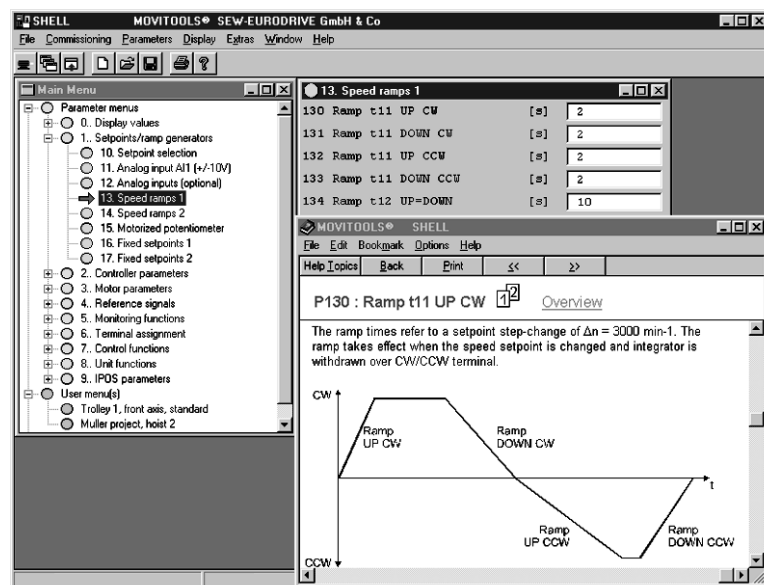
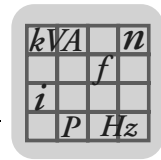


Figure 5: MOVITOOLS® window

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## 2 Technical Data and Dimension Drawings

### 2.1 CE marking, UL approval and unit designation

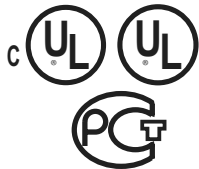
#### CE marking

- Low voltage directive  
MOVIDRIVE® MDX60B/61B drive inverters comply with the regulations of the Low Voltage Directive 73/23/EEC.
- Electromagnetic compatibility (EMC)  
MOVIDRIVE® drive inverters and regenerative power supply units are designed for use as components for installation in machinery and systems. They comply with the EMC product standard EN 61800-3 "Variable-speed electrical drives." Provided the installation instructions are complied with, they satisfy the appropriate requirements for CE marking of the entire machine/system in which they are installed, on the basis of the EMC Directive 89/336/EEC.
- Compliance with limit class A or B has been tested on a specified test setup. SEW-EURODRIVE can provide detailed information on request.



The CE mark on the nameplate indicates conformity with the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC. We can provide a copy of the declaration of conformity on request.

#### UL / cUL / GOST-R

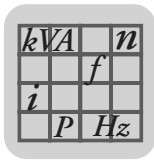


UL, cUL approval (USA) and the GOST-R certificate (Russia) have been approved for the MOVIDRIVE® MDX60B/61B unit series. cUL is equivalent to CSA approval.

#### C-Tick

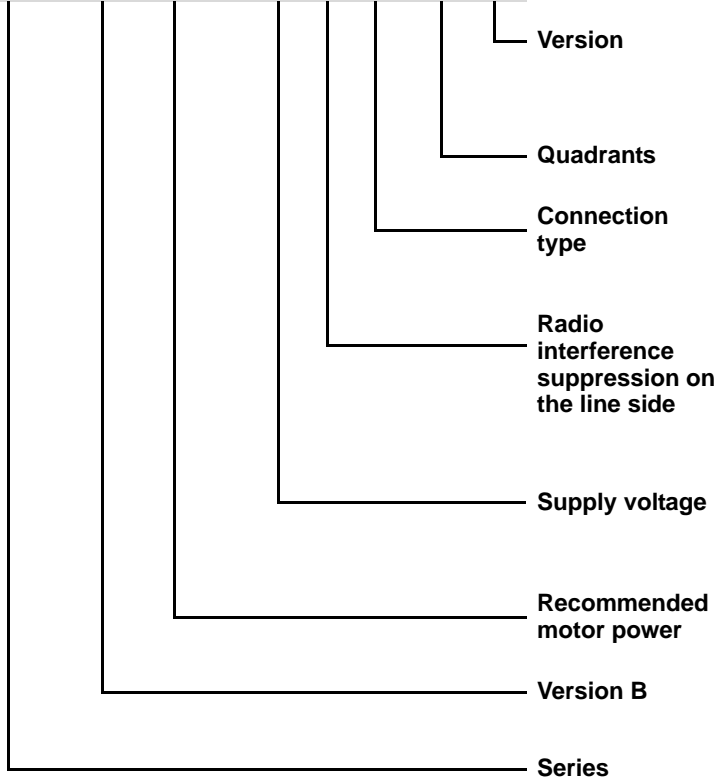


C-Tick approval has been granted for the MOVIDRIVE® MDX60B/61B series. C-Tick certifies conformity with ACA (Australian Communications Authority) standards.

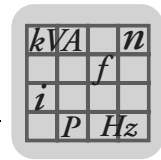


**Sample unit designation**

**MDX61 B 0055 - 5 A 3 - 4 00**



- Version
  - 00 = Standard
  - 0T = Application
- Quadrants
  - 4 = 4Q (with brake chopper)
- Connection type
  - 3 = 3-phase
- Radio interference suppression on the line side
  - B = Radio interference suppression B
  - A = Radio interference suppression A
  - 0 = No radio interference suppression
- Supply voltage
  - 5 = AC 380 ... 500 V
  - 2 = AC 200 ... 240 V
- Recommended motor power
  - 0055 = 5.5 kW
- Version B
- Series
  - 60 = no options can be installed
  - 61 = options can be installed

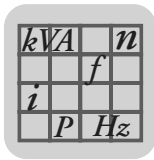


## 2.2 General technical data

The following table lists the technical data applicable to all MOVIDRIVE® MDX60/61B drive inverters, regardless of their type, version, size and power rating.

MOVIDRIVE® MDX60B/61B	All sizes
<b>Interference immunity</b>	Fulfills EN 61800-3
<b>Interference emission with EMC compliant installation</b>	Sizes 0 to 6 meet EN 61800-3 Sizes 0 to 5: In accordance with limit value class B to EN 55011 and EN 55014 with corresponding line filter Sizes 0, 1, and 2 in accordance with limit value class A to EN 55011 and EN 55014 without additional measures Size 6 in accordance with limit value class A to EN 55011 and EN 55014 with corresponding line filter
<b>Ambient temperature</b> $\vartheta_U$  <b>Derating ambient temperature</b>  <b>Climate class</b>	0 °C...+50 °C when $I_D = 100\% I_N$ and $f_{PWM} = 4$ kHz 0 °C...+40 °C when $I_D = 125\% I_N$ and $f_{PWM} = 4$ kHz 0 °C...+40 °C when $I_D = 100\% I_N$ and $f_{PWM} = 8$ kHz Derating: • 2.5 % $I_N$ per K between 40 °C - 50 °C • 3 % $I_N$ per K for 50 °C - 60 °C EN 60721-3-3, class 3K3
<b>Storage temperature<sup>1)</sup></b> $\vartheta_L$	-25 °C...+70 °C (EN 60721-3-3, class 3K3) DBG keypad: -20 °C...+60 °C
<b>Cooling type (DIN 51751)</b>	Forced cooling (temperature-controlled fan, response threshold 45 °C)
<b>Enclosure</b> <b>Sizes 0 to 3</b> <b>EN 60529</b> <b>Sizes 4 to 6</b> <b>(NEMA1)</b>	IP20 IP00 (power connections) IP10 (power connections) with • fitted plexiglass cover supplied as standard and • shrink tubing (not included in scope of delivery)
<b>Operating mode</b>	Continuous operation with 50 % overload (size 0: 100 %)
<b>Overvoltage category</b>	III according to IEC 60664-1 (VDE 0110-1)
<b>Pollution class</b>	2 according to IEC 60664-1 (VDE 0110-1)
<b>Installation altitude</b> <b>h</b>	Up to $h \leq 1000$ m without restrictions. The following restrictions apply at heights $\geq 1000$ m: • From 1000 m (3,280 ft.) to max. 4,000 m (6561 ft.): – $I_N$ reduction by 1% per 100 m (330 ft) • From 2000 m (6,561 ft.) to max. 4000 m (13,123 ft.): – AC 230 V units: $V_N$ reduction by AC 3 V per 100 m – AC 500 V units: $V_N$ reduction by AC 6 V per 100 m Over 2000 m only overvoltage class 2, external measures are required for overvoltage class 3. Overvoltage classes according to DIN VDE 0110-1.

1) In case of long-term storage, the unit must be connected to the mains voltage for at least 5 minutes every two years, otherwise the unit's service life may be reduced.



**MOVIDRIVE®  
MDX60B/61B  
series, size 0**



Figure 6: MOVIDRIVE® MDX60/61B series, size 0

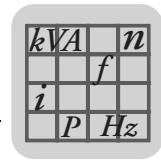
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**MOVIDRIVE®  
MDX61B series,  
sizes 1 to 6**



Figure 7: MOVIDRIVE® MDX61B series, sizes 1 to 6

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2.3 MOVIDRIVE® MDX60/61B...-5\_3 (AC 400/500 V units)

Size 0 (400/500 V) MDX60B0005 ... 0014, no options can be installed

MDX61B0005 ... 0014, options can be installed

2

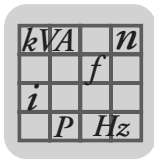


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MOVIDRIVE® MDX60/61B		0005-5A3-4-0_	0008-5A3-4-0_	0011-5A3-4-0_	0014-5A3-4-0_	
Size		0S		0M		
INPUT						
Supply voltage	$U_{\text{Netz}}$	3 × AC 380 V –10 % ... 3 × AC 500 V +10 %				
Supply frequency	$f_{\text{Netz}}$	50 Hz ... 60 Hz ± 5 %				
Rated supply current <sup>1)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ )	$I_{\text{Netz}}$	100 % 125 %	AC 1.8 A AC 2.3 A	AC 2.2 A AC 2.7 A	AC 2.8 A AC 3.5 A	AC 3.6 A AC 4.5 A
OUTPUT						
Apparent output power <sup>2)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 380...500 \text{ V}$ )	$S_N$	1.4 kVA	1.6 kVA	2.1 kVA	2.8 kVA	
Rated output current <sup>1)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ )	$I_N$	AC 2 A	AC 2.4 A	AC 3.1 A	AC 4 A	
Continuous output current (= 125 % $I_N$ ) $I_D$ (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ and $f_{\text{PWM}} = 4 \text{ kHz}$ )	$I_D$	AC 2.5 A	AC 3 A	AC 3.8 A	AC 5 A	
Continuous output current (= 100 % $I_N$ ) $I_D$ (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ and $f_{\text{PWM}} = 8 \text{ kHz}$ )	$I_D$	AC 2 A	AC 2.4 A	AC 3.1 A	AC 4 A	
Current limitation	$I_{\text{max}}$	Motor and regenerative 200 % $I_N$ , duration depending on capacity utilization				
Internal current limitation		$I_{\text{max}} = 0 \dots 200 \%$ adjustable				
Minimum permitted braking resistor value (4Q operation)	$R_{\text{BRmin}}$	68 Ω				
Output voltage	$U_A$	Max. $V_{\text{mains}}$				
PWM frequency	$f_{\text{PWM}}$	Can be set: 4/8/12/16 kHz				
Speed range / resolution	$n_A / \Delta n_A$	–6000 ... 0 ... +6000 $\text{min}^{-1}$ / 0.2 $\text{min}^{-1}$ across the entire range				
GENERAL INFORMATION						
Power loss at $S_N$ <sup>2)</sup>	$P_{\text{Vmax}}$	42 W	48 W	58 W	74 W	
Cooling air consumption		3 $\text{m}^3/\text{h}$		9 $\text{m}^3/\text{h}$		



1) The system and output currents must be reduced by 20 % from the nominal values for  $V_{\text{mains}} = 3 \times \text{AC } 500 \text{ V}$ .

2) The performance data applies to  $f_{\text{PWM}} = 4 \text{ kHz}$ .

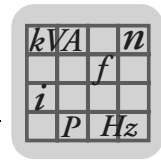


## Technical Data and Dimension Drawings

### MOVIDRIVE® MDX60/61B...-5\_3 (AC 400/500 V units)

<b>MDX60B standard version</b>	<b>0005-5A3-4-00</b>	<b>0008-5A3-4-00</b>	<b>0011-5A3-4-00</b>	<b>0014-5A3-4-00</b>
<b>Part number</b>	827 722 2	827 723 0	827 724 9	827 725 7
<b>MDX60B Application version</b>	<b>0005-5A3-4-0T</b>	<b>0008-5A3-4-0T</b>	<b>0011-5A3-4-0T</b>	<b>0014-5A3-4-0T</b>
<b>Part number</b>	827 726 5	827 727 3	827 728 1	827 729 X
 <b>Constant load Recommended motor power</b> $P_{Mot}$	0.55 kW	0.75 kW	1.1 kW	1.5 kW
 <b>Variable torque load or constant load without overload Recommended motor power</b> $P_{Mot}$	0.75 kW	1.1 kW	1.5 kW	2.2 kW
<b>Weight</b>	2.0 kg		2.5 kg	
<b>Dimensions</b> $W \times H \times D$	45 × 317 × 260 mm		67.5 × 317 × 260 mm	

<b>MDX61B standard version (VFC/CFC/SERVO)</b>	<b>0005-5A3-4-00</b>	<b>0008-5A3-4-00</b>	<b>0011-5A3-4-00</b>	<b>0014-5A3-4-00</b>
<b>Part number</b>	827 730 3	827 731 1	827.732 X	827 733 8
<b>MDX61B application version (VFC/CFC/SERVO)</b>	<b>0005-5A3-4-0T</b>	<b>0008-5A3-4-0T</b>	<b>0011-5A3-4-0T</b>	<b>0014-5A3-4-0T</b>
<b>Part number</b>	827 734 6	827 735 4	827 736 2	827 737 0
<b>Weight</b>	2.3 kg		2.8 kg	
<b>Dimensions</b> $W \times H \times D$	72.5 × 317 × 260 mm		95 × 317 × 260 mm	
<b>Recommended motor power</b>	→ MOVIDRIVE® B system manual, section "Motor Selection"			



**Size 1 (400/500 V) MDX61B0015 ... 0040, options can be installed in all units**

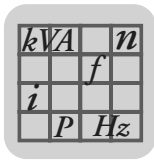


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MOVIDRIVE® MDX61B		0015-5A3-4-0_	0022-5A3-4-0_	0030-5A3-4-0_	0040-5A3-4-0_
<b>INPUT</b>					
Supply voltage	$U_{\text{Netz}}$	3 × AC 380 V –10 % ... 3 × AC 500 V +10 %			
Supply frequency	$f_{\text{Netz}}$	50 Hz ... 60 Hz ± 5 %			
Rated supply current <sup>1)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ )	$I_{\text{Netz}}$	100 % 125 %	AC 3.6 A AC 4.5 A	AC 5.0 A AC 6.2 A	AC 6.3 A AC 7.9 A
<b>OUTPUT</b>					
Apparent output power <sup>2)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 380...500 \text{ V}$ )	$S_N$	2.8 kVA	3.8 kVA	4.9 kVA	6.6 kVA
Rated output current <sup>1)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ )	$I_N$	AC 4 A	AC 5.5 A	AC 7 A	AC 9.5 A
Continuous output current (= 125 % $I_N$ ) $I_D$ (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ and $f_{\text{PWM}} = 4 \text{ kHz}$ )	$I_D$	AC 5 A	AC 6.9 A	AC 8.8 A	AC 11.9 A
Continuous output current (= 100 % $I_N$ ) $I_D$ (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ and $f_{\text{PWM}} = 8 \text{ kHz}$ )	$I_D$	AC 4 A	AC 5.5 A	AC 7 A	AC 9.5 A
Current limitation	$I_{\text{max}}$	Motor and regenerative 150 % $I_N$ , duration depending on capacity utilization			
Internal current limitation		$I_{\text{max}} = 0 \dots 150 \%$ adjustable			
Minimum permitted braking resistor value (4Q operation)	$R_{\text{BRmin}}$	68 Ω			
Output voltage	$U_A$	Max. $V_{\text{mains}}$			
PWM frequency	$f_{\text{PWM}}$	Can be set: 4/8/12/16 kHz			
Speed range / resolution	$n_A / \Delta n_A$	–6000 ... 0 ... +6000 $\text{min}^{-1}$ / 0.2 $\text{min}^{-1}$ across the entire range			
<b>GENERAL INFORMATION</b>					
Power loss at $S_N$ <sup>2)</sup>	$P_{\text{Vmax}}$	85 W	105 W	130 W	180 W
Cooling air consumption		40 $\text{m}^3/\text{h}$			
Weight		3.5 kg			
Dimensions	$W \times H \times D$	105 × 314 × 234 mm			



1) The system and output currents must be reduced by 20 % from the nominal values for  $V_{\text{mains}} = 3 \times \text{AC } 500 \text{ V}$ .

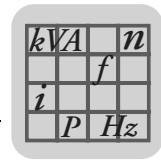
2) The performance data applies to  $f_{\text{PWM}} = 4 \text{ kHz}$ .



## Technical Data and Dimension Drawings

### MOVIDRIVE® MDX60/61B...-5\_3 (AC 400/500 V units)

<b>MDX61B Standard version</b>	<b>0015-5A3-4-00</b>	<b>0022-5A3-4-00</b>	<b>0030-5A3-4-00</b>	<b>0040-5A3-4-00</b>
Part number	827 957 8	827 958 6	827 959 4	827 960 8
<b>MDX61B Application version</b>	<b>0015-5A3-4-0T</b>	<b>0022-5A3-4-0T</b>	<b>0030-5A3-4-0T</b>	<b>0040-5A3-4-0T</b>
Part number	827 975 6	827 976 4	827 977 2	827 978 0
 <b>Constant load</b> Recommended motor power $P_{Mot}$	1.5 kW	2.2 kW	3.0 kW	4.0 kW
 <b>Variable torque load or constant load without overload</b> Recommended motor power $P_{Mot}$	2.2 kW	3.0 kW	4.0 kW	5.5 kW
Recommended motor power	→ MOVIDRIVE® B system manual, section "Motor Selection"			



Size 2S, 2  
 (400/500 V)

MDX61B0055 ... 0110, options can be installed in all units



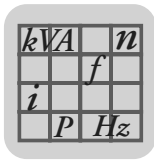
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MOVIDRIVE® MDX61B		0055-5A3-4-0_	0075-5A3-4-0_	0110-5A3-4-0_
Size		2S		2
<b>INPUT</b>				
Supply voltage	$U_{\text{Netz}}$	3 × AC 380 V –10 % ... 3 × AC 500 V +10 %		
Supply frequency	$f_{\text{Netz}}$	50 Hz ... 60 Hz ± 5 %		
Rated supply current <sup>1)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ )	$I_{\text{Netz}}$	100 % AC 11.3 A	125 % AC 14.1 A	AC 14.4 A AC 18.0 A
<b>OUTPUT</b>				
Apparent output power <sup>2)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 380...500 \text{ V}$ )	$S_{\text{N}}$	8.7 kVA	11.2 kVA	16.8 kVA
Rated output current <sup>1)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ )	$I_{\text{N}}$	AC 12.5 A	AC 16 A	AC 24 A
Continuous output current (= 125 % $I_{\text{N}}$ ) $I_{\text{D}}$ (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ with $f_{\text{PWM}} = 4 \text{ kHz}$ )		AC 15.6 A	AC 20 A	AC 30 A
Continuous output current (= 100 % $I_{\text{N}}$ ) $I_{\text{D}}$ (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ with $f_{\text{PWM}} = 8 \text{ kHz}$ )		AC 12.5 A	AC 16 A	AC 24 A
Current limitation	$I_{\text{max}}$	Motor and regenerative 150 % $I_{\text{N}}$ , duration depending on capacity utilization		
Internal current limitation		$I_{\text{max}} = 0 \dots 150 \%$ adjustable		
Minimum permitted braking resistor value (4Q operation)	$R_{\text{BRmin}}$	47 Ω		22 Ω
Output voltage	$U_{\text{A}}$	Max. $V_{\text{mains}}$		
PWM frequency	$f_{\text{PWM}}$	Can be set: 4/8/12/16 kHz		
Speed range / resolution	$n_{\text{A}} / \Delta n_{\text{A}}$	–6000 ... 0 ... +6000 $\text{min}^{-1}$ / 0.2 $\text{min}^{-1}$ across the entire range		
<b>GENERAL INFORMATION</b>				
Power loss at $S_{\text{N}}^{2)}$	$P_{\text{Vmax}}$	220 W	290 W	400 W
Cooling air consumption		80 $\text{m}^3/\text{h}$		
Weight		6.6 kg		
Dimensions	$W \times H \times D$	105 × 335 × 294 mm		135 × 315 × 285 mm



1) The system and output currents must be reduced by 20 % from the nominal values for  $V_{\text{mains}} = 3 \times \text{AC } 500 \text{ V}$ .

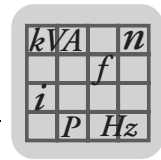
2) The performance data applies to  $f_{\text{PWM}} = 4 \text{ kHz}$ .



## Technical Data and Dimension Drawings

### MOVIDRIVE® MDX60/61B...-5\_3 (AC 400/500 V units)

<b>MDX61B Standard version</b>	<b>0055-5A3-4-00</b>	<b>0075-5A3-4-00</b>	<b>0110-5A3-4-00</b>
<b>Part number</b>	827 961 6	827 962 4	827 963 2
<b>MDX61B Application version</b>	<b>0055-5A3-4-0T</b>	<b>0075-5A3-4-0T</b>	<b>0110-5A3-4-0T</b>
<b>Part number</b>	827 979 9	827 980 2	827 981 0
 <b>Constant load</b> Recommended motor power $P_{Mot}$	5.5 kW	7.5 kW	11 kW
 <b>Variable torque load or constant load without overload</b> Recommended motor power $P_{Mot}$	7.5 kW	11 kW	15 kW
<b>Recommended motor power</b>	→ MOVIDRIVE® B system manual, section "Motor Selection"		



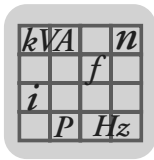
Size 3 (400/500 V) MDX61B0150 ... 0300, options can be installed in all units



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

MOVIDRIVE® MDX61B		0150-503-4-0_	0220-503-4-0_	0300-503-4-0_
<b>INPUT</b>				
Supply voltage	$U_{\text{Netz}}$	3 × AC 380 V –10 % ... 3 × AC 500 V +10 %		
Supply frequency	$f_{\text{Netz}}$	50 Hz ... 60 Hz ± 5 %		
Rated supply current <sup>1)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ )	$I_{\text{Netz}}$	100 % 125 %	AC 28.8 A AC 36 A	AC 41.4 A AC 51.7 A
<b>OUTPUT</b>				
Apparent output power <sup>2)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 380...500 \text{ V}$ )	$S_N$	22.2 kVA	31.9 kVA	41.6 kVA
Rated output current <sup>1)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ )	$I_N$	AC 32 A	AC 46 A	AC 60 A
Continuous output current (= 125 % $I_N$ ) $I_D$ (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ with $f_{\text{PWM}} = 4 \text{ kHz}$ )	$I_D$	AC 40 A	AC 57.5 A	AC 75 A
Continuous output current (= 100 % $I_N$ ) $I_D$ (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ with $f_{\text{PWM}} = 8 \text{ kHz}$ )	$I_D$	AC 32 A	AC 46 A	AC 60 A
Current limitation	$I_{\text{max}}$	Motor and regenerative 150 % $I_N$ , duration depending on capacity utilization		
Internal current limitation		$I_{\text{max}} = 0 \dots 150 \%$ adjustable		
Minimum permitted braking resistor value (4Q operation)	$R_{\text{BRmin}}$	15 Ω		12 Ω
Output voltage	$U_A$	Max. $V_{\text{mains}}$		
PWM frequency	$f_{\text{PWM}}$	Can be set: 4/8/12/16 kHz		
Speed range / resolution	$n_A / \Delta n_A$	–6000 ... 0 ... +6000 min <sup>–1</sup> / 0.2 min <sup>–1</sup> across the entire range		
<b>GENERAL INFORMATION</b>				
Power loss at $S_N$ <sup>2)</sup>	$P_{\text{Vmax}}$	550 W	750 W	950 W
Cooling air consumption		180 m <sup>3</sup> /h		
Weight		15.0 kg		
Dimensions	$W \times H \times D$	200 × 465 × 308 mm		

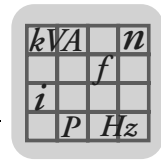
1) The system and output currents must be reduced by 20 % from the nominal values for  $V_{\text{mains}} = 3 \times \text{AC } 500 \text{ V}$ .  
 2) The performance data applies to  $f_{\text{PWM}} = 4 \text{ kHz}$ .



## Technical Data and Dimension Drawings

### MOVIDRIVE® MDX60/61B...-5\_3 (AC 400/500 V units)

<b>MDX61B Standard version</b>	<b>0150-503-4-00</b>	<b>0220-503-4-00</b>	<b>0300-503-4-00</b>
Part number	827 964 0	827 965 9	827 966 7
<b>MDX61B Application version</b>	<b>0150-503-4-0T</b>	<b>0220-503-4-0T</b>	<b>0300-503-4-0T</b>
Part number	827 982 9	827 983 7	827 984 5
 <b>Constant load</b> Recommended motor power $P_{Mot}$	15 kW	22 kW	30 kW
 <b>Variable torque load or constant load without overload</b> Recommended motor power $P_{Mot}$	22 kW	30 kW	37 kW
Recommended motor power	→ MOVIDRIVE® B system manual, section "Motor Selection"		



Size 4 (400/500 V) MDX61B0370 ... 0450, options can be installed in all units



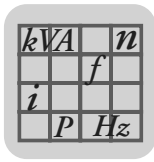
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MOVIDRIVE® MDX61B		0370-503-4-0_	0450-503-4-0_
<b>INPUT</b>			
Supply voltage	$U_{\text{Netz}}$	3 × AC 380 V –10 % ... 3 × AC 500 V +10 %	
Supply frequency	$f_{\text{Netz}}$	50 Hz ... 60 Hz ± 5 %	
Rated supply current <sup>1)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ )	$I_{\text{Netz}}$	100 % 125 %	AC 65.7 A AC 81.9 A AC 80.1 A AC 100.1 A
<b>OUTPUT</b>			
Apparent output power <sup>2)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 380...500 \text{ V}$ )	$S_{\text{N}}$	51.1 kVA	62.3 kVA
Rated output current <sup>1)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ )	$I_{\text{N}}$	AC 73 A	AC 89 A
Continuous output current (= 125 % $I_{\text{N}}$ ) $I_{\text{D}}$ (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ with $f_{\text{PWM}} = 4 \text{ kHz}$ )	$I_{\text{D}}$	AC 91 A	AC 111 A
Continuous output current (= 100 % $I_{\text{N}}$ ) $I_{\text{D}}$ (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ with $f_{\text{PWM}} = 8 \text{ kHz}$ )	$I_{\text{D}}$	AC 73 A	AC 89 A
Current limitation	$I_{\text{max}}$	Motor and regenerative 150 % $I_{\text{N}}$ , duration depending on capacity utilization	
Internal current limitation		$I_{\text{max}} = 0 \dots 150 \%$ adjustable	
Minimum permitted braking resistor value (4Q operation)	$R_{\text{BRmin}}$	6 Ω	
Output voltage	$U_{\text{A}}$	Max. $V_{\text{mains}}$	
PWM frequency	$f_{\text{PWM}}$	Can be set: 4/8/12/16 kHz	
Speed range / resolution	$n_{\text{A}} / \Delta n_{\text{A}}$	–6000 ... 0 ... +6000 min <sup>–1</sup> / 0.2 min <sup>–1</sup> across the entire range	
<b>GENERAL INFORMATION</b>			
Power loss at $S_{\text{N}}$ <sup>2)</sup>	$P_{\text{Vmax}}$	1200 W	1450 W
Cooling air consumption		180 m <sup>3</sup> /h	
Weight		27 kg	
Dimensions	$W \times H \times D$	280 × 522 × 307 mm	



1) The system and output currents must be reduced by 20 % from the nominal values for  $V_{\text{mains}} = 3 \times \text{AC } 500 \text{ V}$ .

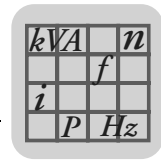
2) The performance data applies to  $f_{\text{PWM}} = 4 \text{ kHz}$ .



## Technical Data and Dimension Drawings

### MOVIDRIVE® MDX60/61B...-5\_3 (AC 400/500 V units)

<b>MDX61B Standard version</b>	<b>0370-503-4-00</b>	<b>0450-503-4-00</b>
Part number	827 967 5	827 968 3
<b>MDX61B Application version</b>	<b>0370-503-4-0T</b>	<b>0450-503-4-0T</b>
Part number	827 985 3	827 986 1
 <b>Constant load</b> Recommended motor power $P_{Mot}$	37 kW	45 kW
 <b>Variable torque load or constant load without overload</b> Recommended motor power $P_{Mot}$	45 kW	55 kW
Recommended motor power	→ MOVIDRIVE® B system manual, section "Motor Selection"	



Size 5 (400/500 V) MDX61B0550 ... 0750, options can be installed in all units

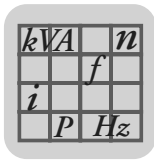


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MOVIDRIVE® MDX61B		0550-503-4-0_	0750-503-4-0_
<b>INPUT</b>			
Supply voltage	$U_{\text{Netz}}$	3 × AC 380 V –10 % ... 3 × AC 500 V +10 %	
Supply frequency	$f_{\text{Netz}}$	50 Hz ... 60 Hz ± 5 %	
Rated supply current <sup>1)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ )	$I_{\text{Netz}}$	100 % AC 94.5 A 125 % AC 118.1 A	AC 117 A AC 146.3 A
<b>OUTPUT</b>			
Apparent output power <sup>2)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 380...500 \text{ V}$ )	$S_{\text{N}}$	73.5 kVA	91.0 kVA
Rated output current <sup>1)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ )	$I_{\text{N}}$	AC 105 A	AC 130 A
Continuous output current (= 125 % $I_{\text{N}}$ ) $I_{\text{D}}$ (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ with $f_{\text{PWM}} = 4 \text{ kHz}$ )	$I_{\text{D}}$	AC 131 A	AC 162 A
Continuous output current (= 100 % $I_{\text{N}}$ ) $I_{\text{D}}$ (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ with $f_{\text{PWM}} = 8 \text{ kHz}$ )	$I_{\text{D}}$	AC 105 A	AC 130 A
Current limitation	$I_{\text{max}}$	Motor and regenerative 150 % $I_{\text{N}}$ , duration depending on capacity utilization	
Internal current limitation		$I_{\text{max}} = 0 \dots 150 \%$ adjustable	
Minimum permitted braking resistor value (4Q operation)	$R_{\text{BRmin}}$	6 Ω	4 Ω
Output voltage	$U_{\text{A}}$	Max. $V_{\text{mains}}$	
PWM frequency	$f_{\text{PWM}}$	Can be set: 4/8/12/16 kHz	
Speed range / resolution	$n_{\text{A}} / \Delta n_{\text{A}}$	–6000 ... 0 ... +6000 min <sup>–1</sup> / 0.2 min <sup>–1</sup> across the entire range	
<b>GENERAL INFORMATION</b>			
Power loss at $S_{\text{N}}$ <sup>2)</sup>	$P_{\text{Vmax}}$	1700 W	2000 W
Cooling air consumption		360 m <sup>3</sup> /h	
Weight		35 kg	
Dimensions	$W \times H \times D$	280 × 610 × 330 mm	



1) The system and output currents must be reduced by 20 % from the nominal values for  $V_{\text{mains}} = 3 \times \text{AC } 500 \text{ V}$ .

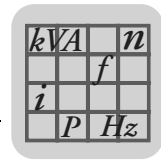
2) The performance data applies to  $f_{\text{PWM}} = 4 \text{ kHz}$ .



## Technical Data and Dimension Drawings

### MOVIDRIVE® MDX60/61B...-5\_3 (AC 400/500 V units)

<b>MDX61B Standard version</b>	<b>0550-503-4-00</b>	<b>0750-503-4-00</b>
Part number	827 969 1	827 970 5
<b>MDX61B Application version</b>	<b>0550-503-4-0T</b>	<b>0750-503-4-0T</b>
Part number	827 988 8	827 989 6
 <b>Constant load</b> Recommended motor power $P_{Mot}$	55 kW	75 kW
 <b>Variable torque load or constant load without overload</b> Recommended motor power $P_{Mot}$	75 kW	90 kW
Recommended motor power	→ MOVIDRIVE® B system manual, section "Motor Selection"	



Size 6 (400/500 V) MDX61B0900 ... 1320, options can be installed in all units



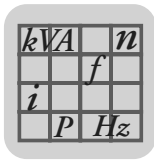
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MOVIDRIVE® MDX61B		0900-503-4-0_	1100-503-4-0_	1320-503-4-0_
<b>INPUT</b>				
Supply voltage	$U_{\text{Netz}}$	3 × AC 380 V –10 % ... 3 × AC 500 V +10 %		
Supply frequency	$f_{\text{Netz}}$	50 Hz ... 60 Hz ± 5 %		
Rated supply current <sup>1)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ )	$I_{\text{Netz}}$	100 % AC 153 A 125 % AC 191 A	AC 180 A AC 225 A	AC 225 A AC 281 A
<b>OUTPUT</b>				
Apparent output power <sup>2)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 380...500 \text{ V}$ )	$S_{\text{N}}$	118 kVA	139 kVA	174 kVA
Rated output current <sup>1)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ )	$I_{\text{N}}$	AC 170 A	AC 200 A	AC 250 A
Continuous output current (= 125 % $I_{\text{N}}$ ) $I_{\text{D}}$ (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ with $f_{\text{PWM}} = 4 \text{ kHz}$ )	$I_{\text{D}}$	AC 212 A	AC 250 A	AC 312 A
Continuous output current (= 100 % $I_{\text{N}}$ ) $I_{\text{D}}$ (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ with $f_{\text{PWM}} = 4 \text{ kHz}$ )	$I_{\text{D}}$	AC 170 A	AC 200 A	AC 250 A
Current limitation	$I_{\text{max}}$	Motor and regenerative 150 % $I_{\text{N}}$ , duration depending on capacity utilization		
Internal current limitation		$I_{\text{max}} = 0 \dots 150 \%$ adjustable		
Minimum permitted braking resistor value (4Q operation)	$R_{\text{BRmin}}$	2.7 Ω		
Output voltage	$U_{\text{A}}$	Max. $V_{\text{mains}}$		
PWM frequency	$f_{\text{PWM}}$	Can be set: 4 or 8 kHz		
Speed range / resolution	$n_{\text{A}} / \Delta n_{\text{A}}$	–6000 ... 0 ... +6000 min <sup>-1</sup> / 0.2 min <sup>-1</sup> across the entire range		
<b>GENERAL INFORMATION</b>				
Power loss at $S_{\text{N}}^2)$	$P_{\text{Vmax}}$	2300 W	2500 W	2700 W
Cooling air consumption		600 m <sup>3</sup> /h		
Weight		60 kg		
Dimensions	$W \times H \times D$	280 × 1000 × 382mm		



1) The system and output currents must be reduced by 20 % from the nominal values for  $V_{\text{mains}} = 3 \times \text{AC } 500 \text{ V}$ .

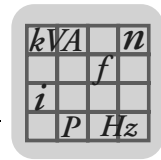
2) The performance data applies to  $f_{\text{PWM}} = 4 \text{ kHz}$ .



## Technical Data and Dimension Drawings

### MOVIDRIVE® MDX60/61B...-5\_3 (AC 400/500 V units)

<b>MDX61B Standard version</b>	<b>0900-503-4-00</b>	<b>1100-503-4-00</b>	<b>1320-503-4-00</b>
Part number	827 971 3	827 972 1	827 974 8
<b>MDX61B Application version</b>	<b>0900-503-4-0T</b>	<b>1100-503-4-0T</b>	<b>1320-503-4-0T</b>
Part number	827 991 8	827 992 6	827 993 4
 <b>Constant load</b> Recommended motor power $P_{Mot}$	90 kW	110 kW	132 kW
 <b>Variable torque load or constant load without overload</b> Recommended motor power $P_{Mot}$	110 kW	132 kW	160 kW
<b>Recommended motor power</b>	→ MOVIDRIVE® B system manual, section "Motor Selection"		



2.4 MOVIDRIVE® MDX61B...-2\_3 (AC 230 V units)

Size 1 (230 V)

MDX61B0015 ... 0037, options can be installed in all units

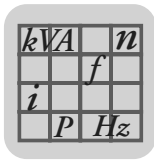
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MOVIDRIVE® MDX61B		0015-2A3-4-0_	0022-2A3-4-0_	0037-2A3-4-0_
<b>INPUT</b>				
Supply voltage	$U_{\text{Netz}}$	3 × AC 200 V –10 % ... 3 × AC 240 V +10 %		
Supply frequency	$f_{\text{Netz}}$	50 Hz ... 60 Hz ± 5 %		
Rated supply current (at $U_{\text{Netz}} = 3 \times \text{AC } 230 \text{ V}$ )	$I_{\text{Netz}}$	100 %	AC 6.7 A	AC 7.8 A
		125 %	AC 8.4 A	AC 9.8 A
<b>OUTPUT</b>				
Apparent output power <sup>1)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 230...240 \text{ V}$ )	$S_{\text{N}}$	2.7 kVA	3.4 kVA	5.8 kVA
Rated output current (at $U_{\text{Netz}} = 3 \times \text{AC } 230 \text{ V}$ )	$I_{\text{N}}$	AC 7.3 A	AC 8.6 A	AC 14.5 A
Continuous output current (= 125 % $I_{\text{N}}$ ) $I_{\text{D}}$ (at $U_{\text{Netz}} = 3 \times \text{AC } 230 \text{ V}$ with $f_{\text{PWM}} = 4 \text{ kHz}$ )		AC 9.1 A	AC 10.8 A	AC 18.1 A
Continuous output current (= 100 % $I_{\text{N}}$ ) $I_{\text{D}}$ (at $U_{\text{Netz}} = 3 \times \text{AC } 230 \text{ V}$ with $f_{\text{PWM}} = 8 \text{ kHz}$ )		AC 7.3 A	AC 8.6 A	AC 14.5 A
Current limitation	$I_{\text{max}}$	Motor and regenerative 150 % $I_{\text{N}}$ , duration depending on capacity utilization		
Internal current limitation		$I_{\text{max}} = 0 \dots 150 \%$ adjustable		
Minimum permitted braking resistor value (4Q operation)	$R_{\text{BRmin}}$	27 Ω		
Output voltage	$U_{\text{A}}$	Max. $V_{\text{mains}}$		
PWM frequency	$f_{\text{PWM}}$	Can be set: 4/8/12/16 kHz		
Speed range / resolution	$n_{\text{A}} / \Delta n_{\text{A}}$	–6000 ... 0 ... +6000 $\text{min}^{-1}$ / 0.2 $\text{min}^{-1}$ across the entire range		
<b>GENERAL INFORMATION</b>				
Power loss at $S_{\text{N}}$ <sup>1)</sup>	$P_{\text{Vmax}}$	110 W	126 W	210 W
Cooling air consumption		40 $\text{m}^3/\text{h}$		
Weight		2.8 kg		
Dimensions	$W \times H \times D$	105 × 314 × 234 mm		

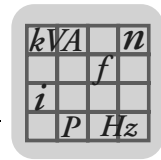
1) The performance data applies to  $f_{\text{PWM}} = 4 \text{ kHz}$ .



## Technical Data and Dimension Drawings

### MOVIDRIVE® MDX61B...-2\_3 (AC 230 V units)

<b>MDX61B Standard version</b>	<b>0015-2A3-4-00</b>	<b>0022-2A3-4-00</b>	<b>0037-2A3-4-00</b>
Part number	827 994 2	827 995 0	827 996 9
<b>MDX61B Application version</b>	<b>0015-2A3-4-0T</b>	<b>0022-2A3-4-0T</b>	<b>0037-2A3-4-0T</b>
Part number	828 003 7	828 004 5	828 005 3
Constant load Recommended motor power $P_{Mot}$	1.5 kW	2.2 kW	3.7 kW
Variable torque load or constant load without overload Recommended motor power $P_{Mot}$	2.2 kW	3.7 kW	5.0 kW
Recommended motor power	→ MOVIDRIVE® B system manual, section "Motor Selection"		



Size 2 (230 V)

MDX61B0055 ... 0075, options can be installed in all units

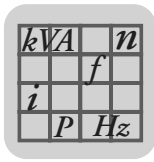


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

MOVIDRIVE® MDX61B		0055-2A3-4-0_	0075-2A3-4-0_
<b>INPUT</b>			
Supply voltage	$U_{\text{Netz}}$	3 × AC 200 V –10 % ... 3 × AC 240 V +10 %	
Supply frequency	$f_{\text{Netz}}$	50 Hz ... 60 Hz ± 5 %	
Rated supply current (at $U_{\text{Netz}} = 3 \times \text{AC } 230 \text{ V}$ )	$I_{\text{Netz}}$	100 % AC 19.5 A	125 % AC 24.4 A
<b>OUTPUT</b>			
Apparent output power <sup>1)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 230 \dots 240 \text{ V}$ )	$S_{\text{N}}$	8.8 kVA	11.6 kVA
Rated output current (at $U_{\text{Netz}} = 3 \times \text{AC } 230 \text{ V}$ )	$I_{\text{N}}$	AC 22 A	AC 29 A
Continuous output current (= 125 % $I_{\text{N}}$ ) $I_{\text{D}}$ (at $U_{\text{Netz}} = 3 \times \text{AC } 230 \text{ V}$ with $f_{\text{PWM}} = 4 \text{ kHz}$ )		AC 27.5 A	AC 36.3 A
Continuous output current (= 100 % $I_{\text{N}}$ ) $I_{\text{D}}$ (at $U_{\text{Netz}} = 3 \times \text{AC } 230 \text{ V}$ with $f_{\text{PWM}} = 8 \text{ kHz}$ )		AC 22 A	AC 29 A
Current limitation	$I_{\text{max}}$	Motor and regenerative 150 % $I_{\text{N}}$ , duration depending on capacity utilization	
Internal current limitation		$I_{\text{max}} = 0 \dots 150 \%$ adjustable	
Minimum permitted braking resistor value (4Q operation)	$R_{\text{BRmin}}$	12 Ω	
Output voltage	$U_{\text{A}}$	Max. $V_{\text{mains}}$	
PWM frequency	$f_{\text{PWM}}$	Can be set: 4/8/12/16 kHz	
Speed range / resolution	$n_{\text{A}} / \Delta n_{\text{A}}$	–6000 ... 0 ... +6000 min <sup>–1</sup> / 0.2 min <sup>–1</sup> across the entire range	
<b>GENERAL INFORMATION</b>			
Power loss at $S_{\text{N}}$ <sup>1)</sup>	$P_{\text{Vmax}}$	300 W	380 W
Cooling air consumption		80 m <sup>3</sup> /h	
Weight		5.9 kg	
Dimensions	$W \times H \times D$	135 × 315 × 285 mm	

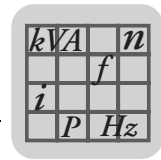
1) The performance data applies to  $f_{\text{PWM}} = 4 \text{ kHz}$ .



## Technical Data and Dimension Drawings

### MOVIDRIVE® MDX61B...-2\_3 (AC 230 V units)

<b>MDX61B Standard version</b>	<b>0055-2A3-4-00</b>	<b>0075-2A3-4-00</b>
Part number	827 997 7	827 998 5
<b>MDX61B Application version</b>	<b>0055-2A3-4-0T</b>	<b>0075-2A3-4-0T</b>
Part number	828 006 1	828 008 8
 Constant load Recommended motor power $P_{Mot}$	5.5 kW	7.5 kW
 Variable torque load or constant load without overload Recommended motor power $P_{Mot}$	7.5 kW	11 kW
Recommended motor power	→ MOVIDRIVE® B system manual, section "Motor Selection"	



Size 3 (230 V)

MDX61B0110 ... 0150, options can be installed in all units

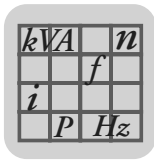


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

MOVIDRIVE® MDX61B		0110-203-4-0_	0150-203-4-0_
<b>INPUT</b>			
Supply voltage	$U_{\text{Netz}}$	3 × AC 200 V –10 % ... 3 × AC 240 V +10 %	
Supply frequency	$f_{\text{Netz}}$	50 Hz ... 60 Hz ± 5 %	
Rated supply current (at $U_{\text{Netz}} = 3 \times \text{AC } 230 \text{ V}$ )	$I_{\text{Netz}}$ 100 % 125 %	AC 40 A AC 50 A	AC 49 A AC 61 A
<b>OUTPUT</b>			
Apparent output power <sup>1)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 230...240 \text{ V}$ )	$S_N$	17.1 kVA	21.5 kVA
Rated output current (at $U_{\text{Netz}} = 3 \times \text{AC } 230 \text{ V}$ )	$I_N$	AC 42 A	AC 54 A
Continuous output current (= 125 % $I_N$ ) $I_D$ (at $U_{\text{Netz}} = 3 \times \text{AC } 230 \text{ V}$ with $f_{\text{PWM}} = 4 \text{ kHz}$ )		AC 52.5 A	AC 67.5 A
Continuous output current (= 100 % $I_N$ ) $I_D$ (at $U_{\text{Netz}} = 3 \times \text{AC } 230 \text{ V}$ with $f_{\text{PWM}} = 8 \text{ kHz}$ )		AC 42 A	AC 54 A
Current limitation	$I_{\text{max}}$	Motor and regenerative 150 % $I_N$ , duration depending on capacity utilization	
Internal current limitation		$I_{\text{max}} = 0 \dots 150 \%$ adjustable	
Minimum permitted braking resistor value (4Q operation)	$R_{\text{BRmin}}$	7.5 Ω	5.6 Ω
Output voltage	$U_A$	Max. $V_{\text{mains}}$	
PWM frequency	$f_{\text{PWM}}$	Can be set: 4/8/12/16 kHz	
Speed range / resolution	$n_A / \Delta n_A$	–6000 ... 0 ... +6000 $\text{min}^{-1}$ / 0.2 $\text{min}^{-1}$ across the entire range	
<b>GENERAL INFORMATION</b>			
Power loss at $S_N$ <sup>1)</sup>	$P_{\text{Vmax}}$	580 W	720 W
Cooling air consumption		180 $\text{m}^3/\text{h}$	
Weight		14.3 kg	
Dimensions	$W \times H \times D$	200 × 465 × 308 mm	

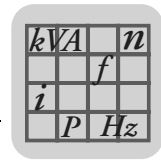
1) The performance data applies to  $f_{\text{PWM}} = 4 \text{ kHz}$ .



## Technical Data and Dimension Drawings

### MOVIDRIVE® MDX61B...-2\_3 (AC 230 V units)

<b>MDX61B Standard version</b>	<b>0110-203-4-00</b>	<b>0150-203-4-00</b>
Part number	827 999 3	828 000 2
<b>MDX61B Application version</b>	<b>0110-203-4-0T</b>	<b>0150-203-4-0T</b>
Part number	828 009 6	828 011 8
 <b>Constant load</b> Recommended motor power $P_{Mot}$	11 kW	15 kW
 <b>Variable torque load or constant load without overload</b> Recommended motor power $P_{Mot}$	15 kW	22 kW
Recommended motor power	→ MOVIDRIVE® B system manual, section "Motor Selection"	



Size 4 (230 V)

MDX61B0220 ... 0300, options can be installed in all units

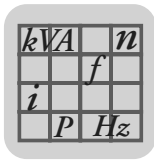


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

MOVIDRIVE® MDX61B		0220-203-4-0_	0300-203-4-0_
<b>INPUT</b>			
Supply voltage	$U_{\text{Netz}}$	3 × AC 200 V -10 % ... 3 × AC 240 V +10 %	
Supply frequency	$f_{\text{Netz}}$	50 Hz ... 60 Hz ± 5 %	
Rated supply current (at $U_{\text{Netz}} = 3 \times \text{AC } 230 \text{ V}$ )	$I_{\text{Netz}}$ 100 % 125 %	AC 72 A AC 90 A	AC 86 A AC 107 A
<b>OUTPUT</b>			
Apparent output power <sup>1)</sup> (at $U_{\text{Netz}} = 3 \times \text{AC } 230...240 \text{ V}$ )	$S_N$	31.8 kVA	37.8 kVA
Rated output current (at $U_{\text{Netz}} = 3 \times \text{AC } 230 \text{ V}$ )	$I_N$	AC 80 A	AC 95 A
Continuous output current (= 125 % $I_N$ ) $I_D$ (at $U_{\text{Netz}} = 3 \times \text{AC } 230 \text{ V}$ with $f_{\text{PWM}} = 4 \text{ kHz}$ )		AC 100 A	AC 118 A
Continuous output current (= 100 % $I_N$ ) $I_D$ (at $U_{\text{Netz}} = 3 \times \text{AC } 230 \text{ V}$ with $f_{\text{PWM}} = 4 \text{ kHz}$ )		AC 80 A	AC 95 A
Current limitation	$I_{\text{max}}$	Motor and regenerative 150 % $I_N$ , duration depending on capacity utilization	
Internal current limitation		$I_{\text{max}} = 0 \dots 150 \%$ adjustable	
Minimum permitted braking resistor value (4Q operation)	$R_{\text{BRmin}}$	3.0 Ω	
Output voltage	$U_A$	Max. $V_{\text{mains}}$	
PWM frequency	$f_{\text{PWM}}$	Can be set: 4/8/12/16 kHz	
Speed range / resolution	$n_A / \Delta n_A$	-6000 ... 0 ... +6000 min <sup>-1</sup> / 0.2 min <sup>-1</sup> across the entire range	
<b>GENERAL INFORMATION</b>			
Power loss at $S_N$ <sup>1)</sup>	$P_{V\text{max}}$	1100 W	1300 W
Cooling air consumption		180 m <sup>3</sup> /h	
Weight		26.3 kg	
Dimensions	$W \times H \times D$	280 × 522 × 307 mm	

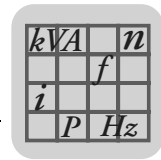
1) The performance data applies to  $f_{\text{PWM}} = 4 \text{ kHz}$ .



## Technical Data and Dimension Drawings

### MOVIDRIVE® MDX61B...-2\_3 (AC 230 V units)

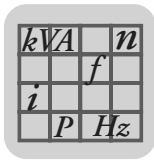
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Part number	828 001 0	828 002 9
<b>MDX61B Application version</b>	<b>0220-203-4-0T</b>	<b>0300-203-4-0T</b>
Part number	828 012 6	828 013 4
 <b>Constant load</b> Recommended motor power $P_{Mot}$	22 kW	30 kW
 <b>Variable torque load or constant load without overload</b> Recommended motor power $P_{Mot}$	30 kW	37 kW
Recommended motor power	→ MOVIDRIVE® B system manual, section "Motor Selection"	



## 2.5 MOVIDRIVE® MDX60/61B electronics data

MOVIDRIVE® MDX60/61B		General electronics data	
Voltage supply for setpoint input	X11:1 X11:5	REF1: DC+10 V +5 % / -0 %, $I_{max} = DC 3 \text{ mA}$ REF2: DC-10 V +0 % / -5 %, $I_{max} = DC 3 \text{ mA}$	Reference voltages for setpoint potentiometer
Setpoint input n1 (Differential input) Operating mode AI11/AI12 Resolution Internal resistance	X11:2/X11:3	AI11/AI12: Voltage or current input, can be set with S11 and P11_, sampling interval 1 ms  Voltage input: n1 = DC 0...+10 V or DC -10 V...0...+10 V 12 bit $R_i = 40 \text{ k}\Omega$ (external voltage supply) $R_i = 20 \text{ k}\Omega$ (supply from REF1/REF2)	Current input: n1 = DC 0...20 mA or DC 4...20 mA 11 bit $R_i = 250 \Omega$
Internal setpoints		Parameter set 1: $n11/n12/n13 = -6000...0...+6000 \text{ min}^{-1}$ Parameter set 2: $n21/n22/n23 = -6000...0...+6000 \text{ min}^{-1}$	
Time ranges of the speed ramps at $\Delta n = 3000 \text{ min}^{-1}$		1. Ramp t11/t21 Up: 0...2000 s Down: 0...2000 s 2. Ramp t12/t22 Up = down: 0...2000 s Stop ramp t13/t23 Down: 0...20 s Emergency ramp t14/t24 Down: 0...20 s Motor potentiometer t3 Up: 0.2...50 s Down: 0.2...50 s	
Auxiliary voltage output <sup>1)</sup> X13:8/X10:8		VO24: $V_{OUT} = DC 24 \text{ V}$ , maximum current carrying capacity $I_{max} = DC 400 \text{ mA}$	
External voltage supply <sup>1)</sup>	X10:9	VI24: $V_{IN} = DC 24 \text{ V} -15 \% / +20 \%$ according to EN 61131-2	
Binary inputs X13:1...X13:6 and X16:1/X16:2 Internal resistance  Signal level  Function X13:1 X13:2...X13:6, X16:1/X16:2		Isolated (optocoupler), PLC compatible (EN 61131), sampling interval 1 ms DIØØ...DIØ5 and DIØ6/DIØ7 $R_i \approx 3 \text{ k}\Omega$ , $I_E \approx DC 10 \text{ mA}$  DC +13 V...+30 V = "1" = Contact closed DC -3 V...+5 V = "0" = Contact open meets EN 61131  DIØØ: fixed assignment with "/Controller inhibit" DIØ1...DIØ5, DIØ6/DIØ7: Selection option → Parameter menu P60_	
Binary outputs <sup>1)</sup> X10:3/X10:7 and X16:3...X16:5  Signal level  Function X10:3 X10:7, X16:3...X16:5		PLC-compatible (EN 61131-2), response time 1ms DBØØ/DOØ2 and DOØ3...DOØ5  "0" = DC 0 V "1" = DC +24 V <b>Important:</b> Do not apply external voltage!  DBØØ: With fixed assignment "/Brake", $I_{max} = DC 150 \text{ mA}$ , short-circuit proof, protected against external voltage to DC 30 V DOØ2, DOØ3...DOØ5: Selection option → Parameter menu P62_, $I_{max} = DC 50 \text{ mA}$ , short-circuit proof, protected against external voltage to DC 30 V	
Relay output  Function X10:4 X10:5 X10:6	X10:4...X10:6	DOØ1: Load capacity of the relay contacts $U_{max} = DC 30 \text{ V}$ , $I_{max} = DC 800 \text{ mA}$  DOØ1-C: Shared relay contact DOØ1-NO: Normally open contact DOØ1-NC: Normally closed contact Selection option → Parameter menu P62_	
System bus (SBus)	X12:1 X12:2 X12:3	DGND: Reference potential SC11: SBus high SC12: SBus low	CAN bus according to CAN specification 2.0, parts A and B, transmission technology according to ISO 11898, max. 64 stations, terminating resistor (120Ω) can be activated using DIP switch.
RS485 interface	X13:10 X13:11	ST11: RS485+ ST12: RS485-	EIA standard, 9.6 kBaud, max. 32 stations Max. cable length 200 m Dynamic terminating resistor with fixed installation
TF/TH/KTY input	X10:1	TF1: Response threshold at $R_{TF} \geq 2.9 \text{ k}\Omega \pm 10 \%$	
Reference terminals X11:4 X12:1/X13:9/X16:6/X10:2/X10:10 X13:7  Permitted cable cross section		AGND: Reference potential for analog signals and terminals X11:1 and X11:5 (REF1/REF2) DGND: Reference potential for binary signals, system bus, RS485 interface and TF/TH DCOM: Reference potential for binary inputs X13:1...X13:6 and X16:1/X16:2 (DIØØ...DIØ5 and DIØ6/DIØ7)  One conductor per terminal: 0.20...2.5 mm <sup>2</sup> (AWG 24...12) Two conductors per terminal: 0.25...1 mm <sup>2</sup> (AWG 22...17)	

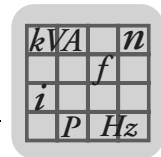
1) The unit provides a current of  $I_{max} = DC 400 \text{ mA}$  for the DC+24 V outputs (VO24, binary outputs). If this value is insufficient, a DC 24 V voltage supply must be connected to X10:9 (VI24).



## Technical Data and Dimension Drawings

### MOVIDRIVE® MDX60/61B electronics data

MOVIDRIVE® MDX60/61B		General electronics data
Safety contact	X17:1 X17:2  X17:3 X17:4	DGND: Reference potential for X17:3 VO24: : $V_{OUT} = DC\ 24\ V$ , only to supply X17:4 of the same unit; <b>it cannot be used</b> to supply other units. SOV24: Reference potential for DC+24 V input "Safe stop" (safety contact) SVI24: DC+24 V input "Safe stop" (safety contact)
Permitted cable cross section		One conductor per terminal: $0.08...1.5\ mm^2$ (AWG28...16) Two conductors per terminal: $0.25 \dots 1.0\ mm^2$ (AWG23...17)
Power consumption X17:4		Size 0: 3 W Size 1: 5 W Size 2, 2S: 6 W Size 3: 7.5 W Size 4: 8 W Size 5: 10 W Size 6: 6 W
Input capacitance X17:4		Size 0: 27 $\mu F$ Size 1...6: 270 $\mu F$
Time for restart Time to inhibit output stage		$t_A = 200\ ms$ $t_S \leq 100\ ms$
Signal level		DC +19.2 V...+30 V = "1" = Contact closed DC-30 V...+5 V = "0" = Contact open



2.6 MOVIDRIVE® MDX60B dimension drawings

Size 0S

2

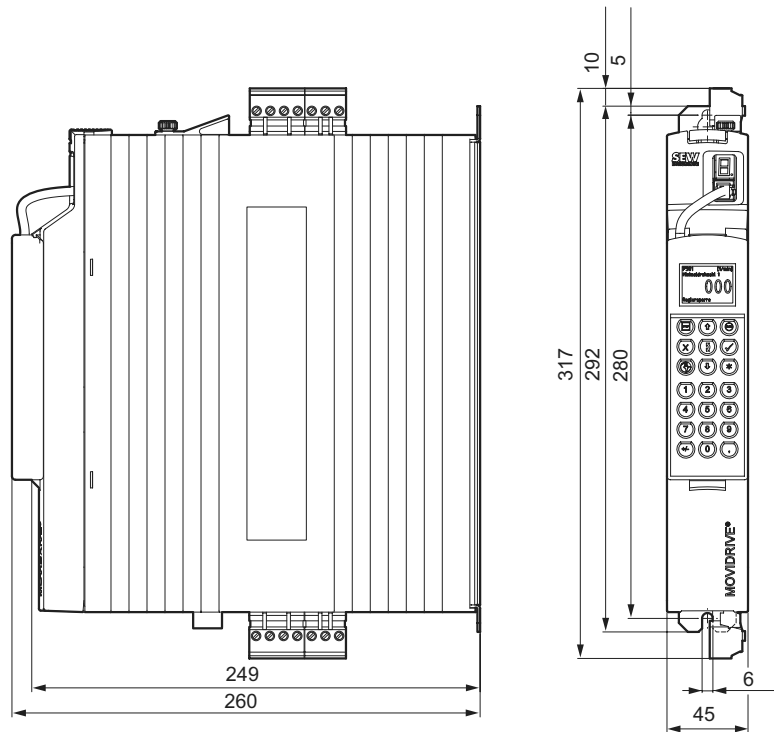


Figure 8: Dimension drawing for MDX60B size 0S, dimensions in mm

53019BXX

Size 0S with  
 mounted braking  
 resistor

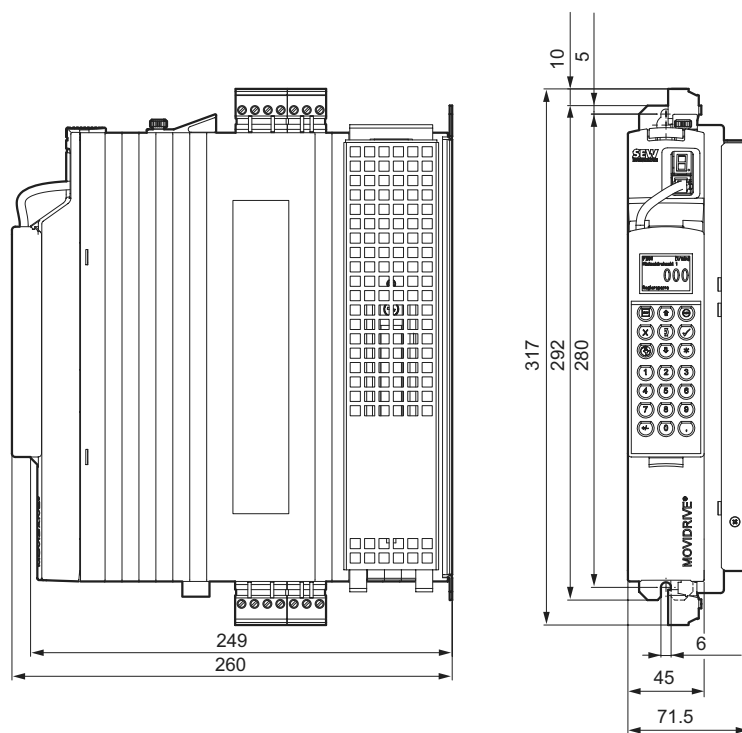
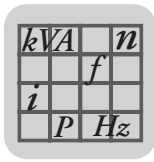


Figure 9: Dimension drawing for MDX60B size 0S with braking resistor, dimensions in mm

53020BXX



Size 0SM

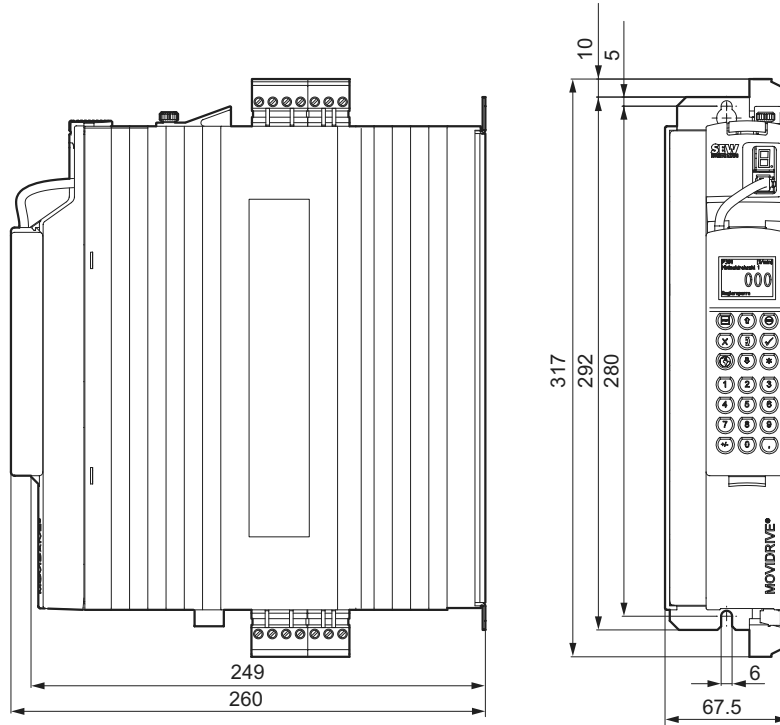


Figure 10: Dimension drawing for MDX60B size 0M, dimensions in mm

53022BXX

Size 0M with  
 mounted braking  
 resistor

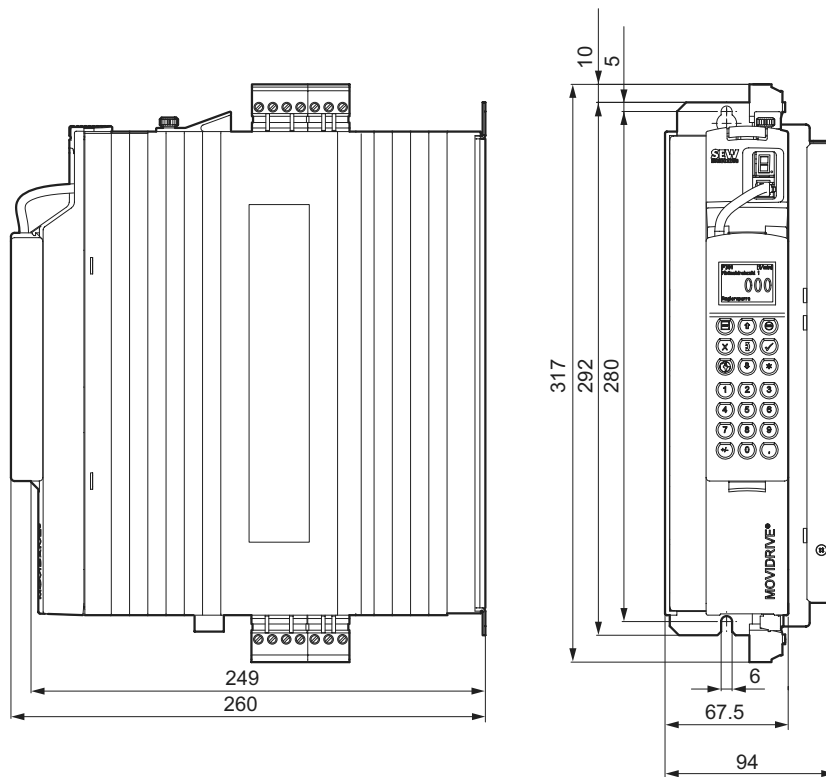
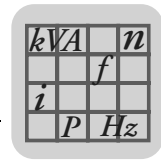



Figure 11: Dimension drawing for MDX60B size 0M with braking resistor, dimensions in mm

53023BXX



2.7 MOVIDRIVE® MDX61B dimension drawings

	<p><b>NOTE</b></p> <p>For MOVIDRIVE® MDX61B size 0, installing a braking resistor does not affect the dimensions. Therefore, all dimension drawings are shown without braking resistors.</p>
---	--

Size 0S

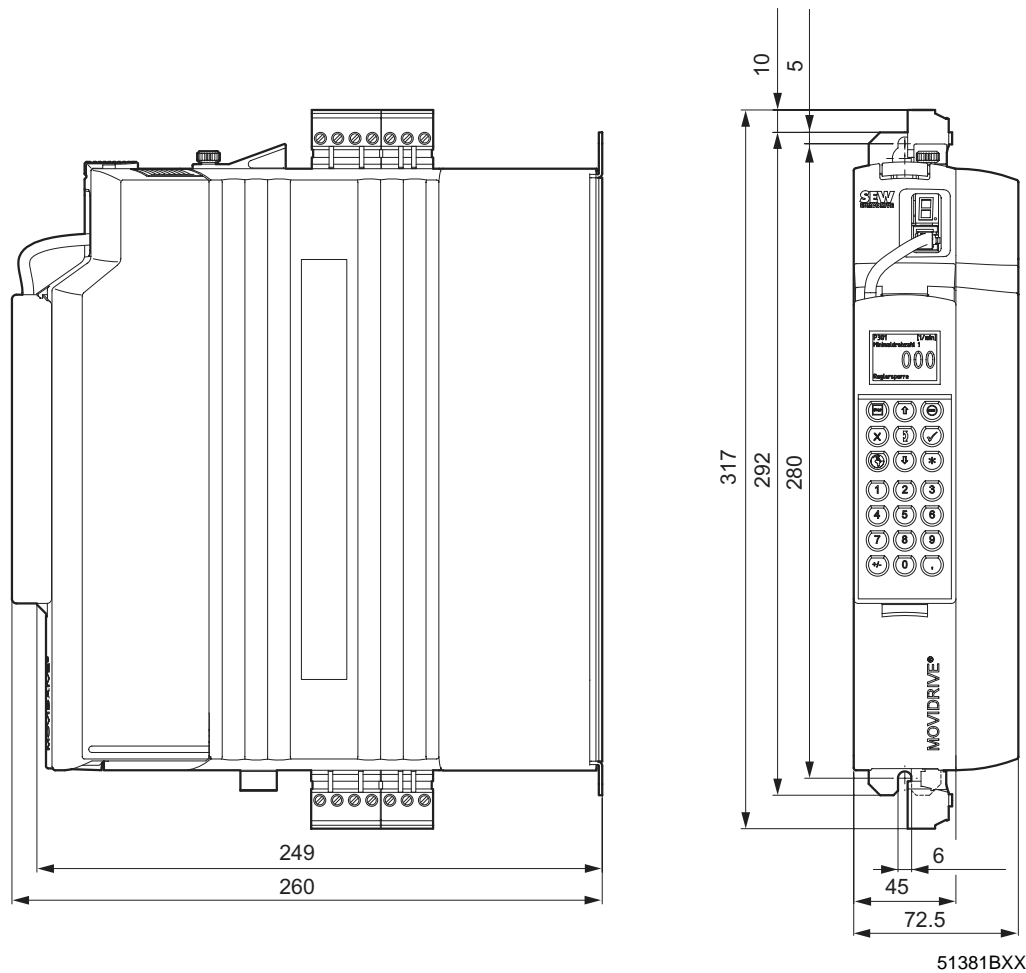
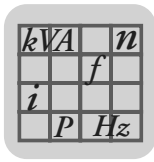
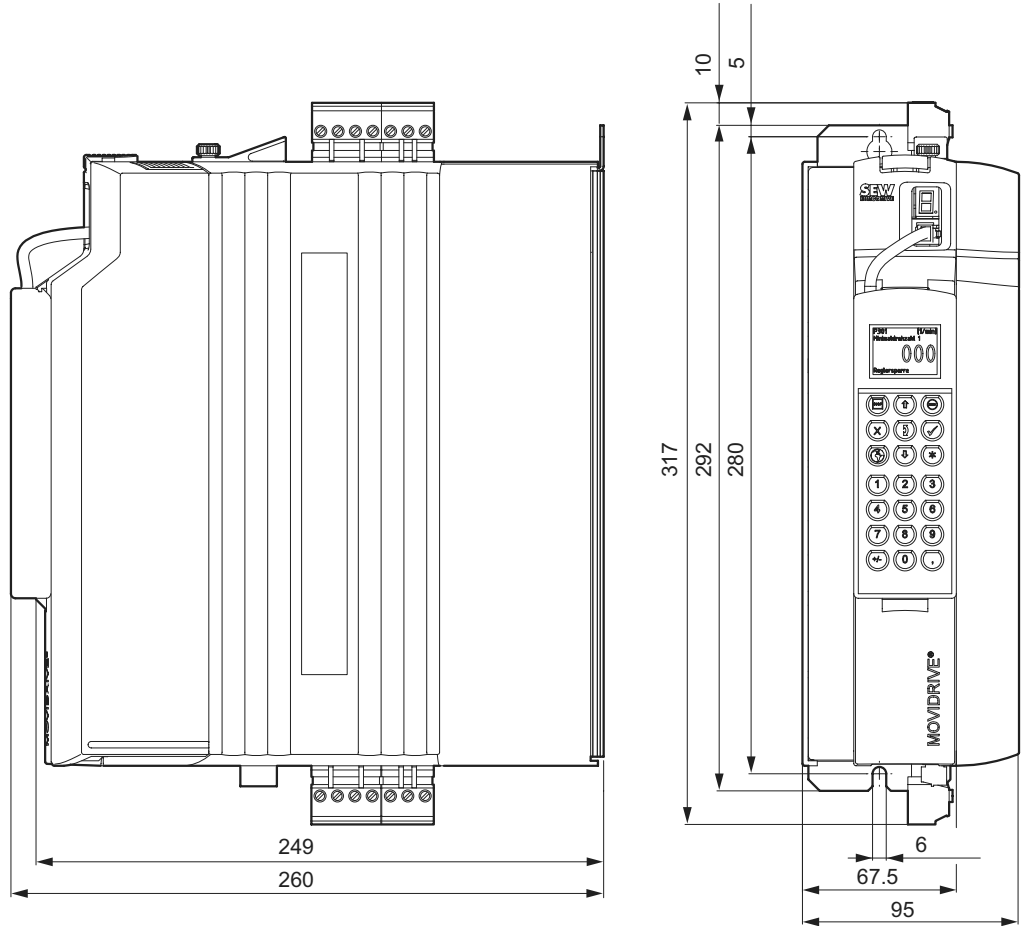


Figure 12: Dimension drawing for MDX61B size 0S, dimensions in mm

51381BXX

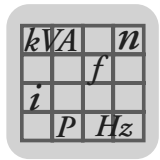


Size 0SM

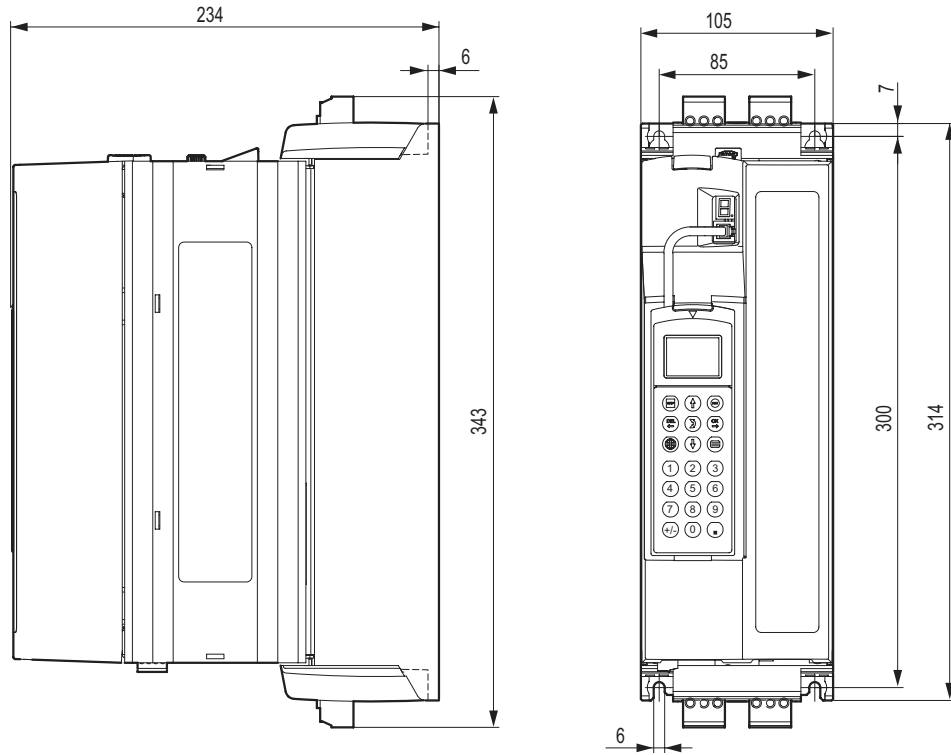


51378BXX

Figure 13: Dimension drawing for MDX61B size 0M, dimensions in mm

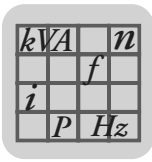


Size 1



52274BXX

Figure 14: Dimension drawing for MDX61B size 1, dimensions in mm



Size 2S

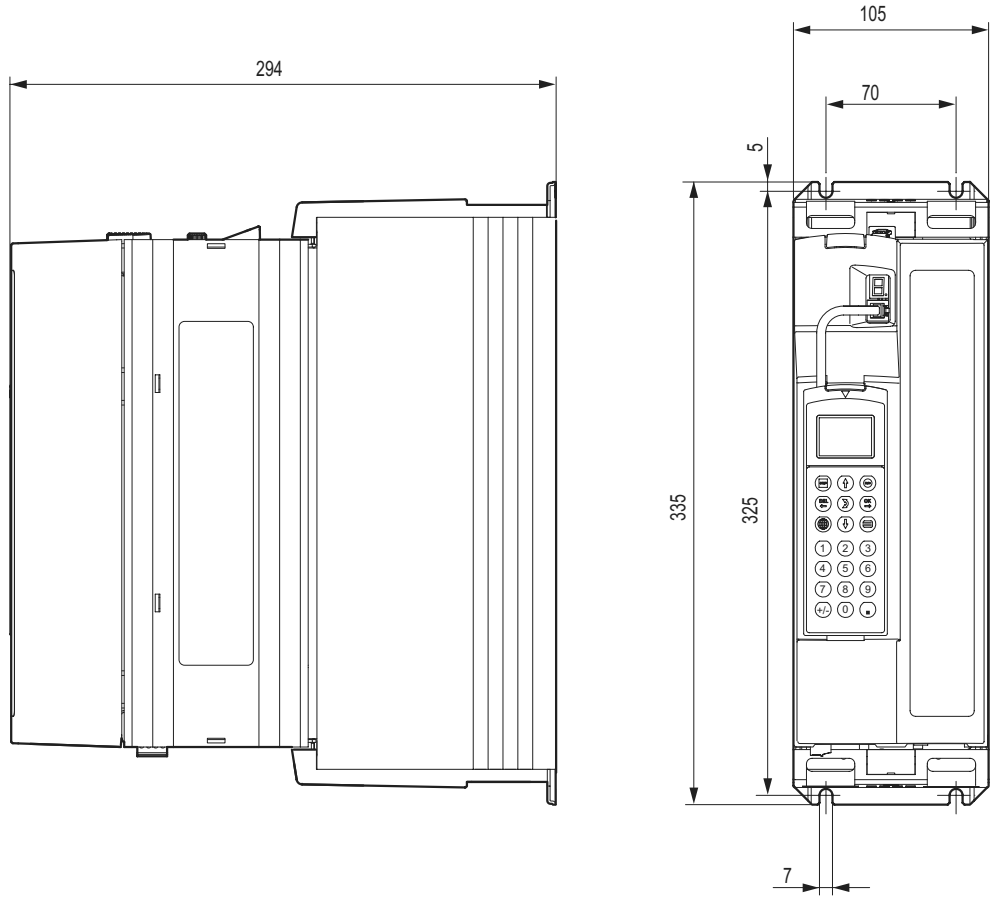
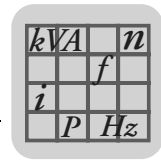
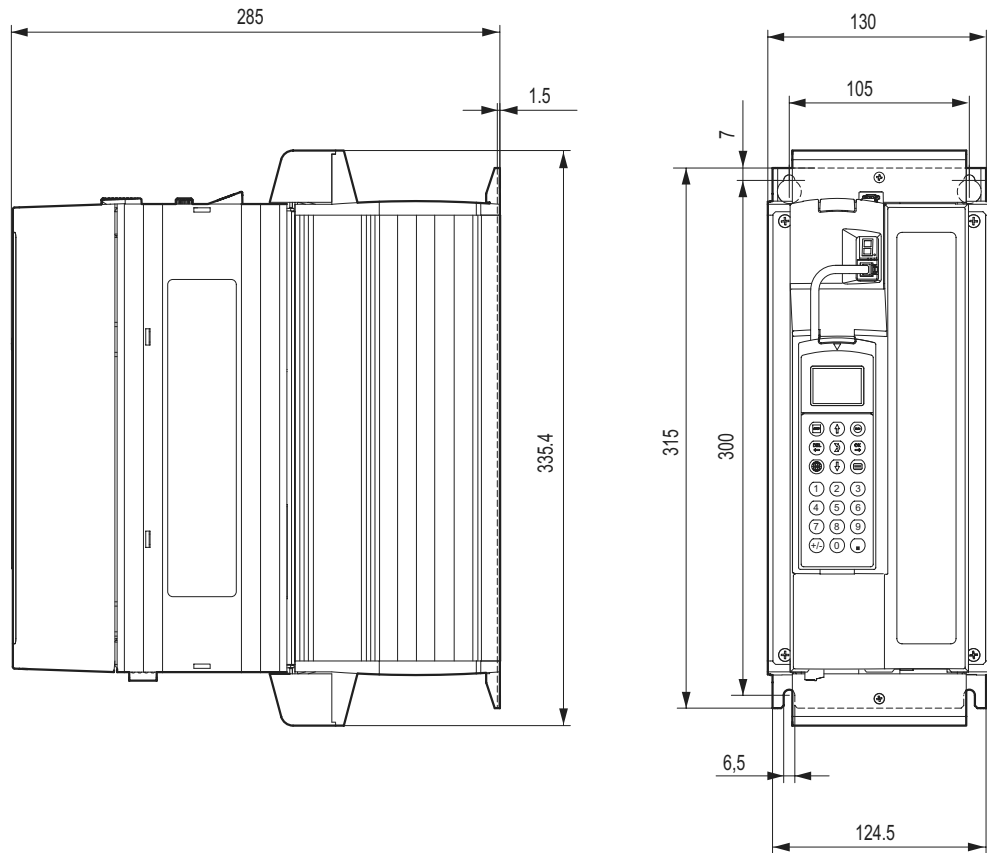


Figure 15: Dimension drawing for MDX61B size 2S, dimensions in mm

52273BXX



Size 2



2

Figure 16: Dimension drawing for MDX61B size 2, dimensions in mm

52276BXX

kVA	n
f	
i	
P	Hz

Size 3

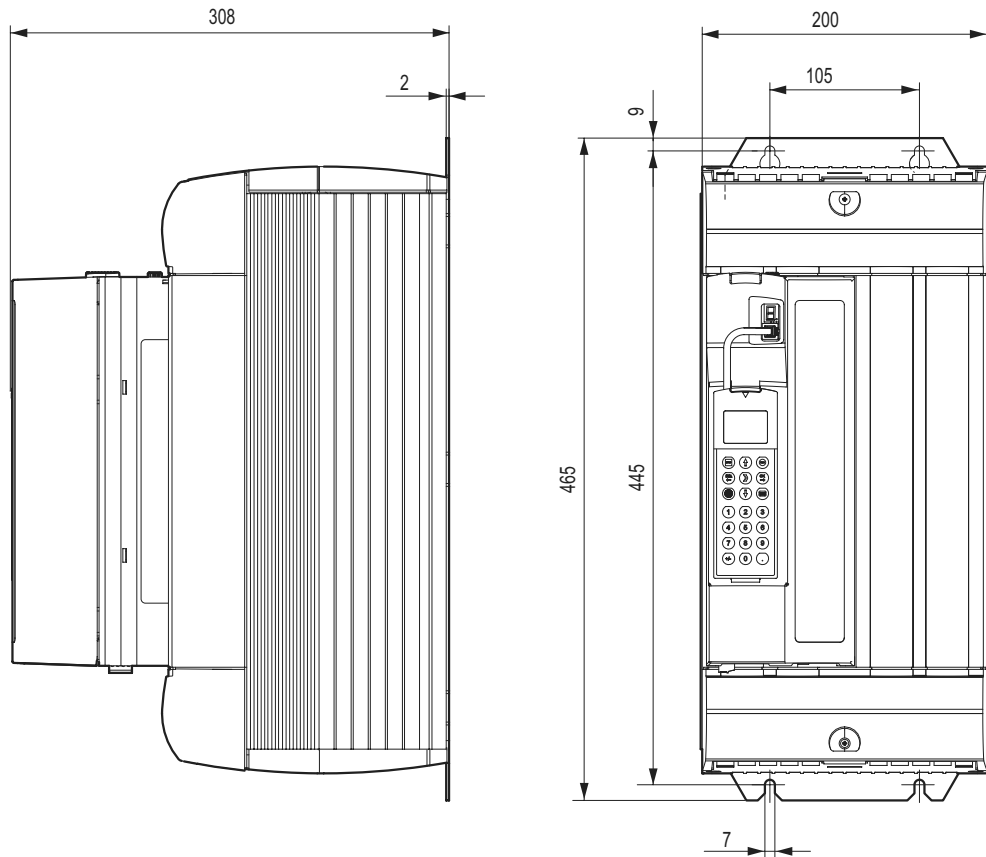
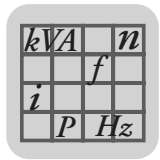


Figure 17: Dimension drawing for MDX61B size 3, dimensions in mm

52315BXX



Size 4

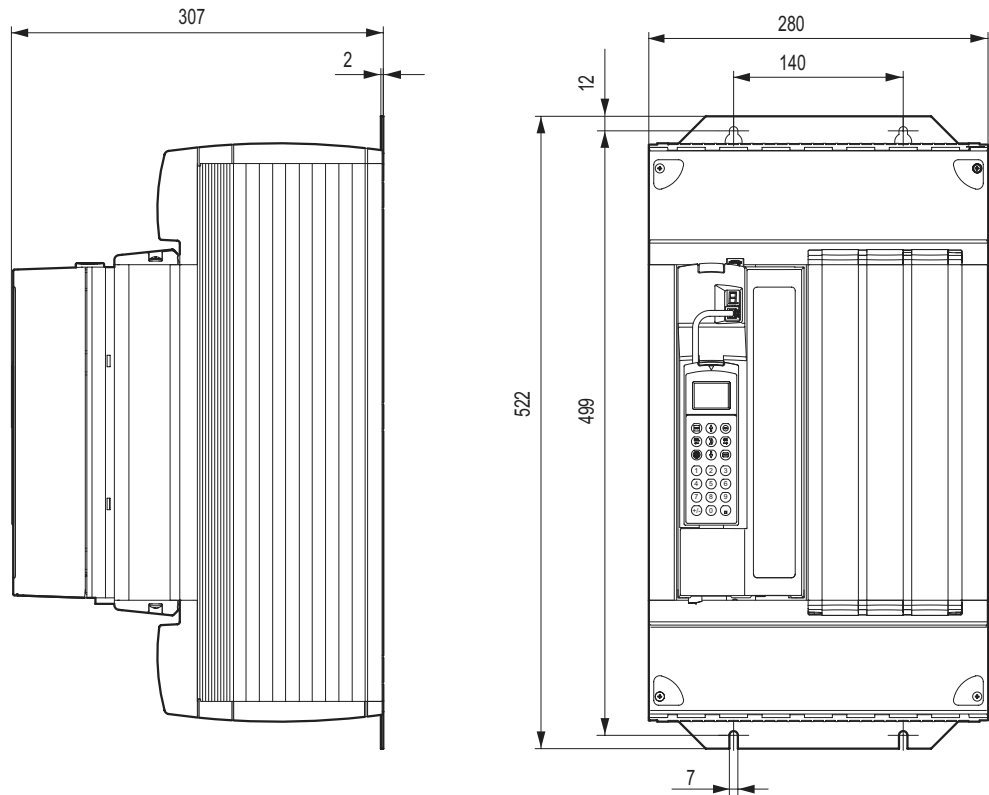
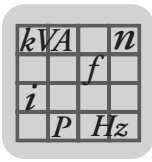


Figure 18: Dimension drawing for MDX61B size 4, dimensions in mm

52277BXX



**Size 5**

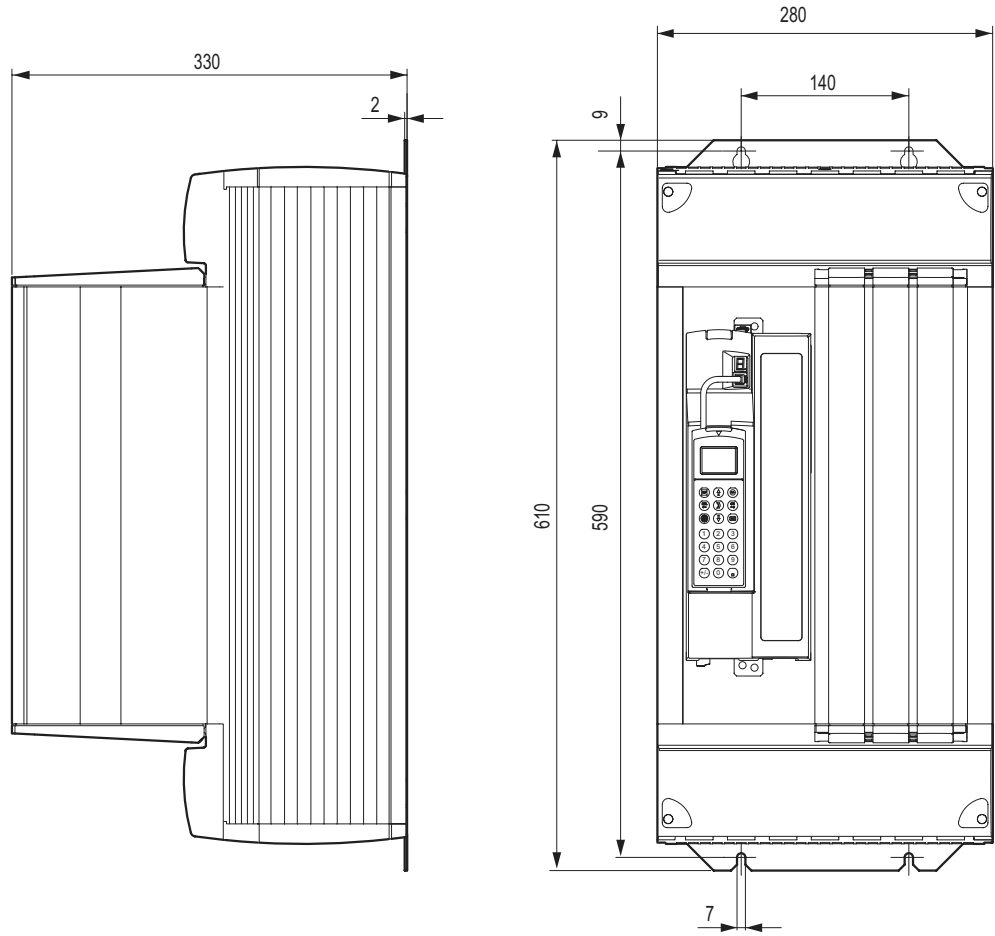
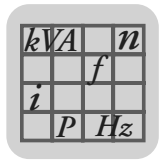


Figure 19: Dimension drawing for MDX61B size 5, dimensions in mm

52278BXX



Size 6

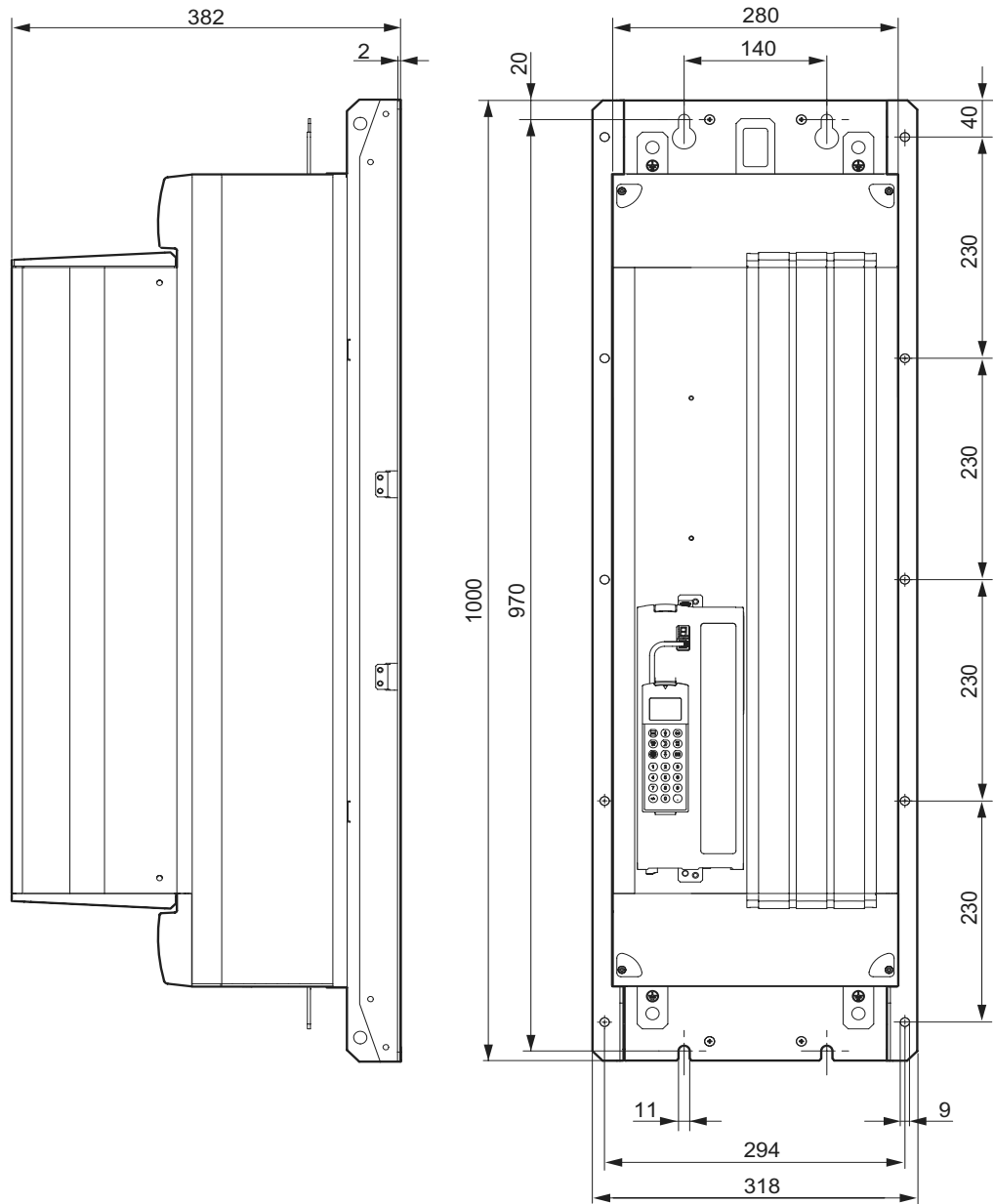
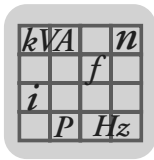


Figure 20: Dimension drawing for MDX61B size 6, dimensions in mm

58389BXX



## 2.8 MOVIDRIVE® MDR60A regenerative power supply unit

In MOVIDRIVE® drive inverters operating in regenerative mode (4Q operation), the MOVIDRIVE® MDR60A regenerative power supply unit can be used as an alternative to braking resistors. The prerequisite is a powerful supply system. For more detailed information, refer to the "MOVIDRIVE® MDR60A Regenerative Power Supply Unit" system manual. This manual can be ordered from SEW-EURODRIVE.

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

### UL approval



UL and cUL approval has been granted for the entire MOVIDRIVE® MDR60A0370-503-00 and MDR60A0750-503-00 range of units. cUL is equivalent to CSA approval. The MOVIDRIVE® MDR60A1320-503-00 unit does not have UL or cUL approval.

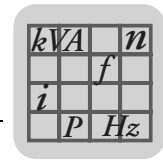
### Protection and monitoring functions

- Monitoring and protection against thermal overload.
- Detection of power failure within one supply system half-wave.
- Overvoltage protection.



Figure 21: MOVIDRIVE® MDR60A regenerative power supply units

54512AXX



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

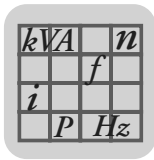
- Energy balance: Regenerative power is fed back into the supply system instead of being converted into waste heat.
- Less installation work for several inverter (network and braking resistor connections). However, a braking resistor is required to bring the drive to a controlled stop even when there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

2

**General technical data**

MOVIDRIVE® MDR60A	0370-503-00 (size 3) 0750-503-00 (size 4)	1320-503-00 (size 6)
Interference immunity	Fulfills EN 61800-3	Meets EN 61000-6-1 and EN 61000-6-2
Interference emission with EMC-compliant installation	Fulfills EN 61800-3 <ul style="list-style-type: none"> <li>• With NF085-503 line filter (size 3)</li> <li>• With NF150-503 line filter (size 4)</li> </ul>	Meets EN 61000-6-4 with line filter NF300-503
Ambient temperature $\vartheta_U$ Derating ambient temperature	0 °C...+40 °C $I_N$ reduction: 3 % $I_N$ per K to max. 60 °C	0 °C...+40 °C $I_N$ reduction: 3 % $I_N$ per K to max. 55 °C
Climate class	EN 60721-3-3, class 3K3	
Storage temperature <sup>1)</sup> $\vartheta_L$	-25 °C...+70 °C (EN 60721-3-3, class 3K3)	-25 °C...+55 °C (EN 60721-3-3, class 3K3)
Cooling type (DIN 51751)	Forced cooling (temperature-controlled fan, response threshold 50 °C)	Forced cooling (temperature-controlled fan, response threshold 45 °C)
Enclosure EN 60529 (NEMA1)	Size 3 Size 4 IP20 (power connections) IP00 (power connections) <ul style="list-style-type: none"> <li>• With fitted plexiglass cover supplied as standard</li> <li>• With shrink tubing (not included in scope of delivery)</li> </ul>	IP20
Operating mode	continuous duty (EN 60149-1-1 and 1-3)	
Overvoltage category	III according to IEC 60664-1 (VDE 0110-1)	
Pollution class	2 according to IEC 60664-1 (VDE 0110-1)	
Installation altitude	There are no restrictions for heights $\leq$ 1000 m. The following restrictions apply at heights $\geq$ 1000 m: <ul style="list-style-type: none"> <li>• From 1000 m (3,280 ft.) to max. 4,000 m (6561 ft.):                             <ul style="list-style-type: none"> <li>- <math>I_N</math> reduction by 1% per 100 m (330 ft)</li> </ul> </li> <li>• From 2000 m (6,561 ft.) to max. 4000 m (13,123 ft.):                             <ul style="list-style-type: none"> <li>- <math>V_N</math> reduction by AC 6 V per 100 m</li> </ul> </li> </ul> Over 2000 m only overvoltage class 2, external measures are required for overvoltage class 3. Overvoltage classes according to DIN VDE 0110-1.	$h \leq$ 1000 m: No limitation From 1000 m (3,280 ft.) to max. 4,000 m (6561 ft.): $I_N$ reduction: 0.5 % per 100 m

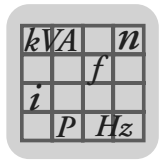
1) In case of long-term storage, the unit must be connected to the mains voltage for at least 5 minutes every two years, otherwise the unit's service life may be reduced.



#### Technical data of the MOVIDRIVE® MDR60A regenerative power supply unit

MOVIDRIVE® MDR60A	0370-503-00 (size 3)	0750-503-00 (size 4)	1320-503-00 (size 6)
Part number	826 658 1	826 556 9	827 952 7
<b>INPUT</b>			
Supply voltage	$U_{\text{Netz}}$	3 × AC 380 V –10 % ... 3 × AC 500 V +10 %	
Supply frequency	$f_{\text{Netz}}$	50 Hz ... 60 Hz ± 5 %	40 Hz ... 60 Hz ± 10 %
Rated connected load	$P_N$	37 kW	AC 66 A
Rated supply current (at $U_{\text{Netz}} = 3 \times \text{AC } 400 \text{ V}$ )	$I_{\text{Netz}}$	AC 66 A	AC 117 A
<b>DC LINK</b>			
Apparent output power (at $U_{\text{Netz}} = 3 \times \text{AC } 380...500 \text{ V}$ )	$S_A$	50 kVA	90 kVA
DC link voltage	$V_{\text{DClink}}$	DC 560 V ... 780 V	
Rated DC link current	$I_{\text{DClink}}$	DC 70 A	DC 141 A
Max. DC link current	$I_{\text{DC\_max}}$	DC 105 A	DC 212 A
<b>GENERAL INFORMATION</b>			
Power loss at $P_N$	$P_{V\text{max}}$	950 W	1700 W
Cooling air consumption		180 m <sup>3</sup> /h	360 m <sup>3</sup> /h
Connection for power terminals X1, X2 (L1, L2, L3 for size 6) Permitted tightening torque Permitted cable cross section		M6 screw with washer 3.5 Nm 25 mm <sup>2</sup> (AWG4)	M10 terminal studs 14 Nm 70 mm <sup>2</sup> (AWG2/0)
Connection for DC link connection ±UG Permitted cable cross section Permitted tightening torque		-	-
Connection for electronics terminals X3 (X2 for size 6)		Permitted cable cross section: • One conductor per terminal: 0.20...2.5 mm <sup>2</sup> (AWG24...13) • Two conductors per terminal: 0.25...1 mm <sup>2</sup> (AWG23...17)	Permitted cable cross section: • 0.8...4 mm <sup>2</sup> (AWG18...12)
Weight		16 kg	24 kg
Dimensions	$W \times H \times D$	200 × 465 × 221 mm	280 × 522 × 205 mm
Line choke (always required)		ND085-013 $L_N = 0.1 \text{ mH}$ Part number 826,014 1	ND200-0033 $L_N = 0.03 \text{ mH}$ Part number 826,579 8
Line filter (optional)		NF085-503, part number 827 415 0	NF150-503, part number 827 417 7
For MOVIDRIVE® MDX60B/61B...-5_3		0005 ... 0370	0005 ... 0750
			0005 ... 1320

1) Important: Do not apply tightening torque directly at terminals L1, L2, L3 and ±UG; use a second wrench.



**MDR60A dimension drawings**

Provide at least 100 mm clearance above and below the unit. There is no need for clearance at the sides. You can line up the units directly next to one another. With sizes 4 and 6, do not install any components that are sensitive to high temperatures within 300 mm of the top of the unit, for example contactors or fuses.

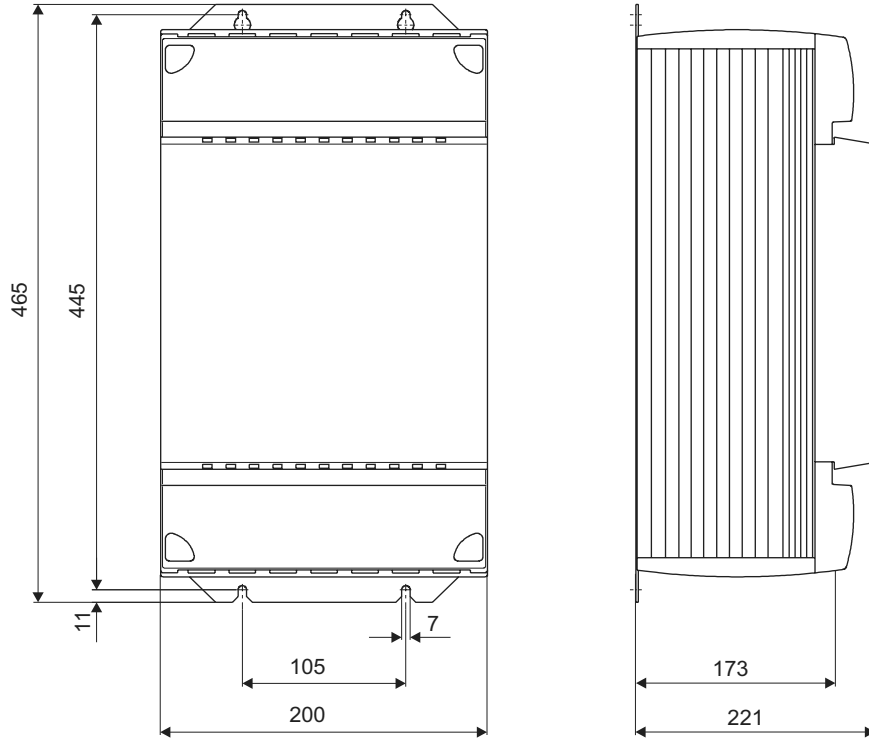


Figure 22: Dimension drawing for MDR60A size 3, dimensions in mm

54260BXX

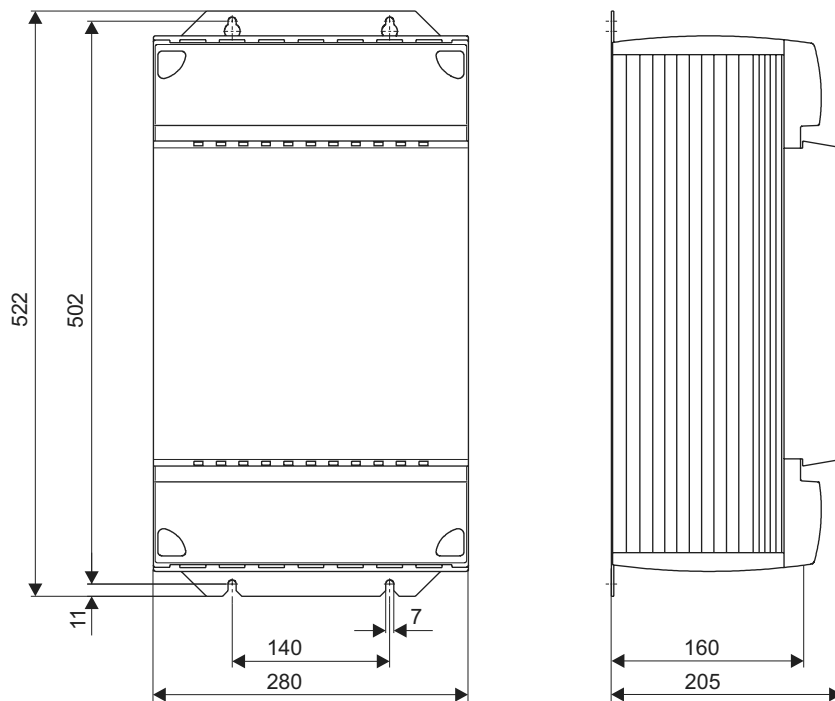
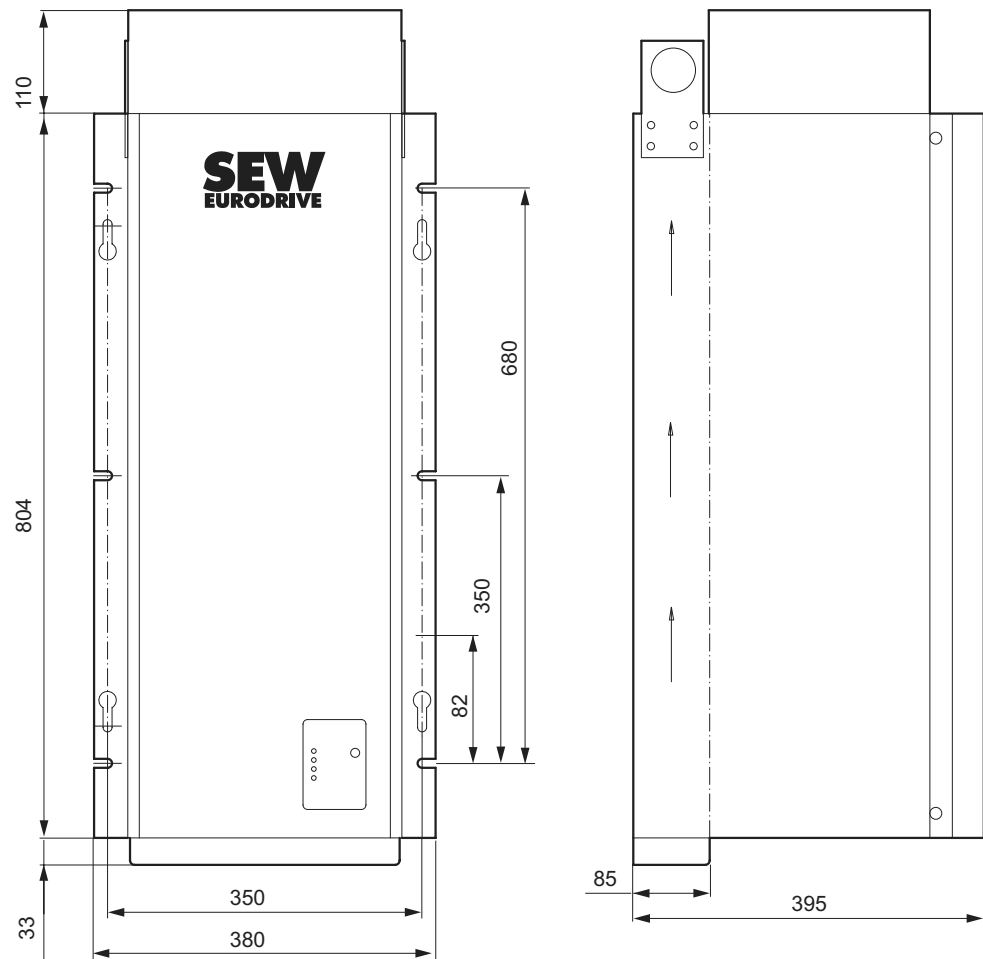
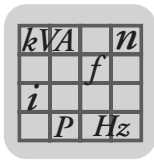


Figure 23: Dimension drawing for MDR60A size 4, dimensions in mm

54261BXX



54282BXX

Figure 24: Dimension drawing for MDR60A size 6, dimensions in mm

#### DC link connection

SEW-EURODRIVE recommends using the following cable sets for the DC link connection. These cable sets offer the appropriate dielectric strength and are also color-coded. Color coding is necessary because cross-polarity and ground faults could cause irreparable damage to the connected equipment.

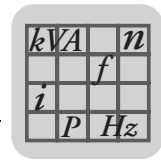
The length of the cables restricts the DC link connection to the permitted length of 5 m. They can also be cut to length by the customer for connecting several units. The lugs for connection to the regenerative power supply unit and an inverter are supplied with the cable set. Use commercially available lugs for connecting additional inverters. The inverters must then be connected to the regenerative power supply unit in star configuration.

Cable set type	DCP12A	DCP13A	DCP15A	DCP16A
Part number	814 567 9	814 250 5	814 251 3	817 593 4
For connecting MOVIDRIVE®	0005 ... 0110	0150 ... 0370	0450 ... 0750	0900 ... 1320



#### NOTE

Refer to the "MOVIDRIVE® MDR60A Regenerative Power Supply Unit" system manual for information on the DC link connection. This manual can be ordered from SEW-EURODRIVE.



## 2.9 IPOSplus®

### Description

IPOSplus® positioning and sequence control is integrated into every MOVIDRIVE® inverter as standard. IPOSplus® can be used to control functions and positioning tasks either simultaneously or independently of one another.

The IPOSplus® sequence control system makes it possible to run a user program, regardless of the encoder feedback or the selected control mode (VFC, CFC, SERVO). In conjunction with encoder feedback, the IPOSplus® positioning control provides high-performance point-to-point positioning. The IPOSplus® program is written using the MOVITOOLS® software. Starting up the inverter, accessing parameters and editing variables are all possible either with the operating software or the DBG60B keypad (startup in VFC mode only).

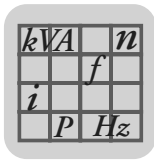
### Features

- Program execution independent of encoder feedback and operating mode
- The user program is continued even if a unit malfunction occurs (troubleshooting is possible in the user program)
- Three user programs can be run in parallel and independently of one another (task 1, task 2 and task 3, each of them interrupt-capable)
- The user programs programmed in assembler can contain up to 3200 program lines
- User-friendly and comprehensive control options for the inverter
- Access to all available options
- Extensive options for communication via system bus (SBus), RS485, RS232 and fieldbus (direct communication with MOVIMOT® is possible)
- Processing of digital and analog input/output signals
- Positioning with selectable travel speed, positioning ramp and jerk limitation
- Feedforward for position, speed and torque control loops with minimized lag error
- Two touch probe inputs
- Ramp types: LINEAR, JERK LIMITED, SINE and SQUARE
- Status and monitoring functions: Lag error monitoring, position signal, software and hardware limit switches
- Nine types of reference travel
- Possibility of changing the target position, travel speed, positioning ramp and torque while movement is in progress
- Possibility of "Endless positioning"
- Override function
- Cam control
- Synchronous operation and electronic cam

Only with encoder feedback

### Technical data for assembler programming

Max. program length of task 1, task 2 and task 3	Total of ca. 3200 program lines
Command processing time per program line	1 ... 11 commands/ms can be configured
Variables	1024, of which 128 (0 ... 127) can be stored to non-volatile memory; range of values: $-2^{31} \dots + (2^{31}-1)$
Touch probe inputs	2 inputs, processing time < 100 µs
Sampling interval of digital and analog inputs	1 ms
Digital inputs/outputs	8 inputs / 5 outputs
Analog inputs/outputs	1 input (DC 0 ... 10 V, DC±10 V, DC 0 ... 20 mA, DC 4 ... 20 mA) 1 input (DC 0...10 V) 1 output (DC 0...20 mA, DC 4...20 mA)



## 2.10 DBG60B keypad

**Description** The basic version of MOVIDRIVE® does not have a DBG60B keypad and can be upgraded to include the keypad as an option.

Keypad	Language variants	Part number	
<p>56555AXX</p>	<b>DBG60B-01</b>	DE/EN/FR/IT/ES/PT/NL (German/English/French/Italian/Spanish/ Portuguese/Dutch)	1820 403 1
	<b>DBG60B-02</b>	DE/EN/FR/FI/SV/DA/TR (German/English/French/Finnish/ Swedish/Danish/Turkish)	1820 405 8
	<b>DBG60B-03</b>	DE/EN/FR/RU/PL/CS (German/English/France/Russian/Polish/ Czech)	1820 406 6
	<b>DBG60B-04</b>	DE/EN/FR/ZH (German/English/French/Chinese)	1820 850 9
	<b>Door installation set<sup>1)</sup></b>	<b>Description (= scope of delivery)</b>	<b>Part number</b>
	<b>DBM60B</b>	<ul style="list-style-type: none"> <li>Housing for DBG60B (IP65)</li> <li>DKG60B extension cable, length 5 m</li> </ul>	824 853 2
	<b>Extension cable</b>	<b>Description (= scope of delivery)</b>	<b>Part number</b>
<b>DKG60B</b>	<ul style="list-style-type: none"> <li>Length 5 m</li> <li>4-core, shielded cable</li> </ul>	817 583 7	

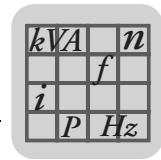
1) The DBG60B keypad is not included in the scope of delivery and must be ordered separately.

### Functions

- Process values and status displays
- Status display of binary inputs and outputs
- Error memory and error reset queries
- Option to display and set the operating parameters and service parameters
- Data backup and transfer of parameter sets to other MOVIDRIVE® units
- User-friendly startup menu for VFC mode
- Manual control for MOVIDRIVE®
- Manual operation of MOVIMOT® (→ Decentralized technology documentation)

### Features

- Illuminated text display, range of languages
- Keypad with 21 keys
- Selection between user menu, detailed parameter menu and startup menu in VFC mode (CFC and SERVO startup is not possible with the DBG60B)
- Can be plugged into MOVIDRIVE®
- Can be connected via extension cable DKG60B (5 m)
- Enclosure IP40 (EN 60529)



**NOTE**

The DBG60B keypad option and the interface adapter are plugged into the same inverter slot (XT) and therefore cannot be used at the same time.

**DBG60B dimension drawing**

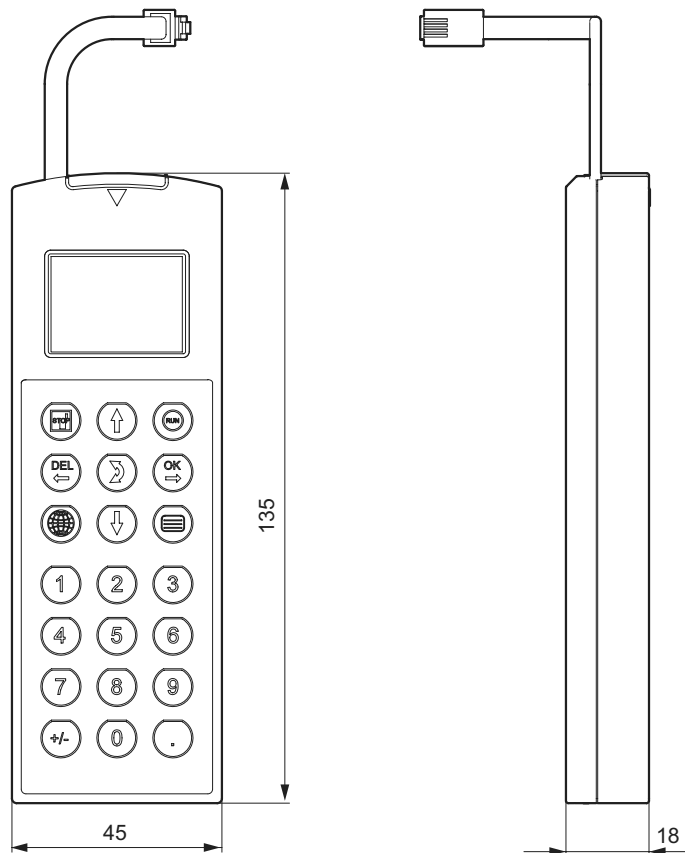
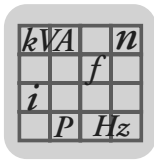


Figure 25: Dimension drawing for DBG60B, dimensions in mm

53147BXX



**Dimension drawing for installation  
DBG60B housing**

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

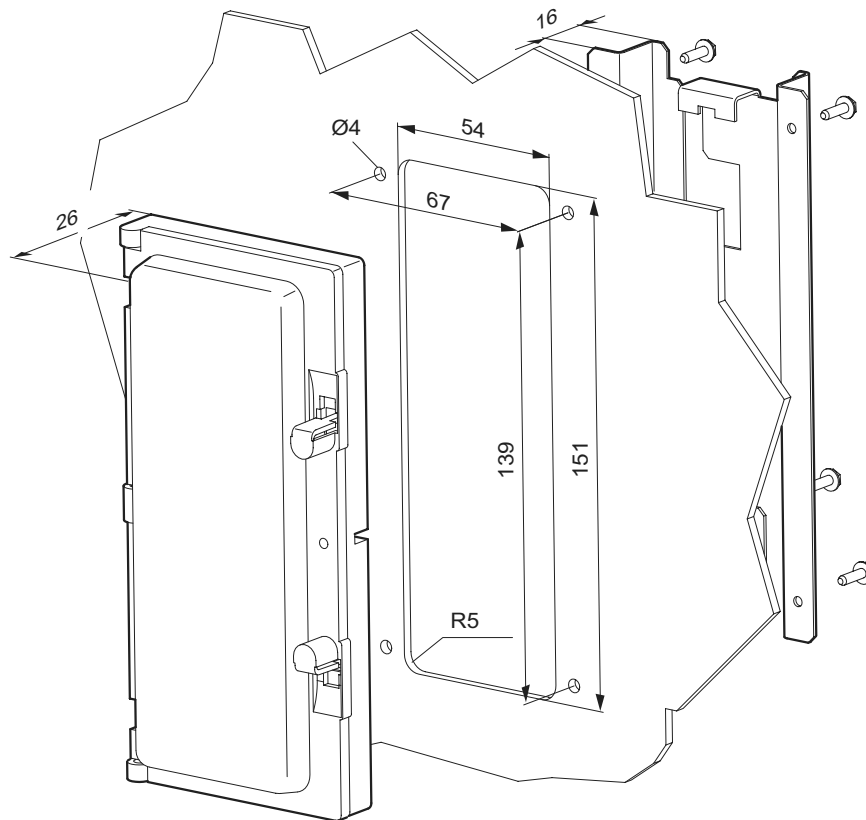
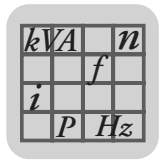


Figure 26: Dimension drawing for DBG60B housing, dimensions in mm

55735BXX

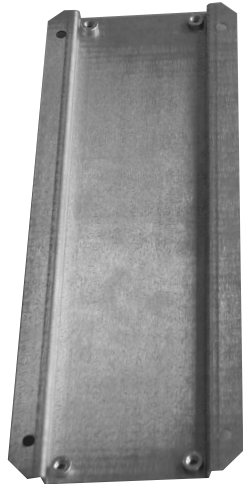


## 2.11 DMP11B mounting panel

**Part number** 818 398 8

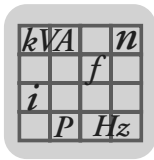
### Description

DMP11B



54588AXX

If a MOVIDRIVE® MD\_60A size 2 unit is to be replaced by MOVIDRIVE® MDX61B size 2S, the MDX61B size 2S can be fitted on the existing mounting plate with the DMP11B fitting panel. New retaining holes do not have to be drilled.




## 2.12 HIPERFACE® encoder card type DEH11B

**Part number** 824 310 7

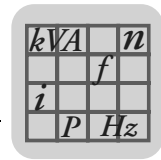
### Description

The option-capable MOVIDRIVE® MDX61B units can be equipped with the HIPERFACE® encoder card type DEH11B. The encoder card offers one input for the motor encoder and one input for an external encoder, also referred to as synchronous encoder. The input for the external encoder can also be used as an output for incremental encoder simulation.

### Electronics data

Option DEH11B	
	Output for incremental encoder simulation or external encoder input X14: Output for incremental encoder simulation: Signal level to RS422 The number of pulses is: <ul style="list-style-type: none"> <li>• 1024 pulses/revolution (Hiperface® encoder on X15)</li> <li>• as at X51: Motor encoder input (sin/cos encoder or TTL sensor with negated tracks at X15)</li> </ul>
	Motor encoder input X15: Permitted encoder types: <ul style="list-style-type: none"> <li>• HIPERFACE® encoder</li> <li>• sin/cos encoder AC 1 V<sub>SS</sub></li> <li>• TTL encoder with negated tracks</li> <li>• Encoder with signal level to RS422</li> <li>• Permitted resolution: 128/256/512/1024/2048 [increments/revolution]</li> </ul> Encoder power supply: DC+12 V, I <sub>max</sub> = DC 650 mA <sup>1)</sup>
	External encoder input (max. 200 kHz): Permitted encoder types: <ul style="list-style-type: none"> <li>• HIPERFACE® encoder</li> <li>• sin/cos encoder AC 1 V<sub>SS</sub></li> <li>• TTL encoder with negated tracks</li> <li>• Encoder with signal level to RS422</li> </ul> Encoder power supply: DC+12 V, I <sub>max</sub> = DC 650 mA <sup>1)</sup>
Maximum cable length:	100 m

1) Total current load of DC 12 V encoder supply ≤ DC 650 mA.




### 2.13 Resolver card type DER11B

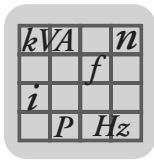
**Part number** 824 307 7

**Description**

Option-capable MOVIDRIVE® MDX61B units can be equipped with resolver card type DER11B. The resolver card offers one input for the resolver as motor encoder and one input for an external encoder, also referred to as synchronous encoder. The input for the external encoder can also be used as an output for incremental encoder simulation.

**Electronics data**

Option DER11B			
 <p>53157AXX</p>	Output for incremental encoder simulation or external encoder input X14:	Output for incremental encoder simulation: Signal level to RS422 The number of pulses is 1024 pulses/revolution	External encoder input (max. 200 kHz): Permitted encoder types: <ul style="list-style-type: none"> <li>• HIPERFACE® encoder</li> <li>• sin/cos encoder AC 1 V<sub>SS</sub></li> <li>• TTL encoder with negated tracks</li> </ul> Encoder power supply: DC+12 V, I <sub>max</sub> = DC 650 mA
	Motor encoder input X15:	Resolver 2-pole, V <sub>ref</sub> = AC 3.5 V <sub>eff</sub> , 4 kHz V <sub>in</sub> / V <sub>ref</sub> = 0.5	
	Maximum cable length:	100 m	



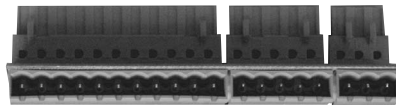
#### 2.14 Connector adapter for replacing MD\_60A - MDX60B/61B

The following adapters are available for rapid replacement of a MOVIDRIVE® A unit with a MOVIDRIVE® B unit during system operation.

- DAT11B: Terminal adapter, part number 824 671 8

X10 can be rearranged directly when using MOVIDRIVE® MDF, MDV or MDS. Three plugs have to be rewired. You can avoid such rewiring work by using the DAT11B terminal adapter. Using this adapter will prevent incorrect connection and save time. The terminal adapter is required for terminals X11 (analog input), X12 (SBus) and X13 (binary inputs).

**DAT11B**



54589AXX

- DAE15B: Encoder adapter X15, part number 817 629 9

If a motor with encoder on X15 is in operation on an MDV or MCV, the encoder is connected via a 9-pin plug connector to MOVIDRIVE® A. Since the DEH11B option for MOVIDRIVE® MDX61B comes equipped with a 15-pin socket, you will either have to convert the encoder cable or use the encoder adapter. The encoder adapter DAE15B for connecting sin/cos and TTL encoders can be inserted directly between the existing encoder cable with a 9-pin connector and the 15-pin socket on DEH11B. This step makes for fail-safe and fast connection of existing drives. HTL encoders have to be connected to MOVIDRIVE® B with the option DWE11B/12B (→ section "DWE11B/12B interface adapter option).

**DAE15B**

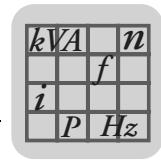


54585AXX

Length of DAE15B: 200 mm±20 mm

Line cross section: 6 x 2 x 0.25 mm<sup>2</sup>

Terminal of the 15-pin sub D plug (MOVIDRIVE® MDX61B, option DEH11B, X15)	Core color in prefabricated cable	Terminal of 9-pin sub D socket (encoder end)
1	Yellow (YE)	1
2	Red (RD)	2
3	Pink (PK)	3
4	Violet (VT)	4
8	Brown (BN)	5
9	Green (GN)	6
10	Blue (BU)	7
11	Gray (GY)	8
15	White (WH)	9



- DAE14B: Encoder adapter X14, part number 817 630 2  
If a synchronous encoder at X14 is operated on MOVIDRIVE® MDV, MDS, MCV or MCS, connection takes place via a 9-pin connector. Since the DEH11B and DER11B options for MOVIDRIVE® MDX61B come equipped with a 15-pin connector, you will either have to rework the encoder cable or use the DAE14B encoder adapter. The DAE14B encoder adapter can be plugged directly between the existing encoder cable with 9-pin socket and the 15-pin connector on the DEH11B/DER11B. This step makes for fail-safe and fast connection of existing drives.

**DAE14B**

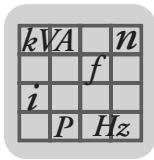


54586AXX

Length of DAE14B: 200 mm ±20 mm

Line cross section: 6 x 2 x 0.25 mm<sup>2</sup>

Terminal of the 15-pin sub D socket (MOVIDRIVE® MDX61B, option DEH11B/DER11B, X14)	Core color in prefabricated cable	Terminal of the 9-pin sub D connector (encoder end)
1	Yellow (YE)	1
2	Red (RD)	2
3	Pink (PK)	3
7	Violet (VT)	4
8	Brown (BN)	5
9	Green (GN)	6
10	Blue (BU)	7
11	Gray (GY)	8
15	White (WH)	9

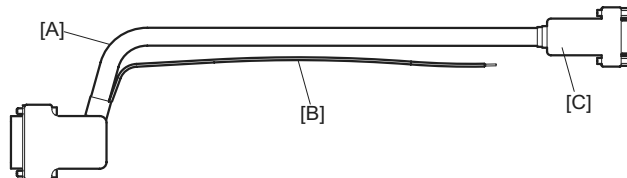


#### 2.15 Interface adapter type DWE11B/12B

##### Part number and description

- DWE11B, part number 188 187 6

The interface adapter DWE11B (HTL→TTL) in the form of an adapter cable is used **to connect single-ended HTL encoders to the optional HIPERFACE® encoder card DEH11B**. Only the A, B and C tracks are connected. The interface adapter is suitable for all HTL encoders that were operated on MOVIDRIVE® A, MDV and MCV and can be connected without any rewiring effort.



58748AXX

[A] 5 x 2 x 0.25 mm<sup>2</sup> / length 1000 mm /

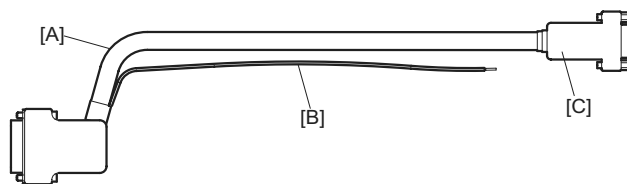
Max. line length inverter - encoder: 100 m

[B] Connection DC 24 V for HTL encoder; 1 x 0.5 mm<sup>2</sup> / 250 mm long

Signal	Terminal of 9-pin sub D socket [C] (encoder end)
A	1
B	2
C	3
UB	9
GND	5

- DWE12B, part number 188 180 9

The interface adapter DWE12B (HTL→TTL) in the form of an adapter cable is used **to connect push-pull HTL encoders to the optional HIPERFACE® encoder card DEH11B**. In addition to the A, B and C track, you will also have to connect the negated tracks ( $\bar{A}$ ,  $\bar{B}$ ,  $\bar{C}$ ). SEW-EURODRIVE recommends using this interface adapter for any new system.



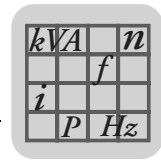
58748XX

[A] 4 x 2 x 0.25 mm<sup>2</sup> / 1000 mm long

Max. line length inverter - encoder: 200 m

[B] Connection DC 24 V for HTL encoder; 1 x 0.5 mm<sup>2</sup> / 250 mm long

Signal	Terminal of 9-pin sub D socket [C] (encoder end)
A	1
$\bar{A}$	6
B	2
$\bar{B}$	7
C	3
$\bar{C}$	8
UB	9
GND	5



## 2.16 Interface adapter type UWS11A

**Part number** 822,689 X

### Description

The UWS11A option converts RS232 signals, for example from the PC, into RS485 signals. These RS485 signals can then be routed to the RS485 interface of the MOVIDRIVE® unit (ST11/ST12).

The UWS11A option requires a DC 24 V voltage supply ( $I_{max} = DC 50 \text{ mA}$ ).

### RS232 interface

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

### RS485 interface

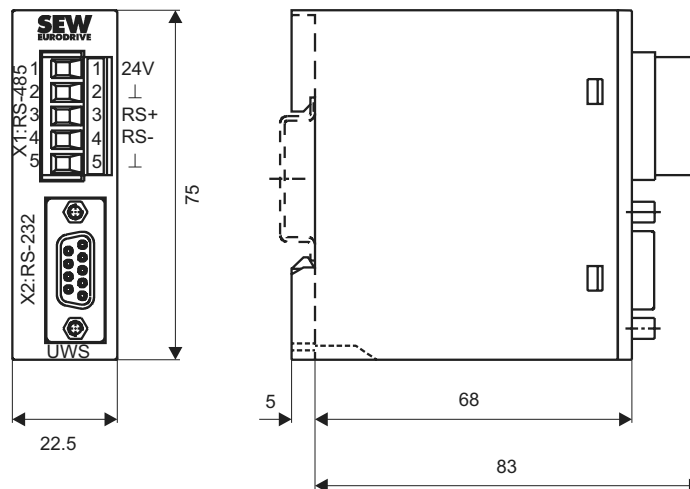
Max. 32 MOVIDRIVE® units can be networked for communication (max. line length 200 m) via the RS485 interface of the UWS11A. Do not connect external terminating resistors because dynamic terminating resistors are already installed!

Permitted cable cross section: One core per terminal 0.20...2.5 mm<sup>2</sup> (AWG 24...12)

Two cores per terminal 0.20...1 mm<sup>2</sup> (AWG 24...17)

### Dimension drawing

UWS11A dimension drawing, dimensions in mm



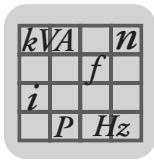
59322AXX

Figure 27: UWS11A dimension drawing, dimensions in mm

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

### Technical data

UWS11A	
<b>Part number</b>	822 689 X
<b>Ambient temperature</b>	0 ... 40 °C
<b>Storage temperature</b>	-25 °C ... +70 °C (according to EN 60721-3-3, class 3K3)
<b>Enclosure</b>	IP20
<b>Current consumption</b>	max. DC 50 mA
<b>Weight</b>	150 g
<b>Dimensions</b>	83 x 75 x 22.5 mm



#### 2.17 Interface adapter type UWS21B

**Part number** 1820 456 2

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

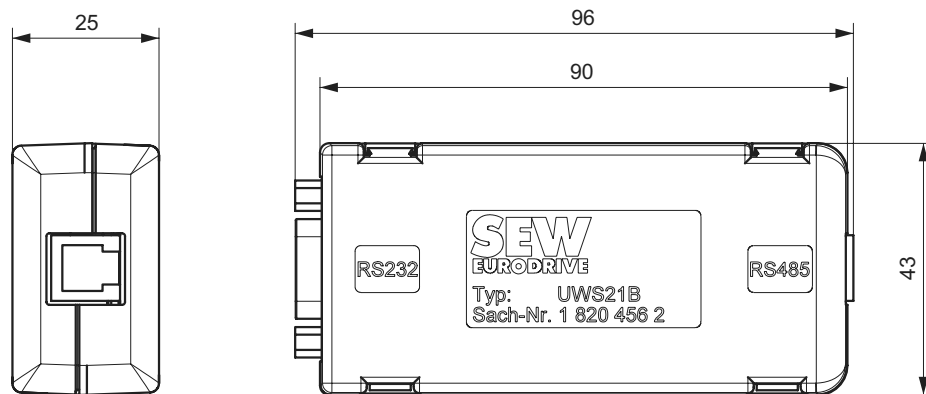
**RS232 interface** The connection between UWS21B and PC is made using a commercially available serial interface cable (shielded!).

**RS485 interface** UWS21B and MOVIDRIVE® B are connected using a serial interface cable with RJ10 connectors.

**Scope of delivery** The scope of delivery for the UWS21B option includes:

- UWS21B adapter
- Serial interface cable with 9-pin sub D socket and 9-pin sub D connector to connect the UWS21B option to the PC.
- Serial interface cable with two RJ10 connectors to connect UWS21B and MOVIDRIVE® B.
- CD-ROM with MOVITOOLS®

#### Dimension drawing

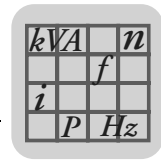


58558AXX

Figure 28: UWS21B dimension drawing, dimensions in mm

#### Technical data

UWS21B	
<b>Part number</b>	1 820 456 2
<b>Ambient temperature</b>	0 ... 40 °C
<b>Storage temperature</b>	-25 °C ... +70 °C (according to EN 60721-3-3, class 3K3)
<b>Enclosure</b>	IP20
<b>Weight</b>	300 g
<b>Dimensions</b>	96 x 43 x 25 mm



## 2.18 Interface adapter type USB11A

**Part number** 824 831 1

**Description** Option USB11A enables a PC or laptop with a USB interface to be connected to the XT slot of MOVIDRIVE® B. The USB11A interface adapter supports USB1.1 and USB2.0.

**USB11A - PC** USB11A is connected to the PC using a commercially available, shielded USB connection cable type USB A-B.

**MOVIDRIVE® - USB11A** MOVIDRIVE® B and USB11A are connected using a serial interface cable with RJ10 connectors.

**Scope of delivery** The scope of delivery for the USB11A option includes:

- USB11A interface adapter
- USB connection cable to connect USB11A - PC
- Serial interface cable with two RJ10 connectors to connect USB11A and MOVIDRIVE® B
- CD-ROM with drivers and MOVITOOLS®

### Dimension drawing

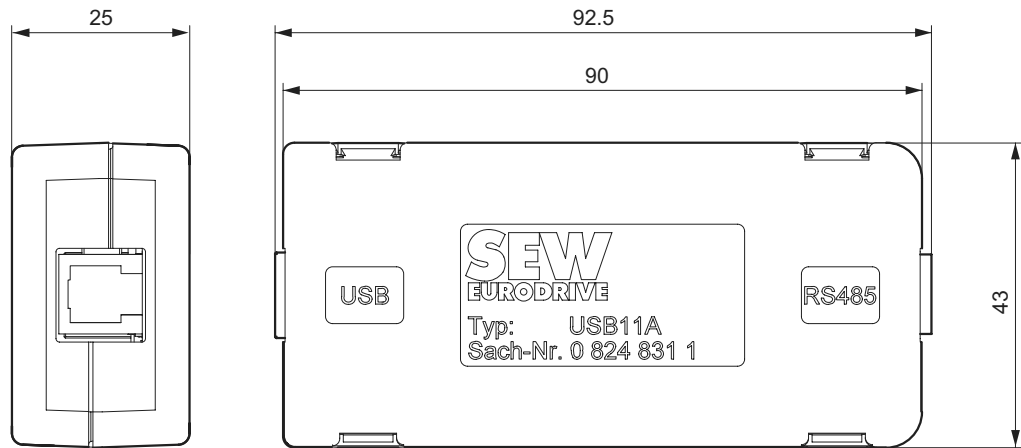
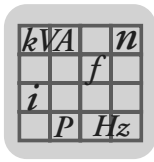


Figure 29: USB11A dimension drawing, dimensions in mm

### Technical data

USB11A	
<b>Part number</b>	824 831 1
<b>Ambient temperature</b>	0 ... 40 °C
<b>Storage temperature</b>	-25 °C ... +70 °C (according to EN 60721-3-3, class 3K3)
<b>Enclosure</b>	IP20
<b>Weight</b>	300 g
<b>Dimensions</b>	92.5 x 43 x 25 mm



#### 2.19 DC 5 V encoder supply type DWI11A

**Part number** 822 759 4

#### Description

If you are using an incremental encoder with a DC 5 V encoder power supply, install the DC 5 V encoder power supply option type DWI11A between the inverter and the incremental encoder. This option provides a regulated DC 5 V power supply for the encoder. For this purpose, the DC 12 V power supply for the encoder inputs is converted to DC 5 V by means of a voltage controller. A sensor line is used to measure the supply voltage at the encoder and compensate the voltage drop along the encoder cable.

Incremental encoders with DC 5 V encoder power supply are not allowed to be connected directly to the encoder inputs X14: and X15: . This would cause irreparable damage to the encoder.

#### NOTE



Note that if a short circuit occurs in the sensor cable, the connected encoder may be exposed to a voltage higher than permitted.

**Recommendation** Use prefabricated cables from SEW for the encoder connection.

#### Dimension drawing

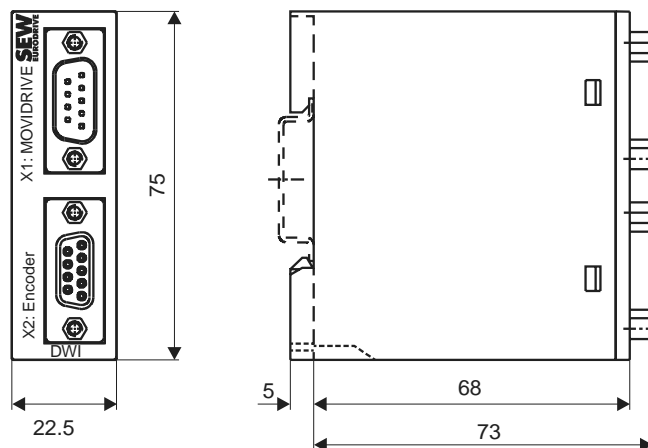


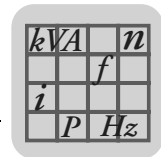
Figure 30: DWI11A dimension drawing, dimensions in mm

01315CXX

The DWI11A option is mounted on a support rail (EN 50022-35 × 7.5) in the control cabinet.

#### Technical data

DC 5 V encoder power supply option type DWI11A	
<b>Part number</b>	822 759 4
<b>Voltage input</b>	DC 10...30 V, $I_{\max} = \text{DC } 120 \text{ mA}$
<b>Encoder power supply</b>	DC +5 V (up to $U_{\max} \approx +10 \text{ V}$ ), $I_{\max} = \text{DC } 300 \text{ mA}$
<b>Max. line length that can be connected</b>	100 m total Use a shielded twisted-pair cable (A and $\bar{A}$ , B and $\bar{B}$ , C and $\bar{C}$ ) for connecting the encoder to the DWI11A and the DWI11A to MOVIDRIVE®.



## 2.20 Input/output card type DIO11B

Part number 824 308 5

### Description

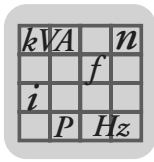
The number of inputs/outputs of the basic MOVIDRIVE® B unit can be expanded with the DIO11B option. The DIO11B option is plugged into the fieldbus slot. If the fieldbus slot is not available, you can plug the DIO11B option into the expansion slot. The programmable signal types of the additional binary inputs/outputs are the same as for the basic unit (→ parameter group P6\_\_\_, terminal assignment).

### Electronics data

DIO11B option				
<p>53159AXX</p>	Setpoint input n2	X20:1/X20:2	AI21/AI22: Voltage input Differential input or input with AGND reference potential  n2 = DC 0...+10 V or DC -10 V...0...+10 V 12 bit, sampling time 1 ms R <sub>i</sub> = 40 kΩ	
	Mode AI21/AI22 Resolution Internal resistance			
	Analog outputs	X21:1/X21:4  X21:2/X21:5	AOV1/AOV2: Voltage outputs DC -10 V...0...+10 V, I <sub>max</sub> = DC 10 mA, short-circuit proof and protected against external voltage to DC 30 V, selection option → parameter menu P64_ AOC1/AOC2: Current outputs DC 0(4)...20 mA, short-circuit proof and protected against external voltage to DC 30 V, selection option → parameter menu P64_	
	Response time Resolution		5 ms 12 bit	
	Binary inputs X22:1...X22:8 Internal resistance		Isolated (optocoupler), PLC compatible (EN 61131) DI1Ø...DI17 R <sub>i</sub> ≈ 3 kΩ, I <sub>E</sub> ≈ DC 10 mA Sampling interval 1 ms	
	Signal level		DC+13 V...+30 V = "1" = Contact closed DC-3 V...+5 V = "0" = Contact open	Fulfills EN 61131
	Function	X22:1...X22:8	DI10...DI17: Selection option → Parameter menu P61_	
	Binary outputs Signal level	X23:1...X23:8	DO1Ø...DO17: PLC-compatible (EN 61131-2), response time 1ms "0" = DC 0 V "1" = DC+24 V	
	Function	X23:1...X23:8	DO10...DO17: Selection option → Parameter menu P63_, I <sub>max</sub> = DC 50 mA, short-circuit proof and protected against external voltage to DC 30 V	
	Reference terminals X20:3/X21:3/X21:6	X22:9 X22:10	AGND: Reference potential for analog signals (AI21/AI22/AO_1/AO_2) DCOM: Reference potential for binary inputs X22:1...X22:8 (DI1Ø...DI17) DGND: Reference potential for binary signals, reference potential for DC 24 V power supply	
Voltage input	X23:9	24VIN: Supply voltage DC +24 V for binary outputs DO1Ø...DO17		
Permitted line cross section		One core per terminal: 0.08...1.5 mm <sup>2</sup> (AWG 28...16) Two cores per terminal: 0.25...1 mm <sup>2</sup> (AWG 22...17)		

### Functions

- 8 binary inputs
- 8 binary outputs
- 1 analog differential input (DC 0...10 V, DC -10 V...+10 V, DC 0...20 mA with corresponding load)
- 2 analog outputs (DC-10 V ... +10 V, DC 0...20 mA, DC 4...20 mA)



#### 2.21 PROFIBUS fieldbus interface type DFP21B

**Part number** 824 240 2

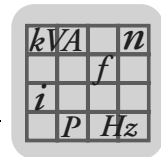
#### Description

MOVIDRIVE® B can be equipped with a 12 Mbaud fieldbus interface for the PROFIBUS-DP serial bus system. For detailed information, refer to the PROFIBUS documentation package, which can be ordered from SEW-EURODRIVE. The documentation package contains the GSD files (device database files) and type files for MOVIDRIVE® B to help with project planning and to facilitate startup.

PROFIBUS-DP (Decentralized Periphery) is primarily used at the sensor/actuator level where fast response times are required. The principal task of PROFIBUS-DP is to exchange data, e.g. setpoints or binary commands, in rapid cycles between central automation equipment (PROFIBUS master) and decentralized peripheral units (e.g. drive inverters). The DFP21B option supports PROFIBUS-DP and DP-V1. In this way, MOVIDRIVE® B can be controlled via a PLC and PROFIBUS-DP / DP-V1.

#### Electronics data

DFP21B option		
	Protocol option	PROFIBUS-DP and DPV1 to IEC 61158
	Baud rate	Automatic detection of baud rate from 9.6 kbaud to 12 Mbaud
	Connection technology	9-pin sub D socket, pin assignment to IEC 61158
	Bus terminator	Not integrated, implement using suitable PROFIBUS connector with terminating resistors that can be activated
	Station address	0 ... 125, adjustable via DIP switches
	Name of the GSD file	SEWA6003.GSD
	DP ident. number	6003 <sub>hex</sub> (24579 <sub>dec</sub> )
	Max. number of process data	10 process data



**2.22 INTERBUS fieldbus interface type DFI11B**

**Part number** 824 309 3

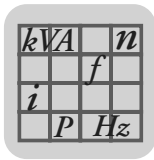
**Description**

MOVIDRIVE® B can be equipped with a fieldbus interface for the non-proprietary and standardized INTERBUS sensor/actuator bus system. For detailed information, refer to the INTERBUS documentation package, which can be ordered from SEW-EURODRIVE.

INTERBUS is defined in EN 50254 / DIN 19258 and, as far as its function is concerned, it consists of a process data channel and a parameter data channel. Intelligent actuators such as the MOVIDRIVE® B drive inverter can be controlled and configured in a user-friendly way.

**Electronics data**

DFI11B option		
	Supported baud rates	500 kBaud and 2 MBaud, can be selected via DIP switch
	Connection technology	Remote bus input: 9-pin sub-D connector Remote bus output: 9-pin Sub-D socket RS485 transmission technology, 6-core shielded and twisted-pair cable
	DP identity numbers	E3 <sub>hex</sub> = 227 <sub>dec</sub> (1 PCP word) E0 <sub>hex</sub> = 224 <sub>dec</sub> (2 PCP words) E1 <sub>hex</sub> = 225 <sub>dec</sub> (4 PCP words) 38 <sub>hex</sub> = 56 <sub>dec</sub> (microprocessor not ready) 03 <sub>hex</sub> = 3 <sub>dec</sub> (no PCP word)
	Max. number of process data	6 process data



#### 2.23 INTERBUS-LWL fieldbus interface type DFI21B


**Part number** 824 311 5

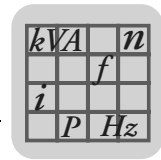
**Description**

MOVIDRIVE® B can be equipped with a fieldbus interface for the non-proprietary and standardized INTERBUS sensor/actuator bus system / INTERBUS with fiber optic cables (INTERBUS-LWL). For detailed information, refer to the INTERBUS documentation package, which can be ordered from SEW-EURODRIVE.

INTERBUS is defined in EN 50254 / DIN 19258 and, as far as its function is concerned, it consists of a process data channel and a parameter data channel. Intelligent actuators such as the MOVIDRIVE® B drive inverter can be controlled and configured in a user-friendly way.

**Electronics data**

DFI21B option		
 <p>55731AXX</p>	Supported baud rates	500 kBaud and 2 MBaud, can be selected via DIP switch
	Connection technology	F-SMA connector
	DP identity numbers	E3 <sub>hex</sub> = 227 <sub>dec</sub> (1 PCP word) E0 <sub>hex</sub> = 224 <sub>dec</sub> (2 PCP words) E1 <sub>hex</sub> = 225 <sub>dec</sub> (4 PCP words) 38 <sub>hex</sub> = 56 <sub>dec</sub> (microprocessor not ready) 03 <sub>hex</sub> = 3 <sub>dec</sub> (no PCP word)
	Max. number of process data	6 process data



## 2.24 Option Feldbus-Schnittstelle Modbus/TCP Typ DFE11B

**Part number** 1820 036 2

### Description

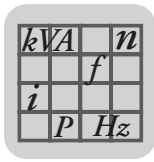
The MOVIDRIVE® MDX61B drive inverter enables you to use the DFE11B option to connect to higher-level automation, project planning and visualization systems via Ethernet thanks to its powerful, universal fieldbus interface. You can use option DFE11B to communicate directly with the inverters via Ethernet and operate the MOVITOOLS® software to change parameters and IPOS<sup>plus</sup>® programs. An integrated Web server makes it possible for the user to access diagnostic values quickly and easy using a standard browser (e.g. Internet Explorer).

### Electronics data

Option DFE11B	
	<b>Application protocol</b> <ul style="list-style-type: none"> <li>• <b>MODBUS/TCP</b> (Transmission Control Protocol) to control and set parameters for the drive inverter.</li> <li>• <b>HTTP</b> (Hypertext Transfer Protocol) for diagnostics using a Web browser.</li> <li>• <b>SMLP</b> (Simple Movilink Protocol), protocol used by MOVITOOLS®.</li> <li>• <b>DHCP</b> (Dynamic Host Configuration Protocol) to assign address parameter automatically.</li> </ul>
	<b>Port numbers used</b> <ul style="list-style-type: none"> <li>• 502 (MODBUS)</li> <li>• 300 (SMLP)</li> <li>• 80 (HTTP)</li> <li>• 67 / 68 (DHCP)</li> </ul>
	<b>EtherNet services</b> <ul style="list-style-type: none"> <li>• ARP</li> <li>• ICMP (Ping)</li> </ul>
	<b>Automatic baud rate detection</b> 10 MBaud / 100 MBaud
	<b>Max. number of process data</b> 10 process data
	<b>Connection technology</b> RJ45 (modular jack 8-8)
	<b>Addressing</b> 4 byte IP address
	<b>Tools for startup</b> <ul style="list-style-type: none"> <li>• MOVITOOLS® software</li> <li>• DBG60B keypad</li> </ul>

### Functions

- MODBUS / TCP protocol
- RJ45 plug connection, star-type cabling
- Up to 10 process data and parameter data items can be transferred at the same time
- Three ways to allocate the IP address:
  1. Set the node address manually (byte 0 or IP address)
  2. Make the setting using the DBG60B keypad and MOVITOOLS®
  3. Use the DHCP server
- Engineering access using MOVITOOLS® via Ethernet-TCP/IP
- Inverter diagnostics using a standard browser (e.g. Internet Explorer) via the integrated Web server:
  - Transfer display values
  - Configure DFE11B (after login)




#### 2.25 PROFINET IO RT fieldbus interface type DFE12B

**Part number** 1820 563 1

#### Description

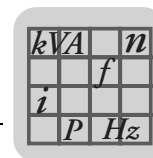
The MOVIDRIVE® MDX61B drive inverter enables you to use the DFE12B option to connect to higher-level automation, project planning and visualization systems via Ethernet thanks to its powerful, universal fieldbus interface. You can use option DFE12B to communicate directly with the inverters via Ethernet and operate the MOVITOOLS® software to change parameters and IPOS<sup>plus</sup>® programs. An integrated Web server makes it possible for the user to access diagnostic values quickly and easy using a standard browser (e.g. Internet Explorer).

#### Electronics data

Option DFE12B		
 <p>58482AXX</p>	Application protocol	<ul style="list-style-type: none"> <li>• <b>PROFINET IO</b> to control and configure the drive inverter.</li> <li>• <b>HTTP</b> (Hypertext Transfer Protocol) for diagnostics using a Web browser.</li> <li>• <b>SMLP</b> (Simple Movilink Protocol), protocol used by MOVITOOLS®.</li> </ul>
	Port numbers used	<ul style="list-style-type: none"> <li>• 34962 - 34964 (PROFINET IO)</li> <li>• 300 (SMLP)</li> <li>• 80 (HTTP)</li> </ul>
	Ethernet services	<ul style="list-style-type: none"> <li>• ICMP (ping)</li> <li>• ARP</li> </ul>
	Transmission rate	100 MBit full duplex
	Transmission process	100BASETX
	Max. number of process data	10 process data
	Connection technology	RJ45 (modular jack 8-8)
	Auto-negotiation	Yes
	GSD file	GSDML-V1.0-SEW-DFE12B-xxxxxxx.xml (xxxxxxx is a placeholder for year/month/day)
	SEW manufacturer ID	010A <sub>hex</sub>
	Device ID	0001 <sub>hex</sub>
	Alarms	Diagnostic alarm in the event of a unit fault (can be activated)
	Diagnostics	Yes
	Configuration via PROFINET	In preparation
	Max. number of ARs	3
	Tools for startup	<ul style="list-style-type: none"> <li>• MOVITOOLS® software</li> <li>• DBG60B keypad</li> </ul>

#### Functions

- PROFINET IO protocol
- RJ45 plug connection, star-type cabling
- Up to 10 process data and PROFINET diagnostic parameter data items can be transferred at the same time
- The PROFINET IO controller assigns the IP address
- Engineering access using MOVITOOLS® via Ethernet-TCP/IP
- Inverter diagnostics using a standard browser (e.g. Internet Explorer) via the integrated Web server:
  - Transfer display values
  - DFE11B configuration (after login)



## 2.26 EtherNet/IP fieldbus interface type DFE13B

**Part number** 1820 565 8

### Description

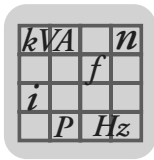
The MOVIDRIVE® MDX61B drive inverter enables you to use the DFE13B option to connect to higher-level automation, project planning and visualization systems via Ethernet thanks to its powerful, universal fieldbus interface. You can use option DFE13B to communicate directly with the inverters via Ethernet and operate the MOVITOOLS® software to change parameters and IPOS<sup>plus</sup>® programs. An integrated Web server makes it possible for the user to access diagnostic values quickly and easy using a standard browser (e.g. Internet Explorer).

### Electronics data

Option DFE13B		
	Application protocol	<ul style="list-style-type: none"> <li><b>EtherNet/IP</b> (Industrial Protocol) to control and set parameters for the drive inverter.</li> <li><b>HTTP</b> (Hypertext Transfer Protocol) for diagnostics using a Web browser.</li> <li><b>SMLP</b> (Simple Movilink Protocol), protocol used by MOVITOOLS®.</li> <li><b>DHCP</b> (Dynamic Host Configuration Protocol) to assign address parameter automatically.</li> </ul>
	Port numbers used	<ul style="list-style-type: none"> <li>44818 (EtherNet/IP TCP)</li> <li>2222 (EtherNet/IP UDP)</li> <li>300 (SMLP)</li> <li>80 (HTTP)</li> <li>67 / 68 (DHCP)</li> </ul>
	EtherNet services	<ul style="list-style-type: none"> <li>ARP</li> <li>ICMP (Ping)</li> </ul>
	Automatic baud rate detection	10 MBaud / 100 MBaud
	Max. number of process data	10 process data
	Connection technology	RJ45 modular jack 8-8
	Addressing	4 byte IP address
	Manufacturer ID	013B <sub>hex</sub>
	Tools for startup	<ul style="list-style-type: none"> <li>MOVITOOLS® software</li> <li>DBG60B keypad</li> </ul>

### Functions

- EtherNet/IP protocol
- RJ45 plug connection, star-type cabling
- Up to 10 process data and parameter data items can be transferred at the same time
- Two ways to allocate the IP address:
  1. Make the setting using the DBG60B keypad and MOVITOOLS®
  2. Use the DHCP server
- Engineering access using MOVITOOLS® via Ethernet-TCP/IP
- Inverter diagnostics using a standard browser (e.g. Internet Explorer) via the integrated Web server:
  - Transfer display values
  - DFE13B configuration (after login)



#### 2.27 DeviceNet fieldbus interface type DFD11B

**Part number** 824 972 5

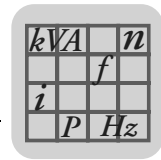
#### Description

The MOVIDRIVE® MDX61B drive inverter in conjunction with the DFD11B option allows connection to higher-level automation, project planning and visualization systems via the open and standardized DeviceNet fieldbus system thanks to the option's high-performance universal fieldbus interface.

The DeviceNet fieldbus interface type DFD11B can be plugged into the fieldbus slot on all MOVIDRIVE® MDX61B units. The DFD11B option enables communication with the machine control for a maximum of 10 process data. You need an EDS file to be able to integrate the DFD11B in the machine control. You can download this file from the SEW homepage in the Software section.

#### Electronics data

DFD11B option		
<p>55729AXX</p>	Communication protocol	Master/slave connection set acc. to DeviceNet specification version 2.0
	Number of process data words	Adjustable via DIP switches: <ul style="list-style-type: none"> <li>• 1 ... 10 process data words</li> <li>• 1 ... 4 process data words with Bit-Strobe I/O</li> </ul>
	Baud rate	125, 250 or 500 kBaud, to be set via DIP switches
	Bus cable length	For thick cable according to DeviceNet specification 2.0 Appendix B <ul style="list-style-type: none"> <li>• 500 m at 125 kbaud</li> <li>• 250 m at 250 kbaud</li> <li>• 100 m at 500 kbaud</li> </ul>
	Transmission level	ISO 11 98 - 24 V
	Connection technology	<ul style="list-style-type: none"> <li>• 2-wire bus and 2-wire supply voltage DC 24 V with 5-pole Phoenix terminal</li> <li>• Pin assignment according to DeviceNet specification</li> </ul>
	MAC-ID	0 ... 63, can be set using DIP switch Max. 64 stations
	Supported services	<ul style="list-style-type: none"> <li>• Polled I/O: 1 ... 10 words</li> <li>• Bit-Strobe I/O: 1 ... 4 words</li> <li>• Explicit message: <ul style="list-style-type: none"> <li>– Get_Attribute_Single</li> <li>– Set_Attribute_Single</li> <li>– Reset</li> <li>– Allocate_MS_Connection_Set</li> <li>– Release_MS_Connection_Set</li> </ul> </li> </ul>
	Tools for startup	<ul style="list-style-type: none"> <li>• MOVITOOLS® software</li> <li>• DBG60B keypad</li> </ul>



## 2.28 CAN/CANopen fieldbus interface type DFC11B

**Part number** 824 317 4

### Description

The MOVIDRIVE® MDX61B drive inverter in conjunction with the DFC11B option allows connection to higher-level automation, project planning and visualization systems via the open and standardized CANopen fieldbus system thanks to the option's high-performance universal fieldbus interface. You can also access parameters using the MOVILINK® protocol designed especially for units from SEW-EURODRIVE.

The DeviceNet fieldbus interface type DFC11B can be plugged into the fieldbus slot on all MOVIDRIVE® MDX61B units. In this way, a second system bus (CAN) on MOVIDRIVE® is made available. The DFC11B option enables communication with the machine control for a maximum of 10 process data. You need an EDS file to be able to integrate the DFC11B in the higher-level CANopen control. You can download this file from the SEW homepage in the Software section.

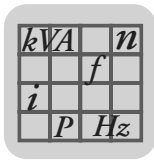
### Electronics data

DFC11B option		
	Communication profile	<ul style="list-style-type: none"> <li>SEW-MOVILINK®</li> <li>CANopen</li> <li>CAN Layer 2</li> </ul>
	Number of process data words	1 ... 10 process data words
	Baud rate	Setting using parameter P894: 125 kBaud / 250 kBaud / 500 kBaud / 1 MBaud
	Connection technology	Sub-D9 plug connector X30 (plug assigned to CIA standard) or via terminal X31
	Permitted line cross section X31 (CAN-Bus connection)	One core per terminal: 0.20 ... 2.5 mm <sup>2</sup> (AWG24 ... 12) Two cores per terminal: 0.25 ... 1 mm <sup>2</sup> (AWG22 ... 17)
	Terminating resistor	120 Ω (setting at DIP switch S1-R)
	Addressing	Setting via parameter P891 (SBus MOVILINK) or P896 (CANopen)
	Tools for startup	<ul style="list-style-type: none"> <li>MOVITOOLS® software</li> <li>DBG60B keypad</li> </ul>

### Functions

- CAN Layer 2 and communication profile MOVILINK® or CANopen
- Electrical isolation via optocoupler

	<b>NOTE</b>
	If electrical isolation is not required, the CAN-Bus can be connected directly to the basic unit at X12:SC11/SC12 without the DFC11B option. This does not effect the functionality.



#### 2.29 Absolute encoder card type DIP11B

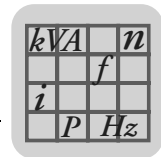
**Part number** 824 969 5

**Description** Option DIP11B extends the MOVIDRIVE® B system to include an SSI interface for absolute encoders. This option allows the following possibilities for IPOS<sup>plus</sup>® positioning:

- No reference travel required when the system is started or after a power failure
- Positioning can take place either with the absolute encoder or the incremental encoder/resolver installed on the motor
- No position switch needed on the travel distance, even without motor encoder feedback
- Free processing of the absolute position in the IPOS<sup>plus</sup>® program
- In addition to the basic unit, 8 digital inputs and 8 digital outputs are available
- The absolute encoder can be mounted either on the motor or along the track (e.g. high-bay warehouse)
- Simple encoder adjustment with user-guided startup
- Endless positioning in combination with activated modulo function

#### Electronics data

DIP11B option		
	Connection binary inputs X60:1 ... 8  Internal resistance Signal level (EN 61131) Function X60:1 ... 8	DI10 ... DI17 isolated via optocoupler; PLC compatible (EN 61131), Sampling interval 1 ms  $R_i \approx 3 \text{ k}\Omega$ , $I_E \approx \text{DC } 10 \text{ mA}$ DC+13 V ... +30 V = "1" / DC-3 V ... +5 V = "0" DI10 ... DI17: Selection option → Parameter menu P61_
	Connection binary outputs X61:1 ... 8  Signal level (EN 61131) Function X61:1 ... 8	DO10 ... DO17, PLC-compatible (EN 61131), short-circuit proof and protected against external voltage to DC 30 V Response time 1 ms  DC +24 V = "1" DC 0 V = "0" <b>Important:</b> Do not apply external voltage! DO10 ... DO17: Selection option → Parameter menu P63_
	Encoder connection X62:	SSI encoder input
	Reference terminals X60:9 X60:10  Permitted line cross section	DCOM: Reference potential for binary inputs (DI10 ... DI17) DGND: Reference potential for binary signals and 24VIN • Without jumper X60:9 -X60:10 (DCOM-DGND) isolated binary inputs • With jumper X60:9-X60:10 (DCOM-DGND) non-isolated binary inputs  One core per terminal: 0.08 ... 1.5 mm <sup>2</sup> (AWG28 ... 16) Two cores per terminal: 0.25 ... 1 mm <sup>2</sup> (AWG22 .. 17)
	Voltage input X61:9	24VIN: Supply voltage DC+24 V for binary outputs DO10 ... DO17 and encoder (mandatory)



### 2.30 Synchronous operation board type DRS11B

**Part number** 824 672 6

**Description** The DRS11B option enables a group of motors to be operated at a synchronous angle to one another or in an adjustable proportional relationship. For detailed information, refer to the "Synchronous Operation Board Type DRS11B" manual, which can be ordered from SEW-EURODRIVE.

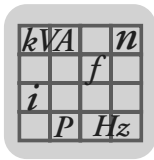
The basis for synchronous operation is the continuous comparison of the rotor angle positions of the master and the slave motors. The motors must be fitted with encoders. The DRS11B option is plugged into the expansion slot.

#### Electronics data

Option DRS11B			
	Binary inputs	X40:1...X40:6	EINGØ...EING5: isolated (opto-coupler) PLC compatible (EN 61131) $R_i \approx 3 \text{ k}\Omega$ , $I_E \approx \text{DC } 10 \text{ mA}$ Sampling interval 5 ms
	Internal resistance		
	Signal level		DC+13 V...+30 V = "1" = Contact closed DC-3 V...+5 V = "0" = Contact open
	Function		Fixed assignment with: <ul style="list-style-type: none"> <li>EINGØ = Free-running</li> <li>INP1 = Offset 1</li> <li>INP2 = Offset 2</li> <li>INP3 = Offset 3</li> <li>INP4 = IPOS<sup>plus</sup>® variable H477.0</li> <li>INP5 = IPOS<sup>plus</sup>® variable H477.1</li> </ul>
	Binary outputs	X40:9/X40:10	OUTPØ/OUTP1: PLC compatible (EN 61131-2) Response time 5 ms
	Signal level		"0" = DC 0 V "1" = DC+24 V <b>Important:</b> Do not apply external voltage!
	Function		Fixed assignment with: <ul style="list-style-type: none"> <li>OUTPØ = IPOS<sup>plus</sup>® variable H476.0</li> <li>OUTP1 = IPOS<sup>plus</sup>® variable H476.1</li> </ul> $I_{\text{max}} = \text{DC } 50 \text{ mA}$ , short-circuit proof, protected against external voltage to DC 30 V
	Reference terminals	X40:11	DGND: Reference potential for binary signals
	Voltage output	X40:7	DCOM: Reference potential for binary inputs X40:1...X40:6 (INØ...IN5)
		X40:8	VO24: Voltage output DC +24 V, max. DC 100 mA
Synchronous encoder input	X41:	Max. 200 kHz, signal level according to RS422 or sin/cos	
Encoder power supply		DC +24 V, $I_{\text{max}} = 650 \text{ mA}^1$ 9-pin Sub-D socket	
Master encoder input	X42:	Max. 200 kHz, signal level according to RS422 or sin/cos	
Encoder power supply		DC+24 V, $I_{\text{max}} = \text{DC } 650 \text{ mA}^1$ 9-pin Sub-D socket	
Encoder simulation output	X43:	Signal level to RS422 9-pin sub-D connector	
Voltage input	X44:1	GND	
	X44:2	DC+24 V supply voltage for binary outputs X40:9/X40:10 and encoder GND	
	X44:3	GND	
Permitted line cross section		One core per terminal: 0.08 ... 1.5 mm <sup>2</sup> (AWG28 ... 16) Two cores per terminal: 0.25 ... 1 mm <sup>2</sup> (AWG22 .. 17)	

56448AXX

1) Total current load (X41 and X42) of the DC 24 V encoder supply  $\leq \text{DC } 650 \text{ mA}$



### 2.31 MOVI-PLC® basic controller DHP11B..

#### Part numbers

The MOVI-PLC® basic controller DHP11B.. is available in 3 versions, which differ in the modules available from a range of libraries.

Part number	MOVI-PLC® basic DHP11B.. unit versions	Description
1820 472 4	DHP11B-T0	MOVI-PLC® basic controller
1820 822 3	DHP11B-T1	Application version I (in addition to version T0, enables additional functions including electronic cam and synchronous operation)
1820 823 1	DHP11B-T2	Application version II (in addition to version T1, enables additional functions including handling)

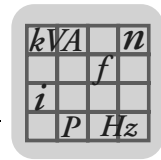
#### Description

MOVI-PLC® is a series of controllers available from SEW-EURODRIVE. MOVI-PLC® can be programmed by users according to IEC 61131-3 and PLCOpen.

The MOVI-PLC® basic controller DHP11B.. is equipped with a PROFIBUS DP-V1 slave interface, two SBus interfaces (CAN), RS485 and eight digital inputs/outputs, five of which are interrupt-capable. MOVI-PLC® basic DHP11B.. can control 12 units at the same time (MOVIDRIVE® A/B, MOVITRAC® 07/B, MOVIAXIS®, MOVIMOT®).

#### Electronics data

MOVI-PLC® basic controller DHP11B.. option		
<p>58585AXX</p>	Status displays	LEDs for the voltage supply to the I/Os, firmware, program, PROFIBUS, system buses
	Fieldbus	<ul style="list-style-type: none"> <li>PROFIBUS DP and DP-V1 to IEC 61158</li> <li>Automatic detection of baud rate from 9.6 kbaud to 12 Mbaud</li> <li>Bus termination must be implemented with a suitable connector</li> <li>GSD file SEW_6007.GSD</li> <li>DP ident. number 6007<sub>hex</sub> (24579<sub>dec</sub>)</li> <li>Maximum 32 process data</li> </ul>
	System bus	<ul style="list-style-type: none"> <li>2 system buses (CAN) to control 12 inverters and CANopen I/O modules</li> <li>CAN Layer 2 (SCOM cyclic, acyclic) or via the SEW MOVILINK® protocol</li> <li>Baud rate: 125 kbaud ... 1 Mbaud</li> <li>External bus terminator</li> <li>Address range: 0 ... 127</li> </ul>
	Engineering	Via RS485, PROFIBUS and the system buses
	Panel operation	Via RS485 and CAN 2 (in preparation)
	Connection technology	<ul style="list-style-type: none"> <li>PROFIBUS: 9-pin Sub-D connector to IEC 61158</li> <li>System buses and I/Os: pluggable terminals</li> <li>RS485: RJ10</li> </ul>
	Binary inputs/outputs	8 I/Os to IEC 61131-2; can be configured as inputs or outputs. Five are interrupt-capable
	Memory	<ul style="list-style-type: none"> <li>Program: 512 kByte</li> <li>Data: 128 kByte</li> <li>Retain: 24 kByte</li> </ul>
	Tools for startup	MOVITOOLS® MotionStudio with integrated PLC editor (programming languages IL, ST, LD, FBD, CFC, SFC; libraries for optimized inverter control)



### 2.32 Option OST11B


**Part number** 1820 544 5

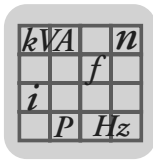
**Description**

Option OST11B provides an additional RS485 interface (COM2) for MOVI-PLC® *basic* DHP11B.. in terminal design or as an engineering interface. Only use option OST11B in conjunction with MOVI-PLC® *basic* DHP11B...

When the MOVI-PLC® *basic* DHP11B.. option is plugged into the fieldbus slot, option OST11B is plugged into the encoder slot. When the MOVI-PLC® *basic* DHP11B.. option is plugged into the expansion slot, option OST11B is installed in the expansion slot above the option MOVI-PLC® *basic* DHP11B...

**Electronics data**

Option OST11B		
 <p>58586AXX</p>	RS485 interface COM2 X35:1 ... X35:4 X36:1 ... X36:3	<ul style="list-style-type: none"> <li>For connection of an engineering PC, a DOP11A operator terminal or a gearmotor with integrated MOVIMOT® frequency inverter</li> <li>I/O standard, 57.6 kBaud, max. total cable length 200 m, dynamic terminating resistor permanently installed</li> </ul>
	Potential level	COM2 is isolated from the MOVI-PLC® <i>basic</i> DHP11B.. controller.



### 2.33 Braking resistors type BW... / BW...-T / BW...-P

#### General

- Braking resistors BW... / BW...-T and BW...-P are adapted to the technical characteristics of MOVIDRIVE® drive inverters.
- Plan for a load derating of 4 % per 10 K from an ambient temperature of 45 °C. Do not exceed a maximum ambient temperature of 80 °C.

#### PTC resistor BW090-P52B

- Direct installation on MOVIDRIVE® MDX60B/61B size 0 (0005 ... 0014) (→ section "Dimensions drawings for MOVIDRIVE® MDX60B")
- The MOVIDRIVE® units can be lined up even with mounted braking resistor BW090-P52B.
- The resistor protects itself (reversible) against regenerative overload by changing abruptly to high resistance and no longer consuming any more energy. The inverter then switches off and signals a brake chopper fault (F04).

#### Flat-type braking resistors

- Protection against contact (IP54)
- Internal thermal overload protection (non-replaceable fuse)
- Touch guard and mounting rail attachment available from SEW as accessories

#### Wire and grid resistors

- Perforated sheet cover (IP20) open to mounting surface
- The short-term load capacity of the wire and grid resistors is higher than in the flat-type braking resistors (→ MOVIDRIVE® MDX60B/61B system manual, section "Selecting the braking resistor")
- A temperature switch is integrated in the BW...-T braking resistor
- A thermal overcurrent relay is integrated in the BW...-P braking resistor

SEW-EURODRIVE recommends also protecting the wire and grid resistors against overload using a bimetallic relay with trip characteristics of trip class 10 or 10A (in accordance with EN 60947-4-1). Set the trip current to the value  $I_F$  (→ following tables). Do not use electronic or electromagnetic fuses because these can be triggered even in case of short-term excess currents that are still within the tolerance range.

For braking resistors in the BW...-T / BW...-P series, you can connect the integrated temperature sensor using a 2-core, shielded cable as an alternative to a bimetallic relay. The cable entry for the BW...-T and BW...-P braking resistors can be run from the front or the back (→ dimension drawing for BW... / BW...-T / BW...-P braking resistors). Use filler plugs for tapped holes that are not connected.

The resistor surfaces will get very hot under a load of  $P_N$ . Make sure to select an installation site that will accommodate these high temperatures. As a rule, therefore, braking resistors are mounted on the control cabinet roof.

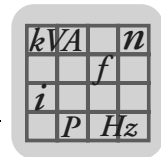
The performance data listed in the tables below show the load capacity of the braking resistors according to their cyclic duration factor (cyclic duration factor = cdf of the braking resistor in % in relation to a cycle duration  $\leq 120$  s).

#### UL and cUL approval

Type BW... braking resistors are UL and cUL approved in conjunction with MOVIDRIVE® B drive inverters. SEW-EURODRIVE will provide a certificate on request. The BW...-T and BW...-P braking resistors have cRUus approval independent of the MOVIDRIVE® inverters.

#### Parallel connection

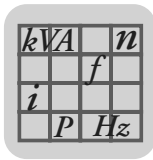
Two braking resistors with the same value must be connected in parallel for some inverter/resistor combinations. In this case, the trip current must be set on the bimetallic relay to twice the value of  $I_F$  entered in the table. For the BW...-T / BW...-P braking resistors, the temperature switch / overcurrent relay must be connected in series.



### Assignment to AC 400/500 V units (...-5\_3)

Braking resistor type BW...	BW090-P52B	BW100-005	BW100-006	BW072-003	BW072-005	BW168	BW268
<b>Part number</b>	824 563 0	826 269 1	821 701 7	826 058 3	826 060 5	820 604 X	820 715 1
<b>Braking resistor type BW...-T</b>			<b>BW100-006-T</b>			<b>BW168-T</b>	<b>BW268-T</b>
<b>Part number</b>			1820 419 8			1820 133 4	1820 417 1
<b>Cont. braking power (= 100 % cdf)</b>	0.10 kW	0.45 kW	0.6 kW	0.23 kW	0.45 kW	0.8 kW	1.2 kW
<b>Load capacity at 50 % cdf<sup>1)</sup></b>	0.15 kW	0.60 kW	1.1 kW	0.31 kW	0.60 kW	1.4 kW	2.2 kW
<b>at 25 % cdf</b>	0.2 kW	0.83 kW	1.9 kW	0.42 kW	0.83 kW	2.6 kW	3.8 kW
<b>12 % cdf</b>	0.4 kW	1.11 kW	3.6 kW	0.58 kW	1.11 kW	4.8 kW	7.2 kW
<b>6 % cdf</b>	0.7 kW	2.00 kW	5.7 kW	1.00 kW	2.00 kW	7.6 kW	11 kW
Observe <b>regenerative power limit</b> of the inverter! (= 150 % of the recommended motor power → Technical Data)							
<b>Resistance value</b> $R_{BW}$	90 Ω ±35 %	100 Ω ±10 %		72 Ω ±10 %		68 Ω ±10 %	
<b>Trip current (of F16)</b> $I_F$	-	0.8 A <sub>RMS</sub>	2.4 A <sub>RMS</sub>	0.6 A <sub>RMS</sub>	1 A <sub>RMS</sub>	3.4 A <sub>RMS</sub>	4.2 A <sub>RMS</sub>
<b>Design</b>	PTC	Flat design	Wire resistor on ceramic core	Flat design		Wire resistor on ceramic core	
<b>Connections/ Tightening torque</b>	Cables	Cables	Ceramic terminals 2.5 mm <sup>2</sup> (AWG13) 0.5 Nm	Cables		Ceramic terminals 2.5 mm <sup>2</sup> (AWG13) 0.5 Nm	
<b>Enclosure</b>	IP20	IP54	IP20 (when installed)	IP54		IP20 (when installed)	
<b>Ambient temperature</b> $\vartheta_U$	-20 °C ... +40 °C						
<b>Type of cooling</b>	KS = Self-cooling						
<b>For MOVDRIVE®</b>	0005 ... 0014	0005 ... 0022	0015 ... 0040	0005 ... 0014		0005 ... 0040	0015 ... 0040

1) cdf = Cyclic duration factor of the braking resistor based on a cycle duration  $T_D \leq 120$  s.



## Technical Data and Dimension Drawings

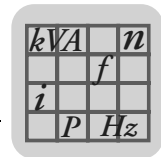
### Braking resistors type BW... / BW...-T / BW...-P

Braking resistor type BW...	BW147	BW247	BW347	BW039-012		
Part number	820 713 5	820 714 3	820 798 4	821 689 4		
Braking resistor type BW...-T	BW147-T	BW247-T	BW347-T	BW039-012-T	BW039-026-T	BW039-050-T
Part number	1820 134 2	1820 084 2	1820 135 0	1820 136 9	1820 415 5	1820 137 7
Cont. braking power (= 100 % cdf)	1.2 kW	2.0 kW	4.0 kW	1.2 kW	2.6 kW	5.0 kW
Load capacity at 50 % cdf <sup>1)</sup>	2.2 kW	3.6 kW	7.2 kW	2.1 kW	4.7 kW	8.5 kW
at 25 % cdf	3.8 kW	6.4 kW	12.8 kW	3.8 kW	8.3 kW	15.0 kW
12 % cdf	7.2 kW	12 kW	20 kW <sup>2)</sup>	7.2 kW	15.6 kW	24.0 kW <sup>2)</sup>
6 % cdf	11 kW	19 kW	20 kW <sup>2)</sup>	11.4 kW	24.0 kW <sup>2)</sup>	24.0 kW <sup>2)</sup>
Observe <b>regenerative power limit</b> of the inverter! (= 150 % of the recommended motor power → Technical Data)						
Resistance value $R_{BW}$	47 $\Omega$ $\pm$ 10 %			39 $\Omega$ $\pm$ 10 %		
Trip current (of F16) $I_F$	5 A <sub>RMS</sub>	6.5 A <sub>RMS</sub>	9.2 A <sub>RMS</sub>	5.5 A <sub>RMS</sub>	8.1 A <sub>RMS</sub>	11.3 A <sub>RMS</sub>
Design	Wire resistor on ceramic core					Grid resistor
Connections/ Tightening torque	Ceramic terminals 2.5 mm <sup>2</sup> (AWG13) / 0.5 Nm BW347-T: Ceramic terminals 10 mm <sup>2</sup> (AWG8) / 1.6 Nm					M8 stud / 6 Nm
Enclosure	IP20 (when installed)					
Ambient temperature $\vartheta_U$	-20 °C ... +40 °C					
Type of cooling	KS = Self-cooling					
For MOVIDRIVE®	0055/0075			0110		

- 1) cdf = Cyclic duration factor of the braking resistor based on a cycle duration  $T_D \leq 120$  s.
- 2) Physical power limit due to DC link voltage and resistance value.

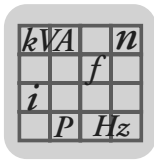
Braking resistor type BW...	BW018-015			
Part number	821 684 3			
Braking resistor type BW...-T/-P	BW018-015-P	BW018-035-T	BW018-075-T	BW915-T
Part number	1820 416 3	1820 138 5	1820 139 3	1820 413 9
Cont. braking power (= 100 % cdf)	1.5 kW	3.5 kW	7.5 kW	16 kW
Load capacity at 50 % cdf <sup>1)</sup>	2.5 kW	5.9 kW	12.7 kW	27.2 kW
at 25 % cdf	4.5 kW	10.5 kW	22.5 kW	48 kW
12 % cdf	6.7 kW	15.7 kW	33.7 kW	62.7 kW <sup>2)</sup>
6 % cdf	11.4 kW	26.6 kW	52.2 kW <sup>2)</sup>	62.7 kW <sup>2)</sup>
Observe <b>regenerative power limit</b> of the inverter! (= 150 % of the recommended motor power → Technical Data)				
Resistance value $R_{BW}$	18 $\Omega$ $\pm$ 10 %			15 $\Omega$ $\pm$ 10 %
Trip current (of F16) $I_F$	9.1 A <sub>RMS</sub>	13.9 A <sub>RMS</sub>	20.4 A <sub>RMS</sub>	32.6 A <sub>RMS</sub>
Design	Wire resistor on ceramic core	Steel-grid resistor		
Connections/ Tightening torque	BW018-015: Ceramic terminals 2.5 mm <sup>2</sup> (AWG13) / 0.5 Nm BW018-015-P: Terminal 2.5 mm <sup>2</sup> (AWG13) / 1 Nm	M8 bolt / 6 Nm		
Enclosure	IP20 (when installed)			
Ambient temperature $\vartheta_U$	-20 °C ... +40 °C			
Type of cooling	KS = Self-cooling			
For MOVIDRIVE®	0150/0220 and 2 × parallel for 0370/0450 <sup>3)</sup>			0220

- 1) cdf = Cyclic duration factor of the braking resistor based on a cycle duration  $T_D \leq 120$  s.
- 2) Physical power limit due to DC link voltage and resistance value.
- 3) When connected in parallel, the load capacity and trip current are doubled.



Braking resistor type BW...-	BW012-025				
Part number	821 680 0				
Braking resistor type BW...-T/-P	BW012-025-P	BW012-050T	BW012-100-T	BW106-T	BW206-T
Part number	1820 414 7	1820 140 7	1820 141 5	1820 083 4	1820 412 0
<b>Cont. braking power (= 100 % cdf)</b>	2.5 kW	5.0 kW	10 kW	13.5 kW	18 kW
<b>Load capacity</b>	4.2 kW	8.5 kW	17 kW	23 kW	30.6 kW
<b>at</b>					
<b>25 % cdf</b>	7.5 kW	15.0 kW	30 kW	40 kW	54 kW
<b>12 % cdf</b>	11.2 kW	22.5 kW	45 kW	61 kW	81 kW
<b>6 % cdf</b>	19.0 kW	38.0 kW	76 kW	102 kW	136.8 kW
Observe <b>regenerative power limit</b> of the inverter! (= 150 % of the recommended motor power → Technical Data)					
<b>Resistance value</b> $R_{BW}$	12 $\Omega$ $\pm$ 10 %			6 $\Omega$ $\pm$ 10 %	
<b>Trip current (of F16)</b> $I_F$	14.4 A <sub>RMS</sub>	20.4 A <sub>RMS</sub>	28.8 A <sub>RMS</sub>	47.4 A <sub>RMS</sub>	54.7 A <sub>RMS</sub>
<b>Design</b>	Steel-grid resistor				
<b>Connections/ Tightening torque</b>	Ceramic terminals 2.5 mm <sup>2</sup> (AWG13) / 0.5 Nm BW012-025-P: Terminals 4 mm <sup>2</sup> (AWG12) / 1 Nm			M8 bolt / 6 Nm	
<b>Enclosure</b>	IP20 (when installed)				
<b>Ambient temperature</b> $\vartheta_U$	-20 °C ... +40 °C				
<b>Type of cooling</b>	KS = Self-cooling				
<b>For MOVIDRIVE®</b>	0300			0370...0750 and 2 × parallel for 0900/1100/1320 <sup>2</sup> )	

- 1) cdf = Cyclic duration factor of the braking resistor based on a cycle duration  $T_D \leq 120$  s.
- 2) When connected in parallel, the load capacity and trip current are doubled.



#### Assignment to AC 230 V units (...-2\_3)

Braking resistor type BW...	BW039-003	BW039-006	BW039-012		BW027-006	BW027-012		
Part number	821 687 8	821 688 6	821 689 4		822 422 6	822 423 4		
Braking resistor type BW...T			BW039-012-T	BW039-026-T			BW018-015-T	BW018-035-T
Part number			1820 136 9	1820 415 5			1820 416 3	1820 138 5
Cont. braking power (= 100 % cdf)	0.3 kW	0.6 kW	1.2 kW	2.6 kW	0.6 kW	1.2 kW	1.5 kW	3.5 kW
Load capacity at 50 % cdf <sup>1)</sup>	0.5 kW	1.1 kW	2.1 kW	4.6 kW	1.1 kW	2.1 kW	2.5 kW	5.9 kW
at 25 % cdf	1.0 kW	1.9 kW	3.8 kW	6.0 kW <sup>2)</sup>	1.9 kW	3.8 kW	4.5 kW	10.5 kW
12 % cdf	1.8 kW	3.6 kW	6.0 kW <sup>2)</sup>	6.0 kW <sup>2)</sup>	3.6 kW	7.2 kW	6.7 kW	13.0 kW <sup>2)</sup>
6 % cdf	2.8 kW	5.7 kW	6.0 kW <sup>2)</sup>	6.0 kW <sup>2)</sup>	5.7 kW	8.7 kW <sup>2)</sup>	11.4 kW	13.0 kW <sup>2)</sup>
Observe <b>regenerative power limit</b> of the inverter! (= 150 % of the recommended motor power → Technical Data)								
Resistance value $R_{BW}$	39 Ω ±10 %				27 Ω ±10 %		18 Ω ±10 %	
Trip current (of F16) $I_F$	2.7 A <sub>RMS</sub>	3.9 A <sub>RMS</sub>	5.5 A <sub>RMS</sub>	8.1 A <sub>RMS</sub>	4.7 A <sub>RMS</sub>	6.6 A <sub>RMS</sub>	9.1 A <sub>RMS</sub>	13.9 A <sub>RMS</sub>
Design	Wire resistor						Steel-grid resistor	
Connections/ Tightening torque	Ceramic terminals 2.5 mm <sup>2</sup> (AWG12) / 0.5 Nm							M8 stud / 6 Nm
Enclosure	IP20 (when installed)							
Ambient temperature $\vartheta_U$	-20 °C ... +40 °C							
Type of cooling	KS = Self-cooling							
For MOVIDRIVE®	0015/0022				0015...0037		2 × parallel with 0110 <sup>3)</sup>	

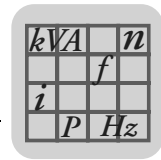
- 1) cdf = Cyclic duration factor of the braking resistor based on a cycle duration  $T_D \leq 120$  s.
- 2) Physical power limit due to DC link voltage and resistance value.
- 3) When connected in parallel, the load capacity and trip current are doubled.

Braking resistor type BW...T	BW018-075-T	BW915-T	BW012-025-T	BW012-050-T	BW012-100-T	BW106-T	BW206-T
Part number	1820 139 3	1820 413 9	1820 414 7	1820 140 7	1820 141 5	1820 083 4	1820 412 0
Cont. braking power (= 100 % cdf)	7.5 kW	15.6 kW <sup>2)</sup>	2.5 kW	5.0 kW	10 kW	13.5 kW	18 kW
Load capacity at 50 % cdf <sup>1)</sup>	12.7 kW	15.6 kW <sup>2)</sup>	4.2 kW	8.5 kW	17 kW	23 kW	30.6 kW
at 25 % cdf	13.0 kW <sup>2)</sup>	15.6 kW <sup>2)</sup>	7.5 kW	15.0 kW	19.6 kW <sup>2)</sup>	39.2 kW <sup>2)</sup>	39.2 kW <sup>2)</sup>
12 % cdf	13.0 kW <sup>2)</sup>	15.6 kW <sup>2)</sup>	11.2 kW	19.6 kW <sup>2)</sup>	19.6 kW <sup>2)</sup>	39.2 kW <sup>2)</sup>	39.2 kW <sup>2)</sup>
6 % cdf	13.0 kW <sup>2)</sup>	15.6 kW <sup>2)</sup>	19.0 kW	19.6 kW <sup>2)</sup>	19.6 kW <sup>2)</sup>	39.2 kW <sup>2)</sup>	39.2 kW <sup>2)</sup>
Observe <b>regenerative power limit</b> of the inverter! (= 150 % of the recommended motor power → Technical Data)							
Resistance value $R_{BW}$	18 Ω ±10 %	15 Ω ±10 %	12 Ω ±10 %			6 Ω ±10 %	
Trip current (of F16) $I_F$	20.4 A <sub>RMS</sub>	32.6 A <sub>RMS</sub>	14.4 A <sub>RMS</sub>	20.4 A <sub>RMS</sub>	28.8 A <sub>RMS</sub>	47.4 A <sub>RMS</sub>	54.7 A <sub>RMS</sub>
Design	Steel-grid resistor						
Connections/ Tightening torque	M8 stud / 6 Nm						
Enclosure	IP20 (when installed)						
Ambient temperature $\vartheta_U$	-20 °C ... +40 °C						
Type of cooling	KS = Self-cooling						
For MOVIDRIVE®	2 × parallel with 0110 <sup>3)</sup>		0055/0075			0150 and 2 × parallel with 0220/0300 <sup>3)</sup>	

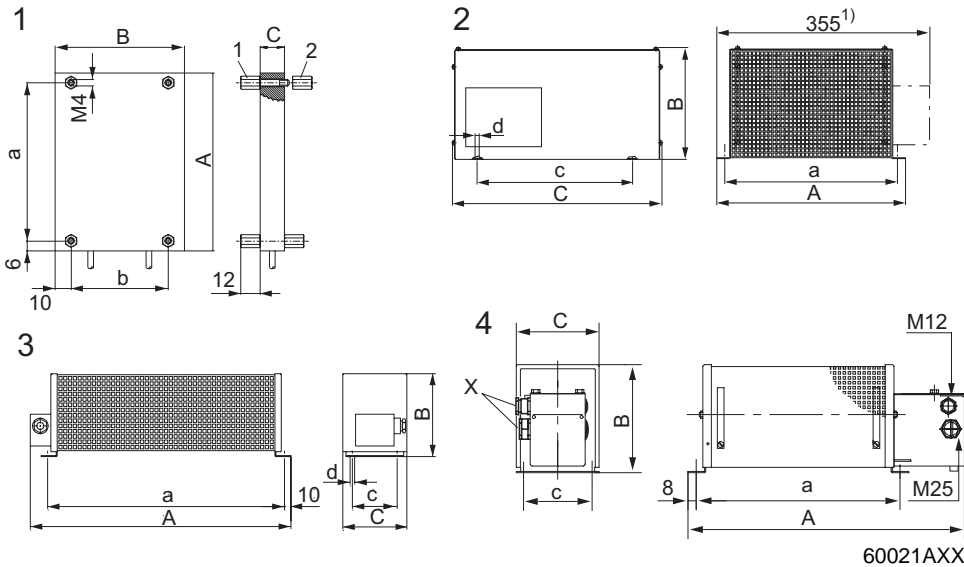
- 1) cdf = Cyclic duration factor of the braking resistor based on a cycle duration  $T_D \leq 120$  s.
- 2) Physical power limit due to DC link voltage and resistance value.
- 3) When connected in parallel, the load capacity and trip current are doubled.

#### Technical data for braking resistors BW...-T / BW...-P

BW...-T / BW...-P	
Connection cross section for signal contact	1 x 2.5 mm <sup>2</sup>
Switching capability of the thermostat's signal contact	<ul style="list-style-type: none"> <li>• DC 2 A / DC 24 V (DC11)</li> <li>• AC 2 A / AC 230V (AC11)</li> </ul>
Switch contact (NC)	according to EN 61800-5-1



### Dimension drawings for braking resistors BW... / BW...-T / BW...-P

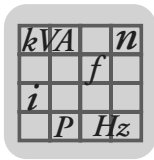


BW... :

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

60021AXX

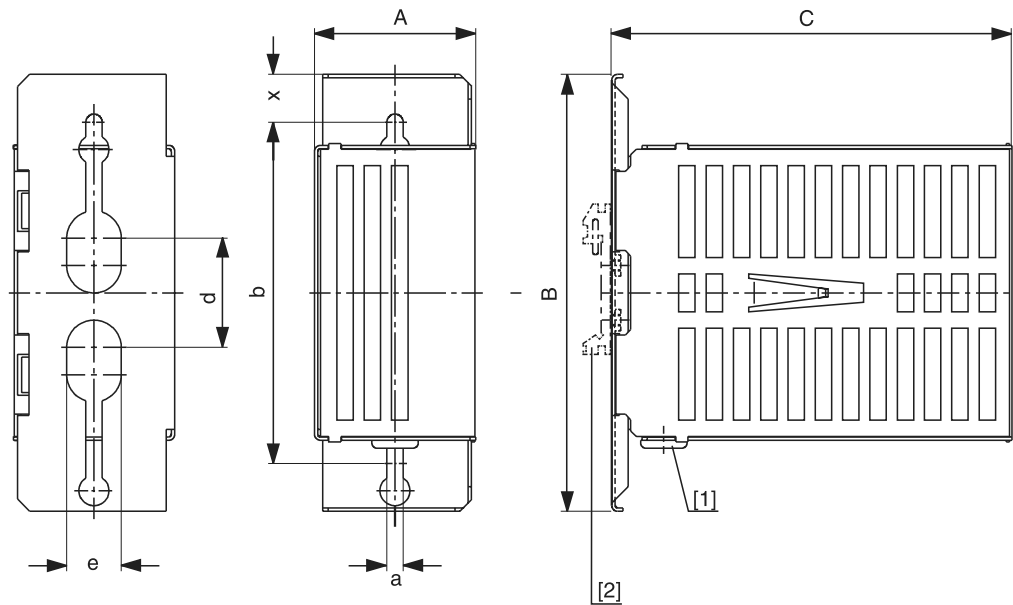
Type BW...	Mounting position	Main dimensions [mm]			Fastening parts [mm]			Cable gland	Weight [kg]
		A	B	C	a	b/c	d		
BW...-T / BW...-P									
BW106-T	2	795	270	490	770	380	10.5	-	32
BW206-T	2	995	270	490	970	380	10.5	-	40
BW012-025-P <sup>1)</sup>	2	295	260	490	270	380	10.5	M12 + M25	8.0
BW012-050-T	2	395	260	490	370	380	10.5	-	12
BW012-100-T	2	595	270	490	570	380	10.5	-	21
BW915-T	2	795	270	490	770	380	10.5	-	30
BW018-015	3	620	120	92	544	64	6.5	PG11	4.0
BW018-015-P	4	649	120	185	530	150	6.5	M12 + M25	5.8
BW018-035-T	2	295	270	490	270	380	10.5	-	9.0
BW018-075-T	2	595	270	490	570	380	10.5	-	18.5
BW027-006	3	486	120	92	430	64	6.5	PG11	2.2
BW027-012	3	486	120	185	426	150	6.5	PG11	4.3
BW039-003	3	286	120	92	230	64	6.5	PG11	1.5
BW039-006	3	486	120	92	430	64	6.5	PG11	2.2
BW039-012	3	486	120	185	426	150	6.5	PG11	4.3
BW039-012-T	4	549	120	185	426	150	6.5	M12 + M25	4.9
BW039-026-T	4	649	120	275	530	240	6.5	M12 + M25	7.5
BW039-050-T	2	395	260	490	370	380	10.5	-	12
BW147	3	465	120	185	426	150	6.5	PG13.5	4.3
BW147-T	4	549	120	185	426	150	6.5	M12 + M25	4.9
BW247	3	665	120	185	626	150	6.5	PG13.5	6.1
BW247-T	4	749	120	185	626	150	6.5	M12 + M25	9.2
BW347	3	670	145	340	630	300	6.5	PG13.5	13.2
BW347-T	4	749	210	185	630	150	6.5	M12 + M25	12.4
BW168	3	365	120	185	326	150	6.5	PG13.5	3.5
BW168-T	4	449	120	185	326	150	6.5	M12 + M25	3.6
BW268	3	465	120	185	426	150	6.5	PG13.5	4.3
BW268-T	4	549	120	185	426	150	6.5	M12 + M25	4.9
BW072-003	1	110	80	15	98	60	-	-	0.3
BW072-005	1	216	80	15	204	60	-	-	0.6
BW100-005	1	216	80	15	204	60	-	-	0.6
BW100-006	4	486	120	92	430	64	6.5	PG11	2.2
BW100-006-T	4	549	120	92	430	80	6.5	M12 + M25	3.0



**BS... touch guard** Touch guards are available for braking resistors in flat design.

Touch guard	BS003	BS005
Part number	813 151 1	813,152 X
for braking resistor	BW027-003 BW072-003	BW027-005 BW072-005 BW100-005

**Dimension drawing for touch guard BS...**



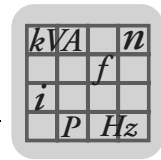
05247AXX

Figure 31: Dimension drawing for BS touch guard with grommet [1] and mounting rail attachment [2]

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

**Mounting rail installation**

A mounting rail attachment is available from SEW-EURODRIVE as an accessory, part number 822 194 4, for mounting the touch guard on a mounting rail.



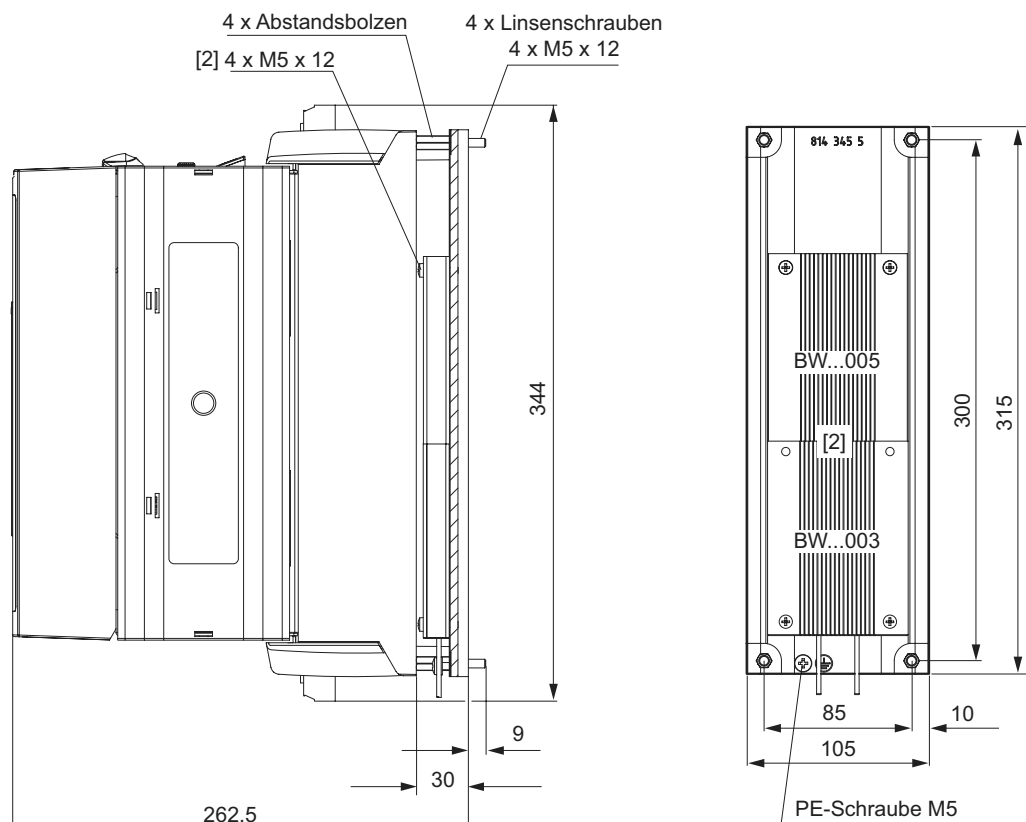
**DKB11A heat sink for brake resistors in flatpack design**

Part number 814 345 5

**Description**

The DKB11A heat sink provides a space-saving means of mounting braking resistors in flatpack design (BW072-005, BW100-005) under MOVIDRIVE® B size 1 (400/500 V units: 0015...0040; 230 V units: 0015...0037). The resistor is inserted into the heat sink and attached using the supplied screws (M4 × 20).

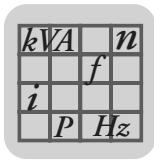
**Dimension drawing**



55773BDE

Figure 32: Dimension drawing for DKB11A heat sink, all dimensions in mm

- 1) Mounting surface for the braking resistor
- 2) Retaining screws are not included in the delivery scope



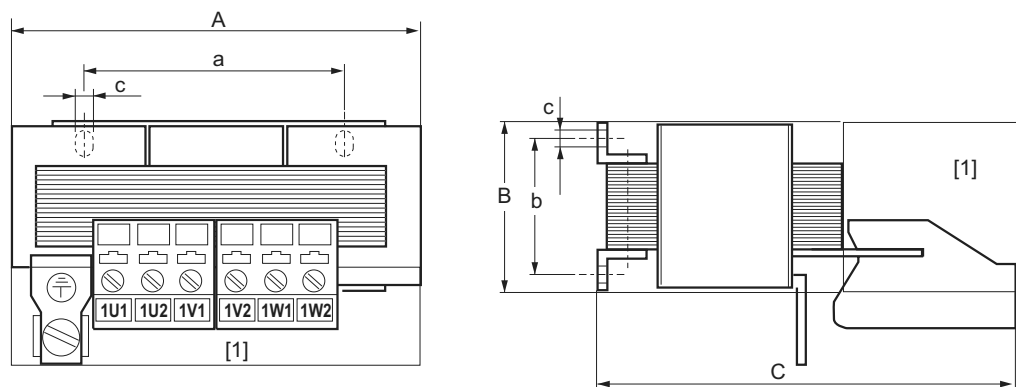
#### 2.34 Line choke type ND..

- To increase overvoltage protection.
- To limit the charging current when several inverters are connected together in parallel on the input end with shared mains contactors (rated current of line choke = total of inverter currents).
- ND.. line filters have cRUus approval independent of the MOVIDRIVE® drive inverters.

Line choke type	ND020-013	ND030-023	ND045-013	ND085-013	ND150-013	ND200-0033	ND300-0053
Part number	826 012 5	827 151 8	826 013 3	826 014 1	825 548 2	826 579 8	827 721 4
Rated voltage $U_N$	3 × AC 380 V -10 % ... 3 × AC 500 V +10 %, 50/60 Hz						
Rated current <sup>1)</sup> $I_N$	AC 20 A	AC 30 A	AC 45 A	AC 85 A	AC 150 A	AC 200 A	AC 300 A
Power loss at $I_N$ $P_V$	10 W	30 W	15 W	25 W	65 W	100 W	280 W
Inductance $L_N$	0.1 mH	0.2 mH	0.1 mH	0.1 mH	0.1 mH	0.03 mH	0.05 mH
Ambient temperature $\vartheta_U$	-25 °C ... +45 °C						
Enclosure	IP 00 (EN 60529)						
Connections	Terminal strips 4 mm <sup>2</sup> (AWG12)	Terminal strips 2.5 mm <sup>2</sup> ... 10 mm <sup>2</sup> (AWG13 ... AWG8)	Terminal blocks 10 mm <sup>2</sup> (AWG8)	Terminal blocks 35 mm <sup>2</sup> (AWG2)	M10 stud Pl: M8 stud	M12 stud Pl: 2 × M10	
Tightening torque	0.6 ... 0.8 Nm	max. 2.5 Nm		3.2 ... 3.7 Nm	M10 stud: 10 Nm Pl: 6 Nm	M12 stud: 15.5 Nm Pl: 10 Nm	
<b>Assignment to AC 400/500 V units (MDX60/61B...-5_3)</b>							
Rated operation (100 %)	0005...0075	0110...0220	0300...0450 and MDR60A0370	0550/0750	MDR60A0750		0900...1320
Increased power (125 %)	0005...0075	0110/0150	0220...0370	0450...0750			
<b>Assignment to AC 230 V units (MDX61B...-2_3)</b>							
Rated operation (100 %)	0015...0055	0075/0110	0150/0220	0300	-	-	
Increased power (125 %)	0015...0037	0055/0075	0110/0150	0220/0300	-	-	

1) If more than one MOVIDRIVE® unit is connected to a line choke, the **total value of the rated currents** of the connected units **must not exceed the rated current of the line choke!**

#### Dimension drawings for ND...



58699AXX

Figure 33: Dimension drawing for line chokes ND020.. / ND030.. / ND045.. / ND085..

(1) Space for installation terminals

Input: 1U1, 1V1, 1W1

Output: 1U2, 1V2, 1W2

Any mounting position

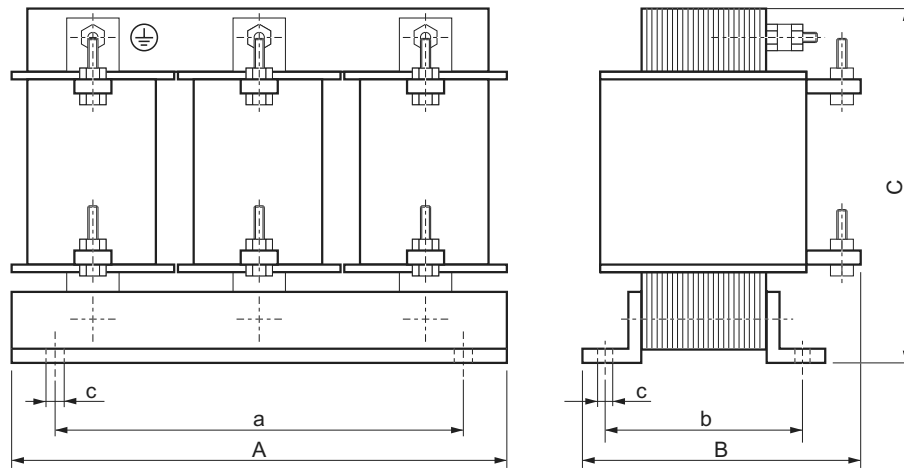
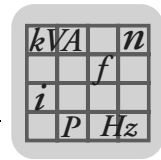
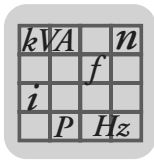


Figure 34: Dimension drawing for line chokes ND150.. / ND200.. / ND300..

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All dimensions in mm:

Line choke type	Main dimensions			Mounting dimensions		Hole dimension c	Weight kg
	A	B	C	a	b		
ND020-013	85	60	120	50	31-42	5-10	0.5
ND030-023 ND045-013	125	95	170	84	55-75	6	2.5
ND085-013	185	115	235	136	56-88	7	8
ND150-013	255	140	230	170	77	8	17
ND200-0033	250	160	230	180	98	8	15
ND300-0053	300	190	295	255	145	11	35

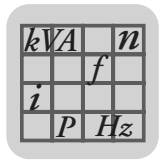


#### 2.35 Line filter option type NF...-...

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

Line filter type	NF009-503	NF014-503	NF018-503	NF035-503	NF048-503
Part number	827 412 6	827,116 X	827 413 4	827 128 3	827 117 8
Rated voltage $U_N$	3 × AC 380 V –10 % ... AC 500 V +10 %, 50/60 Hz				
Rated current $I_N$	AC 9 A	AC 14 A	AC 18 A	AC 35 A	AC 48 A
Power loss at $I_N$ $P_V$	6 W	9 W	12 W	15 W	22 W
Earth-leakage current at $V_N$	< 25 mA	< 25 mA	< 25 mA	< 25 mA	< 40 mA
Ambient temperature $\vartheta_U$	–25 °C ... +40 °C				
Degree of protection	IP20 (EN 60529)				
Connections L1-L3/L1'-L3' PE	4 mm <sup>2</sup> (AWG 10) M5 stud 0.8 Nm			10 mm <sup>2</sup> (AWG 8) M5/M6 stud 1.8 Nm	
Tightening torque					
Assignment to AC 400/500 V units (MDX60/61B...-5_3)					
Rated operation (100 %)	0005...0040	0055/0075	-	0110/0150	0220
Increased power (125 %)	0005...0030	0040/0055	0075	0110	0150
Assignment to AC 230 V units (MDX61B...-2_3)					
Rated operation (100 %)	0015/0022	0037	-	0055/0075	0110
Increased power (125 %)	0015	0022	0037	0055/0075	-

Line filter type	NF063-503	NF085-503	NF115-503	NF150-503	NF210-503	NF300-503
Part number	827 414 2	827 415 0	827 416 9	827 417 7	827 418 5	827 419 3
Rated voltage $U_N$	3 × AC 380 V –10 % ... AC 500 V +10 %, 50/60 Hz					
Rated current $I_N$	AC 63 A	AC 85 A	AC 115 A	AC 150 A	AC 210 A	AC 300 A
Power loss at $I_N$ $P_V$	30 W	35 W	60 W	90 W	150 W	180 W
Earth-leakage current at $V_N$	< 30 mA	< 30 mA	< 30 mA	< 30 mA	< 40 mA	< 45 mA
Ambient temperature $\vartheta_U$	–25 ... +40 °C					
Degree of protection	IP20 (EN 60529)					
Connections L1-L3/L1'-L3' PE	16 mm <sup>2</sup> (AWG 6) M6	35 mm <sup>2</sup> (AWG 2) M8	50 mm <sup>2</sup> (AWG1/0) M10	95 mm <sup>2</sup> (AWG4/0) M10	95 mm <sup>2</sup> (AWG4/0) M10	150 mm <sup>2</sup> (AWG300-2) M12
Tightening torque	3 Nm	3.7 Nm	3.7 Nm	3.7 Nm	20 Nm	30 Nm
Assignment to AC 400/500 V units (MDX60/61B...-5_3)						
Rated operation (100 %)	0300	0370/0450	0550	0750	0900/1100	1320
Increased power (125 %)	0220	0300/0370	0450	0550/0750	0900	1100/1320
Assignment to AC 230 V units (MDX61B...-2_3)						
Rated operation (100 %)	0150	0220	0300	-	-	-
Increased power (125 %)	0110/0150	-	0220/0300	-	-	-



Dimension drawing for NF...

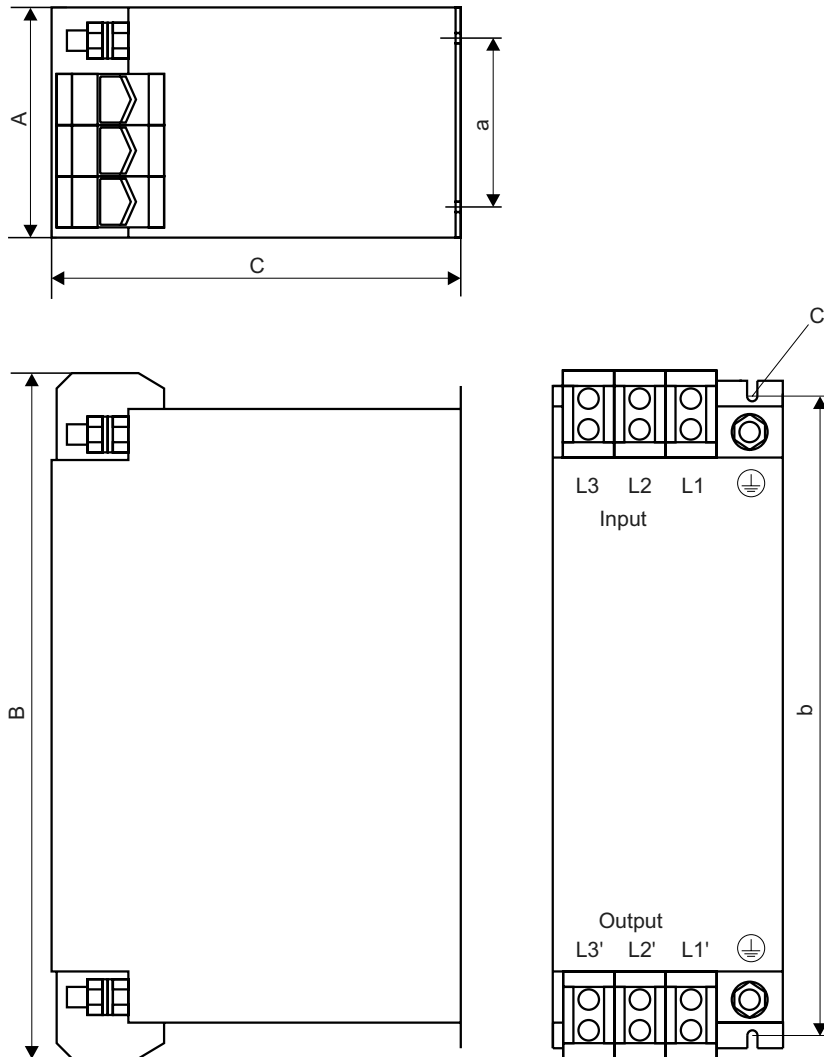
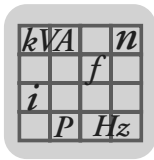


Figure 35: Dimension drawing for NF line filter  
Any mounting position

55862AEN

All dimensions in mm:

Line filter type	Main dimensions			Mounting dimensions		Hole dimension c	PE connection	Weight kg	
	A	B	C	a	b				
NF009-503	55	195	80	20	180	5.5	M5	0.8	
NF014-503		225			210			0.9	
NF018-503		255			240			1.1	
NF035-503	60	275	100	30	255			M6	1.7
NF048-503		315			295				2.1
NF063-503	90	260	140	60	235	6.5	M8	2.4	
NF085-503		320			255			3.5	
NF115-503		330			255			4.8	
NF150-503	100	330	155	65	255			M10	5.6
NF210-503									140
NF300-503	170	540	230	125	435	M12	12.2		



#### 2.36 Output chokes option type HD...

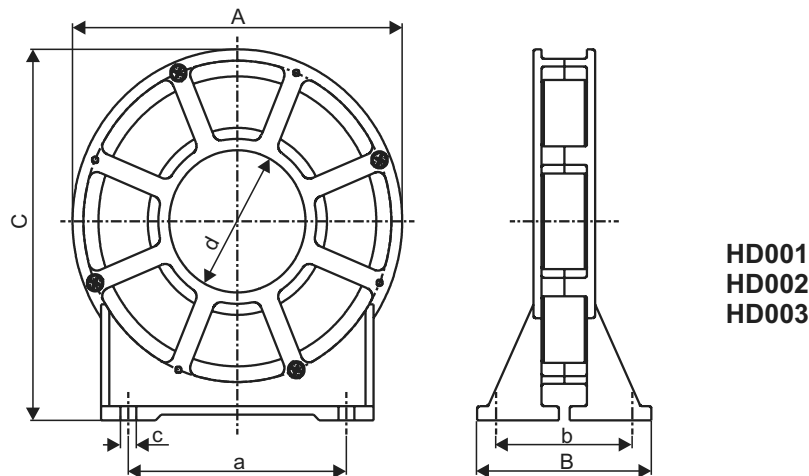
- For suppression of interference from the unshielded motor cable. For HD001 to HD003 we recommend routing the motor cable through the output choke with 5 loops. Only 5 loops are possible if the cable has a large diameter. To make up for this, 2 or 3 output chokes should be connected in series. Connect in series two output chokes in case of 4 windings and three output chokes in case of 3 windings.
- Output chokes HD001 to HD003 are allocated using the cable cross sections of the motor feeders. Consequently, there is no separate assignment table for the AC 230 V units.
- The HD004 output choke is assigned to size 6 units (0900 ... 1320).

Output choke type	HD001 <sup>1)</sup>	HD002 <sup>1)</sup>	HD003 <sup>1)</sup>	HD004 <sup>2)</sup>
Part number	813 325 5	813 557 6	813 558 4	816 885 7
Max. power loss $P_{Vmax}$	15 W	8 W	30 W	100 W
For cable cross sections/connections/ tightening torque	1.5...16 mm <sup>2</sup> (AWG 16...6)	≤1.5 mm <sup>2</sup> (AWG 16)	≥16 mm <sup>2</sup> (AWG 6)	M12 terminal studs 20 Nm
Enclosure	-	-	-	IP20

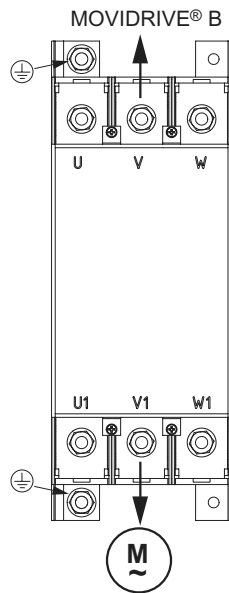
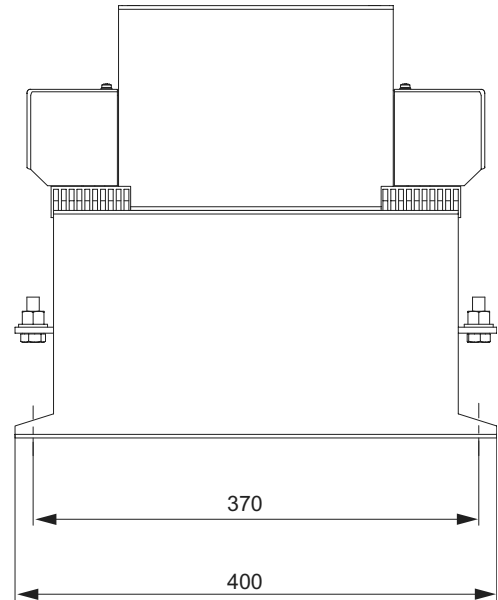
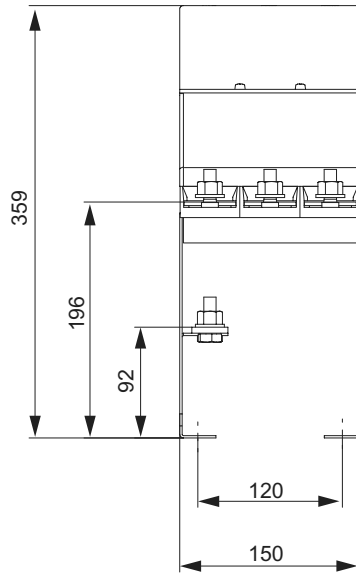
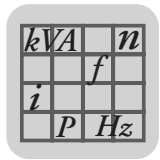
1) The HD... output choke is not a UL/cUL-relevant component.

2) UL/cUL approval is not available for the HD004 output choke

#### Dimension drawing for HD...



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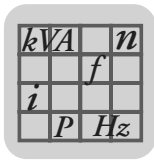


HD004

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All dimensions in mm:

Output choke type	Main dimensions			Mounting dimensions		Inside $\varnothing$	Hole dimension c	Dimensions kg
	A	B	C	a	b			
HD001	121	64	131	80	50	50	5.8	0.5
HD002	66	49	73	44	38	23		0.2
HD003	170	64	185	120	50	88	7.0	1.1
HD004	150	400	360	120	370	-	9.0	12.5




#### 2.37 Output filter option type HF...

HF... output filters are sine filters used to smooth output voltage from inverters. HF... output filters (with the exception of HF450-503) are approved to UL/cUL in combination with MOVIDRIVE® drive inverters. HF... output filters are used in the following cases:

- In group drives (several motor leads in parallel); the discharge currents in the motor cables are suppressed.
- To protect the motor winding insulation of non-SEW motors which are not suitable for inverters.
- For protection against overvoltage peaks in long motor cables (> 100 m).

Please read the following notes carefully:

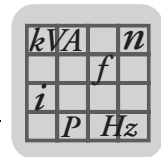
	<b>NOTE</b>
	<ul style="list-style-type: none"> <li>• Operate output filters in V/f and VFC operating modes only. Do not use output filters in CFC / SERVO operating modes.</li> <li>• Do not use output filters in hoist applications.</li> <li>• During project planning of the drive, take into account the voltage drop in the output filter and consequently the reduced motor torque available. This applies particularly to AC 230 V units with output filters.</li> </ul>

Output filter type	HF008-503 <sup>1)</sup>	HF015-503 <sup>1)</sup>	HF022-503 <sup>1)</sup>	HF030-503 <sup>1)</sup>	HF040-503 <sup>1)</sup>	HF055-503 <sup>1)</sup>
Part number	826,029 X	826 030 3	826 031 1	826,032 X	826 311 6	826 312 4
Rated voltage $U_N$	3 × AC 380 V –10 % ... 3 × AC 500 V +10 %, 50/60 Hz <sup>2)</sup>					
Earth-leakage current at $V_N$ $\Delta I$	0 mA					
Power loss at $I_N$ $P_V$	25 W	35 W	55 W	65 W	90 W	115 W
Interference emission via unshielded motor cable	According to class B limit to EN 55011 and EN 55014 complies with EN 50081, parts 1 and 2					
Ambient temperature $\vartheta_U$	0 °C ... +45 °C (reduction: 3 % $I_N$ per K to max. 60 °C)					
Enclosure (EN 60529)	IP20					
Connections/ tightening torque	M4 terminal studs 1.6 Nm ± 20 %					
Weight	3.1 kg	4.4 kg			10.8 kg	
<b>Assignment to AC 400/500 V units (MDX60/61B...-5_3)</b>						
Voltage drop at $I_N$ $\Delta V$	< 6.5 % (7.5 %) at AC 400 V / < 4 % (5 %) at AC 500 V and $f_{Amax} = 50$ Hz (60 Hz)					
Rated through current <sup>3)</sup> $I_{N\ 400\ V}$ (at $U_{Netz} = 3 \times AC\ 400\ V$ )	AC 2.5 A	AC 4 A	AC 6 A	AC 8 A	AC 10 A	AC 12 A
Rated through current <sup>3)</sup> $I_{N\ 500\ V}$ (at $U_{Netz} = 3 \times AC\ 500\ V$ )	AC 2 A	AC 3 A	AC 5 A	AC 6 A	AC 8 A	AC 10 A
Rated operation (100 %) <sup>3)</sup>	0005 ... 0011	0014 / 0015	0022	0030	0040	0055
Increased power (125 %) <sup>3)</sup>	0005	0008 / 0011	0014 / 0015	0022	0030	0040
<b>Assignment to AC 230 V units (MDX61B...-2_3)</b>						
Voltage drop at $I_N$ $\Delta V$	-	< 18.5 % (19 %) at AC 230 V with $f_{Amax} = 50$ Hz (60 Hz)				
Rated through current <sup>3)</sup> $I_{N\ 230\ V}$ (at $U_{Netz} = 3 \times AC\ 230\ V$ )	AC 4.3 A	AC 6.5 A	AC 10.8 A	AC 13 A	AC 17.3 A	AC 22 A
Rated operation (100 %) <sup>3)</sup>	-	-	0015/0022	-	0037	0055
Increased power (125 %) <sup>3)</sup>	-	-	0015/0022	-	-	0037

1) UL/cUL approval in combination with MOVIDRIVE® drive inverters. SEW-EURODRIVE will provide a certificate on request.

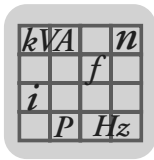
2) A reduction of 6 %  $I_N$  per 10 Hz applies above  $f_N = 60$  Hz for the rated through current  $I_N$ .

3) Only applies to operation without  $V_{DC\ link}$  connection. For operating the inverter with  $V_{DC\ link}$  connection, observe the project planning notes in the system manual of the respective inverter.



Output filter type	HF075-503 <sup>1)</sup>	HF023-403 <sup>1)</sup>	HF033-403 <sup>1)</sup>	HF047-403 <sup>1)</sup>	HF450-503
Part number	826 313 2	825 784 1	825,785 X	825 786 8	826 948 3
Rated voltage $U_N$	3 × AC 380 V –10 % ... 3 × AC 500 V +10 %, 50/60 Hz <sup>2)</sup>				
Earth-leakage current at $V_N$ $\Delta I$	0 mA				
Power loss at $I_N$ $P_V$	135 W	90 W	120 W	200 W	400 W
Interference emission via unshielded motor cable	According to class B limit to EN 55011 and EN 55014 complies with EN 50081, parts 1 and 2				
Ambient temperature $\vartheta_U$	0 °C ... +45 °C (reduction: 3 % $I_N$ per K to max. 60 °C)				
Enclosure (EN 60529)	IP 20?	IP20			IP 10
Connections/ tightening torque	M4 terminal studs 1.6 Nm ± 20 %	35 mm <sup>2</sup> (AWG 2) 3.2 Nm			
Weight	10.8 kg	15.9 kg	16.5 kg	23 kg	32 kg
<b>Assignment to AC 400/500 V units (MDX60/61B...-5_3)</b>					
Voltage drop at $I_N$ $\Delta V$	< 6.5 % (7.5 %) at AC 400 V / < 4 % (5 %) at AC 500 V and $f_{Amax} = 50$ Hz (60 Hz)				
Rated through current <sup>3)</sup> (at $U_{Netz} = 3 \times AC 400 V$ ) $I_{N 400 V}$	AC 16 A	AC 23 A	AC 33 A	AC 47 A	AC 90 A
Rated through current <sup>3)</sup> (at $U_{Netz} = 3 \times AC 500 V$ ) $I_{N 500 V}$	AC 13 A	AC 19 A	AC 26 A	AC 38 A	AC 72 A
Rated operation (100 %) <sup>3)</sup>	0075	0110	0150/0300 <sup>4)</sup>	0220	0370/0450/ 0550 <sup>4)</sup> /0750 <sup>4)</sup> / 0900 <sup>4)</sup>
Increased power (125 %) <sup>3)</sup>	0055	0075	0110/0220 <sup>4)</sup>	0150	0300/0370/0450/ 0550 <sup>4)</sup> /0750 <sup>4)</sup>
<b>Assignment to AC 230 V units (MDX61B...-2_3)</b>					
Voltage drop at $I_N$ $\Delta V$	< 18.5 % (19 %) at AC 230 V with $f_{Amax} = 50$ Hz (60 Hz)				
Rated through current <sup>3)</sup> (at $U_{Netz} = 3 \times AC 230 V$ ) $I_{N 230 V}$	AC 29 A	AC 42 A	AC 56.5 A	AC 82.6 A	AC 156 A
Rated operation (100 %) <sup>3)</sup>	0075	0110	0150/0300 <sup>4)</sup>	0220	0300
Increased power (125 %) <sup>3)</sup>	0055	0075	0110/0220 <sup>4)</sup>	0150	0220/0300

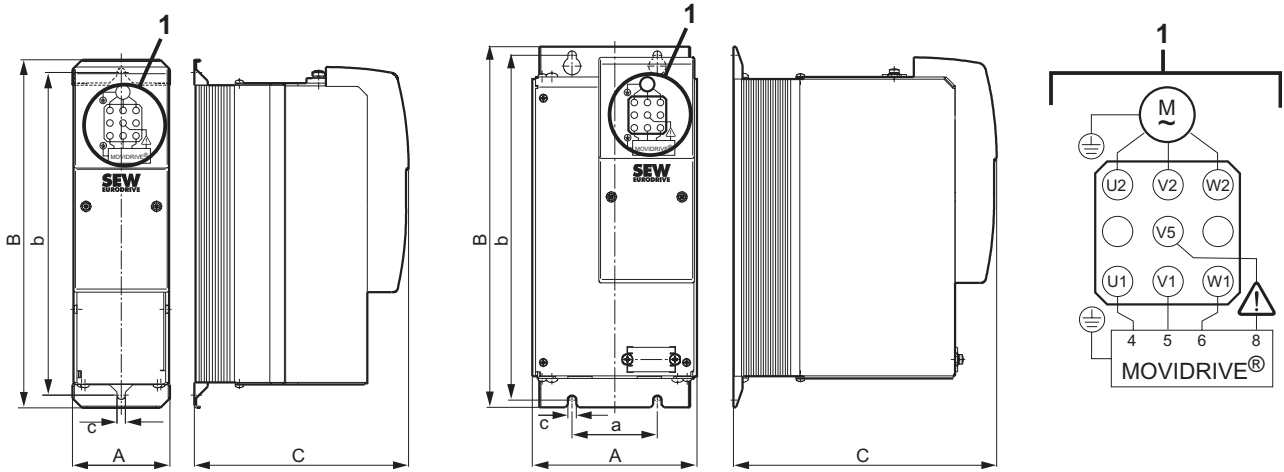
- 1) UL/cUL approval in combination with MOVIDRIVE® drive inverters. SEW-EURODRIVE will provide a certificate on request.
- 2) A reduction of 6 %  $I_N$  per 10 Hz applies above  $f_N = 60$  Hz for the rated through current  $I_N$ .
- 3) Only applies for operation without  $V_{DC link}$  connection. For operation with  $V_Z$  connection, observe the project planning instructions in the MOVIDRIVE® MDX6/61B system manual, section "Project Planning/Connecting the optional power components."
- 4) Connect **two HF...-... output filters in parallel** for operation with these MOVIDRIVE® units.



**Dimension drawings for output filter HF...-503, all dimensions in mm**

HF008/015/022/030-503

HF040/055/075-503



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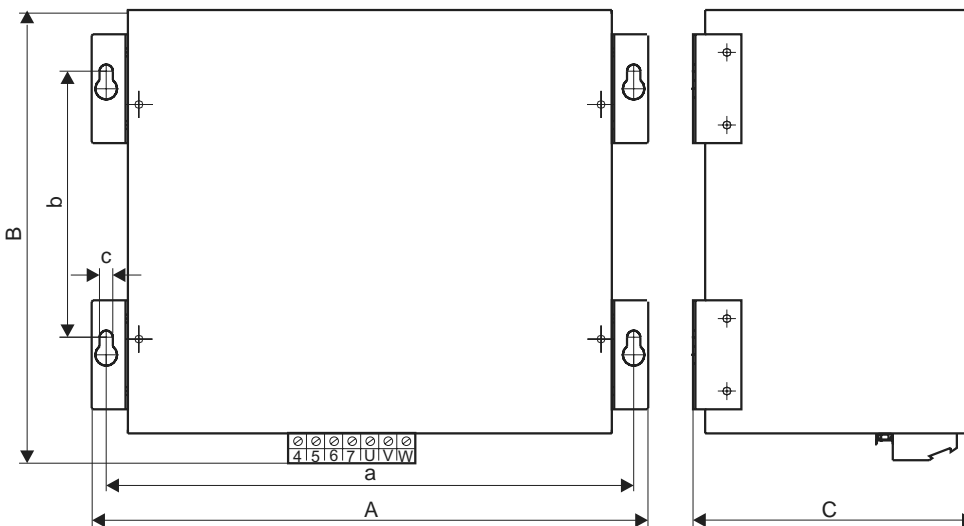
Figure 36: Dimension drawings for output filters HF008...075-503

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

Output filter type	Main dimensions			Mounting dimensions		Dimension c	Ventilation clearances <sup>1)</sup>	
	A	B	C	a	b		Top	below
HF008/015/022/030-503	80	286	176	-	265	7	100	100
HF040/055/075-503	135	296	216	70	283			

1) There is no need for clearance at the sides. You can line up the units next to one another.

HF450-503

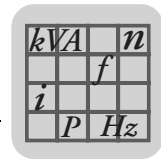


58417AXX

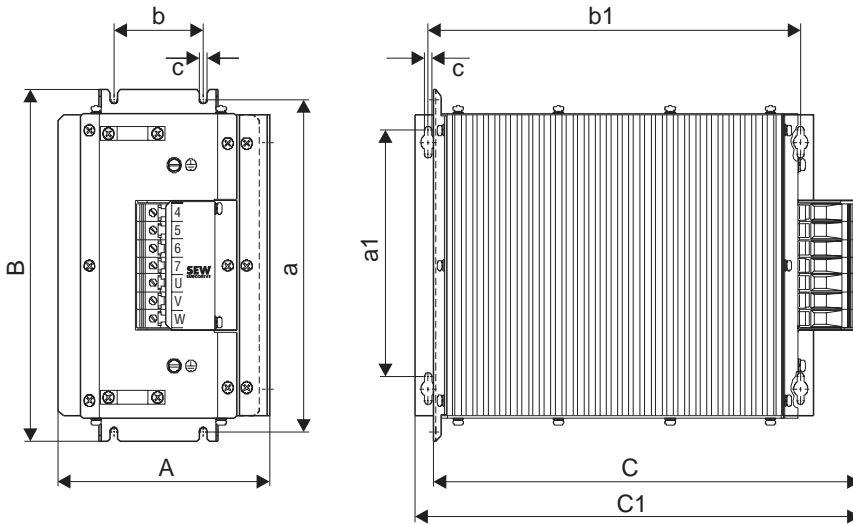
Figure 37: Dimension drawing for output filter HF450-503

Only the mounting position shown in the dimension diagram is permitted

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



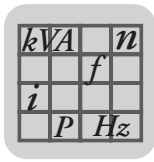
Dimension drawing for HF...-403 output filter, dimensions in mm



58996AXX

Figure 38: Dimension drawing for HF...-403 output filter

Type	Main dimensions			Mounting dimensions				Hole dimension c	Ventilation clearances		
				Standard mounting position		Horizontal mounting position					
	A	B	C/C1	a	b	a1	a2		Side	Above	Below
HF023-403	145	284	365/390	268	60	210	334	6.5	30 each	150	150
HF033-403											
HF047-403											



### 2.38 Prefabricated cables

#### Overview

SEW-EURODRIVE offers cable sets and prefabricated cables for straightforward and fault-free connection of various system components to MOVIDRIVE®. The cables are prefabricated in 1 m steps to the required length. It is necessary to differentiate between whether the cables are intended for fixed routing or for cable carrier applications.

1. Cable sets for DC link connection MDR → MDX
2. Motor cables and extension cables for connecting CM motors
3. Motor cables and extension cables for connecting DS, CMD and CMP motors.
4. VR forced cooling fan cable and extension cable
5. Connection to DEH11B / DER11B: Encoder cable and extensions cable (Hiperface®, incremental encoder), resolver cable and extension cable in plug and terminal box design for motors.

#### 1. Cables set for DC link connection MDR → MDX

##### Description

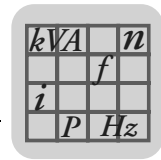
SEW-EURODRIVE strongly recommends using the cable sets listed in the table below. These cable sets offer the appropriate dielectric strength and are also color-coded. Color coding is necessary because cross-polarity and ground faults could cause irreparable damage to the connected equipment.

The length of the cables restricts the DC link connection to the permitted length of 5 m. They can also be cut to length by the customer for connecting several units. The lugs for connection to the regenerative power supply unit and an inverter are supplied with the cable set. Use commercially available cable lugs to connect other inverters. In this case, connect inverters in star configuration to the regenerative power supply unit. Use a busbar subdistributor if the DC link terminals of the regenerative power supply unit are not sufficient.

##### Routing type

Only fixed routing is possible.

Cable set type	DCP12A	DCP13A	DCP15A	DCP16A
Part number	814 567 9	814 250 5	814 251 3	817 593 4
For connecting MOVIDRIVE®	0015...0110	0150...0370	0450...0750	0900...1320



## 2. Prefabricated cables and extension cables for connecting CM motors to MDX

### Motor cables

The cables are equipped with a connector for motor connection and conductor end sleeves for inverter connection.

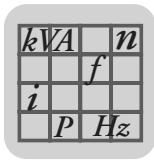
Number of cores and line cross section	Part number	Routing type	For motor
4×1.5 mm <sup>2</sup>	199 179 5	Fixed routing	CM..SM51
4×1.5 mm <sup>2</sup> + 3×1.0 mm <sup>2</sup>	199 189 2		CM..BR SB51
4×2.5 mm <sup>2</sup>	199 181 7		CM..SM52
4×2.5 mm <sup>2</sup> + 3×1.0 mm <sup>2</sup>	199 191 4		CM..BR SB52
4×4 mm <sup>2</sup>	199 183 3		CM..SM54
4×4 mm <sup>2</sup> + 3×1.0 mm <sup>2</sup>	199 193 0		CM..BR SB54
4×6 mm <sup>2</sup>	199 185 X		CM..SM56
4×6 mm <sup>2</sup> + 3×1.5 mm <sup>2</sup>	199 195 7		CM..BR SB56
4×10 mm <sup>2</sup>	199 187 6		CM..SM59
4×10 mm <sup>2</sup> + 3×1.5 mm <sup>2</sup>	199 197 3		CM..BR SB59

Number of cores and line cross section	Part number	Routing type	For motor
4×1.5 mm <sup>2</sup>	1 333 114 0	Cable carrier installation	CM..SM51
4×1.5 mm <sup>2</sup> + 3×1.0 mm <sup>2</sup>	1 333 116 7		CM..BR SB51
4×2.5 mm <sup>2</sup>	1 333 115 9		CM..SM52
4×2.5 mm <sup>2</sup> + 3×1.0 mm <sup>2</sup>	1 333 117 5		CM..BR SB52
4×4 mm <sup>2</sup>	199 184 1		CM..SM54
4×4 mm <sup>2</sup> + 3×1.0 mm <sup>2</sup>	199 194 9		CM..BR SB54
4×6 mm <sup>2</sup>	199 186 8		CM..SM56
4×6 mm <sup>2</sup> + 3×1.5 mm <sup>2</sup>	199 196 5		CM..BR SB56
4×10 mm <sup>2</sup>	199 188 4		CM..SM59
4×10 mm <sup>2</sup> + 3×1.5 mm <sup>2</sup>	199 198 1		CM..BR SB59

### Extension cables

The cables are equipped with a connector and adapter for extending the CM motor cable.

Number of cores and line cross section	Part number	Routing type	For motor
4×1.5 mm <sup>2</sup>	199 549 9	Fixed routing	CM..SM51
4×1.5 mm <sup>2</sup> + 3×1.0 mm <sup>2</sup>	199 199 X		CM..BR SB51
4×2.5 mm <sup>2</sup>	199 551 0		CM..SM52
4×2.5 mm <sup>2</sup> + 3×1.0 mm <sup>2</sup>	199 201 5		CM..BR SB52
4×4 mm <sup>2</sup>	199 553 7		CM..SM54
4×4 mm <sup>2</sup> + 3×1.0 mm <sup>2</sup>	199 203 1		CM..BR SB54
4×6 mm <sup>2</sup>	199 555 3		CM..SM56
4×6 mm <sup>2</sup> + 3×1.5 mm <sup>2</sup>	199 205 8		CM..BR SB56
4×10 mm <sup>2</sup>	199 557 X		CM..SM59
4×10 mm <sup>2</sup> + 3×1.5 mm <sup>2</sup>	199 207 4		CM..BR SB59



Number of cores and line cross section	Part number	Routing type	For motor
4×1.5 mm <sup>2</sup>	1 333 118 3	Cable carrier installation	CM..SM51
4×1.5 mm <sup>2</sup> + 3×1.0 mm <sup>2</sup>	1 333 120 5		CM..BR SB51
4×2.5 mm <sup>2</sup>	1 333 119 1		CM..SM52
4×2.5 mm <sup>2</sup> + 3×1.0 mm <sup>2</sup>	1 333 121 3		CM..BR SB52
4×4 mm <sup>2</sup>	199 554 5		CM..SM54
4×4 mm <sup>2</sup> + 3×1.0 mm <sup>2</sup>	199 204 X		CM..BR SB54
4×6 mm <sup>2</sup>	199 556 1		CM..SM56
4×6 mm <sup>2</sup> + 3×1.5 mm <sup>2</sup>	199 206 6		CM..BR SB56
4×10 mm <sup>2</sup>	199 558 8		CM..SM59
4×10 mm <sup>2</sup> + 3×1.5 mm <sup>2</sup>	199 208 2		CM..BR SB59

### 3. Prefabricated cables and extension cables for connecting DS/CMD/CMP motors

#### Motor cables

The cables are equipped with a connector for motor connection and conductor end sleeves for inverter connection.

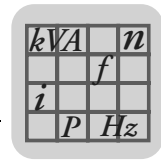
Number of cores and line cross section	Part number	Routing type	For motor
4×1.5 mm <sup>2</sup>	590 454 4	Fixed routing	DS56 /CMD.. / CMP.. SM11
4×1.5 mm <sup>2</sup> + 2×1 mm <sup>2</sup>	1 332 485 3		DS56..B / CMD..BP / CMP..BP SB11
4×2.5 mm <sup>2</sup>	590 455 2		DS56 /CMD.. / CMP.. SM12
4×2.5 mm <sup>2</sup> + 2×1 mm <sup>2</sup>	1 333 213 9		DS56..B / CMD..BP / CMP..BP SB12
4×4 mm <sup>2</sup>	590 456 0		DS56 /CMD.. / CMP.. SM14
4×4 mm <sup>2</sup> + 2×1 mm <sup>2</sup>	1 333 214 7		DS56..B / CMD..BP / CMP..BP SB14

Number of cores and line cross section	Part number	Routing type	For motor
4×1.5 mm <sup>2</sup>	590 624 5	Cable carrier installation	DS56 /CMD.. / CMP.. SM11
4×1.5 mm <sup>2</sup> + 2×1 mm <sup>2</sup>	1 333 122 1		DS56..B / CMD..BP / CMP..BP SB11
4×2.5 mm <sup>2</sup>	590 625 3		DS56 /CMD.. / CMP.. SM12
4×2.5 mm <sup>2</sup> + 2×1 mm <sup>2</sup>	1 333 215 5		DS56..B / CMD..BP / CMP..BP SB12
4×4 mm <sup>2</sup>	590 480 3		DS56 /CMD.. / CMP.. SM14
4×4 mm <sup>2</sup> + 2×1 mm <sup>2</sup>	1 333 216 3		DS56..B / CMD..BP / CMP..BP SB14

#### Extension cables

The cables are equipped with a connector and adapter for extending the motor cable.

Number of cores and line cross section	Part number	Routing type	For motor
4×1.5 mm <sup>2</sup>	1 333 254 7	Cable carrier installation	DS56 /CMD.. / CMP.. SM11
4×1.5 mm <sup>2</sup> + 2×1 mm <sup>2</sup>	1 333 248 1		DS56..B / CMD..BP / CMP..BP SB11
4×2.5 mm <sup>2</sup>	1 333 246 5		DS56 /CMD.. / CMP.. SM12
4×2.5 mm <sup>2</sup> + 2×1 mm <sup>2</sup>	1 333 250 3		DS56..B / CMD..BP / CMP..BP SB12
4×4 mm <sup>2</sup>	1 333 247 3		DS56 /CMD.. / CMP.. SM14
4×4 mm <sup>2</sup> + 2×1 mm <sup>2</sup>	1 333 251 1		DS56..B / CMD..BP / CMP..BP SB14



**4. Prefabricated cables and extension cables for connecting the VR forced cooling fan**

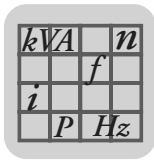
*VR forced cooling fan cable:*

Number of cores and line cross section	Part number	Routing type
3×1 mm <sup>2</sup>	198 634 1	Fixed routing
3×1 mm <sup>2</sup>	199 560 X	Cable carrier installation

2

*Extension cable for the VR forced cooling fan cable:*

Number of cores and line cross section	Part number	Routing type
3×1 mm <sup>2</sup>	199 561 8	Fixed routing
3×1 mm <sup>2</sup>	199 562 6	Cable carrier installation



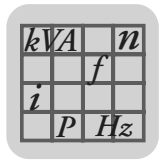
#### 5. Prefabricated cables for connecting option DEH11B / DER11B

The following overviews show the possible connections for the DEH11B and DER11B options.

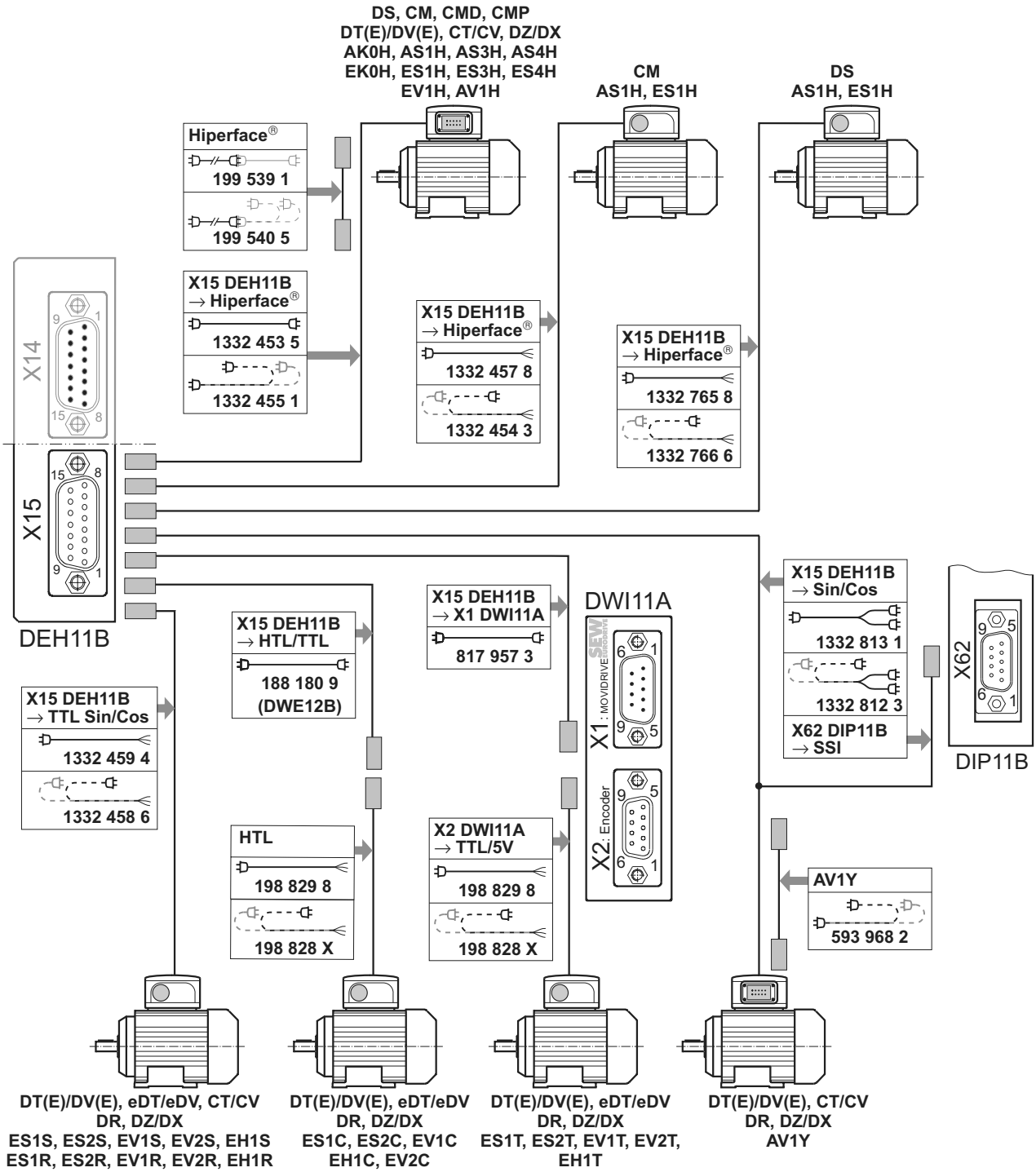
#### Meaning of the icons

The connection cables are assigned a part number and a symbol. The symbols have the following meaning:

Symbol	Meaning
 56047AXX	Connection cable connector → connector for fixed installation
 56051AXX	Extension connection cable connector → connector for fixed installation
 56048AXX	Connection cable connector → connector for cable carrier installation
 56052AXX	Extension connection cable connector → connector for cable carrier installation
 56049AXX	Connection cable connector → terminal box for fixed installation
 56050AXX	Connection cable connector → terminal box for cable carrier installation
 56053AXX	Connection cable connector → Y connector for fixed installation
 56054AXX	Connection cable connector → Y connector for cable carrier installation
 56489AXX	Connection cable connector → connector with crossed A/B track for reversing the direction of rotation (for fixed installation)
 56112AXX	Encoder connection via plug connector
 56113AXX	Encoder connection via encoder terminal strip
 56114AXX	Connection via plug connector on the motor side
 56115AXX	Connection via terminal box on the motor side



Connection options for X15 DEH11B

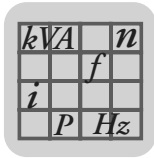


59103AXX



**NOTE**

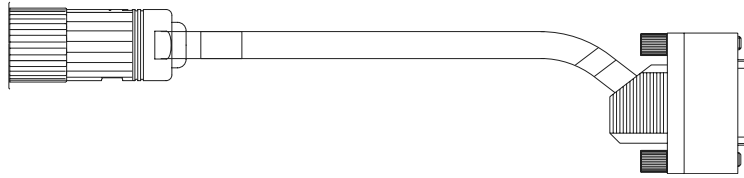
For the individual wiring diagrams, refer to the section "Installation" in the MOVIDRIVE® MDX60B/61B operating instructions.



## Technical Data and Dimension Drawings

### Prefabricated cables

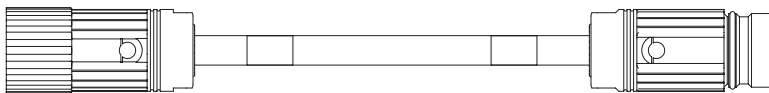
- Cable to connect HIPERFACE® encoders AK0H, AS1H, AS3H, AS4H, EK0H, ES1H, ES3H, ES4H, EV1H, AV1H with plug connector connection on the motor side to DS, CM, CMD, CMP, DT, DV, DT(E), DV(E), CT, CV, DZ or DX motors.



56135AXX

Type	Installation	Part number
DEH11B X15 → DS-/CM-/CMD-/CMP-/DT-/DV-/DT(E)-/DV(E)-/CT-/CV-/DZ/DX motors with AK0H, AS1H, AS3H, AS4H, EK0H, ES1H, ES3H, ES4H, EV1H, AV1H	 56047AXX	1332 453 5
	 56048AXX	1332 455 1

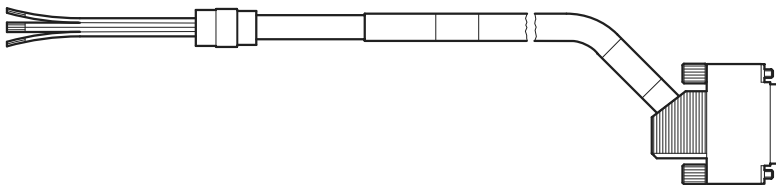
- Extension cable to connect HIPERFACE® encoders AK0H, AS1H, AS3H, AS4H, EK0H, ES1H, ES3H, ES4H, EV1H, AV1H with plug connector connection on the motor side to DS, CM, CMD, CMP, DT, DV, DT(E), DV(E), CT, CV, DZ or DX motors.



56136AXX

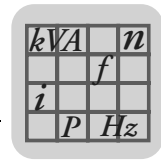
Type	Installation	Part number
DEH11B X15 → DS-/CM-/CMD-/CMP-/DT-/DV-/DT(E)-/DV(E)-/CT-/CV-/DZ/DX motors with AK0H, AS1H, AS3H, AS4H, EK0H, ES1H, ES3H, ES4H, EV1H, AV1H	 56051AXX	199 539 1
	 56052AXX	199 540 5

- Cable to connect HIPERFACE® encoders AS1H, ES1H with terminal box connection on the motor side to CM motors.

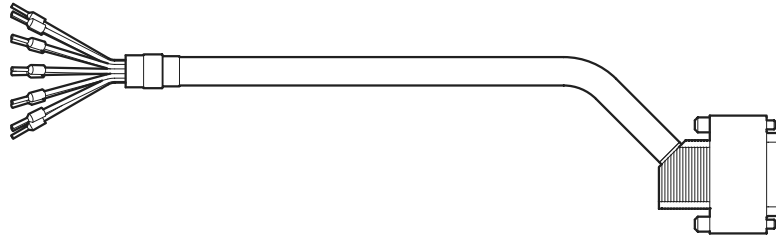


56137AXX

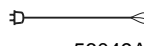
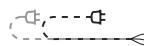
Type	Installation	Part number
DEH11B X15 → CM motors with AS1H, ES1H	 56049AXX	1332 457 8
	 56050AXX	1332 454 3



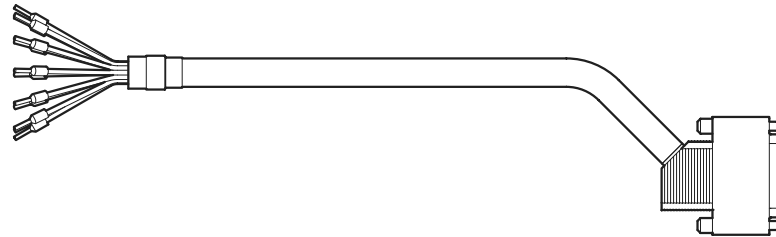
- Cable to connect HIPERFACE® encoders AS1H, ES1H with terminal box connection on the motor side to DS motors.



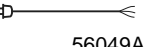
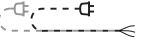
56132AXX

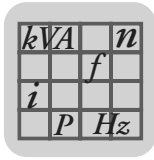
Type	Installation	Part number
DEH11B X15 → DS motors with AS1H, ES1H	 56049AXX	1332 765 8
	 56050AXX	1332 766 6

- Cable to connect sin/cos encoders ES1S, ES2S, EV1S, EV2S, EH1S, ES1R, ES2R, EV1R, EV2R, EH1R with terminal box connection on the motor side to CT, CV, DT(E), DV(E), eDT, eDV, DR, DZ and DX motors.



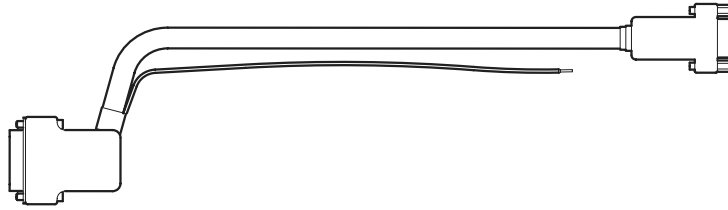
56132AXX

Type	Installation	Part number
DEH11B X15 → DT(E)/DV(E)/eDT/eDV/CT/CV/DR/DZ/DX motors with sin/cos encoders ES1S, ES2S, EV1S, EV2S, EH1S, ES1R, ES2R, EV1R, EV2R, EH1R	 56049AXX	1332 459 4
	 56050AXX	1332 458 6



**Technical Data and Dimension Drawings**  
**Prefabricated cables**

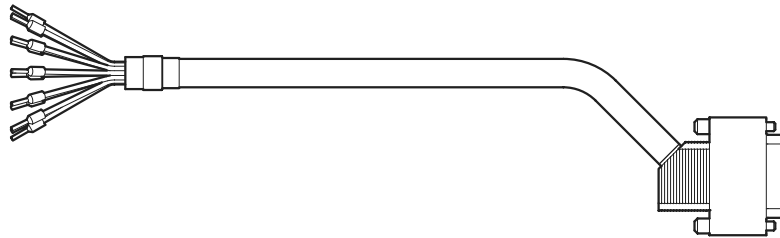
- Cable (option DWE12B, interface adapter HTL→TTL) to connect push-pull HTL encoders at X15 of option (→ section "Interface adapter DWE11B/12B").



59109AXX

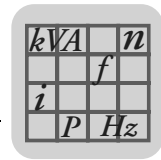
Type	Installation	Part number
DEH11B X15 → Option DWE12B (connection for push-pull HTL encoders)	 56047AXX	188 180 9

- Cable to connect push-pull HTL encoders ES1C, ES2C, EV1C, EV2C, EH1C with terminal box connection on the motor side to DT(E), DV(E), eDT, eDV, DR, DZ and DX motors.

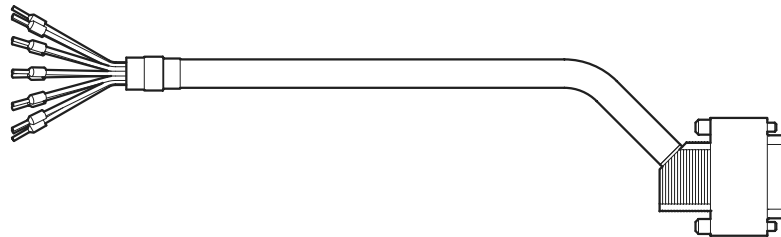


56132AXX

Type	Installation	Part number
Push-pull HTL encoders ES1C, ES2C, EV1C, EV2C, EH1C → DT(E)/DV(E)/eDT/eDV/DR/DZ/DX motors	 56049AXX	198 829 8
	 56050AXX	198 828 X



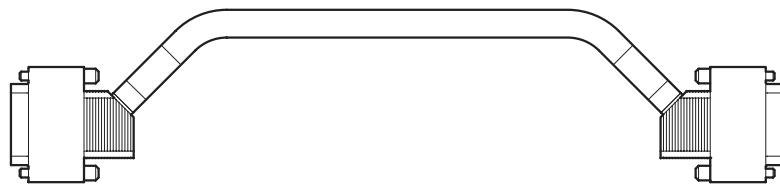
- Cable to connect DC 5 V TTL sensors ES1T, ES2T, EV1T, EV2T, EH1T with terminal box connection on the motor side (DT(E), DV(E), eDT, eDV, DR, DZ or DX motors) to DC 5 V encoder power supply type DWI11A.



56132AXX

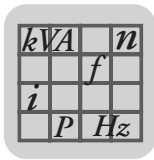
Type	Installation	Part number
DC 5 V TTL sensors ES1T, ES2T, EV1T, EV2T, EH1T → DWI11A X2	 56049AXX	198 829 8
	 56050AXX	198 828 X

- Cable to connect the DC 5 V encoder power supply type DWI11A via plug connector.



56109AXX

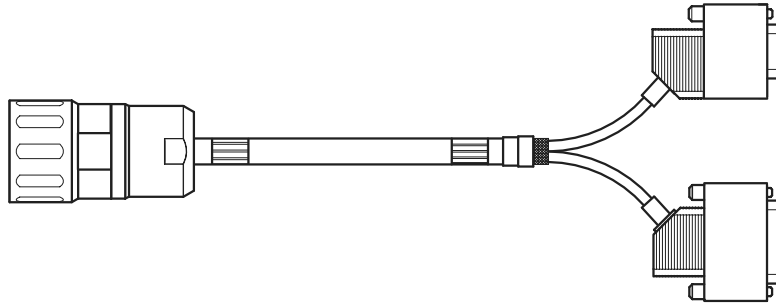
Type	Installation	Part number
DEH11B X15 → DWI11A X1	 56047AXX	817 957 3



## Technical Data and Dimension Drawings

### Prefabricated cables

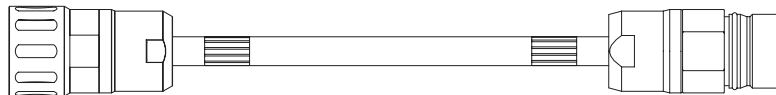
- Y cable to connect the AV1Y absolute encoder with plug connector on the motor side to DT(E), DV(E), CT, CV, DR, DZ and DX motors. The following encoder tracks are evaluated with the Y cable:
  - SSI track of the AV1Y absolute encoder and at DIP11B X62
  - sin/cos track of the AV1Y absolute encoder at DEH11B X15



59321AXX

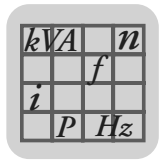
Type	Installation	Part number
DEH11B X15 → AV1Y and DIP11B X62	 56053AXX	1332 813 1
	 56054AXX	1332 812 3

- Extension cable to connect the AV1Y absolute encoder with plug connector on the motor side to DT(E), DV(E), CT, CV, DR, DZ und DX motors.

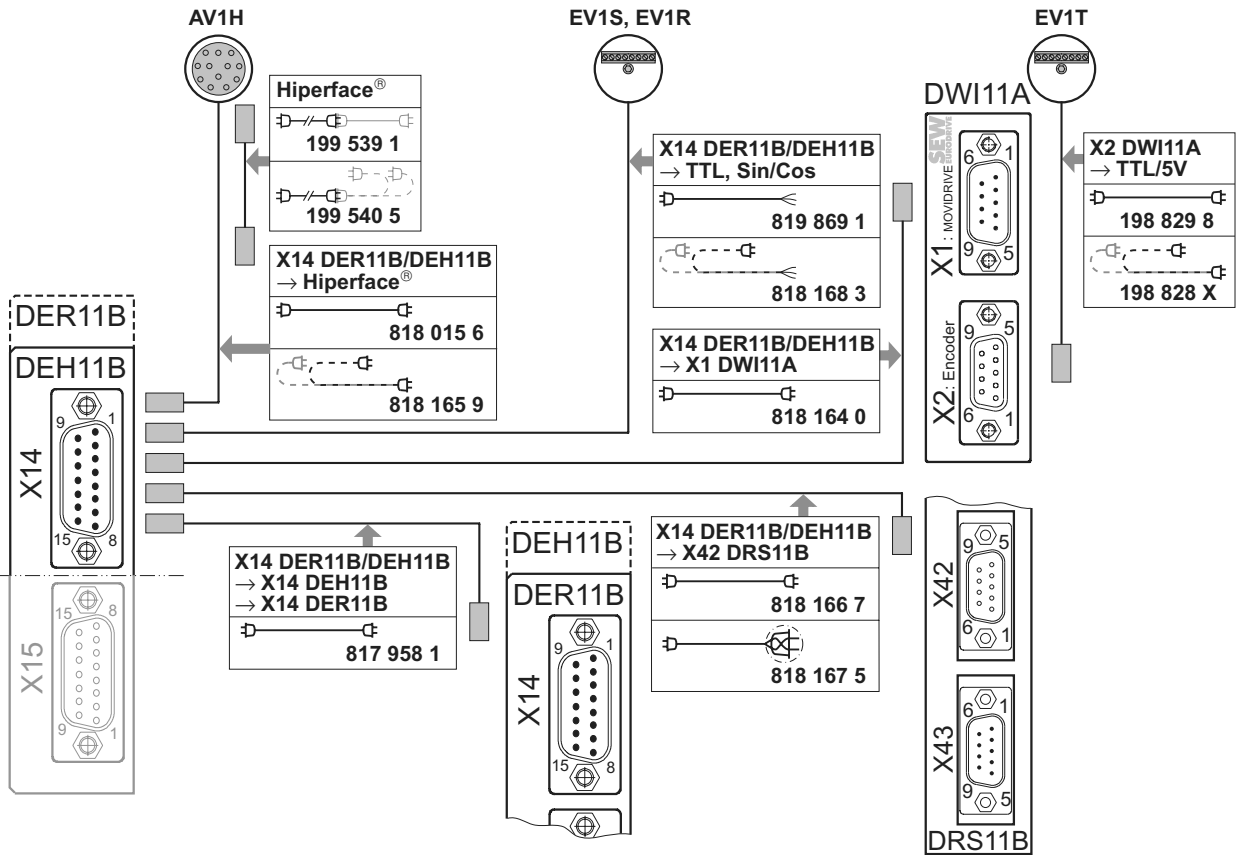


56131AXX

Type	Installation	Part number
DT(E)/DV(E)/CT/CV/DR/DZ/DX motors → AV1Y	 56052AXX	593 968 2



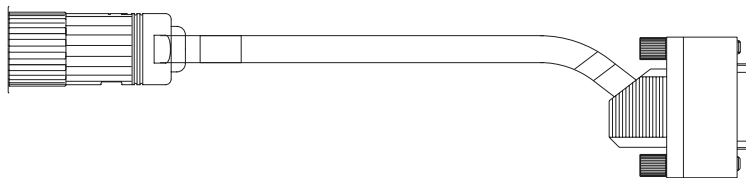
Connection options for X14, DEH11B / DER11B



56479BXX

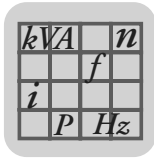
	<b>NOTE</b>
	For the individual wiring diagrams, refer to the section "Installation" in the MOVIDRIVE® MDX60B/61B operating instructions.

- Cable to connect external HIPERFACE® encoders AV1H, AS1H, ES1H via plug connector.



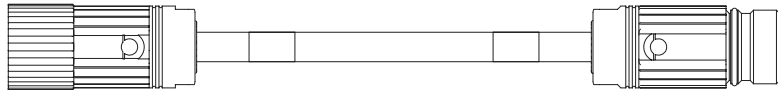
56130AXX

Type	Installation	Part number
DEH11B / DER11B X14 → AV1H, AS1H, ES1H	 56047AXX	818 015 6
	 56048AXX	818 165 9



**Technical Data and Dimension Drawings**  
Prefabricated cables

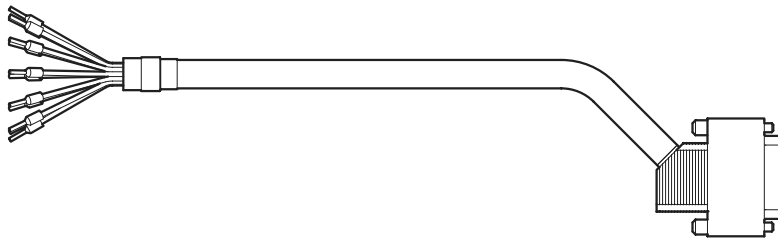
- Extension cable to connect external HIPERFACE® encoders AV1H, AS1H, ES1H via plug connector.



56131AXX

Type	Installation	Part number
DEH11B / DER11B X14 → AV1H, AS1H, ES1H	 56051AXX	199 539 1
	 56052AXX	199 540 5

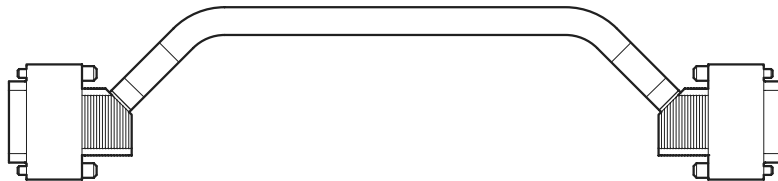
- Cable to connect external sin/cos encoders via encoder terminal strip.



56132AXX

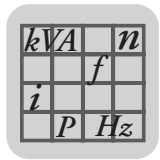
Type	Installation	Part number
DEH11B / DER11B X14 → sin/cos encoders	 56049AXX	819 869 1
	 56050AXX	818 168 3

- Cable to connect the DC 5 V encoder power supply type DWI11A via plug connector.

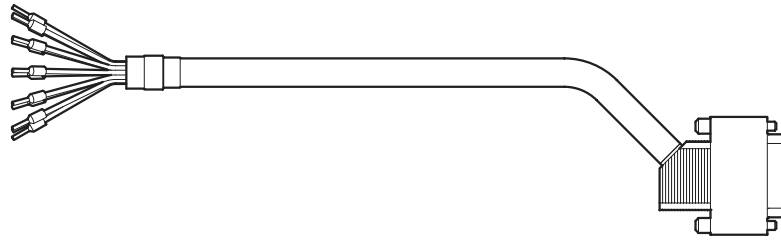


56109AXX


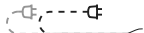
Type	Installation	Part number
DEH11B / DER11B X14 → DWI11A X1	 56047AXX	818 164 0



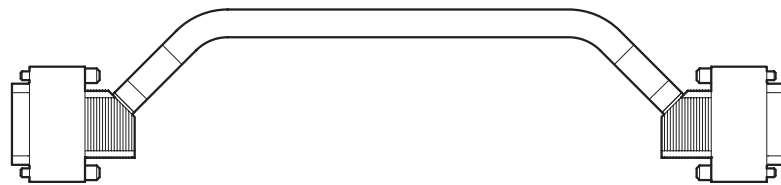
- Cable to connect an external DC 5 V TTL sensor to the DC 5 V encoder power supply type DWI11A via encoder terminal strip.



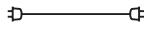
56132AXX

Type	Installation	Part number
DC 5 V TTL sensor → DWI11A X2	 56049AXX	198 829 8
	 56050AXX	198 828 X

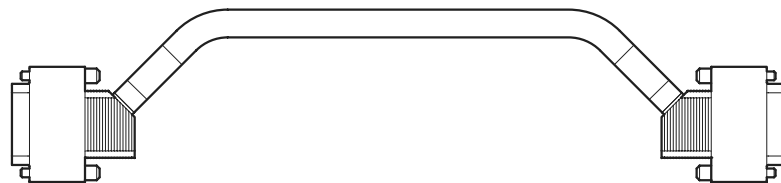
- Cable to connect a master/slave connection.



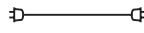
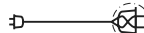
56109AXX

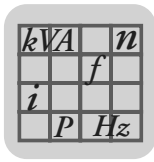
Type	Installation	Part number
DEH11B/DER11B X14 → DER11B/DEH11B X14	 56047AXX	817 958 1

- Cable to connect the encoder simulation (DEH11B/DER11B:X14) of the master to terminal X42 of option DRS11B.

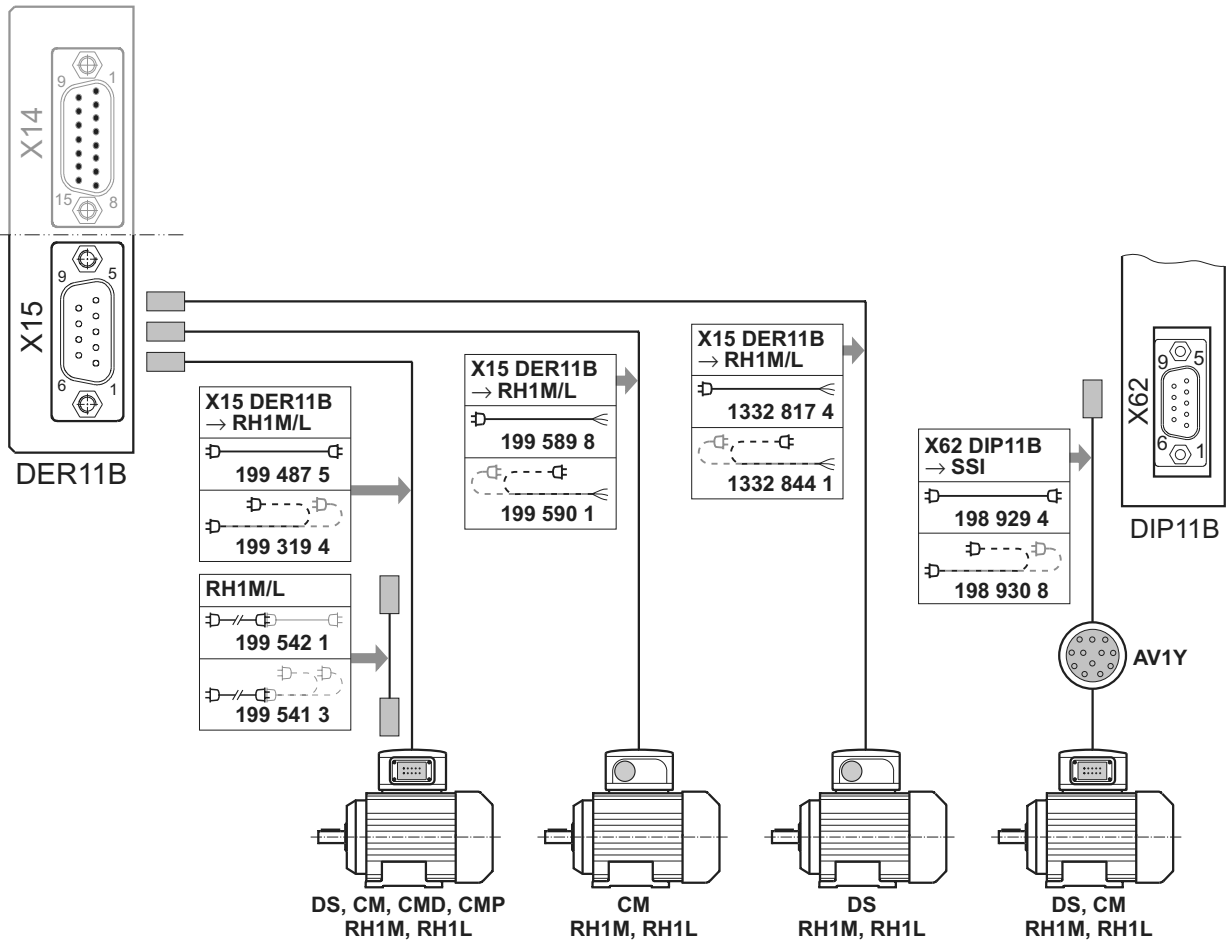


56109AXX

Type	Installation	Part number
DEH11B/DER11B X14 → DRS11B X42 (master and slave turn in the same direction)	 56047AXX	0818 166 7
DEH11B/DER11B X14 → DRS11B X42 (master and slave turn in opposite directions)	 56489AXX	0818 167 5



Connection options for X15 DER11B

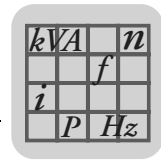


56483BXX



**NOTE**

For the individual wiring diagrams, refer to the section "Installation" in the MOVIDRIVE® MDX60B/61B operating instructions.



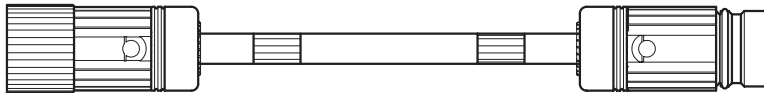
- Cable to connect resolvers RH1M / RH1L with plug connector connection on the motor side to DS, CM, CMD or CMP motors.



56138AXX

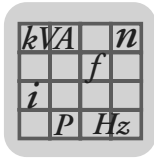
Type	Installation	Part number
DER11B X15 → DS/CM/CMD/CMP motors with RH1M/RH1L	 56047AXX	199 487 5
	 56048AXX	199 319 4

- Extension cable to connect resolvers RH1M / RH1L with plug connector connection on the motor side to DS, CM, CMD or CMP motors.



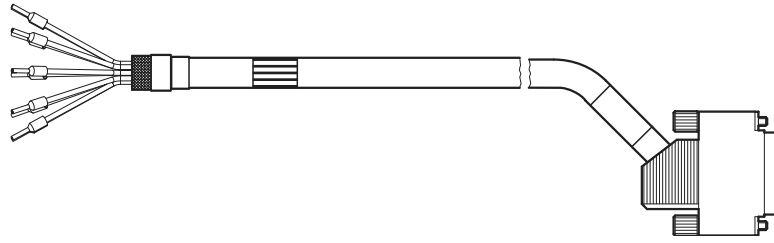
56139AXX

Type	Installation	Part number
DER11B X15 → DS/CM/CMD/CMP motors with RH1M/RH1L	 56051AXX	199 542 1
	 56052AXX	199 541 3




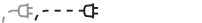


**Technical Data and Dimension Drawings**  
**Prefabricated cables**

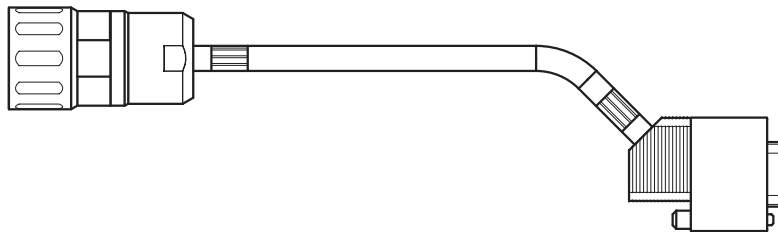
- Cable to connect resolvers RH1M / RH1L with terminal box connection on the motor side to CM and DS motors.




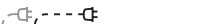
56142AXX

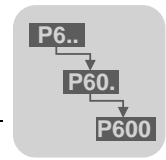
Type	Installation	Part number
DER11B X15 → CM motors with RH1M/RH1L	 56049AXX	199 589 8
	 56050AXX	199 590 1
DER11B X15 → DS motors with RH1M/RH1L	 56049AXX	1332 817 4
	 56050AXX	1332 844 1

- CM and DS motors with integrated resolver: Additional cable to connect the AV1Y absolute encoder with plug connector connection on the motor side to DIP11B X62.



56143AXX

Type	Installation	Part number
DS/CM motors with AV1Y → DIP11B X62	 56047AXX	198 929 4
	 56048AXX	198 930 8



### 3 Parameters

Generally speaking, the parameter menu is only required for startup and in case of service. That is the reason why MOVIDRIVE® is designed as a basic unit without keypad. You can equip the MOVIDRIVE® with a PC connection or a keypad.

You can set the MOVIDRIVE® parameters in various ways:

- With the optional keypad type DBG60B.
- With the MOVITOOLS® PC program (includes SHELL, SCOPE and IPOS<sup>plus</sup>® programming).
- Using the serial interfaces.
- Using the fieldbus interfaces.
- Using IPOS<sup>plus</sup>®.

You can download the latest version of the MOVITOOLS® program from the SEW homepage [www.sew-eurodrive.de](http://www.sew-eurodrive.de).

#### 3.1 Menu structure DBG60B

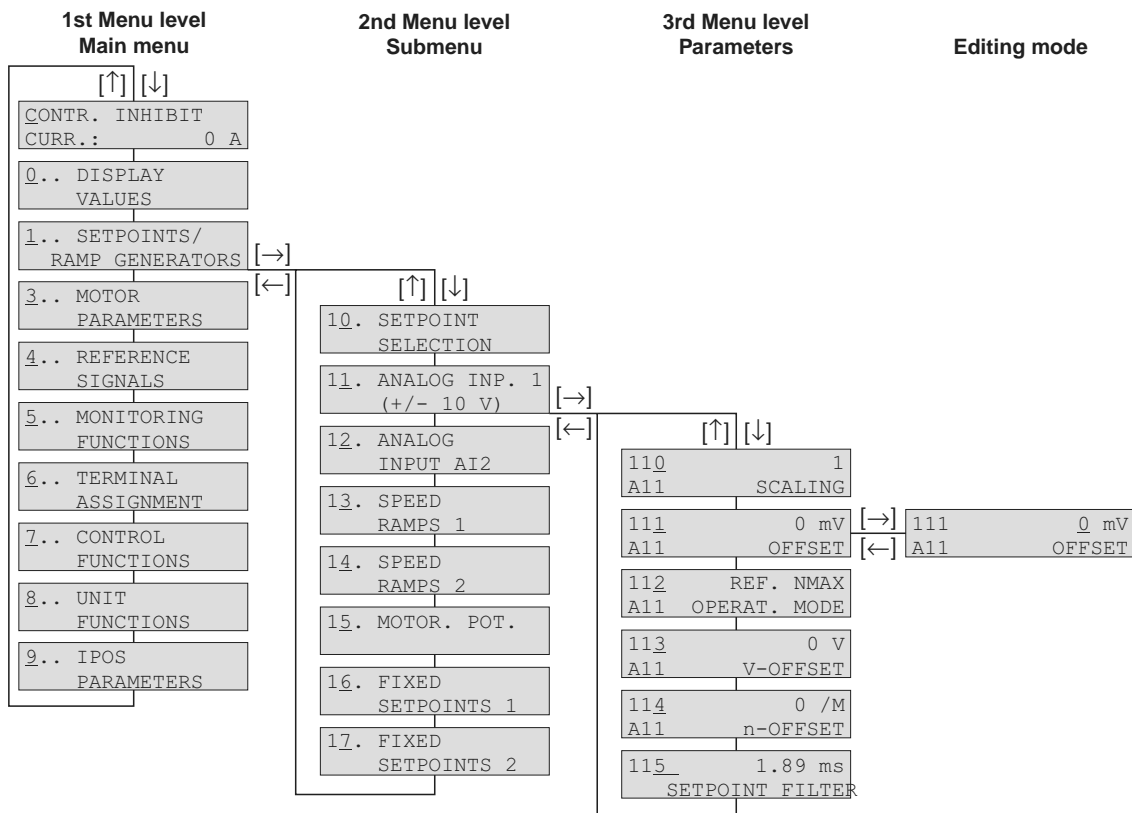
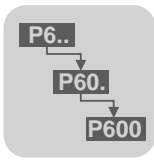


Figure 39: Structure of the DBG60B menu

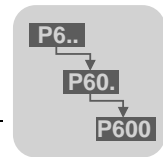
02407AEN



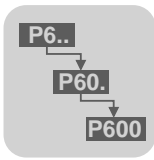
### 3.2 Overview of parameters

The following table lists all parameters together with their setting range and the factory settings (underlined):

0xx	Display values	
00x	<b>Process values</b>	
000	Speed	
001	User display	
002	Frequency	
003	Actual position	
004	Output current	
005	Active current	
006 / 007	Motor utilization 1 / 2	
008	DC link voltage	
009	Output current	
01x	<b>Status displays</b>	
010	Inverter status	
011	Operating state	
012	Fault status	
013	Current parameter set	
014	Heat sink temperature	
015	Hours of operation	
016	Enable hours	
017	Work	
018 / 019	KTY capacity utilization 1 / 2	
02x	<b>Analog setpoints</b>	
020 / 021	Analog input AI1/AI2	
022	External current limitation	
03x	<b>Binary inputs basic unit</b>	
030 ... 037	Binary input DI00 ... DI07	
039	Binary inputs DI00 ... DI07	
04x	<b>Binary inputs option</b>	
040 ... 047	Binary input DI10 ... DI17	
048	Binary inputs DI10 ... DI17	
05x	<b>Binary outputs basic unit</b>	
050	Binary output DB00	
051 ... 055	Binary output DO01 ... DO05	
059	Binary outputs DB00, DO01 ... DO05	
06x	<b>Binary outputs option</b>	
060 ... 067	Binary output DO10 ... DO17	
068	Binary outputs DO10 ... DO17	
07x	<b>Unit data</b>	
070	Unit type	
071	Rated output current	
072	Option / firmware encoder slot	
073	Option / firmware fieldbus slot	



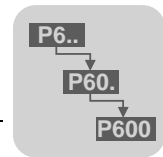
074	Option / firmware expansion slot	
076	Firmware basic unit	
078	Technology function	
079	Unit type	
08x	<b>Fault memory</b>	
080 ... 084	Fault t-0 ... t-4	
09x	<b>Bus diagnostics</b>	
090	PD configuration	
091	Fieldbus type	
092	Fieldbus baud rate	
093	Fieldbus address	
094 ... 096	PO1 ... PO3 Setpoint	
097 ... 099	PI1 ... PI3 Actual value	
1xx	<b>Setpoints/ ramp generators</b>	
10x	<b>Setpoint selection</b>	
100	Setpoint source	<u>UNIPOL/FIX.SETPT</u>
101	Control signal source	<u>TERMINALS</u>
102	Frequency scaling	0.1 ... <u>10</u> ... 65 kHz
11x	<b>Analog input AI1</b>	
110	AI1 scaling	-10 ... 0 ... <u>1</u> ... 10
111	AI1 Offset	-500 ... <u>0</u> ... 500 mV
112	AI1 operating mode	<u>Ref. N-MAX</u>
113	AI1 voltage offset	-10 ... <u>0</u> ... 10 V
114	AI1 speed offset	-6000 ... <u>0</u> ... 6000 1/min
115	Filter setpoint	0 ... <u>5</u> ... 100 ms, 0 = OFF
12x	<b>Analog inputs option</b>	
120	AI2 operating mode (optional)	<u>NO FUNCTION</u>
13x / 14x	<b>Speed ramps 1 / 2</b>	
130 / 140	Ramp t11 / t21 up CW	0 ... <u>2</u> ... 2000 s
131 / 141	Ramp t11 / t21 down CW	0 ... <u>2</u> ... 2000 s
132 / 142	Ramp t11 / t21 up CCW	0 ... <u>2</u> ... 2000 s
133 / 143	Ramp t11/ t21 down CCW	0 ... <u>2</u> ... 2000 s
134 / 144	Ramp t12 / t22 UP = DOWN	0 ... <u>10</u> ... 2000 s
135 / 145	S pattern t12 / t22	<u>0</u> ... 3
136 / 146	Stop ramp t13 / t23	0 ... <u>2</u> ... 20 s
137 / 147	Emergency ramp t14 / t24	0 ... <u>2</u> ... 20 s
138	Ramp limit VFC	<u>YES</u> / NO
139 / 149	Ramp monitoring 1 / 2	YES / <u>NO</u>
15x	<b>Motor potentiometer</b>	
150	Ramp t3 up	0.2 ... <u>20</u> ... 50 s
151	Ramp t3 down	0.2 ... <u>20</u> ... 50 s
152	Save last setpoint	ON / <u>OFF</u>



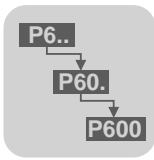
## Parameters

### Overview of parameters

16x / 17x	<b>Fixed setpoints 1 / 2</b>	
160 / 170	Internal setpoint n11 / n21	-6000 ... <u>150</u> ... 6000 1/min (% I <sub>N</sub> )
161 / 171	Internal setpoint n12 / n22	-6000 ... <u>750</u> ... 6000 1/min (% I <sub>N</sub> )
162 / 172	Internal setpoint n13 / n23	-6000 ... <u>1500</u> ... 6000 1/min (% I <sub>N</sub> )
<b>2xx</b>	<b>Controller parameters</b>	
<b>20x</b>	<b>Speed control</b>	
200	P gain n controller	0.01 ... <u>2</u> ... 32
201	Time constant n-controller	0 ... <u>10</u> ... 3000 ms
202	Gain acceleration feedforward	<u>0</u> ... 65
203	Filter acceleration feedforward	<u>0</u> ... 100 ms
204	Filter speed actual value	<u>0</u> ... 32 ms
205	Load feedforward CFC	-150 ... <u>0</u> ... 150 %
206	Sampling time n-controller	<u>1 ms</u> / 0.5 ms
207	Load feedforward VFC	-150 ... <u>0</u> ... 150 %
<b>21x</b>	<b>Hold controller</b>	
210	P gain hold controller	0.1 ... <u>0.5</u> ... 32
<b>22x</b>	<b>Synchronous operation control (only with the DRS11B option)</b>	
220	P-gain DRS	1 ... <u>10</u> ... 200
221	Master gear unit factor	<u>1</u> ... 3 999 999 999
222	Slave gear unit factor	<u>1</u> ... 3 999 999 999
223	Mode selection	<u>Mode 1</u> ... mode 8
224	Slave counter	-99 999 999 ... <u>10</u> ... 99 999 999
225	Offset 1	-32 767 ... <u>10</u> ... 32 767
226	Offset 2	-32 767 ... <u>10</u> ... 32 767
227	Offset 3	-32 767 ... <u>10</u> ... 32 767
228	Feedforward filter DRS	<u>0</u> ... 100 ms
<b>23x</b>	<b>Synchronous operation with synchronous encoder (only with the DRS11B option)</b>	
230	Synchronous encoder	<u>OFF</u> / EQUAL-RANKING / CHAIN
231	Factor slave encoder	<u>1</u> ... 1000
232	Factor slave synchronous encoder	<u>1</u> ... 1000
233	Synchronous encoder resolution	128 / 256 / 512 / <u>1024</u> / 2048
234	Master encoder resolution	128 / 256 / 512 / <u>1024</u> / 2048
<b>24x</b>	<b>Synchronous operation with catch up</b>	
240	Synchronous speed	-6000 ... <u>1500</u> ... 6000 1/min
241	Synchronous ramp	0 ... <u>2</u> ... 50 s
<b>26x</b>	<b>Process controller parameters</b>	
260	Operating mode	<u>Controller off</u> / Control / Step response
261	Cycle time	1 / <u>5</u> / 10 ms
262	Interruption	<u>No response</u> / Move closer to setpoint
263	Factor K <sub>P</sub>	0 ... <u>1</u> ... 32,767
264	Integrative time T <sub>n</sub>	<u>0</u> ... 10 ... 65535 ms
265	Derivative time T <sub>v</sub>	<u>0</u> ... 1 ... 30 ms
266	Feedforward	-32767 ... <u>0</u> ... 32767 [0.2/min]
<b>27x</b>	<b>Process controller input values</b>	
270	Setpoint source	<u>Parameter</u> / IPOS variable / Analog 1 / Analog 2
271	setpoint	-32767 ... <u>0</u> ... 32767 [0.2/min]
272	IPOS setpoint address	<u>0</u> ... 1023
273	Time constant	<u>0</u> ... 0.01 ... 2000 s



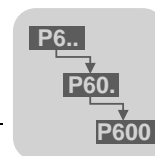
274	Scaling setpoint	-32.767 ... <u>1</u> ... 32.767
275	Actual value source	<u>Analog 1</u> / Analog 2 / IPOS variable
276	IPOS actual value address	<u>0</u> ... 1023
277	Actual scaling factor	-32.767 ... <u>1</u> ... 32.767
278	Actual offset value	-32767 ... <u>0</u> ... 32767
279	Actual time constant	<u>0</u> ... 500 ms
28x	<b>Process controller limits</b>	
280	Minimum offset + actual value	-32767 ... <u>0</u> ... 32767
281	Maximum offset + actual value	-32767 ... <u>10000</u> ... 32767
282	Minimum output PID controller	-32767 ... <u>-1000</u> ... 32767 [0.2/min]
283	PID controller maximum output	-32767 ... <u>10000</u> ... 32767 [0.2 / min]
284	Minimum output process controller	-32767 ... <u>0</u> ... 32767 [0.2/min]
285	Maximum output process controller	-32767 ... <u>7500</u> ... 32767 [0.2/min]
<b>3xx</b>	<b>Motor parameters</b>	
30x / 31x	<b>Limits 1 / 2</b>	
300 / 310	Start/stop speed 1 / 2	0 ... 150 1/min
301 / 311	Minimum speed 1 / 2	0 ... <u>15</u> ... 6100 1/min
302 / 312	Maximum speed 1 / 2	0 ... <u>1500</u> ... 6100 1/min
303 / 313	Current limit 1 / 2	0 ... 150 % I <sub>N</sub> (BG0: 0 ... 200 % I <sub>N</sub> )
304	Torque limit	<u>0</u> ... 150 % (BG0: 0 ... 200 %)
32x / 33x	<b>Motor compensation 1 / 2 (asynchronous)</b>	
320 / 330	Automatic adjustment 1/2	<u>ON</u> / OFF
321 / 331	Boost 1 / 2	<u>0</u> ... 100 %
322 / 332	×R compensation 1 / 2	0 ... 100 %
323 / 333	Premagnetizing time 1 / 2	0 ... 2 s
324 / 334	Slip compensation 1 / 2	0 ... 500 1/min
34x	<b>Motor protection</b>	
340 / 342	Motor protection 1 / 2	<u>OFF</u> / ON ASYNCHRONOUS / ON SERVO
341 / 343	Cooling type 1 / 2	<u>FAN COOLED</u> / FORCED COOLING
344	Interval for motor protection	0.1... <u>4</u> ...20 s
345 / 346	I <sub>N</sub> -UL monitoring 1 / 2	0.1 ... 500 A
35x	<b>Direction of rotation of the motor</b>	
350 / 351	Change direction of rotation 1 / 2	ON / <u>OFF</u>
36x	<b>Startup (only available in DBG60B)</b>	
360	Startup	YES / <u>NO</u>
<b>4xx</b>	<b>Reference signals</b>	
40x	<b>Speed reference signal</b>	
400	Speed reference value	0 ... <u>1500</u> ... 6000 1/min
401	Hysteresis	0 ... <u>100</u> ... 500 1/min
402	Deceleration time	0 ... <u>1</u> ... 9 s
403	Signal = "1" if:	<u>n ≤ n<sub>ref</sub></u> / n > n <sub>ref</sub>
41x	<b>Speed window signal</b>	
410	Window center	0 ... <u>1500</u> ... 6000 1/min
411	Range width	<u>0</u> ... 6000 1/min
412	Deceleration time	0 ... <u>1</u> ... 9 s
413	Signal = "1" if:	<u>INSIDE</u> / OUTSIDE



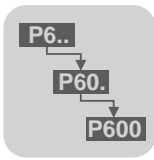
## Parameters

### Overview of parameters

42x	<b>Speed setpoint/actual value comparison</b>	
420	Hysteresis	0 ... <u>100</u> ... 300 1/min
421	Deceleration time	0 ... <u>1</u> ... 9 s
422	Signal = "1" if:	$n \neq n_{\text{setpt}} / \underline{n} = n_{\text{setpt}}$
43x	<b>Current reference signal</b>	
430	Current reference value	0 ... <u>100</u> ... 200 % $I_N$
431	Hysteresis	0 ... <u>5</u> ... 30 % $I_N$
432	Deceleration time	0 ... <u>1</u> ... 9 s
433	Signal = "1" if:	$I < I_{\text{ref}} / I > I_{\text{ref}}$
44x	<b>I<sub>max</sub> signal</b>	
440	Hysteresis	0 ... <u>5</u> ... 50 % $I_N$
441	Deceleration time	0 ... <u>1</u> ... 9 s
442	Signal = "1" if:	$I = I_{\text{max}} / \underline{I} < I_{\text{max}}$
5xx	<b>Monitoring functions</b>	
50x	<b>Speed monitoring</b>	
500 / 502	Speed monitoring 1 / 2	OFF / MOTOR / REGENERATIVE / <u>MOT.&amp;REGEN.MODE</u>
501 / 503	Delay time 1 / 2	0 ... <u>1</u> ... 10 s
504	Encoder monitoring motor	YES / <u>NO</u>
505	Synchronous encoder monitoring	YES / <u>NO</u>
51x	<b>Synchronous operation monitoring</b>	
510	Positional tolerance slave	10 ... <u>25</u> ... 32 768 inc.
511	Prewarning setpoint deviation	<u>50</u> ... 99 999 999 inc.
512	Setpoint deviation limit	100 ... <u>4000</u> ... 99 999 999
513	Delay lag error signal	0 ... <u>1</u> ... 99 s
514	Counter LED display	10 ... <u>100</u> ... 32 768 inc.
515	Delay in-position signal	5 ... <u>10</u> ... 2000 ms
516	X41 Encoder monitoring	<u>NO</u> / YES
517	X41 Pulse count monitoring	<u>NO</u> / YES
518	X42 Encoder monitoring	<u>NO</u> / YES
519	X42 Pulse count monitoring	<u>NO</u> / YES
52x	<b>Mains OFF monitoring</b>	
520	Mains OFF response time	<u>0</u> ... 5 s
521	Mains OFF response	<u>CONTROL.INHIBIT</u> / EMERGENCY STOP
522	Phase failure monitoring	OFF / <u>ON</u>
53x	<b>Motor temperature protection</b>	
530	Sensor type 1	<u>No sensor</u> / TF-TH / KTY
531	Sensor type 2	<u>No sensor</u> / TF-TH / KTY
54x	<b>Gear unit/motor monitoring functions</b>	
540	Response drive vibration / warning	<u>Display fault</u>
541	Response drive vibration / fault	<u>Rapid stop/Warning</u>
542	Response oil aging / warning	<u>Display fault</u>
543	Response oil aging / fault	<u>Display fault</u>
544	Response oil aging/overtemperature	<u>Display fault</u>
545	Response oil aging/ready signal	<u>Display fault</u>
549	Response brake wear	<u>Display fault</u>



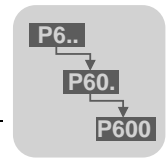
6xx	Terminal assignment	
60x	<b>Binary inputs basic unit</b>	
600	Binary input DIØ1	<u>CW/STOP</u>
601	Binary input DIØ2	<u>CCW/STOP</u>
602	Binary input DIØ3	<u>ENABLE/STOP</u>
603	Binary input DIØ4	<u>n11/n21</u>
604	Binary input DIØ5	<u>n12/n22</u>
605	Binary input DIØ6	<u>NO FUNCTION</u>
606	Binary input DIØ7	<u>NO FUNCTION</u>
61x	<b>Binary inputs option</b>	
610 ... 617	Binary inputs DI1Ø ... DI17	<u>NO FUNCTION</u>
62x	<b>Binary outputs basic unit</b>	
620	Binary output DOØ1	<u>READY FOR OPERATION</u>
621	Binary output DOØ2	<u>/FAULT</u>
622	Binary output DOØ3	<u>IPOS OUTPUT</u>
623	Binary output DOØ4	<u>IPOS OUTPUT</u>
624	Binary output DOØ5	<u>IPOS OUTPUT</u>
63x	<b>Binary outputs option</b>	
630 ... 637	Binary outputs DO1Ø ... DO17	<u>NO FUNCTION</u>
64x	<b>Optional analog outputs</b>	
640	Analog output AO1	<u>ACTUAL SPEED</u>
641	Scaling AO1	-10 ... 0 ... <u>1</u> ... 10
642	Operating mode AO1	OFF / <u>-10 V...+10 V</u> / 0(4) ... 20 mA
643	Analog output AO2	<u>OUTPUT CURRENT</u>
644	Scaling AO2	-10 ... 0 ... <u>1</u> ... 10
645	Operating mode AO2	OFF / <u>-10 V...+10 V</u> / 0(4) ... 20 mA
7xx	<b>Control functions</b>	
70x	<b>Operating modes</b>	
700 / 701	Operating mode 1 / 2	<u>VFC 1 / 2</u>
71x	<b>Standstill current</b>	
710 / 711	Standstill current 1 / 2	<u>0 ... 50 % I<sub>Mot</sub></u>
72x	<b>Setpoint stop function</b>	
720 / 723	Setpoint stop function 1 / 2	<u>ON / OFF</u>
721 / 724	Stop setpoint 1 / 2	0 ... <u>30</u> ... 500 1/min
722 / 725	Start offset 1 / 2	0 ... <u>30</u> ... 500 1/min
73x	<b>Brake function</b>	
730 / 733	Brake function 1 / 2	<u>ON</u> / OFF
731 / 734	Brake release time 1 / 2	0 ... 2 s
732 / 735	Brake application time 1 / 2	0 ... 2 s
74x	<b>Speed hide</b>	
740 / 742	Skip window center 1 / 2	0 ... <u>1500</u> ... 6000 1/min
741 / 743	Skip width 1 / 2	<u>0</u> ... 300 1/min
75x	<b>Master/slave function</b>	
750	Slave setpoint	<u>MASTER-SLAVE OFF</u>
751	Scaling slave setpoint	-10 ... 0 ... <u>1</u> ... 10
76x	<b>Manual operation</b>	
760	Locking Run/Stop keys	YES / <u>NO</u>



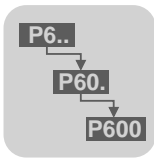
## Parameters

### Overview of parameters

77x	<b>Energy-saving function</b>	
770	Energy-saving function	ON / OFF
78x	<b>Ethernet configuration</b>	
780	IP address	000.000.000.000 ... <u>192.168.10.x</u> ... 223.255.255.255
781	Subnetwork mask	000.000.000.000 ... <u>255.255.255.000</u> ... 255.255.255.255
782	Standard gateway	<u>000.000.000.000</u> ... 223.255.255.255
783	Baud rate [MBaud]	
784	MAC address	
785	EtherNet/IP startup configuration	<u>DHCP</u> / Saved IP parameters
<b>8xx</b>	<b>Unit functions</b>	
80x	<b>Setup</b>	
800	User menu	<u>ON</u> / OFF (only in DBG60B)
801	Language	Dependent on DBG60B version
802	Factory setting	<u>NO</u> / DEFAULT STANDARD / DELIVERY STATUS
803	Parameter lock	ON / <u>OFF</u>
804	Reset statistics data	<u>NO</u> / FAULT MEMORY / kWh METER / OPERATING HOURS
806	Copy DBG→MDX	YES / <u>NO</u> (in DBG60B only)
807	Copy MDX→DBG	YES / <u>NO</u> (in DBG60B only)
81x	<b>Serial communication</b>	
810	RS-485 address	<u>0</u> ... 99
811	RS485 group address	<u>100</u> ... 199
812	RS485 timeout delay	<u>0</u> ... 650 s
819	Fieldbus timeout delay	0 ... <u>0.5</u> ... 650 s
82x	<b>Brake operation</b>	
820 / 821	4-quadrant operation 1 / 2	<u>ON</u> / OFF
83x	<b>Fault responses</b>	
830	Response EXT. FAULT	<u>EMERG.STOP/FAULT</u>
831	Response FIELDBUS TIMEOUT	<u>RAPID STOP/FAULT</u>
832	Response MOTOR OVERLOAD	<u>EMERG.STOP/FAULT</u>
833	Response RS485 TIMEOUT	<u>RAPID STOP/WARNG</u>
834	LAG ERROR response	<u>EMERG.STOP/FAULT</u>
835	Response TF SIGNAL	<u>NO RESPONSE</u>
836 / 837	Response SBus TIMEOUT 1 / 2	<u>EMERG.STOP/FAULT</u>
838	Response SW LIMIT SWITCH	<u>EMERG.STOP/FAULT</u>
84x	<b>Reset behavior</b>	
840	Manual reset	YES / <u>NO</u>
841	Auto reset	ON / <u>OFF</u>
842	Restart time	1 ... <u>3</u> ... 30 s
85x	<b>Scaling actual speed value</b>	
850	Scaling factor numerator	<u>1</u> ... 65 535
851	Scaling factor denominator	<u>1</u> ... 65 535
852	User-defined unit	<u>1/min</u>
86x	<b>Modulation</b>	
860 / 861	PWM frequency 1 / 2 VFC	<u>4</u> / 8 / 12 / 16 kHz
862 / 863	PWM fix 1/2	ON / <u>OFF</u>
864	PWM CFC	<u>4</u> / 8 / 16 kHz
87x	<b>Process data description</b>	
870	Setpoint description PO1	<u>CONTROL WORD 1</u>



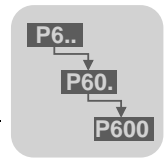
871	Setpoint description PO2	<u>SPEED</u>
872	Setpoint description PO3	<u>NO FUNCTION</u>
873	Actual value description PI1	<u>STATUS WORD 1</u>
874	Actual value description PI2	<u>SPEED</u>
875	Actual value description PI3	<u>OUTPUT CURRENT</u>
876	PO data enable	<u>ON / OFF</u>
88x / 89x	<b>Serial communication SBus 1 / 2</b>	
880 / 890	Protocol SBus 1 / 2	<u>SBus MOVILINK / CANopen</u>
881 / 891	SBus address 1 / 2	<u>0 ... 63</u>
882 / 892	SBus group address 1 / 2	<u>0 ... 63</u>
883 / 893	SBus timeout delay 1 / 2	<u>0 ... 650 s</u>
884 / 894	Baud rate SBus 1 / 2	125 / 250 / <u>500</u> / 1000 kBaud
885 / 895	Synchronization ID SBus 1 / 2	<u>0 ... 2047</u>
886 / 896	CANopen address 1 / 2	1 ... <u>127</u>
887	Synchronization ext. Description	<u>ON / OFF</u>
888	Synchronization time	1 ... <u>5</u> ... 10 ms
889 / 899	Parameter channel 2	<u>YES / NO</u>
<b>9xx</b>	<b>IPOS parameters</b>	
90x	<b>IPOS Reference travel</b>	
900	Reference offset	$-(2^{31}-1) \dots 0 \dots 2^{31}-1$ inc.
901	Reference speed 1	0 ... <u>200</u> ... 6000 1/min
902	Reference speed 2	0 ... <u>50</u> ... 6000 1/min
903	Reference travel type	<u>0 ... 8</u>
904	Reference travel to zero pulse	<u>YES / NO</u>
905	Hiperface® offset X15	$-(2^{31}-1) \dots 0 \dots 2^{31}-1$ inc.
91x	<b>IPOS travel parameters</b>	
910	Gain X controller	0.1 ... <u>0.5</u> ... 32
911	Positioning ramp 1	0.01 ... <u>1</u> ... 20 s
912	Positioning ramp 2	0.01 ... <u>1</u> ... 20 s
913	Positioning speed CW	0 ... <u>1500</u> ... 6000 1/min
914	Positioning speed CCW	0 ... <u>1500</u> ... 6000 1/min
915	Speed feedforward	-199.99 ... 0 ... <u>100</u> ... 199.99 %
916	Ramp function	<u>LINEAR / SINE / SQUARE / BUS RAMP / JERK-LIMITED / ELECTRONIC CAM / SYNCHRONOUS OPERATION / CROSS CUTTER / SPEED INTERPOLATION / POS.INTERPOL. 12 BIT/ POS.INTERPOL. 16 BIT</u>
917	Ramp mode	<u>MODE 1 / MODE 2</u>
92x	<b>IPOS Monitoring</b>	
920	CW SW limit switch	$-(2^{31}-1) \dots 0 \dots 2^{31}-1$ inc.
921	CCW SW limit switch	$-(2^{31}-1) \dots 0 \dots 2^{31}-1$ inc.
922	Position window	0 ... <u>50</u> ... 32 767 inc.
923	Lag error window	0 ... <u>5000</u> ... $2^{31}-1$ inc.
93x	<b>IPOS Special functions</b>	
930	Override	<u>ON / OFF</u>
931	IPOS CTRL word Task 1	<u>START / STOP</u> (with DBG60B only)
932	IPOS CTRL word Task 2	<u>STOP / START / HALT</u> (with DBG60B only)
933	Jerk time	<u>0.005</u> ... 2 s
938	Speed task 1	<u>0</u> ... 9 additional commands/ms
939	Speed task 2	<u>0</u> ... 9 additional commands/ms
94x	<b>IPOS encoder</b>	



## Parameters

### Overview of parameters

940	IPOS variables edit	ON / OFF
941	Source actual position	Motor encoder (X15) / Ext. encoder (X14) / Absolute encoder (DIP)
942	Encoder factor numerator	1 ... 32 767
943	Encoder factor denominator	1 ... 32 767
944	Encoder scaling ext. Encoder	$\underline{x1} / x2 / x4 / x8 / x16 / x32 / x64$
945	Synchronous encoder type (X14)	TTL / SIN/COS / HIPERFACE
946	Synchronous encoder counting direction (X14)	NORMAL / INVERTED
947	Hiperface <sup>®</sup> Offset X14	$-(2^{31} - 1) \dots 0 \dots 2^{31} - 1$ inc.
95x	<b>DIP</b>	
950	Encoder type	NO ENCODER
951	Counting direction	NORMAL / INVERTED
952	Cycle frequency	1 ... 200 %
953	Position offset	$-(2^{31} - 1) \dots 0 \dots 2^{31} - 1$ inc.
954	Zero point offset	$-(2^{31} - 1) \dots 0 \dots 2^{31} - 1$ inc.
955	Encoder scaling	$\underline{x1} / x2 / x4 / x8 / x16 / x32 / x64$
96x	<b>IPOS Modulo function</b>	
960	Modulo function	OFF / SHORT / CW / CCW
961	Modulo numerator	0 ... 1 ... $2^{31} - 1$
962	Modulo denominator	0 ... 1 ... $2^{31} - 1$
963	Modulo encoder resolution	0 ... 4096 ... 65535
97x	<b>IPOS synchronization</b>	
970	DPRAM synchronization	ON / OFF
971	Synchronization phase	-2 ... 0 ... 2 ms



### 3.3 Explanation of the parameters

The parameters are explained below. The parameters are divided into 10 groups. The parameter names correspond to their representation in the SHELL<sup>®</sup> PC program. The factory setting is indicated by underline.

#### Symbols

The following symbols explain the parameters:



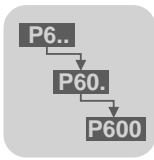
These parameters are switch-selectable and available in parameter sets 1 and 2.



These parameters can only be changed with INHIBITED inverter status (= output stage at high resistance).



The startup function automatically changes this parameter.



## Parameters

### Explanation of the parameters

#### ***P0xx display values***

This parameter group contains the following information:

- process values and states of the basic unit
- process values and states of the installed options
- Fault memory
- Fieldbus parameters

#### *P00x process values*

##### *P000 Speed*

Unit: [1/min]

Resolution with DBG60B: +/- 1 1/min; with SHELL: +/-0.2 1/min

The speed is determined by taking the setpoint speed and the set slip compensation in VFC or V/f mode without an encoder connection. The speed is established from the encoder or resolver signals and displayed when there is an encoder connection.

##### *P001 User display*

Unit: [Text]

The user display is defined by the following parameters:

- P850 Scaling factor numerator
- P851 Scaling factor denominator
- P852 User-defined unit

##### *P002 Frequency*

Unit: [Hz]

Output frequency of the inverter.

##### *P003 Actual position*

Unit: [Inc] (4,096 increments/motor revolution)

Position of the drive with correct sign in increments ranging from 0 ... +/- 2<sup>31</sup> /-1 Inc (with encoder connection). Without encoder connection, the value is zero.

##### *P004 Output current*

Unit: [% I<sub>N</sub>]

Apparent current in the range 0 ... 200 % of the rated unit current (BG0: 250 %).

##### *P005 Active current*

Unit: [% I<sub>N</sub>]

Active current in the range 0... 200 % I<sub>N</sub> (BG0: 250 %). The display value is positive when torque is in positive sense of rotation; negative when torque is in negative sense of rotation.

##### *P006 / P007 Motor utilization 1 / 2*

Unit: [%]

The thermal loading of the connected motor is displayed in the range 0 ... 200 %.

The displayed value is the current motor utilization for the motor in parameter sets 1 / 2 that is determined via the motor temperature emulation in the inverter. The synchronous motor with KTY and the asynchronous motor is turned off when 110 % is reached.

##### *P008 DC link voltage*

Unit: [V]

The displayed value is the voltage measured in the DC link circuit.

##### *P009 Output current*

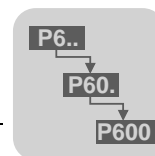
Unit: [A]

Apparent current, displayed in AC A.

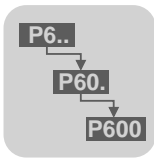
#### *P01x Status displays*

##### *P010 Inverter status*

Status of the unit output stage (INHIBITED, ENABLED).



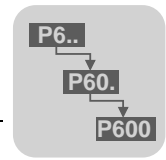
<i>P011 Operational status</i>	<p>The following operating states are possible (7 segment display):</p> <ul style="list-style-type: none"> <li>• 0: 24 V OPERATION (inverter not ready for operation)</li> <li>• 1: CONTROLLER INHIBIT</li> <li>• 2: NO ENABLE</li> <li>• 3: CURRENT AT STANDSTILL</li> <li>• 4: ENABLE (VFC)</li> <li>• 5: ENABLE (N-CONTROL)</li> <li>• 6: TORQUE CONTROL</li> <li>• 7: HOLD CONTROL</li> <li>• 8: FACTORY SETTING</li> <li>• 9: LIMIT SWITCH</li> <li>• A: TECHNOLOGY OPTION</li> <li>• c: REFERENCE OPERATION</li> <li>• d: FLYING START IS RUNNING</li> <li>• EN: CALIBRATE ENCODER</li> <li>• F: FAULT</li> <li>• H: MANUAL MODE</li> <li>• t: WAITING ON DATA</li> <li>• U: SAFE STOP</li> </ul>
<i>P012 Fault status</i>	<p>Fault number and fault in plain text. The fault number also appears on the inverter's 7-segment display.</p>
<i>P013 Current parameter set</i>	<p>Parameter set 1 or 2.</p>
<i>P014 Heat sink temperature</i>	<p>Unit: [°C] Heat sink temperature of the inverter in the range –40 °C ... 0 ... 125 °C.</p>
<i>P015 Operating time</i>	<p>Unit: [h] Total number of hours for which the inverter has been connected to the mains or an external DC 24 V supply. Storage cycle every 15 min.</p>
<i>P016 Operating time (enabled)</i>	<p>Unit: [h] Total number of hours for which the inverter was in ENABLE operating status; storage cycle every 15 min.</p>
<i>P017 Electrical energy</i>	<p>Unit: [kWh] Total of the active energy the motor has consumed; storage cycle every 15 min.</p>
<i>P018 / P019 KTY utilization 1 / 2</i>	<p>Unit: [%] Display 0 %: Motor is not in operation at max. ambient temperature. Display 110 %: Cut-off point of motor.</p>
<i>P02x Analog setpoints</i>	
<i>P020/P021 Analog input AI1/AI2</i>	<p>Unit: [V] Voltage (–10 V... +10 V) at analog input AI1 (020) and at the optional analog input AI2 (021). If P112 AI1 Operating mode = N-MAX, 0(4) ... 20 mA and S11 = ON, then the display will show P020 0(1) ... 5 V = 0(4) ... 20 mA.</p>



## Parameters

### Explanation of the parameters

<i>P022 External current limit</i>	Unit: [%] If P120 AI2 operating mode (optional) = 0 ... 10 V I-limit, then P022 will display the external current limit that is active.
<i>P03x Binary inputs basic unit</i>	
<i>P030 ... P037 binary input DI00 ... DI07</i>	The display will show the current status of input terminal DI00 ... DI07 and the current function assignment. Please note that binary input DI00 is always assigned with controller inhibit. Menu selection see P60x Binary inputs basic unit.
<i>P039 Binary inputs DI00 ... DI07</i>	Displays the standard binary inputs DI00 to DI07 in this sequence.
<i>P04x Binary inputs option</i>	
<i>P040 ... P047 Binary input DI10 ... DI17</i>	Displays the current status of the binary input on an option card (e.g. DIO) with the current function assignment. If the option is not present, the display will read "-". Menu selection see P61x Binary inputs option.
<i>P048 Binary inputs DI10 ... DI17</i>	Displays the optional binary inputs DO10 ... DO17 in this sequence.
<i>P05x Binary outputs basic unit</i>	
<i>P050 ... P055 Binary output DB00, DO01 ... DO05</i>	Displays the current status of the binary output on the basic unit with the the current function assignment. Output DB00 is always programmed to the "/brake" function. Menu selection see P62x Binary outputs basic unit.
<i>P059 Binary outputs DB00, DO01 ... DO05</i>	Displays the binary outputs DB00 and DO01 ... DO05 in this sequence.
<i>P06x Binary outputs option</i>	
<i>P060 ... P067 Binary output DO10 ... DO17</i>	Displays the current status of the binary output on an option card (e.g. DIO) with the current function assignment. If the option is not present, the display will read "-". Menu selection see P63x Binary outputs option.
<i>P068 Binary outputs DO10 ... DO17</i>	Displays the optional binary outputs DO10 ... DO17 in this sequence.
<i>P07x Unit data</i>	Unit type, rated unit current, type of options and firmware part numbers (basic unit and options), type (standard or application).
<i>P070 Unit type</i>	Displays the complete designation of the unit, e.g. MDX60B0014-5A3.
<i>P071 Rated output current</i>	Displays the r.m.s. value of the rated output current.
<i>P072 Option / firmware encoder slot</i>	Displays the encoder card currently installed in the encoder slot and the program version.
<i>P073 Option / firmware fieldbus slot</i>	Displays the fieldbus card currently installed in the fieldbus slot and the program version.
<i>P074 Option / firmware expansion slot</i>	Displays the option card currently installed in the expansion slot and the program version, if this option has a program memory.
<i>P076 Firmware basic unit</i>	Displays the program version of the firmware used in the basic unit.



*P078 Technology function*

Displays the currently set technology function.

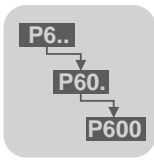
The function is set via MOVITOOLS® in "Startup – Select technology function".

- STANDARD: Setting for operation of drive inverter with the functions described in the system manual (positioning, speed control, etc.).
- ELECTRONIC CAM: Setting for technology function "Electronic cam" to coordinate the operation of several drives. Prerequisites are:
  - Motor with encoder feedback
  - Inverter in unit design "Application version"
- ISYNCH: Setting for technology function "Electronic synchronous operation" to synchronize the operation of several drives with accurate positioning. Prerequisites are:
  - Motor with encoder feedback
  - Inverter in unit design "Application version"
- AUTO / ASR: Special solution for optimum load distribution of the drive power for running gear with multiple-axle drive.
- SBUS / TP: Special solution for sending data in an event-controlled manner depending touch probe events.
- Cross cutter: Special solution for synchronizing a slave that follows the master using a certain travel profile.

*P079 Device type*

Displays the device type.

- STANDARD: Application modules and technology functions are not available.
- TECHNOLOGY: Application modules and technology functions are available.



## Parameters

### Explanation of the parameters

#### *P08x Fault memory*

*P080 ... P084 Fault  
t-0 ... t4*

There are 5 fault memories (t-0 ... t-4). The faults are stored in a chronological sequence with the most recent fault event being held in fault memory t-0. If there are more than 5 faults, the fault event of longest standing, stored in t-4, is deleted.

Programmable fault responses: see table P83x.

The following information is stored at the time of the fault and can be displayed in the event of a fault:

- Status ("0" or "1") of binary inputs/outputs
- Operating status of the inverter
- Inverter status
- Heat sink temperature [°C]
- Speed [1/min]
- Output current [% I<sub>N</sub>]
- Active current [%]
- Unit utilization[%]
- DC link voltage [V]
- Operating hours [h]
- Enable hours [h]
- Parameter set [1/2]
- Motor utilization 1 and 2 [%]

#### *P09x Bus diagnostics*

*P090 PD configuration*

Set process data configuration.

*P091 Fieldbus type*

Installed fieldbus type:

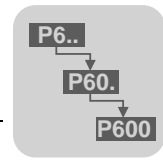
- PROFIBUS DP
- INTERBUS
- INTERBUS with LWL
- Ethernet
- DeviceNet
- NO FIELDBUS

*P092 Fieldbus  
baud rate*

Active baud rate.

*P093 Fieldbus  
address*

Address of the inverter on the fieldbus.



*P094 ... P096 PO1  
... PO3 setpoint*

Displays the value currently transferred on the process data word in hexadecimal form.

PO setpoint	Description
P094 PO1 setpoint	P870 Setpoint description PO1
P095 PO2 setpoint	P871 Setpoint description PO2
P096 PO3 setpoint	P872 Setpoint description PO3

*P097 ... P099 PE1  
... PI3 actual value*

Displays the value currently transferred on the process data word in hexadecimal form.

PI setpoint	Description
P097 PI1 actual value	P873 Actual value description PI1
P098 PI2 actual value	P874 Actual value description PI2
P099 PI3 actual value	P875 Actual value description PI3

### **P1xx Setpoints / ramp generators**

#### *P10x Setpoint selection*

P100 and P101 can also be used for selecting a communication port as the setpoint or control signal source. However, the interfaces are not automatically deactivated with these parameters because the drive inverter must remain ready to receive via all interfaces at any time.

Fixed setpoints have priority over other setpoints.

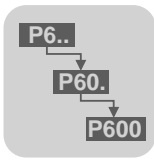
If the drive inverter is in "t = Wait for data" status, please check the timeout intervals of parameters P812, P815 and P819 and, if necessary, switch off timeout monitoring by entering 0 s or 650 s.

*P100 Setpoint source*



This parameter is used to set the setpoint source for the inverter.

- **BIPOL./FIX.SETPT:** The setpoint is provided by the analog inputs (AI1/AI2) or P16x Fixed setpoints 1, if these are selected via P60x Binary inputs basic unit / P61x Binary inputs option . The setpoints are processed as signed values. Positive setpoint results in CW rotation, negative setpoint in CCW rotation.
- **UNIPOL./FIX.SETPT:** The setpoint is provided by the analog inputs or the fixed setpoints. Negative analog setpoints result in a setpoint of zero. The fixed setpoints are processed in accordance with their value. The direction of rotation is specified via P60x Binary inputs basic unit / P61x Binary inputs option.
- **RS485:** The setpoint comes from the RS485 interface.
- **FIELD BUS:** The setpoint comes from the fieldbus interface.
- **MOTOR POT.:** The setpoint is generated by the internal motor potentiometer. For this purpose, one binary input must be programmed to MOTOR.POT. UP and another binary input to MOTOR.POT. DOWN, and the binary inputs must be activated accordingly. The direction of rotation is specified by the clockwise/stop and counter-clockwise/stop binary inputs. See P15x Motor potentiometer.
- **MOTORPOT+ANALOG1:** The setpoint is defined by the total of the motorized potentiometer and the setpoint selection at analog input AI1. The analog setpoint is processed as a signed setpoint. If the sum is negative,  $n_{min}$  applies. The direction of rotation is specified using binary inputs. The following settings apply: P112 AI1 Operating mode. See P15x Motor potentiometer.



## Parameters

### Explanation of the parameters

- **FIX SETP+ANALOG1:** The setpoint is defined by the total of the selected fixed setpoint and the setpoint selection at analog input AI1. The fixed setpoint is processed without sign (= according to its value) and the analog setpoint is processed as a signed setpoint. If the sum is negative,  $n_{\min}$  applies. The direction of rotation is specified using binary inputs. See P16x Fixed setpoints 1.
- **FIXEDSETxANALOG1:** The value at the analog input AI1 serves as an evaluation factor (0 ... 10 V = 0 ... 100 %) for the selected fixed setpoint. The fixed setpoint is processed without sign (= as absolute number). If the voltage at analog input AI1 is negative or if no fixed setpoint is selected,  $n_{\min}$  applies. The direction of rotation is specified using binary inputs. See P16x Fixed setpoints 1.
- **MASTER SBus1:** The setpoint comes from the master in master/slave mode via system bus 1. See P75x Master-Slave function.
- **MASTER-RS485:** The setpoint comes from the master in master/slave mode via the RS485 interface. See P75x Master-Slave function.
- **SBus 1:** The setpoint is specified using system bus 1. See IPOS<sup>plus</sup>® manual.
- **FREQUENCY INPUT:** Setting the parameter P100 Setpoint source to the function "Frequency input" causes the set speed to be set via binary input DI04 in the form of a frequency. For this purpose, the binary input DI04 (P603) must be set to "No function" and DIP switch S14 must be set to "ON" position. The binary input works with PLC-compatible input signals that are specified as follows:
  - 0 ... 7 V -> 0 level
  - 7 ... 24 V -> 1 level
  - This means an HTL encoder can be connected to the binary input to serve as a reference input variable encoder. The pulses from this encoder are then counted via binary input DI04 and a setpoint is calculated for the unit. The pulse duty factor (pulse width of the high and low signal) should be about 1 : 1. The factor determines the rising edge and the falling edge of the input signal. The P102 Frequency scaling is used to determine at which input frequency the system setpoint 100 % is reached. The reference of the system setpoint is set via parameter P112 AI1 Operating mode . The direction of rotation is set via the binary inputs CW/STOP and CCW/STOP.
  - The number of pulses recorded at binary input DI04 are mapped in IPOS variable H508. The maximum input frequency is 65 kHz.
- **SBus 2:** The setpoint is specified using system bus 2 (see IPOS<sup>plus</sup>® manual).
- **IPOS Setpoint:** The value of the IPOS variable H524 (IPOS system setpoint) is used as the setpoint. The setpoint is interpreted depending on P700 Operating mode 1 .
  - If P700 Operating mode 1 is used to set an operating mode of speed control (CFC, servo, VFC, VFC-n control, VFC & group, VFC & Hoist, VFC & Flying start, VFC & DC Brake) is set, then the setpoint will be interpreted as speed. The following formula applies:  $H524 = \text{Set speed [1/min]} \times 5$ .
  - If P700 Operating mode 1 is used to set an operation mode of torque control (CFC+M-ctrl., Servo+M-ctrl.), the setpoint will be interpreted as the torque value. The following formula applies:  $H524 = \text{Set current [\% } I_N] \times 100$ .
  - In the operating modes CFC & IPOS, CFC & Sync, Servo & IPOS, Servo & Sync, VFC & n-control & IPOS, VFC & n-control & Sync, the setting of P100 to the IPOS setpoint function will have no effect.

**P101 Control signal source**



This parameter is used to set the source of the control signals for the inverter (CONTROLLER INHIBIT, ENABLE, CW, CCW, ...). Control via IPOS<sup>plus</sup>® is taken into account regardless of P101.

- **TERMINALS:** Control is performed via the binary inputs.
- **RS485:** Control is performed via the RS485 interface and the binary inputs.
- **FIELDBUS:** Control is performed via the fieldbus and the binary inputs.
- **SBus:** Control is performed via the system bus and the binary inputs.

**P102 Frequency scaling**



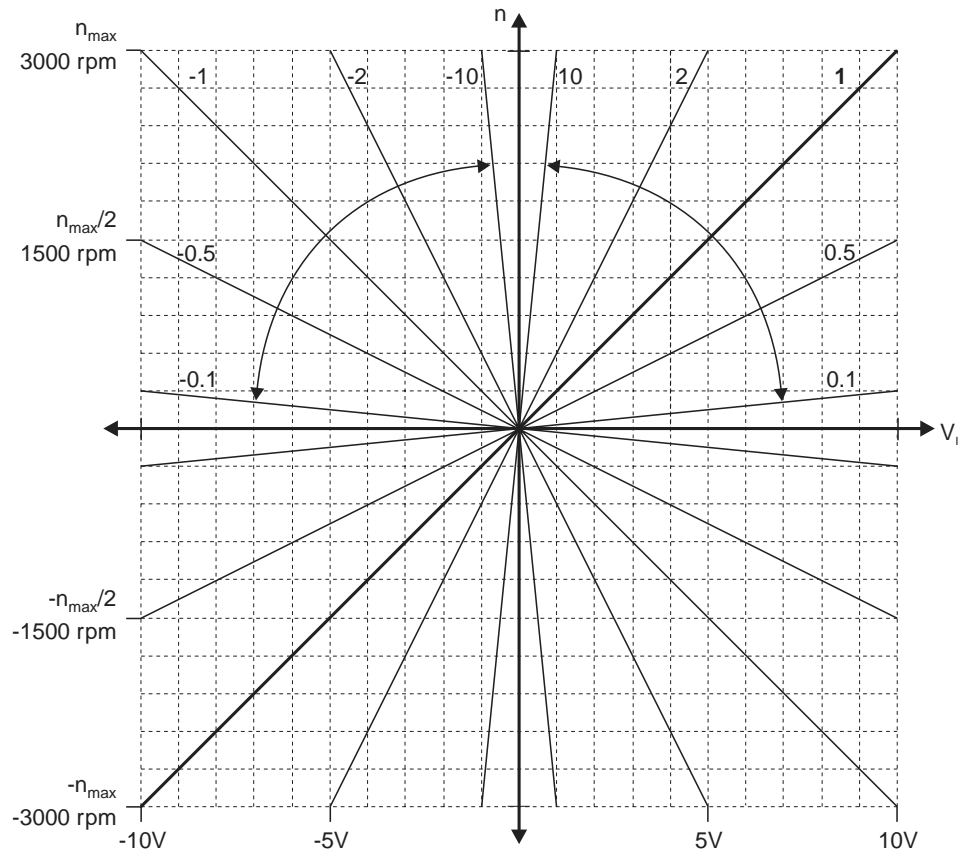
Setting range: 0.1 ... 10 ... 65 kHz

**P11x Analog input AI1**

**P110 AI1 Scaling**

Setting range: -10 ... 0 ... 1 ... 10

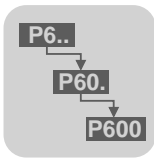
The slope of the setpoint characteristic is defined. Depending on P112 AI1 Operating mode with AI1 scaling = 1 and an input voltage  $V_i$  of  $\pm 10$  V, the setpoint  $\pm 3000$  1/min or  $\pm n_{max}$  is selected.



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Figure 40: Incline of the setpoint characteristic curve

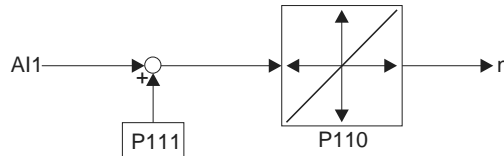
With P100 Setpoint source = UNIPOL./FIXED SETPT. only the 1st quadrant can be used, negative setpoint selections then produce the setpoint zero. If a current input is set in P112 AI1 Operating mode, P110 AI1 scaling will have no effect.

*P111 AI1 Offset*

Unit: [mV]

Setting range:  $-500 \dots 0 \dots 500$  mV

When the setpoint is selected by an external controller, it is possible to compensate for a voltage offset present at analog input AI1 when the setpoint selection is zero. The setting of this parameter causes calibration of the coordinate basic origin of Figure 40. This setting takes effect in all AI1 operating modes.



01292BXX

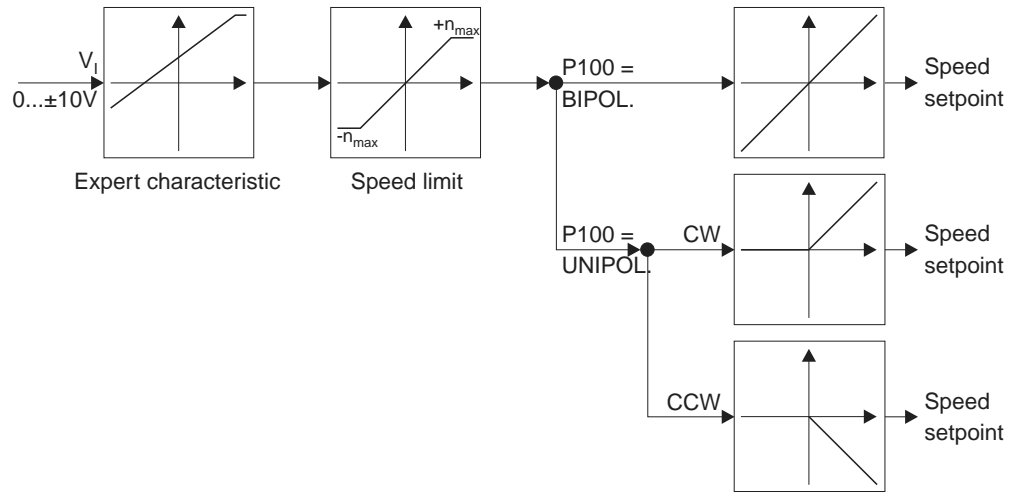
Figure 41: Effect of the AI1 offset

*P112 AI1 Operating mode*

The selection for the AI1 operating mode differentiates between various characteristic curves and voltage/current input.

- **Ref. N-MAX:** Voltage input with reference  $n_{\max}$  (P302 Maximum speed 1 / P312 Maximum speed 2). Using P110 AI1 Scaling you can adapt the characteristics. P113 AI1 voltage offset and P114 AI1 speed offset will have no effect.
- **Reference 3000 1/min:** Voltage input with reference 3000 1/min. Using P110 AI1 Scaling you can adapt the characteristics. P113 AI1 voltage offset and P114 AI1 speed offset will have no effect.
- **V-Off., N-MAX:** Voltage input with reference  $n_{\max}$ . Using P113 AI1 voltage offset you can adapt the characteristics. P110 AI1 Scaling and P114 AI1 speed offset will have no effect.
- **N-Off., N-MAX:** Voltage input with reference  $n_{\max}$ . Using P114 AI1 speed offset you can adapt the characteristics. P110 AI1 Scaling and P113 AI1 voltage offset will have no effect.
- **N-MAX, 0-20mA:** Current input  $0 \dots 20 \text{ mA} = 0 \dots n_{\max}$ , no setting options (P110 AI1 Scaling has no effect). Set the internal burden ( $250 \Omega$ ) "S11 = ON."
- **N-MAX, 4-20mA:** Current input  $4 \dots 20 \text{ mA} = 0 \dots n_{\max}$ , no setting options (P110 AI1 Scaling has no effect). Set the internal burden ( $250 \Omega$ ) "S11 = ON."

- Expert characteristic: Free choice of reference between setpoint voltage and speed. Using P110 AI1 Scaling (Reference 3000 1/min), P113 AI1 voltage offset and P114 AI1 speed offset you can adapt the characteristics (-> Figure 46). The following structural diagram shows how a speed setpoint is created from an expert characteristics.



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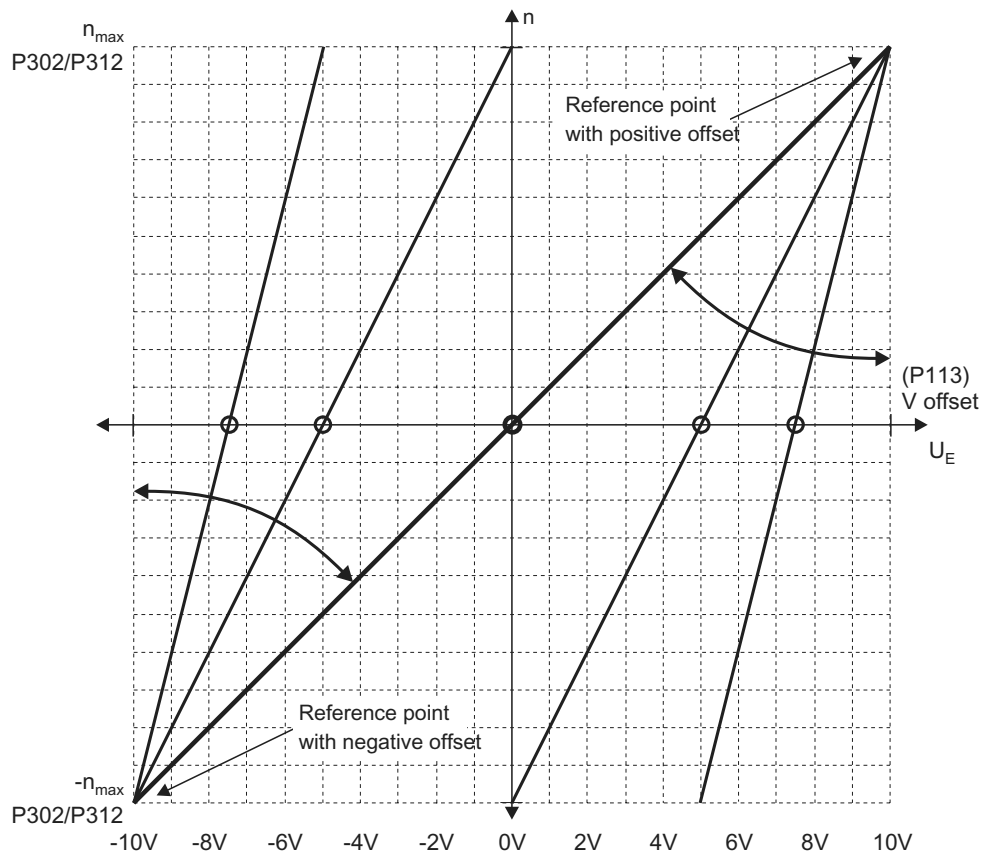
Figure 42: Structural diagram "Expert characteristic"

P113 AI1 Voltage offset

Unit: [V]

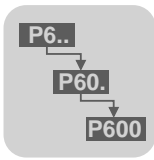
Setting range: -10 ... 0 ... 10 V

The zero passage of the setpoint characteristic can be moved along the  $U_E$  axis.



58607AEN

Figure 43: AI1 voltage offset



## Parameters

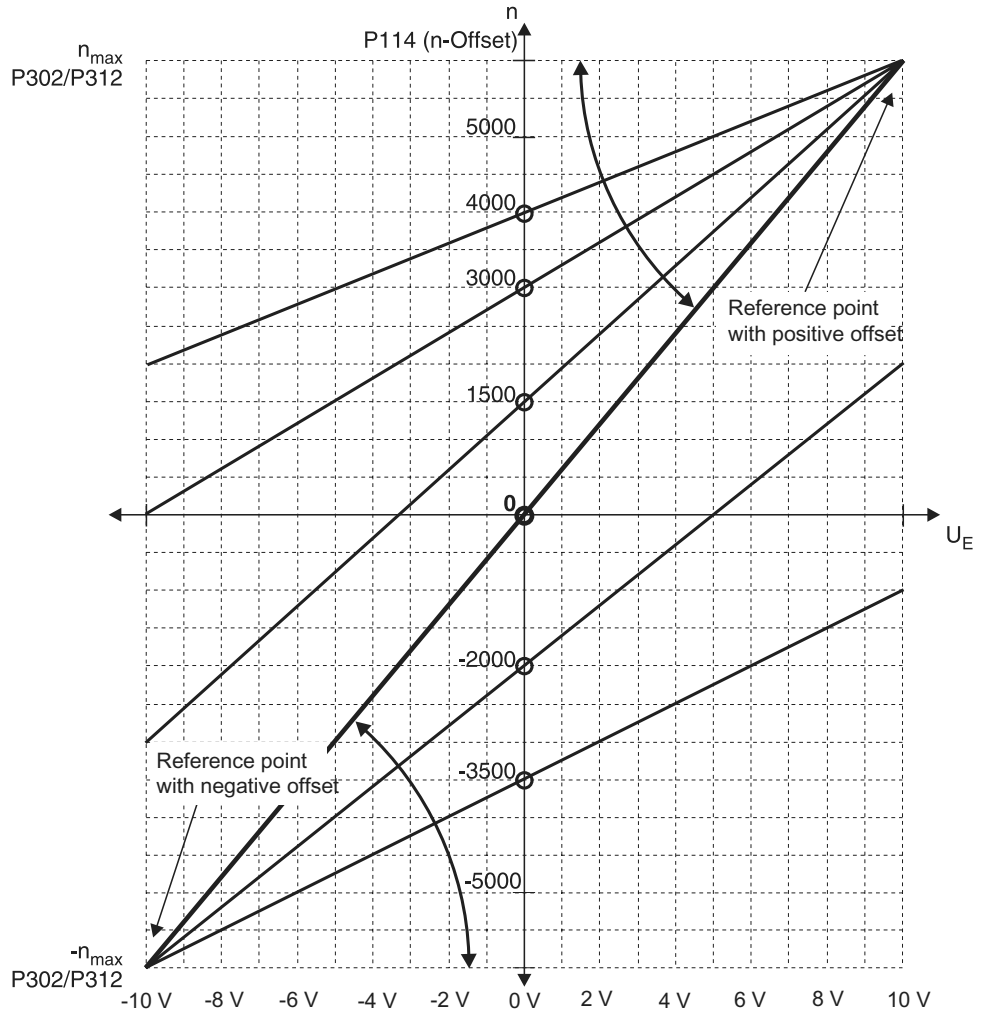
### Explanation of the parameters

*P114 AI1 speed offset*

Unit: [1/min]

Setting range: -6000 ... 0 ... 6000 1/min

The zero passage of the setpoint characteristic can be moved along the n-axis.



58610AEN

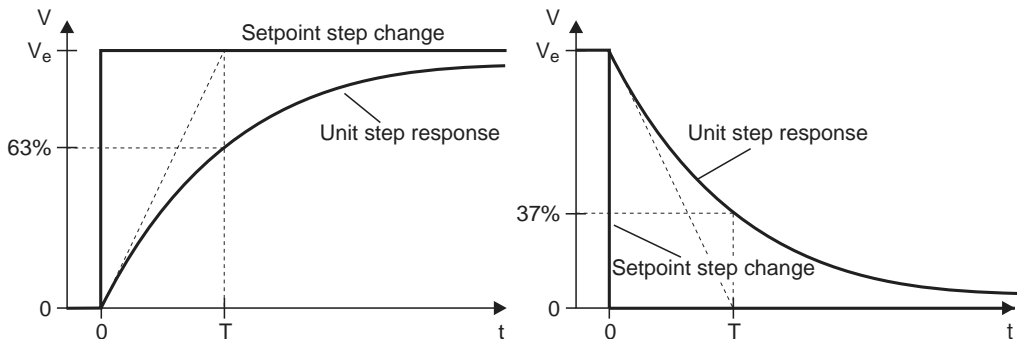
Figure 44: AI1 speed offset

*P115 Filter setpoint*

Unit: [ms]

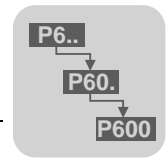
Setting range: T = 0 ... 5 ... 100 ms (0 = setpoint filter Off)

The speed ramp is filtered. The filter can be used for dampening stepped setpoint selections, e.g. from external controllers or interference pulses at the analog input. Also effective for torque control.



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Figure 45: Effect of setpoint filter



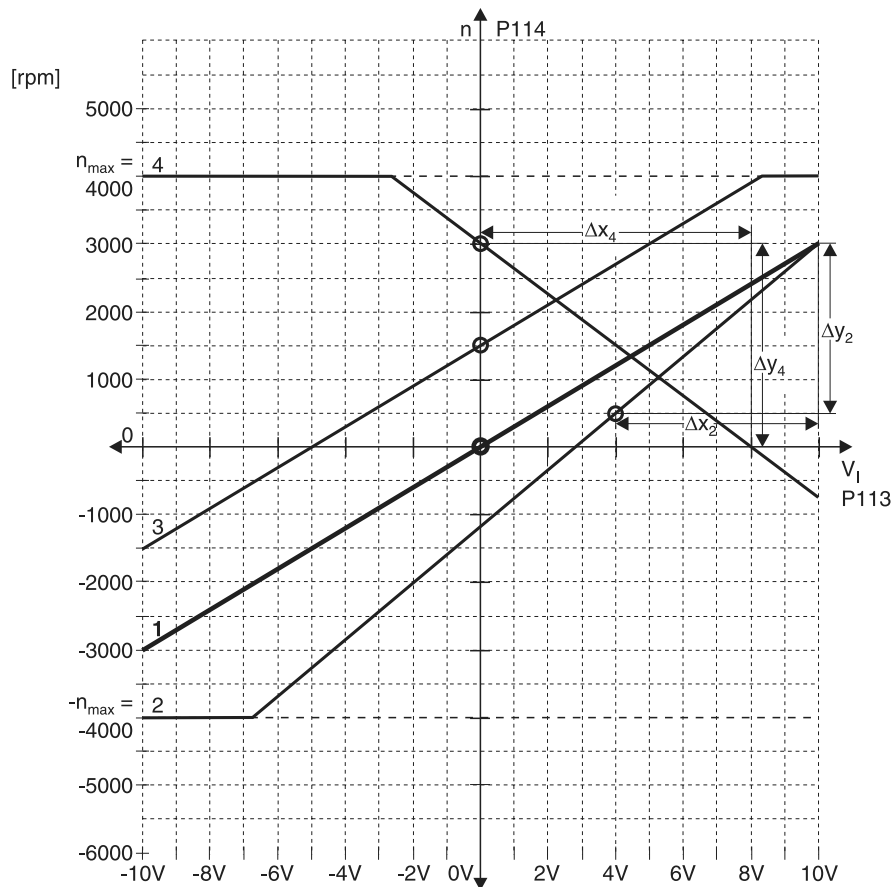
**Examples for expert characteristics (P112 AI1 Operating mode = expert charact.):**

Free choice of reference between setpoint voltage and speed for the expert characteristics. For access to all options of the expert characteristics, set the parameter P100 Setpoint source = BIPOL./FIX.SETPT.

One point in the characteristic (in Figure 46 indicated by a circle) is selected with P113 AI1 voltage offset and P114 AI1 speed offset and the pitch is then selected with P110 AI1 Scaling . Reference 3000 1/min always applies to scaling with the expert characteristic.

The speed range is limited by P302 Maximum speed 1 / P312 Maximum speed 2 . In Figure 46 the P302 Maximum speed 1 = 4000 1/min is set. The incline is not changed by the maximum speed setting.

When calculating the slope triangulation function  $\Delta y/\Delta x = \text{slope} = \text{setting value of P110 AI1 Scaling}$  the voltage value of the x-axis must be converted to a speed value. The following applies: 10 V = 3000 1/min.

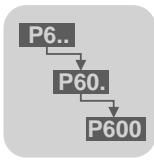


01264DEN  
Figure 46: Samples of expert characteristics with P100 Setpoint source = BIPOL./FIX.SETPT.

For characteristics 2 and 4 in Figure 46 , the slope triangulation functions are calculated and the setting values for P110 AI1 Scaling determined.

Characteristic 2:  $\Delta y_2 = 2500 \text{ 1/min}$ ,  $\Delta x_2 = 6 \text{ V} = 1800 \text{ 1/min}$ ,  $\Delta y_2/\Delta x_2 = 2500/1800 = 1.39$

Characteristic 4:  $\Delta y_4 = -3000 \text{ 1/min}$ ,  $\Delta x_4 = 8 \text{ V} = 2400 \text{ 1/min}$ ,  $\Delta y_4/\Delta x_4 = -3000/2400 = -1.25$



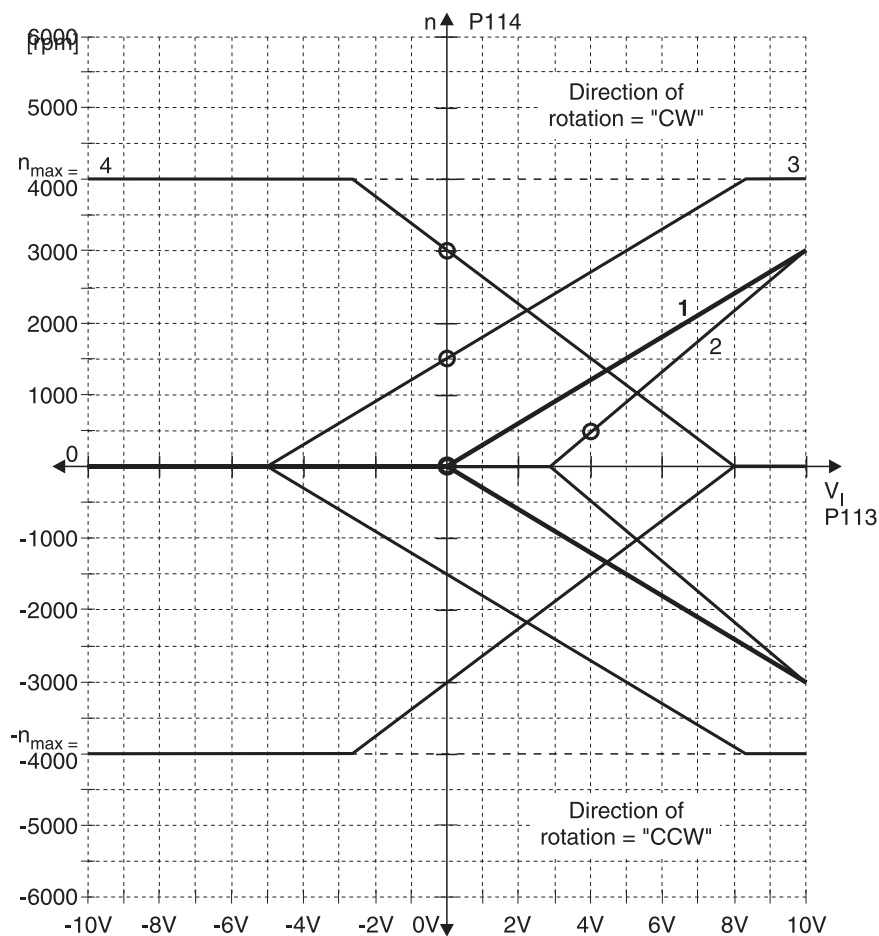
## Parameters

### Explanation of the parameters

The expert characteristics displayed in Figure 46 are created as follows:

Characteristic	P113 AI1 voltage offset [V]	P114 AI1 speed offset [1/min]	P110 AI1 scaling (slope)
1	0	0	1
2	4	500	1.39
3	0	1500	1
4	0	3000	-1.25

The expert characteristics can also be used with P100 Setpoint source = UNIPOL./FIX.SETPT.. The direction of rotation is specified using binary inputs. The expert characteristic is mapped at the x-axis. The section below the x-axis results in a speed setpoint = 0. In case of set direction of rotation CW, only speeds in the range 0 ...  $n_{max}$  will be executed; for set direction of rotation CCW only speeds in the range 0 ...  $-n_{max}$  will be executed. Figure 47 shows the expert characteristics from Figure 46 at the setting P100 Setpoint source = UNIPOL./FIX.SETPT.

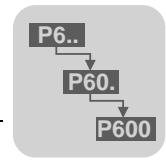


02143CEN

Figure 47: Samples of expert characteristics with P100 Setpoint source = UNIPOL./FIX.SETPT.

The expert characteristics displayed in Figure 47 are created as follows:

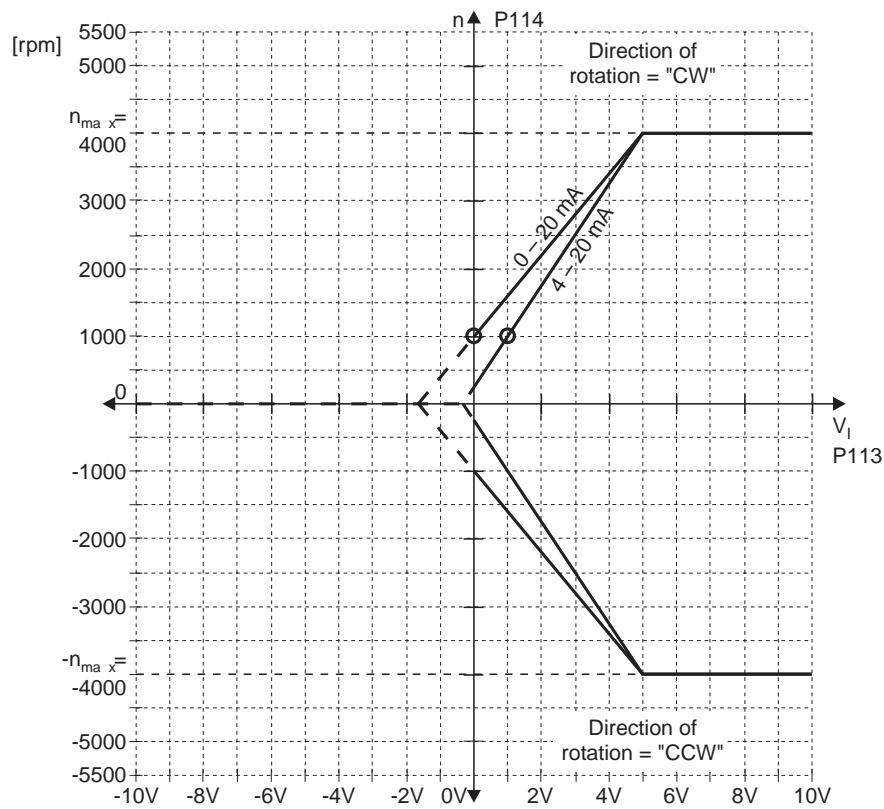
Characteristic	P113 AI1 voltage offset [V]	P114 AI1 speed offset [1/min]	P110 AI1 scaling (slope)
1	0	0	1
2	4	500	1.39



Char-acter-istic	P113 AI1 voltage offset [V]	P114 AI1 speed offset [1/min]	P110 AI1 scaling (slope)
3	0	1500	1
4	0	3000	-1.25

**Expert characteristic with current setpoints:**

Voltage signals are required at the AI11/AI12 analog input for the expert characteristic function. If a load-independent current 0 (4)...20 mA is available as setpoint, switch S11 (changeover I-signal/V-signal) must be set to ON and the current signal routed to X11:2 AI11. The setpoints 0 (4) ...20 mA will be converted into voltage signals 0 (1) ... 5 V through the internal burden (250 Ω) .



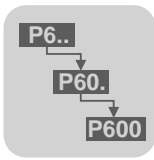
02165BEN

Figure 48: Sample expert characteristics with current setpoints

If you want to achieve speeds of 1000 ... 4000 1/min with 0 (4) ... 20 mA, you will have to set 4000 1the expert characteristics as follows:

<b>for 0 ... 20 mA:</b>	P110 = 2	P113 = 0 V	P114 = 1000 1/min	P302 (n <sub>max</sub> ) = 4000 1/min
<b>for 4 ... 20 mA:</b>	P110 = 2.5	P113 = 1 V	P114 = 1000 1/min	P302 (n <sub>max</sub> ) = 4000 1/min

Set P100 Setpoint source = UNIPOL/FIX.SETPT. The direction of rotation is then specified using binary inputs.



## Parameters

### Explanation of the parameters

#### P12x Analog inputs option

##### P120 AI2 operating mode (optional)

Analog input AI2 is only available with the optional input/output card (DIO11B).

- **NO FUNCTION:** The setpoint at AI2 is not used; the external current limitation is set to 100 %.
- **0 ... 10 V + Setpt.1:** The setpoint at AI2 is added to setpoint 1 (=AI1) observing the signs; the external current limitation is set to 100%.  $\pm 10 \text{ V} = \pm n_{\max}$  (reference  $n_{\max}$ ).
- **0 ... 10 V I-limit:** The input serves as external current limitation.  $0 \dots 10 \text{ V} = 0 \dots 100 \%$  of the internally set current limitation (P303 Current limit 1 / P313 Current limit 2).
- **ACTUAL VALUE CONTROLLER:** Feedback of actual value for process controller ( $\rightarrow$  P275).

#### P13x / P14x Speed ramps 1 / 2

##### P130 ... P133 / P140 ... P143 Ramp t11/t21 up/down CW/CCW



P130 Ramp t11 up CW [s] / P140 Ramp t21 up CW [s]

P131 Ramp t11 up CW [s] / P141 Ramp t21 up CW [s]

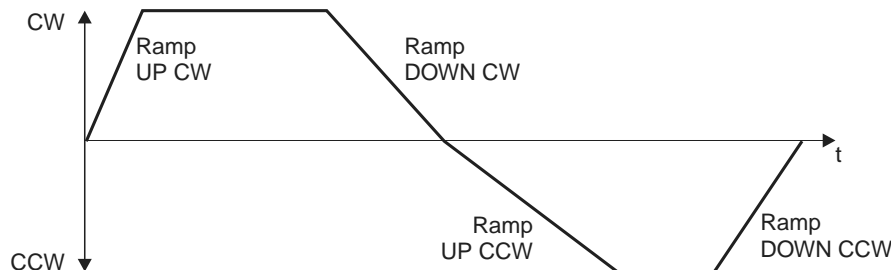
P132 Ramp t11 up CCW [s] / P142 Ramp t21 up CCW [s]

P133 Ramp t11 up CCW [s] / P143 Ramp t21 up CCW [s]

Unit: [s]

Setting range: 0 ... 2 ... 2000 s

The ramp times refer to a setpoint step change of  $\Delta n = 3000 \text{ 1/min}$ . The ramp takes effect when the speed setpoint is changed and the enable is withdrawn via the CW/CCW terminal.



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Figure 49: Separately adjustable speed ramps

##### P134 / P144 Ramp t12 / t22 UP=DOWN

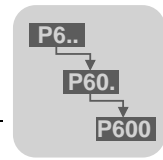


Unit: [s]

Setting range: 0 ... 10 ... 2000 s

The following applies to this ramp: UP = DOWN and CW = CCW.

Ramps t12 / t22 are activated by a binary input ( $\rightarrow$  P610 ... P617, which is set to the function "Ramp switchover").



P135 / P145 S pattern t12 / t22



Setting range: 0/1/2/3 (0 = off, 1 = weak, 2 = medium, 3 = strong)

The 2nd ramp (t12/ t22) of parameter sets 1 and 2 can be rounded with 3 pattern grades to achieve a smoother acceleration of the drive.

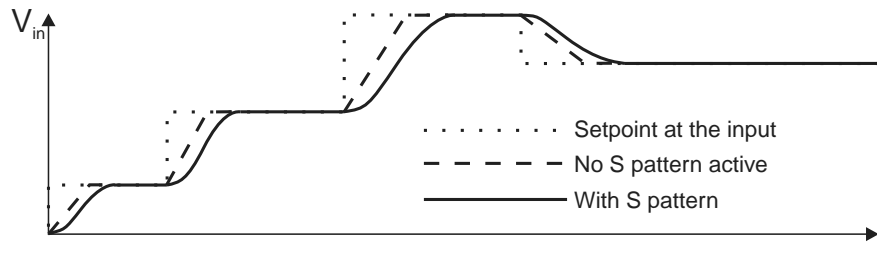


Figure 50: Effect of the S pattern

01266BEN

A started S pattern is interrupted by the stop ramp t13/t23 and a changeover to ramp t11/t12. Withdrawing the setpoint or a stop via the input terminals causes the started S curve to be completed. This means the drive can accelerate despite the revoked setpoint.

P136 / P146 Stop ramp t13 / t23



Unit: [s]

Setting range: 0 ... 2 ... 20 s

The stop ramp is activated by withdrawing the ENABLE terminal or by a fault (P83x Fault responses).

P137 / P147 Emergency ramp t14 / t24



Setting range: 0 ... 2 ... 20 s

The emergency ramp is activated by a fault (P83x Fault responses). The system monitors whether the drive reaches zero speed within the set time. After expiry of the set time, the output stage will be inhibited and the brake applied even if zero speed has not yet been reached.

P138 Ramp limit VFC



Setting range: YES / NO

The ramp limit limits the smallest ramp time in VFC and U/f operating modes (P700 Operating mode 1) to 100 ms (reference:  $\Delta n = 3000$  1/min). Settings lower than 100 ms are ignored and the ramp time 100 ms is in effect. The ramp limitation limits the maximum output current to the value set in P303/P313. Active stall protection is implemented for the connected motor using the current limiting controller when ramp limitation is activated.

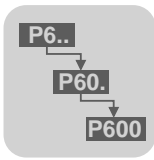
	<p><b>NOTE</b></p> <p>There is no active stall protection for the connected motor when ramp limit is deactivated and ramp times of less than 100 ms are used. Parameters P303 Current limit 1 / P313 Current limit 2 will not be effective in this case. If a maximum output current of 185 % of the rated output current is exceeded (applies to BG1...6; 225 % apply to BG0) for more than 60 ms, the inverter switches off and signals fault F01 Overcurrent and the "Immediate switch-off" fault response.</p>
--	--

P139 / P149 Ramp monitoring 1 / 2



Setting range: YES / NO

If you set the deceleration ramps to a value that is a lot shorter than can be physically accomplished in this system, the turning drive will be stopped after expiration of the monitoring time. Such a setting will cause a fault signal and increase brake wear.



## Parameters

### Explanation of the parameters

This step also entails an increased setting of the respective ramp, if the ramp timeout definitely appears in form of a preset ramp that cannot be traveled.

This parameter is an additional monitoring function for speed monitoring. This parameter only applies to the downwards ramp. This means the parameter can be used to monitor the downwards ramp, stop ramp or emergency stop ramp if speed monitoring is not desired.

The ramp times refer to a setpoint step change of  $\Delta n = 3000$  1/min.

*P15x Motor potentiometer*

*P150 / P151 Ramp t3 up / down*



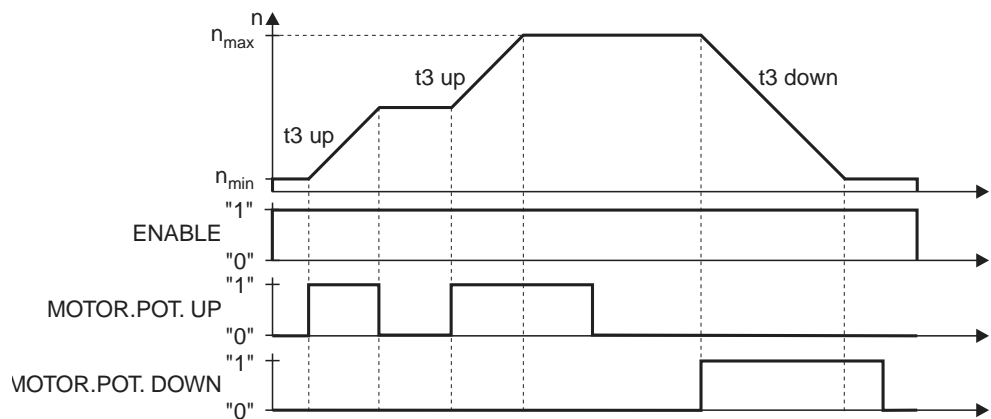
*P152 Save last setpoint*



Setting range: 0,2 ... 20 ... 50 s

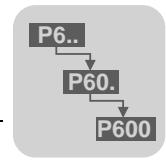
The ramp is active if P100 Setpoint source is set to MOTOR POTENTIOMETER or MOTORPOT+ANALOG1 and an input terminal programmed to MOTORPOTI UP or MOTORPOTI DOWN P6xx Terminal assignment has a "1" signal.

- **ON:** If MOTOR POT UP and MOTOR POT DOWN = "0" the last applicable motor potentiometer setpoint is stored in the non-volatile memory 2 s afterwards. The last motorized potentiometer setpoint is reactivated following mains power off/power on.
- **OFF:** Following a mains power off/power on or after withdrawal of the enable, the inverter starts with P301 Minimum speed 1 / P311 Minimum speed 2).



01294BEN

Figure 51: Motor potentiometer function



P16x / P17x Fixed setpoints 1 / 2



3 internal setpoints (= fixed setpoints) can be set separately for parameter sets 1 and 2. The internal setpoints are active if P100 Setpoint source is set to one of the following functions and an input terminal programmed to n11/n21 or n12/n22 (P6xx Terminal assignment) has a "1" signal:

- BIPOL./FIX.SETPT
- UNIPOL/FIX.SETPT.
- FIXED SETP+ANALOG1
- FIXEDSETxANALOG1

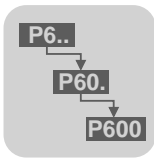
Setting range: 0 ... 6000 1/min

Fixed setpoint	Factory setting
P160 / P170 Internal setpoint n11/n21	n11 / n21 = 150 1/min
P161 / P171 Internal setpoint n12 / n22	n12 / n22 = 750 1/min
P162 / P172 Internal setpoint n13/n23	n13 / n23 = 1500 1/min

Programming the input terminals:

Response	Terminal			
	n11/n21	n12/n22	Enable/Stop	Parameter set 1/2
Stop with t13/t23	X	X	"0"	X
Fixed setpoint not active	"0"	"0"	"1"	"0"
n11 effective	"1"	"0"	"1"	"0"
n12 effective	"0"	"1"	"1"	"0"
n13 effective	"1"	"1"	"1"	"0"
n21 effective	"1"	"0"	"1"	"1"
n22 effective	"0"	"1"	"1"	"1"
n23 effective	"1"	"1"	"1"	"1"

If an input terminal is programmed to FIX SETPT SW.OV, the fixed setpoints of the currently inactive parameter set come into effect when this terminal is actuated (= "1"). This changeover is possible when the unit is inhibited and enabled.



### P2xx Controller parameters

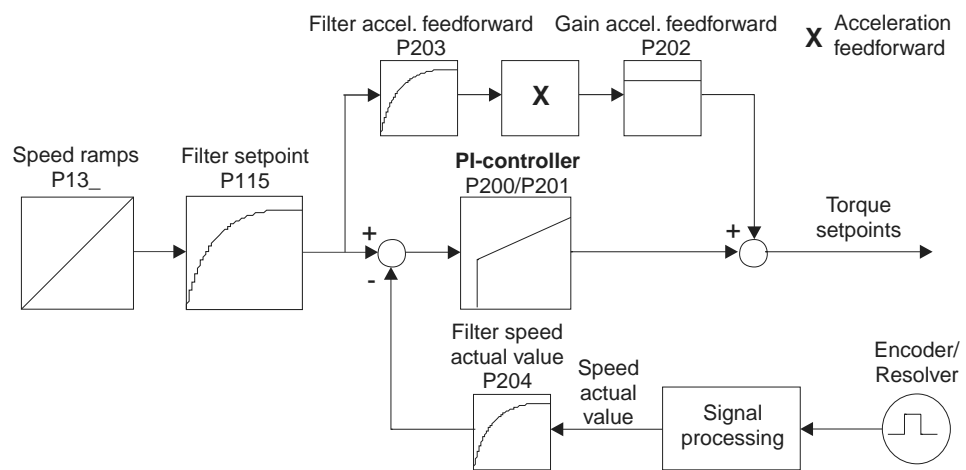
#### P20x Speed control

Speed control only in parameter set 1.

The speed controller of the MOVIDRIVE® is a PI-controller and is active when the following operating modes are set:

- All operating modes with VFC-n-CONTROL.
- CFC operating modes: The speed controller is only active in “CFC & M-CONTROL” when speed limiting is active (P70x Operating modes).
- Servo operating modes: The speed controller is only active in “SERVO & M-CONTROL” when speed limiting is active (P70x Operating modes).

The setting of all parameters relevant for speed control is supported by the SHELL startup functions or the DBG60B keypad (VFC only). Direct alterations to individual controller parameters are reserved for optimization by specialists.



01312BEN

Figure 52: Basic structure of the speed control loop

#### P200 P gain speed controller

Setting range: 0,01 ... 2 ... 32

Gain factor of the P-component of the speed controller.

AUTO

#### P201 Time constant n-controller

Setting range: 0 ... 10 ... 3000 ms (0 = no I-component)

Integration time constant of the speed controller. The I-component reacts inversely proportionate to the time constant, i.e. a large numerical value results in a small I-component, although 0 = no I-component.

AUTO

#### P202 Gain acceleration feedforward

Setting range: 0 ... 65

Gain factor of acceleration feedforward. This parameter improves the control response of the speed controller.

AUTO

#### P203 Filter acceleration feedforward

Setting range: 0 ... 100 ms

Filter time constant of acceleration feedforward. This constant influences the control response of the speed controller. The differentiator is programmed and cannot be changed.

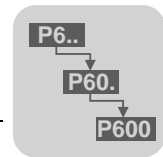
AUTO

#### P204 Filter speed actual value

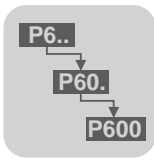
Setting range: 0 ... 32 ms

Filter time constant of the actual speed value filter.

AUTO



<i>P205 Load feedforward CFC</i>	<p>Load feedforward CFC (only effective in CFC and SERVO operating modes). Setting range: <math>-150 \dots 0 \dots 150 \%</math></p> <p>This parameter determines the initial value of the torque setpoint upon enable. The parameter must be set if an increased starting torque is required at enable. For example, setting the value to greater than 0 % makes it possible to prevent the unwanted sagging of hoists when the brake is released. This function should only be used in hoists without counterweight.</p> <p>Recommended setting: Value of the active current (P005 [% <math>I_N</math>]) when <math>n = 0</math> is specified.</p>
<i>P206 Sampling time n-control</i>	<p>Sampling time n-control only effective in CFC and SERVO operating modes. Setting range: <math>1 \text{ ms} / 0.5 \text{ ms}</math></p> <p>The setting 0.5 ms improves speed control for dynamic drives with low moment of inertia.</p>
<i>P207 Load feedforward VFC</i>	<p>Load feedforward VFC only effective in VFC-n-CTRL operating modes. Setting range: <math>-150 \dots \underline{\text{OFF}} \dots 150 \%</math></p> <p>This parameter determines the initial value of slip control upon enable. Setting the value to greater than 0 % presets slip control, which means the motor can deliver more torque upon enable. Doing so makes it possible, for example, to prevent the unwanted sagging of hoists when the brake is released. This function should only be used in hoists without counterweight.</p> <p>Setting values greater than 150 % switches off the function (no pre-stressing). In VFC &amp; HOIST mode and with a value greater than 150 % set, pre-stressing of <math>0.5 \times s_N</math> is in effect. Recommended setting: Value of the active current (P005 [% <math>I_N</math>]) at minimum speed.</p>
<i>P21x Hold controller</i>	<p>Hold control only parameter set 1.</p> <p>The hold control function is used for standstill control of the drive without drift and can only be activated in operating modes with speed control (encoder feedback). Hold control is active when an input terminal programmed to /HOLD CONTROL (P6xx Terminal assignment) has a "0" signal. The unit then performs a stop using the "t11 up" or "t21 down" ramp. Once the drive reaches zero speed, the position valid at that moment will be maintained. The gain factor setting is supported in the <b>startup function</b> of the speed controller in MOVITOOLS\SHELL or in the DBG60B keypad. The 7-segment display shows status '7' when hold control is active.</p>
<i>P210 P gain hold controller</i>	<p>Setting range: <math>0,1 \dots \underline{0,5} \dots 32</math></p> <p>The parameter corresponds to the proportional gain of a position controller and is only effective in conjunction with the activated 'Hold control' function.</p>
<i>P22x Synchronous operation control</i>	<p>Synchronous operation control only in parameter set 1 and with the DRS11B option. For a detailed description, refer to the "MDX61B - Synchronous Operation Board DRS11B" manual.</p>
<i>P220 P gain DRS</i>	<p>Setting range: <math>1 \dots \underline{10} \dots 200</math></p> <p>Gain of the synchronous operation controller in the slave drive. Determines the control response of the slave drive depending on the angle differentials in relation to the master drive.</p>
<i>P221 / P222 Master gear ratio factor / Slave gear ratio factor</i>	<p>Setting range: <math>\underline{1} \dots 3\,999\,999\,999</math></p> <p>These settings are only required with the slave inverter. These parameters set the position measurement ratio between the master and slave drives. The ratio is entered as the quotient of master to slave drive to include non-integer ratios.</p>



## Parameters

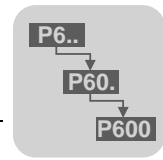
### Explanation of the parameters

#### P223 Mode selection

Note that position measurement of the master and slave drive can only occur using the motor encoders if there is **positive power transmission (without slip)**. Position measurement has to be via an **additional encoder (external encoder)** in all applications in which power transmission between motor shaft and machine is **by friction** and thus slip is to be expected. The encoder must be installed on the moving machine component with a positive connection.

Setting range: Mode 1 / Mode 2 / Mode 3 / Mode 4 / Mode 5 / Mode 6 / Mode 7 / Mode 8  
Mode selection determines how the slave drive reacts to a free running signal.

- Mode 1: Free-running unlimited, new reference point
  - Free-running is active when a "1" signal is set at X40:1.
  - The input terminals and setpoints of the slave drive are effective in free-running mode.
  - An angular offset generated in free-running mode is not processed when synchronization is started again.
- Mode 2: Free-running unlimited, offset is processed
  - Free-running is active when a "1" signal is set at X40:1.
  - The input terminals and setpoints of the slave drive are effective in free-running mode.
  - An angular offset generated during free-running mode is reduced to zero when synchronization is started again.
- Mode 3: Free-running unlimited, offset generated is processed + P224
  - Free-running is active when a "1" signal is set at X40:1.
  - The input terminals and setpoints of the slave drive are effective in free-running mode.
  - During resynchronization, in addition to the offset, the old synchronous position of the signed position offset in P224 is also reduced to zero.
- Mode 4: Free-running limited by *P224 Slave counter*, generated offset is processed
  - Free-running is activated via a "1" signal (>100 ms) at X40:1.
  - The input terminals and setpoints of the slave drive are effective during free-running.
  - Free-running ends when the angle differential entered in P224 has been reached. The angular offset is then reduced to zero.
- Mode 5: Free-running limited by *P224 Slave counter*, new reference point
  - Free-running is activated via a "1" signal (>100 ms) at X40:1.
  - The input terminals and setpoints of the slave drive are effective during free-running.
  - Free-running ends when the angle differential entered in P224 has been reached.
  - If another HIGH signal is applied at X40:1 before free-running has ended, the value at which free-running is to end increases to the value entered in P224.
  - The slave drive synchronizes with the new angle differential.



- Mode 6: Temporary angular offset, new reference point
  - Free-running is active when a "1" signal is set at X40:1.
  - The input terminals and setpoints of the slave drive are effective in free-running mode.
  - An angular offset generated in free-running mode is not processed when synchronization is started again.
  - A "1" signal at 40:2, X40:3 or X40:4 on DRS11B activates an angular offset. Each angular offset is stored in parameters P225, P226 and P227.
  - If a "0" signal is applied again at one of the input terminals X40:2, X40:3 or X40:4, the angular offset is eliminated again.
- Mode 7: Permanent angular offset (phase trimming), new reference point
  - Free-running is active when a "1" signal is set at X40:1.
  - The input terminals and setpoints of the slave drive are effective in free-running mode.
  - An angular offset generated in free-running mode is not processed when synchronization is started again.
  - A "1" signal at 40:2, X40:3 or X40:4 on DRS11B activates an angular offset. Each angular offset is stored in parameters P225, P226 and P227.
  - If a "0" signal is applied again at one of the input terminals X40:2, X40:3 or X40:4, the angular offset is maintained.
  - If the input signal lasts longer than 3 seconds, the value is corrected at four steps per second.
- Mode 8: Free-running unlimited, new reference point + P224
  - Free-running is active when a "1" signal is set at X40:1.
  - The input terminals and setpoints of the slave drive are effective in free-running mode.
  - If a "0" signal is applied at input terminal X40:1, the slave drive synchronizes with the current position of the master drive plus the position offset stored in P224.

*P224 Slave counter*

Unit: [Inc]

Setting range: -99 999 999 ... 10 ... 99 999 999

The angular offset in relation to the master drive, which can be activated in mode 3, 4, 5 and 8, is referred to as the slave counter. In contrast to the offset, this offset angle can be set using the "Teach In" function. Depending on the mode, it functions as a limit value for free running or specifies a permanent angular offset for the slave drive in relation to the master drive (= new reference point).

*P225 / P226 / P227 Offset 1 / 2 / 3*

Setting range: -32 767 ... 10 ... 32 767 inc (only effective in mode 6 or mode 7!)

Three separately adjustable angle differentials to which the slave drive sets itself for the duration of the "1" signal on X40:2 / X40:3 / X40:4.

*P228 Feedforward filter DRS*

Setting range: 0 ... 100 ms

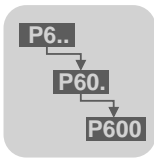
Setpoint filter for feedforward of synchronous operation control DRS11B. The master speed (determined on the DRS) must be filtered for optimum acceleration feedforward of the slave drive. Filtering requires the filter time constant. Value 0 indicates an unfiltered master speed.

*P23x Synchronous operation with synchronous encoder*

Synchronous operation with synchronous encoder only in parameter set 1 and with the DRS11B option (not in BG 0).

For a detailed description, refer to the "MDX61B - Synchronous Operation Board DRS11B" manual.

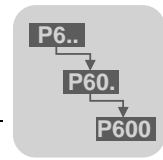
Position measurement has to be performed via an external encoder (=synchronous encoder) in all applications in which power transmission between the motor shaft and the machine is non-positive, which means that slip is to be expected.



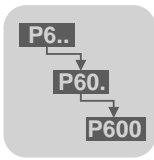
## Parameters

### Explanation of the parameters

<i>P230 Synchronous encoder</i>	<p>Setting range: <u>OFF</u> / EQUAL-RANKING / CHAIN</p> <ul style="list-style-type: none"> <li>• <u>OFF</u>: Synchronous operation control with the signals on X15: "Motor encoder". P231 and P232 have no effect.</li> <li>• EQUAL-RANKING: Forwarding of X42 signals: "Master encoder" at X43: "Incremental encoder output." Evaluation of P231 and P232.</li> <li>• CHAIN: Forwarding of X41 signals: "Input synchronous encoder" at X43: "Incremental encoder output." Evaluation of P231 and P232.</li> </ul>
<i>P231 / P232 Factor slave encoder / Factor slave sync. encoder</i>	<p>Setting range: <u>1</u> .. 1000</p> <p>In most cases there is a mechanical gear ratio between the encoders. The parameters are used to set the gear ratio.</p>
<i>P233 Synchronous encoder resolution</i>	<p>Setting range: 128 / 256 / 512 / <u>1024</u> / 2048</p> <p>Setting the resolution of the connected synchronous encoder.</p>
<i>P234 Master encoder resolution</i>	<p>Setting range: 128 / 256 / 512 / <u>1024</u> / 2048</p> <p>Setting the resolution of the connected master encoder.</p>
<i>P24x Synchronous operation with catch up</i>	<p>Synchr operation with catch up only in parameter set 1 and with the DRS11B option.</p> <p>For a detailed description, refer to the "MDX61B - Synchronous Operation Board DRS11B" manual.</p> <p>When the slave drive is switched to synchronous operation, the current angle offset in relation to the master is reduced to zero, depending on the operation mode selected. For this catch up procedure to be performed in a controlled manner, it is possible to set parameters for both the synchronization speed and the synchronization ramp.</p>
<i>P240 Synchronization speed</i>	<p>Unit: [1/min]</p> <p>Setting range: 0 ... <u>1500</u> ... 6000 1/min</p> <p>This parameter indicates the duration of the synchronization procedure.</p>
<i>P241 Synchronization ramp</i>	<p>Unit: [s]</p> <p>Setting range: 0 ... <u>2</u> ... 50 s</p> <p>Value of the acceleration ramp for synchronizing the slave with the master. A value of 0 means maximum possible acceleration.</p>
<i>P26x Process controller parameters</i>	
<i>P260 Operation mode</i>	<p>Setting range: <u>Controller off</u> / Control / Step response</p> <ul style="list-style-type: none"> <li>• <u>Controller off</u>: The PID controller is deactivated.</li> <li>• Control: The PID controller is active and determines the required motor speed using the control deviation and its parameters.</li> <li>• Step response: A step can be specified via the setpoint (P271). The filtered and scaled actual value can be included for purposes of evaluation.</li> <li>• P260 and the IPOS variable H543 are identical.</li> </ul>
<i>P261 Cycle time</i>	<p>Setting range: 1 / <u>5</u> / 10 ms</p> <p>This parameter sets the cycle time of the PID controller.</p>



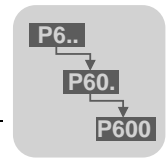
<i>P262 Interruption</i>	<p>Setting range: <u>No response</u> / Move closer to setpoint</p> <p>This parameter specifies how the PID controller responds to an interruption (controller inhibit).</p> <ul style="list-style-type: none"> <li>• <u>No response</u>: The PID controller is not affected and continues to operate as usual.</li> <li>• Move closer to setpoint: After an interruption, the setpoint is set to the actual value. The ID controller then moves closer to the set value again via the setpoint ramp.</li> </ul>
<i>P263 Factor <math>K_P</math></i>	<p>Setting range: 0 ... <u>1</u> ... 32,767</p> <p>Proportional factor of the proportional share of the PID controller with 3 decimal places. The proportionality factor takes the sign (+/-) of the parameter "Direction of rotation" into account. P263 and the IPOS variable H541 are identical.</p>
<i>P264 Integrative time <math>T_N</math></i>	<p>Setting range: <u>0</u> ... 65535 ms</p> <p>This parameter is used to set the integrative time (time constant) of the integrating part of the PID controller:</p> <ul style="list-style-type: none"> <li>• <math>1 \text{ ms} \leq T_N \leq 65535 \text{ ms}</math></li> <li>• <math>T_N = 0 \rightarrow</math> no I-component</li> </ul>
<i>P265 Derivative time <math>T_V</math></i>	<p>Setting range: <u>0</u> ... 30 ms</p> <p>This parameter is used to set the derivative time (time constant) of the differential part of the PID controller:</p> <ul style="list-style-type: none"> <li>• <math>1 \text{ ms} \leq T_V \leq 30 \text{ ms}</math></li> <li>• <math>T_V = 0 \rightarrow</math> no D-component</li> </ul>
<i>P266 Feedforward</i>	<p>Setting range: -32767 ... <u>0</u> ... 32767</p> <p>The feedforward value is added to the result of the PID controller. P266 and the IPOS variable H545 are identical.</p>
<i>P27x Process controller input values</i>	
<i>P270 Setpoint source</i>	<p>Setting range: <u>Parameter</u> / IPOS variable / Analog 1 / Analog 2</p> <p>This parameter is used to set the source from which the setpoint should be read.</p>
<i>P271 Setpoint</i>	<p>Setting range: -32767 ... <u>0</u> ... 32767</p> <p>Unit: [0.2/min]</p> <p>If P270 is set to "Parameter," the value of the parameter P271 is used as the setpoint. P271 and the IPOS variable H546 are identical.</p>
<i>P272 IPOS setpoint address</i>	<p>Setting range: <u>0</u> ... 1023</p> <p>If P270 is set to "IPOS variable," the address of the variable to be used is stored in P271. P272 and the IPOS variable H547 are identical.</p>
<i>P273 Time constant</i>	<p>Setting range: <u>0</u> ... 0.01 ... 2000 s</p> <p>This parameter is used to set the time constant for the setpoint ramp generator via a ramp that can be set via parameters.</p> <ul style="list-style-type: none"> <li>• Time constant <math>T_{\text{setpoint}} = 0 \rightarrow</math> ramp is deactivated.</li> </ul>
<i>P274 Scaling setpoint</i>	<p>Setting range: -32,767 ... <u>1</u> ... 32,767</p> <p>Factor for scaling the setpoint. P274 and the IPOS variable H548 are identical.</p>
<i>P275 Actual value source</i>	<p>Setting range: <u>Analog 1</u> / Analog 2 / IPOS variable</p> <p>This parameter is used to set the source from which the actual value should be read.</p>
<i>P276 IPOS actual value address</i>	<p>Setting range: <u>0</u> ... 1023</p> <p>If P275 is set to "IPOS variable," the address of the variable to be used is stored in P276. P276 and the IPOS variable H549 are identical.</p>



## Parameters

### Explanation of the parameters

<i>P277 Scaling actual value</i>	Setting range: $-32,767 \dots \underline{1} \dots 32,767$ Scaling factor of the filtered actual value. P277 and the IPOS variable H550 are identical.
<i>P278 Offset actual value</i>	Setting range: $-32767 \dots \underline{0} \dots 32767$ This parameter is used to set an integer, permanent offset of the actual value. P278 and the IPOS variable H552 are identical.
<i>P279 Time constant actual value</i>	Setting range: $\underline{0} \dots 1 \dots 500$ ms This parameter is used to set the time constant of the actual value 1 filter. When the parameter is set to "0," the filter is deactivated.
<i>P28x Process controller limits</i> The output value of the process controller is stored in the IPOS variable H524.	
<i>P280 Minimum offset + actual value</i>	Setting range: $-32767 \dots \underline{0} \dots 32767$ Minimum value for the offset. P280 and the IPOS variable H553 are identical.
<i>P281 Maximum offset + actual value</i>	Setting range: $-32767 \dots \underline{10000} \dots 32767$ Maximum value for offset. P281 and the IPOS variable H554 are identical.
<i>P282 PID controller minimum output</i>	Setting range: $-32767 \dots \underline{-1000} \dots 32767$ Unit: [0.2/min] Minimum output value of the P, I and D components. P282 and the IPOS variable H555 are identical. With PI and PID controllers, a negative value must be entered to allow for downward integration
<i>P283 PID controller maximum output</i>	Setting range: $-32767 \dots \underline{10000} \dots 32767$ Unit: [0.2/min] Maximum output value of the P, I and D components. P283 and the IPOS variable H556 are identical.
<i>P284 Process controller minimum output</i>	Setting range: $-32767 \dots \underline{0} \dots 32767$ Unit: [0.2/min] Minimum output value of the process controller (PID controller + feedforward P266). P284 and the IPOS variable H557 are identical.
<i>P285 Process controller maximum output</i>	Setting range: $-32767 \dots \underline{7500} \dots 32767$ Unit: [0.2/min] Maximum output value of the process controller (PID controller + feedforward P266). P285 and the IPOS variable H558 are identical.



**P3xx Motor parameters**

This parameter group is used to adjust the inverter to the motor. The parameters can be set separately for parameter set 1 and 2. This means two different motors can be operated alternately on the same inverter without requiring a new setting.

**P30x / P31x Limits 1 / 2**

**P300 / P310**

Start/stop speed  
1/2



Setting range: 0 ... 150 1/min

During startup in the VFC & Hoist operating mode, the rated slip of the connected motor is set. In all other operating modes,  $0.5 \times$  the rated slip of the connected motor is set at startup.

Only effective in the VFC and U/f operating modes. The parameter is not relevant in CFC and SERVO operating modes. This entry defines the smallest speed request which the inverter sends to the motor when enabled. The transition to the speed determined in the setpoint selection is made using the active acceleration ramp.

When a stop command is executed, this setting also determines the smallest speed at which the motor current is cut off or post-magnetization begins and the brake is applied, if necessary.

**P301 / P311 Minimum speed 1 / 2**



Setting range: 0 ... 15 ... 6100 1/min

The speed value which lower limit must not be exceeded even when zero is selected as the setpoint. The minimum speed also applies when  $n_{\min} < n_{\text{start/stop}}$  has been set.

**Important:**

- The slowest speed is 15 1/min when the hoist function is active, even if  $n_{\min}$  has been set to a lower value.
- To enable the drive to move clear of the limit switches even at low speeds,  $n_{\min}$  is not active for the hardware limit switch with which the drive has come into contact.

**P302 / P312 Maximum speed 1 / 2**



Setting range: 0 ... 1500 ... 6100 1/min

The value set in this parameter cannot be exceeded by a setpoint selection. If  $n_{\min} > n_{\max}$  is set, then  $n_{\max}$  applies.

**P303 / P313 Current limit 1 / 2**



Setting range: 0 ... 150 %  $I_N$  (size 0: 200 %  $I_N$ )

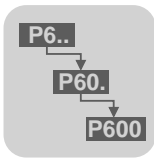
The factory setting for the current limitation is set to 150 %  $I_N$  of the matching motor.

The internal current limitation is based on the apparent current. It is assigned to the external current limitation (P120 AI2 Operating mode = 0 ... 10 V I-limit). Consequently, the entry determines the 100 % value within which the external current limitation can take effect. The current limit is automatically reduced in the field weakening range above the frequency of  $1.15 \times f_{\text{trans}}$ . This provides protection against the motor deviating from the optimal operating point.

The current limit effective in the field weakening range can be calculated using the following formula:

$$\text{Current limit [\%]} = (1.15 \times f_{\text{trans}} / f_{\text{act}}) \times \text{Setting value of P303 / P313 [\%]}$$

$f_{\text{act}}$  is the current rotating field frequency.



## Parameters

### Explanation of the parameters

#### P304 Torque limit



Setting range: 0 ... 150 % (size 0: 200 %)

The parameter limits the maximum torque of the motor. The entry acts on the setpoint of the motor torque ( $k_T \times I_{N\_inverter}$ ). The value is multiplied by the external current limit and can be altered with analog input 2. This function is only effective in CFC and SERVO operating modes. Refer to the "Project Planning" chapter for detailed information about calculating the setpoint torque (Motor selection for asynchronous servomotors CFC and synchronous servomotors SERVO).



#### NOTE

In the CFC and SERVO operating modes, the current limit P303 must always be set  $\geq$  P304 Torque limit to ensure that speed monitoring is triggered reliably.

#### P32x / P33x Motor compensation 1 / 2 (asynchronous)

#### P320 / P330 Automatic adjustment 1/2



Setting range: ON / OFF

Only effective in the VFC and U/f operating modes. The function is only useful for single motor operation. The inverter sets P322 IxR compensation 1 / P332 IxR compensation 2 automatically with each enable and saves the value. The inverter determines a basic setting that is adequate for a great number of drive applications. The connected motor is calibrated during the last 20 ms of the pre-magnetization time. The motor is **no** calibrated if:

- P320 Automatic adjustment 1 / P330 Automatic adjustment 2 = OFF
- P700 Operating mode 1 / P701 Operating mode 2 = VFC & GROUP or VFC & FLYING START
- P323 Premagnetizing time 1 / P333 Premagnetizing time 2 was shortened by more than 30 ms compared to the suggested value.
- VFC n-CONTROL mode is selected and P730 Brake function 1 / P733 Brake function 2 is set to OFF.

In such cases, the set IxR value is used for calculating the winding resistance.

- ON: Automatic adjustment.
- OFF: No automatic adjustment.

#### P321 / P331 Boost 1/2



Setting range: 0 ... 100 %

With VFC & GROUP: Manual setting to increase the starting torque by increasing the output voltage in a range below the transition speed.

With VFC: Manual setting is usually not required. In exceptional cases, manual setting may be necessary to increase the breakaway torque. In this case set to **max. 10 %**.

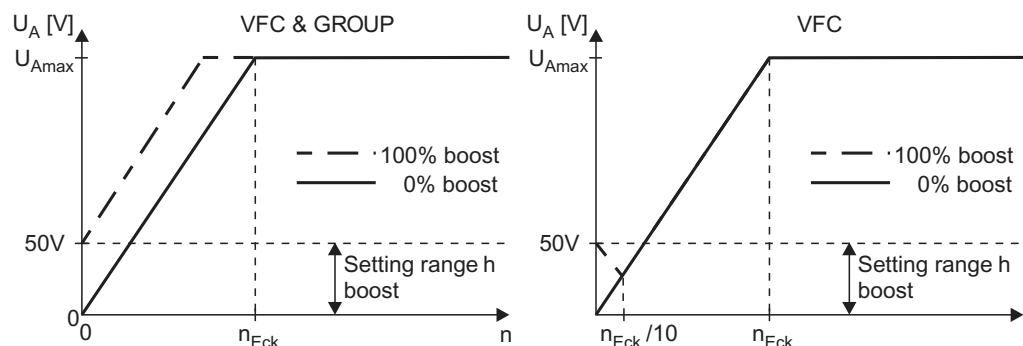
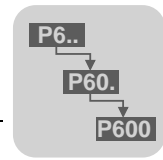


Figure 53: Working principle of boost (drawing not true to scale)

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**P322 / P332 IxR compensation 1/2**



Setting range: 0 ... 100 %

The IxR value of the matching motor is set as the factory setting.

In VFC operating mode, this parameter acts on the parameters of the calculated motor model which establish the torque. With P320 Automatic adjustment 1 / P330 Automatic adjustment 2 = ON an automatic setting takes place. If set to 100 %, the output voltage of the inverter is increased by 50 V when the rated current of the motor flows. Manual alterations to individual controller parameters are reserved for optimization by specialists.

**P323 / P333 Pre-magnetizing time 1 / 2**



Setting range: 0 ... 2 s

The pre-magnetization value of the matching motor is set as the factory setting.

Pre-magnetization serves to establish a high motor torque and starts when the inverter is enabled.

Pre-magnetization is in effect in VFC with encoder feedback operating mode with:

- P730 Brake function 1 / P733 Brake function 2 active
- P710 Standstill current 1 / P711 Standstill current 2 Switched off

**P324 / P334 Slip compensation 1 / 2**



Setting range: 0 ... 500 1/min

The value of the matching motor is set as the factory setting.

Only effective in VFC, VFC-n control and U/f operating modes. Slip compensation increases the speed accuracy of the motor. If values are entered manually, you will have to enter the rated slip of the connected motor. A setting range of +/- 20 % of the rated slip is permitted if a value other than the rated slip is entered to compensate for fluctuations between various motors.

**P34x Motor protection**

**P340 / P342 Motor protection 1 / 2**



Setting range: OFF / ON ASYNCHRONOUS / ON SERVO

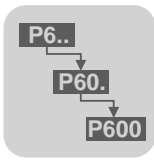
Depending on the motor connected (synchronous or asynchronous motor) this function can have the following effects.

OFF: Function not active

ON ASYNCHRONOUS:

When this function is activated, MOVIDRIVE® takes over the thermal protection of the connected motor by electronic means. In most cases, the motor protection function is comparable to standard thermal protection (motor protection switch) and, furthermore, it takes account of speed-dependent cooling by the integrated fan. Motor utilization is determined using the inverter output current, cooling type, motor speed and time. The thermal motor model is based on the motor data entered during startup (MOVITOOLS® / DBG60B) and when the operating conditions specified for the motor are observed.

	<b>NOTE</b>
	<p>If the motor also has to be protected against failure of the ventilation, blockage of air ducts, etc., it is also necessary to employ protection in the form of a TF positive temperature coefficient thermistor or TH bimetallic switch.</p>



## Parameters

### Explanation of the parameters

The following signal and display functions are available in conjunction with motor protection:

Parameter	Signal and display function
P006 Motor utilization 1 / P007 Motor utilization 2	Display of the motor utilization for parameter set 1 / 2.
P832 Response MOTOR OVERLOAD	Fault response of inverter when reaching P006 Motor utilization 1 / P007 Motor utilization 2 of 110 %. Default setting: EMERG.STOP/FAULT

Set the following parameters:

Parameter	Setting / Description
P341 Type of cooling	Self-ventilation or forced cooling
Binary output can be programmed to: /Motor utilization 1 /Motor utilization 2	Prewarning in case Motor utilization 1 (P006) / Motor utilization 2 (P007) exceeds a value of 100 %. In this case, the programmed output is set to "0" = 0 V.

**Important:** Switching off the inverter (mains and 24 V external) always resets the motor utilization to zero; i.e. any motor heating existing when the motor is switched back on is **not** taken into account.

The motor protection function processes the utilization of the connected motors separately for both parameter sets. The motor protection function may **not** be used if only one motor is permanently connected to the inverter and the "Parameter set changeover" function is only used for control purposes. Equally, the motor protection function must not be used with group drives because it is not possible to protect each individual motor reliably.

ON SERVO:

- Motor **without** KTY temperature sensor: MOVIDRIVE® B calculates and displays the motor utilization based on the current. The goal is to determine if the drive is going to fail based on an overload with the fault TF sensor (F31) after only a few cycles or during startup. This setting is available for parameter set 1 only.

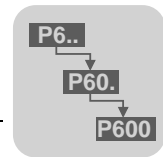
**Requirements:** Motor utilization is always determined based on the rated motor current. Enter the duration of the machine cycle to receive an exact statement concerning the utilization for the motor powering the machine cycle.


The following signal and display functions are available in conjunction with motor protection:

Parameter	Signal and display function
P006 Motor utilization 1	Display of motor utilization for parameter set 1. Valid after ca. 10 to 20 cycles or after ca 2 s and can be evaluated using IPOS <sup>plus</sup> ® or from a PLC.
P007 Motor utilization 2	In setting P340 = ON SERVO without function
P832 Response MOTOR OVERLOAD	In setting P340 = ON SERVO without function

Set the following parameters:

Parameter	Meaning
P344 Motor protection interval	Corresponds to the machine cycle of the application. Range: 0.1 s... 20 s



	<b>NOTE</b>
	<p>Activating the function does not trigger monitoring or protection of the connected motor. Protection must be guaranteed via TF/TH.</p> <p>Setting a binary output to "Motor utilization_1" or "Motor utilization_2" also has no effect when P340 is set to ON SERVO.</p>

- SEW motor **with** KTY temperature sensor: Motor utilization is calculated using a motor model stored in MOVIDRIVE (P006 Motor utilization1, P018 KTY utilization 1). Once the motor dependent switch-off limit is reached, the inverter will be switched off using the response set in P832 Response motor utilization. In this case, the settings in P341 and P344 are not relevant.

P341 / P343 Cooling type 1 / 2



Setting range: FAN COOLED / FORCED COOLING

For calculation of the thermal motor load as described in P340 Motor protection 1 / P342 Motor protection 2 you will need to know the type of cooling for the motor.

P344 Interval

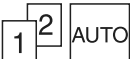


Setting range: 0,1 ... 4 ... 20 s

P344 is not relevant for asynchronous motors. For synchronous motors without KTY temperature sensor, this parameter corresponds to the cycle time of the movement and is used for the function P006 Motor utilization 1 / P007 Motor utilization 2 . The setting range is 100 ms ... 20000 ms.

You should always set the time for roundtrip travel (back and forth).

P345 / 346 I<sub>N</sub> / UL monitoring 1 / 2



Setting range: 0,1 ... 500 A

The function cannot be deactivated. The factory setting is dependent on the rated power of the MOVIDRIVE® B unit and is set to the rated current of the SEW motor with the same power (when option DER11B is installed: factory setting = 0).

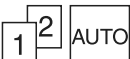
At 150 % rated motor current, the inverter switches off after 5 minutes with F84.

At 500 % rated motor current, the inverter switches off after 20 seconds with F84.

P35x Motor sense of rotation

SEW-EURODRIVE specifies the direction of rotation as seen onto the drive side of the motor. Clockwise (positive) is defined as rotation to the right and counterclockwise as rotation to the left. This definition is used for the motor connection type according to SEW designation.


P350 / P351 Change direction of rotation 1/2



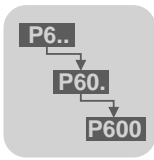
Setting range: ON / OFF

Change in direction of rotation	Positive setpoint (positive direction of travel)	Negative setpoint (negative direction of travel)
<b>OFF</b>	Motor turns clockwise	Motor turns counterclockwise
<b>ON</b>	Motor turns counterclockwise	Motor turns clockwise

- ON:** Above definition is reversed. The assignment of limit switches is maintained. When the motor turns in **CLOCKWISE** direction, the drive will be properly stopped once it hits the right limit switch. It is important to carefully check that the limit switch is connected properly and the reference point and travel positions are defined correctly when using this parameter.

	<b>NOTE</b>
	<p>Altering the 'Change direction of rotation' parameter after the system has been moved to its reference point causes the system to lose its reference point for the absolute position. The result may be undesirable travel movements of the axis.</p>

- OFF: The SEW definition applies.



## Parameters

### Explanation of the parameters

P36x Startup  
P360 Startup

**Startup** (only available in the DBG60B keypad).  
Setting range: YES / NO

- YES: Begins the startup function with the DBG60B keypad.

	<b>NOTE</b>
	With P360, MOVIDRIVE® B can only be started up in VFC operating modes. Startup in CFC and SERVO operating modes requires MOVITOOLS/SHELL.

- NO: The startup function is not begun.

### P4xx Reference signals

The following reference values are used for recording and signaling certain operating states. All signals from parameter group P4xx can be issued via binary outputs (P62x Binary outputs basic unit / P63x Binary outputs option).

**Important:** The signals are only valid if the inverter has signaled "Ready" after switch-on and there is no fault display.

P40x Speed reference signal

Signal if the speed is less than or greater than the set reference speed.

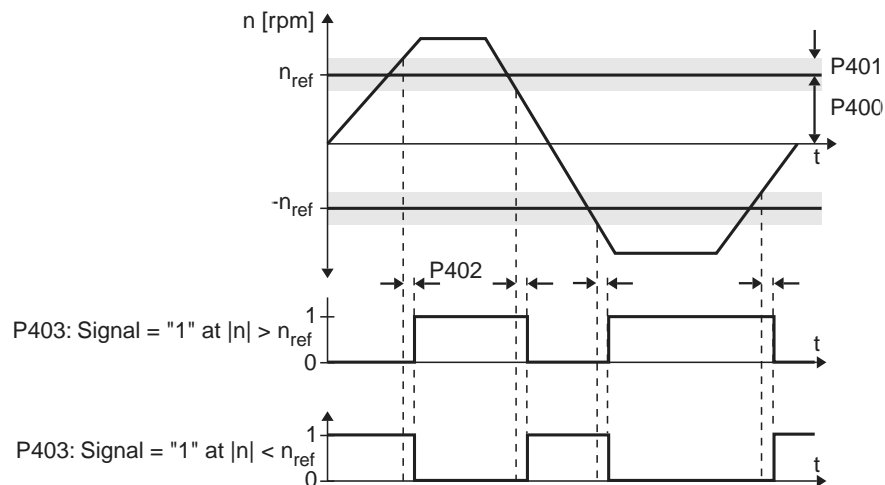


Figure 54: Speed reference signal

01619BEN

P400 Speed reference value

Setting range: 0 ... 1500 ... 6000 1/min

P401 Hysteresis

Setting range: 0 ... 100 ... 500 1/min

P402 Delay time

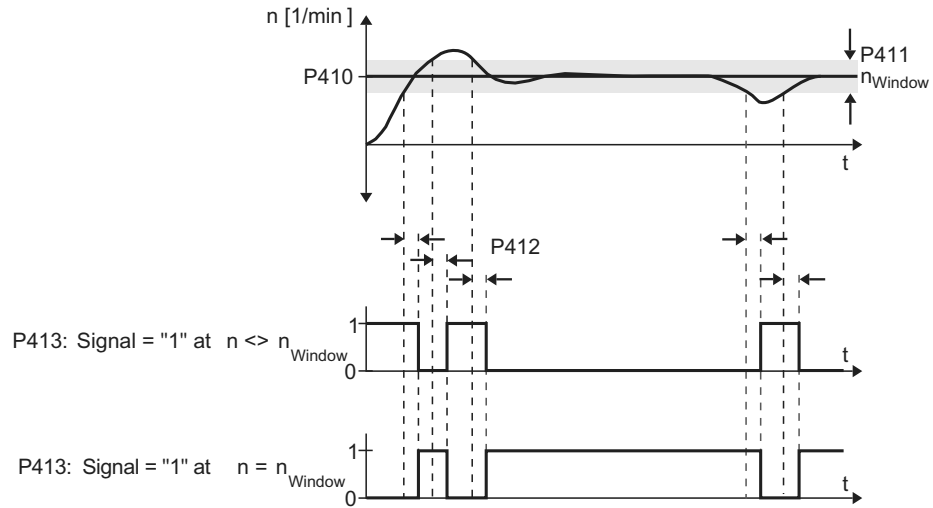
Setting range: 0 ... 1 ... 9 s

P403 Signal = "1" when:

$n \leq n_{ref}$  /  $n > n_{ref}$

*P41x Speed window signal*

Signals whether the speed is within or outside the set window range.



55733BEN

Figure 55: Speed window signal

*P410 Window center*

Setting range: 0 ... 1500 ... 6000 1/min

*P411 Range width*

Setting range: 0 ... 6000 1/min

*P412 Delay time*

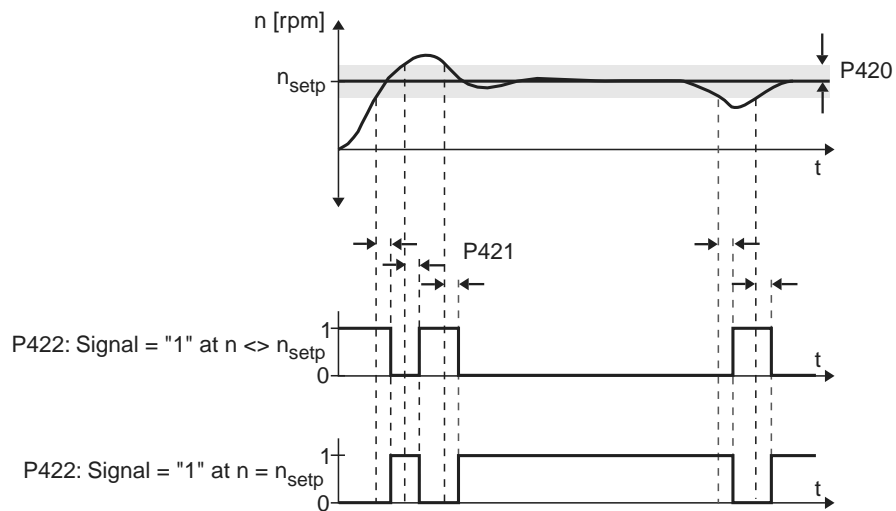
Setting range: 0 ... 1 ... 9 s

*P413 Signal = "1" when:*

INSIDE / OUTSIDE

*P42x Speed setpoint/actual value comparison*

Signal if the speed is equal to or not equal to the setpoint speed.



01625BEN

Figure 56: Speed setpoint/actual value comparison

*P420 Hysteresis*

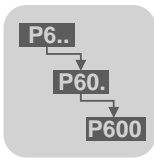
Setting range: 0 ... 100 ... 300 1/min

*P421 Delay time*

Setting range: 0 ... 1 ... 9 s

*P422 Signal = "1" when:*

n = n\_setpt / n <> n\_setpt



## Parameters

### Explanation of the parameters

**P43x Current reference signal** Signal if the output current is greater than or less than the reference value.

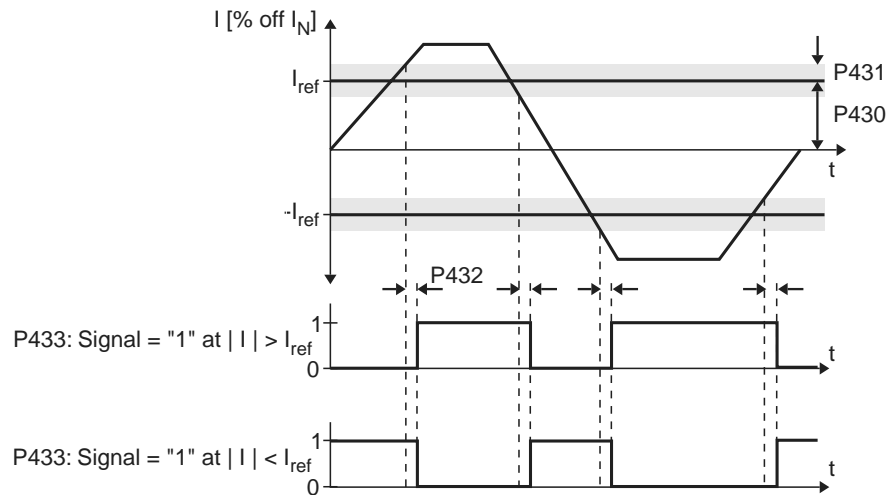


Figure 57: Current reference signal

01623BEN

**P430 Current reference value** Setting range: 0 ... 100 ... 150 %  $I_N$  (size 0: 200 %  $I_N$ )

**P431 Hysteresis** Setting range: 0 ... 5 ... 30 %  $I_N$

**P432 Delay time** Setting range: 0 ... 1 ... 9 s

**P433 Signal = "1" when:**  $I < -I_{ref} / I > I_{ref}$

**P44x I<sub>max</sub> signal** Signal if the inverter has reached the current limitation.

**P440 Hysteresis** Setting range: 0 ... 5 ... 50 %  $I_N$

**P441 Delay time** Setting range: 0 ... 1 ... 9 s

**P442 Signal = "1" when:**  $I < -I_{max} / I = I_{max}$

### P5xx Monitoring functions

The following monitoring functions have been implemented to monitor what happens to drive-specific parameters in the specific application and to be able to react in case of impermissible deviations. Some of the monitoring functions are available separately in both parameter sets. The response to the triggering of the monitoring functions can be set with P83x Fault responses .

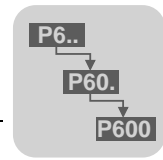
#### P50x Speed monitoring

**P500 / P502** Setting range: AUS / MOTOR / RGENERATIVE / MOT&REGEN.MODE

**Speed monitoring**  
1 / 2



The speed required by the setpoint can only be achieved if there is sufficient torque available to meet the load requirements. If P303 Current limit 1 / P313 Current limit 2 and the external current limit has been reached, then MOVIDRIVE® assumes that the torque has reached the maximum limit and the desired speed cannot be attained. Speed monitoring is triggered if this situation persists for the duration specified in P501 Deceleration time 1 / P503 Deceleration time 2 .



P501 / P503 Delay  
time 1 / 2



Activate the speed monitoring for hoists and set the delay time to a rather small value. Speed monitoring is not that important for safety since an incorrect movement of the hoist does not necessarily mean operation in the current limitation.

Setting range: 0 ... 1 ... 10 s

The set current limit can be reached briefly during acceleration, deceleration, or load peaks. You can prevent the speed monitoring from responding too sensitively by setting the deceleration time accordingly. The current limit must be reached permanently for the duration of the deceleration time before monitoring responds.

P504 Encoder  
monitoring motor

Setting range: YES / NO

- NO: An open circuit between frequency inverter and motor encoder is not directly detected. In case of a defective connection, fault F08 Speed monitoring will be issued in enabled state unless it was deactivated.
- YES: An open circuit between frequency inverter and motor encoder will be directly detected when using sin/cos encoders and TTL encoders. The fault signal F14 Encoder fault will be issued in case of a fault. This fault will also be generated in inhibited state.

	<b>NOTE</b>
	<p>Encoder monitoring is not a safety function!</p> <p>If you use an HIPERFACE® encoder, encoder monitoring is always active (also for the track) independent of the setting in P504.</p>

P505 Synchrono-  
us encoder  
monitoring

Setting range: YES / NO

- NO: An open circuit between frequency inverter and synchronous encoder is not directly detected. In case of a defective connection, fault F08 Speed monitoring will be issued in enabled state unless it was deactivated.
- YES: An open circuit between frequency inverter and synchronous encoder will be directly detected when using sin/cos encoders and TTL encoders. The fault message F14 Encoder fault will be issued in case of a fault. This fault will also be generated in inhibited state.

P51x Synchrono-  
us operation  
monitoring

**Synchr. operation monitoring** only parameter set 1 and when the DRS11B option is used.

For a detailed description, refer to the “MDX61B - Synchronous Operation Board DRS11B” manual.

P510 Positioning  
tolerance slave

Setting range: 10 ... 25 ... 32 768 inc

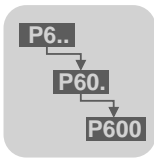
Various conditions must be met to allow for precise positioning of the slave drive. The brake of the slave drive is applied if all of the following conditions are met:

- Brake function of the slave drive is activated
- Master drive at a standstill
- Master drive is de-energized (= inverter status INHIBITED)
- Slave drive is at a standstill and is located within the positioning window

P511 Prewarning  
lag error

Setting range: 50 ... 99 999 999 inc

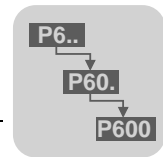
A prewarning is issued if the angular offset exceeds the value set here. The prewarning is issued regardless of the operating mode of the slave drive.



## Parameters

### Explanation of the parameters

<i>P512 Lag error limit</i>	<p>Setting range: 100 ... <u>4000</u> ... 99 999 999 inc</p> <p>Fault message F42 "Lag error" is issued if the angular misalignment exceeds the value set here. This is regardless of whether the slave drive is operating in free-running or synchronous operation mode.</p>
<i>P513 Delay lag error signal</i>	<p>Setting range: 0 ... <u>1</u> ... 99 s</p> <p>For an adjustable hold time, the messages 'Prewarn. lag error' and 'Lag error limit' as fault messages or as signal at a binary output can be suppressed during transition from free-running to synchronous operation.</p>
<i>P514 Counter LED display</i>	<p>Setting range: 10 ... <u>100</u> ... 32 768 inc</p> <p>The LED V1 (green) lights up if the angular offset exceeds the set value. This permits an immediate visual display of the maximum differential between the master and slave drives during operation. This is helpful during startup.</p>
<i>P515 Delay in-position signal</i>	<p>Setting range: 5 ... <u>10</u> ... 2000 ms</p> <p>The DRS SLAVE IN POS binary output message is not issued unless the master and slave drives are located within the time set in P510 Positioning tolerance slave .</p>
<i>P516 X41 Encoder monitoring</i>	<p>Setting range: <u>NO</u> / YES</p> <ul style="list-style-type: none"> <li>• <u>NO</u>: Wire breakage between the frequency inverter and a TTL encoder connected at X41 is not recognized directly. In case of a defective connection, fault F42 "Lag error" will be issued in enabled state unless it has been deactivated.</li> <li>• <u>YES</u>: Wire breakage between the frequency inverter and a TTL encoder connected at X41 is recognized directly. The fault message F48 "Hardware DRS" will be issued in case of a fault. This fault will also be generated in inhibited state.</li> </ul> <p>Encoder monitoring is not a safety function!</p>
<i>P517 X41 Pulse count monitoring</i>	<p>Setting range: <u>NO</u> / YES</p> <p>The number of pulses of the encoder connected at X41 is checked using the resolution set in P233 through evaluation of the C track. If increments are lost, the fault message F48 "Hardware DRS" is generated.</p> <ul style="list-style-type: none"> <li>• <u>NO</u>: Pulse counter monitoring is not active.</li> <li>• <u>YES</u>: Pulse counter monitoring is active.</li> </ul>
<i>P518 X42 Encoder monitoring</i>	<p>Setting range: <u>NO</u> / YES</p> <ul style="list-style-type: none"> <li>• <u>NO</u>: Wire breakage between the frequency inverter and a TTL encoder connected at X42 is not recognized directly. In case of a defective connection, fault F42 "Lag error" will be issued in enabled state unless it has been deactivated.</li> <li>• <u>YES</u>: Wire breakage between the frequency inverter and a TTL encoder connected at X42 is recognized directly. The fault message F48 "Hardware DRS" will be issued in case of a fault. This fault will also be generated in inhibited state.</li> </ul> <p>Encoder monitoring is not a safety function!</p>
<i>P519 X42 Pulse count monitoring</i>	<p>Setting range: <u>NO</u> / YES</p> <p>The number of pulses of the encoder connected at X42 is checked using the resolution set in P234 through evaluation of the C track. If increments are lost, the fault message F48 "Hardware DRS" is generated.</p> <ul style="list-style-type: none"> <li>• <u>NO</u>: Pulse counter monitoring is not active.</li> <li>• <u>YES</u>: Pulse counter monitoring is active.</li> </ul>
<i>P52x Mains OFF monitoring</i>	<p>Setting the parameter P520 Mains off response time / P521 Power off response The setting of P520/P521 is significant when a binary input is programmed to "POWER ON" and MOVIDRIVE® regenerative mode is used (see MOVIDRIVE® regenerative power unit MDR60A system manual).</p>



*P520 Mains OFF response time*      Setting range: 0 ... 5 s

*P521 Mains OFF response*      CONTROL.INHIBIT / EMERGENCY STOP

*P522 Phase failure monitoring*      OFF / ON

The power supply phases of the MOVIDRIVE® unit are monitored for phase failure. If a phase failure is detected in two phases, then the DC link will be de-energized, which corresponds to a power supply (mains) disconnection. Since the power supply phases cannot be monitored directly, monitoring has to be done indirectly via ripple of the DC link, which increases drastically in case of a phase failure.

The DC link voltage is monitored at a time interval  $\Delta t = 1$  ms for dropping below a minimum voltage level that depends on the rated supply voltage of the unit.

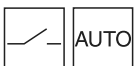
The result is the following nominal guide value for detection of a phase failure:

- 50 Hz power supply: ca.  $t_{max} = 3.0$  s
- 60 Hz power supply: ca.  $t_{max} = 2.5$  s

Once a phase failure has been detected, the output stage is inhibited and the brake is applied. The fault message *F06 Phase failure* is displayed. The fault response is as follows: Immediate switch-off with inhibit. The fault can only be remedied by executing a unit reset.

*P53x Temperature protection motor*

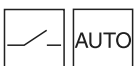
*P530 Sensor type 1*      Setting values: No sensor / TF-TH / KTY (KTY only for SEW synchronous motors)



Selection of the sensor used for motor protection in parameter set 1.

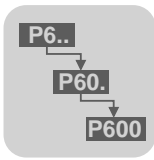
- TF/TH: Set the response with P835 Response TF SIGNAL.
- KTY: Set P340 Motor protection 1 to "ON SERVO". The motor model is now activated. Set the response using P832 Response motor overload.

*P531 Sensor type 2*      Setting values: No sensor / TF-TH / KTY (KTY not implemented)



Selection of the sensor used for motor protection in parameter set 2.

	<b>NOTE</b>
	If you select the setting "KTY" (for SEW synchronous motors only), you have to repeat startup, else fault F84 will be triggered.



## Parameters

### Explanation of the parameters

#### P54x Gear unit / motor monitoring functions

These parameters are used to set the response to be triggered in the event of a motor or gear unit problem. The binary inputs have to be set accordingly for this purpose. The fault responses will also be triggered in the CONTROLLER INHIBIT inverter status.

Response	Description
<b>NO RESPONSE</b>	No fault is displayed and no fault response is undertaken. The fault which is signaled is completely ignored.
<b>DISPLAY FAULT</b>	The fault is displayed (in 7-segment display and SHELL), the fault output is set (if programmed). The unit has no other fault responses. The fault can be reset (terminal, RS485, fieldbus, auto-reset).
<b>IMM. STOP/FAULT</b>	The inverter performs an immediate switch-off and a fault is signaled. The output stage is inhibited and the brake is applied. The ready signal is revoked and the fault output is set, if programmed. A restart is only possible after a fault reset has been performed during which the inverter is reinitialized.
<b>EMERG.STOP/FAULT</b>	The drive is braked with the emergency ramp t14/t24. Once the stop speed is reached, the output stage is inhibited and the brake is applied. The fault is signaled immediately. The ready signal is revoked and the fault output is set, if programmed. A restart is only possible after a fault reset has been performed during which the inverter is reinitialized.
<b>RAPID STOP/FAULT</b>	The drive is braked with the set stop ramp t13/t23. Once the stop speed is reached, the output stage is inhibited and the brake is applied. The fault is signaled immediately. The ready signal is revoked and the fault output is set, if programmed. A restart is only possible after a fault reset has been performed during which the inverter is reinitialized.
<b>IMM. STOP/WARN.</b>	The inverter performs an immediate switch-off and a fault is signaled. The output stage is inhibited and the brake is applied. The fault is signaled via the terminal, if programmed. The ready signal is not revoked. The drive restarts without unit re-initialization if the fault is rectified by an internal procedure or by a fault reset.
<b>EMERG. STOP/WARN G</b>	The drive is braked with the emergency ramp t14/t24. Once the stop speed is reached, the output stage is inhibited and the brake applied. The fault is signaled immediately. The fault is signaled via the terminal, if programmed. The ready signal is not revoked. The drive restarts without unit re-initialization if the fault is rectified by an internal procedure or by a fault reset.
<b>RAPID STOP/WARN G</b>	The drive is braked with the set stop ramp t13/t23. Once the stop speed is reached, the output stage is inhibited and the brake applied. The fault is signaled immediately. The fault is signaled via the terminal, if programmed. The ready signal is not revoked. The drive restarts without unit re-initialization if the fault is rectified by an internal procedure or by a fault reset.

#### P540 Response drive vibration / warning

Default setting: Display fault

Once the drive vibration sensor signals a warning, the inverter will respond with the set response.

#### P541 Response drive vibration / fault

Default setting: Rapid stop warning

Once the drive vibration sensor signals a fault, the inverter will respond with the set response.

#### P542 Response oil aging / warning

Default setting: Display fault

Once the oil aging sensor signals a warning, the inverter will respond with the set response.

#### P543 Response oil aging / fault

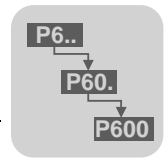
Default setting: Display fault

Once the oil aging sensor signals a fault, the inverter will respond with the set response.

#### P544 Oil aging / overtemperature

Default setting: Display fault

Once the oil aging sensor signals overtemperature, the inverter will respond with the set response.



*P545 Oil aging /  
ready signal*

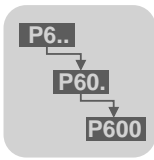
Default setting: Display fault

Once the oil aging sensor signals ready, the inverter will respond with the set response.

*P549 Response  
brake wear*

Default setting: Display fault

Once the brake wear sensor signals a fault, the inverter will respond with the set response.



## Parameters

### Explanation of the parameters

#### P6xx Terminal assignment

**P60x Binary inputs basic unit** Binary input DIØØ with fixed assignment "/CONTROL. INHIBIT."

**P600 ... P606 Binary inputs DIØ1 ... DIØ7** The binary inputs of the basic unit can be set to the same functions as the binary outputs option (P61x).

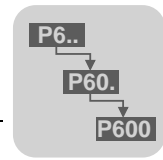


#### P61x Binary inputs option

**P610 ... P617 Binary input DI1Ø ... DI17** The binary inputs can be programmed to the following functions:




Function	In effect at		Effective in Inverter status		factory set to	See also
	"0" signal	"1" signal	Inhibited	released		
<b>NO FUNCTION</b>	–	–	–	–	DIØ6 DIØ7	
<b>ENABLE / STOP</b>	Stop on t11/t23	Enable	No	Yes	DIØ3	P13x / P14x
<b>CCW/STOP</b>	Stop on t11/t21 or t12/t22	Enable CW	No	Yes	DIØ1	
<b>CCW/STOP</b>	Stop on t11/t21 or t12/t22	Enable CCW	No	Yes	DIØ2	
<b>n11/n21</b> n13/n23	External setpoints only	n11/n21    n13/n23	No	Yes	DIØ4	P16x / P17x
<b>n12/n22</b>	External setpoints only	n12/n22	No	Yes	DIØ5	
<b>FIXED SETP. SELECT</b>	Fixed setpoints of the active parameter set selected	Fixed setpoints of the active parameter set selected	Yes	Yes		
<b>PARAM. SELECT<sup>1)</sup></b>	Parameter set 1	Parameter set 2	Yes	No		
<b>RAMP SELECT</b>	1. Ramp (t11/t21) active	2. Ramp (t12/t22) active	Yes	Yes		P13x / P14x
<b>MOTOR POT UP</b>	–	Increase setpoint	No	Yes		P15x
<b>MOTOR POT DOWN</b>	–	Decrease setpoint	No	Yes		
<b>/EXT. FAULT</b>	External fault	–	No	Yes		
<b>FAULT RESET</b>	Reset on positive edge ("0" to "1")		Yes	Yes		
<b>/HOLD CONTROL</b>	Hold control active	–	No	Yes		P210
<b>/LIM. SWITCH CW</b>	Right limit switch reached	Not reached	No	Yes		
<b>/LIM. SWITCH CCW</b>	Left limit switch reached	Not reached	No	Yes		
<b>IPOS INPUT</b>	Function depends on IPOS function					IPOS- plus® manual
<b>REFERENCE CAM</b>	not actuated	actuated	No	Yes		
<b>START REF.TRAVEL</b>	–	Start referencing for IPOS	No	Yes		
<b>SLAVE FREE RUNNING</b>	Master/slave operation	Slave free running	Yes	Yes		
<b>ACCEPT SETPOINT</b>	Do not take over	Accept setpoint	No	Yes		
<b>POWER ON</b>	see P521	Ext. POWER ON signal	Yes	Yes		P52x
<b>SET DRS ZERO PT.</b>	"1" to "0": sets new zero point	Delete angular offset	Yes	Yes		Synchron- ous operation manual
<b>START DRS SLAVE</b>	No enable	Enable	No	Yes		
<b>DRS TEACH IN</b>	–	Adopt angular offset in P224	Yes	Yes		
<b>DRS MASTER STOP</b>	Master drive turns	Master drive at a standstill	Yes	Yes		
<b>Vibration/Warning</b>	Vibration sensor signals warning	Vibration sensor does not signal warning	Yes	Yes		



Function	In effect at		Effective in Inverter status		factory set to	See also
	"0" signal	"1" signal	Inhibited	released		
Vibration/fault	Vibration sensor signals fault	Vibration sensor does not signal fault	Yes	Yes		
Oil aging/warning	Oil aging sensor signals warning	Oil aging sensor does not signal warning	Yes	Yes		
Oil aging/fault	Oil aging sensor signals fault	Oil aging sensor does not signal fault	Yes	Yes		
Oil aging/overtemperature	Oil aging sensor reports overtemperature	Oil aging sensor does not signal overtemperature	Yes	Yes		
Oil aging/ready	Oil aging sensor is not ready for operation	Oil aging sensor is ready for operation	Yes	Yes		
Brake wear	Brake is worn	Brake is ok	Yes	Yes		

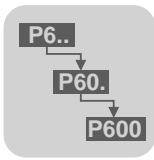
1) Important for operating modes with encoder feedback: The parameter set must not be changed more often than every 2 seconds.

*P62x Binary output basic unit* Use binary output DBØØ for controlling the brake. This binary output has the fixed assignment of the "/BRAKE" function. The "BRAKE RELEASED" and "BRAKE APPLIED" signals are intended to be passed on to a master controller.

	<b>NOTE</b>
	<p>The binary signals are only valid if the inverter has signaled "Ready" after switch-on and there is no fault display. Binary signals have "0" status while MOVIDRIVE® is being initialized.</p> <p>Several terminals can be assigned the same function.</p>

*P620 ... P624 Binary output DOØ1 ... DOØ5* The binary outputs of the basic unit can be set to the same functions as the binary outputs option (P63x).





## Parameters

### Explanation of the parameters

#### P63x Binary outputs option

P630 ... P637

Binary output

DO1Ø ... DO17

The following functions can be assigned to the binary outputs:



Function	Binary output has		factory set to	See also
	"0" signal	"1" signal		
NO FUNCTION	Always "0" signal	–		
/FAULT	Collective fault signal	–	DOØ2	
READY FOR OPERATION	Not ready for operation	Ready for operation	DOØ1	
OUTPUT STAGE ON	Unit inhibited	Unit enabled and motor energized		
ROTATING FIELD ON	No rotating field	Rotating field		
BRAKE RELEASED <sup>1)</sup>	Brake applied	Brake released		
BRAKE APPLIED <sup>1)</sup>	Brake released	Brake applied		
MOTOR STANDSTILL	Motor is turning	Motor stopped		
PARAMETER SET	Parameter set 1 active	Parameter set 2 active		
SPEED REFERENCE P403 = $n < n_{ref}$ ( $n > n_{ref}$ )	$n > n_{ref}$ ( $n < n_{ref}$ )	$n < n_{ref}$ ( $n > n_{ref}$ )		P40x
SPEED WINDOW P413 = WITHIN (OUTSIDE)	Speed is outside (within) speed window	Speed is within (outside) speed window		P41x
SP/ACT.VAL.COMP. P422 = $n = n_{set}$ ( $n <> n_{set}$ )	$n <> n_{set}$ ( $n = n_{set}$ )	$n = n_{set}$ ( $n <> n_{set}$ )		P42x
CURRENT REFERENCE P433 = $I < I_{ref}$ ( $I > I_{ref}$ )	$I > I_{ref}$ ( $I < I_{ref}$ )	$I < I_{ref}$ ( $I > I_{ref}$ )		P43x
I <sub>max</sub> SIGNAL P442 = $I = I_{max}$ ( $I < I_{max}$ )	$I < I_{max}$ ( $I = I_{max}$ )	$I = I_{max}$ ( $I < I_{max}$ )		P44x
/MOTOR UTILIZATION 1	100 % prewarning of motor protection in parameter set 1	–		P34x
/MOTOR UTILIZATION 2	100 % prewarning of motor protection in parameter set 2	–		
/DRS PREWARNING	Value for prewarning lag error (P511) exceeded	–		Synchronous operation manual
/DRS LAG ERROR	Lag error limit (P512) exceeded	–		
DRS SLAVE IN POS	Position not reached	Position reached		IPOS <sup>plus</sup> ® manual
IPOS IN POSITION	Position not reached	Position reached		
IPOS REFERENCE	No referencing	Referencing carried out		
IPOS OUTPUT	Depends on IPOS program		DOØ3 DOØ4 DOØ5	
/IPOS fault	Fault message IPOS program	–		

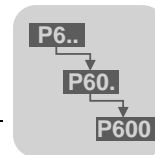
1) Use binary output DBØØ to control the brake. This binary output has the fixed assignment of the "/BRAKE" function. The "BRAKE RELEASED" and "BRAKE APPLIED" signals are intended to be passed on to a master controller.



#### NOTE

The binary signals are only valid if the inverter has signaled "READY" after switch-on. Binary signals have "0" status while MOVIDRIVE® is being initialized.

Several terminals can be assigned the same function.



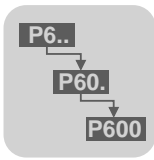
*P64x Analog outputs optional*

*P640 / P643 Analog output AO1 / AO2* Depending on P642 Operating mode AO1 / P645 Operating mode AO2 the signal range is  $-10 \dots 0 \dots 10$  V (AOV1 / AOV2) or  $0 (4) \dots 20$  mA (AOC1 / AOC2).

The following functions can be assigned to the analog outputs:



Function	Scaling (at P641/P644 = 1)		Explanation	Factory setting
	Reference value	Output value		
<b>NO FUNCTION</b>	always 0 V or 0 mA		–	
<b>RAMP INPUT</b>	+/-3000 1/min	+/-10 V or 20 mA	Setpoint speed at the input of the internal ramp generator	
<b>SET SPEED</b>	+/-3000 1/min	+/-10 V or 20 mA	Valid setpoint speed (output ramp generator or correcting variable of master controller)	
<b>ACTUAL SPEED</b>	+/-3000 1/min	+/-10 V or 20 mA	Actual speed	AO1
<b>ACTUAL FREQUENCY</b>	+/-100 Hz	+/-10 V or 20 mA	Rotating field frequency	
<b>OUTPUT CURRENT</b>	150 % $I_N$ (BG0: 200 % $I_N$ )	10 V or 20 mA	Apparent current	AO2
<b>ACTIVE CURRENT</b>	+/-150 % $I_N$ (BG0: +/-200 % $I_N$ )	+/-10 V or 20 mA	Active current, positive when torque is in positive sense of rotation; negative when torque is in negative sense of rotation.	
<b>RELATIVE TORQUE</b>	+/-150 % $I_N$ (BG0: +/-200 % $I_N$ )	+/-10 V or 20 mA	Active current that forms the torque; the value "0" is always output in VFC operating modes.	
<b>UNIT UTILIZATION</b>	150 % (BG0: 200 %)	10 V or 20 mA	Current unit utilization	
<b>IPOS OUTPUT</b>	+/-10 000 digits	+/-10 V or 20 mA	Internal IPOS values (see IPOS <sup>plus</sup> ® manual)	
<b>IPOS OUTPUT 2</b>	+/-10 000 digits	+/-10 V or 20 mA	Internal IPOS values (see IPOS <sup>plus</sup> ® manual)	



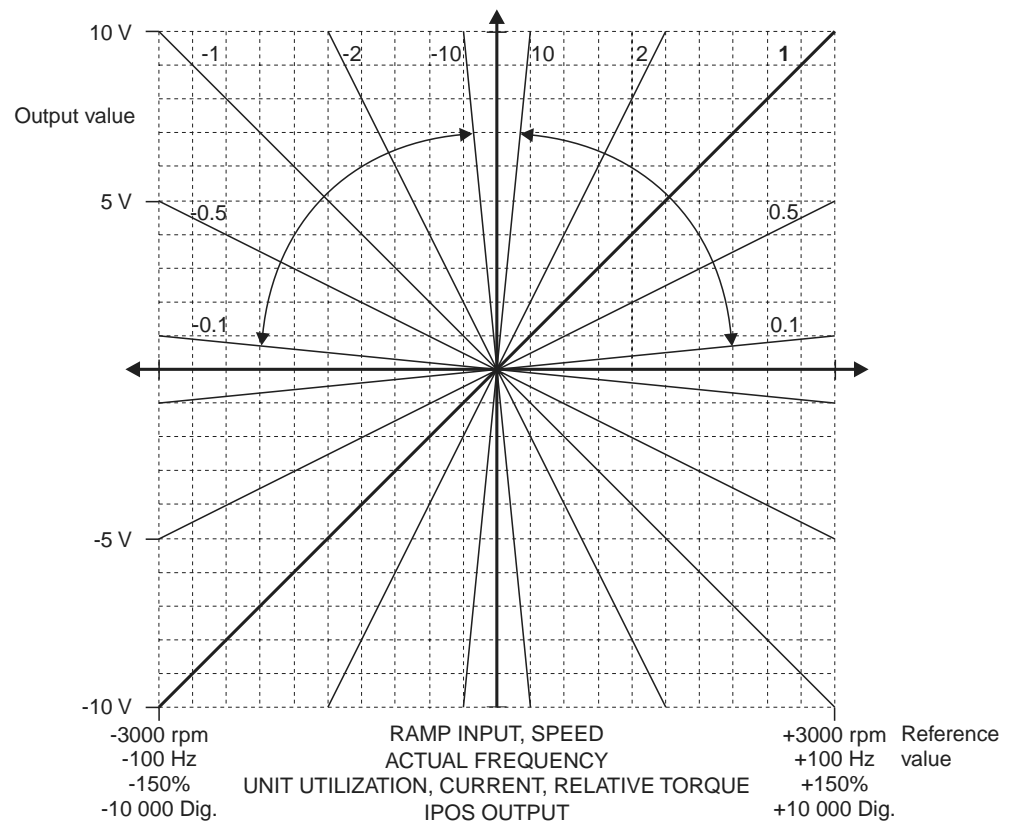
## Parameters

### Explanation of the parameters

*P641 / P644 Scaling AO1 / AO2*

Setting range:  $-10 \dots 0 \dots 1 \dots 10$

The incline of the characteristic for the analog outputs is defined. The value for unit utilization, current and relative torque is 200% for each in BGo.



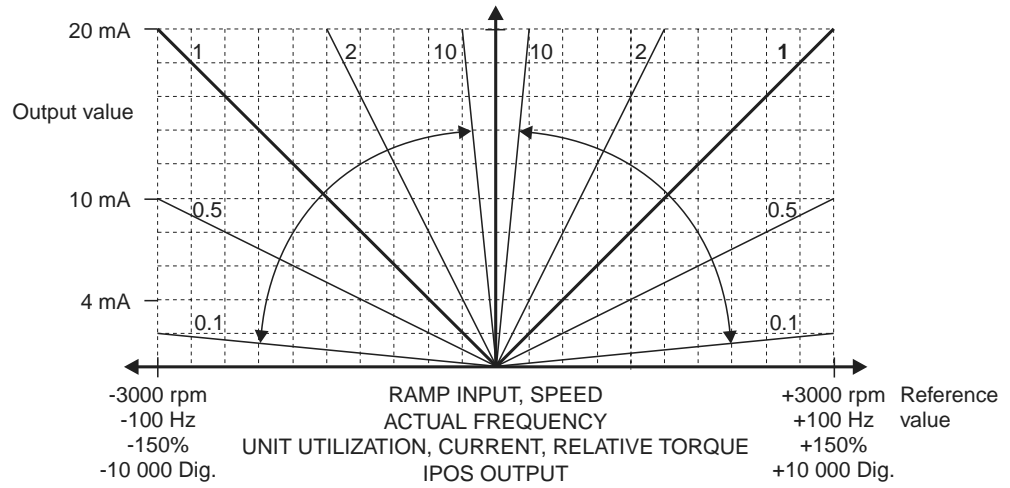
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Figure 58: Incline of the characteristic curve for the analog outputs

*P642 / P645 Operating mode AO1 / AO2*

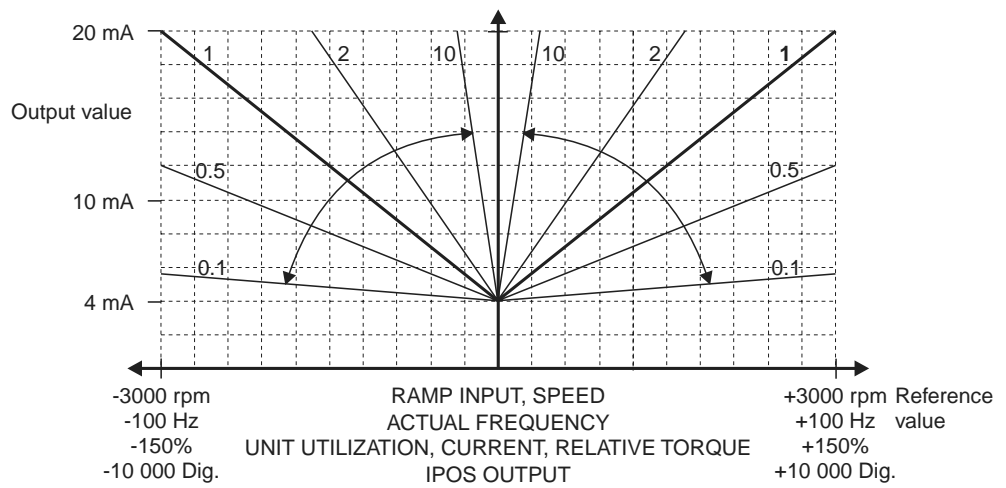
Here you can set the operating mode of the analog output. The following operating modes are available:

- OFF: The value zero is always output.
- $-10 \dots 0 \dots 10 \text{ V}$ : Output of the reference value with the correct signs as voltage values on AOV1/AOV2; the current outputs AOC1/AOC2 are not valid.
- $0 \dots 20 \text{ mA}$ : Output of the value of the reference values as current values  $0 \dots 20 \text{ mA}$  on AOC1 / AOC2; voltage outputs AOV1 / AOV2 are invalid. P641 Scaling AO1 / P644 Scaling AO2 will be evaluated as absolute number.
- $4 \dots 20 \text{ mA}$ : Output of the value of the reference values as current values  $4 \dots 20 \text{ mA}$  on AOC1 / AOC2; voltage outputs AOV1 / AOV2 are invalid. The slope of the characteristics is flatter than in  $0 \dots 20 \text{ mA}$ . The characteristics has an offset of 4 mA and the absolute of P641 Scaling AO1 / P644 Scaling AO2 refers to the value range of 16 mA. For BGo, the value for unit utilization, current and relative torque is 200 % for each.



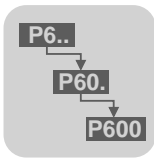
01306BEN

Figure 59: Characteristic of 0... 20 mA



01307BEN

Figure 60: Characteristic of operating mode 4... 20 mA



## Parameters

### Explanation of the parameters

#### P7xx Control functions

All settings with regard to the fundamental control properties of the inverter are defined within parameter group 7xx. These are all functions that the inverter automatically performs when activated and that influence its behavior in certain operating modes.

	<b>NOTE</b>
	When using incremental encoders (resolver, TTL, RS422, sin/cos, Hiperface® single-turn), changing the parameter set invalidates the positions H510 and H511. If a valid position is to be maintained after the parameter set has been changed, an absolute encoder (SSI, Hiperface® multi-turn) must be used.

#### P70x Operating modes

##### P700/P701 Operating mode 1/2



This parameter is used to set the basic operating mode of the inverter for parameter sets 1 and 2. This includes in particular the definition of the motor system, encoder feedback and corresponding control functions. When MOVIDRIVE® inverters are delivered, their parameters are set to the specific motor which matches the power of the motor.

All operating modes can be set for parameter set 1. Only operating modes without encoder feedback can be set for parameter set 2 (see following table).

Parameter set 1/2 P700 Operating mode 1 P701 Operating mode 2	Unit and option	Motor
VFC 1 / 2 (factory setting) VFC 1 / 2 & Group VFC 1 / 2 & Hoist VFC 1 / 2 & DC BRAK. VFC 1 / 2 & Flying start V/f characteristic U/f & DC BRAKING	MDX, no option required	DT/DV without incremental encoder
VFC n-control VFC-n-control & group VFC-n-control & hoist	MDX + DEH11B	DT/DV with incremental encoder or HIPERFACE® encoder
VFC n-control & sync	MDX + DRS11B + DEH11B	
VFC n-control & IPOS	MDX + DEH11B	
CFC CFC & M-control CFC & IPOS	MDX + DEH11B	DT/DV/D with incremental encoder or HIPERFACE® encoder or CT/CV (incremental encoder installed as standard)
CFC & Sync	MDX + DRS11B + DEH11B	
SERVO SERVO & M-control SERVO & IPOS	MDX with option DER11B or DEH11B	DS/CM/CMD with HIPERFACE® encoder or resolver
SERVO & Sync	MDX + DRS11B + DEH11B/DER11B	

You will find detailed information on the individual operating modes in the Operating modes chapter.

#### P71 x Standstill current

##### P710 / P711

##### Standstill current 1 / 2

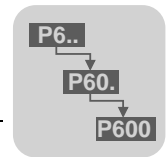


Setting range: 0 ... 50 %  $I_{Mot}$

The standstill current is used for injecting an adjustable current into the motor when the motor is at a standstill and the brake is applied. The standstill current can be switched off by /CONTROLLER INHIBIT = 0. This allows the following functions to be carried out:

- When the ambient temperature of the motor is low, it is possible to prevent the risk of condensation and freezing (in particular of the disc brake). Overheating of the motor is to be avoided when setting the rate of current.

**Recommendation:** Motor housing should be hand hot.



- It is possible to perform a rapid motor start when standstill current is activated because the motor is kept in an excited state. This means the motor can be started without having to wait for the pre-magnetizing time.

**Recommendation:** Set to 45 ... 50 %.

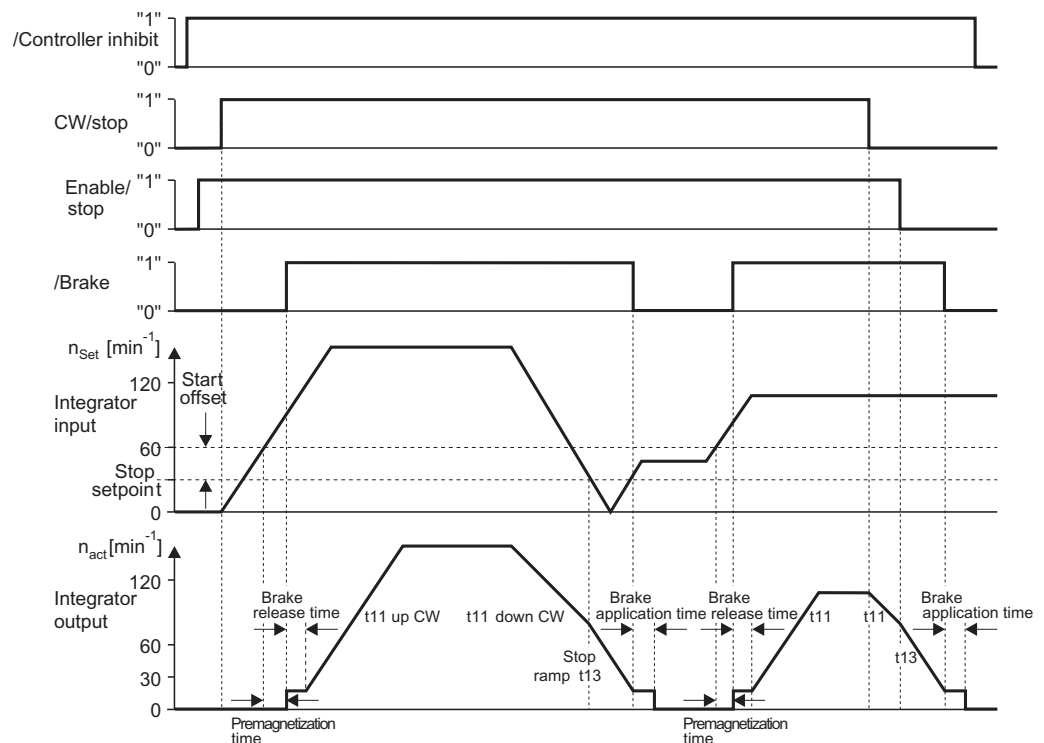
The standstill current function is deactivated by P710/P711 = 0. Setting is made in % of the rated motor current. The standstill current is definitely monitored by P303 Current limit 1 / P313 Current limit 2 .

In CFC operating mode, at least the magnetization current required according to the motor model will be applied. If P710 Standstill current 1 / P711 Standstill current 2 is set to a higher value, this higher value applies. This function does not have any effect in SERVO operating mode. The rated magnetizing current will always be set for operating modes VFC & hoist, VFC n-control & hoist and CFC if P710 is active. A rapid start will only take place in case the set standstill current is greater than or equal to the rated magnetizing current.

During the standstill current phase, the motor resistance is calibrated in the intervals of the set premagnetization time if the standstill current was constant and greater than the rated magnetizing current of the motor during the measurement interval. If a new enable takes place before expiration of the measurement interval, there will be no calculation of a new resistance value. The existing resistance value will still be used.

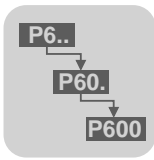
*P72x Setpoint stop function*

The setpoint stop function enables the inverter to automatically generate an enable function depending on the main setpoint. It results in an enable process with all necessary functions, such as premagnetization, brake control, etc. It always requires an additional enable via terminals.



59199AEN

Figure 61: Setpoint stop function



## Parameters

### Explanation of the parameters

**P720 / P723 Set-point stop function 1/2**



Setting range: ON / OFF

**P721 / P724 Stop setpoint 1 / 2**



Setting range: 0 ... 30 ... 500 1/min

In the VFC&Hoist operating mode, the minimum stop setpoint is internally limited to 16 1/min.

**P722 / P725 Start offset 1/2**




Setting range: 0 ... 30 ... 500 1/min

There is no enable for stop setpoint + start offset (start setpoint) >  $n_{max}$ .

Movement with  $n_{min}$  is never possible if the stop setpoint is >  $n_{min}$ .

**P73x Brake function**

MOVIDRIVE® B inverters are capable of controlling a brake installed on the motor. The brake function acts on the binary output DBØØ which has the fixed assignment of the '/BRAKE' function (24 V = brake released). In drives with encoder feedback (speed control), it is possible to select between electrical holding of the load and mechanical application of the brake in halt condition.

	<b>NOTE</b>
	The brake is <b>always</b> applied when /CONTROL.INHIBIT = 0.

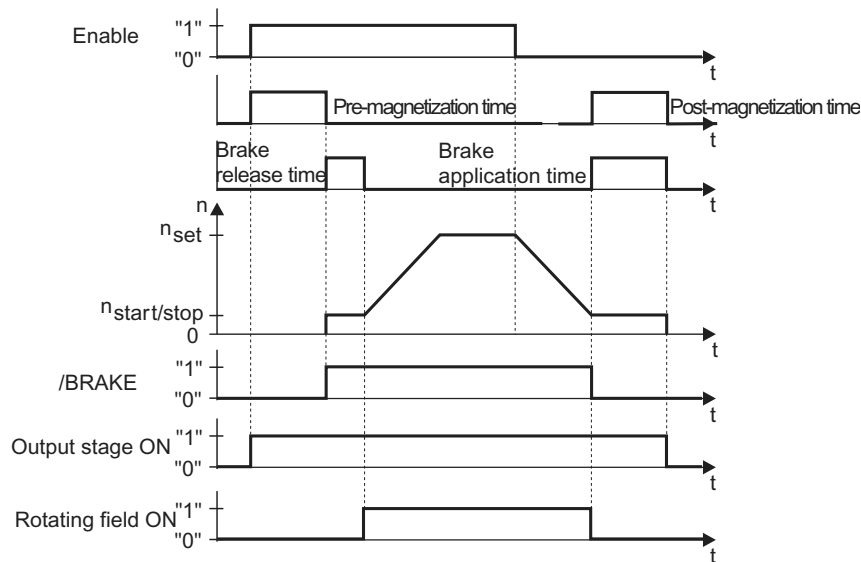


Figure 62: Inverter behavior with activated brake function

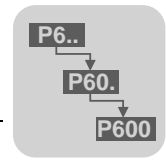
55734BEN

**P730 / P733 Brake function 1/2**



Setting range: ON / OFF

This function determines whether the brake is to be activated when the enable is withdrawn (enable = "0"). The brake is always active in controlled hoist operation.



**P731/P734 Brake release time 1/2**



Setting range: 0 ... 2 s

The brake release time of the matching motor is set as the factory setting.

This parameter determines how long the motor will remain at a standstill after expiration of the premagnetizing time and how much time the brake has to release.

**P732/P735 Brake application time 1/2**



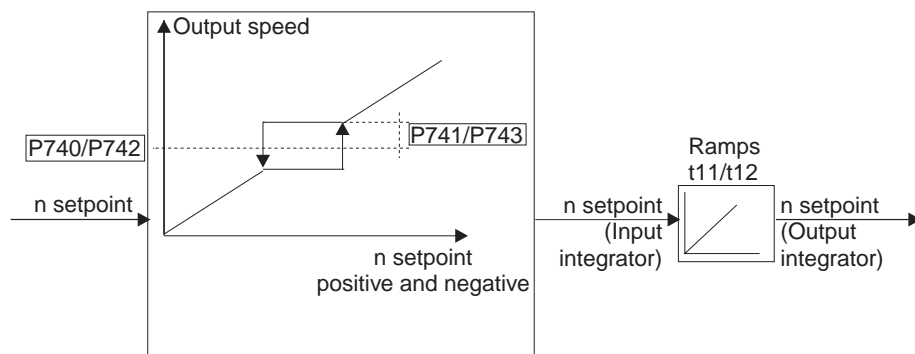
Setting range: 0 ... 2 s

The brake application time of the matching motor is set as the factory setting.

Serves to set the time required for application of the mechanical brake. This parameter prevents a sagging of the drive (particularly in hoists).

**P74x Speed skip function**

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



01310BEN

Figure 63: Speed skip function

The 'Speed skip' function makes it possible to prevent the motor speed from remaining within a certain speed window. This suppresses vibration and noise, in particular in machines with pronounced mechanical resonance.

**P740 / P742 Skip window center 1/2**

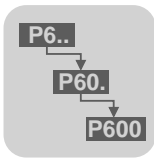


Setting range: 0 ... 1500 ... 6000 1/min

**P741 / P743 Skip width 1/2**



Setting range: 0 ... 300 1/min




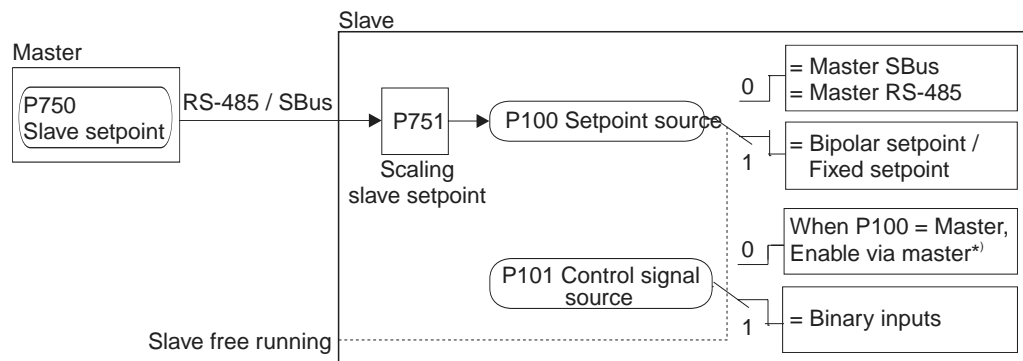
## Parameters

### Explanation of the parameters

#### P75x Master-slave function

The master-slave function allows for implementing automatical functions such as speed synchronization, shared load and torque control (slave). The RS485 interface (ST11 / ST12) or the system bus interface (SC11 / SC12) can be used as the communication link. To do so, make the following settings for the slave: P100 Setpoint source = Master-SBus or P100 Setpoint source = Master-RS485. The process output data PO1 ... PO3 (P870, P871, P872) are automatically set by the firmware. The programmed terminal function "Slave free running" P60x Binary inputs basic unit / P61x Binary inputs option gives operators the option to separate the slave from the master and switch to a local control mode.


<b>NOTE</b>	
	For the slave, the process data P87x are automatically assigned as follows:
	<ul style="list-style-type: none"> <li>- PO1 = Control word 1</li> <li>- PO2 = Speed or current in M-control</li> <li>- PO3 = IPOS PO data</li> <li>- PI1 = Status word 1</li> <li>- PE2 = Speed</li> <li>- PI3: IPOS PI data</li> </ul> <p>P13 and PO3 are not used and are freely available in IPOS<sup>plus</sup>®.</p>

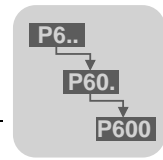


01311BEN

Figure 64: Master/slave function

\*) DIØØ "/Controller inhibit" and the programmed binary inputs Enable, CW and CCW must also get a "1" signal.

<b>NOTE</b>	
	P811 RS485 group address or P882 SBus group address must be set to the same value for master and slave. For Master/slave operation via the RS485 interface set P811 RS485 group address greater than 100. For operation via system bus (e.g. master/slave operation), the bus terminating resistors at the start and end of the system bus must be activated (S12 = ON).

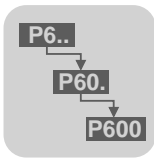


- Connection check**
- System bus (SBus): In case of a communication link via SBus, P883 SBus timeout delay is effective. If P883 SBus timeout delay is set to '0,' there is no monitoring of data transmission via the SBus.
  - RS485 interface: A connection check is always in place with a communication link via the RS485 interface; P812 RS485 timeout delay has no function. The slave inverter must receive a valid RS485 telegram within the fixed time interval of  $t = 500$  ms. If the time is exceeded, the slave drives are stopped at the emergency stop ramp and fault message F43 "RS485 timeout" is signaled.
  - In case of communication via SBus 2, parameter P893 Timeout delay SBus 2  $\geq$  should be set to 10 ms (recommendation: 100 ms).

	<b>NOTE</b>
	<p>The fault is automatically reset and the drives are enabled when the slave inverters once again receive a valid telegram.</p> <p>The connection check is effective at both RS485 interfaces. If you have connected a PC using XTERMINAL and the UWS21B option, every telegram from the PC will reset the fault.</p>

Overview of functions of master/slave operation

Function	Master		Slave	
	P750 Slave setpoint	P700 Operating mode 1	P100 Setpoint source	P700 Operating mode 1
<b>Synchronous speed running:</b> • Master controlled • Slave controlled	SPEED (485+SBus)	VFC VFC & GROUP VFC & HOIST V/f CHARACTERISTIC U/f & DC BRAKING	MASTER SBus MASTER RS485:	VFC VFC & GROUP VFC & HOIST V/f CHARACTERISTIC U/f & DC BRAKING
<b>Synchronous speed running:</b> • Master speed controlled • Slave controlled	SPEED (485+SBus)	VFC n-CONTROL VFC n-REG & ... CFC CFC/SERVO & IPOS CFC/SERVO & SYNC	MASTER SBus MASTER RS485:	VFC VFC & GROUP VFC & HOIST
<b>Synchronous speed running:</b> • Master speed controlled • Slave controlled • No rigid mechanical connection between the drives!	SPEED (485+SBus)	VFC n-CONTROL VFC n-REG & ... CFC/SERVO CFC/SERVO & IPOS CFC/SERVO & SYNC	MASTER SBus MASTER RS485:	VFC n-CONTROL VFC n-CTRL & GROUP VFC n-CTRL & HOIST CFC SERVO
<b>Synchronous speed running:</b> • Master controlled • Slave controlled • No mechanically rigid connection between the drives!	SPEED (485+SBus)	VFC VFC & GROUP VFC & HOIST	MASTER SBus MASTER RS485:	VFC n-CONTROL VFC n-CTRL & GROUP VFC n-CTRL & HOIST CFC SERVO
<b>Load distribution:</b> • Master controlled • Slave controlled	LOAD SHARE (485+SBus)	VFC VFC & GROUP VFC & HOIST	MASTER SBus MASTER RS485:	VFC VFC & GROUP VFC & HOIST
<b>Load distribution:</b> • Master speed controlled • Slave controlled	LOAD SHARE (485+SBus)	VFC n-CONTROL VFC n-REG & ... CFC/SERVO CFC/SERVO & IPOS CFC/SERVO & SYNC	MASTER SBus MASTER RS485:	VFC VFC & GROUP VFC & HOIST VFC & FLYING START
<b>Load distribution:</b> • Master speed controlled • Slave controlled	Not possible			
<b>Load distribution:</b> • Master controlled • Slave controlled	Not possible			
<b>Torque control of the slave:</b> • Master speed controlled • Slave torque controlled	TORQUE (485+SBus)	CFC/SERVO CFC/SERVO & IPOS CFC/SERVO & SYNC	MASTER SBus MASTER RS485:	CFC/SERVO & M-CTRL.



## Parameters

### Explanation of the parameters

#### Synchronous speed running

#### Speed synchronization (SPEED (RS485) / SPEED (SBus) / SPEED (485+SBus)):

The speed of the inverter that is set up as the slave follows the speed of the master inverter. Set the speed ratio with P751 Scaling slave setpoint at the slave inverter. P324 Slip compensation 1 / P334 Slip compensation 2 of the slave is to remain at the value set in the startup setting. Example:

Parameter	Setting on the master	Setting on the slave
P100 Setpoint source	e.g. UNIPOL./FIXED SETP	MASTER SBus
P101 Control signal source	e.g. TERMINALS	Not in effect
P700 Operating mode 1	VFC n-CONTROL	VFC 1
P750 Slave setpoint	SPEED (SBus)	MASTER-SLAVE OFF
P751 Scaling slave setpoint	Not in effect	1 (then 1 : 1)
P811 RS485 group address	Not in effect	
P881 Address SBus 1/2	Set different values	
P882 / P892 SBus groupaddress	Set the same value (0 ... 63)	
P884 / P894 SBus baud rate	Set the same value (125, 250, 500 or 1000 kBaud)	

#### Load sharing

#### Load sharing (LOAD SHAR (RS485) / LOAD SHARE (SBus) / LOAD S (485+SBus)):

This function lets two inverters control the same load. It is assumed in this case that the shafts of the motors corresponding to the master and the slave are rigidly connected together. You are recommended to use the same motors with the same gear ratios, otherwise different delays may result during starting/stopping due to the pre-magnetizing time and the brake release/application time. Set the load load distribution ratio (recommendation: 1) with P751 Scaling slave setpoint.

#### NOTE



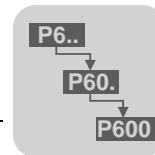
P324 Slip compensation 1 / P334 Slip compensation 2 of the slave must be set to 0.

Better behavior can be accomplished by setting the slave as follows:

- P138 Ramp limitation VFC: OFF
- P115 Filter setpoint: 0 s
- Ramps P130 / P131 / P132 / P133: 0 s
- P301 Minimum speed 1 / P311 Minimum speed 2: 0 min<sup>-1</sup>

Example:

Parameter	Setting on the master	Setting on the slave
P100 Setpoint source	e.g. BIPOL./FIXED SETP	MASTER RS485
P101 Control signal source	e.g. TERMINALS	Not in effect
P324 Slip compensation 1	Do not change	0
P700 Operating mode 1	VFC 1	VFC 1
P750 Slave setpoint	LOAD SHARE (RS485)	MASTER-SLAVE OFF
P751 Scaling slave setpoint	Not in effect	1 (then 1 : 1)
P810 RS485 Address	Set different values	
P811 RS485 group address	Set the same value (101 ... 199)	
P882 / P892 SBus groupaddress	Not in effect	
P884 / P894 SBus baud rate	Not in effect	



*Torque control*

**Torque control of the slave (TORQUE (RS485) / TORQUE (SBus) / TORQUE (485+SBus)):**

The slave inverter receives the torque setpoint of the master directly (the correcting variable of the speed controller). This also enables high quality load distribution to be achieved, for example. This setting should be preferred over load sharing if the drive configuration permits it. Set the speed ratio with P751 Scaling slave setpoint. Example:

Parameter	Setting on the master	Setting on the slave
<b>P100 Setpoint source</b>	e.g. UNIPOL./FIXED SETP	MASTER RS485
<b>P101 Control signal source</b>	e.g. TERMINALS	Not in effect
<b>P700 Operating mode 1</b>	CFC	CFC & M-CONTROL
<b>P750 Slave setpoint</b>	TORQUE (RS485)	MASTER-SLAVE OFF
<b>P751 Scaling slave setpoint</b>	Not in effect	1 (then 1 : 1)
<b>P810 RS485 Address</b>	Set different values	
<b>P811 RS485 group address</b>	Set the same value (101 ... 199)	
<b>P882 / P892 SBus groupaddress</b>	Not in effect	
<b>P884 / P894 SBus baud rate</b>	Not in effect	

*P750 Slave setpoint*

The setpoint to be transferred to the slave is set on the master. The "MASTER-SLAVE OFF" setting must be retained on the slave.

- MASTER-SLAVE OFF
- SPEED (RS485)
- SPEED (SBus1)
- SPEED (485+SBus1)
- TORQUE (RS485)
- TORQUE (SBus1)
- TORQUE (485+SBus1)
- LOAD SHARE (RS485)
- LOAD SHARE (SBus1)
- LOAD SHARE (485+SBus1)

*P751 Scaling slave setpoint*

Setting range: -10 ... 0 ... 1 ... 10

With this setting in the slave, the setpoint transferred by the master is multiplied by this factor.

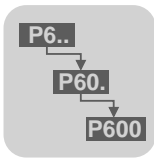
*P76x Manual operation*

*P760 Locking run/stop keys*

YES / NO

NO: Run/stop keys of the DBG60B keypad are active and can be used for starting and stopping the motor.

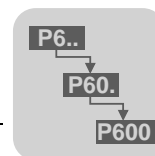
YES: Run/stop keys of the DBG60B keypad are locked and therefore without function.



## Parameters

### Explanation of the parameters

<i>P77x Energy-saving function</i>	Energy can be saved when operating pumps, fans, conveyor belts, etc. In this procedure, the magnetization of the asynchronous motor is controlled depending on the load by adapting the voltage-frequency ratio; the motor is undermagnetized.
<i>P770 Energy saving function</i>	<p>ON / <u>OFF</u></p> <p>The energy-saving function can be activated for the following operatin modes: VFC / VFC &amp; GROUP / VFC &amp; FLYING START / V/f CHARACTERISTIC During no-load operation, the power consumption of the inverter can be reduced by up to 70 %.</p> <p>Please observe the following limitations:</p> <ul style="list-style-type: none"> <li>• The energy-saving function only offers advantages in the part-load range</li> <li>• No large changes in load should occur during operation</li> </ul>
<i>P78x Ethernet configuration</i>	The parameter group P78x includes display and setting values that are specific for the DFE11B option card.
<i>P780 IP address</i>	<p>Setting range: 000.000.000.000 ... <u>192.168.10.x</u> ... 223.255.255.255</p> <p>Use P780 to set the IP address for linking MOVIDRIVE® B via Ethernet. The IP address consists of four bytes in decimal form separated by dots. The first three bytes of the IP address are specified in the menu. The last byte is set via the DIP switches of the option. If the DIP switch is set to 0, the last byte of the IP address can be set via P780 as well. If the value is set via the DIP switch of the DHCP (Dynamic Host Configuration Protocol) option, the value specified by the DHCP server will be displayed.</p>
<i>P781 Subnetwork screen</i>	<p>Setting range: 000.000.000.000 ... <u>255.255.255.0</u> ... 255.255.255.255</p> <p>Factory setting at delivery is a class C network.</p> <p>The subnetwork mask divides the network into subnetworks. The set bits determine which part of the IP address represents the address of the subnetwork. If the DHCP option is activated via the DIP switch, the value specified by the DHCP server will be displayed.</p>
<i>P782 Standard gateway</i>	<p>Setting range: <u>000.000.000.000</u> ... 255.255.255.255</p> <p>The standard gateway is addressed if the desired communication partner is not within the actual network. The standard gateway will have to be part of the actual network. If the DHCP option is activated via the DIP switch, the value specified by the DHCP server will be displayed.</p>
<i>P783 Baud rate</i>	Display value, cannot be altered. Shows the current baud rate of the Ethernet connection. During the initialization phase of the DFE11B, the value 0 is displayed for approximately 35 seconds.
<i>P784 MAC address</i>	Display value, cannot be altered. Indicates the MAC address, i.e. the layer -2 Ethernet address of the interface, that is clearly assigned worldwide.
<i>P785 Ethernet / IP startup configuration</i>	<p>Setting range: <u>DHCP</u> / Saved IP parameters</p> <p>Only available with DFE13B EtherNet/IP option.</p> <ul style="list-style-type: none"> <li>• <u>DHCP</u>: The DFE13B option is assigned its IP parameters (P780 ... P782) by a DHCP server when the supply voltage is switched on. .</li> <li>• Saved IP parameters: The DFE13B option is started with the saved IP parameters when the supply voltage is switched on.</li> </ul>



### P8xx Unit functions

#### P80x Setup

**P800 User menu** User menu only for DBG60B keypad.

Setting range: ON / OFF

P800 enables the DBG60B keypad to be switch between the individual user menu and the detailed parameter menu. A slash following the parameter number indicates that the user menu is activated. The parameters contained in the standard user menu are by a “\” in the parameter list. The previously selected menu is active after the MOVIDRIVE® B unit has been switched off and on again.

#### P801 Language

Language selection only for DBG60B keypad.

You can set different languages with P801 in the DBG60B keypad. The language setting is not changed by the factory setting of MOVIDRIVE® MDX60B/61B units.

#### P802 Factory setting

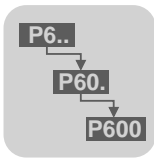
Setting range: NO / DEFAULT STANDARD / DELIVERY STATUS

You can use P802 to reset the factory settings stored in the EPROM for almost all parameters. The following data are not reset when default standard is selected:

- IPOS program
- P20x Speed control
- P210 P gain hold controller
- P26x Process controller parameters
- P27x Process controller input values
- P28x Process controller limits
- P30x Limits 1 / P31x Limits 2
- P32x Motor compensation 1 / P33x Motor compensation 2
- P344 Interval for motor protection
- P345 / P346  $I_N$ - $U_L$  monitoring 1 / 2
- P53x Thermal protection motor
- P70x Operating modes
- P73x Brake function
- P78x Ethernet configuration
- P810 RS485 address
- P811 RS485 group address
- P88x Serial communication SBus 1 (except for P883, P884, P885)
- P89x Serial communication SBus 2 (except for P893, P894, P895)
- P905 Hiperface offset X15
- P910 Gain X controller
- P938 / P939 Speed task 1 / 2
- P94x IPOS encoder (except for P944)
- P95x DIP (except for P955)
- Fault memory
- Statistical data


The "Delivery state" setting also resets the data listed above.

An "8" appears on the 7-segment display during the reset. The previous operating status of the inverter appears on the display after the factory settings have been restored. P802 automatically reverts to "NO."



## Parameters

### Explanation of the parameters

	<b>NOTE</b>
	<p>The "Default standard" setting overwrites almost all parameter values; the setting "delivery status" overwrites all parameter values. Save the set parameter values with SHELL or the DBG60B keypad before you start resetting the parameters. After resetting, it is necessary to adapt the altered parameter values and terminal assignments to meet the requirements.</p>

#### *P803 Parameter lock*

Setting range: ON / OFF

By setting P803 to "ON", you can prevent any modification of parameters (except P840 Manual reset and the parameter lock itself). This makes sense, for example, after the MOVIDRIVE<sup>®</sup> B setting has been optimized. P803 must be set to "OFF" to enable changes to parameters again.

**Important:** The parameter lock also acts on the RS485, fieldbus and SBus interfaces and on IPOS<sup>plus</sup><sup>®</sup>.

#### *P804 Reset statistics data*

Setting range: NO / FAULT MEMORY / kWh METER / OPERATING HOURS

P804 permits reset of the statistics data stored in the EEPROM, namely the fault memory, kilowatt-hour meter and operating hours counter. These data are not influenced when selecting "Default Standard" of the P802 Factory setting.

#### *P806 Copy DBG -> MDX*

Setting range: YES / NO

The parameter data in the DBG60B are transmitted to MOVIDRIVE<sup>®</sup>.

#### *P807 Copy MDX -> DBG*

Setting range: YES / NO


The parameter data set in MOVIDRIVE<sup>®</sup> are transmitted to the DBG60B keypad.

#### *P81x Serial communication*

##### *P810 RS485 Address*

Setting range: 0 ... 99

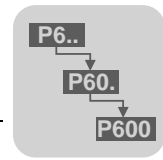
P810 sets the address by means of which communication can take place with MOVIDRIVE<sup>®</sup> B via the serial interfaces. You can network together max. 32 stations.

	<b>NOTE</b>
	<p>MOVIDRIVE<sup>®</sup> B units are always set to the address 0 on delivery. To avoid problems during data exchange in serial communication with several inverters, we recommend that you do not use address 0.</p>

##### *P811 RS485 group address*

Setting range: 100 ... 199

P811 makes it possible to group together several MOVIDRIVE<sup>®</sup> B units for communication via the serial interface. All MOVIDRIVE<sup>®</sup> B units with the same RS485 group address can thus be addressed using a multicast telegram via this address. The data received via the group address are not acknowledged by MOVIDRIVE<sup>®</sup> B. For example, the RS485 group address makes it possible to send setpoint selections to a group of MOVIDRIVE<sup>®</sup> B inverters simultaneously. Group address 100 means that the inverter is not assigned to a group.



*P812 RS485  
Timeout interval*

Setting range: 0 ... 650 s

P811 sets the monitoring time for data transmission via the serial interface. MOVIDRIVE® B performs the fault response set in P833 Response RS485 TIMEOUT if there is no cyclical process data exchange via the serial interface for the period set in parameter 812 . . No monitoring of serial data transmission takes place when P812 is set to 0. Monitoring is activated with the first cyclical data exchange.

*P819 Fieldbus  
timeout delay*

Setting range: 0 ... 0.5 ... 650 s

P819 sets the monitoring time for data transmission via the implemented fieldbus (DFx). If no data traffic takes place via the fieldbus during the time period set in P819, MOVIDRIVE® B will execute the fault response set in P831 FIELDBUS TIMEOUT response . When P819 is set to the value 0 or 650, data transmission via the fieldbus is not monitored. The timeout time is specified automatically by the DP master with PROFIBUS-DP and DeviceNet. Changing this parameter does not have any effect and is overwritten whenever the PROFIBUS-DP is started up again.

*P82x Brake operation*

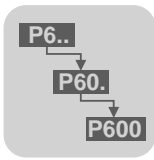
*P820 / P821 4-  
quadrant opera-  
tion 1 / 2*



Setting range: ON / OFF

This setting is only taken into account in operating modes without encoder feedback (VFC, V/f); 4-quadrant operation is assumed in all other operating modes. P820 / P821 enables 4-quadrant operation to be switched on and off for parameter sets 1 / 2. 4-quadrant operation is possible if a braking resistor or a regenerative power supply unit is connected to MOVIDRIVE® B (CCW / CW; motor / regenerative). P820/P821 must be set to "NO" if there is neither a braking resistor nor a regenerative power supply unit connected to MOVIDRIVE® B, which means regenerative operation is not possible. In these operating modes, MOVIDRIVE® B attempts to extend the deceleration ramp so the generated power is not too great and the DC link voltage remains below the switch-off threshold.

Despite the fact that the deceleration ramps are automatically extended by MOVIDRIVE® B, it is possible that the generated power during braking may be too great, leading to MOVIDRIVE® B switching itself off and issuing fault message F07 (DC link overvoltage). In this case you have to extend the deceleration ramps manually.



## Parameters

### Explanation of the parameters

#### P83x Fault responses

The following responses can be programmed:

Response	Description
<b>NO RESPONSE</b>	No fault is displayed and no fault response is undertaken. The fault which is signaled is completely ignored.
<b>DISPLAY FAULT</b>	The fault is displayed (in 7-segment display and SHELL), the fault output is set (if programmed). The unit has no other fault responses. The fault can be reset (terminal, RS485, fieldbus, auto-reset).
<b>IMM. STOP/FAULT</b>	The inverter performs an immediate switch-off and a fault is signaled. The output stage is inhibited and the brake is applied. The ready signal is revoked and the fault output is set, if programmed. A restart is only possible after a fault reset has been performed during which the inverter is reinitialized.
<b>EMERG. STOP/FAULT</b>	The drive is braked with the emergency ramp t14/t24. Once the stop speed is reached, the output stage is inhibited and the brake is applied. The fault is signaled immediately. The ready signal is revoked and the fault output is set, if programmed. A restart is only possible after a fault reset has been performed during which the inverter is reinitialized.
<b>RAPID STOP/FAULT</b>	The drive is braked with the set stop ramp t13/t23. Once the stop speed is reached, the output stage is inhibited and the brake is applied. The fault is signaled immediately. The ready signal is revoked and the fault output is set, if programmed. A restart is only possible after a fault reset has been performed during which the inverter is reinitialized.
<b>IMM. STOP/WARN.</b>	The inverter performs an immediate switch-off and a fault is signaled. The output stage is inhibited and the brake is applied. The fault is signaled via the terminal, if programmed. The ready signal is not revoked. The drive restarts without unit re-initialization if the fault is rectified by an internal procedure or by a fault reset.
<b>EMERG. STOP/WARN</b>	The drive is braked with the emergency ramp t14/t24. Once the stop speed is reached, the output stage is inhibited and the brake applied. The fault is signaled immediately. The fault is signaled via the terminal, if programmed. The ready signal is not revoked. The drive restarts without unit re-initialization if the fault is rectified by an internal procedure or by a fault reset.
<b>RAPID STOP/WARNING</b>	The drive is braked with the set stop ramp t13/t23. Once the stop speed is reached, the output stage is inhibited and the brake applied. The fault is signaled immediately. The fault is signaled via the terminal, if programmed. The ready signal is not revoked. The drive restarts without unit re-initialization if the fault is rectified by an internal procedure or by a fault reset.

#### P830 Response EXT. FAULT

Default setting: **EMERG. STOP/FAULT**

The fault is only triggered in the ENABLED inverter status. P830 programs the fault response that is triggered by an input terminal programmed to "/EXT. FAULT"

#### P831 Response FIELD BUS TIMEOUT

Default setting: **RAPID STOP/WARN**

The fault is only triggered in the ENABLED inverter status. P831 programs the fault response which is triggered by the fieldbus timeout monitoring. The response time of the monitoring function can be set with P819 Fieldbus timeout delay (see "Fieldbus Unit Profile" for more details).

#### P832 Response MOTOR OVERLOAD

Default setting: **EMERG. STOP/FAULT**

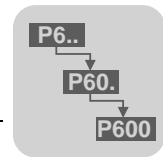
P832 programs the fault response that is triggered in the event of motor overload. Make the following settings to monitor motor overload:

- P340 Motor protection set to ON ASYNCHRONOUS
- P340 Motor protection 1 set to ON SERVO and P530 Sensor type 1 to KTY

#### P833 Response RS485 TIMEOUT

Default setting: **RAPID STOP/WARN**

P833 programs the fault response that is triggered by the RS485 timeout monitoring. The response time of the monitoring function can be set with P812 RS485 timeout delay



- P834 LAG ERROR response** Response lag error with DRS11B and IPOS<sup>plus</sup>® only.  
Default setting: EMERG. STOP/FAULT  
P834 is used to program the fault response that is triggered by lag error monitoring of the synchronous operation option DRS11B and of the positioning mode with IPOS<sup>plus</sup>®. Different settings are available in P51x Synchronous operation monitoring .
- P835 Response TF sensor signal** Default setting: NO RESPONSE  
P835 programs the fault response which is triggered by the temperature sensor monitoring of the TF or TH which may be incorporated in the motor winding.
- P836 / P837 Response SBus TIMEOUT 1 / 2** Default setting: EMERG. STOP/FAULT  
P836 / P837 programs the fault response that is triggered by the system bus timeout monitoring. The response time of the monitoring function can be set with P883 SBus timeout delay 1 / P893 SBus timeout delay 2 .
- P838 Response SW LIMIT SWITCH** Default setting: EMERG. STOP/FAULT  
P838 programs the fault response executed by the inverter if a target position for a referenced drive is outside the software limit switch. The software limit switches are set via parameters P920 / P921 .

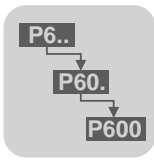
**P84x Reset response**

- P840 Manual reset** Setting range: YES / NO
- YES: The fault in MOVIDRIVE<sup>®</sup> B unit is reset. In case of a fault, it is possible to press the [← / Del] key on the DBG60B to access P840 directly. P840 is also available in the "Parameters" main menu in SHELL. P840 automatically reverts to NO after the reset. Activating the manual reset does not have any effect if there is no fault present.
  - NO: No reset.
- P841 Auto reset** Setting range: ON / OFF
- ON: The auto reset function is activated. In case of a fault, this function performs an automatic unit reset following P842 Restart time . A maximum of five auto resets are possible during an auto reset phase. If five faults occur that are reset by an auto-reset, no more auto-resets are possible until:
    - a manual reset is performed using the input terminal,
    - a manual reset is performed using the serial interface (SHELL, DBG60B, master controller),
    - there is a transition to 24V support operation or the inverter is completely turned off

Afterwards, five auto resets are possible again.

	<p><b>! DANGER!</b></p>
	<p>Risk of crushing if the motor starts up automatically after an auto reset. Severe or fatal injuries.</p> <ul style="list-style-type: none"> <li>• Do not use auto reset with drives where an automatic restart represents a danger to people or units.</li> <li>• Perform a manual reset.</li> </ul>

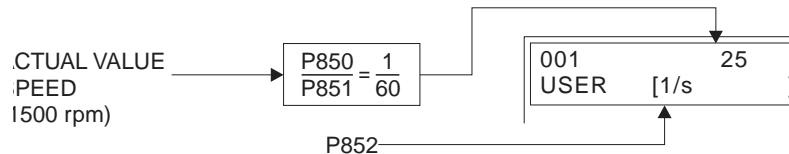
- OFF: No auto reset.



## Parameters

### Explanation of the parameters

- P842 Restart time**      Setting range: 1 ... 3 ... 30 s  
P842 is used to set the waiting time between occurrence of the fault and auto reset.
- P85x Scaling actual speed value**      Scaling of the actual speed value with SHELL only.  
Scaling actual speed value sets a user-specific display parameter P001 User display . For example, the user display is to be shown in 1/s. Such a setting requires a scaling factor of 1/60. This means the numerator scaling factor has to be set to 1 and the denominator scaling factor to 60. In P852 User-defined unit the scaling unit 1/s is entered.



01640BEN

Figure 65: Scaling actual speed value (example)

- P850 Scaling factor numerator**      Setting range: 1 ... 65535 (can be set with SHELL only)
- P851 Scaling factor denominator**      Setting range: 1 ... 65535 (can be set with SHELL only)
- P852 User unit**      Default setting: 1/min (can be set with SHELL only)  
Up to eight ASCII characters will be displayed in P001 User display .

### P86x Modulation

#### P860 / P861 PWM frequency 1 / 2 VFC



Setting range: 4 / 8 / 12 / 16 kHz (for size 6: 4 / 8 kHz)

P860/P861 can be used in VFC mode to set the switching frequency at the inverter output for parameter set 1 / 2. If the switching frequency for parameter set 1 / 2 is not fixed to the set value with P862 PWM fix 1 / P863 PWM fix 2 , the inverter automatically switches back to lower switching frequencies when the unit utilization reaches a specific level. The modulation frequency reduces switching losses in the output stage and, consequently, unit utilization.

#### P862 / P863 PWM fix 1 / 2



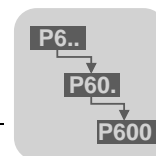
Setting range: ON / OFF

- ON: If an automatic reduction of the PWM frequency (e. g. by installing output filters) is not wanted, use P862 / P863 = ON for parameter set 1 / 2 to fix the frequency set with P860 PWM frequency 1 / P861 PWM frequency 2 .
- OFF: MOVIDRIVE® B automatically reduces the set output frequency (down to minimum 4 kHz) when there is a high level of thermal load on the output stage to avoid a switch-off with the "Unit utilization" fault.

#### P864 PWM frequency CFC

Setting range: 4 / 8 / 16 kHz (for size 6: 4 / 8 kHz)

P864 can be used in CFC and SERVO operating modes to set the switching frequency at the inverter output for parameter set 1. The cycle frequency is set to a fixed value and is not automatically reduced with high unit utilization.



*P87x Process data description*

*P870 / P871 /  
P872 Setpoint  
description PO1 /  
PO2 / PO3*

P870/P871/P872 define the content of the process output data words PO1/PO2/PO3. This is necessary so MOVIDRIVE® B can allocate the appropriate actual values.

Setpoint description	Factory setting
P870 Setpoint description PO1	CONTROL WORD 1
P871 Setpoint description PO2	SPEED
P872 Setpoint description PO3	NO FUNCTION

The following PO assignments are available:

Assignment	Description
<b>NO FUNCTION</b>	The content of the process output data word is ignored
<b>SPEED</b>	Speed setpoint selection in 1/min.
<b>CURRENT [% I<sub>N</sub>]</b>	Current setpoint selection (for torque control)
<b>POSITION LO</b>	Position setpoint low word
<b>POSITION HI</b>	Position setpoint high word
<b>MAX. SPEED</b>	Maximum system speed (P302 / P312).
<b>MAX. CURRENT [% I<sub>N</sub>]</b>	Current limitation in % of I <sub>N</sub> of the inverter (P303 / P313).
<b>SLIP</b>	Slip compensation (P324 / P334).
<b>RAMP</b>	Ramp time for setpoint selection
<b>CONTROL WORD 1</b>	Control signals for start/stop, etc.
<b>CONTROL WORD 2</b>	Control signals for start/stop, etc.
<b>SPEED [%]</b>	Selection of a speed setpoint in % of n <sub>max</sub>
<b>IPOS PO-DATA</b>	Specification of a 16-bit coded value for IPOS <sup>plus</sup> ®

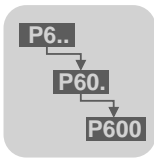
See "Fieldbus unit profile with parameter list" manual for detailed explanations.

Detailed description of process data.

*P873 / P874 /  
P875 Actual value  
description PI1 /  
PI2 / PI3*

P873/P874/P875 define the content of the process input data words PI1/PI2/PI3. This is necessary so MOVIDRIVE® B can allocate the appropriate actual values.

Actual value description	Factory setting
P873 Actual value description PI1	STATUS WORD 1
P874 Actual value description PI2	SPEED
P875 actual value description PI3	NO FUNCTION



## Parameters

### Explanation of the parameters

The following PI assignments are available:

Assignment	Description
<b>NO FUNCTION</b>	The content of the process input data word is 0000 <sub>hex</sub> .
<b>SPEED</b>	Current actual speed value of the drive in 1/min.
<b>OUTPUT CURRENT</b>	Instantaneous output current of the system in % of I <sub>N</sub> .
<b>ACTIVE CURRENT</b>	Current active current of the system in % of I <sub>N</sub> : <ul style="list-style-type: none"> <li>• Positive sign = Positive torque</li> <li>• Negative sign = Negative torque</li> </ul>
<b>POSITION LO<sup>1)</sup></b>	Current actual position low word
<b>POSITION HI<sup>1)</sup></b>	Current actual position high word
	The actual position is read-in from: P941 Source actual position.
<b>STATUS WORD 1</b>	Status information of the inverter
<b>STATUS WORD 2</b>	Status information of the inverter
<b>SPEED [%]</b>	Current actual speed value in % of n <sub>max</sub> .
<b>IPOS PI-DATA</b>	Feedback of a 16-bit coded value for IPOS <sup>plus</sup> ®.
<b>STATUS WORD 3</b>	Status information of the inverter

1) Both assignments always have to be set.

See "Fieldbus unit profile with parameter list" manual for detailed explanations.

Setting range: ON / OFF

- ON: The process output data that was last sent from the fieldbus control become effective.
- OFF: The last valid process output data remain in effect.

*P876 PO data enable*

*P88x / P89x Serial communication SBus 1 / 2*

*P880 / P890 Protocol SBus 1 / 2* Setting range: SBus MOVILINK / CANopen

*P881 / P891* Setting range: 0 ... 63

*Adress SBus 1 / 2* Use P882 / P892 to set system bus address of MOVIDRIVE® B unit. The MOVIDRIVE® B unit can communicate with other MOVIDRIVE® B units using the system bus (SC11 / SC12) by means of the address set here.

*P882 / P892 Group* Setting range: 0 ... 63

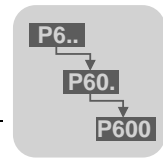
*address SBus 1 / 2* P883 / P893 set the system bus group address for multicast telegrams of the MOVIDRIVE® B unit.

*P883 / P893 Time-* Setting range: 0 ... 650 s

*out delay SBus 1 / 2* P883 / P893 set the monitoring time for data transmission via the system bus. If no data traffic takes place via the fieldbus during the time period set in P883/ P893, MOVIDRIVE® will execute the fault response set in P836 Response SBus TIMEOUT 1 / P837 Response SBus TIMEOUT 2 . No monitoring of data transmission via the system bus takes place when P883 / P893 are set to the value 0.

*P884 / P894 Baud* Setting range: 125 / 250 / 500 / 1000 kBaud


*rate SBus 1 / 2* P884 / P894 set the transmission speed of the system bus. The total of the baudrates in P884 / P894 must not exceed 1125 kBaud.



P885 / P895  
Synchronization ID  
SBus 1 / 2

Setting range: 0 ... 1 ... 2047

A synchronization between the drives can take place for transmitting process data and parameter data via the optional CANBus. For this purpose, the master controller must send a synchronization telegram to the connected inverter at certain intervals. In this way, the inverters synchronize themselves to the master controller. P885 / P895 is used for setting the identifier (address) of the synchronization message in the inverter for the optional CAN bus. Make sure there is no overlap between the identifiers for the process data or parameter data telegrams.

	<b>NOTE</b>
	<p><b>Important:</b> The inverter may either be synchronized by SBus1 or SBus2 or by DPRAM (P970). The inverters must <b>not be synchronized from several interfaces at the same time.</b></p>

P886 / P896  
Address CANopen  
1 / 2

Setting range: 1 ... 127

Use P886 / P896 to set the serial communication with the SBus.

P887 Synchroniza-  
tion ext. Control

Setting range: ON / OFF

If a MOVIDRIVE® B receives cyclical setpoints from a master control via SBus 1 or SBus 2 (e.g. position setpoint or master axis position) it is necessary that the MOVIDRIVE® B processor works synchronously with the control processor so that the internal time dial for the position controller is an integer divisor of the synchronization time (the cycle time for the new setpoints from the control).

This setting prevents information from being processed twice and ensures that setpoint jumps do not occur due to beat effects or long-term drift.

Synchronization of MOVIDRIVE® B and control takes place via P885 Synchronization ID SBus 1 / P895 Synchronization ID SBus 2the setting of the time dial via P887.

For cyclical setting of the position setpoint, you will also have to set P916 Ramp type to BUS RAMP.

ON: the internal time dial for position control will have to be set to exactly 1 ms.

OFF: the internal time dial for position control is set to the standard SEW time base (ca. 1 ms).

If several MOVIDRIVE® B units are synchronized via SBus without control, P887 will have to be set to OFF in all inverters.

Note: For technical reasons, the setting P887 = ON is available for field-oriented operating modes with CFC or SERVO only. VFC operating modes always work with the standard SEW time base.

P888 Synchroniza-  
tion time

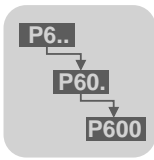
Setting range: 1 ... 5 ... 10 ms

Cycle time for new setpoints of a master control.

See also: P885 Synchronization ID SBus 1 / P895 Synchronization ID SBus 2 / P887 Synchronization ext. Description.

P889 /P899  
Parameter channel  
2

Setting range: YES / NO



## Parameters

### Explanation of the parameters

#### P9xx IPOS parameters

The IPOS<sup>plus</sup>® parameters are described in detail in the IPOS<sup>plus</sup>® manual.

	<b>! DANGER!</b>
	<p>Risk of crushing if the motor starts up unintentionally. Severe or fatal injuries.</p> <ul style="list-style-type: none"> <li>• Ensure that the motor cannot start unintentionally.</li> <li>• Note that modifying these parameters without knowledge of the IPOS<sup>plus</sup>® program, which may be active, can cause unexpected movements and place unwanted loads on the mechanical driveline. It is essential that you are familiar with the IPOS<sup>plus</sup> manual to make the setting for these parameters.</li> </ul>

#### P90x IPOS Reference travel

Reference travel is used to establish a **machine zero** to which all absolute positioning commands refer. You can select different reference travel strategies in P903 Reference travel type . These strategies define appropriate travel modes, for example to search for a reference cam. Based on the **reference point** established through the reference travel, you can use P900 Reference offset to shift the machine zero according to the equation

**Machine zero = reference position + reference offset**

The speeds for the necessary travel movements according to **reference travel type** are set with P901 Reference speed 1 / P902 Reference speed 2 .

#### P900 Reference offset

Setting range:  $-(2^{31}-1) \dots 0 \dots 2^{31}-1$

Reference offset (zero offset) is used to determine the machine zero (origin). The following applies:

Machine zero = reference position + reference offset

The reference offset always refers to the encoder set via P941 Source actual position.

This encoder can be a motor encoder, an external encoder or a DIP encoder. The corresponding actual positions are indicated by IPOS<sup>plus</sup>® variables.

- H509 Actual position DIP encoder
- H510 Actual position external encoder
- H511 Actual position motor encoder

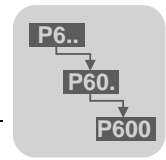
The reference offset is activated again after reference travel has been completed successfully.

	<b>NOTE</b>
	<p>When reference travel of a drive system takes place with absolute encoder (HIPER-FACE® or DIP), depending on the set actual position source, the reference travel will recalculate and overwrite P905 Hiperface offset X14 / P947 Hiperface offset X15 or DIP offset P953 Position offset .</p>

#### P901 Reference speed 1

Setting range: 0 ... 200 ... 6000 1/min

Reference speed 1 determines the travel speed for the first part of the reference travel. Speed change always takes place via stop ramp t13. The search directions during reference travel are determined by the respective reference travel type. The speed is in effect until the reference cam has been reached.



*P902 Reference speed 2*

Setting range: 0 ... 50 ... 6000 1/min

Reference speed 2 determines the travel speed for the second part of the reference travel. Speed change always takes place via stop ramp t13. The search directions during reference travel are determined by the respective reference travel type. The speed is effective upon leaving the reference cam until reaching the first zero pulse.

*P903 Reference travel type*

Setting range: 0 ... 8

The reference travel type specifies the reference travel strategy that is used to establish the machine zero of a machine.

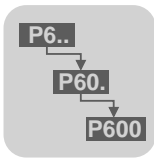
This setting also defines the search direction for the reference cam in the individual referencing phases.

Use parameter P904 Reference travel to zero pulse to determine if reference travel takes place at an edge change of the reference cam or at the next zero pulse of the encoder.

Prerequisite for execution of reference travel is a drive that is **ready** and **enabled** with the exception of reference travel type 8.

There are also types available that can function without a reference cam.

- **Type 0: CCW zero pulse**
  - First search direction is CCW.
  - Reference position = Left zero pulse from current position
  - Machine zero = reference position + reference offset
- **Type 1: CW end of the reference cam**
  - First search direction is CCW.
  - Reference position = First zero pulse or falling edge to the left of the reference cam
  - Machine zero = reference position + reference offset
- **Type 2: CW end of the reference cam**
  - First search direction is CW.
  - Reference position = First zero pulse or falling edge to the right of the reference cam
  - Machine zero = reference position + reference offset
- **Type 3: CW limit switch**
  - First search direction is CW.
  - Reference position = First zero pulse or falling edge to the left of the right limit switch.
  - Machine zero = reference position + reference offset
  - Reference travel should take place to zero pulse.
- **Type 4: CCW limit switch**
  - First search direction is CCW.
  - Reference position = First zero pulse or falling edge to the right of the left limit switch.
  - Machine zero = reference position + reference offset
  - Reference travel should take place to zero pulse.
- **Type 5: No reference travel**
  - Reference position = current position
  - Machine zero = reference offset



## Parameters

### Explanation of the parameters

- **Type 6: Reference cam flush with CW limit switch**
  - First search direction is CW.
  - Reference position = First zero pulse or falling edge to the left of the reference cam
  - Machine zero = reference position + reference offset
  - Note: Reference cam and limit switches must be flush!
- **Type 7: Reference cam flush with CCW limit switch**
  - First search direction is CCW.
  - Reference position = First zero pulse or falling edge to the right of the reference cam
  - Machine zero = reference position + reference offset
  - Note: Reference cam and limit switches must be flush!
- **Type 8: Resetting of encoder position for drive not ready for operation**

Reference travel can take place when the drive is not enabled.

  - Reference position = current position
  - Machine zero = reference offset

*P904 Reference travel to zero pulse*

Setting range: YES / NO

- YES: Reference travel takes place to the zero pulse of the selected IPOS<sup>plus</sup>® encoder.
- NO: Reference travel takes place to the falling edge of the reference cam.

*P905 Hiperface offset X15*

Setting range:  $-(2^{31} - 1) \dots 0 \dots 2^{31} - 1$

This parameter is used to specify the zero point of the motor encoder display.

Use this parameter to define the machine zero without reference travel. It adds or subtracts the offset from the encoder value.

- P905 Hiperface offset X15 has an effect on the actual position of the motor encoder H511.  
H511 = Encoder value – P905
- P947 Hiperface offset X14 has an effect on the actual position of the external encoder H510.  
H510 = Encoder value – P947

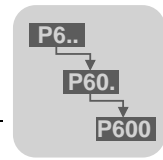
The actual position is determined directly after the values have been entered. A HIPERFACE® multi-turn encoder must be reference once, a HIPERFACE® single-turn encoder must always be referenced.

Note:

When reference travel of a drive system takes place with a HIPERFACE® encoder, the reference travel will recalculate and overwrite the Hiperface offset (P905 or P947) depending on the set actual position source .

The following applies:

- P905 = Encoder value – P900
- P947 = Encoder value – P900



*P91x IPOS<sup>plus</sup>® travel parameters*

*P910 Gain X controller*

Setting range: 0,1 ... 0,5 ... 32

Setting value for the P controller of the position control loop in IPOS<sup>plus</sup>®. In basic setting, the value of P210 P gain hold controller dialog.

*P911/912 Positioning ramp 1/2*

Setting range: 0,01 ... 1 ... 20 s

Value set for the ramp used during the positioning operation. The same ramp (positioning ramp 1) is always used in P916 Ramp type SINE and SQUARE for acceleration and deceleration. With a LINEAR ramp type, deceleration is set depending on P917 Ramp mode .

- P917 Ramp mode = Mode 1: Deceleration for travel to target position (spot braking) only takes place with positioning ramp 2 (P912). Positioning ramp 1 (P911) is used for all other positioning operations.
- P917 Ramp mode = Mode 2: Positioning ramp 2 (P912) is used for deceleration of the travel speed during travel. Positioning ramp 1 (P911) is used for acceleration.

*P913 / P914 Travel speed CW / CCW*

Setting range: 0 ... 1500 ... 6000 1/min

Specifies the speed used for positioning. The setting must be adjusted to the maximum motor speed.

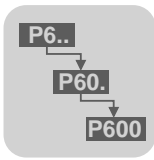
	<b>NOTE</b>
	P302 Maximum speed 1 / P312 Maximum speed 2 limits P913/ P914, always set P302 Maximum speed 1 / P312 Maximum speed 2 about 10 % greater than P913 / P914 to prevent a lag fault!

*P915 Speed feedforward*

Setting range: -199,99 ... 0 ... 100 ... 199,99 %

If set to 100 %, the drive will move at the optimum time using a linear velocity profile. If a value less than 100% is specified, a larger gap between position setpoint and actual position occurs (lag distance) during a positioning operation. This results in a 'soft' run-in to the target position for the acceleration procedure.

	<b>NOTE</b>
	Parameter P915 is only in effect with the LINEAR and JERK LIMITED ramp types. The function has no effect for the ramp types "SINE" and "SQUARED"!



## Parameters

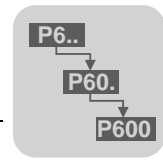
### Explanation of the parameters

#### P916 Ramp type



This parameter specifies the type of positioning ramp. This influences the speed or acceleration characteristics during positioning.

Ramp type	Positioning characteristics
<b>LINEAR</b>	Optimal in terms of time but block shaped acceleration profile.
<b>SQUARED</b>	Softer acceleration and higher torque demand than LINEAR.
<b>SINE</b>	Very soft acceleration profile, required torque higher than with SQUARED acceleration profile.
<b>BUS RAMP</b>	Setting for operation of drive inverter with master controller. This controller generates a cyclical position setpoint that is written directly to the position controller. The ramp generator is deactivated. The positions sent by the external controller cyclically are interpolated linearly. For configuration, one process output data word must be set to "position HIGH" and another one to "position LOW".
<b>JERK LIMITED</b>	Jerk limitation is based on the principle of the linear ramp. For jerk limitation, the torque and, therefore, the acceleration is trapezoidal to limit the jolting action. Over time, jerk limitation builds up the torque in linear form during acceleration until the maximum value is reached. In the same way, the torque is reduced again over time in linear form to zero. This means that system vibrations can be virtually avoided. A setting range can be selected from 0.005 ms to 2 ms (P933). The positioning time in comparison to the linear ramp is extended by the set jerk time. The acceleration and torque do not increase in comparison with the linear ramp.
<b>ELECTRONIC CAM</b>	Activating the technology function "Electronic cam."
<b>I SYNCHRONOUS OPERATION</b>	Activating the technology function "Electronic synchronous operation."
<b>CROSS CUTTER</b>	Activating the technology function "Cross cutter."
<b>SPEED INTERPOLATION</b>	<p>The speed values sent cyclically by the external controller are interpolated linearly.</p> <ul style="list-style-type: none"> <li>Speed specified using process data:           <ul style="list-style-type: none"> <li>Set <i>P888 Synchronization time SBus</i> to 5 ms or 10 ms</li> <li>Set the <i>P100 Setpoint source</i> to "SBus" or "Fieldbus"</li> <li>You have to set a process output data word to "Speed"</li> </ul> </li> <li>Speed specification via SBus/SCOM object:           <ul style="list-style-type: none"> <li>Set <i>P888 Synchronization time SBus</i> to 1 ... 10 ms</li> <li>Set the <i>P100 Setpoint source</i> to "BIPOL. FIXED SETPT"</li> <li>Do not set a process output data word to "Speed"</li> <li>Create a SCOM receive object (with the SCOM receive command → IPOS<sup>plus</sup>® manual) with the target variable <i>SetpPosBus</i> (H499)</li> </ul> </li> </ul>
<b>POSITION INTERPOLATION 12 BIT</b>	<p>The position specifications sent cyclically by the external controller are interpolated. Position resolution: 1 revolution corresponds to 4096 increments (12 bit).</p> <ul style="list-style-type: none"> <li>Position specification using process data:           <ul style="list-style-type: none"> <li>Set <i>P888 Synchronization time SBus</i> to 5 ms or 10 ms</li> <li>Set the <i>P100 Setpoint source</i> to "SBus" or "Fieldbus"</li> <li>Set one process output data word to "position HIGH" and another one to "position LOW".</li> </ul> </li> <li>Position specification via SBus/SCOM object:           <ul style="list-style-type: none"> <li>Set <i>P888 Synchronization time SBus</i> to 1 ... 10 ms</li> <li>Set the <i>P100 Setpoint source</i> to "BIPOL. FIXED SETPT"</li> <li>Do not set a process output data word to "position HIGH" or "position LOW".</li> <li>Create a SCOM receive object (with the SCOM receive command → IPOS<sup>plus</sup>® manual) with the target variable <i>SetpPosBus</i> (H499)</li> </ul> </li> </ul>



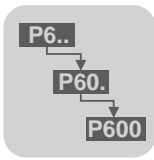
Ramp type	Positioning characteristics
<b>POSITION INTERPOLATION 16 BIT</b>	<p>The position specifications sent cyclically by the external controller are interpolated. Position resolution: 1 revolution corresponds to 65536 increments (16 bit).</p> <ul style="list-style-type: none"> <li>Position specification using process data: <ul style="list-style-type: none"> <li>Set <i>P888 Synchronization time SBus</i> to 5 ms or 10 ms</li> <li>Set the <i>P100 Setpoint source</i> to "SBus" or "Fieldbus"</li> <li>Set one process output data word to "position HIGH" and another one to "position LOW".</li> </ul> <p><b>Important:</b> Position resolution via PI data assignment is 4096 increments per revolution (= 12 bit). The 16-bit extended motor position is available on IPOS<sup>plus</sup>® variable H508. The IPOS<sup>plus</sup>® variable <i>ActPos_Mot</i> (H511) has a position resolution of 4096 increments per revolution (= 12 bit)</p> </li> <li>Position specification via SBus/SCOM object: <ul style="list-style-type: none"> <li>Set <i>P888 Synchronization time SBus</i> to 1 ... 10 ms</li> <li>Set the <i>P100 Setpoint source</i> to "BIPOL. FIXED SETPT"</li> <li>Do not set a process output data word to "position HIGH" or "position LOW".</li> <li>Create a SCOM receive object (with the SCOM receive command → IPOS<sup>plus</sup>® manual) with the target variable <i>SetPosBus</i> (H499)</li> </ul> <p><b>Important:</b> Position resolution via PI data assignment is 4096 increments per revolution (= 12 bit). The position resolution extended to 16 bits of 4096 increments per revolution (= 12 Bit) is available on IPOS<sup>plus</sup>® variable H508. The IPOS<sup>plus</sup>® variable <i>ActPos_Mot</i> (H511) has a position resolution of 4096 increments per revolution (= 12 bit)</p> </li> </ul>

*P917 Ramp mode*

Setting range: MODE 1 / MODE 2

Use this parameter to set Positioning ramp 2 P912 with set LINEAR ramp function.

- P917 = MODE 1: Deceleration for travel to target position (target braking) with Positioning ramp 2 P912 only. For all other positioning processes, use Positioning ramp 1 P911 . If position interpolation 12 or 16 bit is activated, it will operate in mode 1 without delay time compensation.
- P917 = MODE 2: When changing the travel speed during travel, always use Positioning ramp 2 P912. P911 positioning ramp 1 is used for acceleration. If position interpolation 12 or 16 bit is activated, mode 2 will enable delay time compensation.



## Parameters

### Explanation of the parameters

#### P92x IPOS monitoring

##### P920 / P921 SW limit switch CW / CCW

Setting range:  $-(2^{31} - 1) \dots 0 \dots 2^{31} - 1$

Software limit switches are used to limit the range during which travel commands are accepted. The limits of the movement range are specified using these two parameters (software limit switches). If *P941 Source actual position* is set to motor encoder or external encoder, then these do not take effect until after performance of a reference travel. If *P941 Source actual position* is set to absolute encoder DIP, it will be effective immediately without reference travel. If the software limit switches are in effect, the system checks whether the target position H492 of the current travel command is beyond the software limit switches. If the target position is beyond the range limited by the limit switches, the travel command will not be executed. The drive responds according to the fault response set in P838. If *P838 Fault response SW limit switch* is set to "... / Warning" or "... / Fault", then fault message F78 (IPOS SW limit switch) is generated. Software limit switch monitoring is only active in "... & IPOS" (P700) operating modes and in the ramp types "linear", "sine" or "square" (P916).

If *P838 Fault response SW limit switch* is set to ".../Fault", then a drive with incremental encoder is no longer referenced after a fault reset whereas a drive with absolute encoder is still referenced.

If the drive is not referenced, the software limit switches will not take effect and do not become active until re-referencing.

If *P838 Fault response SW limit switch* is set to ".../Warning", the drive remains to be referenced following a reset. The drive may move past the target due to the mass moment of inertia of the machine or incorrectly set controller. In this case the software limit switches will not respond.

**Deactivation:** Set both parameter values to 0 with continuous process so that software limit switch function is deactivated.

##### P922 Position window

Setting range: 0 ... 50 ... 32 767 inc

The parameter defines a distance range (position window) around the target position of a travel or STOP command. The 'Axis in position' = YES condition applies if a drive is inside the position window around the current target position (H492). The 'Axis in position' information is used as a final condition for waiting positioning commands. It can be used further as an output terminal function.

##### P923 Lag error window

Setting range: 0 ... 5000 ...  $2^{31} - 1$  Inc

The lag error window defines a permitted difference between the setpoint and actual position value. If the permitted value is exceeded, a lag error signal or lag error response will be triggered. You can set the response with P834 Lag error response .

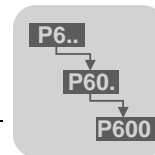
**Deactivation:** Set value = 0 deactivates lag error monitoring

#### P93x IPOS<sup>plus</sup>® Special functions

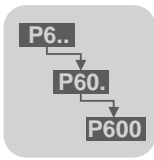
##### P930 Override

Setting range: ON / OFF

The override function makes it possible to change the travel speed for positioning operations which is programmed in the IPOS<sup>plus</sup>® program. The speed can be altered within the range from 0 to 150 % of the specifically programmed speed. It requires an analog input, with 0 to 150 % corresponding to 0 ... 10 V at the analog input. The maximum speed value is always limited by P302 Maximum speed 1 / P312 Maximum speed 2 .



- P931 IPOS CTRL word Task 1**      Setting range: STOP / START / HOLD  
 IPOS CTRL word Task 1 in the DBG60B keypad only, not in SHELL.  
 STOP: Task 1 of the IPOS<sup>plus®</sup> program is stopped.  
 START: Task 1 of the IPOS<sup>plus®</sup> program is started.  
 HALT: Tasks 1, 2 and 3 of the IPOS<sup>plus®</sup> program are stopped.
- P932 IPOS CTRL word Task 2**      Display range: START / STOP  
 IPOS CTRL word Task 2 in the DBG60B keypad only, not in SHELL.  
 Display parameter, cannot be set using DBG60B.  
 START= Task 2 of the IPOS<sup>plus®</sup> program is currently being processed.  
STOP= Task 2 of the IPOS<sup>plus®</sup> program is stopped.
- P933 Jerk time**                      Setting range: 0.005 ... 2 s  
 The jerk time indicates the duration of the torque formation. The positioning time in comparison to the linear ramp is extended by the set jerk time.  
 The jerk time 0.005 ... 2 s that has to be set for the function jerk limit . Note that P911 Positioning ramp 1 / P912 Positioning ramp 2 have a greater or equal value.  
 $P933 \leq P911 \ \& \ P912$   
 If  $P933 > P911 \ \& \ P912$ , torque formation still has a trapezoidal shape with the set jerk time not being the time for the torque formation.
- P938 Speed task 1**                    Setting range: 0 ... 9 additional assembler commands/ms  
 The standard setting for task 1 is 1 assembler command/ms. The speed can be increased by up to 9 assembler commands/ms with P938. P938 and P939 share the resources for the speed increase; that is, task 1 and task 2 **together** can be assigned a total of 9 additional assembler commands/ms. Example:  
 Task 1 + **2 additional assembler commands/ms** = 3 assembler commands/ms  
 Task 2 + **7 additional assembler commands/ms** = 9 assembler commands/ms
- P939 Speed task 2**                    Setting range: 0 ... 9 additional assembler commands/ms  
 The standard setting for task 2 is 2 assembler commands/ms. The speed can be increased by up to 9 additional assembler commands/ms with P939. P939 and P938 share the resources for the speed increase; that is, task 1 and task 2 **together** can be assigned a total of 9 additional assembler commands/ms.  
 Example:  
 Task 1 + **2 additional assembler commands/ms** = 3 assembler commands/ms  
 Task 2 + **7 additional assembler commands/ms** = 9 assembler commands/ms



## Parameters

### Explanation of the parameters

#### *P94x IPOS<sup>plus</sup>® encoder*

##### *P940 IPOS variables edit*

Setting range: ON / OFF

IPOS<sup>plus</sup>® variables edit with DBG60B keypad only, not in SHELL.

The IPOS<sup>plus</sup>® variables can be altered when P940 = "ON".

##### *P941 Source actual position*

Setting range: Motor encoder (X15) / Ext. encoder (X14) / Absolute encoder (DIP)

Defines the encoder to which IPOS<sup>plus</sup>® positions.

##### *Set P942 / P943 encoder factor numerator / denominator*

Setting range: 1 ... 32767

**First** set the parameter P944 Encoder scaling ext. encoder or P955 Encoder scaling (when using DIP11B option). Next, continue with setting P942/P943.

In the event of positioning to an external encoder (X14) or an absolute encoder (DIP), then these two parameters are used for adapting the resolution to the motor encoder (X15).

Proceed as follows:

- Write down the values of variables H509 DIP position (H510 with external encoder) and H511 Current motor position.
- Move the drive by about 30 000 increments (H511).
- Calculate the difference between the values you wrote down and the new values of the variables:
  - H509 new – H509 old = H509 difference
  - H511 new – H511 old = H511 difference
- The values must not differ by more than 32 767 ( $2^{15} - 1$ ). If the values are greater, divide both differentials by the same number to obtain correspondingly smaller values. Alternatively, repeat the procedure with a shorter travel distance.
- Enter the result H511 difference in P942 Encoder factor nominator and H509 in P943 Encoder factor denominator.

##### *P944 Encoder scaling ext. encoder*

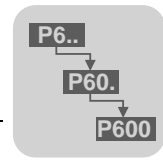
Setting range: x1 / x2 / x4 / x8 / x16 / x32 / x64

**Before** setting P944, make sure that P942 and P943 are set to "1".

The significance of the travel resolution of the motor encoder and external encoder is adapted. The parameter is set so the travel information ratio between the motor encoder and the external encoder is as close to "1" as possible. Set the parameter initially to "x1". To do this, note the values in variables H510 and H511.

- Move the drive by about 1000 increments (H511).
- Calculate the difference between the values you wrote down and the current values:
  - H510 new – H510 old = H510 difference
  - H511 new – H511 old = H511 difference
- Calculate the quotient H511 Difference divided by H510 Difference. Set the parameter P944 Encoder scaling ext. encoder to the value that is closest to the calculated quotient.

**Important:** The encoder scaling directly influences the parameters P900 Reference offset, P942 Encoder factor numerator and P943 Encoder factor denominator and the parameter group P92x IPOS monitoring. All positions of the IPOS<sup>plus</sup>® program have to be adjusted when using the external encoder. The setting of all listed parameters has to be adjusted every time the encoder scaling is changed.



*P945 Encoder type (X14)*

The number of pulses detected at X14 is multiplied by P944 and then mapped to H510. The external encoder must always provide fewer pulses than the motor encoder. If this is not possible, please contact SEW-EURODRIVE.

Setting range: TTL / SIN/COS / HIPERFACE

Enter the used encoder type here. Possible encoder types are:

- TTL: Encoder with digital, rectangular output signal (TTL level 0 V, 5 V, with negated tracks, encoder with signal level according to RS422)
- SIN/COS: Encoder with analog, sine-shaped output signal (1 V<sub>SS</sub>)
- HIPERFACE®: Encoder with designation AV1H, AS1H, ES1H, EV1H

SEW encoder type	Startup parameters encoder type / encoder PPR count
ES1S / ES2S / EV1S / EH1S	SINE ENCODER / 1024
AV1Y	SINE ENCODER / 512
ES1R / ES2R / EV1R / EH1R	INCREM. TTL ENCODER TTL / 1024
ES1T <sup>1)</sup> / ES2T <sup>1)</sup> / EV1T <sup>1)</sup> / EH1T <sup>1)</sup>	INCREM. TTL ENCODER TTL / 1024
AV1H / AS1H / ES1H / EV1H	HIPERFACE®

1) via DWI11A only

*P946 Synchronous encoder counting direction (X14)*

Setting range: NORMAL / INVERTED

Defines the counting direction of the synchronous encoder. The setting must be made so the counting direction of the motor encoder (X15) and the synchronous encoder (X14) match.

*P947 Hiperface offset X14*

Setting range:  $-(2^{31} - 1) \dots 0 \dots 2^{31} - 1$

This parameter is used to specify the zero point of the motor encoder display.

Use this parameter to define the machine zero without reference travel. It adds or subtracts the offset from the encoder value.

- P905 Hiperface offset X15 has an effect on the actual position of the motor encoder H511.  
H511 = Encoder value – P905
- P947 Hiperface offset X14 has an effect on the actual position of the external encoder H510.  
H510 = Encoder value – P947

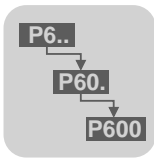
The actual position is determined directly after the values have been entered. It does not require prior reference travel.

Note:

When reference travel of a drive system takes place with Hiperface® encoder, depending on the set actual position source, the reference travel will recalculate and overwrite the Hiperface offsets (P905 or P947) .

The following applies:

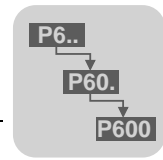
- P905 = Encoder value – P900
- P947 = Encoder value – P900



## Parameters

### Explanation of the parameters

<i>P95x DIP</i>	The DIP parameters are described in detail in the "MOVIDRIVE® MDX61B Absolute Encoder Card DIP11B" manual. The DIP11B option cannot be used with MOVIDRIVE® MDX61B size 0.
<i>P950 Encoder type</i>	<p>The absolute encoder connected to the DIP11B option (X62) is selected. At present, encoders can be selected from the following list:</p> <ul style="list-style-type: none"> <li>• <u>NO ENCODER</u></li> <li>• AV1Y / ROQ424</li> <li>• IVO GM401</li> <li>• LEUZE BPS37</li> <li>• LEUZE OMS1</li> <li>• SICK ATM60 / ATM90</li> <li>• SICK DME -3000-111</li> <li>• SICK DME 5000-111</li> <li>• STAHLWCS2-LS311</li> <li>• STAHL WCS3</li> <li>• STEGMANN AG100 MSSI</li> <li>• STEGMANN AG626 / SICK ATM60</li> <li>• T&amp;R CE65, CE 58, CE100 MSSI</li> <li>• T&amp;R LA66K</li> <li>• T&amp;R LE100</li> <li>• T&amp;R ZE 65M</li> <li>• VISOLUX EDM</li> </ul>
<i>P951 Counting direction</i>	<p>Setting range: <u>NORMAL</u> / INVERTED</p> <p>Defines the counting direction of the absolute encoder. The setting must be made so the counting direction of the motor encoder (X15) and the absolute encoder (X62) match.</p>
<i>P952 Cycle frequency</i>	<p>Setting range: <u>1</u> ... 200 %</p> <p>Defines the cycle frequency at which absolute encoder information is transmitted from the encoder to the inverter. A cycle frequency of 100 % corresponds to the nominal frequency of the encoder in relation to a 100 m cable length.</p>
<i>P953 Position offset</i>	<p>Setting range: <math>-(2^{31}-1) \dots 0 \dots 2^{31}-1</math></p> <p>The position offset P953 only needs to be set on incremental encoders; it should be set to 0 for other encoders.</p> <p>Note: The position value will be recalculated and overwritten automatically after successful completion of the reference travel.</p>
<i>P954 Zero offset</i>	<p>Setting range: <math>-(2^{31}-1) \dots 0 \dots 2^{31}-1</math></p> <p>Zero offset is used for assigning the value you want to a specific position. The range of values can adopt positive or negative position values. The maximum valid parameter must not be exceeded. The limit is determined by the range of values of the numerator (<math>2^{31}</math>) and the range of values of the absolute encoder. Move the drive to a known position. Read off the value of variable H509 ACT.POS.ABS and enter the following value in parameter P954 Zero offset: P954 = Variable H509 – required value.</p> <p>The required value is the display value you wish to have for the current position.</p>



*P955 Encoder scaling*

Setting range: x1 / x2 / x4 / x8 / x16 / x32 / x64

**Before** setting P955, make sure that P942 and P943 are set to "1".

The significance of the travel resolution of the motor encoder and absolute encoder is adapted. The parameter is set so the travel information ratio between the motor encoder and the absolute encoder is as close to "1" as possible. Set the parameter initially to "x1." To do this, note the values in variables H509 and H511.

- Move the drive by about 1000 increments (H511).
- Calculate the difference between the values you wrote down and the current values:
  - H509 new – H509 old = H509 difference
  - H511 new – H511 old = H511 difference
- Calculate the quotient H511 Difference divided by H509 Difference. Set parameter P955 Encoder scaling to the value that is closest to the calculated quotient.

**Important:** The encoder scaling directly influences the parameters P900 Reference offset, P942 Encoder factor numerator and P943 Encoder factor denominator and the parameter group P92x IPOS<sup>plus®</sup> monitoring. All positions of the IPOS<sup>plus®</sup> program have to be adjusted when using the external encoder. The setting of all listed parameters has to be adjusted every time the encoder scaling is changed.

*P96x IPOS<sup>plus®</sup> Modulo function*

The IPOS<sup>plus®</sup> modulo function is used for endless positioning, for example with circular indexing tables or chain conveyors. Refer to the IPOS<sup>plus®</sup> manual for detailed information.

*P960 Modulo function*

Setting range: OFF / SHORT / CW / CCW

- OFF: The modulo function is deactivated.
- SHORT: The "short travel" modulo function is active. The drive moves from the actual position to the target position taking the shortest possible route. Both directions of rotation are possible.
- CW: The "CW" modulo function is active. The drives moves from its actual position to the target position with a "CW" direction of rotation, even if this means moving a longer distance. The "CCW" direction of rotation is not possible.
- CCW: The "CCW" modulo function is active. The drives moves from its actual position to the target position with a "CCW" direction of rotation, even if this means moving a longer distance. The "CW" direction of rotation is not possible.

*P961 Modulo numerator*

Setting range: 0 ... 1 ... 2<sup>31</sup> – 1

Simulation of the gear unit by entering the number of teeth of the gear unit and the additional gear.

Modulo numerator = Numerator gear unit i x numerator additional gear i

*P962 Modulo denominator*

Setting range: 0 ... 1 ... 2<sup>31</sup> – 1

Simulation of the gear unit by entering the number of teeth of the gear unit and the additional gear.

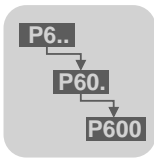
Modulo denominator = Denominator gear unit i x denominator additional gear i

*P963 Modulo encoder resolution*

Setting range: 0 ... 4096 ... 65535

Resolution of the selected IPOS<sup>plus®</sup> encoder system in increments.

The IPOS<sup>plus®</sup> encoder resolution for positioning to the motor encoder will be set to 4096 increments (prerequisite is an encoder resolution of 512 to 2048).



## Parameters

### Explanation of the parameters

#### *P97x IPOS synchronization*

##### *P970 DPRAM synchronization*

Setting range: ON / OFF

MOVIDRIVE® B allows for synchronized operation with option cards (e. g. DHP11B, DFE24B).

ON: Synchronization with the option card is activated.

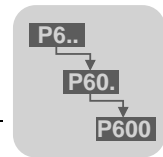
**Important:** Only SBus1 or SBus2 or DPRAM may be used for simultaneously synchronizing the inverters. The inverters must **not be synchronized by several interfaces at the same time**. SEW-EURODRIVE recommends to set P885/895 to an identifier that is not used in the entire CAN network. You need parameters P888 and P916 to implement synchronization with interpolating setpoint processing.

OFF: Synchronization with the option card is not activated.


##### *P971 Synchronization phase*

Setting range: -2 ... 0 ... 2 ms

Time that elapses between clock signal and data transfer.




### 3.4 Operating modes

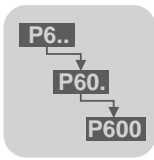
	<b>NOTE</b>
	In operating modes with encoder feedback, it is not allowed to change from one parameter set to the other more frequently than every 2 seconds. Else, the encoders cannot be initialized.

#### VFC 1 / 2 and V/f characteristic curve

Default setting for asynchronous motors without encoder feedback. Suitable for general applications, such as conveyor belts, trolleys, and hoists with counterweight. A flux-oriented motor model is used (not for V/f characteristic operating mode). This model is optimally adapted to the motor after the startup function in SHELL or in the DBG60B keypad has been carried out. It is necessary to enter the motor type (SEW motor) or the nameplate data (motor from another manufacturer) as part of the startup function. The following parameters are preset (parameter set 1/2):

Settings after the startup function	
P303 Current limit 1 / P313 Current limit 2	$I_{max} \text{ (inverter)} = 150 \% I_{N\_mot}$
P302 Maximum speed 1 / P312 Maximum speed 2	Depends on number of poles and rated motor frequency e. g. 2 pole / 50 Hz -> 3000 1/min e. g. 4 pole / 60 Hz -> 1800 1/min
P301 Minimum speed 1 / P311 Minimum speed 2	15 1/min
P130 ... P133 Ramp t11 / P140 ... P143 Ramp t21	2 s
P136 Stop ramp t13 / P146 Stop ramp t23	2 s
P137 Emergency stop ramp t14 / P147 Emergency stop ramp t24	2 s
P500 Speed monitoring 1 / P502 Speed monitoring 2	MOTOR & REGENERATIVE
P501 Deceleration time 1 / P503 Deceleration time 2	1 s
P100 Setpoint source	UNIPOL./FIX.SETPOINT
P101 Control signal source	TERMINALS
P730 Brake function 1 / P733 Brake function 2	ON
P731 Brake release time 1 / P734 Brake release time 2	For SEW motors: Setting in accordance with motor data.
P732 Brake application time 1 / 735 Brake application time 2	<b>For non-SEW motors: Set the correct value manually!</b>
P300 Start/stop speed 1 / P310 Start/stop speed 2	15 1/min
P820 4-quadrant operation 1 / P821 4-quadrant operation 2	ON
P324 Slip compensation 1 / P334 Slip compensation 2	Setting in accordance with specified data
P321 Boost 1 / P331 Boost 2	0
P322 IxR compensation 1 / P332 IxR compensation 2	Setting in accordance with specified data
P320 Automatic adjustment 1 / P330 Automatic adjustment 2	ON
P323 Premagnetizing time 1 / P333 Premagnetizing time 2	Setting in accordance with specified data

	<b>NOTE</b>
	<ul style="list-style-type: none"> <li>SEW-EURODRIVE recommends using the P320 Automatic adjustment 1 / P330 Automatic adjustment 2 activated in the factory setting. The result is an automatic setting during the pre-magnetization phase by calibrating the motor of P322 IxR compensation 1 / P332 IxR compensation 2 .</li> <li>SEW-EURODRIVE recommends keeping the parameters P321 Boost 1 / P331 Boost 2 at the factory setting (= 0).</li> </ul>



#### VFC 1 / 2 & Group

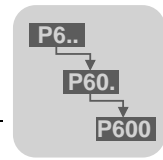
Set this mode if a group of asynchronous motors is to be operated on one inverter. All motors of the group must have the same rated voltage and rated frequency. The brake is controlled via P730 Brake function 1 / P733 Brake function 2. Set the data for the largest motor in the group during startup. Following startup, P303 Current limit 1 / P313 Current limit 2 have to be set to the total current of all connected motors. We recommend a basic setting of P321 Boost 1 / P331 Boost 2 to the same value as P322 IxR compensation 1 / P332 IxR compensation 2.

Settings after the startup function	
P303 Current limit 1 / P313 Current limit 2	$I_{max}(\text{inverter}) = 150 \% \Sigma I_{N\_mot}$
P302 Maximum speed 1 / P312 Maximum speed 2	Depends on number of poles and rated motor frequency e. g. 2 pole / 50 Hz -> 3000 1/min e. g. 4 pole / 60 Hz -> 1800 1/min
P301 Minimum speed 1 / P311 Minimum speed 2	15 1/min
P130 ... P133 Ramp t11 / P140 ... P143 Ramp t21	2 s
P136 Stop ramp t13 / P146 Stop ramp t23	2 s
P137 Emergency stop ramp t14 / P147 Emergency stop ramp t24	2 s
P500 Speed monitoring 1 / P502 Speed monitoring 2	MOTOR & REGENERATIVE
P501 Deceleration time 1 / P503 Deceleration time 2	1 s
P100 Setpoint source	UNIPOL./FIX.SETPOINT
P101 Control signal source	TERMINALS
P730 Brake function 1 / P733 Brake function 2	ON
P731 Brake release time 1 / P734 Brake release time 2	For SEW motors: Setting in accordance with motor data.
P732 Brake application time 1 / P735 Brake application time 2	<b>For non-SEW motors: Set the correct value manually!</b>
P300 Start/stop speed 1 / P310 Start/stop speed 2	Setting in accordance with specified data
P820 4-quadrant operation 1 / P821 4-quadrant operation 2	ON

#### NOTE



- Do not use this operating mode for hoist applications!
- The premagnetization current is adapted to the largest motor in the group during startup. If motors are removed from the group by switching them off, it may be necessary to reduce the current limit to a current that matches the actual combination of motors.
- Slip compensation is not effective. Motor speeds are therefore dependent on the load.



**VFC 1 / 2 & Hoist /  
VFC n-control &  
Hoist**

VFC n-control & hoist in parameter set 1 only. Disabling 4Q operation (P820) will be ignored.

In the VFC&Hoist operating mode, the start/stop speed (P300/P310) is set to the slip speed of the motor; in the VFC n-control & hoist operating mode it is set to 15 1/min.

The minimum speed (P301/P311) is internally limited to 15 1/min in the VFC&Hoist operating mode.

The hoist function automatically provides all functions necessary for operating an unbalanced hoist. In particular, monitoring functions are activated for safety reasons. These may prevent the drive from starting: These are:

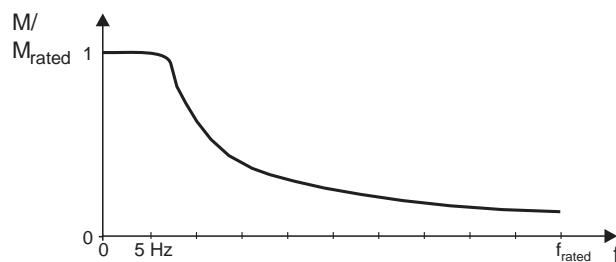
- Monitoring the output current during the pre-magnetization phase.
- Avoiding sag when the brake is released through load precontrol.

Faulty constellation	Triggered fault
2 or 3-phase motor phase failure	F82 = Output open
Premagnetization time too short or incorrect motor/inverter combination.	F81 = Error start condition
Failure of a motor phase by active speed monitoring (factory setting) P500 Speed monitoring 1 / 502 Speed monitoring 2, P501 Deceleration time 1 / P503 Deceleration time 2	F08 = Error n-monitoring

	<b>NOTE</b>
	<ul style="list-style-type: none"> <li>• A single-phase motor phase failure cannot always be detected reliably.</li> <li>• SEW-EURODRIVE strongly recommends activating speed monitoring (factory setting).</li> <li>• Correct performance of the hoist function requires the motor brake to be controlled via the inverter.</li> </ul>

**VFC 1 / 2 & DC  
BRAK. and V/f &  
DC BRAK.**

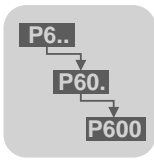
The DC braking function allows the asynchronous motor to be braked using a direct current injection. The motor can be braked without braking resistor on the inverter.



02167BEN

Figure 66: DC braking: Braking torque profile

A constant current with a rotating field frequency of 5 Hz is impressed during the braking process. The braking torque = 0 at standstill. A greater braking torque acts at a slower speed; the braking torque drops as the speed increases. The braking time and consequently the duration of the braking current depends on the load connected to the motor. DC braking is stopped once the rotating field frequency of the motor reaches 5 Hz and the motor is stopped using the rapid stop ramp. Current is injected with the rated motor current in accordance with the startup function. In all cases, the inverter limits the current to max. 125%I<sub>N</sub>. For controlling the brake, see brake function.

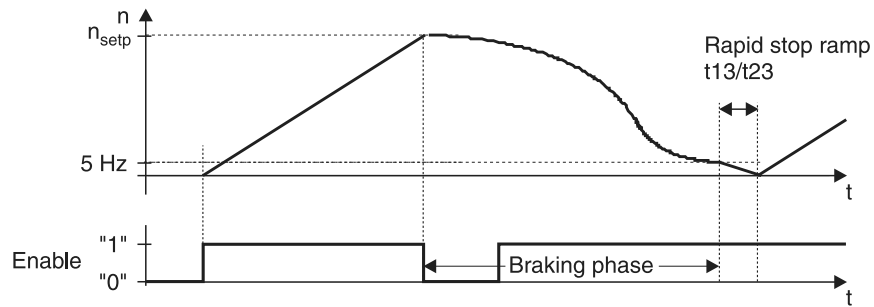


### STOP!

No guided stop.

The machine may be damaged.

With DC braking, guided stops are not possible and certain ramp values cannot be observed. The main purpose of DC braking is to drastically reduce the time the motors need for coasting to a halt.



01313BEN

Figure 67: DC braking: braking process



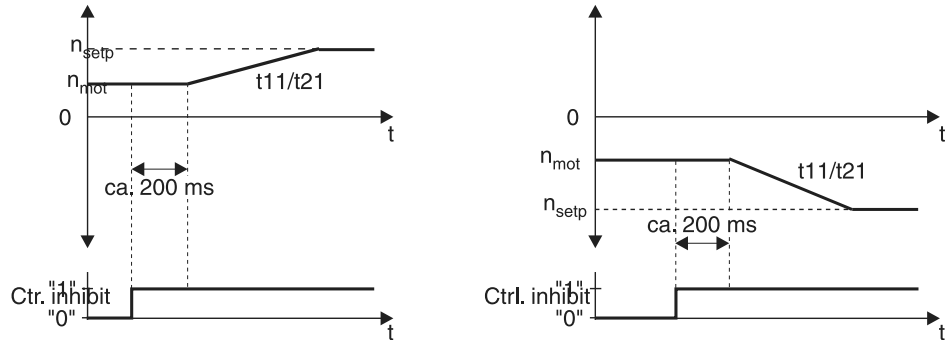
### NOTES

- The **braking procedure is not interrupted** if the "Enable" binary input receives a "1" signal again during the braking phase. The drive is not accelerated before DC braking is completed.
- The drive stops with ramp t11/t21 or t12/t22 if a binary input is programmed to the function "CW/Stop (CCW/Stop)" in "VFC 1/2 & DC BRAK." operating mode and "CW/Stop (CCW/Stop)" receives a "0" signal. The stop is continued and **no DC braking initiated** if the "Enable" binary input is switched from "1" to "0" during the ramp time.

To **start DC braking**, it is **first necessary for "Enable" to be switched from "1" to "0"**, and this must happen at least 10 ms prior to "CW/Stop (CCW/Stop)" is switched from "1" to "0."

**VFC 1 / 2 & Flying start**

The flying start function lets you synchronize the inverter to an already running motor. In particular used with drives that are not braked actively, which run on for a long time or which are turned by a flowing medium, e.g. pumps and fans. The maximum flying start time is approx. 200 ms.



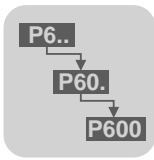
01308CEN

Figure 68: VFC & flying start function

If the inverter does not detect a trap point, it assumes a motor at rest and starts the integrator at  $n = 0$ . This process is characterized by braking of the motor to  $n = 0$  and subsequent acceleration to  $n_{setp}$ . This behavior may arise in particular with very low resistance motors in the speed range below  $n=300$  1/min (4-pole motor).

	<p><b>⚠ DANGER!</b></p>
	<p>Risk of crushing if the motor starts up unintentionally in hoist applications. Severe or fatal injuries.</p> <ul style="list-style-type: none"> <li>• <b>Do not use the flying start function in hoist applications!</b></li> <li>• Ensure that the motor cannot start unintentionally.</li> </ul>

	<p><b>NOTE</b></p>
	<p>The flying restart function does not function if there is an output filter connected to the inverter.</p>



#### VFC n-control

VFC n-control in parameter set 1 only.

Based on VFC operating mode, the VFC n-control operating mode allows for speed controlled operation with an encoder installed on the motor shaft. The following encoders can be used:

- Hiperface® encoder
- TTL sensors with negated tracks, encoders with signal level to RS422
- High-resolution incremental encoder with sine shaped tracks 1  $V_{SS}$
- HTL encoder with DWE12B option

SEW-EURODRIVE recommends the use of encoders with 1024 increments/revolution. Speed control results in the following characteristics:

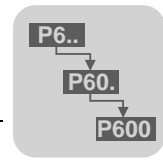
- Increased static control accuracy and higher dynamic response.
- Hold control: By programming a binary input to "/Hold control" (P60x Binary inputs basic unit / P61x Binary inputs option) a position-controlled standstill of the motor can be accomplished under load. Set the hold controller with P210 P gain hold controller .
- Synchronous operation is possible with DRS11B.

The startup function of SHELL not only supports motor startup (VFC) but also the additional controller setting of the speed controller. The following parameters relevant for n-control are set:

Settings after startup function	
P303 Current limit 1	$I_{max} \text{ (inverter)} = 150 \% I_{motor}$
P302 Maximum speed 1	Depends on number of poles and rated motor frequency e. g. 2 pole / 50 Hz -> 3000 1/min e. g. 4 pole / 60 Hz -> 1800 1/min
P301 Minimum speed 1	0 1/min
P500 Speed monitoring 1	MOTOR & REGENERATIVE
P501 Deceleration time 1 / P503 Deceleration time 2	0.1 s
P100 Setpoint source	UNIPOL./FIX.SETPOINT
P101 Control signal source	TERMINALS
P730 Brake function 1	ON
P731 Brake release time 1	For SEW motors: Setting in accordance with motor data.
P732 Brake application time 1	<b>For non-SEW motors: Set the correct value manually!</b>
P323 Premagnetizing time 1	Setting in accordance with specified motor data

Settings after the startup function of the speed controller	
P200 P gain speed controller	Setting in accordance with specified data
P201 Time constant n-controller	
P202 Acceleration feedforward gain	
P204 Actual speed value filter	
P115 Filter setpoint	
P203 Acceleration feedforward filter	
P210 P gain hold controller	Position controller gain for the hold control function
P910 Gain X controller	Position controller gain for IPOS <sup>plus</sup> ® (positioning mode)
P130 ... P133 Ramp t11	Setting in accordance with specified data
P136 Stop ramp t13	
P137 Emergency stop ramp t14	

Setting the parameter P820 4-quadrant operation 1 will be ignored; 4-quadrant operation is always active.



**VFC n-control & Group**

VFC n-control & group in parameter set 1 only.

Set this mode if a group of asynchronous motors is to be operated on one inverter. All motors of the group must have the same rated voltage, rated frequency and rated power. One motor of the group must be operated with speed control and be equipped with an incremental encoder that is connected to X15. The other motors of the group follow the speed controlled motor depending on the slip. The following encoders can be used as incremental encoder:

- Hiperface® encoder
- TTL sensors with negated tracks, encoders with signal level to RS422
- High-resolution incremental encoder with sine shaped tracks 1 V<sub>SS</sub>
- HTL encoder with DWE12B option

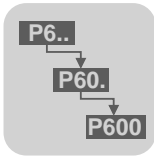
SEW-EURODRIVE recommends the use of encoders with 1024 increments/revolution.

The startup function of SHELL not only supports motor startup (VFC) but also the additional controller setting of the speed controller. The following parameters relevant for n-control are set:

Settings after the startup function	
P303 Current limit 1	$I_{\max}(\text{inverter}) = 150\% \Sigma I_{N\_mot}$
P302 Maximum speed 1	Depends on number of poles and rated motor frequency e. g. 2 pole / 50 Hz -> 3000 1/min e. g. 4 pole / 60 Hz -> 1800 1/min
P301 Minimum speed 1	0 1/min
P500 Speed monitoring 1	MOTOR & REGENERATIVE
P501 Deceleration time 1	0.1 s
P100 Setpoint source	UNIPOL./FIX.SETPOINT
P101 Control signal source	TERMINALS
P730 Brake function 1	ON
P731 Brake release time 1	For SEW motors: Setting in accordance with motor data.
P732 Brake application time 1	<b>For non-SEW motors: Set the correct value manually!</b>
P323 Premagnetizing time 1	Setting in accordance with specified motor data

Settings after the startup function of the speed controller	
P200 P gain speed controller	Setting in accordance with specified data
P201 Time constant n-controller	
P202 Acceleration feedforward gain	
P204 Actual speed value filter	
P115 Filter setpoint	
P203 Acceleration feedforward filter	Position controller gain for the hold control function
P210 P gain hold controller	Position controller gain for IPOS <sup>plus</sup> ® (positioning mode)
P910 Gain X controller	
P130 ... P133 Ramp t11	Setting in accordance with specified data
P136 Stop ramp t13	
P137 Emergency stop ramp t14	

Setting the parameter P820 4-quadrant operation 1 will be ignored; 4-quadrant operation is always active.



## Parameters

### Operating modes

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#### **VFC n-control & Sync**

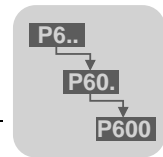
VFC n-control & sync in parameter set 1 only.

Set on the slave drives if a group of asynchronous motors should be operated at a synchronous angle in relation to one another or with an adjustable proportional ratio. Refer to the "MDX61B - Synchronous Operation Board DRS11B" manual for a detailed description of synchronous operation. This manual is available from SEW-EURODRIVE.

#### **VFC n-control & IPOS**

VFC n-control & IPOS in parameter set 1 only.

Must be set if IPOS<sup>plus</sup>® positioning commands are to be processed. Refer to the "IPOS<sup>plus</sup>® Positioning and Sequence Control System" manual for detailed descriptions of IPOS<sup>plus</sup>. This manual can be obtained from SEW-EURODRIVE.



**CFC**

CFC in parameter set 1 only.

The CFC operating mode allows for operating an asynchronous motor with real servo properties, which means high dynamic response, excellent concentric running characteristics and controlled operation even at standstill. It is achieved because the CFC procedure enables direct control over the magnetic flux in the motor and, therefore, over the torque. Speed feedback via encoder is mandatory for this operating mode. The following encoders can be used:

- Hiperface® encoder
- TTL sensors with negated tracks, encoders with signal level to RS422
- High-resolution incremental encoder with sine shaped tracks 1 V<sub>SS</sub>
- HTL encoder with DWE12B option

SEW-EURODRIVE recommends high-resolution incremental encoders with a PPR count of 1024. Optimum control characteristics are achieved with these encoders.

P324 Slip compensation 1, P321 Boost 1 and P322 IxR compensation are ineffective.

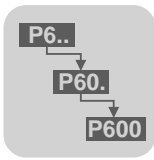
The SHELL startup function requires the motor type to be entered (SEW motor). No startup can be performed with the DBG60B keypad in CFC mode. The following parameters are preset (parameter set 1):

Settings after the startup function	
P303 Current limit 1	$I_{\max}(\text{inverter}) = 150\% I_{\text{motor}}$
P302 Maximum speed 1	Depends on number of poles and rated motor frequency e. g. 2 pole / 50 Hz -> 3000 1/min e. g. 4 pole / 60 Hz -> 1800 1/min
P301 Minimum speed 1	0 1/min
P500 Speed monitoring 1	MOTOR & REGENERATIVE
P501 Deceleration time 1	0.1 s
P100 Setpoint source	UNIPOL./FIX.SETPOINT
P101 Control signal source	TERMINALS
P730 Brake function 1	ON
P731 Brake release time 1	Setting in accordance with specified motor data
P732 Brake application time 1	
P323 Premagnetizing time 1	Setting in accordance with specified motor data

CFC always requires to startup the speed controller.

Settings after the startup function of the speed controller	
P200 P gain speed controller	Setting in accordance with specified data
P201 Time constant n-controller	
P202 Acceleration feedforward gain	
P204 Actual speed value filter	
P115 Filter setpoint	
P203 Acceleration feedforward filter	
P210 P gain hold controller	Position controller gain for the hold control function
P910 Gain X controller	Position controller gain for IPOS <sup>plus</sup> ® (positioning mode)
P130 ... P133 Ramp t11	Setting in accordance with specified data
P136 Stop ramp t13	
P137 Emergency stop ramp t14	

Setting the parameter P820 4-quadrant operation 1 will be ignored; 4-quadrant operation is always active.



#### CFC & M-control

CFC & M-control in parameter set 1 only.

This operating mode enables the asynchronous motor to be controlled directly with torque control. The setpoint is standardized on the torque as follows:

3000 1/min = 150 % output current × torque constant.

In P16x Fixed setpoints 1 you can enter the torque values directly in [% I<sub>N</sub>]. If setpoints are entered via analog input, the set processing P11x Analog input AI1 applies to torque control as well.

The torque constant (motor-specific value) is defined with:  $k_T = M_N / I_{q\_n}$



#### NOTES

- If P500 Speed monitoring 1 is active, the drive is monitored according to parameter description P500.
- If P500 Speed monitoring 1 set to OFF, the drive reacts as follows when exceeding or falling below P302 Maximum speed 1 :
  - Motor operation: The available motor torque is reduced to zero with a linear function above  $n_{max}$  and below  $-n_{max}$ . This means there is no active speed control.
  - Regenerative operation: No response; the master drive must prevent the drive losing position.
- M-control is also in effect in the range  $-n_{min} \dots n \dots n_{min}$ .
- The current is always limited to P303 Current limit 1.

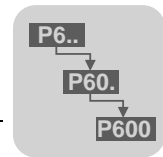
#### Settings after the startup function

P303 Current limit 1	$I_{max} \text{ (inverter)} = 150 \% I_{motor}$
P302 Maximum speed 1	Depends on number of poles and rated motor frequency e. g. 2 pole / 50 Hz -> 3000 1/min e. g. 4 pole / 60 Hz -> 1800 1/min
P301 Minimum speed 1	0 1/min
P500 Speed monitoring 1	MOTOR & REGENERATIVE
P501 Deceleration time 1	0.1 s
P100 Setpoint source	UNIPOL./FIX.SETPOINT
P101 Control signal source	TERMINALS
P730 Brake function 1	ON
P731 Brake release time 1	Setting in accordance with specified motor data.
P732 Brake application time 1	
P323 Premagnetizing time 1	Setting in accordance with specified motor data

#### Settings after the startup function of the torque controller

P200 P gain speed controller	Setting in accordance with specified data
P201 Time constant n-controller	
P202 Acceleration feedforward gain	
P204 Actual speed value filter	
P115 Filter setpoint	
P203 Acceleration feedforward filter	
P210 P gain hold controller	Position controller gain for the hold control function
P910 Gain X controller	Position controller gain for IPOS <sup>plus</sup> ® (positioning mode)
P130 ... P133 Ramp t11	Setting in accordance with specified data
P136 Stop ramp t13	
P137 Emergency stop ramp t14	

Setting the parameter P820 4-quadrant operation 1 will be ignored; 4-quadrant operation is always active.



**CFC & IPOS**

CFC & IPOS in parameter set 1 only.

Must be set if IPOS<sup>plus</sup>® positioning commands are to be processed. Refer to the "IPOS<sup>plus</sup>® Positioning and Sequence Control System" manual for detailed descriptions of IPOS<sup>plus</sup>. This manual can be obtained from SEW-EURODRIVE.

**CFC & Sync**

CFC & Sync in parameter set 1 only.

Set on the slave drives if a group of asynchronous motors should be operated at a synchronous angle in relation to one another or with an adjustable proportional ratio. Refer to the "MDX61B - Synchronous Operation Board DRS11B" manual for a detailed description of synchronous operation. This manual is available from SEW-EURODRIVE.

**SERVO**

SERVO in parameter set 1 only.

The SERVO operating mode allows for operating a permanent-field synchronous motor (servomotor). The motor must be equipped with a resolver or a Hiperface® encoder.

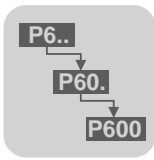
The SHELL startup function requires the motor type to be entered (SEW motor). Startup cannot be performed with the DBG60B keypad in SERVO mode. The following parameters are preset (parameter set 1):

Settings after the startup function	
<b>P303 Current limit 1</b>	$I_{max}$ (inverter) = Max. motor current at standstill
<b>Torque limit</b>	The value of the motor torque can be limited. The maximum value is determined by the motor type. P303 Current limit 1 Do not change!
<b>P302 Maximum speed 1</b>	Rated motor speed (2000 1/min, 3000 1/min, 4500 1/min)
<b>P301 Minimum speed 1</b>	0 1/min
<b>P500 Speed monitoring 1</b>	MOTOR & REGENERATIVE
<b>P501 Deceleration time 1</b>	0.1 s
<b>P100 Setpoint source</b>	UNIPOL./FIX.SETPOINT
<b>P101 Control signal source</b>	TERMINALS
<b>P730 Brake function 1</b>	ON
<b>P731 Brake release time 1</b>	Setting in accordance with specified motor data
<b>P732 Brake application time 1</b>	

SERVO always requires to startup the speed controller.

Settings after the startup function of the speed controller	
<b>P200 P gain speed controller</b>	Setting in accordance with specified data
<b>P201 Time constant n-controller</b>	
<b>P202 Acceleration feedforward gain</b>	
<b>P204 Actual speed value filter</b>	
<b>P115 Filter setpoint</b>	
<b>P203 Acceleration feedforward filter</b>	Position controller gain for the hold control function
<b>P210 P gain hold controller</b>	
<b>P910 Gain X controller</b>	Position controller gain for IPOS <sup>plus</sup> ® (positioning mode)
<b>P130 ... P133 Ramp t11</b>	Setting in accordance with specified data
<b>P136 Stop ramp t13</b>	
<b>P137 Emergency stop ramp t14</b>	

Setting the parameter P820 4-quadrant operation 1 will be ignored; 4-quadrant operation is always active.



#### **SERVO & M-control**

SERVO & M-control in parameter set 1 only.

This operating mode enables the servomotor to be controlled directly with torque control. The setpoint is standardized on the following torque:

$3000 \text{ 1/min} = 150 \% \text{ output current} \times \text{torque constant}$ .

Enter the torque values directly in [% I<sub>N</sub>] as fixed setpoints (P16x Fixed setpoints 1). If setpoints are entered via analog input, the set processing (P11x Analog input AI1) applies to torque control as well.

The torque constant (motor-specific value) is defined with:  $k_e = M_0 / I_0$

#### **NOTES**



- If P500 Speed monitoring 1 is active, the drive is monitored according to parameter description P500.
- If P500 Speed monitoring 1 set to OFF, the drive reacts as follows when exceeding or falling below P302 Maximum speed 1 :
  - Motor operation: The available motor torque is reduced to zero with a linear function above  $n_{\max}$  and below  $-n_{\max}$ . This means there is no active speed control.
  - Regenerative operation: No response; the master drive must prevent the drive losing position.
- M-control is also in effect in the range  $-n_{\min} \dots n \dots n_{\min}$ .
- The current is always limited to P303 Current limit 1.

#### **SERVO & IPOS**

SERVO & IPOS in parameter set 1 only.

Must be set if IPOS<sup>plus</sup>® positioning commands are to be processed. Refer to the "IPOS<sup>plus</sup>® Positioning and Sequence Control System" manual for detailed descriptions of IPOS<sup>plus</sup>. This manual can be obtained from SEW-EURODRIVE.

#### **SERVO & Sync**

SERVO & Sync in parameter set 1 only.

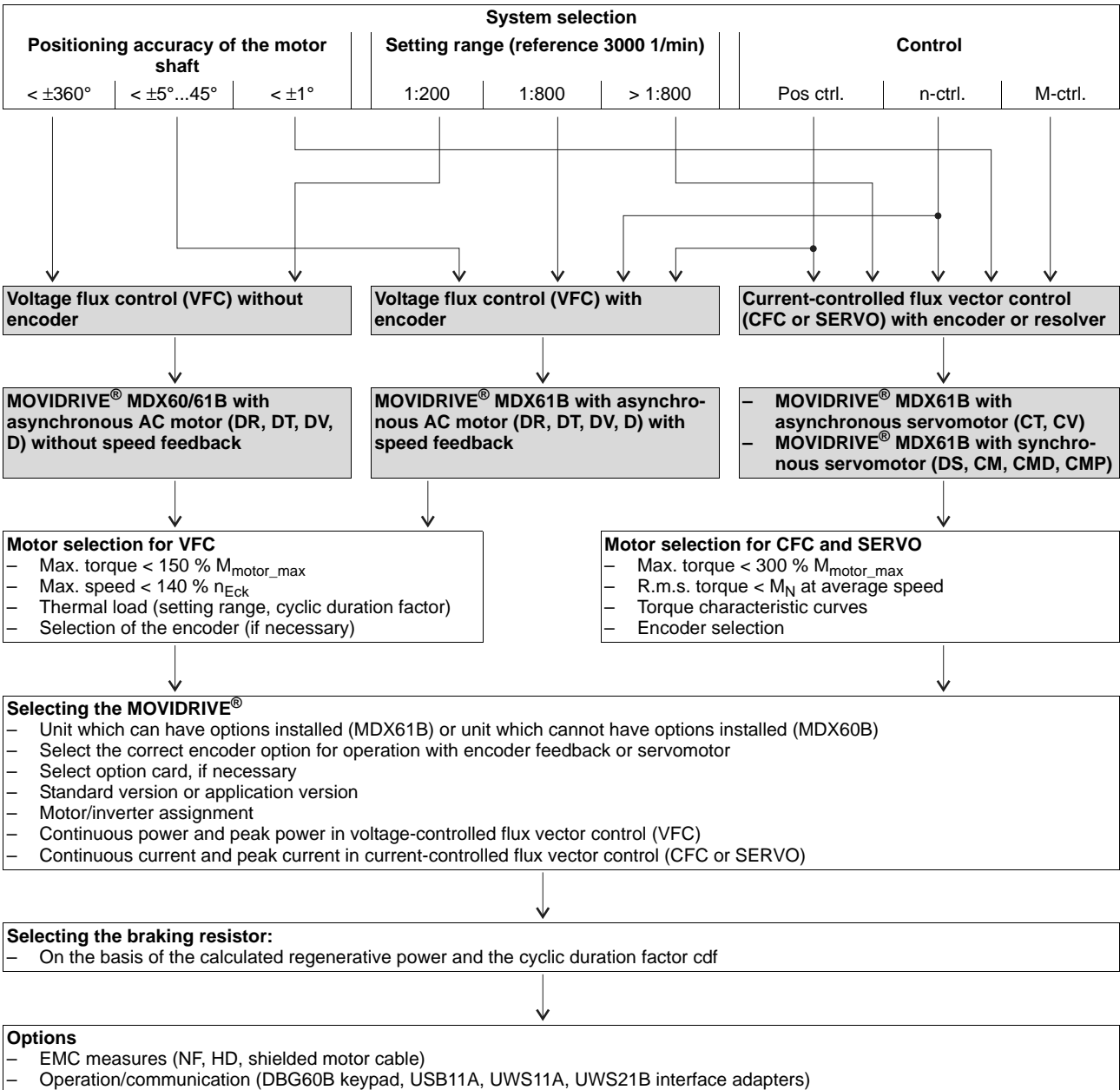
Set on the slave drives if a group of servomotors should be operated at a synchronous angle in relation to one another or with an adjustable proportional ratio. Refer to the "MDX61B - Synchronous Operation Board DRS11B" manual for a detailed description of synchronous operation. This manual is available from SEW-EURODRIVE.



## 4 Project Planning

### 4.1 Schematic procedure

**Drive properties** The required drive properties are the main factors determining the selection of the inverter. Refer to the following figure for assistance.



#### Key

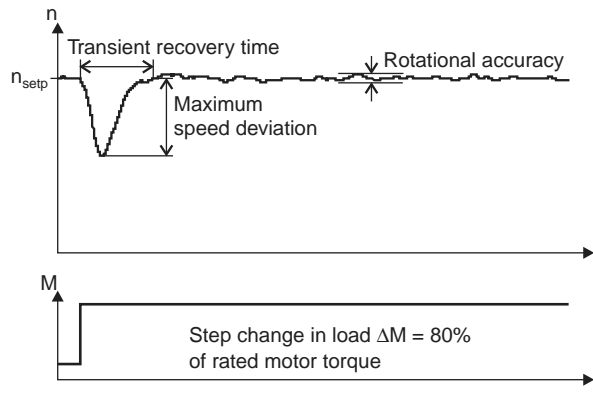
Pos-Reg.	= Positioning control
n-Reg.	= Speed control
M-Reg.	= Torque control
VFC	= Voltage flux control
CFC	= Current flux control for asynchronous servomotors
SERVO	= current-controlled flux vector control for synchronous servomotors
$M_N$	= Rated torque of the motor
$n_{\text{trans}}$	= Rated speed (transition speed) of the motor



#### 4.2 Control characteristics

##### Characteristic values

MOVIDRIVE® drive inverters achieve excellent control characteristics thanks to their optimally adapted control algorithms. The following characteristic features apply to operation with four-pole motors and synchronous servomotors from SEW-EURODRIVE.



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Figure 69: Features for the control characteristics

The following values apply to MOVIDRIVE® inverters in combination with motors of the same power:

MOVIDRIVE® type	Continuous speed range $n_{\max} = 3000$ 1/min	Static control accuracy <sup>1)</sup> based on $n_{\max} = 3000$ 1/min
MDX60/61B, VFC without encoder	1:200	0.30%
MDX61B, VFC with TTL sensor (1024 inc.)	1:800	0.01%
MDX61B, CFC with TTL sensor (1024 inc.)	1:3000	0.01%
MDX61B, CFC with sin/cos encoder	1:5000	0.01%
MDX61B, SERVO with resolver	> 1:3000	0.01%
MDX61B, CFC/SERVO with HIPERFACE® encoder	1:5000	0.01%

1) = Deviation from actual speed value - speed mean value to setpoint speed

The defined control characteristics are maintained in the specified speed range.

##### Control response

The following table shows the differences in control characteristics between VFC without encoder, VFC with encoder, and CFC (always with encoder) operating modes.

##### Data

- Setpoint speed  $n_{\text{set}} = 1000$  1/min
- Step change in load  $\Delta M = 80\%$  of rated motor torque
- Torsion-free load with mass inertia ratio  $J_L/J_M = 1.8$

MOVIDRIVE® MDX60/61B	Transient recovery time in relation to the value of VFC without encoder	Max. speed deviation at $\Delta M = 80\%$ , based on $n = 3000$ 1/min	True-running accuracy at $M = \text{const.}$ based on $n = 3000$ 1/min
VFC without encoder	100 %	1.8 %	$\leq 0.20\%$
VFC with TTL sensor (1024 inc.)	90 %	1.5 %	$\leq 0.17\%$
CFC with TTL sensor (1024 inc.)	35 %	1.0 %	$\leq 0.07\%$
CFC with sin/cos encoder	25 %	0.7 %	$\leq 0.03\%$



### 4.3 Description of applications

#### Inverter selection

The large number of different drive applications can be divided into five categories. The five categories are listed below together with the recommended SEW inverter. The assignment is based on the required setting range and the resulting control process.



1. Drives with a base load and a speed dependent load, such as conveyor drives.
  - Low requirements on the setting range (motor without encoder)
    - MOVIDRIVE® MDX60/61B without option in VFC operating mode
  - High requirements on the setting range (motor with RS422, TTL, sin/cos or HIPERFACE® encoder)
    - MOVIDRIVE® MDX61B with DEH11B option in the VFC n-CONTROL operating mode



2. Dynamic load, e.g. trolleys; brief high torque demand for acceleration followed by low load.
  - Low requirements on the setting range (motor without encoder)
    - MOVIDRIVE® MDX60/61B without option in VFC operating mode
  - High requirements on the setting range (motor with RS422, TTL, sin/cos or HIPERFACE® encoder)
    - MOVIDRIVE® MDX61B with DEH11B option in the VFC n-CONTROL operating mode
  - High dynamics required (asynchronous or synchronous servomotor)
    - Asynchronous or synchronous servomotor with HIPERFACE® encoder: MOVIDRIVE® MDX61B with DEH11B option in CFC or SERVO operating mode
    - Synchronous servomotor with resolver: MOVIDRIVE® MDX61B with DER11B option in SERVO operating mode



3. Static load, e.g. hoists; mainly steady high static load with overload peaks.
  - Low requirements on the setting range (motor without encoder)
    - MOVIDRIVE® MDX60/61B without option in VFC operating mode
  - High requirements on the setting range (motor with encoder)
    - Motor with RS422, TTL, sin/cos or HIPERFACE® encoder: MOVIDRIVE® MDX61B with DEH11B option in VFC-n-CONTROL, CFC or SERVO operating modes
    - Synchronous servomotor with resolver: MOVIDRIVE® MDX61B with DER11B option in SERVO operating mode



4. Load falling in inverse proportion to speed, e.g. winding or coil drives.
  - Torque control (asynchronous or synchronous servomotor)
    - Asynchronous or synchronous servomotor with HIPERFACE® encoder: MOVIDRIVE® MDX61B with DEH11B option in CFC&MCONTROL or SERVO&M-CTRL. operating modes.
    - Synchronous servomotor with resolver: MOVIDRIVE® MDX61B with DER11B option in the SERVO&M-CTRL. operating mode.



5. Variable torque load, e.g. fans and pumps.
  - Low load at low speeds and no load peaks, 125 % utilization ( $I_D = 125 \% I_N$ ).



#### Project planning for trolleys



The motor load in the dynamic sections determines the peak motor power to be dimensioned. The thermal load determines the required continuous motor power. The thermal load is determined on the basis of the travel cycle, with the load from acceleration and deceleration as well as the standstill times. The speed characteristic is a significant factor in determining the self-cooling of the motor. See also "Motor selection examples" on page 236.

#### Project planning for hoists

In practice, hoists are dimensioned by taking account of special thermal and safety-relevant criteria.

#### Thermal considerations

In contrast to trolleys, hoists require approx. 70 to 90 % of the rated motor torque assuming constant speed upwards or downwards and the standard configuration.

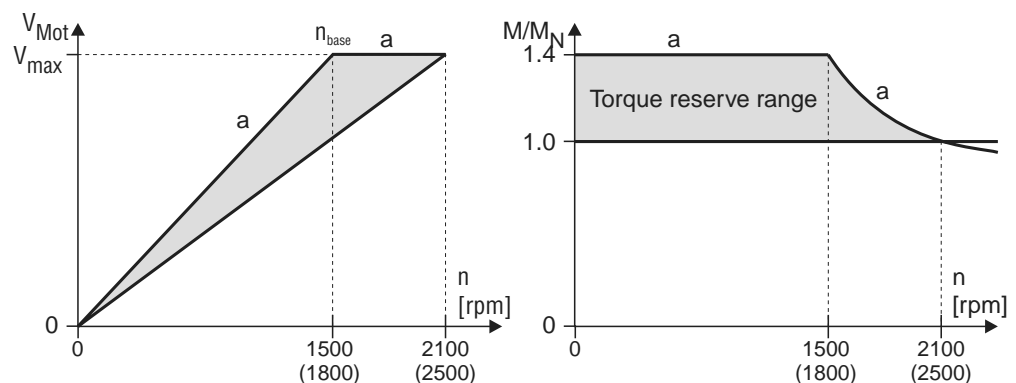
#### Starting torque

The highest operating torque is required for acceleration with maximum load in the UPWARDS hoisting direction.

#### VFC&HOIST



The 4-pole gearmotor should always be selected for a maximum speed of 2100 1/min (70 Hz) with a transition speed of 1500 1/min (50 Hz) and 2500 1/min (83 Hz) with a transition speed of 1800 1/min (60 Hz). This means the input speed of the gear unit is approx. 1.4 times higher. This is why you have to select a 1.4 times higher gear unit reduction ratio. This measure means that no torque is lost on the output shaft in the field weakening range (50...70 Hz or 60...83 Hz), because the higher gear ratio compensates for the inversely proportionate fall in torque in relation to speed (frequency). Furthermore, the startup torque is 1.4 times greater in the range from 0 ... 1500 1/min (0 ... 50 Hz) or 0 ... 1800 1/min (0 ... 60 Hz). Further advantages are that the speed range is greater and the self-cooling of the motor more powerful.



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Figure 70: a = Recommended voltage/speed characteristic curve and resultant torque profile

The motor power for hoists is selected according to the load type.

- S1 (100 % cdf): Motor power of next higher motor type than the selected inverter power, e.g. for lengthy upwards travel or continuous elevators.
- S3 (40 % cdf): Motor power in accordance with the selected inverter power.

The hoisting function must be activated on the inverter regardless of the above guidelines. See also "Motor selection examples" on page 236.



Encoder monitoring

MOVIDRIVE<sup>®</sup> has encoder monitoring for RS422, TTL, sin/cos and HIPERFACE<sup>®</sup> encoders.



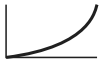
**NOTE**

For speed-controlled hoist drives, SEW-EURODRIVE recommends using RS422, TTL, sin/cos encoders or HIPERFACE<sup>®</sup> encoders and activating encoder monitoring.

Control

The control for the hoist must be designed so that the direction of rotation of the drive can only be changed when it is at a standstill.

Variable torque load (pumps, fans)



Thermal overload of the motor at low speeds can be ruled out in these applications. The maximum load occurs at maximum speed; overload peaks do not occur. As a result, the dimensions of MOVIDRIVE<sup>®</sup> and the motor can be selected so the continuous motor current is less than or equal to the continuous output current (VFC operating mode, 125 % of the rated output current at  $f_{PWM} = 4 \text{ kHz}$ ) of the MOVIDRIVE<sup>®</sup>. This means the MOVIDRIVE<sup>®</sup> unit can operate a motor with the power of the next higher motor type. See also "Motor selection examples" on page 236.



#### 4.4 Motor selection for asynchronous AC motors (VFC)

##### Basic recommendations

Observe the following recommendations for selecting the motor:

- Only use motors with at least thermal class F.
- Use TF thermistors or TH winding thermostats. TH should be preferred for group drives on one inverter. The series connection of the TH contacts (normally closed) is not subject to limitation when both monitoring functions are used.
- For group drives, we recommend that the motors should not differ from one another by more than 3 motor types.
- Use 4-pole motors if possible. This recommendation particularly applies to gear-motors that are operated with a high oil filling level due to their vertical mounting position.
- Generally speaking, the motor can be operated at its listed power without forced cooling if the operating conditions differ from S1 operation, e.g. positioning drive with 1:20 speed range in S3 operation.
- Do not select a motor that is too big, particularly for delta connection. Otherwise, the inverter may trigger a short circuit fault.
- A MOVIDRIVE<sup>®</sup> MDX61B unit with HIPERFACE<sup>®</sup> encoder card type DEH11B option is required for speed control. The motor must then be equipped with an encoder (HIPERFACE<sup>®</sup>, sin/cos or TTL).

##### Voltage/frequency characteristic curve

The operating mode VFC runs the asynchronous motor on a load-dependent voltage/frequency curve. The continuous calculation of the motor model enables the full motor torque to be utilized right down to the lowest speeds. This characteristic curve is set by entering the rated motor voltage and the rated motor frequency in the startup function. The setting determines the speed-dependent torque and power characteristics of the asynchronous motor.

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

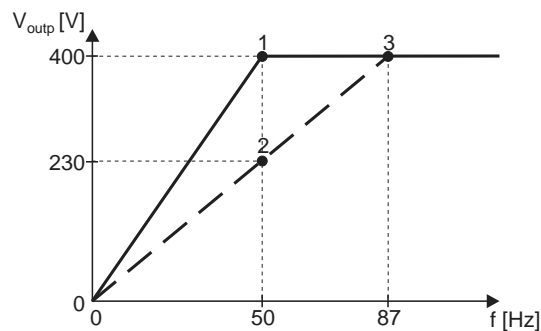


Figure 71: Voltage/frequency characteristics of the asynchronous motor

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- 1 Star connection; 400 V, 50 Hz
- 2 Delta connection: 230 V, 50 Hz
- 3 Delta connection: 400 V, 87 Hz



The inverter output voltage  $V_{out}$  is limited by the connected supply voltage. The "rated supply voltage" input value in the startup function limits the effective value of the maximum output voltage. This restriction is used whenever the connected motor has a lower rated voltage than the power supply of the inverter. Enter the maximum permitted motor voltage. Furthermore, make sure that the "rated supply voltage" input value is less than or equal to the supply voltage of the inverter.

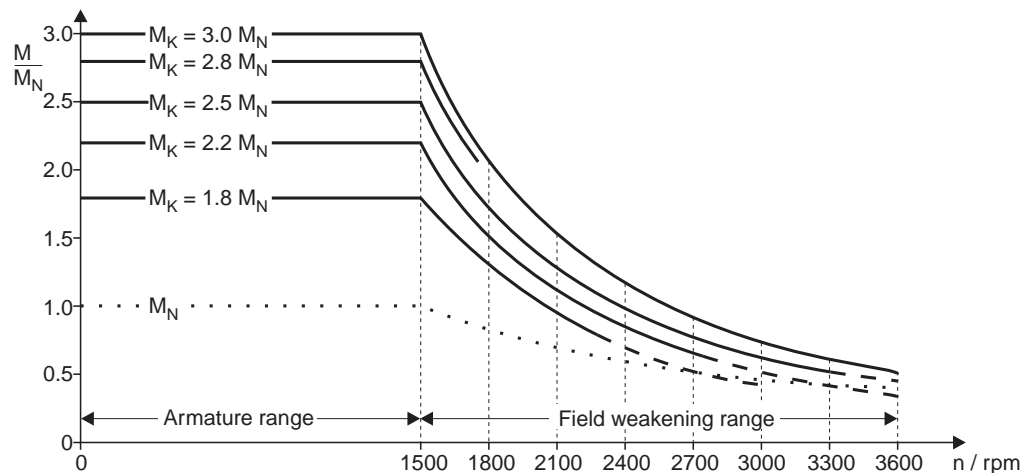
### Speed/torque characteristic curve

The field weakening range starts when the set maximum output voltage of the inverter is reached. Consequently, the speed range of the motor is divided into two ranges:

- Basic speed range → constant torque with increasing power
- Field weakening range → constant power with an inversely proportionate decrease in torque.

When determining the maximum speed in the field weakening range, note that the rated torque  $M_N$  (in relation to the rated speed, e.g.  $n_N = 1500$  1/min) falls in inverse proportion and the breakdown torque  $M_K$  is reduced in an inverse quadratic relationship. The  $M_K/M_N$  ratio is a motor-specific parameter. The MOVIDRIVE® stall protection limits the speed when the maximum possible torque is reached.

The following figure shows an example of different motor characteristic curves in the basic speed range and in the field weakening range.



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Figure 72: Quadratically falling breakdown torque

With gearmotors, the maximum motor speed depends on the size and mounting position of the gear unit. The speed should not exceed 3000 1/min due to the resulting noise and oil churning losses.



## Project Planning

### Motor selection for asynchronous AC motors (VFC)

#### Dynamic applications ( $P_{inverter}$ greater than $P_{motor}$ )

Observe the following notes for dynamic applications in which the inverter power is significantly greater than the motor power:

- The startup function sets the current limit of the inverter (P303/P313) to 150 % of the rated motor current. The value of the current limit is based on the rated inverter current. As a result, 150 % of the rated motor current is less than 150 % of the rated inverter current (value of P303/P313). For dynamic applications, this parameter must be set manually to a higher value.
- The startup function sets the slip compensation parameter (P324/P334) to the rated slip of the motor. In the case of VFC-n-CONTROL, the internal slip limiting function allows the slip to reach max. 150 % of this setting. Consequently, the motor develops at most 150 % of the rated motor torque. For higher torque ratings, the slip compensation parameter (P324) must be increased accordingly.

	<b>NOTE</b>
	Set parameter P324 "Slip compensation" to <b>max. 130 % of the rated slip of the motor for stable operation.</b>

#### Combinations with $P_{inverter}$ greater than $4 \times P_{motor}$

For inverter/motor combinations in which the inverter power is greater than four times the motor power, special measures must be taken during project planning and startup. The reason for this is the large difference between the rated inverter current and the rated motor current.

Therefore, note the following measures:

- Perform project planning for connecting the motor in a delta connection. This increases the motor current by a factor of  $\sqrt{3}$  and lowers the unfavorable ratio.
- If this measure does not suffice, start up the motor in VFC & GROUP or V/f operating mode. In these operating modes, the inverter simulates a supply system with constant voltage and frequency with a constant V/f ratio.



**Motor selection in connection type delta/star (AC 230/400 V / 50 Hz)**

Motors for AC 380 V / 60 Hz can also be allocated on the basis of this selection table.

P <sub>max</sub> [kW] for operation on MOVIDRIVE® MDX60/61B...-5_3 (AC 400/500 V units)					
Connection		Δ / AC 400 V <sup>1)</sup>		Δ / AC 230 V <sup>2)</sup>	
Cooling		Own	Forced	Own	Forced
f <sub>min</sub> - f <sub>max</sub> [Hz]		10 - 50 / 6 - 60 5 - 70 / 5.5 - 80		9 - 87	
n <sub>min</sub> - n <sub>max</sub> [1/min]		300 - 1500 / 180 - 1800 150 - 2100 / 165 - 2400		270 - 2610	
Setting range		1:5 / 1:10 / 1:15		1:10	
Motor type <sup>4)</sup>	Rated power P <sub>n</sub> [kW]	P = P <sub>reduced</sub>		P = P <sub>n</sub>	
		[kW]	MDX <sup>6)</sup> 60/61B...-5_3	[kW]	MDX <sup>6)</sup> 60/61B...-5_3
		P = P <sub>increased</sub> <sup>5)</sup>		P = P <sub>increased</sub> <sup>5)</sup>	
		[kW]	MDX <sup>6)</sup> 60/61B...-5_3	[kW]	MDX <sup>6)</sup> 60/61B...-5_3
DR63S4	0.12			0.18	
DR63M4	0.18			0.18	0005
DR63L4	0.25	0.18	0005	0.25	0005
DT71D4	0.37	0.25		0.37	0005/0015
DT80K4	0.55	0.37	0005/0015	0.55	0005/0015
DT80N4	0.75	0.55		0.75	0008/0015
DT90S4	1.1	0.75	0008/0015	1.1	0011/0015
DT90L4	1.5	1.1	0011/0015	1.5	0014/0015
DV100M4	2.2	1.5	0014/0015	2.2	0022
DV100L4	3.0	2.2	0022	3.0	0030
DV112M4	4.0	3.0	0030	4.0	0040
DV132S4	5.5	4.0	0040	5.5	0055
DV132M4	7.5	5.5	0055	7.5	0075
DV132ML4	9.2	7.5	0075	9.2	0110
DV160M4	11	9.2	0110	11	0110
DV160L4	15	11		15	0150
DV180M4	18.5	15	0150	18.5	0220
DV180L4	22	18.5	0220	22	0220
DV200L4	30	22		30	0300
DV225S4	37	30	0300	37	0370
DV225M4	45	37	0370	45	0450
DV250M4	55	45	0450	55	0550
DV280S4	75	55	0550	75	0750
D280M4	90	75	0750	90	0900
D315S4	110	90	0900	110	1100
D315M4	132	110	1100	132	1320
D315M4a	160	132	1320		

- 1) Also applies to motors with AC 460 V or AC 500 V rated voltage and for AC 400/690 V motors in Δ connection.
- 2) Also applies to motors with AC 266 V or AC 290 V rated voltage.
- 3) Without speed control: f<sub>min</sub> = 0.5 Hz
- 4) In load type S3 (40 % cdf), the motor may be operated at its listed power (P = P<sub>n</sub>) even without forced cooling. Example: P<sub>stat</sub> = 2 kW, P<sub>dyn</sub> = 2.5 kW → selected motor DV100M4 (P<sub>n</sub> = 2.2 kW).
- 5) P<sub>increased</sub> means that the motor is operated at the power of the next larger motor (one frame size), rather than with the √3-fold power.
- 6) In each application, the units listed here permit intermittent loads of up to two times the rated load with size 0 (0005 ... 0014) and up to 1.5 times the rated load with sizes 1 ... 6 (0015 ... 1320). With variable torque load and constant load without overload, each inverter can also be operated with increased continuous output power (→ Sec. Technical Data). The continuous output current of 125 % of the rated unit current is only available at f<sub>PWM</sub> = 4 kHz.



#### Examples for motor selection delta/star AC 230/400 V

##### Trolley drive



Constant load with overload (acceleration) and low load during travel:

- $P_{\text{travel}} = 1.3 \text{ kW}$
- $P_{\text{max}} = 13 \text{ kW}$
- $n_{\text{min}} = 270 \text{ 1/min}$ , setting range 1:10
- $n_{\text{max}} = 2610 \text{ 1/min}$

In inverter mode with adapted power ( $P = P_n$ ), the motor can output 150 % of its listed power during the acceleration phase. The following applies:

$$P_{\text{Mot}} = P_{\text{max}} : 1.5 = 13 \text{ kW} : 1.5 = 8.67 \text{ kW}$$

A DV132M4 motor with delta connection ( $P_n = 9.2 \text{ kW}$ ) is selected.

According to the selection table (→ page 235) a MOVIDRIVE® MDX61B0110 ( $P = P_n$ ) should be selected.

##### Hoist drive



High constant load with short-term overload (acceleration):

- $P_{\text{max}} = 26 \text{ kW}$
- $P_{\text{const.}} = 20 \text{ kW}$
- Setting range 1:15, low speed only for positioning
- Brake applied when the drive is at a standstill
- Load type S3 (40 % cdf)

The inverter can yield 150 % of its rated current during acceleration. Consequently, a MOVIDRIVE® MDX61B0220 is selected.

In view of the load type (S3, 40 % cdf), the selection table allocates motor type DV180L4 ( $P_n = 22 \text{ kW}$ ) in a star connection.

For more information, see → Sec. Project planning for hoists

##### Fan/pump



Variable torque load with the following power values:

- $P_{\text{max}} = 4.8 \text{ kW}$
- $n_{\text{max}} = 1400 \text{ 1/min}$ , continuous duty with  $n_{\text{max}}$

The motor can be operated at its listed power ( $P = P_n$ ) even without forced cooling due to the quadratically falling torque. Therefore, the motor type DV132S4 in star connection ( $P_n = 5.5 \text{ kW}$ ) is sufficient.

According to the selection table, a MOVIDRIVE® MDX61B0055 ( $P = P_n$ ) should be selected. However, as there is a variable torque load without overload, the inverter can be operated with increased output power. Consequently, a MOVIDRIVE® MDX61B0040 is sufficient.



**Motor selection in connection type double-star/star (AC 230/460 V / 60 Hz)**

P <sub>max</sub> [kW] for operation on MOVIDRIVE® MDX60/61B...-5_3 (AC 400/500 V units)							
Connection		Δ / AC 460 V			Y / AC 230 V		
Cooling		Own	Own	Forced	Own	Forced	
f <sub>min</sub> - f <sub>max</sub> [Hz]		6 - 90		10 - 60	0 - 60 <sup>1)</sup>	10 - 120	0 - 120 <sup>1)</sup>
n <sub>min</sub> - n <sub>max</sub> [1/min]		180 - 2700		300 - 1800	0 - 1800	300 - 3600	0 - 3600
Setting range		1:15		1:6	≥ 1:15	1:12	≥ 1:20
Motor type	Rated power P <sub>n</sub> [kW]	P = P <sub>reduced</sub>		P = P <sub>n</sub>		P = P <sub>increased</sub> <sup>2)</sup>	
		[kW]	With MDX60/61B...-5_3 <sup>3)</sup>	[kW]	With MDX60/61B...-5_3 <sup>3)</sup>	[kW]	With MDX60/61B...-5_3 <sup>3)</sup>
DR63S4	0.12					0.18	
DR63M4	0.18			0.18	0005	0.25	0005
DR63L4	0.25	0.18	0005	0.25	0005	0.37	
DT71D4	0.37	0.25		0.37	0005/0015	0.75	0008/0015
DT80K4	0.55	0.37	0005/0015	0.55		1.1	0011/0015
DT80N4	0.75	0.55		0.75	0008/0015	1.5	0014/0015
DT90S4	1.1	0.75	0008/0015	1.1	0011/0015	2.2	0022
DT90L4	1.5	1.1	0011/0015	1.5	0014/0015	3.0	0030
DV100M4	2.2	1.5	0014/0015	2.2	0022	4.0	0040
DV100L4	3.7	2.2	0022	3.0	0030	5.5	0055
DV112M4	4.0	3.0	0030	4.0	0040	7.5	0075
DV132S4	5.5	4.0	0040	5.5	0055	9.2	
DV132M4	7.5	5.5	0055	7.5	0075	11	0110
DV132ML4	9.2	7.5	0075	9.2	0110	15	0150
DV160M4	11	9.2	0110	11		18.5	
DV160L4	15	11		15	0150	22	0220
DV180M4	18.5	15	0150	18.5	0220	30	0300
DV180L4	22	18.5	0220	22		37	0370
DV200L4 <sup>4)</sup>	30	22		30	0300	45	0450
DV225S4 <sup>4)</sup>	37	30	0300	37	0370	55	0550
DV225M4 <sup>4)</sup>	45	37	0370	45	0450	75	0750
DV250M4 <sup>5)</sup>	55	45	0450	55	0550	90	0900
DV280S4 <sup>5)</sup>	75	55	0550	75	0750	110	1100
D280M4 <sup>5)</sup>	90	75	0750	90	0900	132	1320
D315S4	110	90	0900	110	1100		
D315M4	132	110	1100	132	1320		
D315M4a	160	132	1320				

- 1) Without speed control: f<sub>min</sub> = 0.5 Hz
- 2) P<sub>increased</sub> means that the motor is operated at the power of the next larger motor (one frame size), rather than with the  $\sqrt{3}$ -fold power.
- 3) In each application, the units listed here permit intermittent loads of up to two times the rated load with size 0 (0005 ... 0014) and up to 1.5 times the rated load with sizes 1 ... 6 (0015 ... 1320). With variable torque load and constant load without overload, each inverter can also be operated with increased continuous output power (→ Sec. Technical Data). The continuous output current of 125 % of the rated unit current is only available at f<sub>PWM</sub> = 4 kHz.
- 4) Maximum permitted motor speed n<sub>max</sub> = 3000 1/min
- 5) Maximum permitted motor speed n<sub>max</sub> = 2600 1/min


**Motor selection in connection type delta (AC 230 V / 50 Hz)**

P <sub>max</sub> [kW] for operation on MOVIDRIVE® MDX61B...-2_3 (AC 230 V units)				
Connection		Δ / AC 230 V		
Cooling		Own	Forced	
f <sub>min</sub> - f <sub>max</sub> [Hz]		10 - 50 6 - 60 5 - 70 / 5.5 - 80	≤ 2.5 - 50 / ≤ 3 - 60 <sup>1)</sup>	
n <sub>min</sub> - n <sub>max</sub> [1/min]		300 - 1500 180 - 1800 150 - 2100 / 165 - 2400	≤ 75 - 1500 / ≤ 90 - 1800	
Setting range		1:5 1:10 1:15	≥ 1:20	
Motor type <sup>2)</sup>	Rated power P <sub>n</sub> [kW]	P = P <sub>reduced</sub> With MDX61B...-2_3 <sup>3)</sup>		P = P <sub>n</sub> With MDX61B...-2_3 <sup>3)</sup>
DT71D4	0.37	0.25	0015	0.37
DT80K4	0.55	0.37		0.55
DT80N4	0.75	0.55		0.75
DT90S4	1.1	0.75		1.1
DT90L4	1.5	1.1		1.5
DV100M4	2.2	1.5	0022	2.2
DV100L4	3.0	2.2	0022	3.0
DV112M4	4.0	3.0	0030	4.0
DV132S4	5.5	4.0	0040	5.5
DV132M4	7.5	5.5	0055	7.5
DV132ML4	9.2	7.5	0075	9.2
DV160M4	11	9.2	0110	11
DV160L4	15	11		15
DV180M4	18.5	15	0150	18.5
DV180L4	22	18.5	0220	22
DV200L4	30	22		30
DV225S4	37	30	0300	-

1) Without speed control: f<sub>min</sub> = 0.5 Hz

2) In load type S3 (40 % cdf), the motor may be operated at its listed power (P = P<sub>n</sub>) even without forced cooling. Example: P<sub>stat</sub> = 2 kW, P<sub>dyn</sub> = 2.5 kW → selected motor DV100M4 (P<sub>n</sub> = 2.2 kW).

3) The units listed here permit intermittent loads of up to 1.5 times the rated load in the specific application. With variable torque load and constant load without overload, each inverter can also be operated with increased continuous output power (→ Sec. Technical Data). The continuous output current of 125 % of the rated unit current is only available at f<sub>PVM</sub> = 4 kHz.



**Motor selection in connection type double-star (AC 230 V / 60 Hz)**

P <sub>max</sub> [kW] for operation on MOVIDRIVE® MDX61B...-2_3 (AC 230 V units)					
Connection		Δ / AC 230 V			
Cooling		Own	Own	Forced	
f <sub>min</sub> - f <sub>max</sub> [Hz]		6 - 90	10 - 60	0 - 60 <sup>1)</sup>	
n <sub>min</sub> - n <sub>max</sub> [1/min]		180 - 2700	300 - 1800	0 - 1800	
Setting range		1:15	1:6	≥ 1:15	
Motor type	Rated power P <sub>n</sub> [kW]	P = P <sub>reduced</sub> With MDX61B...-2_3 <sup>2)</sup>		P = P <sub>n</sub> With MDX61B...-2_3 <sup>2)</sup>	
		[kW]		[kW]	
DT71D4	0.37	0.25	0015	0.37	0015
DT80K4	0.55	0.37		0.55	
DT80N4	0.75	0.55		0.75	
DT90S4	1.1	0.75		1.1	
DT90L4	1.5	1.1		1.5	
DV100M4	2.2	1.5		2.2	0022
DV100L4	3.7	2.2	0022	3.0	0030
DV112M4	4.0	3.0	0030	4.0	0040
DV132S4	5.5	4.0	0040	5.5	0055
DV132M4	7.5	5.5	0055	7.5	0075
DV132ML4	9.2	7.5	0075	9.2	0110
DV160M4	11	9.2	0110	11	
DV160L4	15	11		15	0150
DV180M4	18.5	15	0150	18.5	0300
DV180L4	22	18.5		22	0370
DV200L4	30	22	0220	30	
DV225S4	37	30	0300		-

- 1) Without speed control: f<sub>min</sub> = 0.5 Hz
- 2) The units listed here permit intermittent loads of up to 1.5 times the rated load in the specific application. With variable torque load and constant load without overload, each inverter can also be operated with increased continuous output power (→ Sec. Technical Data). The continuous output current of 125 % of the rated unit current is only available at f<sub>PWM</sub> = 4 kHz.



#### 4.5 Motor selection for asynchronous servomotors (CFC)

##### Basic recommendations

Observe the following recommendations for selecting the motor:

- Only use motors with at least thermal class F.
- Use TF thermistors or TH winding thermostats.

<b>NOTE</b>	
	<p>The torque limit (M limit) is set automatically by the startup function of the MOVITOOLS<sup>®</sup> operating software. Do not increase this automatically set value!</p> <p>SEW-EURODRIVE recommends always using the latest version of MOVITOOLS<sup>®</sup> for startup. The latest MOVITOOLS<sup>®</sup> version can be downloaded from our homepage (<a href="http://www.sew-eurodrive.com">www.sew-eurodrive.com</a>).</p>

##### Motor characteristics

Drives in CFC modes are characterized by their ability to control torque directly and quickly. This means they achieve a highly dynamic overload capacity (up to  $3 \times M_N$ ) and a very high speed and control range (up to 1:5000). Stable speed and positioning accuracy meet the high requirements of servo technology. This behavior is implemented using field-oriented control. The current components for magnetization ( $I_d$ ) and torque generation ( $I_q$ ) are controlled separately. One prerequisite for the CFC operating modes is that the motor must always be equipped with an encoder.

The inverter needs to know exact data about the connected motor to calculate the motor model. This data is made available by the MOVITOOLS<sup>®</sup> operating software with the startup function. CFC operating modes are only possible with 4-pole SEW-motors (CT/CV or DT/DV/D), not with the other SEW motors or non-SEW motors. The necessary motor data for the CFC operating modes is stored in MOVIDRIVE<sup>®</sup> for 4-pole SEW motors.

##### Typical speed/torque characteristic curves

$M_N$  is determined by the motor.  $M_{max}$  and  $n_{trans}$  depend on the motor/inverter combination. You can refer to the motor selection tables for CFC mode for the values of  $n_{trans}$ ,  $M_N$  and  $M_{max}$ .

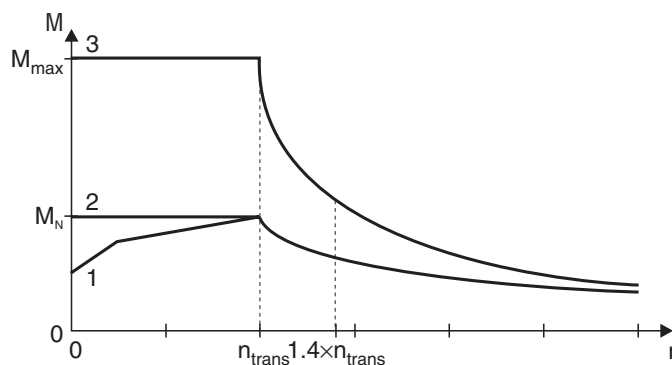


Figure 73: Speed/torque characteristic curve in CFC operating mode

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- 1 With integrated cooling
- 2 With forced cooling
- 3 Maximum torque



### **Magnetization current**

Dynamic drives that have to accelerate without delay are also energized at standstill without load. The magnetizing current  $I_d$  flows at standstill. The inverter must be able to supply this current constantly in applications in which the output stage is permanently enabled, for example in CFC & M-CONTROL mode. In particular in the case of large motors with a slip frequency  $\leq 2$  Hz, you have to refer to the diagrams in Sec. "Load capacity of the units at low output frequencies" to check whether the inverter can supply the current. Also check whether the thermal characteristics of the motor are suitable (forced cooling fan) for this. For the magnetization current  $I_d$ , refer to the motor tables (CT/CV → page 244, DT/DV/D → page 249).

### **CFC mode with speed control**

There is no need to differentiate between the load types quadratic, dynamic and static when performing project planning for the CFC operating mode. Project planning for an asynchronous motor in CFC mode is carried out in accordance with the following requirements:

1. Effective torque requirement at average application speed.

$$M_{\text{eff}} < M_{N\_Mot}$$

The operating point must lie below the characteristic curve for the continuous torque (Figure 73, curve 2). If this operating point lies below the characteristic curve for forced cooling (Figure 73, curve 1), then no forced cooling is required.

2. Maximum torque needed across the speed curve.

$$M_{\text{max}} < M_{\text{dyn\_Mot}}$$

This operating point must lie below the characteristic curve for the maximum torque of the motor/MOVIDRIVE<sup>®</sup> combination (Figure 73, curve 3).

3. Maximum speed

Do not configure the maximum speed of the motor higher than 1.4 times the transition speed. The maximum torque available will then still be approximately 110 % of the continuous rated torque of the motor; also, the input speed for the gear unit connected to the motor output will still be less than 3,000 1/min with delta connection.

$$n_{\text{max}} < 1.4 \times n_{\text{trans}} < 3000 \text{ 1/min}$$

### **Cooling the motor**

Self-cooling of asynchronous motors is based on the integrated fan, which means self-cooling depends on the speed. The integrated fan does not provide cooling for the motor at low speeds and standstill. Forced cooling may be necessary in case of a high static load or a high effective torque.



**CFC mode with torque control (CFC & M-CONTROL)**

This operating mode permits direct torque control of the asynchronous motor in the basic speed range ( $n \leq n_{\text{trans}}$ ). The setpoint sources of the speed-controlled CFC mode can also be used for torque control. All speed setpoint sources (except for bus setpoints) are interpreted as current setpoint sources. Assign "Current" to a process data word for fieldbus control. The settings for evaluating the analog input ( $\rightarrow$  P11\_, parameter description) also remain in effect. The fixed setpoints (P16\_, P17\_) can be entered in the units [1/min] or [% $I_{N\_inverter}$ ] as required ( $\rightarrow$  MOVITOOLS®).

**The following relationship exists between the units:**

3000 1/min = 150 % rated inverter current

The torque on the output shaft of the motor can then be calculated for the basic speed range ( $n \leq n_{\text{trans}}$ ) using the following formulae:

**Specification of a setpoint for the motor torque in % $I_{N\_inverter}$ :**

$$M = k_T \times I_{n\_inverter} \times \text{Setpoint}$$

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**Specification of a setpoint for the motor torque in 1/min:**

$$M = k_T \times 1.5 \times I_{n\_inverter} \times \frac{\text{Setpoint}}{3000 \text{ rpm}}$$

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$I_{N\_inverter}$  = Rated output current of the inverter

$k_T$  = Torque constant =  $M_n / I_{q\_n}$

$M_n$  and  $I_{q\_n}$  are motor-specific values. For the values of the torque constants  $k_T$  and the motor-specific values  $M_n$  and  $I_{q\_n}$ , refer to the motor tables (DT/DV/D  $\rightarrow$  page 249, CT/CV  $\rightarrow$  page 243).

In addition to the current  $I_q$  for creating the torque, the inverter also needs to supply the magnetization current  $I_d$ . The actual inverter output current  $I_{\text{tot}}$  can be calculated using the following formulae:

**Specification of a setpoint for the motor torque in % $I_{N\_inverter}$ :**

$$I_{\text{tot}} = \sqrt{(\text{Setpoint} \times I_{n\_inverter})^2 + I_{d\_N}^2}$$

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**Specification of a setpoint for the motor torque in 1/min:**

$$I_{\text{tot}} = \sqrt{\left( \text{Setpoint} \times 1.5 \times I_{n\_inverter} \times \frac{1}{3000 \text{ rpm}} \right)^2 + I_{d\_N}^2}$$

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$I_{q\_n}$  = Nominal value of the torque-generating current according to the motor table

$I_{d\_n}$  = Nominal value of the magnetization current according to the motor table



**CT/CV asynchronous servomotors**

SEW-EURODRIVE offers CT/CV asynchronous servomotors especially for operation with MOVIDRIVE® in the CFC operating modes. These motors have the following characteristics:

- High power yield*      The optimum winding of CT/CV motors permits a high power yield.
  
- Division into speed classes*      CT/CV motors are available in four speed classes. The division into speed classes ensures optimum utilization of torque and speed.
  
- Sin/cos encoder as standard*      CT/CV motors are equipped as standard with a high-resolution sin/cos encoder (ES1S, ES2S, EV1S).
  
- TF or TH motor protection as standard*      The winding temperature of the three motor phases is monitored using thermistors (TF). The thermistor can be connected to the TF/TH input of MOVIDRIVE®. The temperature is then monitored by MOVIDRIVE®; no additional monitoring unit is required.  
 Bimetallic switches (TH) can also be used instead of thermistors. The bimetallic switches are also connected to the TF/TH input.
  
- Thermal classification F as standard*      CT/CV motors are designed with thermal classification F materials.
  
- Reinforced pinion shaft ends*      CT/CV motors can generate up to three times their rated motor torque in dynamic operation. For this reason, these motors are equipped with reinforced pinion spigots for direct mounting to gear units to enable them to transmit the high torque levels reliably.

Either DT/DV/D motors or CT/CV motors can be used in CFC mode. SEW-EURODRIVE recommends using CT/CV motors to achieve optimum benefit from the CFC mode.

	Advantage	Disadvantage
<b>CFC mode with DT/DV/D motor Motor selection → page 251</b>	Standard motor version	Slower transition speed than the CT/CV motor.
		The power yield of the motor is less than the rated motor power.
		In terms of the power yield, the mass inertia is greater than that of the CT/CV motors.
		The maximum torque is limited for some of the inverter/motor combinations due to mechanical rigidity.
<b>CFC mode with CT/CV motor Motor selection → page 245</b>	Higher transition speed than DT/DV/D motor.	No IEC standard motor
	Usually with a power yield one motor type higher.	
	Based on the power yield of a lower mass moment of inertia.	Higher current demand due to higher power yield; therefore a larger inverter has to be assigned.
	Motor is designed for dynamic operation.	



CT/CV motor table

$n_N$ [1/min]	Motor	$M_N$ [Nm]	$I_N$ [A]	$I_{q,n}$ [A]	$I_{d,n}$ [A]	$k_T$ [Nm/A]	$U_N$ [V]	$J_{Mot}$ [10 <sup>-4</sup> kgm <sup>2</sup> ]	$J_{BMot}$
1200	CT71D4	3	1.4	1.21	0.69	2.48	360	4.6	5.5
	CT80N4	5	2.1	1.65	1.30	3.0	350	8.7	9.6
	CT90L4	10	3.65	3.13	1.89	3.2	345	34	39.5
	CV100M4	15	4.7	4.15	2.25	3.61	345	53	59
	CV100L4	26	8.5	7.9	3.21	3.29	320	65	71
	CV132S4	37	11.5	10.4	4.83	3.56	340	146	158
	CV132M4	50	15.5	14.2	6.18	3.52	340	280	324
	CV132ML4	61	18.2	16.7	7.43	3.66	345	330	374
	CV160M4	73	22.5	20.3	9.73	3.60	335	400	440
	CV160L4	95	30	26.7	14.2	3.56	330	925	1030
	CV180M4	110	36	30.2	19.7	3.65	330	1120	1226
	CV180L4	125	39.5	33.8	20.5	3.7	345	1290	1396
	CV200L4	200	58	53.2	23.7	3.76	330	2340	2475
1700	CT71D4	3	1.9	1.67	0.95	2.48	355	4.6	5.5
	CT80N4	5	2.9	2.28	1.79	3.03	350	8.7	9.6
	CT90L4	10	5	4.32	2.61	3.2	345	34	39.5
	CV100M4	15	6.5	5.73	3.10	3.61	345	53	59
	CV100L4	26	11.7	10.86	4.41	3.29	320	65	71
	CV132S4	37	15.8	14.35	6.67	3.56	340	146	158
	CV132M4	48	21	19.2	8.7	3.52	335	280	324
	CV132ML4	58	26.5	23.8	11.2	3.66	320	330	374
	CV160M4	71	30.5	27.2	13.4	3.6	340	400	440
	CV160L4	89	39.5	34.5	19.53	3.56	335	925	1030
	CV180M4	105	48	39.7	27.2	3.65	335	1120	1226
	CV180L4	115	56	46.6	30.7	3.7	325	1290	1396
	CV200L4	190	79	71.2	33.4	3.76	325	2340	2475
2100	CT71D4	3	2.4	2.1	1.20	1.43	345	4.6	5.5
	CT80N4	5	3.65	2.87	2.26	1.74	340	8.7	9.6
	CT90L4	10	6.4	5.44	3.29	1.84	335	34	39.5
	CV100M4	15	8.2	7.23	3.91	2.07	335	53	59
	CV100L4	25	14.3	13.2	5.56	1.9	310	65	71
	CV132S4	37	19.9	18.1	8.41	2.05	335	146	158
	CV132M4	48	26	23.7	10.75	2.03	330	280	324
	CV132ML4	58	30.5	27.5	12.9	2.1	340	330	374
	CV160M4	70	38	33.9	16.9	2.07	330	400	440
	CV160L4	88	49.5	43	24.6	2.05	330	925	1030
	CV180M4	100	59	47.7	34.2	2.1	325	1120	1226
	CV180L4	115	64	53.7	35.4	2.14	345	1290	1396
	CV200L4	175	91	80.1	41.2	2.16	325	2340	2475
3000	CT71D4	3	3.35	2.9	1.65	1.04	350	4.6	5.5
	CT80N4	4.5	4.75	3.6	3.11	1.26	345	8.7	9.6
	CT90L4	9.5	8.4	7.12	4.54	1.33	345	34	39.5
	CV100M4	15	11.3	9.95	5.39	1.51	345	53	59
	CV100L4	21	17	15.2	7.65	1.38	310	65	71
	CV132S4	35	26.5	23.6	11.6	1.49	340	146	158
	CV132M4	45	34.5	31.2	15.1	1.44	335	280	324
	CV132ML4	52	41.5	36.9	19.3	1.41	320	330	374
	CV160M4	64	48.5	42.6	23.3	1.50	340	400	440
	CV160L4	85	67	57.2	33.9	1.49	340	925	1030
	CV180M4	93	77	61.1	47.2	1.52	335	1120	1226
	CV180L4	110	94	77	53.1	1.43	325	1290	1396
	CV200L4	145	110	94.1	57.8	1.54	330	2340	2475



**CT/CV motor selection**

1. Rated speed  $n_N = 1200$  1/min:

Assignment of **MOVIDRIVE® MDX61B0005-5A3 ... MDX61B0040-503** (sizes 0 and 1):

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)							
		0005	0008	0011	0014	0015	0022	0030	0040
<b>CT71D4</b>	$M_{max}$ [Nm]	7.7	7.7						
	$n_{trans}$ [1/min]	429	429						
<b>CT80N4</b>	$M_{max}$ [Nm]		14.0	16.0	16.0	16.0			
	$n_{trans}$ [1/min]		627	550	550	550			
<b>CT90L4</b>	$M_{max}$ [Nm]				25.0	18.0	26.0	31.0	
	$n_{trans}$ [1/min]				794	928	781	678	
<b>CV100M4</b>	$M_{max}$ [Nm]						29.0	37.0	45.0
	$n_{trans}$ [1/min]						883	781	678
<b>CV100L4</b>	$M_{max}$ [Nm]							33.0	46.0
	$n_{trans}$ [1/min]							1050	934

Assignment of **MOVIDRIVE® MDX61B0055-503 ... MDX61B0550-503** (sizes 2 ... 5):

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)								
		0055	0075	0110	0150	0220	0300	0370	0450	0550
<b>CV100L4</b>	$M_{max}$ [Nm]	61.0	75.0							
	$n_{trans}$ [1/min]	800	666							
<b>CV132S4</b>	$M_{max}$ [Nm]	64.0	84.0	110						
	$n_{trans}$ [1/min]	992	915	826						
<b>CV132M4</b>	$M_{max}$ [Nm]		82.0	125	150					
	$n_{trans}$ [1/min]		1010	877	806					
<b>CV132ML4</b>	$M_{max}$ [Nm]			129	174	183				
	$n_{trans}$ [1/min]			890	781	774				
<b>CV160M4</b>	$M_{max}$ [Nm]			125	169	220				
	$n_{trans}$ [1/min]			986	909	838				
<b>CV160L4</b>	$M_{max}$ [Nm]				163	240	295			
	$n_{trans}$ [1/min]				1045	954	922			
<b>CV180M4</b>	$M_{max}$ [Nm]					240	320	360		
	$n_{trans}$ [1/min]					1050	986	1005		
<b>CV180L4</b>	$M_{max}$ [Nm]					245	325	360	360	
	$n_{trans}$ [1/min]					960	909	947	1035	
<b>CV200L4</b>	$M_{max}$ [Nm]						325	400	495	565
	$n_{trans}$ [1/min]						1010	986	947	941



## Project Planning

### Motor selection for asynchronous servomotors (CFC)

2. Rated speed  $n_N = 1700$  1/min:

Assignment of MOVIDRIVE® MDX61B0005-5A3 ... MDX61B0110-503 (sizes 0 ... 2):

Motor		MOVIDRIVE® MDV60A...-5_3 (AC 400/500 V units) in CFC operating modes (P700)										
		0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
CT71D4	$M_{max}$ [Nm]	7.0	7.7	7.7								
	$n_{trans}$ [1/min]	986	890	890								
CT80N4	$M_{max}$ [Nm]			13.0	16.0	13.0	16.0					
	$n_{trans}$ [1/min]			1125	992	1150	992					
CT90L4	$M_{max}$ [Nm]						18.0	24.0	31.0			
	$n_{trans}$ [1/min]						1400	1285	1150			
CV100M4	$M_{max}$ [Nm]							26.0	36.0	45.0		
	$n_{trans}$ [1/min]							1365	1230	1145		
CV100L4	$M_{max}$ [Nm]								32.0	44.0	57.0	75.0
	$n_{trans}$ [1/min]								1535	1425	1300	1115
CV132S4	$M_{max}$ [Nm]										60.0	91.0
	$n_{trans}$ [1/min]										1470	1330
CV132M4	$M_{max}$ [Nm]											87.4
	$n_{trans}$ [1/min]											1484
CV132ML4	$M_{max}$ [Nm]											83.0
	$n_{trans}$ [1/min]											1560

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B0900-503 (sizes 3 ... 6):

Motor		MOVIDRIVE® MDV60A...-5_3 (AC 400/500 V units) in CFC operating modes (P700)							
		0150	0220	0300	0370	0450	0550	0750	0900
CV132S4	$M_{max}$ [Nm]	110							
	$n_{trans}$ [1/min]	1295							
CV132M4	$M_{max}$ [Nm]	118	150						
	$n_{trans}$ [1/min]	1370	1295						
CV132ML4	$M_{max}$ [Nm]	114	166	183					
	$n_{trans}$ [1/min]	1485	1330	1345					
CV160M4	$M_{max}$ [Nm]	120	176	220					
	$n_{trans}$ [1/min]	1420	1310	1255					
CV160L4	$M_{max}$ [Nm]		171	225	280	295			
	$n_{trans}$ [1/min]		1470	1400	1330	1395			
CV180M4	$M_{max}$ [Nm]		168	225	280	345	360		
	$n_{trans}$ [1/min]		1555	1510	1460	1400	1505		
CV180L4	$M_{max}$ [Nm]			210	260	320	360	360	
	$n_{trans}$ [1/min]			1510	1480	1435	1470	1665	
CV200L4	$M_{max}$ [Nm]					345	410	515	565
	$n_{trans}$ [1/min]					1460	1425	1380	1445



3. Rated speed  $n_N = 2100$  1/min:

Assignment of MOVIDRIVE® MDX61B0008-5A3 ... MDX61B0110-503 (sizes 0 ... 2):

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)									
		0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
CT71D4	$M_{max}$ [Nm]	6.6	7.7	7.7	7.7						
	$n_{trans}$ [1/min]	1470	1320	1320	1320						
CT80N4	$M_{max}$ [Nm]			13	9.7	14	16				
	$n_{trans}$ [1/min]			1535	1755	1510	1420				
CT90L4	$M_{max}$ [Nm]						18	26	31		
	$n_{trans}$ [1/min]						1845	1675	1620		
CV100M4	$M_{max}$ [Nm]							28	38	45	
	$n_{trans}$ [1/min]							1760	1625	1580	
CV100L4	$M_{max}$ [Nm]								34	44	68
	75								1980	1870	1615
CV132S4	$M_{max}$ [Nm]										72
	$n_{trans}$ [1/min]										1850

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B1320-503 (sizes 3 ... 6):

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)									
		0150	0220	0300	0370	0450	0550	0750	0900	1100	1320
CV100L4	$M_{max}$ [Nm]	75.0									
	$n_{trans}$ [1/min]	1555									
CV132S4	$M_{max}$ [Nm]	97	110								
	$n_{trans}$ [1/min]	1720	1785								
CV132M4	$M_{max}$ [Nm]	95	138	150							
	$n_{trans}$ [1/min]	1850	1670	1695							
CV132ML4	$M_{max}$ [Nm]	97	143	183							
	$n_{trans}$ [1/min]	1790	1660	1550							
CV160M4	$M_{max}$ [Nm]		138	183	220						
	$n_{trans}$ [1/min]		1790	1690	1625						
CV160L4	$M_{max}$ [Nm]			177	220	270	295				
	$n_{trans}$ [1/min]			1880	1825	1740	1780				
CV180M4	$M_{max}$ [Nm]				220	270	320	360			
	$n_{trans}$ [1/min]				1940	1895	1835	1935			
CV180L4	$M_{max}$ [Nm]					275	330	360	360		
	$n_{trans}$ [1/min]					1710	1670	1805	1985		
CV200L4	$M_{max}$ [Nm]						330	410	500	565	
	$n_{trans}$ [1/min]						1830	1790	1745	1870	



## Project Planning

### Motor selection for asynchronous servomotors (CFC)

#### 4. Rated speed $n_N = 3000$ 1/min:

Assignment of MOVIDRIVE® MDX61B0011-5A3 ... MDX61B0110-503 (sizes 0 ... 2):

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)								
		0011	0014	0015	0022	0030	0040	0055	0075	0110
CT71D4	$M_{max}$ [Nm]	6.2	7.7	6	7.7					
	$n_{trans}$ [1/min]	2350	2095	2380	2095					
CT80N4	$M_{max}$ [Nm]				9.7	13	16			
	$n_{trans}$ [1/min]				2565	2360	2200			
CT90L4	$M_{max}$ [Nm]						18	24	31	
	$n_{trans}$ [1/min]						2660	2495	2370	
CV100M4	$M_{max}$ [Nm]							27	35	45
	$n_{trans}$ [1/min]							2555	2430	2460
CV100L4	$M_{max}$ [Nm]								31	49
	$n_{trans}$ [1/min]								2850	2645
CV132S4	$M_{max}$ [Nm]									51
	$n_{trans}$ [1/min]									2745

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B1320-503 (sizes 3 ... 6):

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)									
		0150	0220	0300	0370	0450	0550	0750	0900	1100	1320
CV100L4	$M_{max}$ [Nm]	65	75								
	$n_{trans}$ [1/min]	2425	2370								
CV132S4	$M_{max}$ [Nm]	69	101	110							
	$n_{trans}$ [1/min]	2650	2460	2610							
CV132M4	$M_{max}$ [Nm]	66	97	101	110						
	$n_{trans}$ [1/min]	2810	2670	2515	2450						
CV132ML4	$M_{max}$ [Nm]		94	124	152	183					
	$n_{trans}$ [1/min]		2765	2655	2545	2445					
CV160M4	$M_{max}$ [Nm]		98	131	161	197	220				
	$n_{trans}$ [1/min]		2630	2555	2470	2370	2385				
CV160L4	$M_{max}$ [Nm]				155	192	230	285	295		
	$n_{trans}$ [1/min]				2680	2620	2555	2440	2630		
CV180M4	$M_{max}$ [Nm]					190	230	290	350	360	
	$n_{trans}$ [1/min]					2750	2705	2635	2560	2920	
CV180L4	$M_{max}$ [Nm]						210	270	325	360	360
	$n_{trans}$ [1/min]						2680	2630	2575	2855	3170
CV200L4	$M_{max}$ [Nm]							285	350	455	565
	$n_{trans}$ [1/min]							2625	2590	2535	2475



**DT/DV/D motor tables**

Characteristic values for delta/star AC 230/400 V / 50 Hz

Motor	M <sub>N</sub> [Nm]	Mass moment of inertia J <sub>M</sub> [10 <sup>-4</sup> kgm <sup>2</sup> ]		Star $\star$ (AC 400 V)				Delta $\Delta$ (AC 230 V)			
		without brake	with brake	I <sub>n</sub> [A]	I <sub>q,n</sub> <sup>1)</sup> [A]	I <sub>d,n</sub> <sup>1)</sup> [A]	k <sub>T</sub> <sup>1)</sup> [Nm/A]	I <sub>n</sub> [A]	I <sub>q,n</sub> <sup>1)</sup> [A]	I <sub>d,n</sub> <sup>1)</sup> [A]	k <sub>T</sub> <sup>1)</sup> [Nm/A]
DT71D4	2.6	4.6	5.5	1.15	0.95	0.65	2.69	1.99	1.64	1.13	1.56
DT80K4	3.9	6.6	7.5	1.75	1.44	1	2.68	3.03	2.49	1.73	1.55
DT80N4	5.2	8.7	9.6	2.1	1.67	1.27	3.11	3.64	2.89	2.2	1.79
DT90S4	7.5	25	31	2.80	2.39	1.46	3.13	4.85	4.14	2.53	1.81
DT90L4	10.2	34	40	3.55	2.93	2	3.48	6.15	5.07	3.46	2.01
DV100M4	15.0	53	59	4.7	4.12	2.24	3.61	8.14	7.14	3.88	2.09
DV100L4	20.5	65	71	6.3	5.6	2.98	3.66	10.91	9.70	5	2.11
DV112M4	26.9	98	110	8.7	7.85	3.75	3.43	15.1	13.6	6.5	1.98
DV132S4	36.7	146	158	11	9.9	4.7	3.69	19.1	17.2	8.14	2.13
DV132M4	50.1	280	330	15.5	14.2	6.15	3.53	26.9	24.6	10.65	2.04
DV132ML4	61.0	330	380	18.1	16.5	7.46	3.7	31.35	28.6	12.9	2.13
DV160M4	72.9	398	448	22.5	20.3	9.70	3.59	39.0	35.2	16.8	2.07
DV160L4	98.1	925	1060	29.5	26.1	13.7	3.75	51.1	45.28	23.7	2.17
DV180M4	121	1120	1255/1350 <sup>2)</sup>	37	21.7	19.1	3.82	64.1	54.9	33.1	2.2
DV180L4	143	1290	1425/1520 <sup>1)</sup>	42.5	37.4	20.3	3.83	73.6	64.71	35.1	2.21
DV200L4	195	2340	2475/2570 <sup>2)</sup>	55	49.9	23.1	3.91	95.3	86.5	39.9	2.25
DV225S4	240	3010	3145/3240 <sup>2)</sup>	67	61.6	26.4	3.9	116	106.7	45.7	2.25
DV225M4	292	3570	3705/3800 <sup>2)</sup>	83	74.8	36.1	3.9	143.8	129.5	62.4	2.26
DV250M4	356	6300	6600/6730 <sup>2)</sup>	102	91.7	44.7	3.88	176.7	158.8	77.4	2.24
DV280S4	484	8925	9225/9355 <sup>2)</sup>	138	120.4	67.5	4.02	239	208.5	116.8	2.32
DV280M4	581	8925	9225/9355 <sup>2)</sup>	170	148.9	68.9	3.9	294.5	257.9	119.3	2.25
D315S4	707	20000	<sup>3)</sup>	192	180	67.0	3.93	-	-	-	-
D315M4	849	24000		235	209	106	4.06	-	-	-	-
D315M4a	1028	31000		295	259	140	3.97	-	-	-	-

- 1) Applies in the basic speed range up to n<sub>Eck</sub>.
- 2) Double disc brake
- 3) On request



Characteristic values for double-star/star AC 230/460 V / 60 Hz

(according to MG1, NEMA Design B to DT80K4, NEMA Design C from DT80N4)

Motor	$M_N$ [Nm]	Mass moment of inertia $J_M$		Star (AC 460 V)				Double-star (AC 230 V)			
		without brake	with brake	$I_n$ [A]	$I_{q_n}^{(1)}$ [A]	$I_{d_n}^{(1)}$ [A]	$k_T^{(1)}$ [Nm/A]	$I_n$ [A]	$I_{q_n}^{(1)}$ [A]	$I_{d_n}^{(1)}$ [A]	$k_T^{(1)}$ [Nm/A]
DT71D4	2.1	4.6	5.5	1	0.76	0.65	2.74	2	1.52	1.30	1.37
DT80K4	3.1	6.6	7.5	1.45	1.06	0.98	2.92	2.9	2.12	1.96	1.46
DT80N4	4.2	8.7	9.6	1.85	1.39	1.21	3.03	3.7	2.78	2.42	1.51
DT90S4	6.1	25	31	2.6	1.87	1.79	3.25	5.2	3.74	3.58	1.62
DT90L4	8.3	34	40	3.1	2.49	1.84	3.34	6.2	4.98	3.68	1.67
DT100M4	12.1	53	59	4.1	3.59	1.97	3.37	8.2	7.18	3.94	1.69
DT100L4	21	65	71	6.6	5.98	2.78	3.51	13.2	11.96	5.56	1.76
DV112M4	22.1	98	110	7	6.13	3.37	3.61	14	12.26	6.74	1.80
DV132S4	30.5	146	158	9.4	8.61	3.76	3.54	18.8	17.22	7.52	1.77
DV132M4	41.2	280	330	13.7	11.85	6.87	3.48	27.4	23.7	13.74	1.74
DV132ML4	50.5	330	380	16.4	14.41	7.83	3.50	32.8	28.82	15.66	1.75
DV160M4	60.4	398	448	20	17.36	9.92	3.48	40	34.72	19.84	1.74
DV160L4	81.4	925	1060	27	23.24	13.73	3.50	54	46.48	27.46	1.75
DV180M4	100	1120	1255/1350 <sup>2)</sup>	31.5	28.06	14.29	3.56	63	56.1	28.58	1.78
DV180L4	119	1290	1425/1520 <sup>2)</sup>	40	34.5	20.22	3.45	80	69	40.44	1.72
DV200L4	163	2340	2475/2570 <sup>2)</sup>	47.5	44.63	16.25	3.65	95	89.26	32.5	1.83
DV225S4	201	3010	3145/3240 <sup>2)</sup>	59	55.14	21	3.65	118	110.3	42	1.82
DV225M4	244	3570	3705/3800 <sup>2)</sup>	70	64.6	27	3.78	140	129.2	54	1.89
DV250M4	296	6300	6600/6730 <sup>2)</sup>	87	78.45	37.6	3.77	174	156.9	75.2	1.89
DV280S4	402	8925	9225/9355 <sup>2)</sup>	118	106.5	50.8	3.77	236	213	101.6	1.89
D280M4	580	14500	<sup>3)</sup>	162	153	51.7	3.79	324	306	103.4	1.89
D315S4	707	20000	<sup>3)</sup>	201	188	69.8	3.76	-	-	-	-
D315M4	849	24000	<sup>3)</sup>	246	219	111	3.87	-	-	-	-
D315M4a	1028	31000	<sup>3)</sup>	308	271	147	3.79	-	-	-	-

1) Applies in the basic speed range up to  $n_{trans}$ .

2) Double disc brake

3) On request



**DT/DV/D motor selection in connection type delta/star (AC 230/400 V / 50 Hz)**

1. Motors AC 230/400 V / 50 Hz in  $\Delta$  connection or motors AC 400/690 V / 50 Hz in  $\Delta$  connection

Assignment of MOVIDRIVE® MDX61B0005-5A3 ... MDX61B0110-503 (sizes 0 ... 2):

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)										
$\Delta$ AC 400 V / 50 Hz		0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
DT71D4	M <sub>max</sub> [Nm]	4.6										
	n <sub>trans</sub> [1/min]	883										
DT80K4	M <sub>max</sub> [Nm]	6.9	6.9									
	n <sub>trans</sub> [1/min]	813	813									
DT80N4	M <sub>max</sub> [Nm]	9.3	9.3	9.3	9.3	9.3						
	n <sub>trans</sub> [1/min]	915	922	922	922	922						
DT90S4	M <sub>max</sub> [Nm]		13.5	13.5	13.5	13.5						
	n <sub>trans</sub> [1/min]		960	1011	1011	1011						
DT90L4	M <sub>max</sub> [Nm]				18.3	18.3	18.3					
	n <sub>trans</sub> [1/min]				1082	973	1088					
DV100M4	M <sub>max</sub> [Nm]						26.8	26.8	26.8			
	n <sub>trans</sub> [1/min]						941	1043	1056			
DV100L4	M <sub>max</sub> [Nm]							36.8	36.8	36.8		
	n <sub>trans</sub> [1/min]							890	1005	1011		
DV112M4	M <sub>max</sub> [Nm]								47.1	48.4	48.4	
	n <sub>trans</sub> [1/min]								915	1030	1062	
DV132S4	M <sub>max</sub> [Nm]									66.1	66.1	66.1
	n <sub>trans</sub> [1/min]									1011	1171	1222
DV132M4	M <sub>max</sub> [Nm]										81.7	90.2
	n <sub>trans</sub> [1/min]										1011	1145
DV132ML4	M <sub>max</sub> [Nm]											110
	n <sub>trans</sub> [1/min]											1082
DV160M4	M <sub>max</sub> [Nm]											125
	n <sub>trans</sub> [1/min]											986

**Note:** The maximum torque M<sub>max</sub> is limited to 180 % of the rated motor torque M<sub>N</sub>. The data is based on a supply voltage of AC 400 V.



## Project Planning

### Motor selection for asynchronous servomotors (CFC)

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B1320-503 (sizes 3 ... 6):

Motor AC 400 V / 50 Hz		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)									
		0150	0220	0300	0370	0450	0550	0750	0900	1100	1320
DV132M4	M <sub>max</sub> [Nm]	90.2									
	n <sub>trans</sub> [1/min]	1152									
DV132ML4	M <sub>max</sub> [Nm]	110									
	n <sub>trans</sub> [1/min]	1165									
DV160M4	M <sub>max</sub> [Nm]	131	131								
	n <sub>trans</sub> [1/min]	1133	1197								
DV160L4	M <sub>max</sub> [Nm]	172	177	177							
	n <sub>trans</sub> [1/min]	1050	1306	1350							
DV180M4	M <sub>max</sub> [Nm]		217	217	217						
	n <sub>trans</sub> [1/min]		1222	1453	1517						
DV180L4	M <sub>max</sub> [Nm]		231.2	258	258	258					
	n <sub>trans</sub> [1/min]		1018	1152	1299	1370					
DV200L4	M <sub>max</sub> [Nm]			339.5	351	351	351				
	n <sub>trans</sub> [1/min]			1018	1171	1350	1466				
DV225S4	M <sub>max</sub> [Nm]				414.7	433	433	433			
	n <sub>trans</sub> [1/min]				954	1082	1222	1363			
DV225M4	M <sub>max</sub> [Nm]					502.6	526	526			
	n <sub>trans</sub> [1/min]					1037	1146	1344			
DV250M4	M <sub>max</sub> [Nm]						586.5	641	641		
	n <sub>trans</sub> [1/min]						1018	1133	1357		
DV280S4	M <sub>max</sub> [Nm]							735.4	871	871	
	n <sub>trans</sub> [1/min]							1082	1184	1344	
DV280M4	M <sub>max</sub> [Nm]								860.6	1000	1000
	n <sub>trans</sub> [1/min]								1171	1178	1402
D315S4	M <sub>max</sub> [Nm]									1150	1273
	n <sub>trans</sub> [1/min]									1088	1203
D315M4	M <sub>max</sub> [Nm]										1453
	n <sub>trans</sub> [1/min]										1024
D315M4a	M <sub>max</sub> [Nm]										1374
	n <sub>trans</sub> [1/min]										1107

**Note:** The maximum torque M<sub>max</sub> is limited to 180 % of the rated motor torque M<sub>N</sub>. The data is based on a supply voltage of AC 400 V.



2. Motor AC 230/400 V / 50 Hz in delta connection:

Assignment of MOVIDRIVE® MDX61B0008-5A3 ... MDX61B0110-503 (sizes 0 ... 2):

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)									
Δ AC 230 V / 50 Hz		0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
DT71D4	M <sub>max</sub> [Nm]	4.6	4.6	4.6	4.6						
	n <sub>trans</sub> [1/min]	2054	2054	2054	2054						
DT80K4	M <sub>max</sub> [Nm]		6.9	6.9	6.9	6.9					
	n <sub>trans</sub> [1/min]		1869	1869	1850	1869					
DT80N4	M <sub>max</sub> [Nm]			9.3	9.3	9.3					
	n <sub>trans</sub> [1/min]			2080	1869	2080					
DT90S4	M <sub>max</sub> [Nm]					13.5	13.5	13.5			
	n <sub>trans</sub> [1/min]					1971	2246	2304			
DT90L4	M <sub>max</sub> [Nm]						18.3	18.3	18.3		
	n <sub>trans</sub> [1/min]						1946	2342	2387		
DV100M4	M <sub>max</sub> [Nm]							26.8	26.8	26.8	
	n <sub>trans</sub> [1/min]							1862	2214	2298	
DV100L4	M <sub>max</sub> [Nm]								36.8	36.8	36.8
	n <sub>trans</sub> [1/min]								1779	2080	2188
DV112M4	M <sub>max</sub> [Nm]									45.5	48.4
	n <sub>trans</sub> [1/min]									1779	2163
DV132S4	M <sub>max</sub> [Nm]										66.1
	n <sub>trans</sub> [1/min]										2086

**Note:** The maximum torque M<sub>max</sub> is limited to 180 % of the rated motor torque M<sub>N</sub>. The data is based on a supply voltage of AC 400 V.

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B1320-503 (sizes 3 ... 6):

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)									
Δ AC 230 V / 50 Hz		0150	0220	0300	0370	0450	0550	0750	0900	1100	1320
DV112M4	M <sub>max</sub> [Nm]	48.4									
	n <sub>trans</sub> [1/min]	2195									
DV132S4	M <sub>max</sub> [Nm]	66.1	66.1								
	n <sub>trans</sub> [1/min]	2458	2496								
DV132M4	M <sub>max</sub> [Nm]	90.2	90.2								
	n <sub>trans</sub> [1/min]	1939	2310								
DV132ML4	M <sub>max</sub> [Nm]		110	110							
	n <sub>trans</sub> [1/min]		2176	2291							
DV160M4	M <sub>max</sub> [Nm]		131	131	131						
	n <sub>trans</sub> [1/min]		1894	2246	2348						
DV160L4	M <sub>max</sub> [Nm]			177	177	177					
	n <sub>trans</sub> [1/min]			2010	2336	2560					
DV180M4	M <sub>max</sub> [Nm]				217	217	217				
	n <sub>trans</sub> [1/min]				2061	2445	2720				
DV180L4	M <sub>max</sub> [Nm]					258	258	258			
	n <sub>trans</sub> [1/min]					1837	2131	2458			
DV200L4	M <sub>max</sub> [Nm]						341.8	351	351		
	n <sub>trans</sub> [1/min]						1843	2182	2643		
DV225S4	M <sub>max</sub> [Nm]							425	433	433	
	n <sub>trans</sub> [1/min]							1715	2138	2394	
DV225M4	M <sub>max</sub> [Nm]								526	526	526
	n <sub>trans</sub> [1/min]								1952	2253	2630
DV250M4	M <sub>max</sub> [Nm]								542	641	641
	n <sub>trans</sub> [1/min]								1843	1837	2227
DV280S4	M <sub>max</sub> [Nm]									638.2	823.2
	n <sub>trans</sub> [1/min]									1946	1920

**Note:** The maximum torque M<sub>max</sub> is limited to 180 % of the rated motor torque M<sub>N</sub>. The data is based on a supply voltage of AC 400 V.



## Project Planning

### Motor selection for asynchronous servomotors (CFC)

#### DT/DV/D motor selection in connection type double-star/star (AC 230/460 V / 60 Hz)

1. Motors AC 230/460 V / 60 Hz in star connection:

Assignment of MOVIDRIVE® MDX61B0005-5A3 ... MDX61A0110-503 (size 0 ... 2):

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)										
AC 460 V / 60 Hz		0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
DT80K4	M <sub>max</sub> [Nm]	7.0										
	n <sub>trans</sub> [1/min]	1101										
DT80N4	M <sub>max</sub> [Nm]	9.3	9.3	9.3	9.3	9.3						
	n <sub>trans</sub> [1/min]	1133	1146	1146	1146	1146						
DT90S4	M <sub>max</sub> [Nm]			13.5	13.5	13.5						
	n <sub>trans</sub> [1/min]			1325	1350	1312						
DT90L4	M <sub>max</sub> [Nm]				18.3	18.3	18.3					
	n <sub>trans</sub> [1/min]				1312	1152	1318					
DV100M4	M <sub>max</sub> [Nm]						26.8	26.8				
	n <sub>trans</sub> [1/min]						1363	1510				
DV100L4	M <sub>max</sub> [Nm]							35.6	36.8	36.8		
	n <sub>trans</sub> [1/min]							1069	1197	1210		
DV112M4	M <sub>max</sub> [Nm]							35.8	48.4	48.4		
	n <sub>trans</sub> [1/min]							1197	1139	1312		
DV132S4	M <sub>max</sub> [Nm]								48.7	65	66	
	n <sub>trans</sub> [1/min]								1069	992	1101	
DV132M4	M <sub>max</sub> [Nm]									60.8	80	90
	n <sub>trans</sub> [1/min]									1152	1088	1222
DV132ML4	M <sub>max</sub> [Nm]											110
	n <sub>trans</sub> [1/min]											1171
DV160M4	M <sub>max</sub> [Nm]											120
	n <sub>trans</sub> [1/min]											1133

**Note:** The maximum torque M<sub>max</sub> is limited to 180 % of the rated motor torque M<sub>N</sub>. The data is based on a supply voltage of AC 460 V.



Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B1320-503 (sizes 3 ... 6):

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)									
AC 460 V / 60 Hz		0150	0220	0300	0370	0450	0550	0750	0900	1100	1320
DV132ML4	M <sub>max</sub> [Nm]	110									
	n <sub>trans</sub> [1/min]	1267									
DV160M4	M <sub>max</sub> [Nm]	131	131								
	n <sub>trans</sub> [1/min]	1261	1319								
DV160L4	M <sub>max</sub> [Nm]	161	177								
	n <sub>trans</sub> [1/min]	1158	1370								
DV180M4	M <sub>max</sub> [Nm]	164	217	217							
	n <sub>trans</sub> [1/min]	1139	1177	1350							
DV180L4	M <sub>max</sub> [Nm]		228	258	258						
	n <sub>trans</sub> [1/min]		1082	1197	1325						
DV200L4	M <sub>max</sub> [Nm]			323	351	351					
	n <sub>trans</sub> [1/min]			1024	1107	1248					
DV225S4	M <sub>max</sub> [Nm]			318	391	433	433				
	n <sub>trans</sub> [1/min]			1101	1075	1146	1286				
DV225M4	M <sub>max</sub> [Nm]				401	494	526	526			
	n <sub>trans</sub> [1/min]				1082	1056	1139	1325			
DV250M4	M <sub>max</sub> [Nm]						576	641			
	n <sub>trans</sub> [1/min]						1261	1370			
DV280S4	M <sub>max</sub> [Nm]							711	871	871	
	n <sub>trans</sub> [1/min]							1421	1478	1664	
D280M4	M <sub>max</sub> [Nm]							712	946	1045	
	n <sub>trans</sub> [1/min]							1338	1318	1382	
D315S4	M <sub>max</sub> [Nm]									1099	1273
	n <sub>trans</sub> [1/min]									1325	1408
D315M4	M <sub>max</sub> [Nm]										1387
	n <sub>trans</sub> [1/min]										1242
D315M4a	M <sub>max</sub> [Nm]										1308
	n <sub>trans</sub> [1/min]										1344

**Note:** The maximum torque M<sub>max</sub> is limited to 180 % of the rated motor torque M<sub>N</sub>. The data is based on a supply voltage of AC 460 V.



## 2. Motors AC 230/460 V / 60 Hz in double-star connection:

Assignment of MOVIDRIVE® MDX61B0008-5A3 ... MDX61B0110-503 (sizes 0 ... 2):

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)									
AC 230 V / 60 Hz		0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
DT71D4	M <sub>max</sub> [Nm]	4.6	4.6	4.6	4.6						
	n <sub>trans</sub> [1/min]	2771	2989	2989	2989						
DT80K4	M <sub>max</sub> [Nm]		7	7	7	7					
	n <sub>trans</sub> [1/min]		2733	2822	2688	2822					
DT80N4	M <sub>max</sub> [Nm]			9.3	8.3	9.3	9.3				
	n <sub>trans</sub> [1/min]			2835	2586	2874	2970				
DT90S4	M <sub>max</sub> [Nm]					11.9	13.5	13.5			
	n <sub>trans</sub> [1/min]					2637	2931	3462			
DT90L4	M <sub>max</sub> [Nm]						16.4	18.3	18.3		
	n <sub>trans</sub> [1/min]						2605	3014	3354		
DV100M4	M <sub>max</sub> [Nm]							23.1	26	26.8	
	n <sub>trans</sub> [1/min]							3142	3360	3680	
DV100L4	M <sub>max</sub> [Nm]								31.5	36.8	36.8
	n <sub>trans</sub> [1/min]								2470	2605	3014
DV112M4	M <sub>max</sub> [Nm]									41.4	48.4
	n <sub>trans</sub> [1/min]									2534	2989
DV132S4	M <sub>max</sub> [Nm]										62.4
	n <sub>trans</sub> [1/min]										2234

**Note:** The maximum torque M<sub>max</sub> is limited to 180 % of the rated motor torque M<sub>N</sub>. The data is based on a supply voltage of AC 460 V.



Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B1320-503 (sizes 3 ... 6):

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)									
AC 230 V / 60 Hz		0150	0220	0300	0370	0450	0550	0750	0900	1100	1320
DV132S4	M <sub>max</sub> [Nm]	66									
	n <sub>trans</sub> [1/min]	2573									
DV132M4	M <sub>max</sub> [Nm]	80	90.2								
	n <sub>trans</sub> [1/min]	2349	2707								
DV132ML4	M <sub>max</sub> [Nm]		110	110							
	n <sub>trans</sub> [1/min]		2496	2880							
DV160M4	M <sub>max</sub> [Nm]		115	131	131						
	n <sub>trans</sub> [1/min]		2451	2688	2963						
DV160L4	M <sub>max</sub> [Nm]			150	177	177					
	n <sub>trans</sub> [1/min]			2458	2515	2918					
DV180M4	M <sub>max</sub> [Nm]				189	217	217				
	n <sub>trans</sub> [1/min]				2355	2458	2771				
DV180L4	M <sub>max</sub> [Nm]					220	258	258			
	n <sub>trans</sub> [1/min]					2285	2291	2720			
DV200L4	M <sub>max</sub> [Nm]						281	350	351		
	n <sub>trans</sub> [1/min]						2208	2163	2662		
DV225S4	M <sub>max</sub> [Nm]							346	433	433	
	n <sub>trans</sub> [1/min]							2291	2362	2694	
DV225M4	M <sub>max</sub> [Nm]							354	471	526	526
	n <sub>trans</sub> [1/min]							2278	2240	2336	2803
DV250M4	M <sub>max</sub> [Nm]								459	547	641
	n <sub>trans</sub> [1/min]								2656	2630	2771
DV280S4	M <sub>max</sub> [Nm]									533	681
	n <sub>trans</sub> [1/min]									2963	2925

**Note:** The maximum torque M<sub>max</sub> is limited to 180 % of the rated motor torque M<sub>N</sub>. The data is based on a supply voltage of AC 460 V.

**DT/DV motor selection in connection type delta (AC 230 V / 50 Hz)**

Motors AC 230/400 V / 50 Hz in delta connection:

Motor		MOVIDRIVE® MDX61B...-2_3 (AC 230 V units) in CFC operating modes (P700)								
Δ AC 230 V / 50 Hz		0015	0022	0037	0055	0075	0110	0150	0220	0300
DT80K4	M <sub>max</sub> [Nm]	6.9								
	n <sub>trans</sub> [1/min]	813								
DT80N4	M <sub>max</sub> [Nm]	9.3								
	n <sub>trans</sub> [1/min]	922								
DT90S4	M <sub>max</sub> [Nm]	13.5	13.5							
	n <sub>trans</sub> [1/min]	1011	1011							
DT90L4	M <sub>max</sub> [Nm]	18.3	18.3	18.3						
	n <sub>trans</sub> [1/min]	998	1068	1088						
DV100M4	M <sub>max</sub> [Nm]		25.5	26.8						
	n <sub>trans</sub> [1/min]		922	1056						
DV100L4	M <sub>max</sub> [Nm]			36.8	36.8					
	n <sub>trans</sub> [1/min]			973	1011					
DV112M4	M <sub>max</sub> [Nm]				48.4	48.4				
	n <sub>trans</sub> [1/min]				1037	1062				
DV132S4	M <sub>max</sub> [Nm]				66.1	66.1	66.1			
	n <sub>trans</sub> [1/min]				1024	1190	1222			
DV132M4	M <sub>max</sub> [Nm]					85.4	90.2	90.2		
	n <sub>trans</sub> [1/min]					998	1152	1152		
DV132ML4	M <sub>max</sub> [Nm]						110	110	110	
	n <sub>trans</sub> [1/min]						1082	1165	1165	
DV160M4	M <sub>max</sub> [Nm]						126	131	131	
	n <sub>trans</sub> [1/min]						979	1120	1197	
DV160L4	M <sub>max</sub> [Nm]							167	177	177
	n <sub>trans</sub> [1/min]							1056	1306	1350
DV180M4	M <sub>max</sub> [Nm]								217	217
	n <sub>trans</sub> [1/min]								1222	1382
DV180L4	M <sub>max</sub> [Nm]								231	258
	n <sub>trans</sub> [1/min]								1017	1069
DV200L4	M <sub>max</sub> [Nm]									307
	n <sub>trans</sub> [1/min]									1030

**Note:** The maximum torque M<sub>max</sub> is limited to 180 % of the rated motor torque M<sub>N</sub>. The data is based on a supply voltage of AC 230 V.



**DT/DV motor selection in connection type double-star (AC 230 V / 60 Hz)**

Motors AC 230/460 V / 60 Hz in double-star connection:

Motor		MOVIDRIVE® MDX61B...-2_3 (AC 230 V units) in CFC operating modes (P700)								
AC 230 V / 60 Hz		0015	0022	0037	0055	0075	0110	0150	0220	0300
DT80N4	M <sub>max</sub> [Nm]	9.3								
	n <sub>trans</sub> [1/min]	1146								
DT90S4	M <sub>max</sub> [Nm]	13.5	13.5							
	n <sub>trans</sub> [1/min]	1267	1338							
DT90L4	M <sub>max</sub> [Nm]	17.2	18.3	18.3						
	n <sub>trans</sub> [1/min]	1146	1210	1325						
DV100M4	M <sub>max</sub> [Nm]		20.7	26.8						
	n <sub>trans</sub> [1/min]		1459	1517						
DV100L4	M <sub>max</sub> [Nm]			36.8	36.8					
	n <sub>trans</sub> [1/min]			1056	1210					
DV112M4	M <sub>max</sub> [Nm]			37.2	48.4	48.4				
	n <sub>trans</sub> [1/min]			1190	1248	1338				
DV132S4	M <sub>max</sub> [Nm]				57	66.1	66.1			
	n <sub>trans</sub> [1/min]				1030	1062	1120			
DV132M4	M <sub>max</sub> [Nm]					71.7	90.2	90.2		
	n <sub>trans</sub> [1/min]					1114	1165	1222		
DV132ML4	M <sub>max</sub> [Nm]						106	110		
	n <sub>trans</sub> [1/min]						1101	1235		
DV160M4	M <sub>max</sub> [Nm]						104	131	131	
	n <sub>trans</sub> [1/min]						1165	1146	1318	
DV160L4	M <sub>max</sub> [Nm]							133	177	177
	n <sub>trans</sub> [1/min]							1190	1267	1395
DV180M4	M <sub>max</sub> [Nm]								208	217
	n <sub>trans</sub> [1/min]								1101	1203
DV180L4	M <sub>max</sub> [Nm]								195	236
	n <sub>trans</sub> [1/min]								1107	1075
DV200L4	M <sub>max</sub> [Nm]								210	253
	n <sub>trans</sub> [1/min]								1082	1062
DV225S4	M <sub>max</sub> [Nm]									247
	n <sub>trans</sub> [1/min]									1133

**Note:** The maximum torque M<sub>max</sub> is limited to 180 % of the rated motor torque M<sub>N</sub>. The data is based on a supply voltage of AC 230 V.



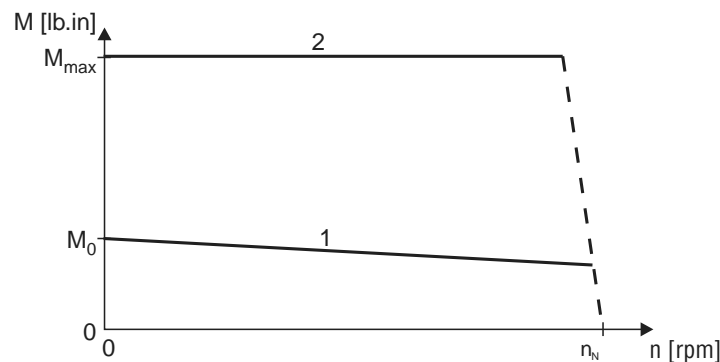
#### 4.6 Motor selection for synchronous servomotors (SERVO)

	<b>NOTE</b>
	<p>The torque limit (M limit) is set automatically by the startup function of the MOVITOOLS<sup>®</sup> operating software. Do not increase this automatically set value!</p> <p>We recommend always using the latest version of MOVITOOLS<sup>®</sup> for startup. The latest MOVITOOLS<sup>®</sup> version can be downloaded from our homepage (<a href="http://www.sew-eurodrive.com">www.sew-eurodrive.com</a>).</p>

##### Motor characteristics

The requirements on a servo drive include speed dynamics, stable speed and positioning accuracy. DS/CM/CMD/CMP motors with MOVIDRIVE<sup>®</sup> meet these requirements.

Technically speaking, these are synchronous motors with permanent magnets on the rotor and a mounted resolver. The required characteristics, namely constant torque over a wide speed range (up to 6000 1/min), a high speed and control range and a high overload capacity, are achieved using control by MOVIDRIVE<sup>®</sup>. The mass moment of inertia of the servomotor is lower than that of the asynchronous motor. This means it is ideally suited to applications requiring dynamic speeds.



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Figure 74: Speed/torque characteristic curve of the DS/CM/CMD/CMP servomotors

- 1 Continuous torque
- 2 Maximum torque

$M_0$  and  $M_{\max}$  are determined by the motor. The attainable  $M_{\max}$  can also be less, depending on the inverter.

Refer to the motor tables (DS/CM/CMD/CMP) for the values for  $M_0$ .

Refer to the motor selection tables (DS/CM/CMD/CMP) for the values for  $M_{\max}$ .

**Basic recommendations**

The necessary motor data for the SERVO operating modes is stored in MOVIDRIVE® for the SEW motors.

Speed is the correcting variable in the SERVO operating modes with speed control. Torque is the correcting variable in the SERVO operating modes with torque control (SERVO & M-CONTROL).

**SERVO mode with speed control**

There is no need to differentiate between the load types quadratic, dynamic and static when performing project planning for the SERVO operating mode. Project planning for a synchronous motor is carried out in accordance with the following requirements:

1. Effective torque requirement at average application speed.

$$M_{\text{eff}} < M_0$$

The operating point must lie below the characteristic curve for the continuous torque (Figure 74, curve 1). The continuous torque of the CM series can be increased by 40 % by forced cooling if this operating point lies above the characteristic curve for self-cooling.

2. Maximum torque needed across the speed curve.

$$M_{\text{max}} < M_{\text{dyn\_Mot}}$$

This operating point must lie below the characteristic curve for the maximum torque of the motor/MOVIDRIVE® combination (Figure 74, curve 2).

3. Maximum speed

The maximum speed must not be configured higher than the rated speed of the motor. Planetary gear units should be used for speeds greater than 3000 1/min as a result of the high input speed.

$$n_{\text{max}} \leq n_N$$

**SERVO mode with torque control (SERVO & M-CTRL.)**

This operating mode enables the servomotor to be controlled directly with torque control. The setpoint sources of the speed-controlled SERVO mode can also be used for torque control. All speed setpoint sources (except for bus setpoints) are interpreted as current setpoint sources. Assign "Current" to a process data word for fieldbus control. The settings for evaluating the analog input (→ P11\_, parameter description) also remain in effect. The fixed setpoints (P16\_, P17\_) can be entered in the units [1/min] or [%I<sub>N\_inverter</sub>] as required (→ MOVITOOLS®).

**The following relationship exists between the units:**

$$3000 \text{ 1/min} = 150 \% \text{ rated inverter current}$$

The torque at the output shaft of the servomotor can be calculated using the following formula:

$$M = \frac{M_0}{I_0} \times \frac{150 \% \times I_{n\_inverter} \times n_{\text{setp}}}{3000 \text{ 1/min}}$$

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$M_0$  Continuous static torque according to motor tables DS/CM/CMD/CMP

$I_0$  Continuous static current according to motor tables DS/CM/CMD/CMP


**Motor table DS/CM**Characteristic values at  $V_{max} = AC 230 V / AC 400 V$ 

$n_N$ [1/min]	Motor	Without forced cooling fan			With forced cooling fan VR			$I_{max}^{1)}$ [A]	$I_{max}^{2)}$ [A]	Mass moment of inertia $J_M$ [10 <sup>-4</sup> kgm <sup>2</sup> ]	
		$M_0$ [Nm]	$I_0^{1)}$ [A]	$I_0^{2)}$ [A]	$M_{0\_VR}$ [Nm]	$I_{0\_VR}^{1)}$ [A]	$I_{0\_VR}^{2)}$ [A]			without brake	with brake
2000	CM71S	5.0	2.2	3.95	7.3	3.2	5.7	8.8	15.8	4.85	6.89
	CM71M	6.5	3.0	5.3	9.4	4.2	7.7	12.0	21.0	6.27	8.31
	CM71L	9.5	4.2	7.4	13.8	6.1	10.7	16.8	29.5	9.1	11.1
	CM90S	11.0	4.9	8.7	16.0	7.1	12.6	19.6	35.0	14.3	19.8
	CM90M	14.5	6.9	12.1	21.0	10.0	17.5	28.0	48.5	18.6	24.1
	CM90L	21.0	9.9	17.1	30.5	14.4	25.0	40.0	68.0	27.1	32.6
	CM112S	23.5	10.0	18.0	34.0	14.5	26.0	40.0	72	67.4	87.5
	CM112M	31.0	13.5	24.5	45.0	19.6	35.5	54.0	98	87.4	108
	CM112L	45.0	20.0	35.5	65.0	29.0	51.0	80.0	142	128	148
	CM112H	68.0	30.5	52.0	95.0	42.5	73.0	122	208	189	209
3000	DS56M	1.0	1.65	1.65	-	-	-	6.6	6.6	0.47	0.85
	DS56L	2.0	2.4	2.4	-	-	-	9.6	9.6	0.82	1.2
	DS56H	4.0	2.8	4.7	-	-	-	11.2	19	1.53	1.88
	CM71S	5.0	3.3	5.9	7.3	4.8	8.6	13.2	23.5	4.85	6.89
	CM71M	6.5	4.3	7.6	9.4	6.2	11.0	17.2	30.5	6.27	8.31
	CM71L	9.5	6.2	11.1	13.8	9.0	16.1	25.0	44.5	9.1	11.1
	CM90S	11.0	7.3	12.7	16.0	10.6	18.4	30.0	51	14.3	19.8
	CM90M	14.5	10.1	17.4	21.0	14.6	25.0	40.0	70	18.6	24.1
	CM90L	21.0	14.4	25.5	30.5	21.0	37.0	58.0	102	27.1	32.6
	CM112S	23.5	15.0	27.0	34.0	22.0	39.0	60.0	108	67.4	87.5
	CM112M	31.0	20.5	35.0	45.0	30.0	51.0	82.0	140	87.4	108
	CM112L	45.0	30.0	48.0	65.0	44.0	70.0	120	192	128	148
	CM112H	68.0	43.0	73.0	95.0	60.0	102	172	292	189	209
4500	DS56M	1.0	1.65	1.65	-	-	-	6.6	6.6	0.47	0.85
	DS56L	2.0	2.4	-	-	-	-	9.6	-	0.82	1.2
	DS56H	4.0	4.0	-	-	-	-	16.0	-	1.53	1.88
	CM71S	5.0	4.9	8.5	7.3	7.2	12.3	20.0	34	4.85	6.89
	CM71M	6.5	6.6	11.3	9.4	9.6	16.4	26.0	45	6.27	8.31
	CM71L	9.5	9.6	17.1	13.8	14.0	25.0	38.0	68	9.1	11.1
	CM90S	11.0	11.1	18.9	16.0	16.2	27.5	44.0	76	14.3	19.8
	CM90M	14.5	14.7	26.0	21.0	21.5	37.5	59.0	104	18.6	24.1
	CM90L	21.0	21.6	39.0	30.5	31.5	57	86.0	156	27.1	32.6
	CM112S	23.5	22.5	38.5	34.0	32.5	56	90.0	154	67.4	87.5
	CM112M	31.0	30.0	54.0	45.0	44.0	78	120	216	87.4	108
	CM112L	45.0	46.0	78.0	65.0	67.0	113	184	312	128	148
	CM112H	68.0	66.0	-	95.0	92.0	-	264	-	189	209
6000	DS56M	1.0	1.65	-	-	-	-	6.6	-	0.47	0.85
	DS56L	2.0	2.75	-	-	-	-	11.0	-	0.82	1.2
	DS56H	4.0	5.3	-	-	-	-	21.0	-	1.53	1.88
	CM71S	5.0	6.5	11.6	7.3	7.2	16.8	26.0	46.5	4.85	6.89
	CM71M	6.5	8.6	14.1	9.4	9.6	20.5	34.0	56	6.27	8.31
	CM71L	9.5	12.5	21.5	13.8	14.0	31.0	50.0	86	9.1	11.1
	CM90S	11.0	14.5	23.5	16.0	16.2	34.0	58.0	94	14.3	19.8
	CM90M	14.5	19.8	37.0	21.0	21.5	54	79.0	148	18.6	24.1
	CM90L	21.0	29.5	51.0	30.5	31.5	74	118.0	204	27.1	32.6

1) For DS/CM synchronous servomotors with AC 400 V system voltage

2) For DS/CM synchronous servomotors with AC 230 V system voltage



	<b>NOTE</b>
	Additional project planning instructions and information on the DS/CM synchronous servomotors can be found in the "Servo Gearmotors" catalog, which can be ordered from SEW-EURODRIVE.

**DS/CM motor selection (AC 400 V system voltage)**

1. Rated speed  $n_N = 2000$  1/min:

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in SERVO operating modes (P700)															
		0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110	0150	0220	0300	0370	0450
CM71S	$M_{max}$ [Nm]	8.9	10.5	13.1	15.6	12.7	15.9	16.5									
CM71M	$M_{max}$ [Nm]	8.6	10.3	13.1	16.2	12.7	16.7	19.8	21.5								
CM71L	$M_{max}$ [Nm]		10.8	13.9	17.7	13.5	18.2	22.5	28.4	31.4							
CM90S	$M_{max}$ [Nm]			13.9	17.8	13.4	18.4	23.2	30.6	38.2	39.4						
CM90M	$M_{max}$ [Nm]				16.8	12.6	17.3	21.9	29.5	38.0	46.9	52.5					
CM90L	$M_{max}$ [Nm]						17.5	22.2	30.1	39.3	49.6	70.3	75.8				
CM112S	$M_{max}$ [Nm]						19.3	24.6	33.4	43.6	54.8	76.2	81.9				
CM112M	$M_{max}$ [Nm]							23.9	32.6	42.9	54.7	79.3	99.6	108.0			
CM112L	$M_{max}$ [Nm]									42.0	53.9	80.3	104.9	141.5	156.8		
CM112H	$M_{max}$ [Nm]										53.2	80.1	106.5	150.3	189.2	220.1	237.0

2. Rated speed  $n_N = 3000$  1/min:

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in SERVO operating modes (P700)															
		0005	0008	0011	0014	0015	0022	0030	0040	0055							
DS56M	$M_{max}$ [Nm]	2.4	2.8	3.6	3.8	3.5	3.8										
DS56L	$M_{max}$ [Nm]	3.3	4.0	5.1	6.4	4.9	6.6	7.6									
DS56H	$M_{max}$ [Nm]	5.7	6.8	8.8	11.2	8.5	11.5	14.3	15.0								
CM71S	$M_{max}$ [Nm]	6.0	7.2	9.2	11.6	8.9	11.9	14.3	16.5								
CM71M	$M_{max}$ [Nm]		7.2	9.3	11.9	9.0	12.2	15.1	19.1	21.5							
CM71L	$M_{max}$ [Nm]				9.5	12.2	9.2	12.6	15.9	21.0	26.2						
CM90S	$M_{max}$ [Nm]					12.0	9.0	12.4	15.7	21.2	27.4						
CM90M	$M_{max}$ [Nm]							11.8	15.0	20.4	26.6						
CM90L	$M_{max}$ [Nm]									20.7	27.3						
CM112S	$M_{max}$ [Nm]									22.2	29.3						
CM112M	$M_{max}$ [Nm]										28.2						

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in SERVO operating modes (P700)															
		0075	0110	0150	0220	0300	0370	0450	0550	0750							
CM71L	$M_{max}$ [Nm]	30.8	31.5														
CM90S	$M_{max}$ [Nm]	34.0	39.2														
CM90M	$M_{max}$ [Nm]	33.7	47.8	51.6													
CM90L	$M_{max}$ [Nm]	34.7	51.1	65.6	75.6												
CM112S	$M_{max}$ [Nm]	37.4	54.8	69.8	81.9												
CM112M	$M_{max}$ [Nm]	36.2	54.0	70.7	95.7	108.0											
CM112L	$M_{max}$ [Nm]	35.8	53.9	71.6	101.0	126.9	147.4	156.8									
CM112H	$M_{max}$ [Nm]		56.6	75.7	108.6	139.9	167.0	197.1	223.2	237.0							



## Project Planning

### Motor selection for synchronous servomotors (SERVO)

#### 3. Rated speed $n_N = 4500$ 1/min:

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in SERVO operating modes (P700)							
		0005	0008	0011	0014	0015	0022	0030	0040
DS56M	$M_{max}$ [Nm]	2.4	2.8	3.6	3.8	3.5	3.8		
DS56L	$M_{max}$ [Nm]	3.3	4.0	5.1	6.4	4.9	6.6	7.6	
DS56H	$M_{max}$ [Nm]	4.0	4.8	6.2	7.9	6.0	8.2	10.3	13.7
CM71S	$M_{max}$ [Nm]			6.3	8.1	6.1	8.3	10.4	13.4
CM71M	$M_{max}$ [Nm]				7.9	5.9	8.1	10.2	13.6
CM71L	$M_{max}$ [Nm]						8.2	10.4	14.0
CM90S	$M_{max}$ [Nm]							10.4	14.1
CM90M	$M_{max}$ [Nm]								14.0

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in SERVO operating modes (P700)											
		0055	0075	0110	0150	0220	0300	0370	0450	0550	0750	0900	1100
DS56H	$M_{max}$ [Nm]	15.2											
CM71S	$M_{max}$ [Nm]	16.1	16.5										
CM71M	$M_{max}$ [Nm]	17.1	20.3	21.3									
CM71L	$M_{max}$ [Nm]	18.1	22.5	30.3	31.2								
CM90S	$M_{max}$ [Nm]	18.4	23.4	33.6	39.2								
CM90M	$M_{max}$ [Nm]	18.4	23.5	34.6	44.5	52.1							
CM90L	$M_{max}$ [Nm]	18.2	23.3	34.7	45.8	63.4	75.0						
CM112S	$M_{max}$ [Nm]	19.5	25.0	37.4	49.2	67.5	81.9						
CM112M	$M_{max}$ [Nm]		24.6	37.1	49.4	69.6	87.4	101.5	108.0				
CM112L	$M_{max}$ [Nm]			35	46.8	67.2	86.9	104.1	123.5	140.7	156.8		
CM112H	$M_{max}$ [Nm]					70.9	92.5	112.1	135.5	157.7	189.4	231.6	237.0

#### 4. Rated speed $n_N = 6000$ 1/min:

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in SERVO operating modes (P700)															
		0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110	0150	0220	0300	0370	0450
DS56M	$M_{max}$ [Nm]	2.4	2.8	3.6	3.8	3.5	3.8										
DS56L	$M_{max}$ [Nm]	2.9	3.5	4.5	5.7	4.3	5.8	7.3	7.6								
DS56H	$M_{max}$ [Nm]			4.7	6.0	4.5	6.2	7.9	10.5	13.6	15.1						
CM71S	$M_{max}$ [Nm]				6.1	4.6	6.3	8.0	10.6	13.3	15.8	16.5					
CM71M	$M_{max}$ [Nm]						6.2	7.9	10.6	13.7	16.8	21.3					
CM71L	$M_{max}$ [Nm]							8.0	10.8	14.1	17.9	25.2	30.7	31.4			
CM90S	$M_{max}$ [Nm]								10.8	14.2	18.1	26.6	34.2	39.4			
CM90M	$M_{max}$ [Nm]									13.7	17.5	26.1	34.3	46.9	51.9		
CM90L	$M_{max}$ [Nm]										17.1	25.6	33.9	48.0	60.9	71.3	75.2



**DS/CM motor selection (AC 230 V system voltage)**

1. Rated speed  $n_N = 2000$  1/min:

Motor		MOVIDRIVE® MDX61B...-2_3 (AC 230 V units) in SERVO operating modes (P700)								
		0015	0022	0037	0055	0075	0110	0150	0220	0300
CM71S	$M_{max}$ [Nm]	12.9	14.6	16.5						
CM71M	$M_{max}$ [Nm]	13.1	15.1	21.4						
CM71L	$M_{max}$ [Nm]	14.0	16.3	25.6	31.3					
CM90S	$M_{max}$ [Nm]	13.8	16.2	26.8	38.0	39.6				
CM90M	$M_{max}$ [Nm]	13.1	15.4	25.8	38.2	48.1	52.0			
CM90L	$M_{max}$ [Nm]		15.8	26.6	40.0	51.9	70.9	74.9		
CM112S	$M_{max}$ [Nm]			28.3	42.7	55.1	74.7	81.9		
CM112M	$M_{max}$ [Nm]			27.4	41.6	54.6	76.8	94.4	108.0	
CM112L	$M_{max}$ [Nm]				41.7	55.0	79.2	100.2	139.3	156.8
CM112H	$M_{max}$ [Nm]					56.6	82.2	105.5	153	177.9

2. Rated speed  $n_N = 3000$  1/min:

Motor		MOVIDRIVE® MDX61B...-2_3 (AC 230 V units) in SERVO operating modes (P700)								
		0015	0022	0037	0055	0075	0110	0150	0220	0300
DS56M	$M_{max}$ [Nm]	3.8								
DS56L	$M_{max}$ [Nm]	7.6								
DS56H	$M_{max}$ [Nm]	9.2	10.7	15.3						
CM71S	$M_{max}$ [Nm]	9.1	10.6	15.8	16.5					
CM71M	$M_{max}$ [Nm]	9.3	10.9	17.2	21.5					
CM71L	$M_{max}$ [Nm]	9.4	11.0	18.2	25.8	31.0	31.4			
CM90S	$M_{max}$ [Nm]	9.5	11.2	18.7	27.7	35.1	39.5			
CM90M	$M_{max}$ [Nm]			18.1	27.2	35.3	48.4	52.2		
CM90L	$M_{max}$ [Nm]			17.9	27.1	35.5	50.5	63.1	75.2	
CM112S	$M_{max}$ [Nm]			18.8	28.7	37.7	53.4	66.3	81.9	
CM112M	$M_{max}$ [Nm]				29.1	38.4	55.3	69.9	97.0	108.0
CM112L	$M_{max}$ [Nm]					40.6	58.9	75.4	108.8	125.9
CM112H	$M_{max}$ [Nm]						58.4	75.3	111.1	131.1

3. Rated speed  $n_N = 4500$  1/min:

Motor		MOVIDRIVE® MDX61B...-2_3 (AC 230 V units) in SERVO operating modes (P700)								
		0015	0022	0037	0055	0075	0110	0150	0220	0300
DS56M	$M_{max}$ [Nm]	3.8								
CM71S	$M_{max}$ [Nm]	6.4	7.5	12.1	16.3	16.5				
CM71M	$M_{max}$ [Nm]	6.3	7.4	12.2	17.4	21.0	21.4			
CM71L	$M_{max}$ [Nm]		7.2	12.1	17.9	22.8	29.9	31.3		
CM90S	$M_{max}$ [Nm]			12.6	19.0	24.8	34.4	39.6		
CM90M	$M_{max}$ [Nm]			12.1	18.3	24.1	34.3	42.8	52.0	
CM90L	$M_{max}$ [Nm]				17.7	23.4	33.7	42.9	61.4	70.5
CM112S	$M_{max}$ [Nm]				20.0	26.5	38.2	48.6	68.3	77.7
CM112M	$M_{max}$ [Nm]					24.8	36.1	46.3	67.4	78.5

4. Rated speed  $n_N = 6000$  1/min:

Motor		MOVIDRIVE® MDX61B...-2_3 (AC 230 V units) in SERVO operating modes (P700)								
		0015	0022	0037	0055	0075	0110	0150	0220	0300
CM71S	$M_{max}$ [Nm]	4.7	5.6	9.2	13.2	15.9	16.6			
CM71M	$M_{max}$ [Nm]	5.0	5.9	9.9	14.6	18.2	21.4			
CM71L	$M_{max}$ [Nm]			9.6	14.5	18.7	25.6	30.3	31.4	
CM90S	$M_{max}$ [Nm]			10.2	15.4	20.1	28.5	35.3	39.4	
CM90M	$M_{max}$ [Nm]				12.9	17.0	24.5	31.2	44.3	50.6
CM90L	$M_{max}$ [Nm]					17.9	25.9	33.1	48.3	56.5

**CMD motor table**Characteristic values at  $V_{max} = AC 400 V$ 

$n_N$ [1/min]	Motor	$M_0$ [Nm]	$I_0$ [A]	$I_{max}$ [A]	Mass moment of inertia $J_M$ [ $10^{-4} \text{ kgm}^2$ ]
1200	CMD93S	2.4	1.55	8.1	1.16
	CMD93M	4.2	2.5	16.2	2.25
	CMD93L	6.0	3.5	22.9	3.35
	CMD138S	6.7	3.9	13.2	6.5
	CMD138M	12.1	5.5	25.5	12.4
	CMD138L	16.5	8	40.2	18.1
2000	CMD138S	6.7	7.4	24.9	6.5
	CMD138M	12.1	11.4	53.0	12.4
	CMD138L	16.5	15.1	75.7	18.1
3000	CMD70S	0.7	1.04	5.8	0.21
	CMD70M	1.1	1.36	7.9	0.4
	CMD70L	1.9	1.96	17.7	0.76
	CMD93S	2.4	2.32	12.2	1.16
	CMD93M	4.2	3.6	23.2	2.25
	CMD93L	6.0	6	39.7	3.35
4500	CMD55S	0.25	0.7	4.1	0.076
	CMD56M	0.45	0.95	6.1	0.15
	CMD56L	0.9	1.5	12.2	0.3

**CMD motor selection (AC 400 V system voltage)**1. Rated speed  $n_N = 1200$  1/min:

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400 V units) in SERVO operating modes (P700)											
		0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110	0150
CMD93S	$M_{max}$ [Nm]	5.8	6.7	8.1	10	7.9	10						
CMD93M	$M_{max}$ [Nm]		8.2	10.5	13.3	10.2	13.6	16.6	20.6	22			
CMD93L	$M_{max}$ [Nm]			10.5	13.5	10.1	14.0	17.6	23.1	28.6	33		
CMD138S	$M_{max}$ [Nm]				12.5	9.8	12.8	15.2	17				
CMD138M	$M_{max}$ [Nm]							21.9	27.9	33.3	37.8	39	
CMD138L	$M_{max}$ [Nm]									36.8	45.0	59	62

2. Rated speed  $n_N = 2000$  1/min:

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400 V units) in SERVO operating modes (P700)							
		0040	0055	0075	0110	0150	0220	0300	
CMD138S	$M_{max}$ [Nm]	11.9	14.7	17					
CMD138M	$M_{max}$ [Nm]			23.7	31.8	37.2	38.8		
CMD138L	$M_{max}$ [Nm]				37.4	47.1	59.6	62	



3. Rated speed  $n_N = 3000$  1/min:

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400 V units) in SERVO operating modes (P700)											
		0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110	0150
CMD70S	$M_{max}$ [Nm]	2.2	2.5	3									
CMD70M	$M_{max}$ [Nm]	3.2	3.7	4.5	5.2	4.4	5						
CMD70L	$M_{max}$ [Nm]	3.8	4.5	5.8	7.4	5.7	7.6	9.1	10.6	11			
CMD93S	$M_{max}$ [Nm]		4.8	6.0	7.3	5.8	7.5	8.8	10				
CMD93M	$M_{max}$ [Nm]				9.5	7.2	9.8	12.3	15.9	19.5	22		
CMD93L	$M_{max}$ [Nm]								13.9	18.1	22.5	30.7	33

4. Rated speed  $n_N = 4500$  1/min:

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400 V units) in SERVO operating modes (P700)							
		0005	0008	0011	0014	0015	0022	0030	0040
CMD55S	$M_{max}$ [Nm]	1.2							
CMD55M	$M_{max}$ [Nm]	1.8	2	2.3					
CMD55L	$M_{max}$ [Nm]	2.5	2.9	3.7	4.5	3.6	4.6	5.4	6

**CMP motor table**Characteristic values at  $V_{max} = AC 400 V$ 

$n_N$ [1/min]	Motor	Without forced cooling fan		With forced cooling fan		$I_{max}$ [A]	Mass moment of inertia $J_M$	
		$M_0$ [Nm]	$I_0$ [A]	$M_{0\_VR}$ [Nm]	$I_{0\_VR}$ [A]		without brake [10 <sup>-4</sup> kgm <sup>2</sup> ]	with brake [10 <sup>-4</sup> kgm <sup>2</sup> ]
3000	CMP40S	0.5	1.2	-	-	6.1	0.104	0.132
	CMP40M	0.8	0.95	-	-	6.0	0.148	0.176
	CMP50S	1.3	0.96	1.7	1.25	5.1	0.415	0.481
	CMP50M	2.4	1.68	3.5	2.45	9.6	0.667	0.733
	CMP50L	3.3	2.2	4.8	3.2	13.6	0.919	0.985
	CMP63S	2.9	2.15	4	3	12.9	1.148	1.489
	CMP63M	5.3	3.6	7.5	5.1	21.6	1.919	2.260
	CMP63L	7.1	4.95	10.3	7.2	29.7	2.689	3.030
4500	CMP40S	0.5	1.2	-	-	6.1	0.104	0.132
	CMP40M	0.8	0.95	-	-	6	0.148	0.176
	CMP50S	1.3	1.32	1.7	1.7	7	0.415	0.481
	CMP50M	2.4	2.3	3.5	3.35	13.1	0.667	0.733
	CMP50L	3.3	3.15	4.8	4.6	19.5	0.919	0.985
	CMP63S	2.9	3.05	4	4.2	18.3	1.148	1.489
	CMP63M	5.3	5.4	7.5	7.6	32.4	1.919	2.260
	CMP63L	7.1	6.9	10.3	10	41.4	2.689	3.030
6000	CMP40S	0.5	1.2	-	-	6.1	0.104	0.132
	CMP40M	0.8	1.1	-	-	6.9	0.148	0.176
	CMP50S	1.3	1.7	1.7	2.2	9	0.415	0.481
	CMP50M	2.4	3	3.5	4.4	17.1	0.667	0.733
	CMP50L	3.3	4.2	4.8	6.1	26	0.919	0.985
	CMP63S	2.9	3.9	4	5.4	23.4	1.148	1.489
	CMP63M	5.3	6.9	7.5	9.8	41.4	1.919	2.260
	CMP63L	7.1	9.3	10.3	13.5	55.8	2.689	3.030

**CMP motor selection (AC 400 V system voltage)**1. Rated speed  $n_N = 3000$  1/min:

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400 V units) in SERVO operating modes (P700)										
		0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
CMP40S	$M_{max}$ [Nm]	1.5	1.7	1.9		1.9	1.9					
CMP40M	$M_{max}$ [Nm]	3.0	3.3	3.8		3.8						
CMP50S	$M_{max}$ [Nm]	4.5	5.0	5.2		5.2						
CMP50M	$M_{max}$ [Nm]	5.4	6.3	7.7	9.3	7.6	9.4	10.3				
CMP50L	$M_{max}$ [Nm]	5.9	6.9	8.7	10.7	8.4	11.0	13.1	15.4			
CMP63S	$M_{max}$ [Nm]	5.2	6.0	7.3	8.7	7.1	8.8	10.1	11.1			
CMP63M	$M_{max}$ [Nm]	6.0	7.1	8.9	11.1	8.7	11.3	13.7	17.0	20.0	21.4	
CMP63L	$M_{max}$ [Nm]			9.0	11.3	8.7	11.6	14.4	18.6	23.0	27.0	30.4



2. Rated speed  $n_N = 4500$  1/min:

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400 V units) in SERVO operating modes (P700)											
		0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110	0150
CMP40S	$M_{max}$ [Nm]	1.5	1.7	1.9		1.9	1.9						
CMP40M	$M_{max}$ [Nm]	3.0	3.3	3.8		3.8							
CMP50S	$M_{max}$ [Nm]	3.5	4.1	4.8	5.2	4.7	5.2						
CMP50M	$M_{max}$ [Nm]	4.1	4.8	6.0	7.4	5.9	7.6	9.0	10.3				
CMP50L	$M_{max}$ [Nm]	4.2	5.0	6.3	7.9	6.1	8.2	10.0	12.7	15.1	15.4		
CMP63S	$M_{max}$ [Nm]	3.8	4.5	5.6	6.8	5.4	7.0	8.2	9.9	11.1			
CMP63M	$M_{max}$ [Nm]			6.2	7.8	6.0	8.0	9.9	12.7	15.6	18.3	21.4	
CMP63L	$M_{max}$ [Nm]				8.3	6.4	8.6	10.7	14.1	17.8	21.6	28.2	30.4

3. Rated speed  $n_N = 6000$  1/min:

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400 V units) in SERVO operating modes (P700)												
		0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110	0150	0220
CMP40S	$M_{max}$ [Nm]	1.5	1.7	1.9		1.9	1.9							
CMP40M	$M_{max}$ [Nm]	2.6	3.0	3.6	3.8	3.5	3.8							
CMP50S	$M_{max}$ [Nm]	2.9	3.3	4.1	4.8	4.0	4.9	5.2						
CMP50M	$M_{max}$ [Nm]		3.8	4.8	6.0	4.6	6.1	7.4	9.2	10.3				
CMP50L	$M_{max}$ [Nm]		3.8	4.8	6.1	4.7	6.3	7.8	10.2	12.5	14.7	15.4		
CMP63S	$M_{max}$ [Nm]		3.6	4.5	5.6	4.4	5.8	6.9	8.6	10.0	11.1			
CMP63M	$M_{max}$ [Nm]				6.3	4.8	6.5	8.0	10.4	13.0	15.6	20.0	21.4	
CMP63L	$M_{max}$ [Nm]						6.5	8.1	10.8	13.8	17.0	23.3	28.1	30.4



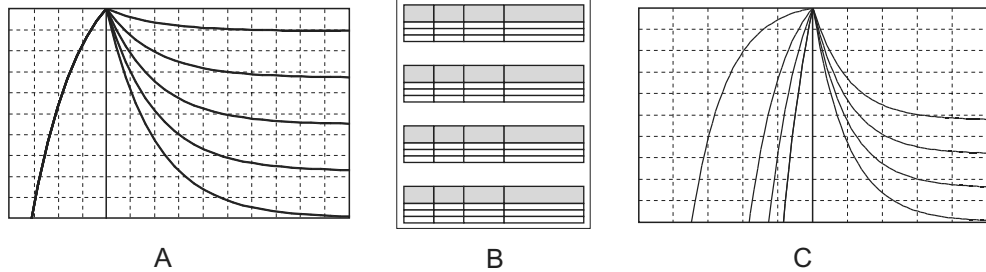
**4.7 Overload capacity of the inverter**

MOVIDRIVE® drive inverters calculate the load on the inverter output stage permanently (unit utilization). Consequently, they enable the maximum possible power to be produced in each operating status. The heat sink constant T of the inverter is used as the time unit. The heat sink time constant T is different for every size (→ Sec. "Heat sink time constant")

**Determining the overload capacity**

Three steps are required to determine the overload capacity:

1. Determine the continuous output current  $I_{out}$  depending on the output frequency (especially < 2 Hz) and the PWM frequency.
2. Characterize the duration of the overload:
  - Minutes:  $t_{overload} \geq 0.25 T$  (e.g. fans)
  - Seconds:  $t_{overload} < 0.25 T$  (e.g. roller conveyor)
  - Fraction of a second:  $t_{overload} \leq 1 s$  (e.g. dynamic servo applications)
3. Determine the overload capacity in the characterized time range (→ following figure):
  - Minutes: Overload diagrams (A) → page 274
  - Seconds: Tables and formulas (B) → page 287
  - Fraction of a second: Overload diagrams (C) → page 289



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**Heat sink time constant T**

Heat sink time constant T for inverter size								
0S	0M	1	2	2S	3	4	5	6
9.3 min = 560 s	6 min = 360 s	3.5 min = 210 s	5 min = 300 s	4 min = 240 s	4 min = 240 s	9 min = 540 s	5 min = 300 s	4.5 min = 270 s

**Load cycle**

The required load cycle is the basis for determining the overload capacity of the inverter. The following conditions must be fulfilled for periodic repetition of a load cycle:

- At the end of overload time  $t_1$ , the critical heat sink temperature is almost reached.
- During the following low-load time  $t_2$ , the heat sink temperature drops to such a degree that another overload is possible for the duration  $t_1$ .

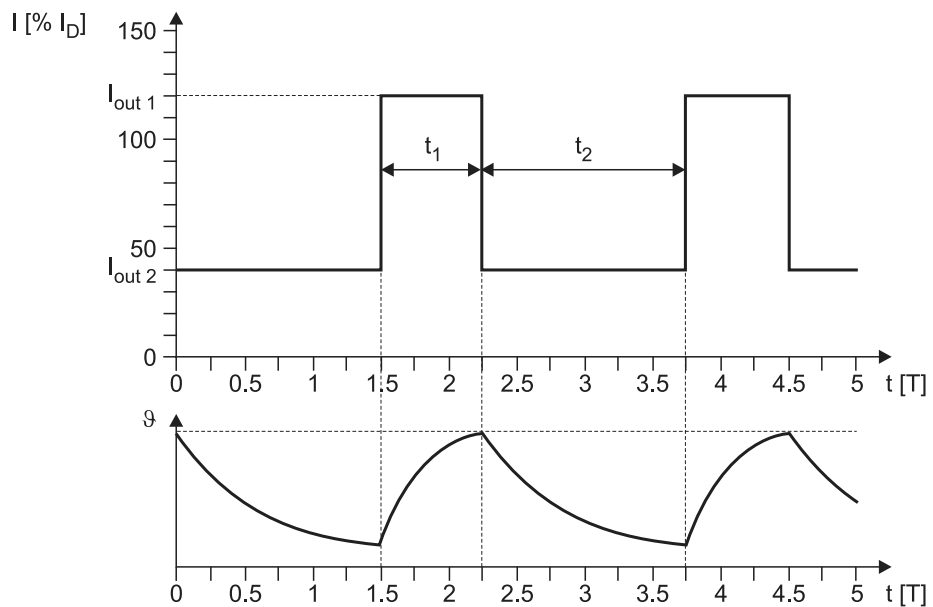
Figure 75 shows an example of such a load cycle. The temperature profiles of the heat sink for the overload time  $t_1$  and the low-load time  $t_2$  are shown under the load cycle. If you arrange the temperature profiles as shown in Figure 75, you can check whether the overload limit is exceeded.



Example

Sample load cycle:

- Overload current  $I_{out\ 1} = 120\ \% I_D$
- Low-load current  $I_{out\ 2} = 40\ \% I_D$
- Overload time  $t_1 = 0.75 \times T$
- Low-load time  $t_2 = 1.5 \times T$



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Figure 75: Sample load cycle

**Continuous output current**

The thermal model in MOVIDRIVE<sup>®</sup> implements dynamic limiting of the maximum output current. The maximum continuous output current  $I_D$  is dependent on the PWM cycle frequency, the ambient temperature  $\vartheta_{amb}$  and the output frequency  $f_A$ .

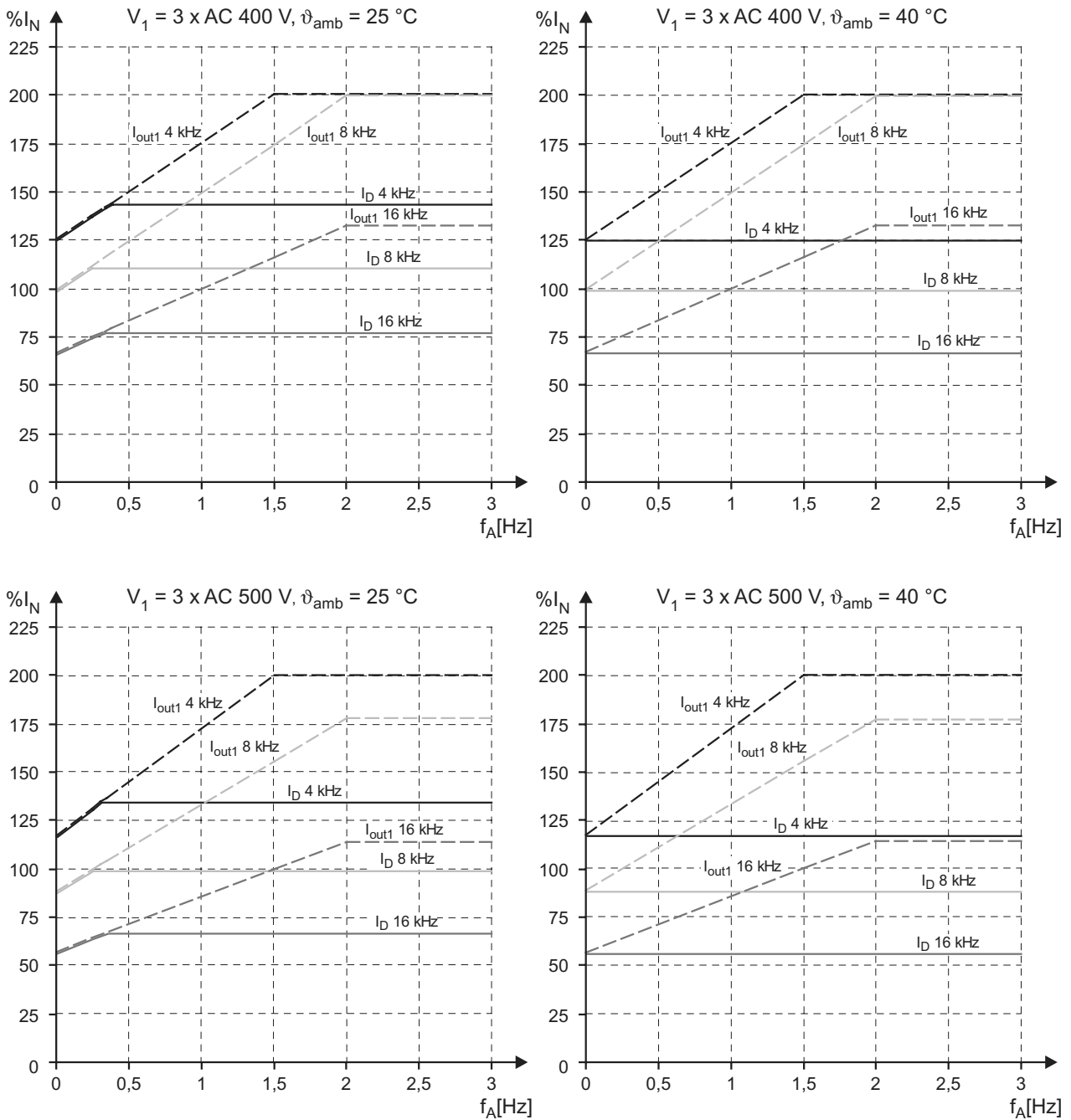
It is particularly important to take output frequencies  $f_A < 2$  Hz into account for:

- Electrically stopping hoists
- Torque control at low speeds or at a standstill

	<b>NOTE</b>
	<p>The output frequency of the inverter when used with asynchronous motors is made up of the rotational frequency (= speed) and the slip frequency. With synchronous motors, the output frequency of the inverter is the same as the rotational frequency of the synchronous motor.</p>



MDX60B / 61B size 0: Guaranteed continuous output currents  $I_D$  depending on the output frequency  $f_A$



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Figure 76: Continuous output currents  $I_D$  for MOVIDRIVE® MDX60B / 61B size 0

$\vartheta_{amb}$  = Ambient temperature

$V_1$  = Mains voltage

$f_A$  = Output frequency of the inverter

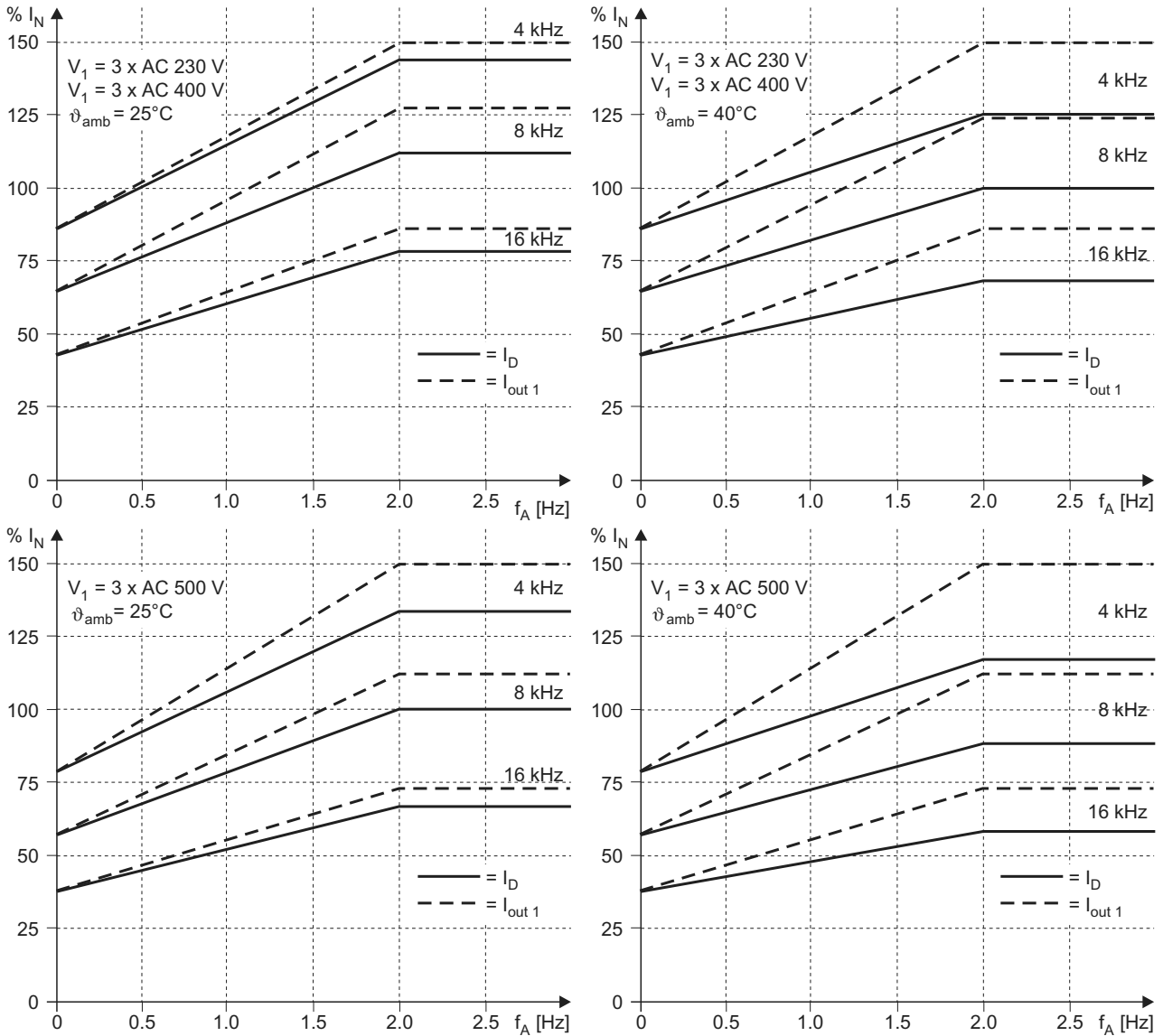
$I_D$  = Inverter continuous output current

$I_{out1}$  = Overload current of the inverter limited to a certain time

$I_N$  = Rated output current of the inverter according to the technical data



MDX61B sizes 1 - 6: Guaranteed continuous output currents  $I_D$  depending on the output frequency  $f_A$



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Figure 77: Continuous output currents  $I_D$  for MOVIDRIVE® MDX61B sizes 1 - 6

$\vartheta_{amb}$  = Ambient temperature

$V_1$  = Mains voltage

$f_A$  = Output frequency of the inverter

$I_D$  = Inverter continuous output current

$I_{out 1}$  = Overload current of the inverter limited to a certain time

$I_N$  = Rated output current of the inverter according to the technical data

**Unit utilization**

If "P860/P861 PWM frequency 1/2" > 4 kHz is set in the VFC and V/f operating modes and "P862/P863 PWM fix 1/2" = OFF, the inverter automatically reduces the PWM frequency in the event of a unit overload. In the CFC and SERVO operating modes, the PWM frequency remains at the same setting and the inverter does not reduce the PWM frequency in the event of a unit overload. If the inverter is subjected to a higher than permitted load, it issues the fault message "F44 Unit utilization" and switches off immediately.

**Temperature controlled fan**

The fans of the power section heat sink are subject to temperature-control. The fan is not switched on until a heat sink temperature of  $\vartheta = 45^\circ\text{C}$  is exceeded.



## Project Planning

### Overload capacity of the inverter

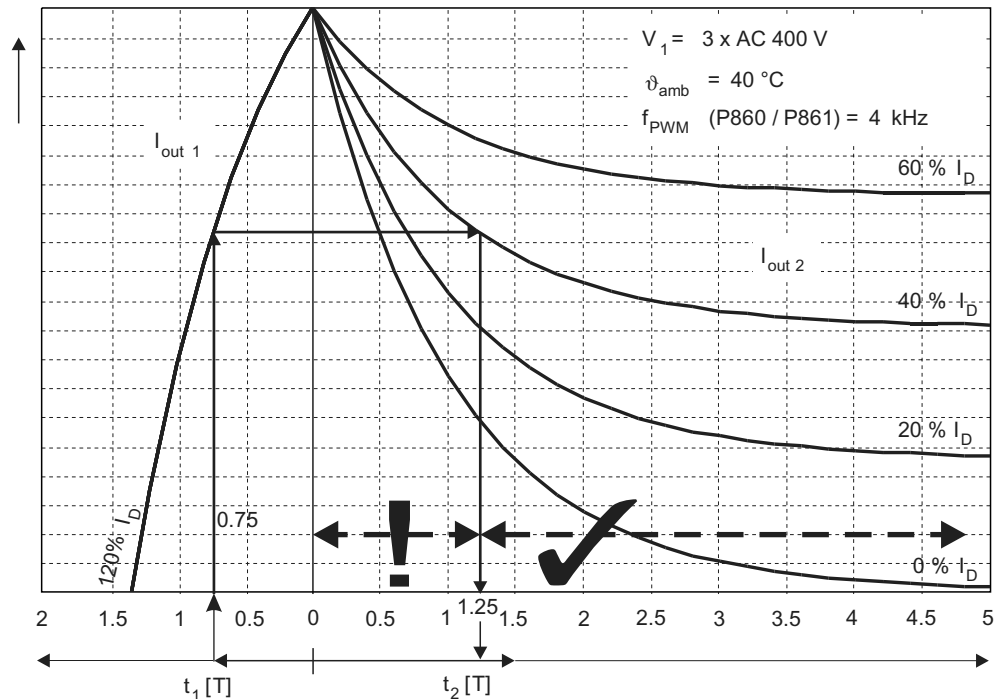
#### Overload capacity in minutes

This is the overload capacity that corresponds to at least a quarter of the heat sink time constant ( $0.25 T$ ). The overload usually lasts a few minutes. The overload capacity can be determined as follows:

Overload time  $t_1 \geq 0.25 \times T \rightarrow$  determine using the diagrams

#### Example

Overload times  $t_1 \geq 0.25 \times T$ :



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Figure 78: Sample overload diagram

The time axis is separate. The left part shows the overload time  $t_1$  and the right part the low-load time  $t_2$ . The temperature profile of the maximum permitted overload current  $I_{out 1}$  is shown above  $t_1$  for the corresponding peripheral conditions. The temperature profiles of the various low-load currents  $I_{out 2}$  are shown in a series of curves above  $t_2$ .

Using the sample data above and the load cycle from Figure 75 the overload capacity ( $\rightarrow$  Fig. 78) is determined as follows:

- At overload time  $t_1 = 0.75 \times T$  move vertically upwards until the point of intersection with  $I_{out 1}$ .
- Move horizontally to the right until the point of intersection with  $I_{out 2} = 0.4 \times I_D$ .
- Move vertically downwards and read the minimum low-load time  $t_2 \rightarrow t_2 = 1.25 \times T$ .

All times  $t_2$  to the right of the point of intersection with  $I_{out 2}$  are permissible ( $\checkmark$ ); all times  $t_2$  to the left are not (!).

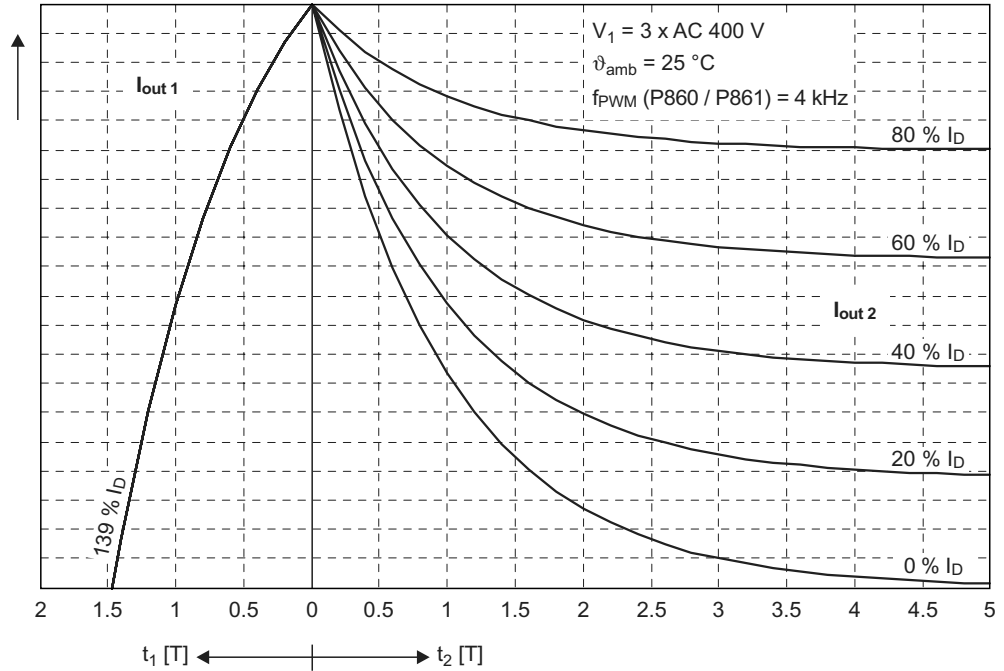
In the load cycle from Figure 75  $t_2 = 1.5 \times T$ , which means the overload capacity is given. For overload times  $t_1 < 0.25 \times T$ , the reading accuracy of the diagrams is inadequate. The curves in this area are almost linear. This means you can use a linear formula for overload times  $t_1 < 0.25 \times T$  instead of the diagrams.

For **overload times  $t_1 \geq 0.25 \times T$**  use the following diagrams to ascertain the overload capacity. Note the dependencies of  $I_D$  on  $I_N$  as shown in Figure 77 .



MDX60B/61B,  
BG0 overload  
capacity at  
400 V / 25 °C

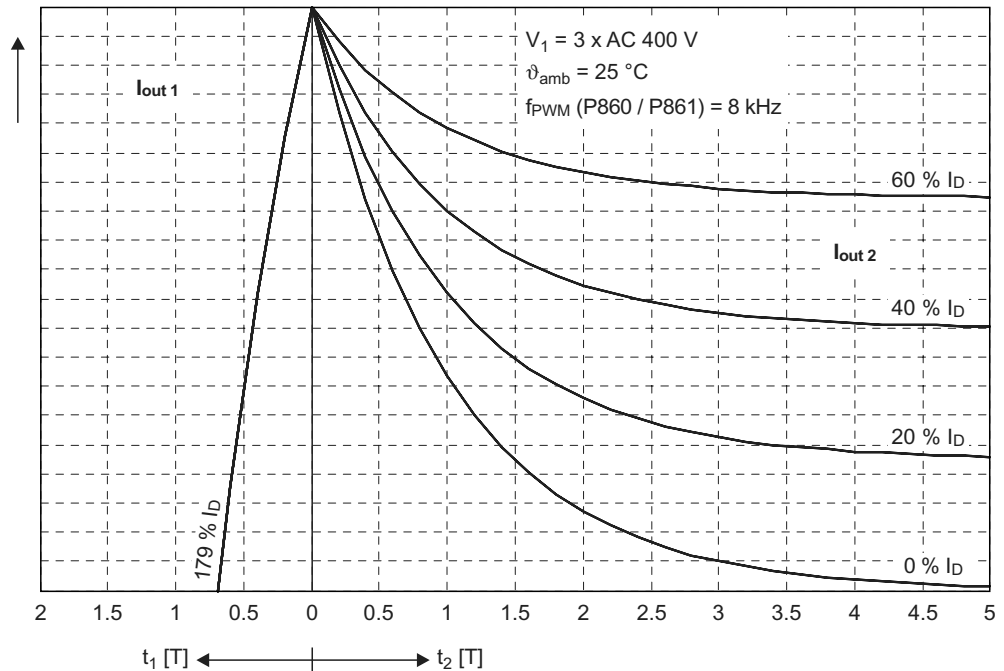
Cycle frequency  $f_{PWM} = 4 \text{ kHz}$ :



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Figure 79: Overload capacity at  $f_{PWM} = 4 \text{ kHz}$  (400 V / 25 °C)

Cycle frequency  $f_{PWM} = 8 \text{ kHz}$ :

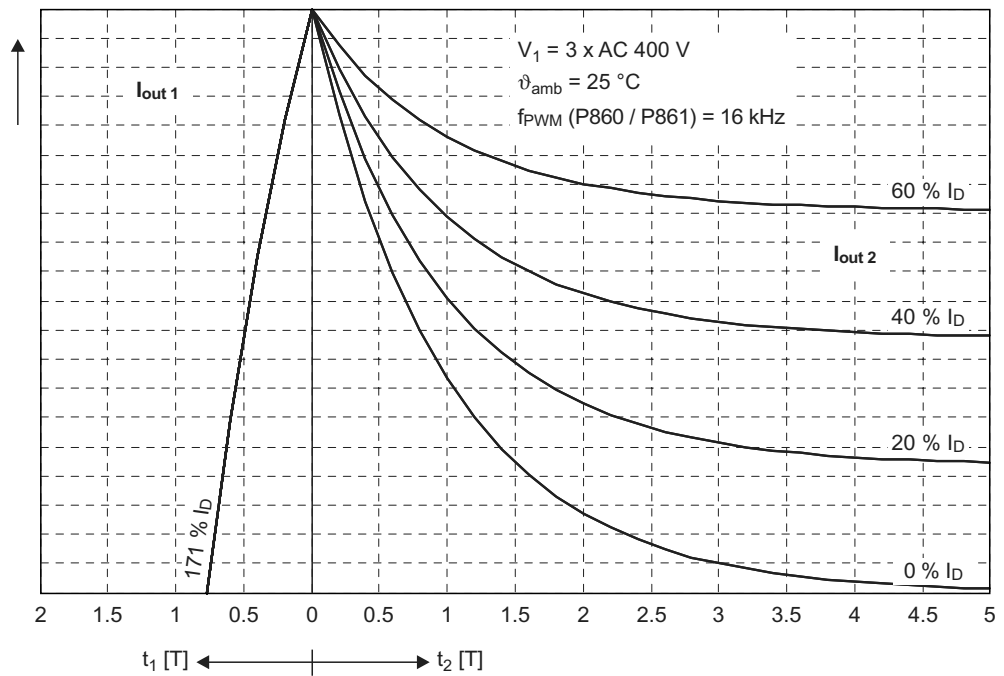


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Figure 80: Overload capacity at  $f_{PWM} = 8 \text{ kHz}$  (400 V / 25 °C)



Cycle frequency  $f_{PWM} = 16 \text{ kHz}$ :

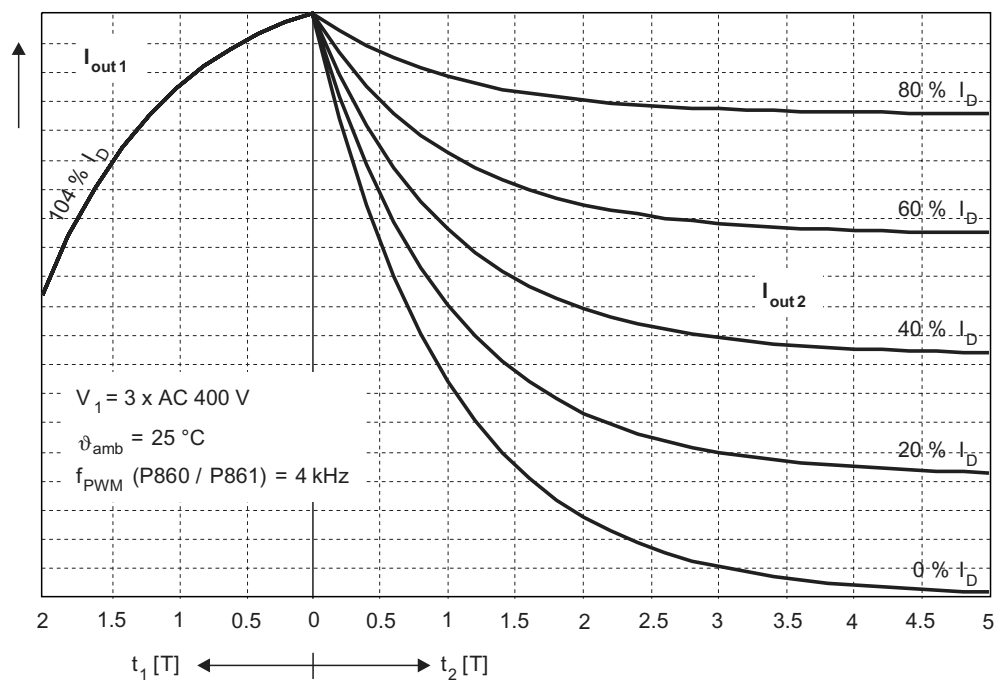


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Figure 81: Overload capacity at  $f_{PWM} = 16 \text{ kHz}$  (400 V / 25 °C)

MDX61B, BG 1-6  
overload capacity  
at 400 V / 25 °C

Cycle frequency  $f_{PWM} = 4 \text{ kHz}$ :



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Figure 82: Overload capacity at  $f_{PWM} = 4 \text{ kHz}$  (400 V / 25 °C)



Cycle frequency  $f_{PWM} = 8 \text{ kHz}$ :

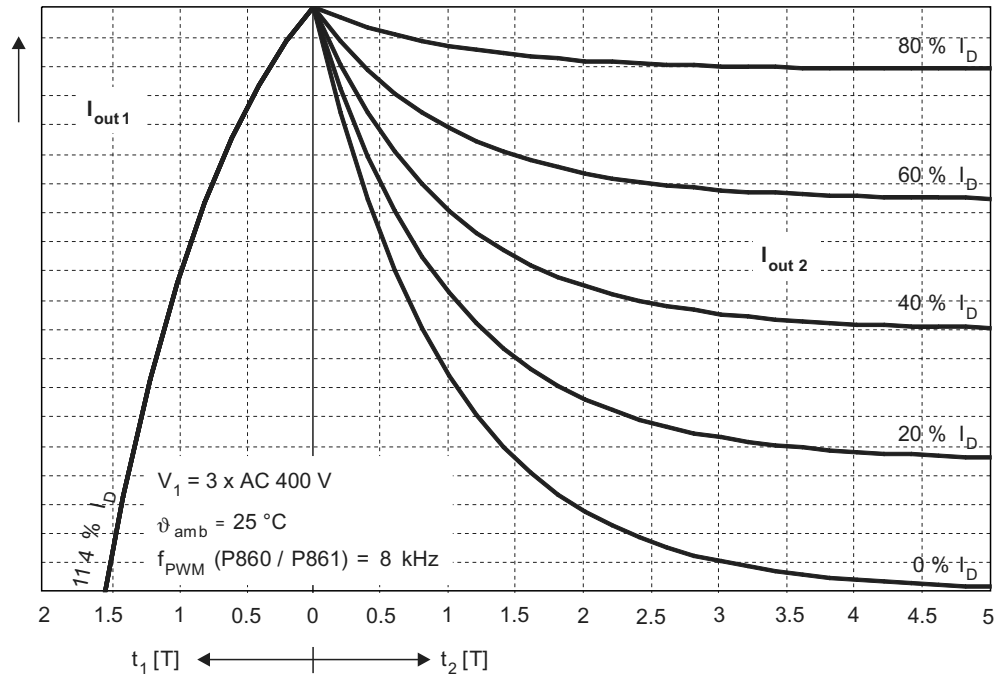


Figure 83: Overload capacity at  $f_{PWM} = 8 \text{ kHz}$  (400 V / 25 °C)

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Cycle frequency  $f_{PWM} = 16 \text{ kHz}$ :

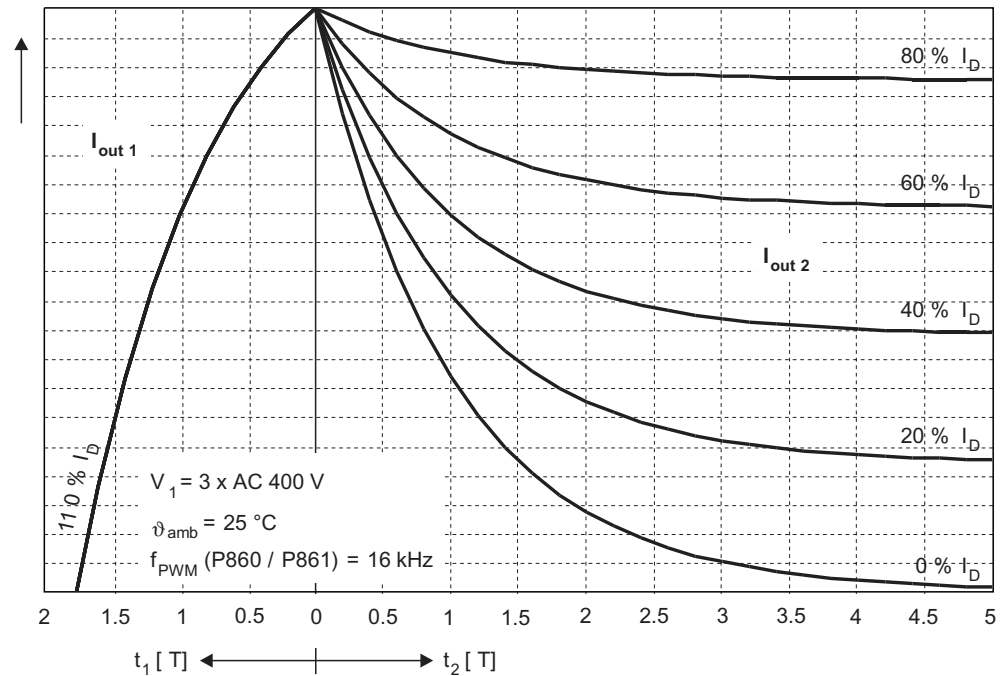


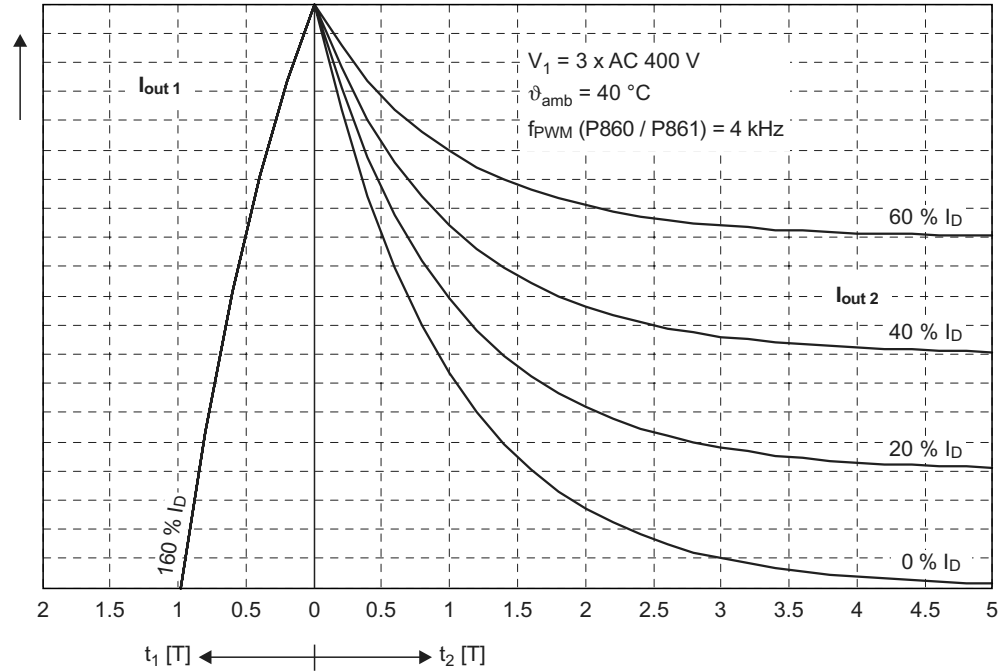
Figure 84: Overload capacity at  $f_{PWM} = 16 \text{ kHz}$  (400 V / 25 °C)

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MDX60B/61B,  
BG0 overload  
capacity at  
400 V / 40 °C

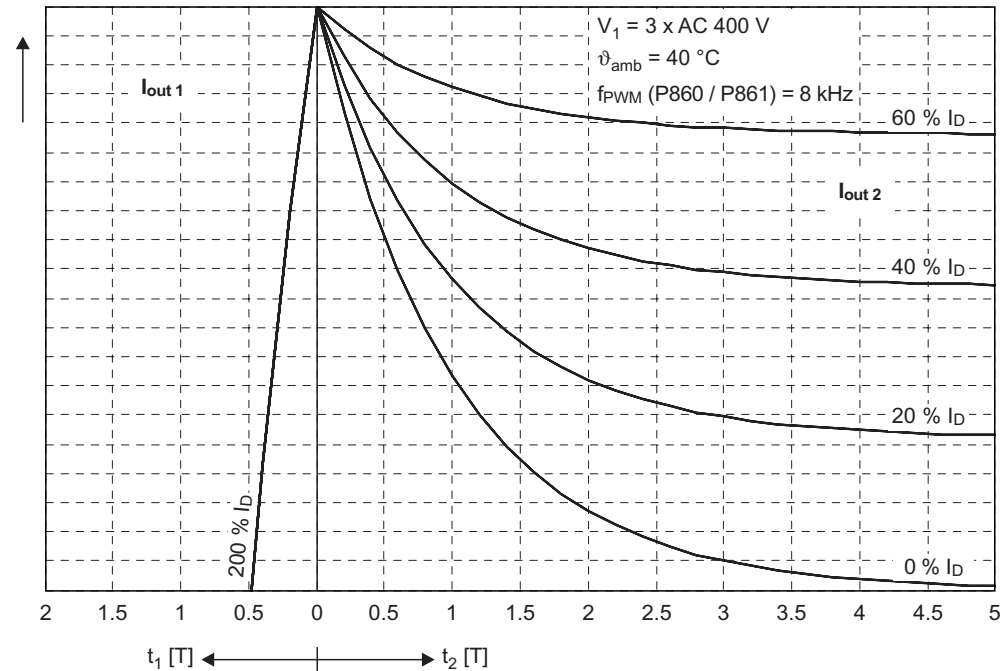
**Cycle frequency  $f_{PWM} = 4$  kHz:**



56701AXX

Figure 85: Overload capacity at  $f_{PWM} = 4$  kHz (400 V / 40 °C)

**Cycle frequency  $f_{PWM} = 8$  kHz:**

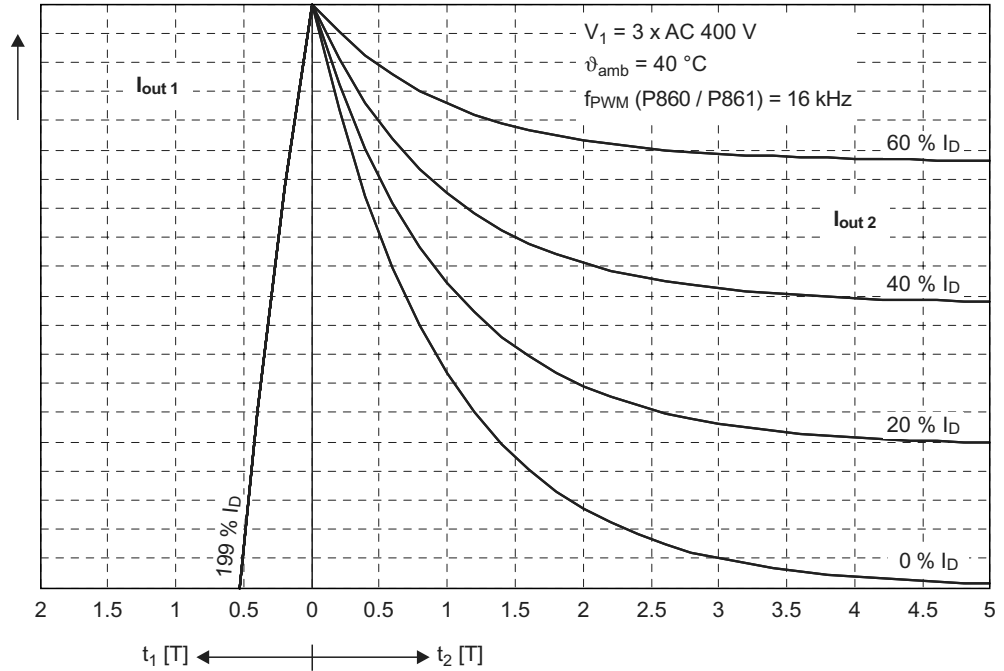


56702AXX

Figure 86: Overload capacity at  $f_{PWM} = 8$  kHz (400 V / 40 °C)



Cycle frequency  $f_{PWM} = 16 \text{ kHz}$ :

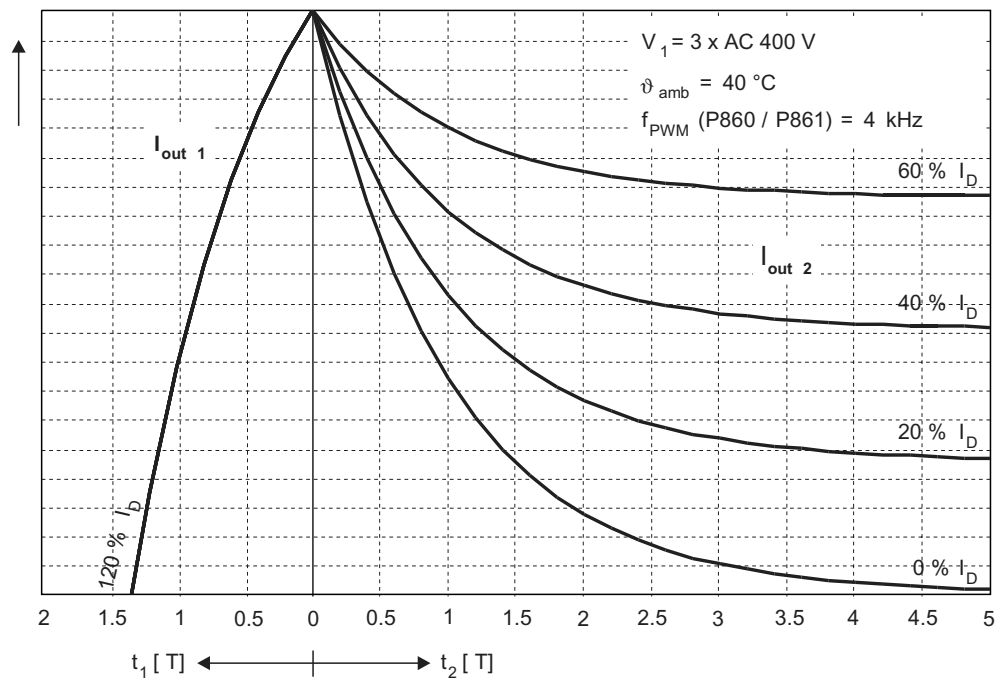


56703AXX

Figure 87: Overload capacity at  $f_{PWM} = 16 \text{ kHz}$  (400 V / 40 °C)

MDX61B, BG 1-6  
overload capacity  
at 400 V / 40 °C

Cycle frequency  $f_{PWM} = 4 \text{ kHz}$ :

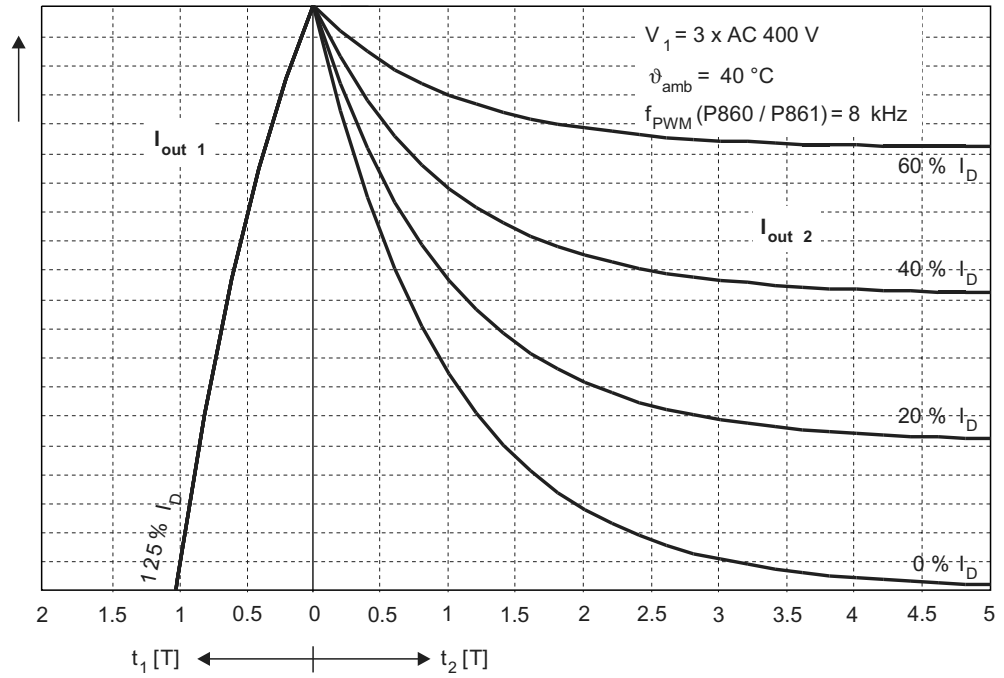


56712AXX

Figure 88: Overload capacity at  $f_{PWM} = 4 \text{ kHz}$  (400 V / 40 °C)



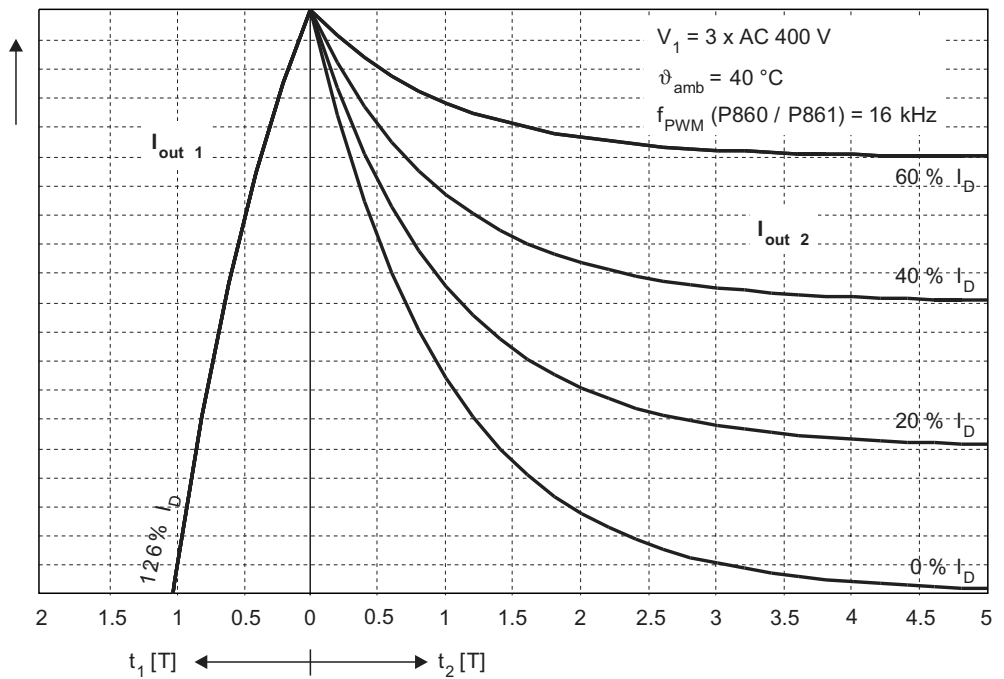
Cycle frequency  $f_{PWM} = 8 \text{ kHz}$ :



56713AXX

Figure 89: Overload capacity at  $f_{PWM} = 8 \text{ kHz}$  (400 V / 40 °C)

Cycle frequency  $f_{PWM} = 16 \text{ kHz}$ :



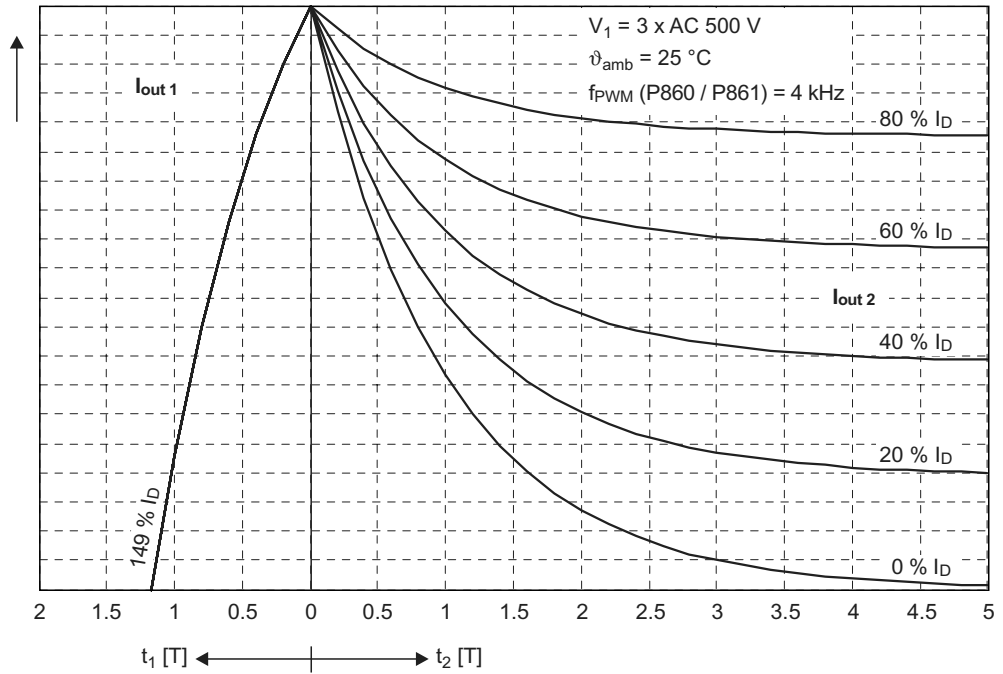
56714AXX

Figure 90: Overload capacity at  $f_{PWM} = 16 \text{ kHz}$  (400 V / 40 °C)



MDX60B/61B,  
BG0 overload  
capacity at  
500 V / 25 °C

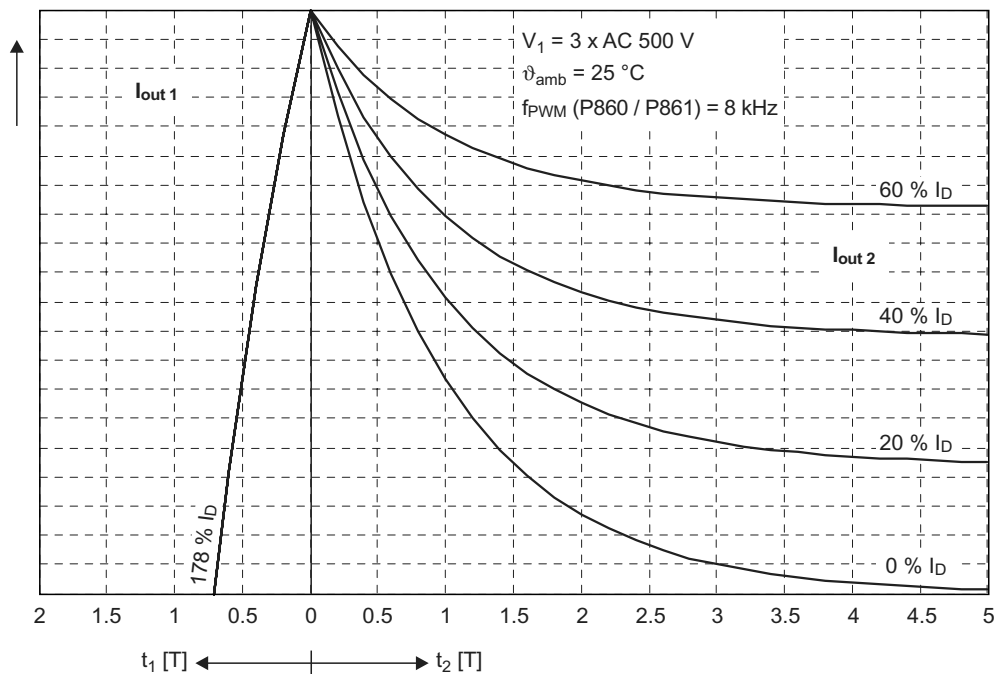
Cycle frequency  $f_{PWM} = 4 \text{ kHz}$ :



56704AXX

Figure 91: Overload capacity at  $f_{PWM} = 4 \text{ kHz}$  (500 V / 25 °C)

Cycle frequency  $f_{PWM} = 8 \text{ kHz}$ :



56706AXX

Figure 92: Overload capacity at  $f_{PWM} = 8 \text{ kHz}$  (500 V / 25 °C)



Cycle frequency  $f_{PWM} = 16 \text{ kHz}$ :

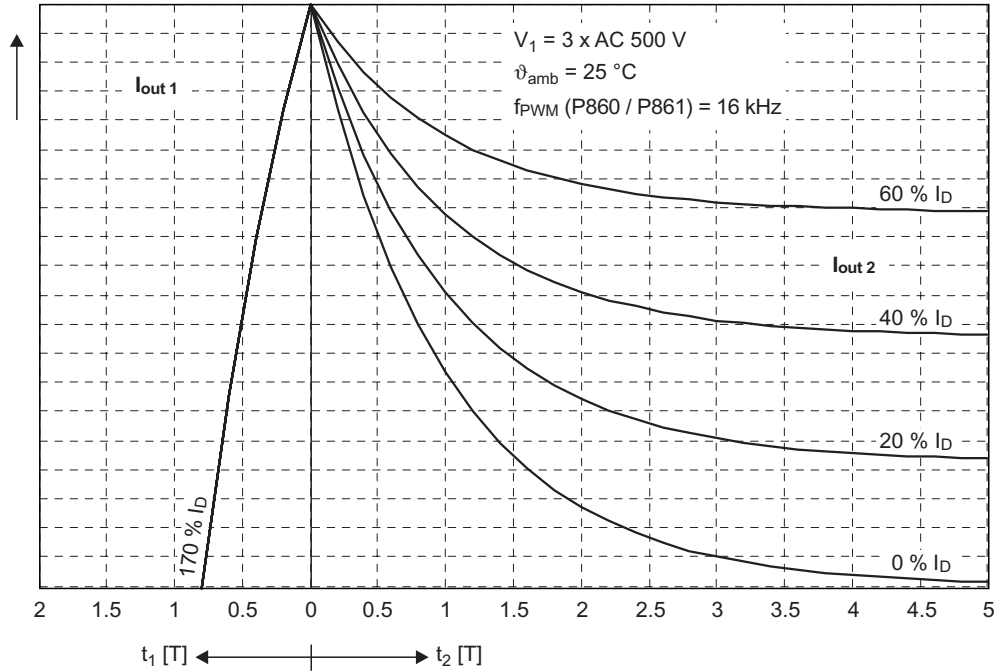


Figure 93: Overload capacity at  $f_{PWM} = 16 \text{ kHz}$  (500 V / 25 °C)

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MDX61B, BG 1-6  
overload capacity  
at 500 V / 25 °C

Cycle frequency  $f_{PWM} = 4 \text{ kHz}$ :

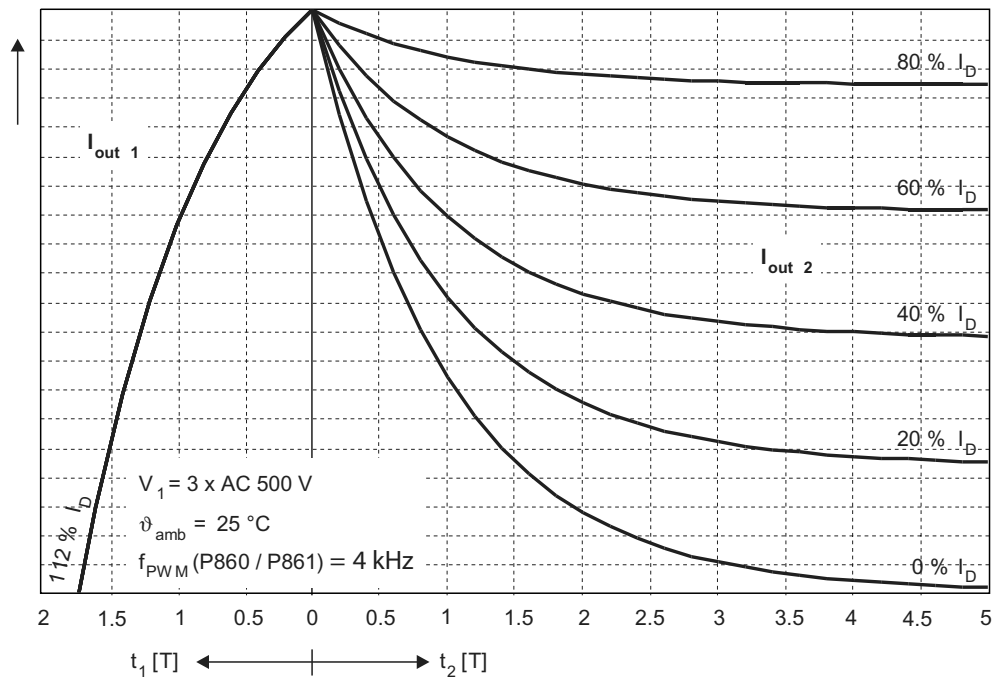


Figure 94: Overload capacity at  $f_{PWM} = 4 \text{ kHz}$  (500 V / 25 °C)

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Cycle frequency  $f_{PWM} = 8 \text{ kHz}$ :

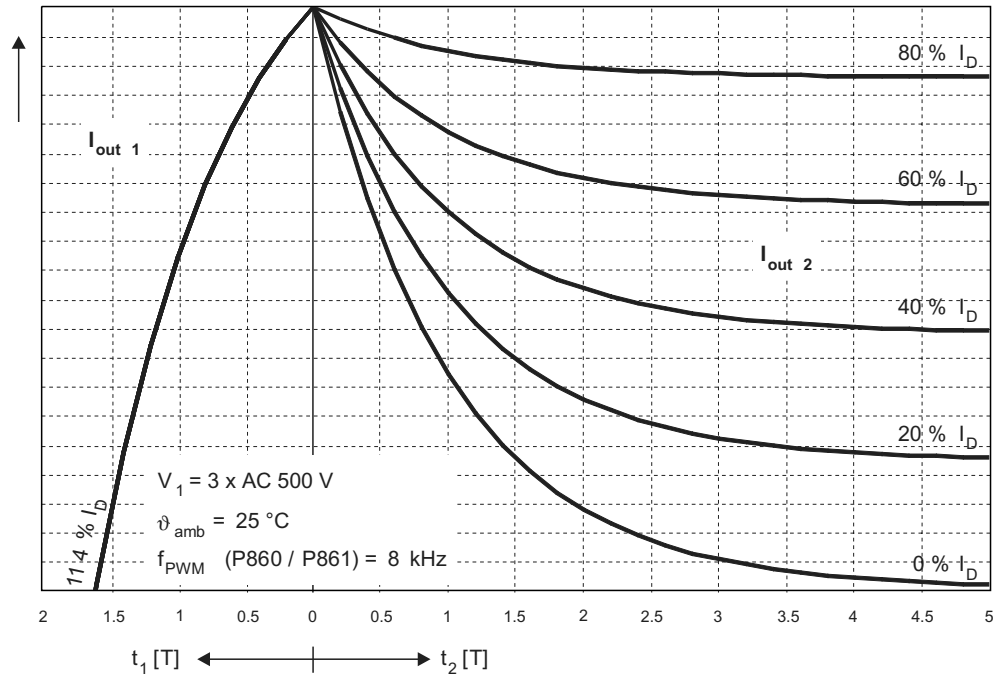


Figure 95: Overload capacity at  $f_{PWM} = 8 \text{ kHz}$  (500 V / 25 °C)

56716AXX

Cycle frequency  $f_{PWM} = 16 \text{ kHz}$ :

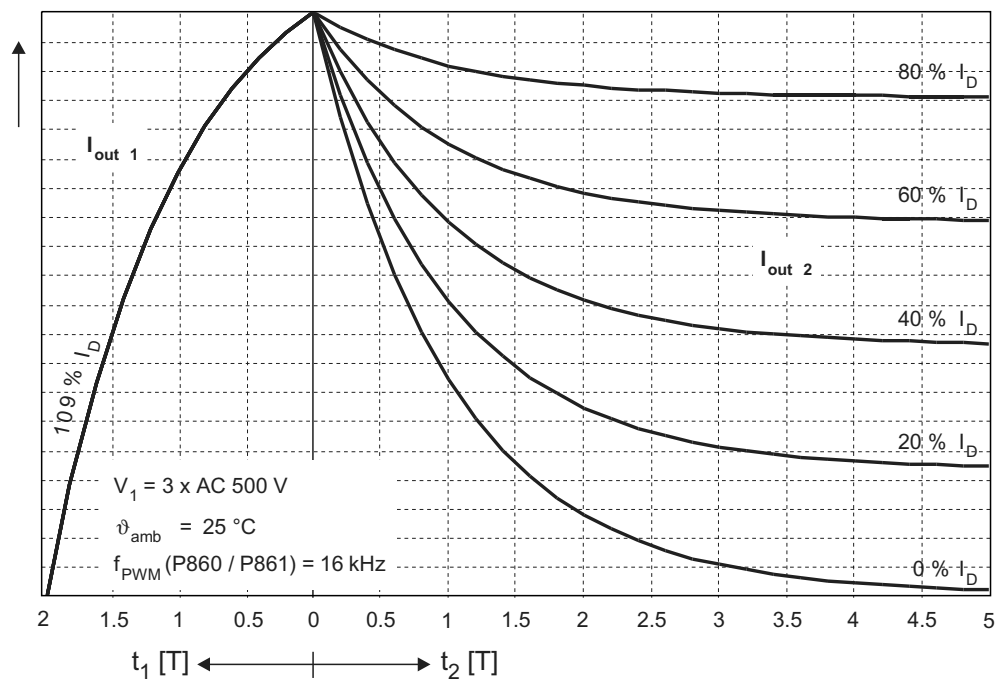


Figure 96: Overload capacity at  $f_{PWM} = 16 \text{ kHz}$  (500 V / 25 °C)

56717AXX



MDX60B/61B,  
BG0 overload  
capacity at  
500 V / 40 °C

**Cycle frequency  $f_{PWM} = 4$  kHz:**

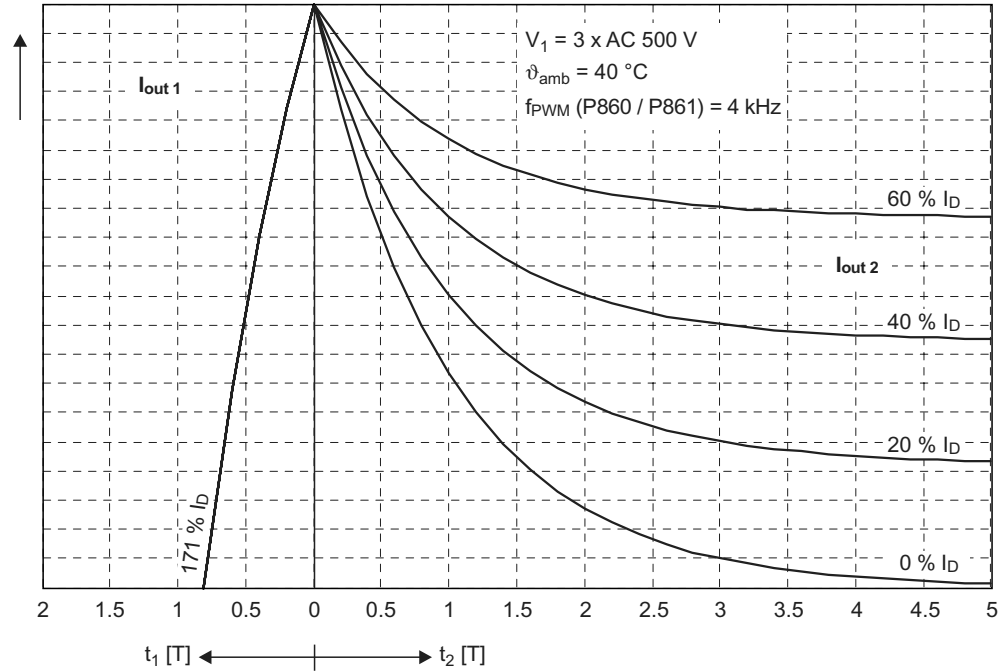


Figure 97: Overload capacity at  $f_{PWM} = 4$  kHz (500 V / 40 °C)

56708AXX

**Cycle frequency  $f_{PWM} = 8$  kHz:**

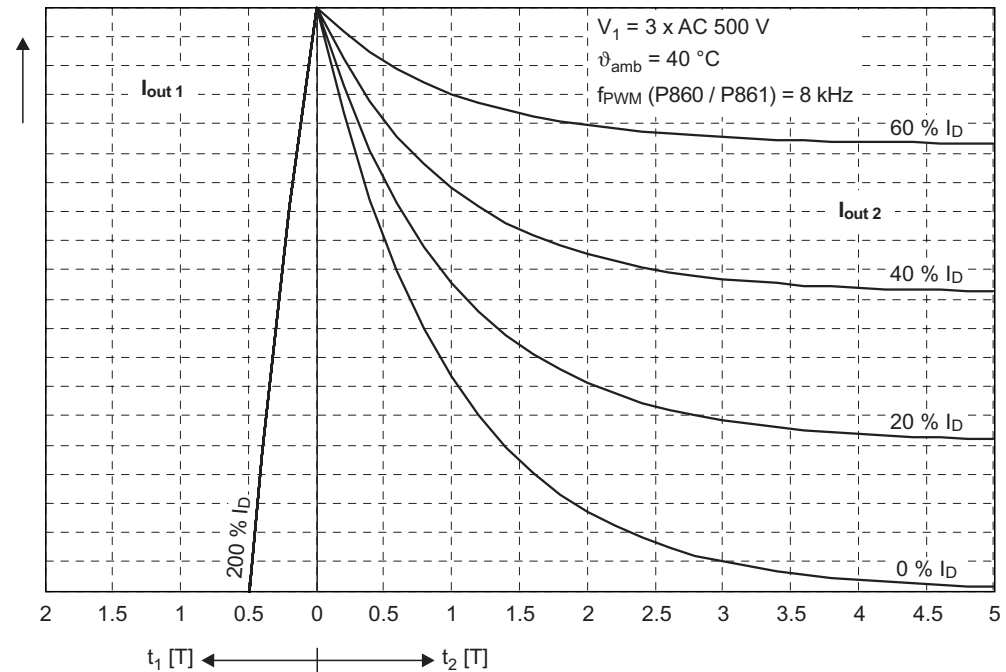


Figure 98: Overload capacity at  $f_{PWM} = 8$  kHz (500 V / 40 °C)

56709AXX



Cycle frequency  $f_{PWM} = 16 \text{ kHz}$ :

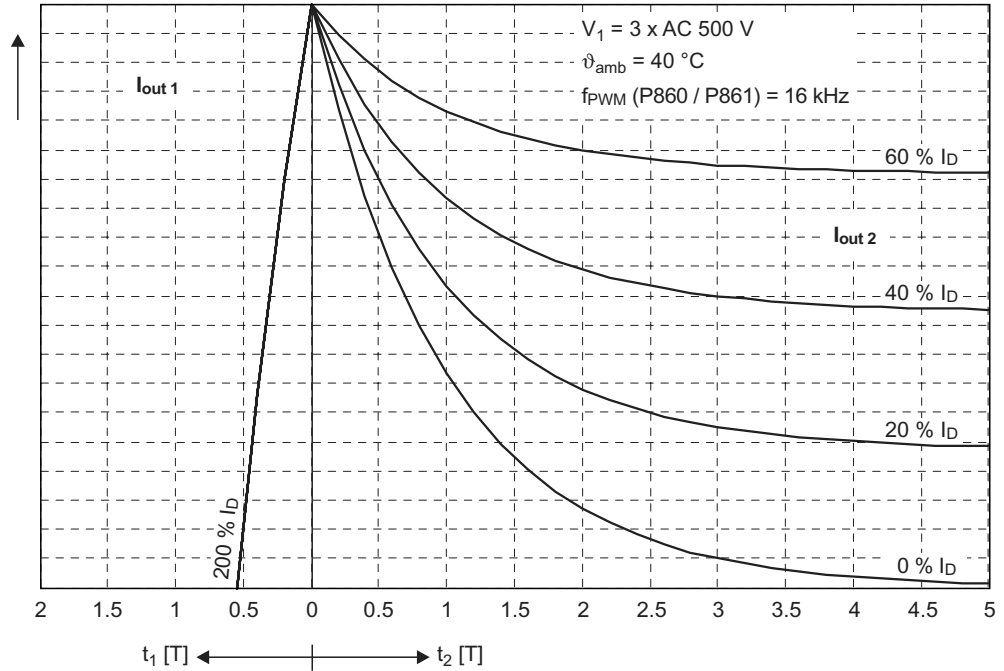


Figure 99: Overload capacity at  $f_{PWM} = 16 \text{ kHz}$  (500 V / 40 °C)

56710AXX

MDX61B, BG 1-6  
overload capacity  
at 500 V / 40 °C

Cycle frequency  $f_{PWM} = 4 \text{ kHz}$ :

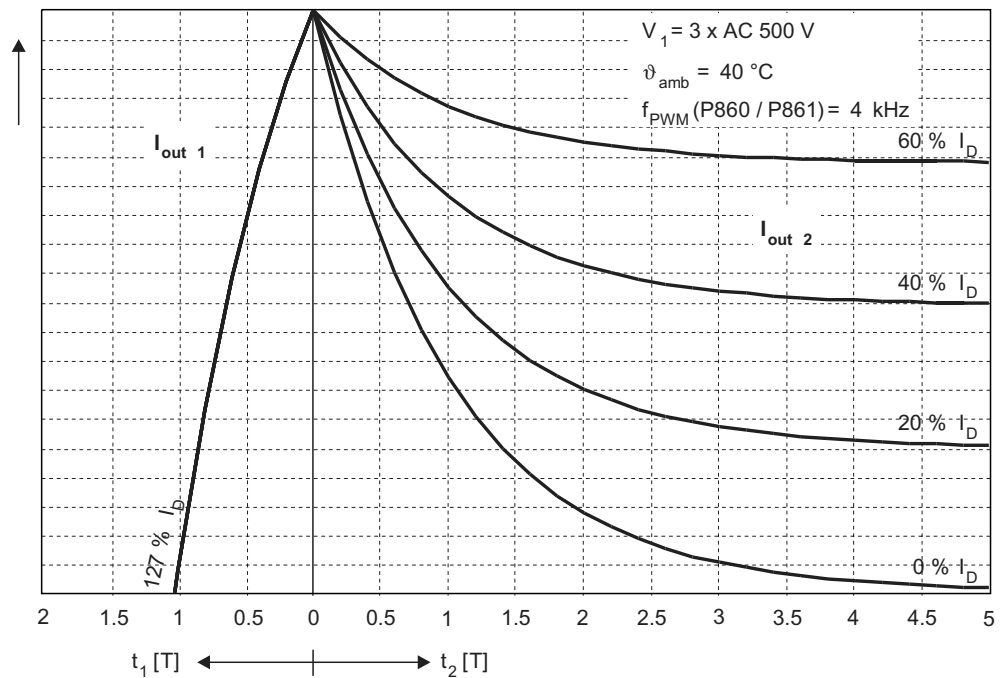
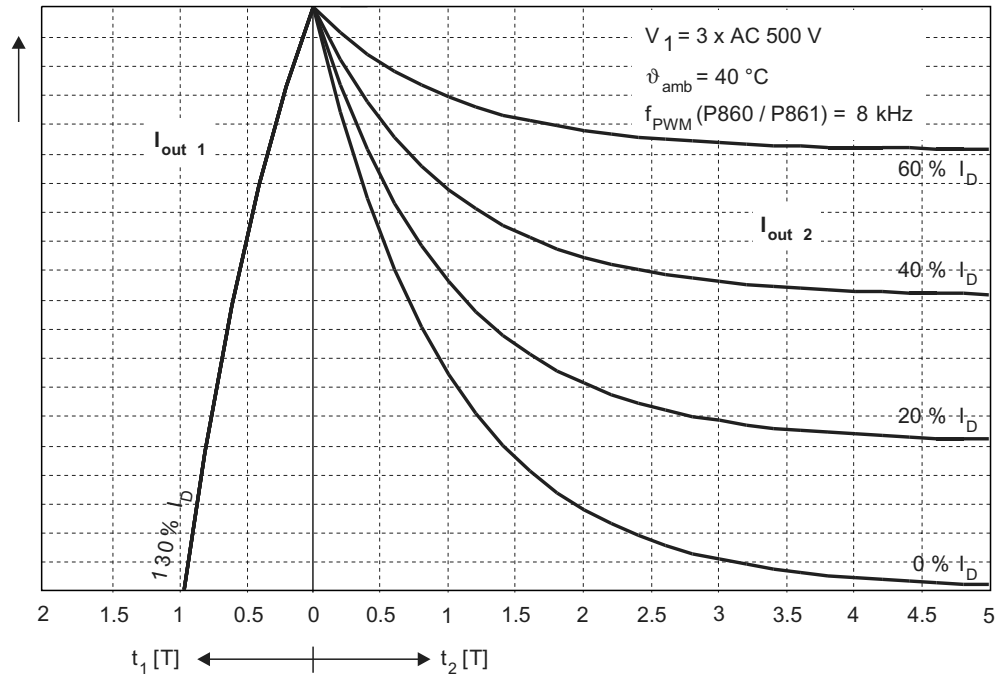


Figure 100: Overload capacity at  $f_{PWM} = 4 \text{ kHz}$  (500 V / 40 °C)

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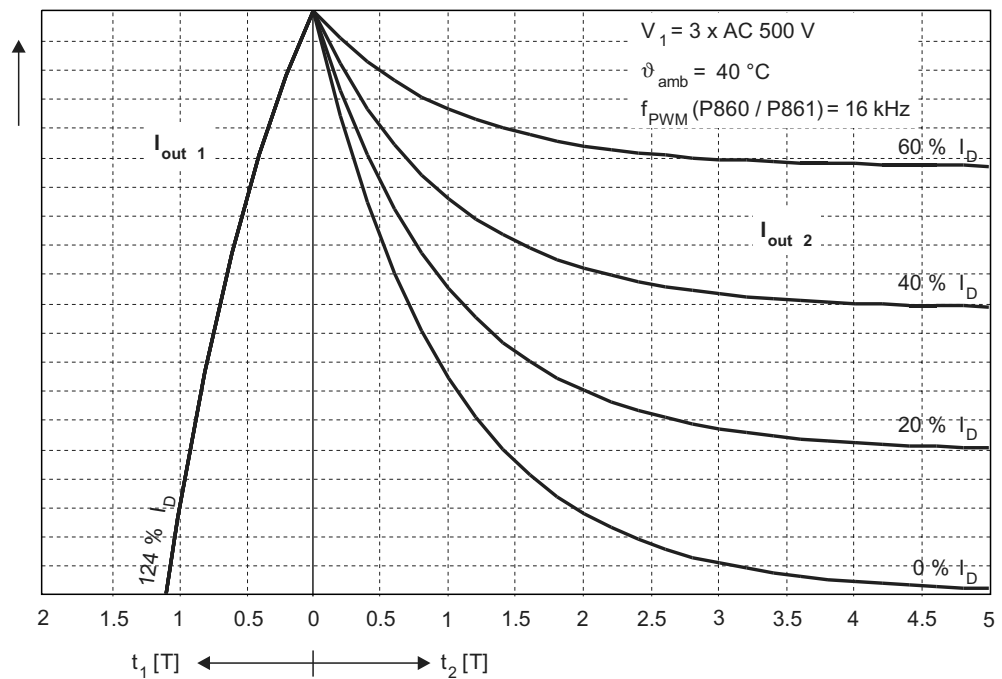
Cycle frequency  $f_{PWM} = 8 \text{ kHz}$ :



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Figure 101: Overload capacity at  $f_{PWM} = 8 \text{ kHz}$  (500 V / 40 °C)

Cycle frequency  $f_{PWM} = 16 \text{ kHz}$ :



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Figure 102: Overload capacity at  $f_{PWM} = 16 \text{ kHz}$  (500 V / 40 °C)



**Overload capacity in seconds**

This is the overload capacity that corresponds at the most to a quarter of the heat sink time constant (0.25 T). The overload usually lasts a few seconds. In this time range, the curve is almost linear and the overload capacity can be determined as follows:

Overload time  $t_1 < 0.25 \times T \rightarrow$  determine using a formula

**Formula**

At overload times  $t_1 < 0.25 \times T$ , you can calculate the overload capacity using the following formula:

$$t_2 > k \times t_1 \quad k = \text{overload factor}$$

The values for overload factors k are given in the following tables, depending on the supply voltage  $V_1$ , ambient temperature  $\vartheta$  and cycle frequency  $f_{PWM}$ .

**Example**

Example with MOVIDRIVE® MDX61B0055 (size 2):

- Operation with supply voltage  $V_1 = 3 \times AC 400 V$ , ambient temperature  $\vartheta = 40 \text{ }^\circ C$  and cycle frequency  $f_{PWM} = 4 \text{ kHz}$ .
- Rated unit current  $I_N = AC 12.5 A$  and continuous output current  $I_D = 125 \% \times I_N = AC 15.6$  ( $\rightarrow$  Figure 77)
- Overload time  $t_1 = 30 \text{ s} = 0.1 \times T$
- Low-load current  $I_{out 2} = 6 A = 0.4 \times I_D \rightarrow k = 0.778$

Cycle frequency $f_{PWM}$	Continuous output current $I_D$ ( $f_A > 2 \text{ Hz}$ )	Overload current $I_{out 1}$ (at $f_A > 2 \text{ Hz}$ )	Overload factor k at low-load current $I_{out 2} =$			
			0	$0,2 \times I_D$	$0,4 \times I_D$	$0,6 \times I_D$
4 kHz	$125\% I_N$	$120\% I_D (= 150\% I_N)$	0,411	0,538	0,778	1,407

- The low-load time must be  $t_2 > k \times t_1 > 0.778 \times 30 \text{ s} > 23.34 \text{ s}$ .

For **overload times  $t_1 < 0.25 \times T$**  use the formula  $t_2 > k \times t_1$  to ascertain the overload capacity. The following tables show the overload factor k for various low-load currents. For your additional information, we have included the value depending on  $I_N$  (at  $f_A > 2 \text{ Hz}$ ) in addition to the overload current.

**MDX60B/61B, BG0 overload capacity at 400 V / 25 °C**

Cycle frequency $f_{PWM}$	Continuous output current $I_D$ ( $f_A > 2 \text{ Hz}$ )	Overload current $I_{out 1}$ (at $f_A > 2 \text{ Hz}$ )	Overload factor k at low-load current $I_{out 2} =$				
			0	$0,2 \times I_D$	$0,4 \times I_D$	$0,6 \times I_D$	$0,8 \times I_D$
4 kHz	$144\% I_N$	$139\% I_D (= 200\% I_N)$	0,368	0,456	0,588	0,838	1,456
8 kHz	$112\% I_N$	$179\% I_D (= 200\% I_N)$	1,182	1,545	2,091	3,545	14,364
16 kHz	$78\% I_N$	$171\% I_D (= 133\% I_N)$	1,000	1,313	1,813	2,938	9,250

**MDX61B, BG 1-6 overload capacity at 400 V / 25 °C**

Cycle frequency $f_{PWM}$	Continuous output current $I_D$ ( $f_A > 2 \text{ Hz}$ )	Overload current $I_{out 1}$ (at $f_A > 2 \text{ Hz}$ )	Overload factor k at low-load current $I_{out 2} =$				
			0	$0,2 \times I_D$	$0,4 \times I_D$	$0,6 \times I_D$	$0,8 \times I_D$
4 kHz	$144\% I_N$	$104\% I_D (= 150\% I_N)$	0,085	0,107	0,145	0,226	0,508
8 kHz	$112\% I_N$	$114\% I_D (= 128\% I_N)$	0,314	0,408	0,582	1,016	4,160
16 kHz	$78\% I_N$	$110\% I_D (= 86\% I_N)$	0,235	0,303	0,427	0,720	2,324



## Project Planning

### Overload capacity of the inverter

MDX60B/61B,  
BG0 overload  
capacity at  
400 V / 40 °C

Cycle frequency $f_{\text{PWM}}$	Continuous output current $I_{\text{D}}$ ( $f_{\text{A}} > 2 \text{ Hz}$ )	Overload current $I_{\text{out 1}}$ (at $f_{\text{A}} > 2 \text{ Hz}$ )	Overload factor k at low-load current $I_{\text{out 2}} =$			
			0	$0,2 \times I_{\text{D}}$	$0,4 \times I_{\text{D}}$	$0,6 \times I_{\text{D}}$
4 kHz	125 % $I_{\text{N}}$	160 % $I_{\text{D}}$ (= 200 % $I_{\text{N}}$ )	0,727	0,909	1,212	1,818
8 kHz	100 % $I_{\text{N}}$	200 % $I_{\text{D}}$ (= 200 % $I_{\text{N}}$ )	1,931	2,690	4,069	9,448
16 kHz	67 % $I_{\text{N}}$	199 % $I_{\text{D}}$ (= 133 % $I_{\text{N}}$ )	0,737	0,912	1,211	1,825

MDX61B, BG 1-6  
overload capacity  
at 400 V / 40 °C

Cycle frequency $f_{\text{PWM}}$	Continuous output current $I_{\text{D}}$ ( $f_{\text{A}} > 2 \text{ Hz}$ )	Overload current $I_{\text{out 1}}$ (at $f_{\text{A}} > 2 \text{ Hz}$ )	Overload factor k at low-load current $I_{\text{out 2}} =$			
			0	$0,2 \times I_{\text{D}}$	$0,4 \times I_{\text{D}}$	$0,6 \times I_{\text{D}}$
4 kHz	125 % $I_{\text{N}}$	120 % $I_{\text{D}}$ (= 150 % $I_{\text{N}}$ )	0,411	0,538	0,778	1,407
8 kHz	100 % $I_{\text{N}}$	125 % $I_{\text{D}}$ (= 125 % $I_{\text{N}}$ )	0,678	0,928	1,473	3,639
16 kHz	68 % $I_{\text{N}}$	126 % $I_{\text{D}}$ (= 86 % $I_{\text{N}}$ )	0,676	0,922	1,448	3,438

MDX60B/61B,  
BG0 overload  
capacity at  
500 V / 25 °C

Cycle frequency $f_{\text{PWM}}$	Continuous output current $I_{\text{D}}$ ( $f_{\text{A}} > 2 \text{ Hz}$ )	Overload current $I_{\text{out 1}}$ (at $f_{\text{A}} > 2 \text{ Hz}$ )	Overload factor k at low-load current $I_{\text{out 2}} =$				
			0	$0,2 \times I_{\text{D}}$	$0,4 \times I_{\text{D}}$	$0,6 \times I_{\text{D}}$	$0,8 \times I_{\text{D}}$
4 kHz	134 % $I_{\text{N}}$	149 % $I_{\text{D}}$ (= 200 % $I_{\text{N}}$ )	0,558	0,674	0,907	1,326	2,674
8 kHz	100 % $I_{\text{N}}$	178 % $I_{\text{D}}$ (= 178 % $I_{\text{N}}$ )	1,154	1,538	2,077	3,462	11,615
16 kHz	67 % $I_{\text{N}}$	170 % $I_{\text{D}}$ (= 114 % $I_{\text{N}}$ )	1,000	1,278	1,778	2,778	7,944

MDX61B, BG 1-6  
overload capacity  
at 500 V / 25 °C

Cycle frequency $f_{\text{PWM}}$	Continuous output current $I_{\text{D}}$ ( $f_{\text{A}} > 2 \text{ Hz}$ )	Overload current $I_{\text{out 1}}$ (at $f_{\text{A}} > 2 \text{ Hz}$ )	Overload factor k at low-load current $I_{\text{out 2}} =$				
			0	$0,2 \times I_{\text{D}}$	$0,4 \times I_{\text{D}}$	$0,6 \times I_{\text{D}}$	$0,8 \times I_{\text{D}}$
4 kHz	134 % $I_{\text{N}}$	112 % $I_{\text{D}}$ (= 150 % $I_{\text{N}}$ )	0,245	0,316	0,443	0,741	2,287
8 kHz	100 % $I_{\text{N}}$	114 % $I_{\text{D}}$ (= 114 % $I_{\text{N}}$ )	0,286	0,369	0,522	0,888	3,040
16 kHz	67 % $I_{\text{N}}$	109 % $I_{\text{D}}$ (= 73 % $I_{\text{N}}$ )	0,182	0,232	0,321	0,521	1,385

MDX60B/61B,  
BG0 overload  
capacity at  
500 V / 40 °C

Cycle frequency $f_{\text{PWM}}$	Continuous output current $I_{\text{D}}$ ( $f_{\text{A}} > 2 \text{ Hz}$ )	Overload current $I_{\text{out 1}}$ (at $f_{\text{A}} > 2 \text{ Hz}$ )	Overload factor k at low-load current $I_{\text{out 2}} =$			
			0	$0,2 \times I_{\text{D}}$	$0,4 \times I_{\text{D}}$	$0,6 \times I_{\text{D}}$
4 kHz	117 % $I_{\text{N}}$	171 % $I_{\text{D}}$ (= 200 % $I_{\text{N}}$ )	1,000	1,268	1,805	3,049
8 kHz	89 % $I_{\text{N}}$	200 % $I_{\text{D}}$ (= 178 % $I_{\text{N}}$ )	1,882	2,529	3,824	8,412
16 kHz	57 % $I_{\text{N}}$	200 % $I_{\text{D}}$ (= 114 % $I_{\text{N}}$ )	1,667	2,208	3,167	5,792

MDX61B, BG 1-6  
overload capacity  
at 500 V / 40 °C

Cycle frequency $f_{\text{PWM}}$	Continuous output current $I_{\text{D}}$ ( $f_{\text{A}} > 2 \text{ Hz}$ )	Overload current $I_{\text{out 1}}$ (at $f_{\text{A}} > 2 \text{ Hz}$ )	Overload factor k at low-load current $I_{\text{out 2}} =$			
			0	$0,2 \times I_{\text{D}}$	$0,4 \times I_{\text{D}}$	$0,6 \times I_{\text{D}}$
4 kHz	117 % $I_{\text{N}}$	128 % $I_{\text{D}}$ (= 150 % $I_{\text{N}}$ )	0,662	0,897	1,395	3,176
8 kHz	89 % $I_{\text{N}}$	126 % $I_{\text{D}}$ (= 112 % $I_{\text{N}}$ )	0,745	1,022	1,627	4,103
16 kHz	59 % $I_{\text{N}}$	123 % $I_{\text{D}}$ (= 73 % $I_{\text{N}}$ )	0,595	0,803	1,234	2,695



**Overload capacity for an overload time < 1 s**

In dynamic applications (CFC and SERVO operating modes) with a short overload time  $t_1$ , the inverter can output overload currents up to 150 %  $I_N$  even at PWM frequencies of 8 kHz and 16 kHz (size 0: 200 % at PWM frequency 8 kHz and 12 kHz; 133 % at PWM frequency 16 kHz).

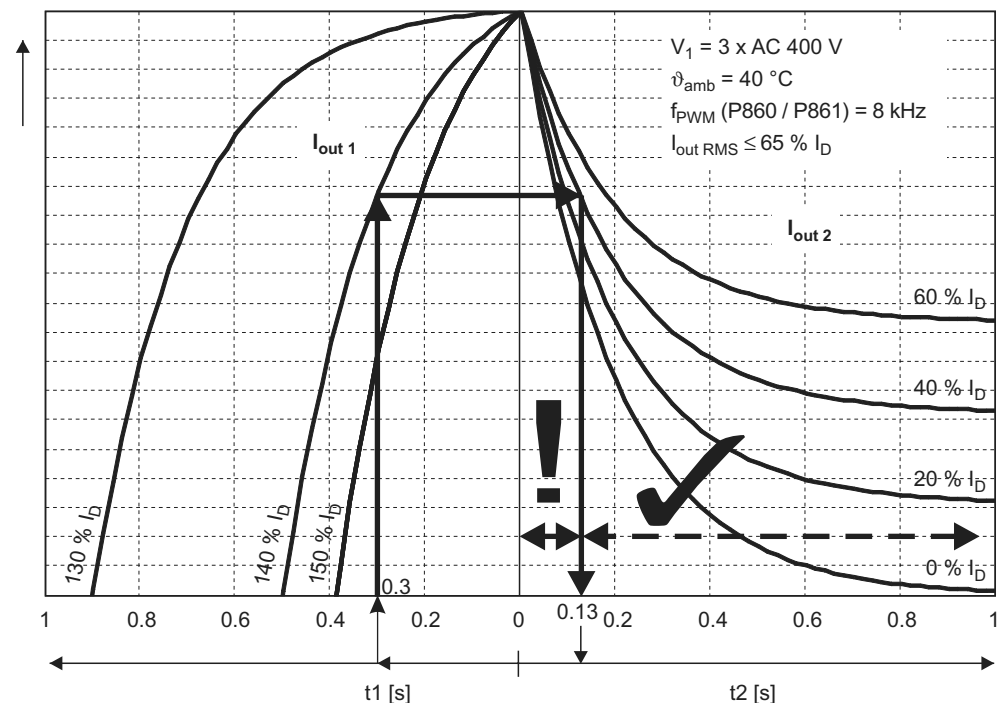
The overload time  $t_1$  **must be less than 1 s** for this high overload capacity to be achieved.

**Determining the overload capacity**

The overload capacity for the short overload time ( $t_1 < 1$  s) is determined as follows:

- Für MDX61B size 1 - 6 using the diagrams (→ following figure)
- For MDX60B/61B size 0 according to the section "Overload capacity in seconds" (→ S.)

The mean inverter output current  $I_{out\ RMS}$  during the load cycle must not exceed a certain value.



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Figure 103: Sample overload diagram for short overload time

The time axis is separate. The left part shows the overload time  $t_1$  and the right part the low-load time  $t_2$ . The temperature profiles of the various low-load currents  $I_{out\ 1}$  are shown in a series of curves above  $t_1$ . The temperature profiles of the various low-load currents  $I_{out\ 2}$  are shown in a series of curves above  $t_2$ .

**Example:**

- Following specifications:
  - Overload current  $I_{out\ 1} = 140\ %\ I_D$
  - Overload time  $t_1 = 0.3\ s$
  - Low-load current  $I_{out\ 2} = 40\ %\ I_D$
  - Low-load time  $t_2 = 1.0\ s$
- At an overload time of  $t_1 = 0.3\ s$  move vertically upwards until the point of intersection with  $I_{out\ 1} = 140\ %\ I_D$ .
- Move horizontally to the right until the point of intersection with  $I_{out\ 2} = 0.4 \times I_D$ .



## Project Planning

### Overload capacity of the inverter

- Move vertically downwards and then read the minimum low-load time  $t_2 \rightarrow t_2 = 0.13$  s. All times  $t_2$  to the right of the point of intersection with  $I_{out2}$  are permissible ( $\checkmark$ ); all times  $t_2$  to the left are not (!).

According to the diagram, the overload capacity is given. In addition to the diagram, you now have to check that the permitted mean inverter output current  $I_{out\ RMS}$  is not exceeded:

$$I_{out\ 1} \times \frac{t_1}{t_1 + t_2} + I_{out\ 2} \times \frac{t_2}{t_1 + t_2} \leq I_{out\ RMS}$$

$$140\% I_D \times \frac{0.3\ s}{1.3\ s} + 40\% I_D \times \frac{1.0\ s}{1.3\ s} \leq 65\% I_D$$

$$32.31\% I_D + 30.77\% I_D = 63.08\% I_D \leq 65\% I_D$$

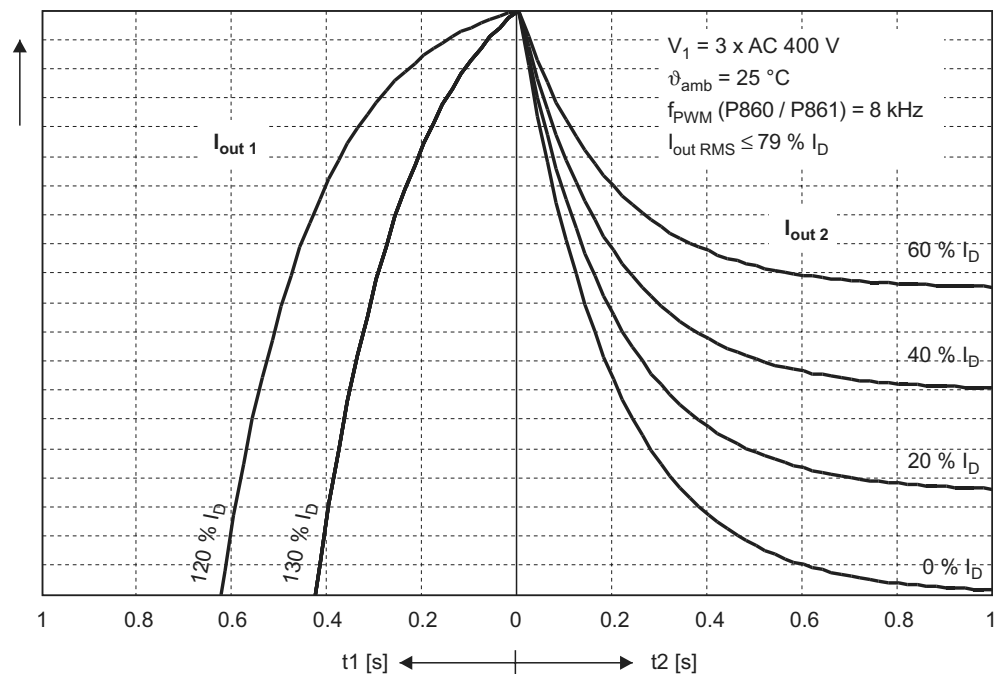
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The permitted mean inverter output current is  $I_{out\ RMS} \leq 65\% I_D$ . In the specified load cycle,  $I_{out\ RMS} = 63.08\% I_D$ . Therefore, the load cycle is permitted.

*MDX61B, BG 1-6  
overload capacity  
at 400 V / 25 °C*

#### Cycle frequency $f_{PWM} = 8$ kHz:

The permitted mean inverter output current is  $I_{out\ RMS} \leq 79\% I_D$ .



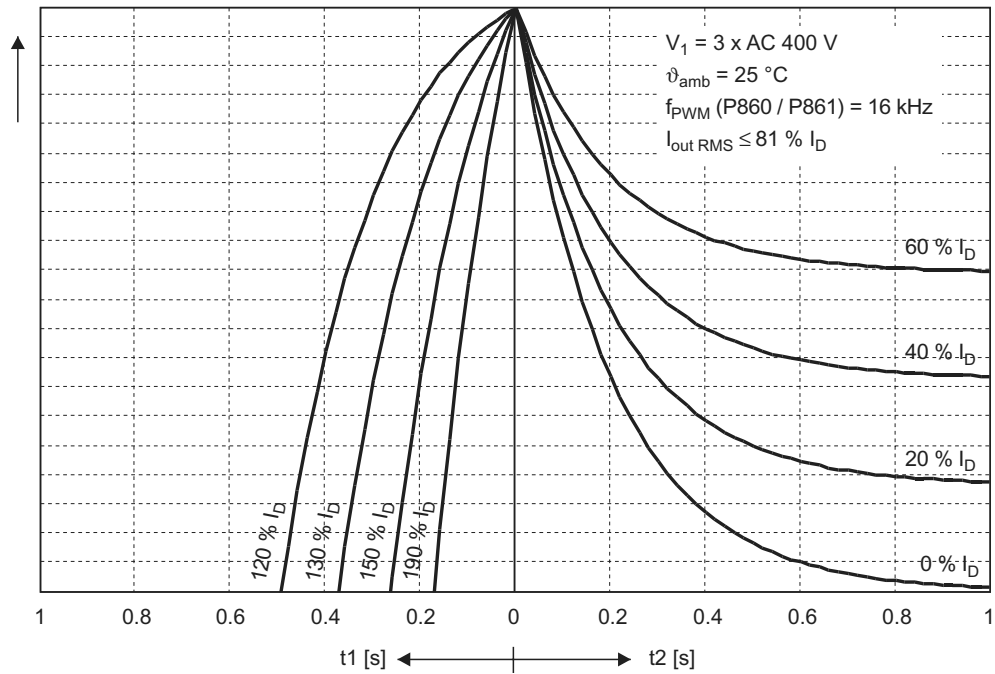
56749AXX

Figure 104: Short-term overload capacity at  $f_{PWM} = 8$  kHz (400 V / 25 °C)



**Cycle frequency  $f_{PWM} = 16 \text{ kHz}$ :**

The permitted mean inverter output current is  $I_{out \text{ RMS}} \leq 81 \% I_D$ .



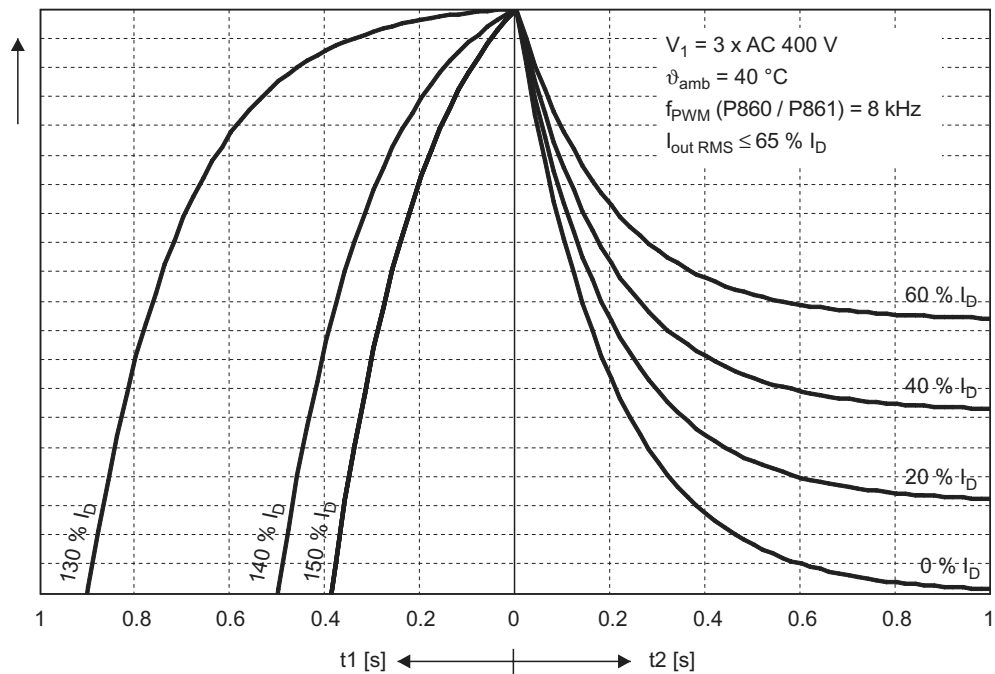
56750AXX

Figure 105: Short-term overload capacity at  $f_{PWM} = 16 \text{ kHz}$  (400 V / 25 °C)

MDX61B, BG 1-6  
overload capacity  
at 400 V / 40 °C

**Cycle frequency  $f_{PWM} = 8 \text{ kHz}$ :**

The permitted mean inverter output current is  $I_{out \text{ RMS}} \leq 65 \% I_D$ .



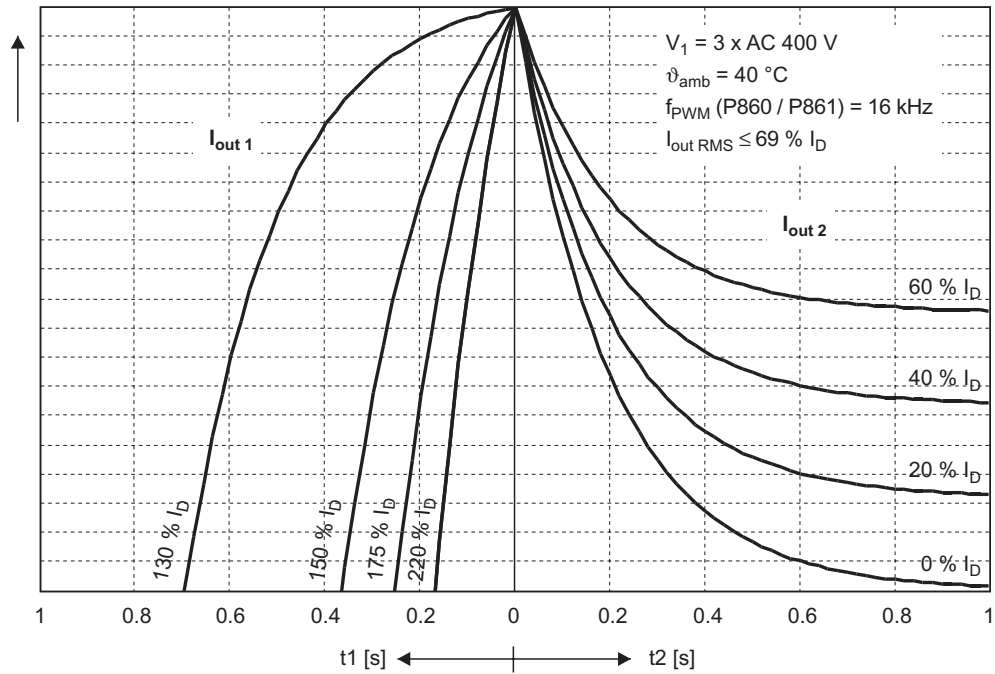
56751AXX

Figure 106: Short-term overload capacity at  $f_{PWM} = 8 \text{ kHz}$  (400 V / 40 °C)



**Cycle frequency  $f_{PWM} = 16 \text{ kHz}$ :**

The permitted mean inverter output current is  $I_{out \text{ RMS}} \leq 69 \% I_D$ .



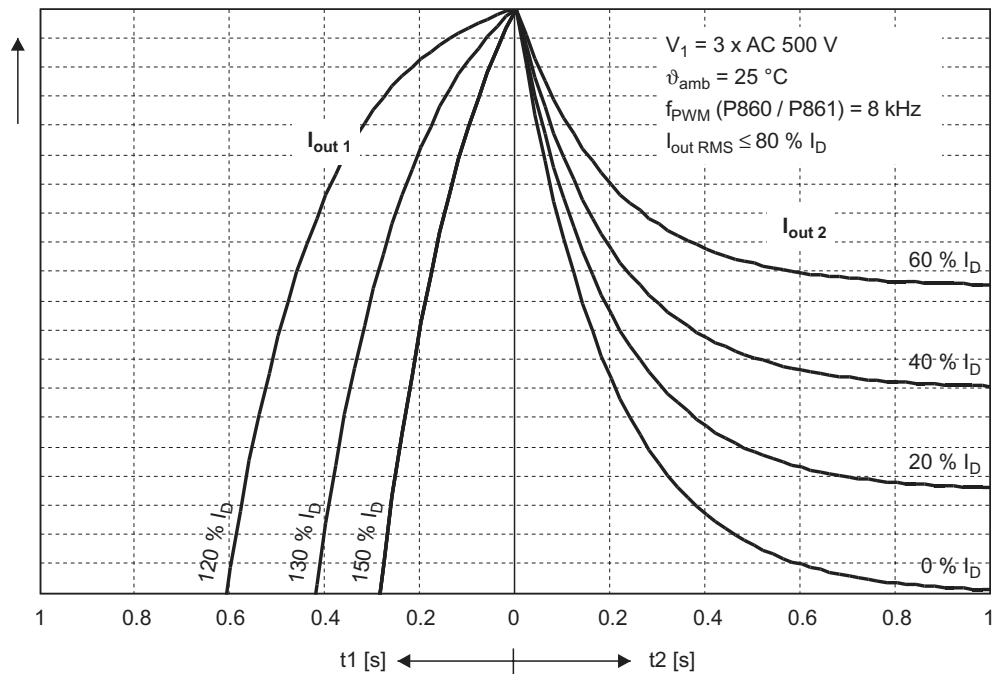
56721ABXX

Figure 107: Short-term overload capacity at  $f_{PWM} = 16 \text{ kHz}$  (400 V / 40 °C)

MDX61B, BG 1-6  
overload capacity  
at 500 V / 25 °C

**Cycle frequency  $f_{PWM} = 8 \text{ kHz}$ :**

The permitted mean inverter output current is  $I_{out \text{ RMS}} \leq 80 \% I_D$ .



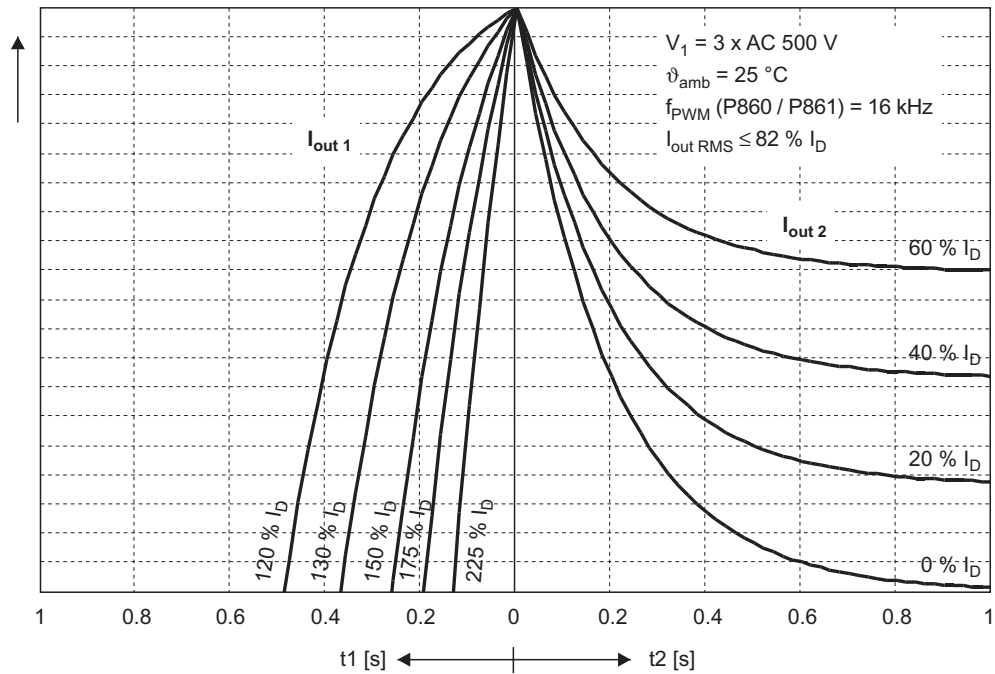
56725AXX

Figure 108: Short-term overload capacity at  $f_{PWM} = 8 \text{ kHz}$  (500 V / 25 °C)



**Cycle frequency  $f_{PWM} = 16$  kHz:**

The permitted mean inverter output current is  $I_{out\ RMS} \leq 82\% I_D$ .



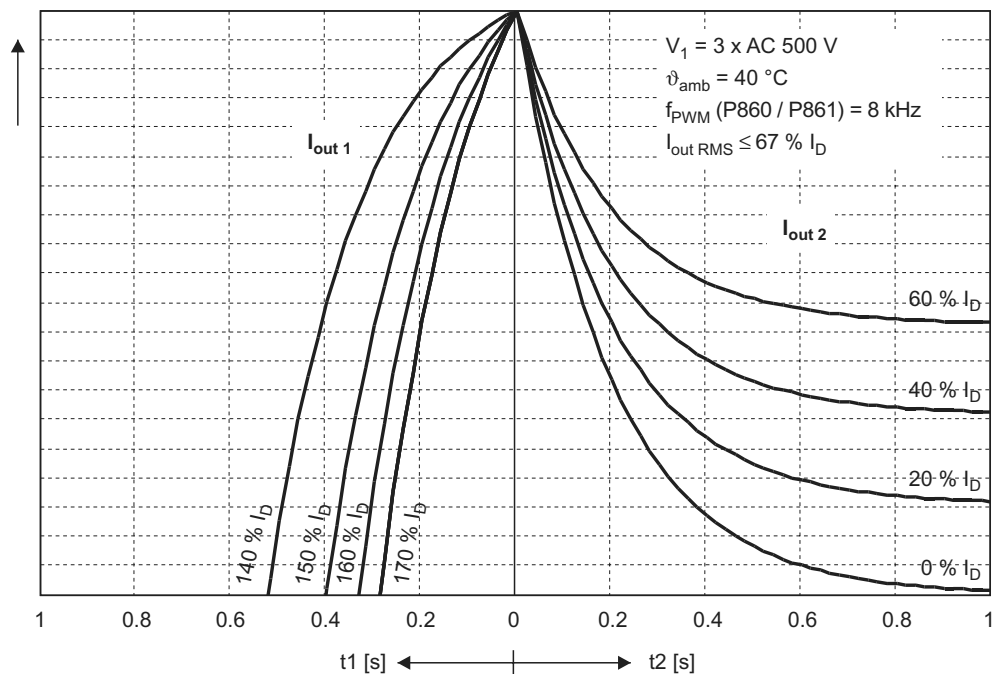
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Figure 109: Short-term overload capacity at  $f_{PWM} = 16$  kHz (500 V / 25 °C)

MDX61B, BG 1-6  
overload capacity  
at 500 V / 40 °C

**Cycle frequency  $f_{PWM} = 8$  kHz:**

The permitted mean inverter output current is  $I_{out\ RMS} \leq 67\% I_D$ .



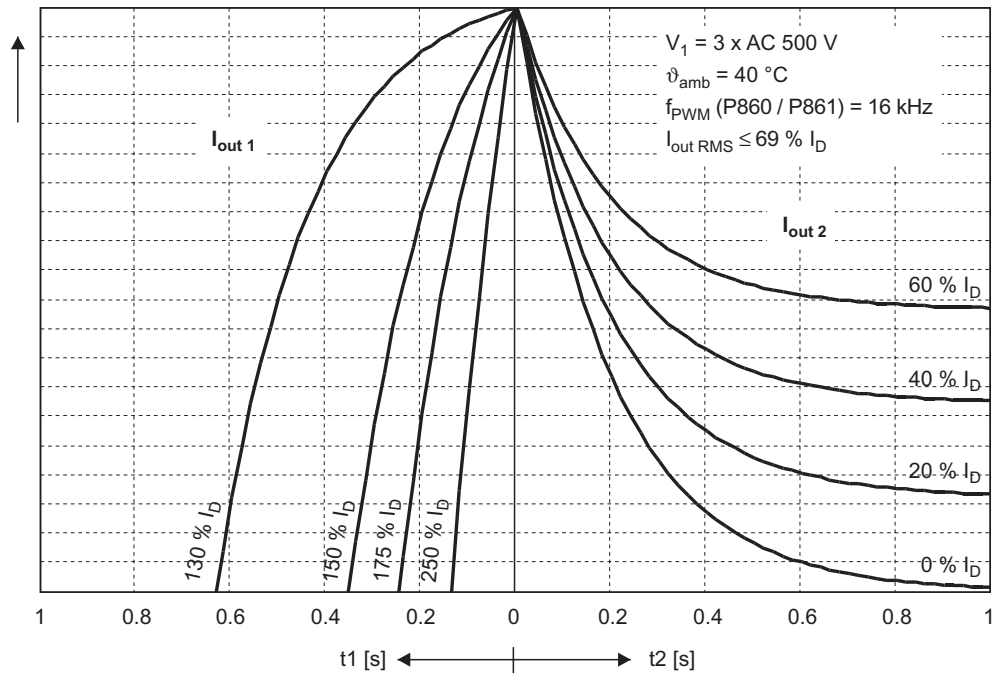
56727AXX

Figure 110: Short-term overload capacity at  $f_{PWM} = 8$  kHz (500 V / 40 °C)



**Cycle frequency  $f_{PWM} = 16 \text{ kHz}$ :**

The permitted mean inverter output current is  $I_{out \text{ RMS}} \leq 69 \% I_D$ .



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Figure 111: Short-term overload capacity at  $f_{PWM} = 16 \text{ kHz}$  (500 V / 40 °C)



#### 4.8 Selecting the braking resistor

	<b>! DANGER!</b>
	<p>The supply cables to the braking resistor carry a <b>high DC voltage (ca. DC 900 V)</b>. Severe or fatal injuries from electric shock.</p> <ul style="list-style-type: none"> <li>• The braking resistor cables must be suitable for this high DC voltage.</li> <li>• Install the braking resistor cables according to the regulations.</li> </ul>

4

	<b>! WARNING!</b>
	<p>The surfaces of the braking resistors get very hot when the braking resistors are loaded with <math>P_{rated}</math>. Risk of burns and fire.</p> <ul style="list-style-type: none"> <li>• Choose a suitable installation location. Braking resistors are usually mounted on top of the control cabinet.</li> <li>• Do not touch the braking resistors.</li> </ul>

	<b>NOTES</b>
	<ul style="list-style-type: none"> <li>• The data applies to BW..., BW...-T and BW...-P braking resistors.</li> <li>• For BW..., BW...-T and BW...-P braking resistors, plan for a load derating of 4 % per 10 K from an ambient temperature of 45 °C. Do not exceed a maximum ambient temperature of 80 °C.</li> <li>• The overload factor of the BW...-T and BW...-P braking resistors is limited by using an integrated temperature relay:             <ul style="list-style-type: none"> <li>– BW...-T up to overload factor 12</li> <li>– BW...-P up to overload factor 40</li> </ul> </li> <li>• The <b>maximum permitted line length</b> between <b>MOVIDRIVE®</b> and the braking resistor is <b>100 m</b>.</li> </ul>

**Parallel connection**

**Two braking resistors with the same value must be connected in parallel** for some inverter/resistor combinations. In this case, set the trip current on the bimetallic relay to twice the value of  $I_f$  entered in the table.

**Peak braking power**

Due to the DC link voltage and the resistance value, the peak braking power can be less than the load capacity of the braking resistor. The peak braking power is determined as follows:

$$P_{max} = \frac{U_{DC}^2}{R}$$

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$U_{DC}$  is the maximum permitted DC link voltage. Its value is

- for MOVIDRIVE® MDX60/61B...-5\_3 (AC 400/500 V units)  $V_{DC} = DC 970 V$  and
- for MOVIDRIVE® MDX61B...-2\_3 (AC 230 V units)  $V_{DC} = DC 485 V$ .



## Project Planning

### Selecting the braking resistor

The following table lists the peak braking power levels that are possible for the different resistance values.

Resistance value	Peak braking power	
	MDX60/61B...-5_3 (AC 400/500 V units)	MDX61B...-2_3 (AC 230 V units)
100 Ω	9.4 kW	2.3 kW
72 Ω	13.0 kW	3.2 kW
68 Ω	13.8 kW	3.2 kW
47 Ω	20.0 kW	5.0 kW
39 Ω	24.0 kW	6.0 kW
27 Ω	34.8 kW	8.7 kW
18 Ω	52.2 kW	13.0 kW
15 Ω	62.7 kW	15.6 kW
12 Ω	78.4 kW	19.6 kW
9 Ω (2 × BW018 parallel)	104 kW	26.1 kW
7.5 Ω (2 × BW915 parallel)	125 kW	31.3 kW
6 Ω	156 kW	39.2 kW
3 Ω (2 × BW106/206 parallel)	313 kW	78.4 kW

#### Assignment to AC 400/500 V units (...-5\_3)

Braking resistor type BW...	BW090-P52B	BW100-005	BW100-006	BW072-003	BW072-005	BW168	BW268
Part number	824 563 0	826 269 1	821 701 7	826 058 3	826 060 5	820,604 X	820 715 1
Braking resistor type BW...-T			<b>BW100-006-T</b>			<b>BW168-T</b>	<b>BW268-T</b>
Part number			1 820 419 8			1 820 133 4	1 820 417 1
Cont. braking power (= 100 % cdf)	0.10 kW	0.45 kW	0.6 kW	0.23 kW	0.45 kW	0.8 kW	1.2 kW
Load capacity at 50 % cdf <sup>1)</sup>	0.15 kW	0.60 kW	1.1 kW	0.31 kW	0.60 kW	1.4 kW	2.2 kW
25 % cdf	0.2 kW	0.83 kW	1.9 kW	0.42 kW	0.83 kW	2.6 kW	3.8 kW
12 % cdf	0.4 kW	1.11 kW	3.6 kW	0.58 kW	1.11 kW	4.8 kW	7.2 kW
6 % cdf	0.7 kW	2.00 kW	5.7 kW	1.00 kW	2.00 kW	7.6 kW	11 kW
Observe <b>regenerative power limit</b> of the inverter! (= 150 % of the recommended motor power → Technical Data)							
Resistance value $R_{BW}$	90 Ω ±35 %	100 Ω ±10 %		72 Ω ±10 %		68 Ω ±10 %	
Trip current (of F16) $I_F$	-	0.8 A <sub>RMS</sub>	2.4 A <sub>RMS</sub>	0.6 A <sub>RMS</sub>	1 A <sub>RMS</sub>	3.4 A <sub>RMS</sub>	4.2 A <sub>RMS</sub>
Design	PTC	Flat design	Wire resistor on ceramic core	Flat design		Wire resistor on ceramic core	
Connections/tightening torque	Cables	Cables	Ceramic terminals 2.5 mm <sup>2</sup> (AWG13) 0.5 Nm	Cables		Ceramic terminals 2.5 mm <sup>2</sup> (AWG13) 0.5 Nm	
Enclosure	IP20	IP54	IP20 (when installed)	IP54		IP20 (when installed)	
Ambient temperature $\vartheta_U$	-20 °C ... +40 °C						
Type of cooling	KS = Self-cooling						
for MOVIDRIVE®	0005 ... 0014	0005 ... 0022	0015 ... 0040	0005 ... 0014		0005 ... 0040	0015 ... 0040

1) cdf = Cyclic duration factor of the braking resistor based on a cycle duration  $T_D \leq 120$  s.



Braking resistor type BW...	BW147	BW247	BW347	BW039-012		
Part number	820 713 5	820 714 3	820 798 4	821 689 4		
Braking resistor type BW...-T	BW147-T	BW247-T	BW347-T	BW039-012-T	BW039-026-T	BW039-050-T
Part number	1 820 134 2	1 820 084 2	1 820 135 0	1 820 136 9	1 820 415 5	1 820 137 7
Cont. braking power (= 100 % cdf)	1.2 kW	2.0 kW	4.0 kW	1.2 kW	2.6 kW	5.0 kW
Load capacity at 50 % cdf <sup>1)</sup>	2.2 kW	3.6 kW	7.2 kW	2.1 kW	4.7 kW	8.5 kW
at 25 % cdf	3.8 kW	6.4 kW	12.8 kW	3.8 kW	8.3 kW	15.0 kW
12 % cdf	7.2 kW	12 kW	20 kW <sup>2)</sup>	7.2 kW	15.6 kW	24.0 kW <sup>2)</sup>
6 % cdf	11 kW	19 kW	20 kW <sup>2)</sup>	11.4 kW	24.0 kW <sup>2)</sup>	24.0 kW <sup>2)</sup>
Observe <b>regenerative power limit</b> of the inverter! (= 150 % of the recommended motor power → Technical Data)						
Resistance value $R_{BW}$	47 Ω ±10 %			39 Ω ±10 %		
Trip current (of F16) $I_F$	5 A <sub>RMS</sub>	6.5 A <sub>RMS</sub>	9.2 A <sub>RMS</sub>	5.5 A <sub>RMS</sub>	8.1 A <sub>RMS</sub>	11.3 A <sub>RMS</sub>
Design	Wire resistor on ceramic core					Grid resistor
Connections/ tightening torque	Ceramic terminals 2.5 mm <sup>2</sup> (AWG13) / 0.5 Nm BW347-T: Ceramic terminals 10 mm <sup>2</sup> (AWG8) / 1.6 Nm					M8 stud / 6 Nm
Enclosure	IP20 (when installed)					
Ambient temperature $\vartheta_U$	-20 °C ... +40 °C					
Type of cooling	KS = Self-cooling					
for MOVIDRIVE®	0055/0075			0110		

- 1) cdf = Cyclic duration factor of the braking resistor based on a cycle duration  $T_D \leq 120$  s.
- 2) Physical power limit due to DC link voltage and resistance value.

Braking resistor type BW...	BW018-015			
Part number	821 684 3			
Braking resistor type BW...-T/P	BW018-015-P	BW018-035-T	BW018-075-T	BW915-T
Part number	1 820 416 3	1 820 138 5	1 820 139 3	1 820 413 9
Cont. braking power (= 100 % cdf)	1.5 kW	3.5 kW	7.5 kW	16 kW
Load capacity at 50 % cdf <sup>1)</sup>	2.5 kW	5.9 kW	12.7 kW	27.2 kW
at 25 % cdf	4.5 kW	10.5 kW	22.5 kW	48 kW
12 % cdf	6.7 kW	15.7 kW	33.7 kW	62.7 kW <sup>2)</sup>
6 % cdf	11.4 kW	26.6 kW	52.2 kW <sup>2)</sup>	62.7 kW <sup>2)</sup>
Observe <b>regenerative power limit</b> of the inverter! (= 150 % of the recommended motor power → Technical Data)				
Resistance value $R_{BW}$	18 Ω ±10 %			15 Ω ±10 %
Trip current (of F16) $I_F$	9.1 A <sub>RMS</sub>	13.9 A <sub>RMS</sub>	20.4 A <sub>RMS</sub>	32.6 A <sub>RMS</sub>
Design	Wire resistor on ceramic core	Steel-grid resistor		
Connections/ tightening torque	BW018-015: Ceramic terminals 2.5 mm <sup>2</sup> (AWG13) / 0.5 Nm BW018-015-P: Terminal 2.5 mm <sup>2</sup> (AWG13) / 1 Nm	M8 bolt / 6 Nm		
Enclosure	IP20 (when installed)			
Ambient temperature $\vartheta_U$	-20 °C ... +40 °C			
Type of cooling	KS = Self-cooling			
for MOVIDRIVE®	0150/0220 and 2 × parallel for 0370/0450 <sup>3)</sup>			0220

- 1) cdf = Cyclic duration factor of the braking resistor based on a cycle duration  $T_D \leq 120$  s.
- 2) Physical power limit due to DC link voltage and resistance value.
- 3) When connected in parallel, the load capacity and trip current are doubled.



## Project Planning

### Selecting the braking resistor

Braking resistor type BW...-	BW012-025				
Part number	821 680 0				
Braking resistor type BW...-T/-P	BW012-025-P	BW012-050T	BW012-100-T	BW106-T	BW206-T
Part number	1 820 414 7	1 820 140 7	1 820 141 5	1 820 083 4	1 820 412 0
Cont. braking power (= 100 % cdf)	2.5 kW	5.0 kW	10 kW	13.5 kW	18 kW
Load capacity at					
50 % cdf <sup>1)</sup>	4.2 kW	8.5 kW	17 kW	23 kW	30.6 kW
25 % cdf	7.5 kW	15.0 kW	30 kW	40 kW	54 kW
12 % cdf	11.2 kW	22.5 kW	45 kW	61 kW	81 kW
6 % cdf	19.0 kW	38.0 kW	76 kW	102 kW	136.8 kW
Observe <b>regenerative power limit</b> of the inverter! (= 150 % of the recommended motor power → Technical Data)					
Resistance value $R_{BW}$	12 $\Omega$ $\pm$ 10 %			6 $\Omega$ $\pm$ 10 %	
Trip current (of F16) $I_F$	14.4 A <sub>RMS</sub>	20.4 A <sub>RMS</sub>	28.8 A <sub>RMS</sub>	47.4 A <sub>RMS</sub>	54.7 A <sub>RMS</sub>
Design	Steel-grid resistor				
Connections/ tightening torque	Ceramic terminals 2.5 mm <sup>2</sup> (AWG13) / 0.5 Nm BW012-025-P: Terminals 4 mm <sup>2</sup> (AWG12) / 1 Nm			M8 bolt / 6 Nm	
Enclosure	IP20 (when installed)				
Ambient temperature $\vartheta_U$	-20 °C ... +40 °C				
Type of cooling	KS = Self-cooling				
for MOVIDRIVE®	0300			0370...0750 and 2 × parallel for 0900/1100/1320 <sup>2)</sup>	

- 1) cdf = Cyclic duration factor of the braking resistor based on a cycle duration  $T_D \leq 120$  s.
- 2) When connected in parallel, the load capacity and trip current are doubled.



**Assignment to AC 230 V units (...-2\_3)**

Braking resistor type BW...	BW039-003	BW039-006	BW039-012		BW027-006	BW027-012		
Part number	821 687 8	821 688 6	821 689 4		822 422 6	822 423 4		
Braking resistor type BW...T			BW039-012-T	BW039-026-T			BW018-015-T	BW018-035-T
Part number			1 820 136 9	1 820 415 5			1 820 416 3	1 820 138 5
Cont. braking power (= 100 % cdf)	0.3 kW	0.6 kW	1.2 kW	2.6 kW	0.6 kW	1.2 kW	1.5 kW	3.5 kW
Load capacity at 50 % cdf <sup>1)</sup>	0.5 kW	1.1 kW	2.1 kW	4.6 kW	1.1 kW	2.1 kW	2.5 kW	5.9 kW
at 25 % cdf	1.0 kW	1.9 kW	3.8 kW	6.0 kW <sup>2)</sup>	1.9 kW	3.8 kW	4.5 kW	10.5 kW
12 % cdf	1.8 kW	3.6 kW	6.0 kW <sup>2)</sup>	6.0 kW <sup>2)</sup>	3.6 kW	7.2 kW	6.7 kW	13.0 kW <sup>2)</sup>
6 % cdf	2.8 kW	5.7 kW	6.0 kW <sup>2)</sup>	6.0 kW <sup>2)</sup>	5.7 kW	8.7 kW <sup>2)</sup>	11.4 kW	13.0 kW <sup>2)</sup>
Observe <b>regenerative power limit</b> of the inverter! (= 150 % of the recommended motor power → Technical Data)								
Resistance value $R_{BW}$	39 Ω ±10 %				27 Ω ±10 %		18 Ω ±10 %	
Trip current (of F16) $I_F$	2.7 A <sub>RMS</sub>	3.9 A <sub>RMS</sub>	5.5 A <sub>RMS</sub>	8.1 A <sub>RMS</sub>	4.7 A <sub>RMS</sub>	6.6 A <sub>RMS</sub>	9.1 A <sub>RMS</sub>	13.9 A <sub>RMS</sub>
Design	Wire resistor						Steel-grid resistor	
Connections/tightening torque	Ceramic terminals 2.5 mm <sup>2</sup> (AWG12) / 0.5 Nm							M8 stud / 6 Nm
Enclosure	IP20 (when installed)							
Ambient temperature $\vartheta_U$	-20 °C ... +40 °C							
Type of cooling	KS = Self-cooling							
for MOVIDRIVE®	0015/0022				0015...0037		2 × parallel with 0110 <sup>3)</sup>	

- 1) cdf = Cyclic duration factor of the braking resistor based on a cycle duration  $T_D \leq 120$  s.
- 2) Physical power limit due to DC link voltage and resistance value.
- 3) When connected in parallel, the load capacity and trip current are doubled.

Braking resistor type BW...T	BW018-075-T	BW915-T	BW012-025-T	BW012-050-T	BW012-100-T	BW106-T	BW206-T
Part number	1 820 139 3	1 820 413 9	1 820 414 7	1 820 140 7	1 820141 5	1 820 083 4	1 820 4120
Cont. braking power (= 100 % cdf)	7.5 kW	15.6 kW <sup>2)</sup>	2.5 kW	5.0 kW	10 kW	13.5 kW	18 kW
Load capacity at 50 % cdf <sup>1)</sup>	12.7 kW	15.6 kW <sup>2)</sup>	4.2 kW	8.5 kW	17 kW	23 kW	30.6 kW
at 25 % cdf	13.0 kW <sup>2)</sup>	15.6 kW <sup>2)</sup>	7.5 kW	15.0 kW	19.6 kW <sup>2)</sup>	39.2 kW <sup>2)</sup>	39.2 kW <sup>2)</sup>
12 % cdf	13.0 kW <sup>2)</sup>	15.6 kW <sup>2)</sup>	11.2 kW	19.6 kW <sup>2)</sup>	19.6 kW <sup>2)</sup>	39.2 kW <sup>2)</sup>	39.2 kW <sup>2)</sup>
6 % cdf	13.0 kW <sup>2)</sup>	15.6 kW <sup>2)</sup>	19.0 kW	19.6 kW <sup>2)</sup>	19.6 kW <sup>2)</sup>	39.2 kW <sup>2)</sup>	39.2 kW <sup>2)</sup>
Observe <b>regenerative power limit</b> of the inverter! (= 150 % of the recommended motor power → Technical Data)							
Resistance value $R_{BW}$	18 Ω ±10 %	15 Ω ±10 %	12 Ω ±10 %			6 Ω ±10 %	
Trip current (of F16) $I_F$	20.4 A <sub>RMS</sub>	32.6 A <sub>RMS</sub>	14.4 A <sub>RMS</sub>	20.4 A <sub>RMS</sub>	28.8 A <sub>RMS</sub>	47.4 A <sub>RMS</sub>	54.7 A <sub>RMS</sub>
Design	Steel-grid resistor						
Connections/tightening torque	M8 stud / 6 Nm						
Enclosure	IP20 (when installed)						
Ambient temperature $\vartheta_U$	-20 °C ... +40 °C						
Type of cooling	KS = Self-cooling						
for MOVIDRIVE®	2 × parallel with 0110 <sup>3)</sup>		0055/0075			0150 and 2 × parallel with 0220/0300 <sup>3)</sup>	

- 1) cdf = Cyclic duration factor of the braking resistor based on a cycle duration  $T_D \leq 120$  s.
- 2) Physical power limit due to DC link voltage and resistance value.
- 3) When connected in parallel, the load capacity and trip current are doubled.



## Project Planning

### Selecting the braking resistor

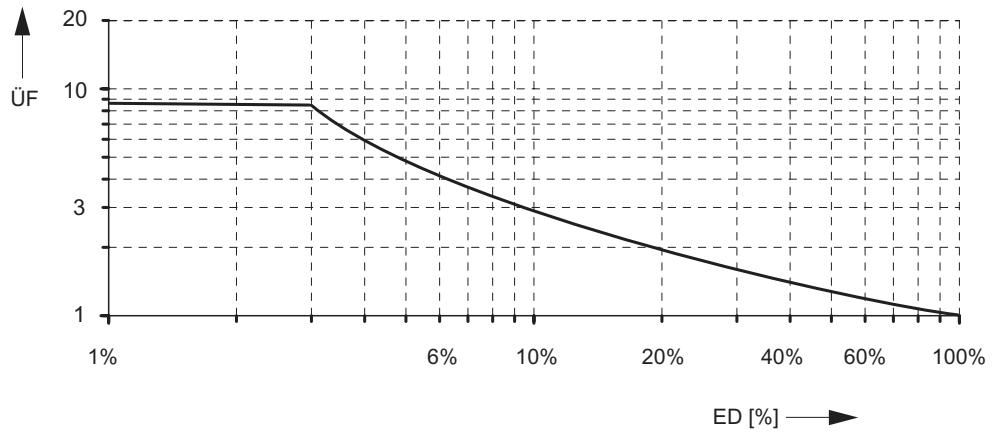
#### Overload factor for braking resistors

In braking operations within the cycle duration  $T_D$  (standard:  $T_D \leq 120$  s), the resulting cdf braking power can be determined using the overload factor ( $\rightarrow$  following diagrams). When determining the load capacity, take account of the peak brake power due to the DC link voltage.

The cdf braking power is calculated using the following formula:

$$\text{cdf braking power} = \text{continuous braking power} \times \text{overload factor}$$

#### Overload factor for flat-type braking resistors



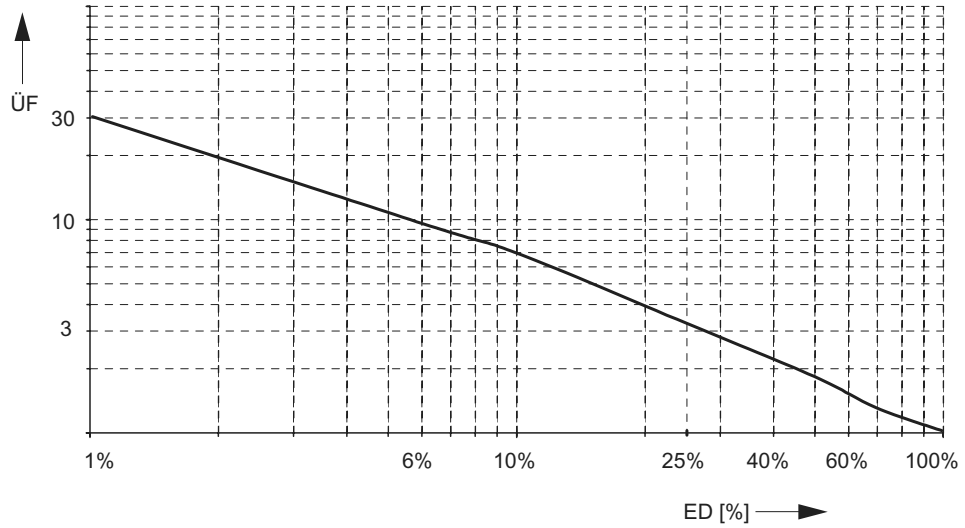
59008AXX

Figure 112: Overload factor depending on the cyclic duration factor for flat-type braking resistors

Cyclic duration factor (cdf)	1 %	3 %	6 %	15 %	25 %	40 %	60 %	80 %	100 %
Overload factor (ÜF)	8.7	8.6	4	2.6	1.83	1.5	1.2	1.12	1



Overload factor for  
wire resistors on  
ceramic core

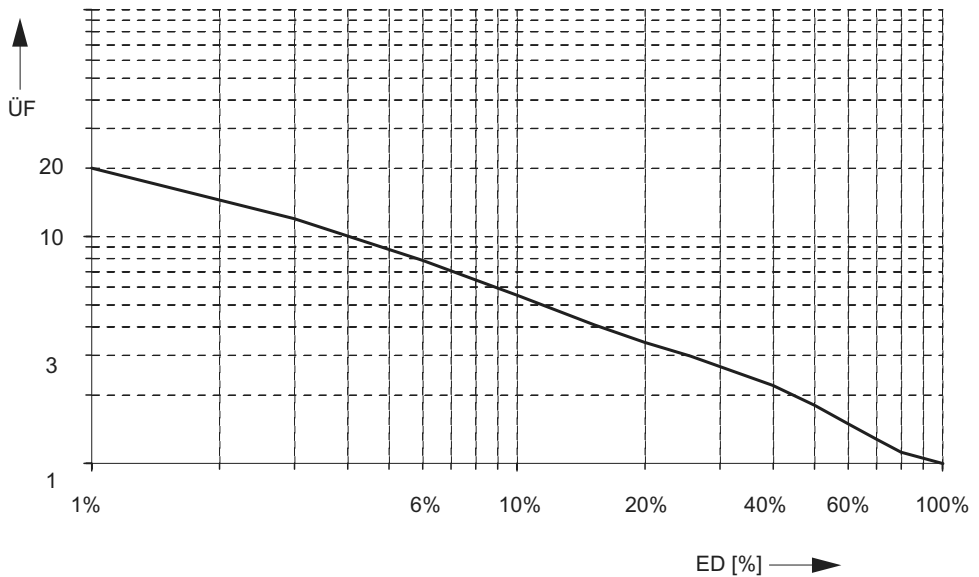


58875AXX

Figure 113: Overload factor depending on the cyclic duration factor for wire resistors

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

Overload factor for  
grid resistors



58876AXX

Figure 114: Overload factor depending on the cyclic duration factor for grid resistors

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



#### Calculation example

Given:

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

Required:

- Braking resistor BW..

#### Procedure

##### 1. Determine the overload capacity.

First determine the overload factor for a cyclic duration factor cdf of 6 % from the respective diagrams.

##### 2. Calculate the continuous braking power.

Calculate the continuous braking power (= 100 % cdf braking power) using the following formula:

Mean braking power / overload factor

Results:

100 % cdf braking power for wire resistors: 685 W.

100 % cdf braking power for grid resistors: 856 W.

##### 3. Determine the maximum braking resistor value depending on **MOVIDRIVE® B**.

For a **MDX60B/61B...-5\_3 (AC 400/500 V unit)**, the **maximum braking resistor value is 72 Ω** at a peak braking power of 13 kW (→ table peak braking power).

For a **MDX60B/61B...-2\_3 (AC 230 V unit)**, the **maximum braking resistor value is 18 Ω** at a peak braking power of 13 kW (→ table peak braking power).

##### 4. Select the matching braking resistor:

Select the matching braking resistor from the assignment tables (AC 400/500 V units or AC 230 V units) on the basis of the following aspects:

- Maximum braking resistance value
- **MOVIDRIVE® B** unit used

Result when using, for example, MDX61B0110-5\_3: BW039-012 (or braking resistor with higher power)


Result when using, for example, MDX61B0110-2\_3: BW018-015-T (or braking resistor with higher power)



#### 4.9 Connecting AC brakemotors

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

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

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

#### **Disconnecting the brake rectifier**

The brake rectifier can be switched off, causing the brake to be applied, in two ways:

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

Always disconnect the brake in the DC and AC circuits in:

- All hoist applications
- The CFC and SERVO operating modes


#### **Activating the brake**

Always activate the brake via binary output DBØØ "/Brake", do not use the PLC!

The binary output DBØØ "/Brake" is configured as an output for operating a relay with free-wheeling diode with a control voltage of DC+24 V / max. 150 mA / 3.6 W. This means a power contactor can be controlled directly with a DC 24 V coil voltage or the BMK brake rectifier. This power contactor is used for switching the brake.


The startup function in the DBG60B keypad and in the MOVITOOLS® operating software sets the brake parameters for the 2 and 4-pole motors from SEW-EURODRIVE. The brake parameters (P73\_) must be set manually for SEW-EURODRIVE motors with a higher number of poles and non-SEW motors.

#### **Brake parameters**

	<b>NOTE</b>
	The brake parameters are adapted to the brake activation arrangement shown in the wiring diagram. If the values set for the brake release and application times are too short, e.g. for long response times in the brake control system, hoists, for example, may sag.




#### 4.10 Permitted voltage supply systems for MOVIDRIVE® B

	<b>NOTE</b>
	<p>MOVIDRIVE® B is intended for operation on voltage supply systems with a directly grounded star point (TN and TT power systems). Operation on voltage supply systems with a non-grounded star point (for example IT power systems) is also permitted. In such a case, SEW-EURODRIVE recommends using earth-leakage monitors employing pulse-code measurement. Using such devices prevents the earth-leakage monitor mis-tripping due to the ground capacitance of the inverter.</p>

#### 4.11 Input contactors and input fuses

**Input contactor** • Use only input contactors in utilization category AC-3 (EN60947-4-1).

	<b>STOP!</b>
	<ul style="list-style-type: none"> <li>• Do not use the <b>input contactor K11</b> (→ MOVIDRIVE® MDX60B/61B operating instructions, section "Wiring diagram for basic unit") for jog mode but <b>only to switch the inverter on and off</b>. For jog mode, use the commands "Enable/Stop", "CW/Stop" or "CCW/Stop".</li> <li>• Observe a minimum switch-off time of 10 s for the input contactor K11.</li> </ul>

**Input fuse types**

Line protection types in the operating classes gL, gG:

- Rated fusing voltage  $\geq$  Rated supply voltage
- Depending on the inverter utilization, rated fusing currents have to be designed for 100% or 125 % of the rated inverter currents.

Line protection switches with characteristics B, C:

- Line protection rated voltage  $\geq$  rated supply voltage
- Rated line protection currents must be 10 % above the rated inverter current.



### 4.12 Supply system cables and motor cables

**Special regulations** Comply with the regulations issued by specific countries and for specific machines regarding fusing and the selection of cable cross sections. If required, also adhere to the notes on **UL compliant installation** (→ Section "UL compliant installation").

**Cable cross sections and fusing** If single-core copper cables with PVC insulation routed in cable ducts are used, SEW-EURODRIVE proposes the following line cross sections and fusing for an ambient temperature of 25 °C and rated system currents of 100 % of the rated inverter current:

#### AC 400/500 V units metric, $V_{mains} = 3 \times AC 400 V$ :

MDX60/61B...-5A3	0005	0008	0011	0014	0015	0022	0030	0040
Size	0S		0M		1			
Fuses F11/F12/F13 $I_N$	16 A				16 A			
Mains conductor L1/L2/L3	1.5 mm <sup>2</sup>				1.5 mm <sup>2</sup>			
PE conductor	2 × 1.5 mm <sup>2</sup> or 1 × 10 mm <sup>2</sup>				2 × 1.5 mm <sup>2</sup> or 1 × 10 mm <sup>2</sup>			
Motor line U/V/W	1.5 mm <sup>2</sup>				1.5 mm <sup>2</sup>			
Unit terminal cross section of the power section	Separable terminal strip 4 mm <sup>2</sup> conductor end sleeve DIN 46228				Separable terminal strip 4 mm <sup>2</sup> conductor end sleeve DIN 46228			
Tightening torque	0.6 Nm							

MDX61B...-503	0055	0075	0110	0150	0220	0300
Size	2S		2	3		
Fuses F11/F12/F13 $I_N$	16 A		25 A	35 A	50 A	63 A
Mains conductor L1/L2/L3	4 mm <sup>2</sup>		4 mm <sup>2</sup>	6 mm <sup>2</sup>	10 mm <sup>2</sup>	16 mm <sup>2</sup>
PE conductor	2 × 4 mm <sup>2</sup> or 1 × 10 mm <sup>2</sup>			2 × 6 mm <sup>2</sup> or 1 × 10 mm <sup>2</sup>	1 × 10 mm <sup>2</sup>	1 × 16 mm <sup>2</sup>
Motor line U/V/W	1.5 mm <sup>2</sup>	2.5 mm <sup>2</sup>	4 mm <sup>2</sup>	6 mm <sup>2</sup>	10 mm <sup>2</sup>	16 mm <sup>2</sup> 1)
Unit terminal cross section of the power section	Terminal strips 4 mm <sup>2</sup> conductor end sleeve DIN 46228		M4 screw and washer assembly with terminal clip 4 mm <sup>2</sup> conductor end sleeve DIN 46228 6 mm <sup>2</sup> crimp cable lug DIN 46234	M6 screw and washer assembly with washer max. 25 mm <sup>2</sup> Crimp cable lug DIN 46234		
Tightening torque	1.5 Nm			3.5 Nm		

1) With synchronous servo drives: Use a motor feeder with a 10 mm<sup>2</sup> cross section due to the connector on the CM motor!

MDX61B...-503	0370	0450	0550	0750	0900	1100	1320
Size	4		5		6		
Fuses F11/F12/F13 $I_N$	80 A	100 A		125 A	160 A	200 A	250 A
Mains conductor L1/L2/L3	25 mm <sup>2</sup>	35 mm <sup>2</sup>		50 mm <sup>2</sup>	70 mm <sup>2</sup>	95 mm <sup>2</sup>	150 mm <sup>2</sup>
PE conductor	1 × 16 mm <sup>2</sup>			25 mm <sup>2</sup>	35 mm <sup>2</sup>	50 mm <sup>2</sup>	70 mm <sup>2</sup>
Motor line U/V/W	25 mm <sup>2</sup> 1)	35 mm <sup>2</sup>		50 mm <sup>2</sup>	70 mm <sup>2</sup>	95 mm <sup>2</sup>	150 mm <sup>2</sup>
Unit terminal cross section of the power section	M10 bolt with nut max. 70 mm <sup>2</sup> Press cable lug DIN 46235				M12 bolt with nut max. 185 mm <sup>2</sup> Press cable lug DIN 46235		
Tightening torque	14 Nm				20 Nm		

1) With synchronous servo drives: Use a motor feeder with a 10 mm<sup>2</sup> cross section due to the connector on the CM motor!



## Project Planning

### Supply system cables and motor cables

#### AC 230 V units metric, $V_{mains} = 3 \times AC\ 230\ V$ :

MDX61B...-2_3	0015	0022	0037	0055	0075
Size	1			2	
Fuses F11/F12/F13 $I_N$	16 A		25 A	25 A	35 A
Mains conductor L1/L2/L3	1.5 mm <sup>2</sup>		4 mm <sup>2</sup>	4 mm <sup>2</sup>	6 mm <sup>2</sup>
PE conductor	2 × 1.5 mm <sup>2</sup> 1 × 10 mm <sup>2</sup>		2 × 4 mm <sup>2</sup> 1 × 10 mm <sup>2</sup>	2 × 4 mm <sup>2</sup> 1 × 10 mm <sup>2</sup>	2 × 6 mm <sup>2</sup> 1 × 10 mm <sup>2</sup>
Motor line U/V/W	1.5 mm <sup>2</sup>		4 mm <sup>2</sup>	4 mm <sup>2</sup>	6 mm <sup>2</sup>
Unit terminal cross section of the power section	Separable terminal strip 4 mm <sup>2</sup> conductor end sleeve DIN 46228			M4 screw and washer assembly with terminal clip 4 mm <sup>2</sup> conductor end sleeve DIN 46228 6 mm <sup>2</sup> crimp cable lug DIN 46234	
Tightening torque	0.6 Nm				

MDX61B...-2_3	0110	0150	0220	0300
Size	3		4	
Fuses F11/F12/F13 $I_N$	50 A	63 A	80 A	100 A
Mains conductor L1/L2/L3	10 mm <sup>2</sup>	16 mm <sup>2</sup>	25 mm <sup>2</sup>	35 mm <sup>2</sup>
PE conductor	1 × 10 mm <sup>2</sup>	1 × 16 mm <sup>2</sup>	1 × 16 mm <sup>2</sup>	1 × 16 mm <sup>2</sup>
Motor line U/V/W	10 mm <sup>2</sup>	16 mm <sup>2</sup>	25 mm <sup>2</sup>	35 mm <sup>2</sup>
Unit terminal cross section of the power section	M6 screw and washer assembly with washer max. 25 mm <sup>2</sup> Crimp cable lug DIN 46234		M10 bolt with nut max. 70 mm <sup>2</sup> Press cable lug DIN 46235	
Tightening torque	3.5 Nm		14 Nm	

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

As stipulated in EN 61800-5-1, the distance between a power connection terminal and an obstruction toward which the wire is directed on leaving the terminal must correspond with the minimum values given in the table below.

Cable cross section [mm <sup>2</sup> ]	Smallest wire bending space [mm]		
	Wires per connection terminal		
	1	2	3
10 ... 16	40	-	-
25	50	-	-
35	65	-	-
50	125	125	180
70	150	150	190
95	180	180	205
120	205	205	230
150	255	255	280
185	305	305	330



**AC 400/500 V units to USA NEC,  $V_{mains} = 3 \times AC 460 V$ :**

MDX61B...-5A3	0005	0008	0011	0014	0015	0022	0030	0040
Size	0S		0M		1			
Fuses F11/F12/F13 $I_N$	6 A	6 A		6 A	6 A	10A		15 A
Mains conductor L1/L2/L3	AWG14				AWG14			
PE conductor	AWG14				AWG14			
Motor line U/V/W	AWG14				AWG14			
Unit terminal cross section of the power section	Separable terminal strip AWG10 conductor end sleeve				Separable terminal strip AWG10 conductor end sleeve			
Tightening torque	0.6 Nm							

MDX61B...-503	0055	0075	0110	0150	0220	0300	
Size	2S		2		3		
Fuses F11/F12/F13 $I_N$	20 A		30 A		40 A	60 A	80 A
Mains conductor L1/L2/L3	AWG12		AWG10		AWG8	AWG6	AWG4
PE conductor	AWG12		AWG10		AWG10		AWG8
Motor line U/V/W	AWG12		AWG10		AWG8	AWG6 <sup>1)</sup>	AWG4 <sup>1)</sup>
Unit terminal cross section of the power section	Terminal strips 4 mm <sup>2</sup> conductor end sleeve DIN 46228		M4 screw and washer assembly with terminal clip AWG10 conductor end sleeve AWG10 crimp cable lug		M6 screw and washer assembly with washer max. AWG4 crimp cable lug		
Tightening torque			1.5 Nm		3.5 Nm		

1) With synchronous servo drives: Use a motor feeder with a 10 mm<sup>2</sup> cross section due to the connector on the CM motor!

MDX61B...-503	0370	0450	0550	0750	0900	1100	1320
Size	4		5		6		
Fuses F11/F12/F13 $I_N$	90 A	110 A	150 A	175 A	175 A	200 A	230 A
Mains conductor L1/L2/L3	AWG4	AWG3	AWG1	AWG2/0	AWG2/0	AWG3/0	AWG4/0
PE conductor	AWG8	AWG6	AWG6		AWG6	AWG6	AWG4
Motor line U/V/W	AWG4 <sup>1)</sup>	AWG3	AWG1	AWG2/0	AWG2/0	AWG3/0	Kcmil 250
Unit terminal cross section of the power section	M10 bolt with nut max. AWG2/0 crimp cable lug				M12 bolt with nut max. Kcmil 350 Crimp cable lug		
Tightening torque	14 Nm				20 Nm		

1) With synchronous servo drives: Use a motor feeder with a 10 mm<sup>2</sup> cross section due to the connector on the CM motor!

**AC 230 V units to USA NEC,  $V_{mains} = 3 \times AC 230 V$ :**

MDX61B...-2_3	0015	0022	0037	0055	0075
Size	1			2	
Fuses F11/F12/F13 $I_N$	16 A		25 A	25 A	35 A
Mains conductor L1/L2/L3	AWG14		AWG12	AWG10	
PE conductor	AWG14		AWG12	AWG10	
Motor line U/V/W	AWG14		AWG12	AWG10	
Unit terminal cross section of the power section	Separable terminal strip AWG10 conductor end sleeve			M4 screw and washer assembly with terminal clip AWG10 conductor end sleeve AWG10 crimp cable lug	
Tightening torque	0.6 Nm				

MDX61B...-2_3	0110	0150	0220	0300
Size	3		4	
Fuses F11/F12/F13 $I_N$	50 A	60 A	80 A	90 A
Mains conductor L1/L2/L3	AWG6	AWG4	AWG4	AWG3
PE conductor	AWG10	AWG8	AWG8	AWG6
Motor line U/V/W	AWG6	AWG4	AWG4	AWG3



MDX61B...-2_3	0110	0150	0220	0300
Unit terminal cross section of the power section	M6 screw and washer assembly with washer max. AWG4 crimp cable lug		M10 bolt with nut max. AWG2/0 crimp cable lug	
Tightening torque	3.5 Nm		14 Nm	

### Permitted motor line lengths

The maximum motor line length depends on:

- Cable type
- Voltage drop in the cable
- Set PWM frequency P860/P861.
- An HF... output filter can only be connected for VFC operating mode. If an HF... output filter is connected, the cable length is not restricted by these limit values, but exclusively by the voltage drop along the motor lead.
- For encoder connection (VFC-n, CFC, SERVO): Maximum cable length for the encoder connection is 100 m at a capacitance per unit length  $\leq 120$  nF/km.

The following data applies by approximation:

### MOVIDRIVE® MDX60/61B...-5\_3:

MDX60/61B...-5_3 At $V_{\text{mains}} = 3 \times \text{AC } 400 \text{ V}$	0005...0014	0015	0022	0030	0040	0055	0075...1320
Recommended maximum motor line length [m]							
Shielded line							
PWM frequency (P860/P861)	120	120	200	250	300	300	400
4 kHz	80	80	120	150	250	250	300
8 kHz	50	50	80	120	200	200	250
12 kHz	40	40	60	100	150	150	200
16 kHz							
Unshielded line							
PWM frequency (P860/P861)	360	360	600	750	900	900	1200
4 kHz	240	240	360	450	750	750	900
8 kHz	150	150	240	360	600	600	750
12 kHz	120	120	180	300	450	450	600
16 kHz							

### MOVIDRIVE® MDX61B...-2\_3:

MDX61B...-2_3 At $V_{\text{mains}} = 3 \times \text{AC } 230 \text{ V}$	0015	0022	0037	0055	0075	0110 ... 0300
Recommended maximum motor line length [m]						
Shielded line						
PWM frequency (P860/P861)	120	200	250	300	300	400
4 kHz	80	120	150	250	250	300
8 kHz	50	80	120	200	200	250
12 kHz	40	60	100	150	150	200
16 kHz						
Unshielded line						
PWM frequency (P860/P861)	360	600	750	900	900	1200
4 kHz	240	360	450	750	750	900
8 kHz	150	240	360	600	600	750
12 kHz	120	180	300	450	450	600
16 kHz						

### NOTE



SEW-EURODRIVE recommends that you do not use an earth-leakage circuit breaker with long motor cables. The earth-leakage currents caused by cable capacitance may cause mis-tripping.



**Voltage drop**

The line cross section of the motor lead should be selected so the **voltage drop is as small as possible**. An excessively large voltage drop means that the full motor torque is not achieved.

The expected voltage drop can be determined using the following tables (the voltage drop can be calculated in proportion to the length if the cables are shorter or longer).

Line Cross section	Load with I [A] =																		
	4	6	8	10	13	16	20	25	30	40	50	63	80	100	125	150	200	250	300
<b>Copper</b>	Voltage drop $\Delta U$ [V] with length = 100 m and $\vartheta = 70$ °C																		
1.5 mm <sup>2</sup>	5.3	8	10.6	13.3	17.3	21.3	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
2.5 mm <sup>2</sup>	3.2	4.8	6.4	8.1	10.4	12.8	16	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
4 mm <sup>2</sup>	1.9	2.8	3.8	4.7	6.5	8.0	10	12.5	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
6 mm <sup>2</sup>					4.4	5.3	6.4	8.3	9.9	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
10 mm <sup>2</sup>						3.2	4.0	5.0	6.0	8.2	10.2	1)	1)	1)	1)	1)	1)	1)	1)
16 mm <sup>2</sup>								3.3	3.9	5.2	6.5	7.9	10.0	1)	1)	1)	1)	1)	1)
25 mm <sup>2</sup>									2.5	3.3	4.1	5.1	6.4	8.0	1)	1)	1)	1)	1)
35 mm <sup>2</sup>											2.9	3.6	4.6	5.7	7.2	8.6	1)	1)	1)
50 mm <sup>2</sup>														4.0	5.0	6.0	1)	1)	1)
70 mm <sup>2</sup>																	4.6	1)	1)
95 mm <sup>2</sup>																	3.4	4.2	1)
150 mm <sup>2</sup>																		2.7	3.3
185 mm <sup>2</sup>																			2.7

1) Load not permitted according to IEC60364-5-52.

Line Cross section	Load with I [A] =																		
	4	6	8	10	13	16	20	25	30	40	50	63	80	100	125	150	200	250	300
<b>Copper</b>	Voltage drop $\Delta U$ [V] with length = 100 m and $\vartheta = 70$ °C																		
AWG16	7.0	10.5	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
AWG14	4.2	6.3	8.4	10.5	13.6	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
AWG12	2.6	3.9	5.2	6.4	8.4	10.3	12.9	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
AWG10					5.6	6.9	8.7	10.8	13.0	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
AWG8						4.5	5.6	7.0	8.4	11.2	1)	1)	1)	1)	1)	1)	1)	1)	1)
AWG6								4.3	5.1	6.9	8.6	10.8	13.7	1)	1)	1)	1)	1)	1)
AWG4									3.2	4.3	5.4	6.8	8.7	10.8	13.5	1)	1)	1)	1)
AWG3									2.6	3.4	4.3	5.1	6.9	8.6	10.7	12.8	13.7	1)	1)
AWG2											3.4	4.2	5.4	6.8	8.5	10.2	10.9	13.6	1)
AWG1												3.4	4.3	5.4	6.8	8.1	8.6	10.8	13.5
AWG1/0												2.6	3.4	4.3	5.4	6.4	6.7	8.6	10.7
AWG2/0													2.7	3.4	4.3	5.1	5.4	6.8	8.5
AWG3/0														2.6	3.3	4.0	4.1	5.2	6.5
AWG4/0															3.1	3.8	4.0	5.0	6.2
Kcmil 250																3.0	3.2	4.0	5.0

1) More than 3 % voltage drop in relation to  $V_{mains} = AC 460 V$ .



#### 4.13 Group drive in VFC mode

In VFC & GROUP operating mode, a group of asynchronous motors can be operated on one inverter. In this operating mode, the inverter operates without slip compensation and with a constant V/f ratio. The motors are operated without encoder feedback.

	<b>NOTE</b>
	The parameter settings apply to all connected motors.

**Motor currents** The total of the rated motor currents must not exceed the rated output current of the inverter.

**Motor lines and fusing** Comply with the **regulations issued by specific countries and for specific machines** regarding fusing and the selection of cable cross sections.

The permitted length of all motor lines connected in parallel is determined as follows:

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

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$l_{tot}$  = Total length of the motor lines connected in parallel

$l_{max}$  = Recommended maximum motor line length (→ page 308)

$n$  = Number of motors connected in parallel

No additional fusing is required if the cross section of the motor line corresponds to that of the supply system lead. If the cross section of the motor line is smaller than that of the supply system lead, then you have to protect the motor line with fusing matching the respective cross section. Motor protection switches are suitable for this purpose.

**Motor size** The motors in a group must not be more than three motor types apart.

**Output filter** Usually no output filter is required for groups with 2 to 3 motors. An output filter HF... is required if the maximum motor cable length ( $l_{max}$ ) given in the table is not adequate. This may be the case in large groups ( $n$ ) or when there are long motor cable lengths connected in parallel ( $l_{tot}$ ). In this case, the maximum motor line length is not limited by the limit value given in the table but by the voltage drop on the motor line. The sum of the rated motor currents must not exceed the rated through current of the output filter.



#### 4.14 Connecting explosion-proof AC motors

Observe the following instructions when connecting explosion-proof AC motors to MOVIDRIVE<sup>®</sup> B drive inverters:

- The inverter must be installed outside the potentially explosive area.
- Comply with the industry and company specific regulations.
- Comply with the regulations and notes of the motor manufacturers concerning operation on a frequency inverter, for example a sine filter may be mandatory.
- In future, all tools and fixtures in the potentially explosive atmosphere must comply with directive 94/9/EC (ATEX 100a).
- The TF/TH input of the MOVIDRIVE<sup>®</sup> B unit must not be used for thermal monitoring of the motor. Use a TF/TH trip switch for thermal monitoring that is approved for use in potentially explosive atmospheres.
- If the motor is equipped with speed feedback, the speed sensor must also be approved for use in potentially explosive atmospheres. The speed sensor can be directly connected to MOVIDRIVE<sup>®</sup> B.



### 4.15 Components for EMC compliant installation

MOVIDRIVE<sup>®</sup> drive inverters and regenerative power supply units are designed for use as components for installation in machinery and systems. They comply with the EMC product standard EN 61800-3 "Variable-speed electrical drives." Provided the information relating to EMC compliant installation is observed, the devices satisfy the appropriate requirements for CE-marking of the entire machine/system in which they are fitted, on the basis of the EMC Directive 89/336/EEC.

MOVIDRIVE<sup>®</sup> MDX60/61B drive inverters of size 0, 1 and 2 are equipped with a line filter as standard. These units comply with limit class A to EN 55011 and EN 55014 on the line side without further measures.

#### Interference immunity

With regard to interference immunity, MOVIDRIVE<sup>®</sup> meets **all** the requirements stipulated in EN 61000-6-2 and EN 61800-3.

#### Interference emission

Higher levels of interference are permitted in industrial environments. In industrial environments, it may be possible to dispense with the measures listed below depending on the situation of the supply system (mains) and the system configuration.

#### Limit value class A

Three options are available for EMC-compliant installation in accordance with EN 55011, **class A limit**, depending on the machine configuration:

Limit value class A	on the motor end	on the supply end	
	Sizes 0 to 6	Sizes 0 to 2	Sizes 3 to 6
1. Option	HD... output choke	No measure required	NF...-... line filter
2. Option	Shielded motor cable	No measure required	NF...-... line filter
3. Option	HF... output filter	No measure required	NF...-... line filter

#### Limit class B

Three options are available for EMC-compliant installation in accordance with EN 55011, **class B limit**, depending on the machine configuration:

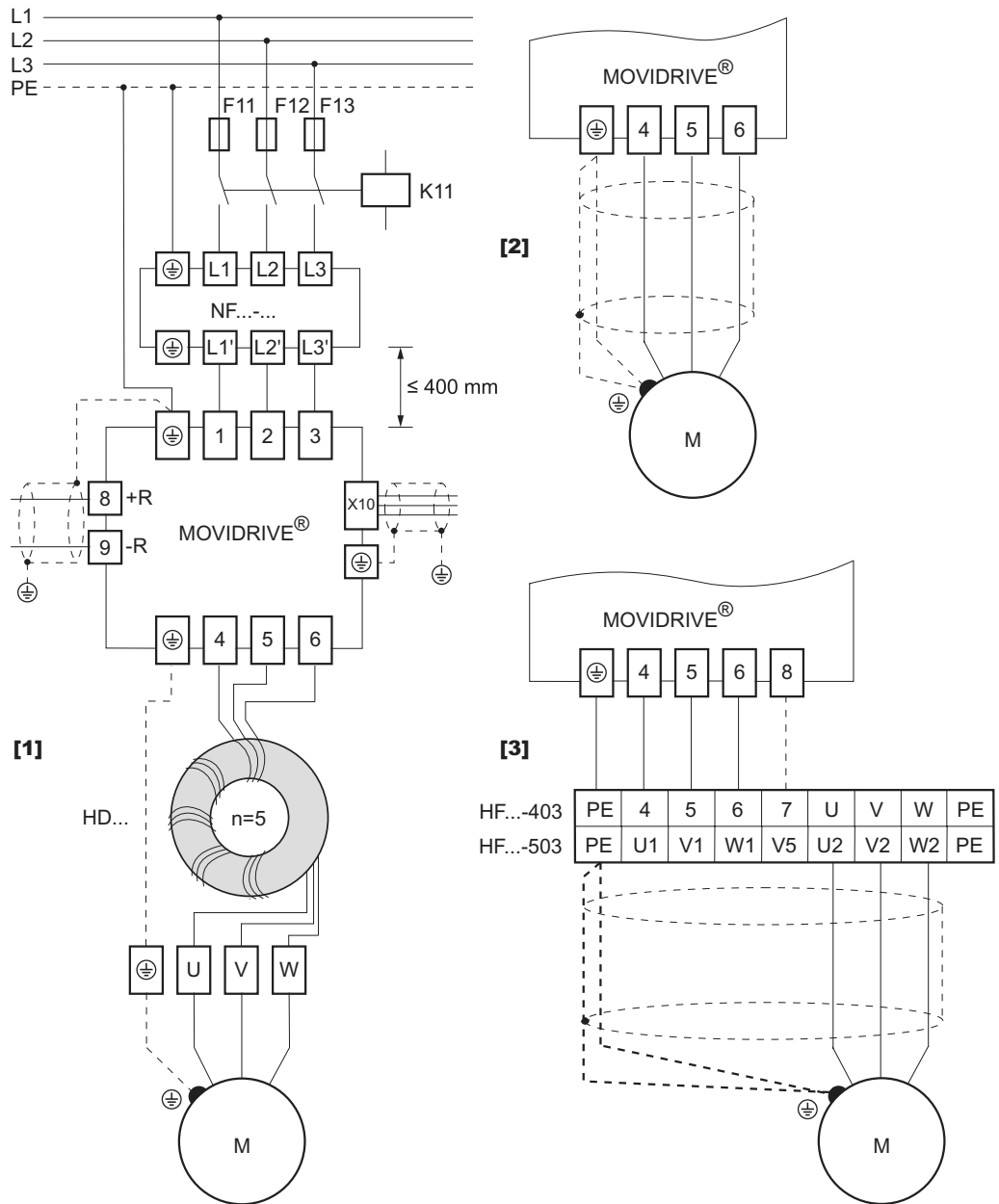
Limit class B	on the motor end	on the supply end
	Sizes 0 to 5	Sizes 0 to 5
1. Option	HD... output choke	NF...-... line filter
2. Option	Shielded motor cable	NF...-... line filter
3. Option	HF... output filter	NF...-... line filter

#### IT systems

	<b>NOTE</b>
	No EMC limits are specified for interference emission in voltage supply systems without a grounded star point (IT systems).



Block diagram of class B limit



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Figure 115: EMC-compliant installation in accordance with limit class B

- (1) = 1. Possible solution with HD... output choke
- (2) = 2. Possible solution with shielded motor line
- (3) = 3. Possible solution with HF... output filter

Refer to the publication "Drive Engineering - Practical Implementation, Electromagnetic Compatibility" for more information. The publication can be ordered from SEW-EURODRIVE.



#### 4.16 Output filter type HF...

##### Important notes

Observe the following instructions when using output filters:

- Operate output filters in V/f and VFC operating modes only. Output filters may not be used in CFC and SERVO operating modes.
- Do not use output filters in hoist applications.
- During project planning of the drive, take into account the voltage drop in the output filter and consequently the reduced motor torque available. This applies particularly to AC -230 V units with output filters.
- Flying restart circuit is not possible with an output filter!

Installation,  
connection and  
operation



#### NOTES

- Install output filters next to the corresponding inverter. Leave a ventilation space of at least 100 mm below and above the output filter. No clearance is required on the sides.
- Limit the connection cable between the inverter and output filter to the absolute minimum length required. Maximum 1 m with an unshielded cable and 10 m for a shielded cable.
- An unshielded motor line is sufficient when using an output filter. Note the following instructions when you use an **output filter** together with a **shielded motor cable**:
  - The maximum permitted length of the motor cable for operation without  $V_{DC}$  link connection is 20 m.
  - Operation with  $V_{DC}$  link connection is required if the motor cable is longer than 20 m.
  - Observe the notes "Operation with  $V_{DC}$  link connection" on the next page.
- The rated through current of the output filter must be higher than or equal to the output current of the inverter. Note whether the projected output current of the inverter is 100 %  $I_N$  (= rated output current) or 125 %  $I_N$  (= continuous output current).
- Several motors can be connected to one output filter when operating a motor group from one inverter. The sum of the rated motor currents must not exceed the rated through current of the output filter.
- It is possible to connect two output filters of the same type to one inverter output to increase the rated through current. All like connections must be connected in parallel on the output filters.
- Considerable noise (magnetostriction) may occur in the output filter especially if operating with  $f_{PWM} = 4$  kHz. In environments susceptible to noise, SEW-EURODRIVE recommends operation with  $f_{PWM} = 12$  kHz (or 16 kHz) and  $V_{DC}$  link connection. Observe the notes regarding  $V_{DC}$  link connection.
- When the inverter is operated with  $f_{PWM} = 4$  or 8 kHz, the output filter connection V5 (with HF...-503) or 7 (with HF...-403) must **not** be connected (no  $V_{DC}$  link connection).



$V_{DClink}$  connection

**Operation without  $V_{DC}$  link connection:**

- Only approved for PWM frequency 4 kHz or 8 kHz.

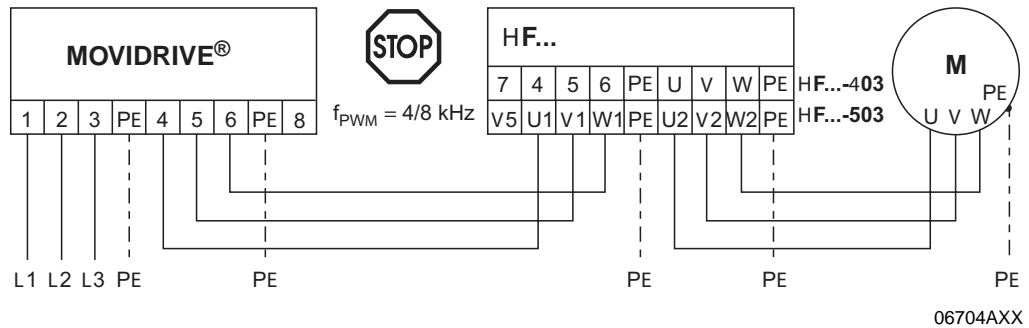


Figure 116: HF...-... output filter connection without  $V_{DC}$  link connection

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### NOTES

**Operation with  $V_{DClink}$  connection**  
(Connection of inverter terminal 8 to HF...-503 terminal V5 or HF...-403 terminal 7):

- Only approved for PWM frequency 12 kHz or 16 kHz. Take into account that increased losses (= power reduction) occur in the inverter when operating the inverter with 12 or 16 kHz.
- Optimized grounded filter effect.
- Higher filter effect in the low-frequency range ( $\leq 150$  kHz).
- Set PMW fix = ON; the inverter must not be able to reduce the PWM frequency automatically
- Strictly observe the following for HF...-403:  $V_{DC}$  link connection only permitted if  $V_{mains} \leq AC 400$  V, not with  $V_{mains} = AC 500$  V.
- The  $V_{DClink}$  connection increases the inverter load. The DC link connection increases the required inverter output current in relation to the rated output current of the inverter as shown in the following table.

$f_{PWM}$	$V_{mains} = 3 \times AC 230$ V	$V_{mains} = 3 \times AC 400$ V	$V_{mains} = 3 \times AC 500$ V
12 kHz	4 %	12 %	15 %
16 kHz	3 %	8 %	12 %

The increased power requirement causes an additional load on the inverter. Take this aspect into account during project planning of the drive. Failure to comply with this aspect may cause the inverter to shut down due to overload.

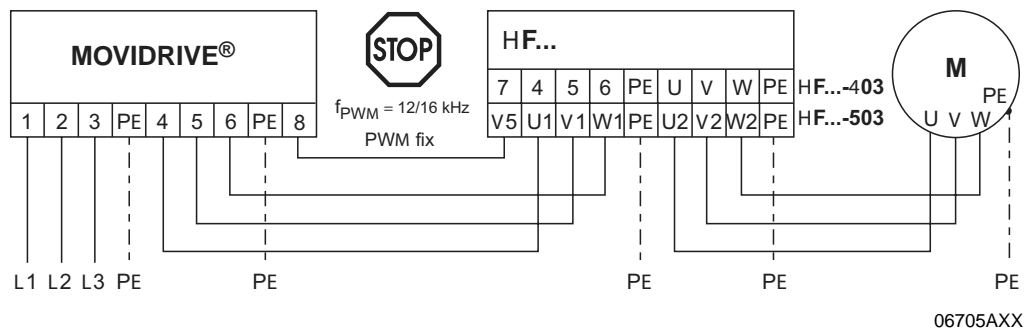
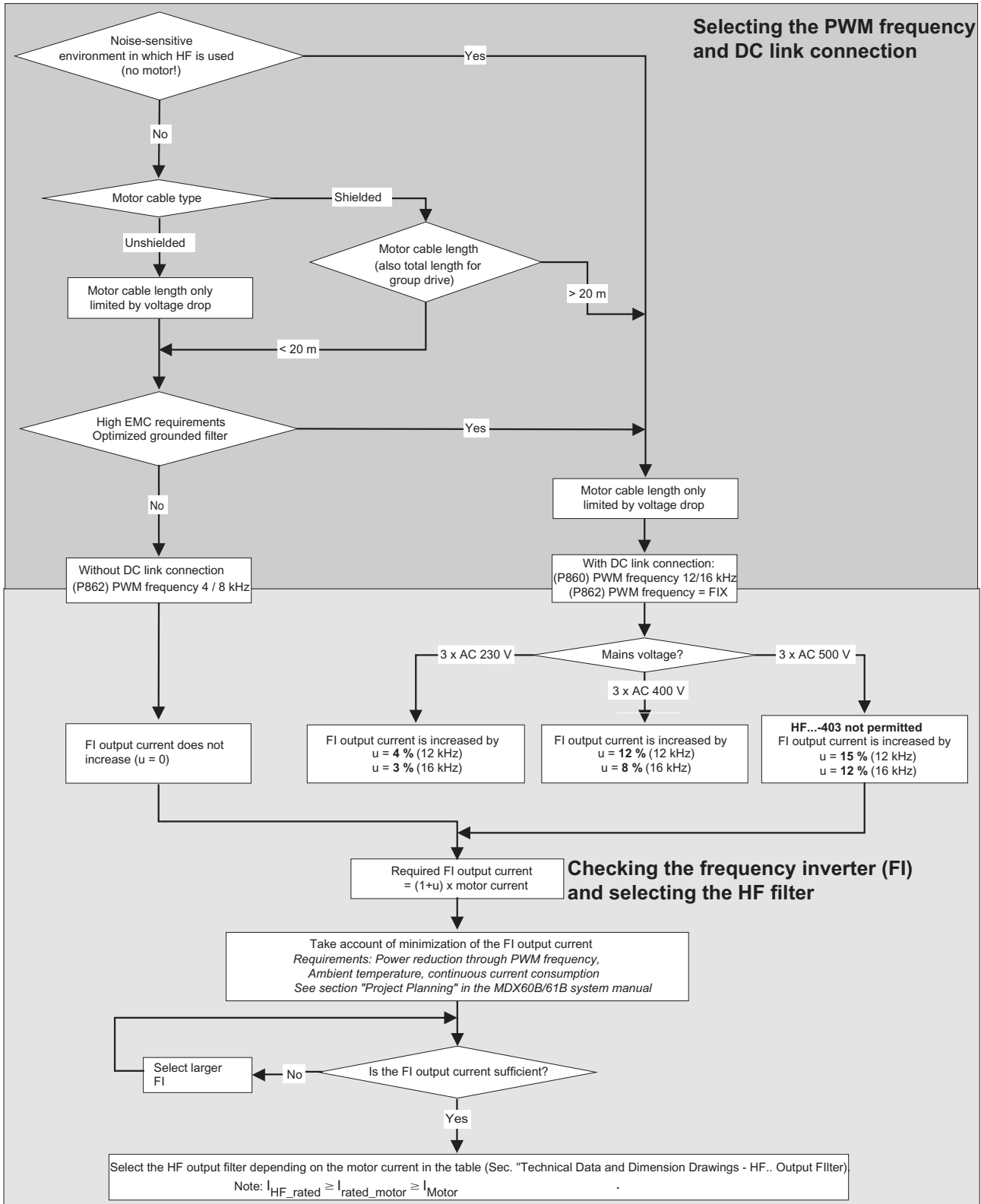


Figure 117: HF...-... output filter connection with  $V_{DC}$  link connection

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The procedure for selecting the PWM frequency and checking the inverter is summarized in the following figure.

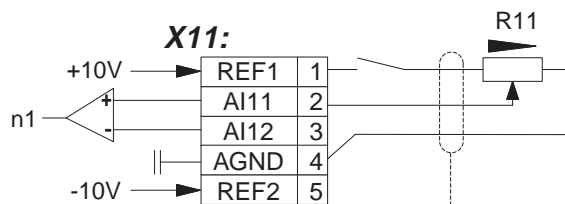


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#### 4.17 Electronics cables and signal generation

- The electronics terminals of the basic unit are suitable for the following cross sections:
    - Single core 0.20...2.5 mm<sup>2</sup> (AWG24...12)
    - Double core 0.20...1 mm<sup>2</sup> (AWG24...17)
- Route electronics cables separately from power cables, contactor control cables or braking resistor cables. If you use shielded electronics cables, ground the shield at both ends.
- Use setpoint potentiometer with R = 5 kΩ.
  - If necessary, potentiometer setpoints are switched using the 10 V voltage rather than via the wiper lead.



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Figure 118: Switch potentiometer setpoint

- Never connect 0V cables (AGND, DGND, DCOM) for generating signals. The 0V cables of several electrical units which are connected should not be looped from unit to unit, but rather wired up in a star configuration. This means:
  - Install the units in adjacent switch cabinet compartments rather than distributing them.
  - Lay the 0 V cables with 1.5 mm<sup>2</sup> (AWG16) cross section from a central point to each individual unit by the shortest possible route.
- If coupling relays are used, they should always have encapsulated, dust-protected electronic contacts suitable for switching small voltages and currents (5 ... 20 V, 0.1 ... 20 mA).
- Binary inputs/outputs
 

The binary inputs are electrically isolated by optocouplers. Binary input commands can also be issued directly as a 0/1 command from the PLC instead of using a coupling relay (signal level → electronics data).

The binary outputs are short-circuit proof and protected against external voltage up to DC 30 V.
- The inverter starts a self-test (ca. 3 s) when the power supply or 24 V supply is connected. All signal outputs have the level "0" during the self-test.
- DC 24 V voltage supply VI24:
 

In accordance with EN 61131-2,  $V_N = +24 \text{ V} -15 \% / +20 \%$ . A total AC voltage component with a peak value of 5 % of the rated voltage (+24 V) is permitted in addition to the specified voltage tolerances.



### 4.18 External DC 24 V voltage supply

#### General information

The internal switched-mode power supply of MOVIDRIVE® B has a maximum power of 29 W. An external DC 24 V power supply unit must be connected if a higher power is needed due to installed options. **In this case, switch on the external DC 24 V power supply unit prior to the input contactor or simultaneously with the input contactor.**

The following table shows the power demand of the MOVIDRIVE® B units without options and the power demand of the individual options. MOVIDRIVE® B without option does not require external DC 24 V supply.

The following conditions apply to the information about the power demand without option:


- The DC 24 V outputs (VO24) are not subject to load.
- Binary outputs DBØØ und DOØ2 ... DOØ5 are not subject to load.

Following conditions apply to the information about the DEH11B and DER11B options:

- The motor encoder/resolver is supplied from MOVIDRIVE® B.
- An external encoder (synchronous encoder) is not connected to X14. Observe the power ratings of the manufacturer when connecting an external encoder (ca. 4 W with SEW encoder).

#### Power demand

The power values of the options are basic values **without** load on the inputs and outputs.

	NOTES								
	<ul style="list-style-type: none"> <li>• The load on the outputs depends on the connected load.</li> <li>• The binary inputs have an internal resistance of 3 kΩ. This results in a power demand of 0.2 W per terminal. You have to take this power into account when you supply terminals via the DC 24 V output of the MOVIDRIVE® B unit.</li> <li>• Power ratings of the DIP11B and DRS11B options do not include the voltage supply of the encoder. The encoders and binary outputs of the DIP11B and DRS11B options are only supplied with voltage if DC 24 V is connected to X10:9 (VI24) of MOVIDRIVE® B. If the voltage supply of these options is taken over by MOVIDRIVE® B, you have to take this additional power into account. Note that MOVIDRIVE® B delivers a maximum total current of DC 400 mA for the DC 24 V outputs.</li> <li>• DC 24 V power demand of MOVIDRIVE® MDX60/61B:</li> </ul>								

MDX60B/61B Size	Without option	Additional DC 24 V power demand with option <sup>1)</sup>							
		DEH11B	DER11B	Fieldbus options <sup>2)</sup>	DIO11B	DIP11B	DRS11B	DHP11B	OST11B
0	17.6 W	5 W	6 W	3 W	6 W	2.5 W	2.5 W	4.5 W	1.5 W
1									
2, 2S									
3	23.6 W								
4	25.6 W								
5									
6									

1) For size 0: Only available with option-capable MDX61B units

2) Fieldbus options are: DFP21B, DFI11B, DFI21B, DFE11B, DFE12B, DFE13B, DFD11B, DFC11B



*Example 1*

MOVIDRIVE<sup>®</sup> MDX61B0022-5A3-4-00 (size 1) with the fieldbus interface option type DFI11B. MOVIDRIVE B supplies the binary inputs DI00 (controller inhibit), DI01 (CW/Stop), DI02 (CCW/Stop), DI03 (Enable/Stop) with voltage. The motor brake is controlled via DB00. The coil of the brake relay requires DC 100 mA at DC 24 V.

- Calculating the total power demand:
  - Power demand of the basic unit: 17,6 W
  - Power demand of the DFI11B option: 3 W
  - Power demand of the binary inputs:  $4 \times 0.2 \text{ W} = 0.8 \text{ W}$
  - Power demand of the brake coil on DB00;  $24 \text{ V} \times 0.1 \text{ A} = 2.4 \text{ W}$

The total power demand is 23.8 W. No external DC 24 V voltage supply is required in this case.

*Example 2*

MOVIDRIVE<sup>®</sup> MDX61B0110-5A3-4-00 (size 2) with the options HIPERFACE<sup>®</sup> encoder card DEH11B, fieldbus interface DFP21B and input/output card DIO11B. Four inputs of the basic unit and four inputs of the DIO11B option are used. The motor brake is controlled via terminal DB00. The coil of the brake relay requires DC 100 mA at DC 24 V. Additionally, six outputs of the DIO11B option are subject to a load of DC 25 mA each.

- Calculating the total power demand:
  - Power demand of the basic unit: 17,6 W
  - Power demand of the DEH11B option: 5 W
  - Power demand of the DFP21B option: 3 W
  - Power demand of the DIO11B option without terminals: 6 W
  - Power demand of the inputs (basic unit + DIO11B):  $8 \times 0.2 \text{ W} = 1.6 \text{ W}$
  - Power demand of the brake coil on DB00;  $24 \text{ V} \times 0.1 \text{ A} = 2.4 \text{ W}$
  - Power demand of the binary outputs:  $6 \times 24 \text{ V} \times 0.025 \text{ A} = 3.6 \text{ W}$

The total power demand is 39.2 W. An external DC 24 V voltage supply is required in this case.



#### 4.19 Parameter set switchover

This function serves for operating two motors on one inverter using two different parameter sets.

The parameter set is switched over via binary input or fieldbus. For this purpose, a binary input must be set to "PARAM. SWITCHOVER" (→ P60\_/P61\_). You can then change from parameter set 1 to 2 and vice versa in INHIBITED inverter status.

Function	In effect at	
	"0" signal	"1" signal
PARAM. SELECT	Parameter set 1 active	Parameter set 2 active

NOTES	
	<ul style="list-style-type: none"> <li>• If encoder feedback is used, changing from one parameter set to the other must not be carried out faster than every 2 seconds. Else, the encoders cannot be initialized.</li> <li>• A changeover contactor should be provided for each of the two motor lines when two motors are operated alternately on the same inverter with the parameter set switchover function in use ( P60→P61_/ PARAM. SWITCHOVER). Only switch changeover contactors when the unit is inhibited!</li> <li>• Parameter set 2 allows for VFC operating modes without speed control only. Speed control or CFC and SERVO operating modes are not possible.</li> </ul>



### 4.20 Priority of operating states and interrelation between control signals

#### Priority of the operating states

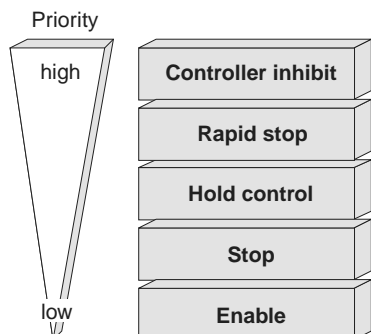


Figure 119: Priority of the operating states

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#### Interrelation between control signals

The following table shows the interrelation between control signals. "/Controller inhibit" is programmed to binary input DIØØ and cannot be changed. The other control signals are only in effect if a binary input is programmed to this function (→ parameter P60\_).

/Controller inhibit (DIØØ)	Binary input is programmed to				Inverter status
	Enable/Rapid stop	/Hold control	CW/Stop	CCW/Stop	
"0"	1)	1)	1)	1)	Inhibited
"1"	"0"	2)	2)	2)	
"1"	"1"	"0"	3)	3)	
"1"	"1"	"1"	"1"	"0"	CW enabled
"1"	"1"	"1"	"0"	"1"	CCW enabled

- 1) Not relevant if "/Controller inhibit (DIØØ)" = "0"
- 2) Not relevant if "Enable/Rapid stop" = "0"
- 3) Not relevant if "/Hold control" = "0"

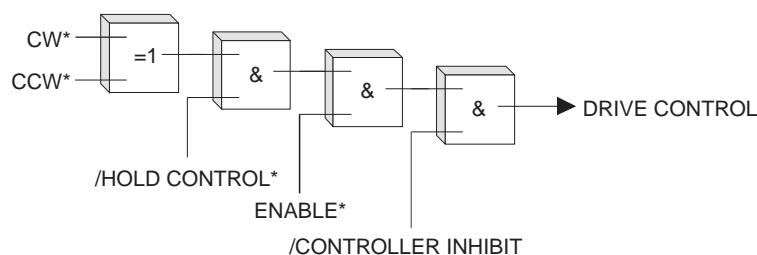


Figure 120: Interrelation between control signals

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\* If a binary input is programmed to this function.



#### 4.21 Limit switches

##### **Limit switch processing**

Limit switch processing makes sure that the travel range of a drive is observed. To do this, it is possible to program the binary inputs to the functions "/LIM. SWITCH CW" and "/LIM. SWITCH CCW." The limit switches are connected to these binary inputs. The limit switches must be "0" active and continuously actuated in the limit switch area (= movement up to limit switch).

"0" active means:

- Limit switch not contacted (= not activated) → 24 V signal
- Limit switch contacted (= actuated) → 0 V signal
- The limit switches must supply a "1" signal continuously in the travel range.

##### **Limit switch contacted ("0" signal)**

- The drive is stopped with the emergency ramp  $t_{14}/t_{24}$ .
- When brake function is activated, the brake is applied.
- In IPOS<sup>plus</sup>® operating modes, contacting a limit switch generates a fault message. A reset is then required in order to move clear of the limit switch (→ IPOS<sup>plus</sup>® manual).

##### **Moving drive clear from limit switch**

- The inverter must be enabled at the binary inputs.
- Hold control must be inactive.
- The inverter receives a setpoint value from the setpoint source that guides it in the right direction.
- When the setpoint stop function is activated: Setpoint > start setpoint

##### **Behavior of the drive when moving clear**

- Once a limit switch is hit, the drive can be moved clear of the limit switch in the other direction.
- When the brake function is activated, the brake is first released and then the drive is moved clear ("0" → "1" signal).

If the drive leaves the limit switch range without having been moved clear of the switch automatically, for example when the drive is moved manually, the drive can still be moved afterwards in the standard operating mode.

##### **Limit switch monitoring function**

- The inverter monitors whether the limit switches are missing, whether there is a break in a wire or whether the limit switches have been mixed up. If this is the case, the inverter triggers an emergency stop and displays fault F27, "Limit switches missing".



## 5 Serial Communication

### 5.1 MOVILINK® Protocol

The MOVILINK® profile enables the uniform transmission of user data between SEW inverters as well as via various communications interfaces to higher-level automation equipment. Consequently, MOVILINK® guarantees a control and parameterization concept which can be used disregarding the fieldbus for all current bus systems, such as:

- PROFIBUS-DP
- INTERBUS with fiber optic cable
- CAN
- RS-232
- RS-485

The MOVILINK® protocol for serial interfaces in the new SEW range of inverters, MOVIDRIVE® and MOVIMOT®, enables you to set up a serial bus connection between a higher-level master and several SEW inverters. For example, masters may take the form of programmable logic controllers, PCs or even SEW inverters with PLC functions (IPOS<sup>plus</sup>®). Generally speaking, the SEW inverters function as slaves in the bus system.

The MOVILINK® protocol allows both of the following applications to be implemented: automation tasks such as control and parameterization of the drives by means of cyclical data exchange; startup and visualization tasks.

#### Features

The principal features of the MOVILINK® protocol are:

- Support for the master/slave structure via RS-485 with one master (single master) and at most 31 slave stations (SEW inverters).
- Support for point-to-point connection via RS-232.
- User-friendly implementation of the protocol in a straightforward and reliable telegram structure with fixed telegram lengths and a unique start identifier.
- Data interface to the basic unit in accordance with the MOVILINK® profile. This means the user data sent to the drive are transmitted to the inverter in the same way as via the other communication interfaces (PROFIBUS, INTERBUS, CAN etc.).
- Access to all drive parameters and functions, therefore can be used for startup, service, diagnosis, visualization and automation tasks
- Startup and diagnostic tools on the basis of MOVILINK® for PC (e.g. MOVITOOLS®/SHELL and MOVITOOLS®/SCOPE).

Refer to the "Serial Communication and System Bus (SBus)" manual for a detailed description of the MOVILINK® protocol. This manual can be ordered from SEW-EURODRIVE.



## 6 Structure of the Safety Notes

The safety notes in these operating instructions are designed as follows:

<b>Pictogram</b>  	<b>SIGNAL WORD!</b>
	Type and source of danger. Possible consequence(s) if the safety notes are disregarded. <ul style="list-style-type: none"> <li>• Measure(s) to prevent the danger.</li> </ul>

Pictogram	Signal word	Meaning	Consequences in case of disregard
Example:   General danger	<b>DANGER!</b>	Imminent danger	Severe or fatal injuries
 Specific danger, e.g. electric shock	<b>WARNING!</b>	Possible dangerous situation	Severe or fatal injuries
	<b>CAUTION!</b>	Possible dangerous situation	Minor injuries
	<b>STOP!</b>	Possible damage to property	Damage to the drive system or its environment
	<b>NOTE</b>	Useful information or a tip Simplifies the handling of the drive system	

	<b>CAUTION!</b>
	<p><b>A requirement of fault-free operation</b> and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the <b>operating instructions</b>. Therefore, <b>read the operating instructions</b> before you start operating the unit!</p> <p>Make sure that the operating instructions are available to persons responsible for the plant and its operation, as well as to person who work independently on the unit. You must also ensure that the documentation is legible.</p>

### Exclusion of liability:

You must comply with the information contained in these operating instructions to ensure safe operation of the **MOVIDRIVE® MDX60B/61B** drive inverters and to achieve the specified product characteristics and performance requirements. **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.



## 7 Safety Notes

The following basic safety notes must be read carefully to prevent injury to persons and damage to property. The operator must make sure that the basic safety notes are read and observed. Make sure that persons responsible for the plant 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.

### 7.1 General information

Never install damaged products or take them into operation. Submit a complaint to the shipping company immediately in the event of damage.

During operation, drive inverters can have live, bare and movable or rotating parts as well as hot surfaces, depending on their enclosure.

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

Consult the documentation for additional information.

### 7.2 Target group

**Only qualified electricians** are authorized to install, startup, troubleshoot or service the units (observe IEC 60364 or CENELEC HD 384 or DIN VDE 0100 and IEC 60664 or DIN VDE 0110 as well as national accident prevention guidelines).

Qualified personnel in the context of these basic safety notes are: All persons familiar with installation, assembly, startup and operation of the product who possess the necessary qualifications.

All work related to transport, storage, operation and disposal must be carried out only by personnel who have been trained and instructed accordingly.

### 7.3 Designated use

Drive inverters are components intended for installation in electrical systems or machines.

In case of installation in machines, startup of the drive inverters (i.e. start of designated operation) is prohibited until it is determined that the machine meets the requirements stipulated in the EC Directive 98/37/ EC (machine guideline); observe EN 60204.

Startup (i.e. start of designated operation) is only permitted with adherence to EMC (89/336/EEC) guideline.

The drive inverters meet the requirements stipulated in low voltage guideline 73/23/EEC. 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 drive inverters.

Technical data and information on the connection requirements are given on the nameplate and in the documentation; they have to be observed under all circumstances.



## Safety Notes

### Transportation, putting into storage

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#### **Safety functions**

The MOVIDRIVE® MDX60B/61B drive inverters may not perform safety functions without higher-level safety systems. Use higher-level safety systems to ensure protection of equipment and personnel.

For safety applications, refer to the information in the following publications:

- Safe Disconnection for MOVIDRIVE® MDX60B/61B – Conditions
- Safe Disconnection for MOVIDRIVE® MDX60B/61B – Applications

#### **7.4 Transportation, putting into storage**

Observe the notes on transportation, storage and proper handling. Observe the climatic conditions as stated in the section "General technical data."

#### **7.5 Installation**

Installation and cooling of the devices must take place according to the guidelines listed in the corresponding documentation.

Protect the drive inverters from excessive strain. Especially during transportation and handling, do not allow the components to be deformed or insulation spaces altered. Avoid contact with electronic components and contacts.

Drive inverters contain components that can be damaged by electrostatic energy and improper handling. Prevent mechanical damage or destruction of electric components (may pose health risk!)

The following applications are prohibited unless measures are expressly taken to make them possible:

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

#### **7.6 Electrical connection**

Observe the applicable national accident prevention guidelines when working on live drive inverters (e.g. BGV A3).

Perform electrical installation according to the pertinent regulations (e.g. line cross sections, fusing, protective conductor connection). For any additional information, refer to the applicable documentation.

You will find notes on EMC-compliant installation, such as shielding, grounding, arrangement of filters and routing of lines, in the documentation of the drive inverters. Always observe these notes even with drive inverters bearing the CE marking. The manufacturer of the system or machine is responsible for maintaining the limits established by the EMC legislation.

Preventive measures and protection devices must correspond to the regulations in force (e.g. EN 60204 or EN 61800-5-1).

Required preventive measures: Ground the unit.

#### **7.7 Safe disconnection**

The unit meets all requirements for safe disconnection of power and electronic connections in accordance with EN 61800-5-1. All connected circuits must also satisfy the requirements for safe disconnection.



## 7.8 Operation

Systems with integrated drive inverters must be equipped with additional monitoring and protection devices, if necessary, according to the applicable safety guidelines, such as the law governing technical equipment, accident prevention regulations, etc. Changes to the drive inverter using the operating software are permitted.

Do not touch live components or power connections immediately after disconnecting the drive inverters from the supply voltage because there may still be some charged capacitors. Note the respective reference plates on the drive inverter.

Keep all covers and doors closed during operation.

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 power supply and no longer carries any voltage.

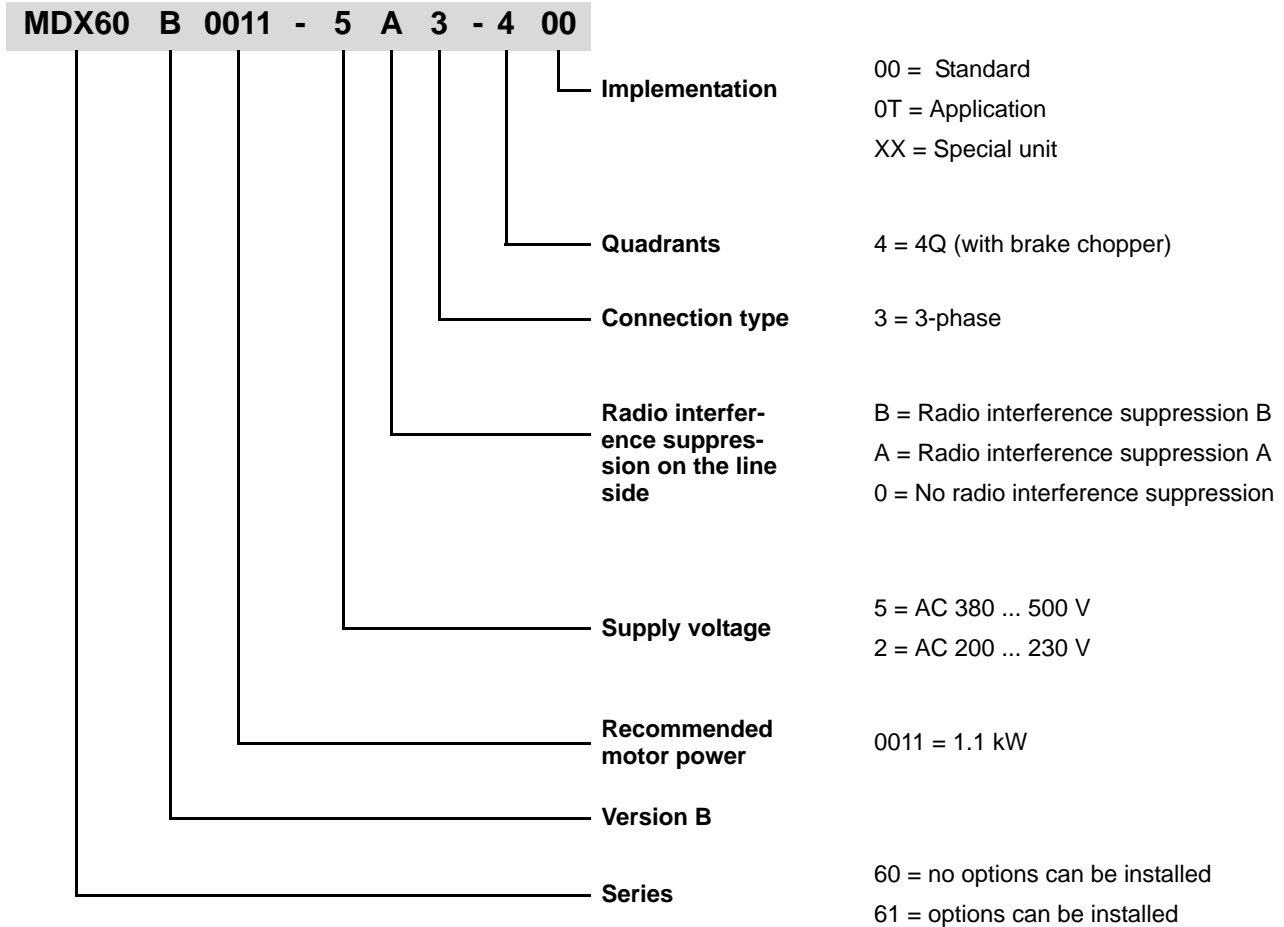
Mechanical blocking or internal safety functions of the unit can cause a motor standstill. Removing the cause of the problem or performing a reset can result in the drive re-starting on its own. If, for safety reasons, this is not permitted for the driven machine, disconnect the unit from the mains before correcting the fault.



**8 Unit Design**

**8.1 Unit designation, nameplates and scope of delivery**

*Example: Unit designation*



**Example: System nameplate**  
**MDX60B/61B..**  
**Size 0**

The **system nameplate** for MDX60B/61B.. size 0 is attached to the side of the unit.

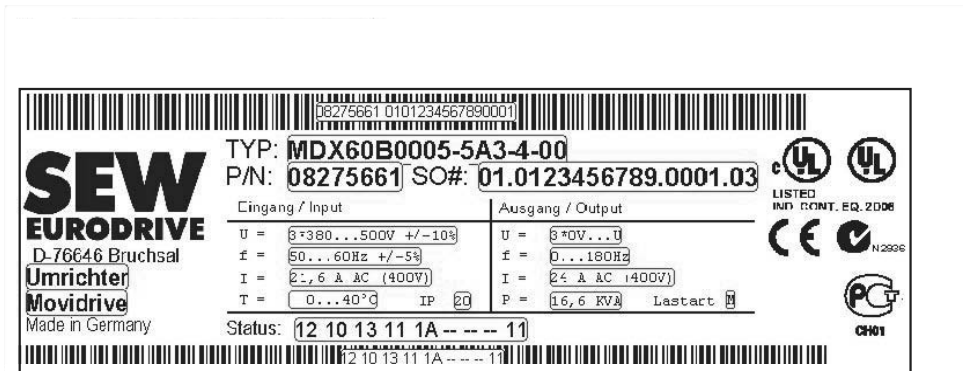


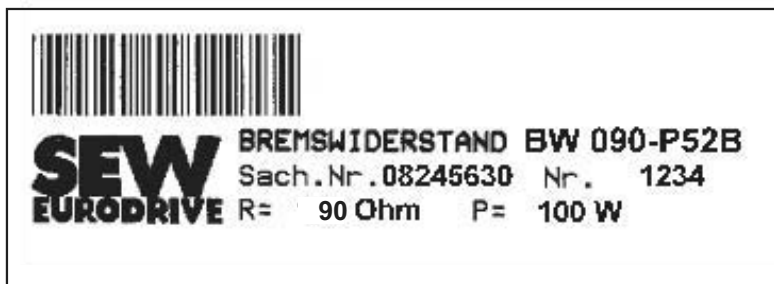
Figure 121: Example: System nameplate for MDX60B/61B.. Size 0

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**Example: Nameplate of braking resistor for MDX60B/61B..**

The braking resistor BW090-P52B is only available for MDX60B/61B size 0.



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Figure 122: Nameplate of braking resistor for MDX60B/61B.. Size 0

**Example: System nameplate for MDX61B.. sizes 1 - 6**

For MDX61B.. sizes 1 - 6, the **system nameplate** is attached to the side of the unit.

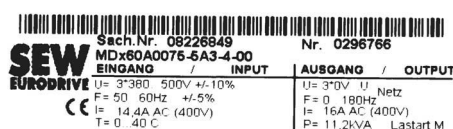


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Figure 123: Example: System nameplate for MDX61B.. sizes 1 - 6

**Example: Nameplate of power section for MDX61B.. sizes 1 - 6**

For MDX61B.. sizes 1-6, the **nameplate of the power section** is located at the side of the unit.



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Figure 124: Nameplate of power section for MDX61B.. sizes 1 - 6

**Example: Nameplate of control unit for MDX61B.. sizes 1 - 6**

For MDX61B.. sizes 1-6, the **nameplate of the control unit** is located at the side of the unit.



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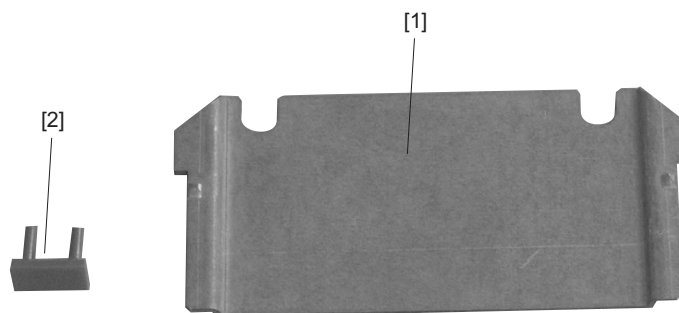
Figure 125: Nameplate of control unit MDX61B.. sizes 1 - 6



## Unit Design

### Unit designation, nameplates and scope of delivery

- Scope of delivery**
- Connector housing for all signal terminals (X10 ... X17), connected
  - Connector housing for the power terminals (X1 ... X4), connected
  - Pluggable memory card, connected
- Size 0**
- 1 set of shield clamps for power cable and signal cable, not installed. The set of shield clamps comprises:
    - 2 shield clamps for power cable (2 contact clips each)
    - 1 shield clamp for signal cable (1 contact clip) for MDX60B
    - 1 shield clamp for signal cable (2 contact clips) for MDX61B
    - 6 contact clips
    - 6 screws for attaching the contact clips
    - 3 screws for attaching the contact clips to the unit
- Sizes 1-6**
- 1 set of shield clamps for signal cable, not installed. The set of shield clamps comprises:
    - 1 shield clamp for signal cable (1 contact clip)
    - 2 contact clips
    - 2 screws for attaching the contact clips
    - 1 screw for attaching the shield clamp to the unit
  - Only for size 6: Carrying bar and 2 split pins
- Size 2S**
- Accessories set, not installed. The accessories set (→ Following illustration) comprises:
    - 2 mounting feet [1] to be plugged into the heat sink
    - 2 touch guards [2] to be fastened to terminals X4:  $-U_z/+U_z$  and X3:  $-R(8)/+R(9)$ . Once the touch guards [2] have been installed, the enclosure is IP20. Otherwise it is IP10 (→ Section "Touch guards").



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**Optional scope of delivery**

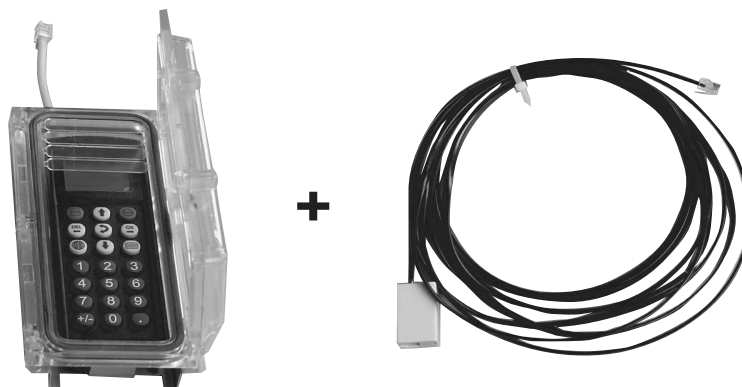
All sizes

- Option DBM60B: Door installation for separate mounting of the DBG60B keypad (e.g. in the control cabinet).

Part number 824 853 2.

The DBM60B option consists of the housing with enclosure IP65 **and** a 5 m extension cable (→ Following illustration). Das Bediengerät DBG60B ist in dieser Option nicht enthalten und muss separat bestellt werden.

**DBM60B**



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- Option DKG60B: 5 m Verlängerungskabel für Bediengerät DBG60B.

Part number 817 583 7.

5 m extension cables are available for mounting the keypad separately in customer housing (→ Following illustration).

**DKG60B**



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## Unit Design

Unit designation, nameplates and scope of delivery

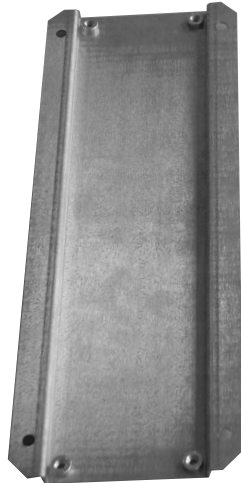
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Size 2 S

- DMP11B mounting panel (→ following figure), not installed.  
Part number 818 398 8.

If a MOVIDRIVE® MD\_60A size 2 unit is to be replaced by MOVIDRIVE® MDX61B size 2S, the MDX61B size 2S can be fitted on the existing mounting plate with the DMP11B mounting panel. New retaining holes do not have to be drilled.

**DMP11B**



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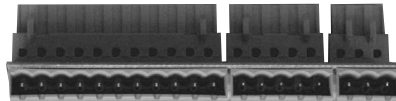


Connector adapter for replacing MOVIDRIVE® A with MOVIDRIVE® B

The following adapters are available for rapid replacement of a MOVIDRIVE® A unit with a MOVIDRIVE® B unit.

- **DAT11B:** Terminal adapter, part number 824 671 8  
X10 can be rearranged directly when using MOVIDRIVE® MDF, MDV or MDS. Three plugs have to be rewired. You can avoid such rewiring work by using the DAT11B terminal adapter. Using this adapter will prevent incorrect connection and save time. The terminal adapter is required for terminals X11 (analog input), X12 (SBus) and X13 (binary inputs).

DAT11B



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- **DAE15B:** Encoder adapter X15, part number 817 629 9  
If a motor with encoder on X15 is in operation on an MDV or MCV, the encoder is connected via a 9-pin plug connector to MOVIDRIVE® A. Since the DEH11B option for MOVIDRIVE® MDX61B comes equipped with a 15-pin socket, you will either have to convert the encoder cable or use the encoder adapter. The encoder adapter DAE15B for connecting sin/cos and TTL encoders can be inserted directly between the existing encoder cable with a 9-pin connector and the 15-pin socket on DEH11B. This step makes for fail-safe and fast connection of existing drives. HTL encoders must be connected to MOVIDRIVE® B with the option DWE11B/12B (→ section "DWE11B/12B interface adapter option").

DAE15B



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Length of DAE15B: 200 mm ± 20 mm

Line cross section: 6 x 2 x 0.25 mm<sup>2</sup>

Terminal of the 15-pin sub D plug (MOVIDRIVE® MDX61B, option DEH11B, X15)	Core color in prefabricated cable	Terminal of 9-pin sub D socket (encoder end)
1	Yellow (YE)	1
2	Red (RD)	2
3	Pink (PK)	3
4	Violet (VT)	4
8	Brown (BN)	5
9	Green (GN)	6
10	Blue (BU)	7
11	Gray (GY)	8
15	White (WH)	9



## Unit Design

### Unit designation, nameplates and scope of delivery

- DAE14B: Encoder adapter X14, part number 817 630 2

If a synchronous encoder is operated at X14 on MOVIDRIVE® MDV, MDS, MCV or MCS, connection takes place via a 9-pin connector. Since the DEH11B and DER11B options for MOVIDRIVE® MDX61B come equipped with a 15-pin plug, you will either have to rework the encoder cable or use the encoder adapter. The encoder adapter can be plugged directly between the existing encoder cable with 9-pin socket and the 15-pin connector on DEH11B/DER11B. This step makes for fail-safe and fast connection of existing drives.

**DAE14B**



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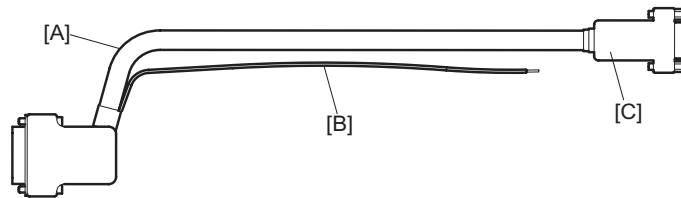
Length of DAE14B: 200 mm ± 20 mm

Line cross section: 6 x 2 x 0.25 mm<sup>2</sup>

Terminal of the 15-pin sub D socket (MOVIDRIVE® MDX61B, option DEH11B/DER11B, X14)	Core color in prefabricated cable	Terminal of the 9-pin sub D connector (encoder end)
1	Yellow (YE)	1
2	Red (RD)	2
3	Pink (PK)	3
7	Violet (VT)	4
8	Brown (BN)	5
9	Green (GN)	6
10	Blue (BU)	7
11	Gray (GY)	8
15	White (WH)	9



- DWE11B: Interface adapter (adapter cable), part number 188 187 6  
The interface adapter DWE11B (HTL→TTL) in the form of an adapter cable is used **to connect single-ended HTL encoders to the HIPERFACE® encoder card DEH11B**. Only the A, B and C tracks are connected. The interface adapter is suitable for all HTL encoders that were operated on MOVIDRIVE® A, MDV and MCV and can be connected without any rewiring effort.



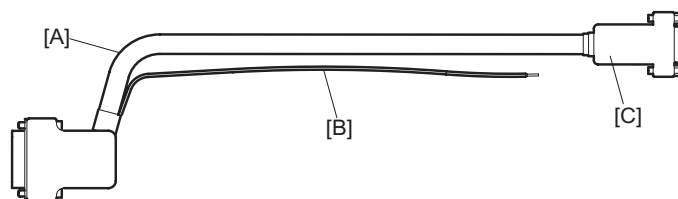
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[A] 5 x 2 x 0.25 mm<sup>2</sup> / length 1000 mm / max. cable length between inverter - encoder: 100 m

[B] DC 24 V connection for HTL encoder; 1 x 0.5 mm<sup>2</sup> / 250 mm long

Signal	Terminal of 9-pin sub D socket [C] (encoder end)
A	1
B	2
C	3
UB	9
GND	5

- DWE12B: : Interface adapter (adapter cable), part number 188 180 9  
The interface adapter DWE12B (HTL→TTL) in the form of an adapter cable is used **to connect push-pull HTL encoders to the HIPERFACE® encoder card DEH11B**. In addition to the A, B and C track, you will also have to connect the negated tracks ( $\bar{A}$ ,  $\bar{B}$ ,  $\bar{C}$ ). SEW-EURODRIVE recommends using this interface adapter for any new system.



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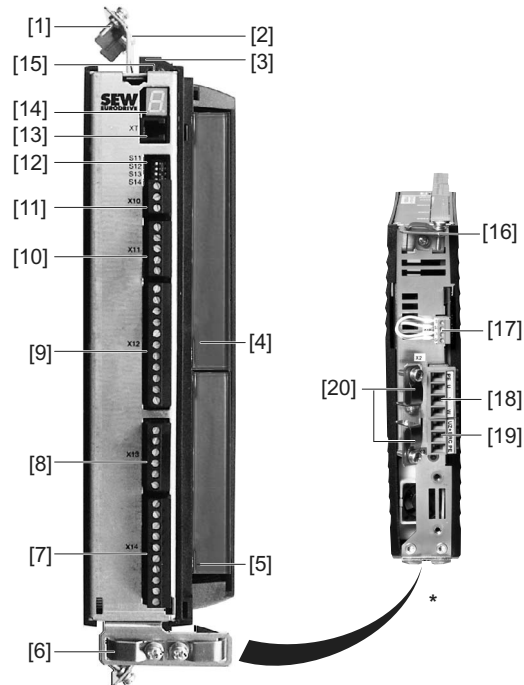
[A] 4 x 2 x 0,25 mm<sup>2</sup> / length 1000 mm / max. cable length between inverter - encoder: 200 m

[B] DC 24 V connection for HTL encoder; 1 x 0.5 mm<sup>2</sup> / 250 mm long

Signal	Terminal of 9-pin sub D socket [C] (encoder end)
A	1
$\bar{A}$	6
B	2
$\bar{B}$	7
C	3
$\bar{C}$	8
UB	9
GND	5


**8.2 Size 0**

MDX60/61B-5A3 (AC 400/500 V units): 0005 ... 0014



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\* View of the underside of the unit

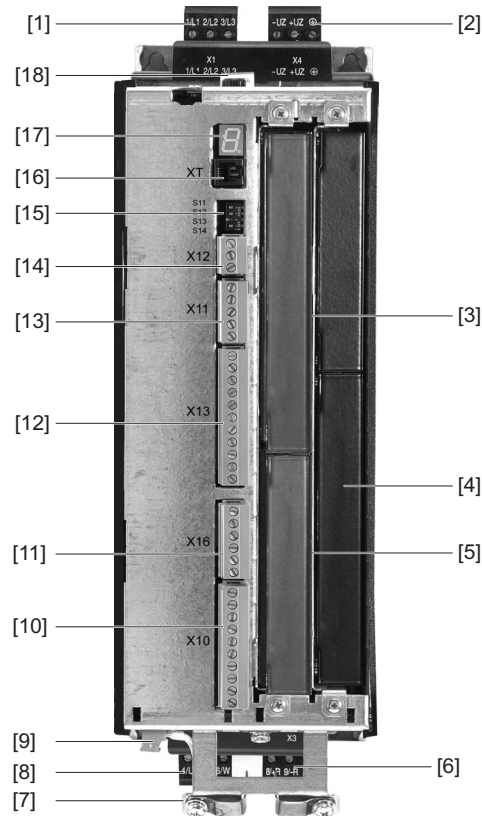
- [1] Power shield clamp for mains connection and connection for DC link connection
- [2] X4: Connection for DC link connection  $-U_Z / +U_Z$  and PE connection, separable
- [3] X1: Power supply connection L1, L2, L3 and PE connection, separable
- [4] Only with MDX61B: Fieldbus slot
- [5] Only with MDX61B: Encoder slot
- [6] Electronics shield clamp MDX61B size 0
- [7] X10: Electronics terminal strip for binary outputs and TF/TH input
- [8] X16: Electronics terminal strip for binary inputs and outputs
- [9] X13: Electronics terminal strip for binary inputs and RS-485 interface
- [10] X11: Electronics terminal strip for setpoint input AI1 and 10 V reference voltage
- [11] X12: Electronics terminal strip for system bus (SBus)
- [12] DIP switches S11 ... S14
- [13] XT: Slot for DBG60B keypad or UWS21B serial interface
- [14] 7-segment display
- [15] Memory card
- [16] Electronics shield clamp MDX60B size 0
- [17] X17: Electronics terminal strip for safety contacts for safe stop
- [18] X2: Motor connection U, V, W and PE connection, separable
- [19] X3: Braking resistor connection  $+R / -R$  and PE connection, separable
- [20] Power shield clamp for motor connection and braking resistor connection



8.3 Size 1

MDX61B-5A3 (AC 400/500 V units): 0015 ... 0040

MDX61B-2A3 (AC 230 V units): 0015 ... 0037



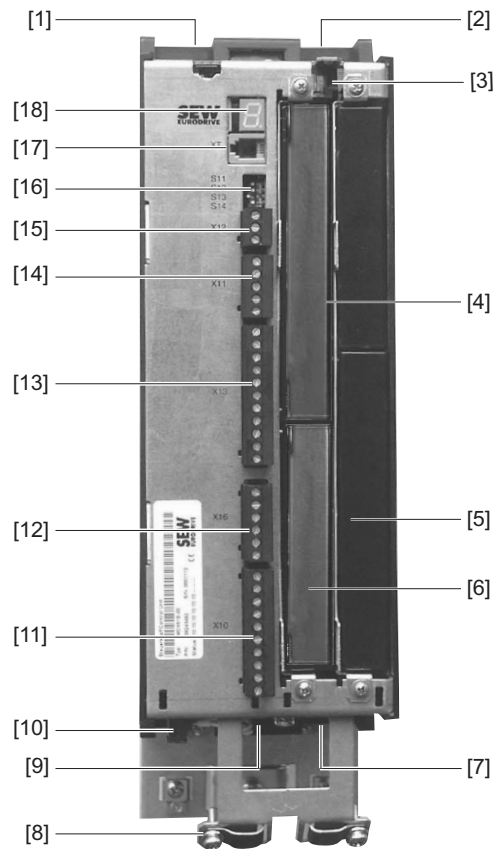
8

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- [1] X1: Power supply connection 1/L1, 2/L2, 3/L3, separable
- [2] X4: Connection for DC link connection  $-U_Z$   $+U_Z$ , separable
- [3] Fieldbus slot
- [4] Expansion slot
- [5] Encoder slot
- [6] X3: Braking resistor connection 8/+R, 9/-R and PE connection, separable
- [7] Electronics shield clamp and PE connection
- [8] X2: Motor connection 4/U, 5/V, 6/W and PE connection, separable
- [9] X17: Electronics terminal strip for safety contacts for safe stop
- [10] X10: Electronics terminal strip for binary outputs and TF/TH input
- [11] X16: Electronics terminal strip for binary inputs and outputs
- [12] X13: Electronics terminal strip for binary inputs and RS485 interface
- [13] X11: Electronics terminal strip for setpoint input AI1 and 10 V reference voltage
- [14] X12: Electronics terminal strip for system bus (SBus)
- [15] DIP switches S11 ... S14
- [16] XT: Slot for DBG60B keypad or UWS21B serial interface
- [17] 7-segment display
- [18] Memory card


**8.4 Size 2S**

MDX61B-5A3 (AC 400/500 V units): 0055 / 0075



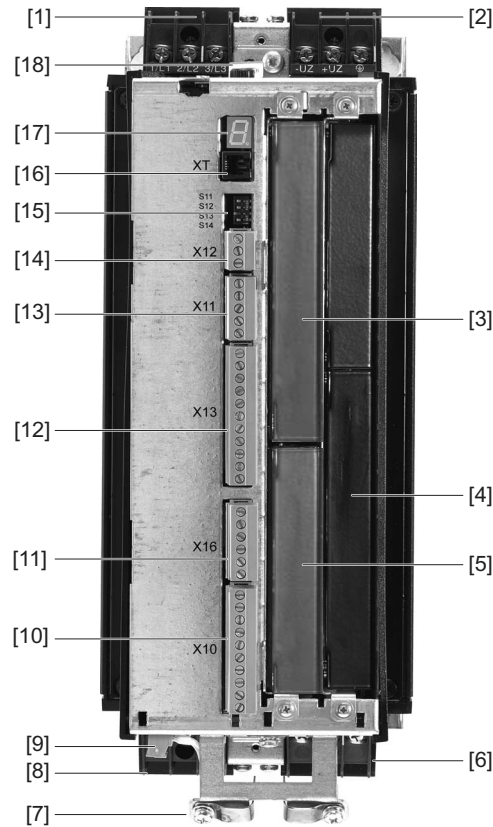
54525AXX

- [1] X1: Power supply connection 1/L1, 2/L2, 3/L3
- [2] X4: Connection for DC link connection  $-U_z$   $+U_z$  and PE connection
- [3] Memory card
- [4] Fieldbus slot
- [5] Expansion slot
- [6] Encoder slot
- [7] X3: Braking resistor connection 8/+R, 9/-R and PE connection
- [8] Electronics shield clamp and PE connection
- [9] X2: Motor connection 4/U, 5/V, 6/W
- [10] X17: Electronics terminal strip for safety contacts for safe stop
- [11] X10: Electronics terminal strip for binary outputs and TF/TH input
- [12] X16: Electronics terminal strip for binary inputs and outputs
- [13] X13: Electronics terminal strip for binary inputs and RS485 interface
- [14] X11: Electronics terminal strip for setpoint input AI1 and 10 V reference voltage
- [15] X12: Electronics terminal strip for system bus (SBus)
- [16] DIP switches S11 ... S14
- [17] XT: Slot for DBG60B keypad or UWS21B serial interface
- [18] 7-segment display



8.5 Size 2

MDX61B-5A3 (AC 400/500 V units): 0110  
MDX61B-2A3 (AC 230 V units): 0055 / 0075



8

59243AXX

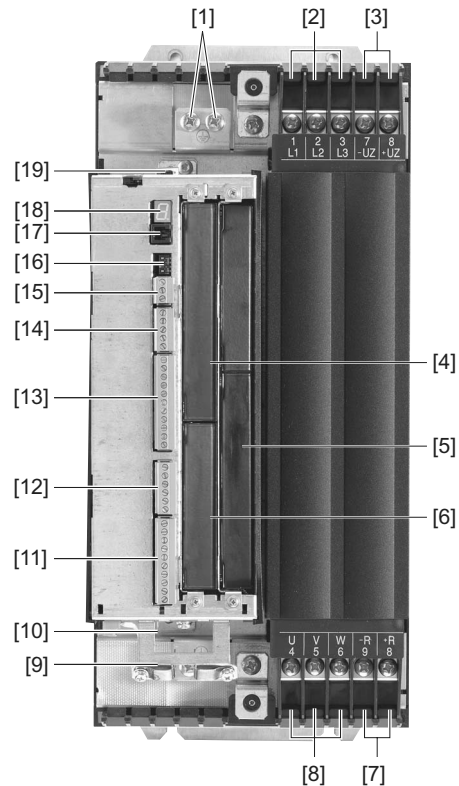
- [1] X1: Power supply connection 1/L1, 2/L2, 3/L3
- [2] X4: Connection for DC link connection  $-U_z$   $+U_z$  and PE connection
- [3] Fieldbus slot
- [4] Expansion slot
- [5] Encoder slot
- [6] X3: Braking resistor connection 8/+R, 9/-R and PE connection
- [7] Electronics shield clamp and PE connection
- [8] X2: Motor connection 4/U, 5/V, 6/W
- [9] X17: Electronics terminal strip for safety contacts for safe stop
- [10] X10: Electronics terminal strip for binary outputs and TF/TH input
- [11] X16: Electronics terminal strip for binary inputs and outputs
- [12] X13: Electronics terminal strip for binary inputs and RS485 interface
- [13] X11: Electronics terminal strip for setpoint input AI1 and 10 V reference voltage
- [14] X12: Electronics terminal strip for system bus (SBus)
- [15] DIP switches S11 ... S14
- [16] XT: Slot for DBG60B keypad or UWS21B serial interface
- [17] 7-segment display
- [18] Memory card



#### 8.6 Size 3

MDX61B-503 (AC 400/500 V units): 0150 ... 0300

MDX61B-203 (AC 230 V units): 0110 / 0150



59979AXX

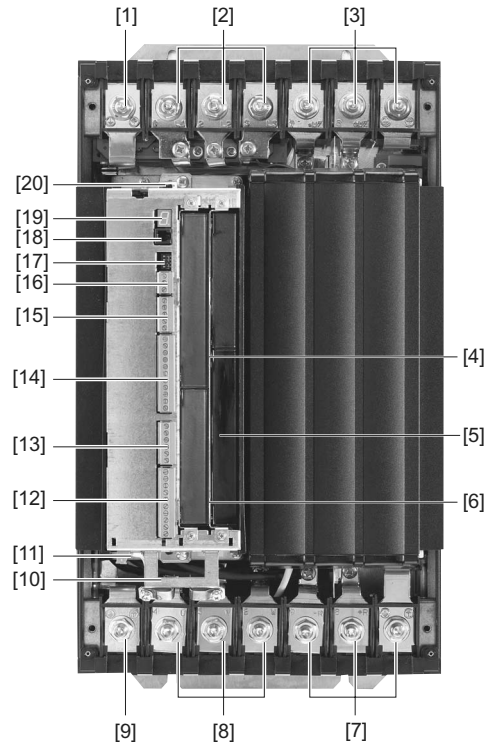
- [1] PE connections
- [2] X1: Power supply connection 1/L1, 2/L2, 3/L3
- [3] X4: Connection for DC link connection  $-U_Z$   $+U_Z$
- [4] Fieldbus slot
- [5] Expansion slot
- [6] Encoder slot
- [7] X3: Braking resistor connection 8/+R, 9/-R
- [8] X2: Motor connection 4/U, 5/V, 6/W
- [9] Electronics shield clamp and PE connection
- [10] X17: Electronics terminal strip for safety contacts for safe stop
- [11] X10: Electronics terminal strip for binary outputs and TF/TH input
- [12] X16: Electronics terminal strip for binary inputs and outputs
- [13] X13: Electronics terminal strip for binary inputs and RS485 interface
- [14] X11: Electronics terminal strip for setpoint input AI1 and 10 V reference voltage
- [15] X12: Electronics terminal strip for system bus (SBus)
- [16] DIP switches S11 ... S14
- [17] XT: Slot for DBG60B keypad or UWS21B serial interface
- [18] 7-segment display
- [19] Memory card



8.7 Size 4

MDX61B-503 (AC 400/500 V units): 0370 / 0450

MDX61B-203 (AC 230 V units): 0220 / 0300



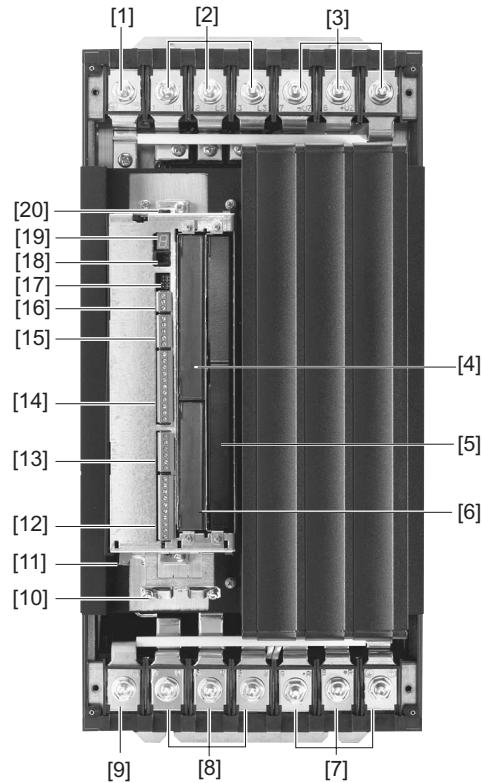
8

59980AXX

- [1] PE connection
- [2] X1: Power supply connection 1/L1, 2/L2, 3/L3
- [3] X4: Connection for DC link connection  $-U_z$   $+U_z$  and PE connection
- [4] Fieldbus slot
- [5] Expansion slot
- [6] Encoder slot
- [7] X3: Braking resistor connection 8/+R, 9/-R and PE connection
- [8] X2: Motor connection 4/U, 5/V, 6/W
- [9] PE connection
- [10] Electronics shield clamp
- [11] X17: Electronics terminal strip for safety contacts for safe stop
- [12] X10: Electronics terminal strip for binary outputs and TF/TH input
- [13] X16: Electronics terminal strip for binary inputs and outputs
- [14] X13: Electronics terminal strip for binary inputs and RS485 interface
- [15] X11: Electronics terminal strip for setpoint input AI1 and 10 V reference voltage
- [16] X12: Electronics terminal strip for system bus (SBus)
- [17] DIP switches S11 ... S14
- [18] XT: Slot for DBG60B keypad or UWS21B serial interface
- [19] 7-segment display
- [20] Memory card


**8.8 Size 5**

MDX61B-503 (AC 400/500 V units): 0550 / 0750



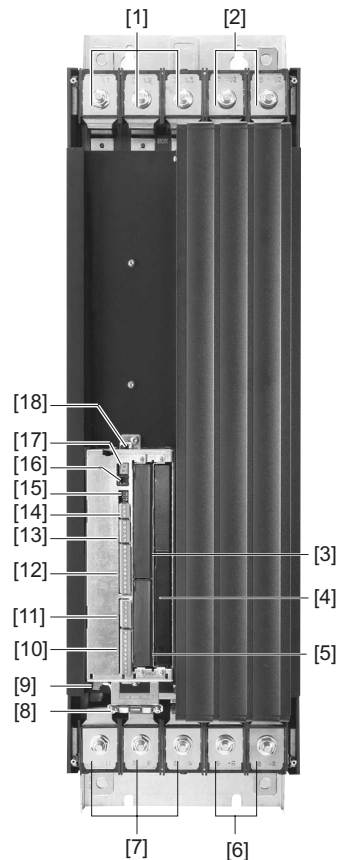
59981AXX

- [1] PE connection
- [2] X1: Power supply connection 1/L1, 2/L2, 3/L3
- [3] X4: Connection for DC link connection  $-U_Z$   $+U_Z$  and PE connection
- [4] Fieldbus slot
- [5] Expansion slot
- [6] Encoder slot
- [7] X3: Braking resistor connection 8/+R, 9/-R and PE connection
- [8] X2: Motor connection 4/U, 5/V, 6/W
- [9] PE connection
- [10] Electronics shield clamp
- [11] X17: Electronics terminal strip for safety contacts for safe stop
- [12] X10: Electronics terminal strip for binary outputs and TF/TH input
- [13] X16: Electronics terminal strip for binary inputs and outputs
- [14] X13: Electronics terminal strip for binary inputs and RS485 interface
- [15] X11: Electronics terminal strip for setpoint input AI1 and 10 V reference voltage
- [16] X12: Electronics terminal strip for system bus (SBus)
- [17] DIP switches S11 ... S14
- [18] XT: Slot for DBG60B keypad or UWS21B serial interface
- [19] 7-segment display
- [20] Memory card



8.9 Size 6

MDX61B-503 (AC 400/500 V units): 0900 ... 1320



8

59982AXX

- [1] X1: Power supply connection 1/L1, 2/L2, 3/L3 and PE connection
- [2] X4: Connection for DC link connection  $-U_Z$   $+U_Z$  and PE connection
- [3] Fieldbus slot
- [4] Expansion slot
- [5] Encoder slot
- [6] X3: Braking resistor connection 8/+R, 9/-R and PE connection
- [7] X2: Motor connection 4/U, 5/V, 6/W and PE connection
- [8] Electronics shield clamp
- [9] X17: Electronics terminal strip for safety contacts for safe stop
- [10] X10: Electronics terminal strip for binary outputs and TF/TH input
- [11] X16: Electronics terminal strip for binary inputs and outputs
- [12] X13: Electronics terminal strip for binary inputs and RS485 interface
- [13] X11: Electronics terminal strip for setpoint input AI1 and 10 V reference voltage
- [14] X12: Electronics terminal strip for system bus (SBus)
- [15] DIP switches S11 ... S14
- [16] XT: Slot for DBG60B keypad or UWS21B serial interface
- [17] 7-segment display
- [18] Memory card



## Installation

Installation instructions for the basic unit

## 9 Installation

### 9.1 Installation instructions for the basic unit

#### Installation notes for size 6

The MOVIDRIVE® units of size 6 (0900 ... 1320) are equipped with a fixed lifting eye [1]. Use a crane and lifting eye [1] to install the unit.



#### ⚠ DANGER!

Suspended load.

Danger of fatal injury if the load falls.

- Do not stand under the suspended load.
- Secure the danger zone.

If a crane is not available, you can push a carrying bar [2] through the rear panel [4] to facilitate installation (included in the delivery scope of size 6). Secure the carrying bar [2] against axial displacement using the split pin [3].

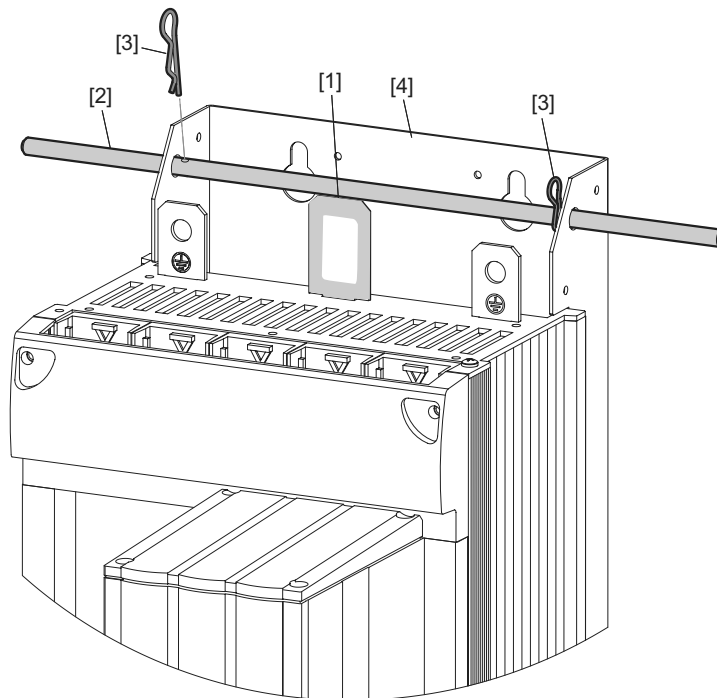


Figure 126: Installing MOVIDRIVE® size 6 with fixed lifting eye and carrying bar

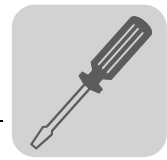
59892AXX

[1] Fixed lifting eye

[2] Carrying bar (included in the delivery of size 6)

[3] 2 split pins (included in the delivery scope of size 6)

[4] Rear panel



**Tightening torques**

- Only use **original connection elements**. Note the **permitted tightening torques** for MOVIDRIVE® power terminals.
  - Sizes 0, 1 and 2S → 0.6 Nm
  - Size 2 → 1.5 Nm
  - Size 3 → 3.5 Nm
  - Sizes 4 and 5 → 14.0 Nm
  - Size 6 → 20.0 Nm
- The **permitted tightening torque** of the **signal terminals** is 0.6 Nm.

**Minimum clearance and mounting position**

- Leave at least **100 mm clearance above and below the unit for optimum cooling**. Make sure air circulation in the clearance is not impaired by cables or other installation equipment. With sizes 4, 5 and 6, do not install any components that are sensitive to high temperatures within 300 mm of the top of the unit.
- Ensure unobstructed cooling air supply and make sure that air heated by other units cannot be drawn in or reused.
- There is no need for clearance at the sides of the unit. You can line up the units directly next to one another.
- Only install the units **vertically**. Do not install them horizontally, tilted or upside down (→ following figure, applies to all sizes).

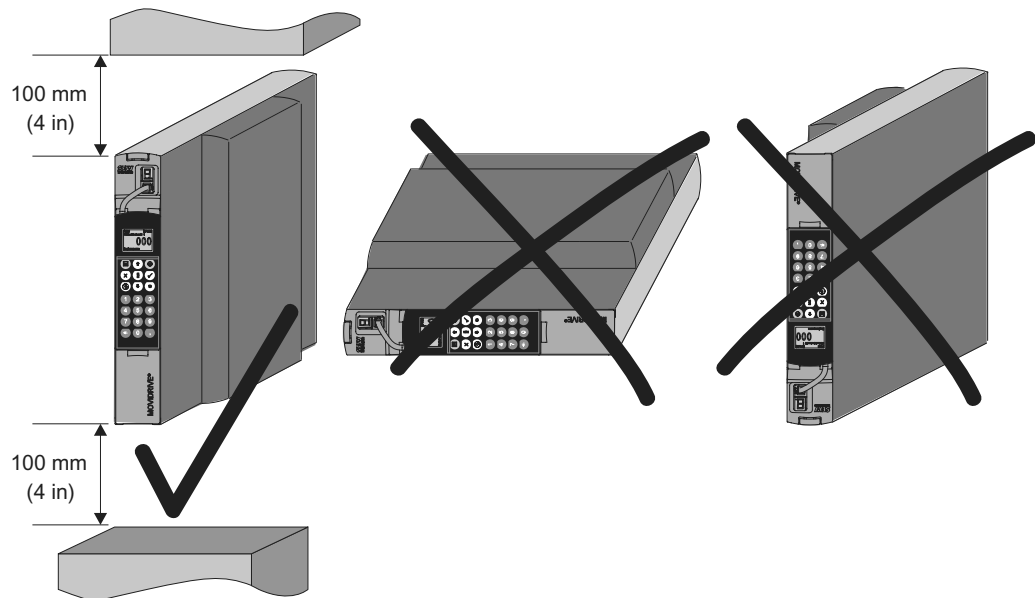


Figure 127: Minimum clearance and mounting position of the units

60030AXX

**Separate cable ducts**

- Route **power cables** and **electronics cables** in **separate cable ducts**.



## Installation

### Installation instructions for the basic unit

#### Fuses and earth-leakage circuit breakers

- Install the **fuses at the beginning of the supply system lead** after the supply bus junction (→ Wiring diagram for basic unit, power section and brake).
- SEW-EURODRIVE recommends that you do not use earth-leakage circuit breakers. However, if an earth-leakage circuit breaker is stipulated for direct or indirect protection against contact, observe the **following note in accordance with EN 61800-5-1**:

	<b>⚠ WARNING!</b>
	<p>Incorrect earth-leakage circuit breaker installed. Severe or fatal injuries.</p> <p>MOVIDRIVE® can cause direct current in the protective earth. In cases where an earth-leakage circuit breaker is used for protection against direct or indirect contact, only install a type B earth-leakage circuit breaker on the <b>power supply end of the MOVIDRIVE® unit</b>.</p>

#### Mains and brake contactors

- Only use **contactors in utilization category AC-3** (IEC 60947-4-1) as mains and brake contactors.

	<b>NOTES</b>
	<ul style="list-style-type: none"> <li>• Only use the <b>mains contactor K11</b> (→ Sec. "Wiring diagram for basic unit") to <b>switch the inverter on and off</b>. Do not use it for jog mode. Use the commands "Enable/Stop", "CW/Stop" or "CCW/Stop" for jog mode.</li> <li>• Observe a minimum switch-off time of 10 s for the mains contactor K11.</li> </ul>

#### PE connection (→ EN 61800-5-1)

Earth-leakage currents  $\geq 3.5$  mA may occur during normal operation. To meet the requirements of EN 61800-5-1 observe the following points:

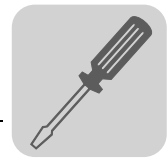
- **Supply system lead  $< 10$  mm<sup>2</sup>**: Route a **second PE conductor with the cross section of the supply system lead** in parallel to the protective earth via separate terminals or use a **copper protective earth conductor with a cross section of 10 mm<sup>2</sup>**.
- **Supply system lead 10 mm<sup>2</sup> ... 16 mm<sup>2</sup>**: Route a **copper protective earth conductor with the cross section of the supply system lead**.
- **Supply system lead 16 mm<sup>2</sup> ... 35 mm<sup>2</sup>**: Route a **copper protective earth conductor with the cross section of 16 mm<sup>2</sup>**.
- **Supply system lead  $> 35$  mm<sup>2</sup>**: Route a **copper protective earth conductor with half the cross section of the supply system lead**.

#### IT systems

- SEW-EURODRIVE recommends using **earth-leakage monitors with pulse-code measurement** for voltage supply systems with a non-grounded star point (**IT systems**). Using such devices prevents the earth-leakage monitor mis-tripping due to the ground capacitance of the inverter. **No EMC limits are specified for interference emission in voltage supply systems without grounded star point** (IT systems).


#### Cross sections

- Supply system lead: **Cross section according to rated input current  $I_{\text{mains}}$**  at rated load.
- Motor lead: **Cross section according to rated output current  $I_{\text{rated}}$** .
- Electronics cables of basic unit (terminals X10, X11, X12, X13, X16):
  - One core per terminal 0.20 ... 2.5 mm<sup>2</sup> (AWG 24 ... 12)
  - Two cores per terminal 0.25 ... 1 mm<sup>2</sup> (AWG 22 ... 17)



- Electronics cables of terminal X17 and DIO11B terminal expansion board (terminals X20, X21, X22):
  - One core per terminal 0.08 ... 1.5 mm<sup>2</sup> (AWG 28 ... 16)
  - Two cores per terminal 0.25 ... 1 mm<sup>2</sup> (AWG 22 ... 17)

**Unit output**

	<b>STOP!</b>
	MOVIDRIVE® B can suffer irreparable damage if you connect capacitive loads. <ul style="list-style-type: none"> <li>• <b>Only connect ohmic/inductive loads (motors).</b></li> <li>• Never connect capacitive loads.</li> </ul>

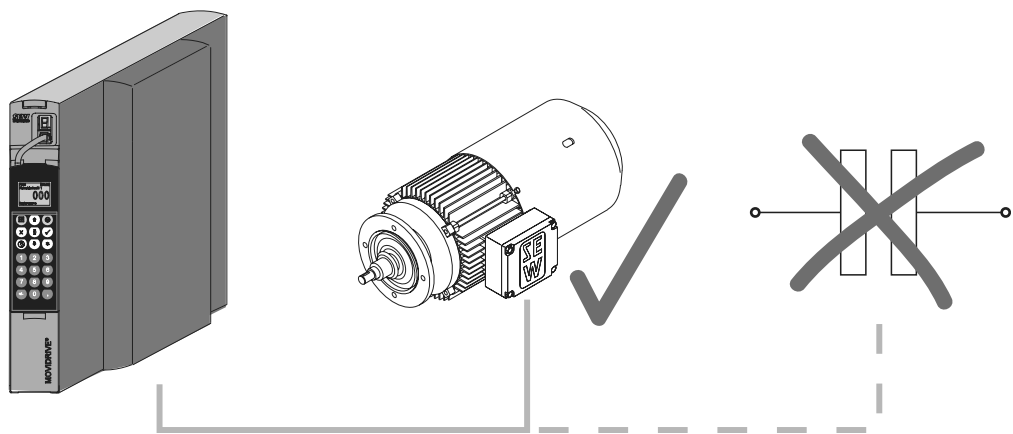


Figure 128: Only connect ohmic/inductive loads; do not connect capacitive loads

60031AXX

**Connecting braking resistors**

- Use **two tightly twisted leads or a 2-core shielded power cable**. Cross section according to the rated output current of the inverter. The rated voltage of the cable must amount to at least  $U_0/U = 300 \text{ V} / 500 \text{ V}$  (in accordance with DIN VDE 0298).
- Protect the braking resistor (except for BW90-P52B) using a **bimetallic relay** (→ wiring diagram for basic unit, power section and brake). Set the **trip current** according to the **technical data of the braking resistor**. SEW-EURODRIVE recommends using an overcurrent relay from trip class 10 or 10A in accordance with EN 60947-4-1.
- For braking resistors of the **BW...-T / BW...-P** series, the **integrated temperature switch/overcurrent relay can be connected using a 2-core shielded cable** as an **alternative** to a bimetallic relay.
- **Flat-type braking resistors** have internal thermal overload protection (fuse which cannot be replaced). Install the **flat-type braking resistors** together with the appropriate **touch guard**.

**Installing braking resistors BW.../ BW..-T / BW...-P**

- Permitted mounting options:
  - on horizontal surfaces
  - on vertical surfaces with brackets at the bottom and perforated sheets at top and bottom
- Mounting not permitted:
  - on vertical surfaces with brackets at the top, right or left



## Installation

### Installation instructions for the basic unit

#### Operating braking resistors

- The connection leads to the braking resistors carry a **high pulsed DC voltage** during rated operation.

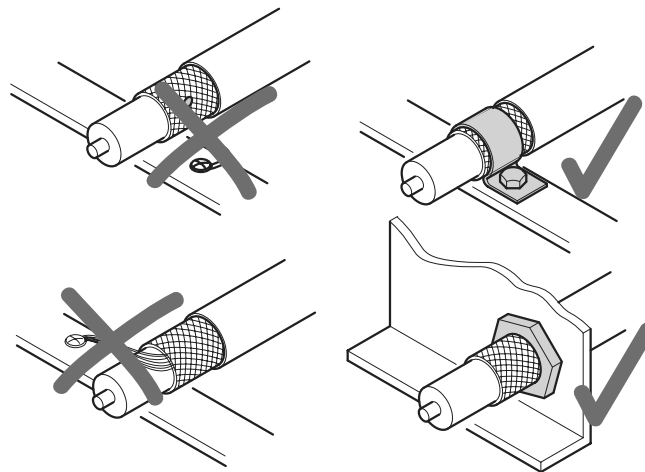
	<b>⚠ WARNING!</b>
	<p>The surfaces of the braking resistors get very hot when the braking resistors are loaded with <math>P_{rated}</math>.</p> <p>Risk of burns and fire.</p> <ul style="list-style-type: none"> <li>Choose a suitable installation location. Braking resistors are usually mounted on top of the control cabinet.</li> <li>Do not touch the braking resistors.</li> </ul>

#### Binary inputs / binary outputs

- The **binary inputs** are electrically **isolated** by optocouplers.
- The **binary outputs** are **short-circuit proof** and **protected against external voltage to DC 30 V**. External voltages > DC 30 V can cause irreparable damage to binary outputs.

#### EMC-compliant installation

- All cables except for the supply system lead must be **shielded**. As an alternative to the shielding, the option HD.. (output choke) can be used for the motor cable to achieve the emitted interference limit values.
- When using shielded motor cables, e.g. prefabricated motor cables from SEW-EURODRIVE, you must keep the **unshielded conductors between the shield and connection terminal of the inverter as short as possible**.
- Apply the **shield by the shortest possible route and make sure it is grounded over a wide area at both ends**. Ground one end of the shield via a suppression capacitor (220 nF / 50 V) to avoid ground loops. If using double-shielded cables, ground the outer shield on the inverter end and the inner shield on the other end.

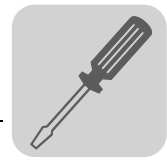


60028AXX

Figure 129: Correct shield connection using metal clamp (shield clamp) or cable gland

- You can also use **grounded sheet-metal ducts or metal pipes to shield the cables**. Route the **power and control cables separately**.
- Ground the **inverter** and **all additional units to ensure high-frequency compatibility** (wide area, metal-on-metal contact between the unit housing and ground, e.g. unpainted control cabinet mounting panel).

## NOTES



- This is a product with restricted availability in accordance with IEC 61800-3. It may cause EMC interference. In this case, the operator may need to implement appropriate measures.
- For detailed information on EMC compliant installation, refer to the publication "Electromagnetic Compatibility in Drive Engineering" from SEW-EURODRIVE.

*NF.. line filter*

- The NF.. line filter option can be used to maintain the class B limit for MOVIDRIVE® MDX60B/61B units size 0 to 5.
- Do not switch between the line filter and MOVIDRIVE® MDX60B/61B.
- Install the **line filter close to the inverter** but outside the minimum clearance for cooling.
- Keep the **length of the cable between the line filter and inverter to an absolute minimum**, and never more than 400 mm. Unshielded, twisted cables are sufficient. Use also unshielded lines for the supply system lead.
- SEW-EURODRIVE recommends taking one of the following **EMC measures on the motor side to maintain class A and B limits**:
  - Shielded motor cable
  - HD... output choke option
  - HF.. output filter option (in operating modes VFC and U/f)

*HD... output choke*

- Install the **output choke close to the inverter** but outside the minimum clearance for cooling.
- Route **all three phases of the motor cable [1] through the output choke**. To achieve a higher filter effect, **do not route the PE conductor through the output choke**.

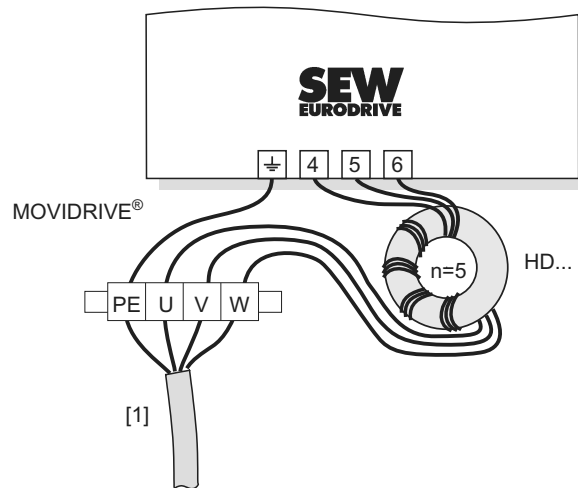


Figure 130: Connecting the HD.. output choke

60029AXX

[1] Motor cable



## Installation

### Removing/installing the keypad

#### 9.2 Removing/installing the keypad

##### Removing the keypad

Proceed as follows to remove the keypad:

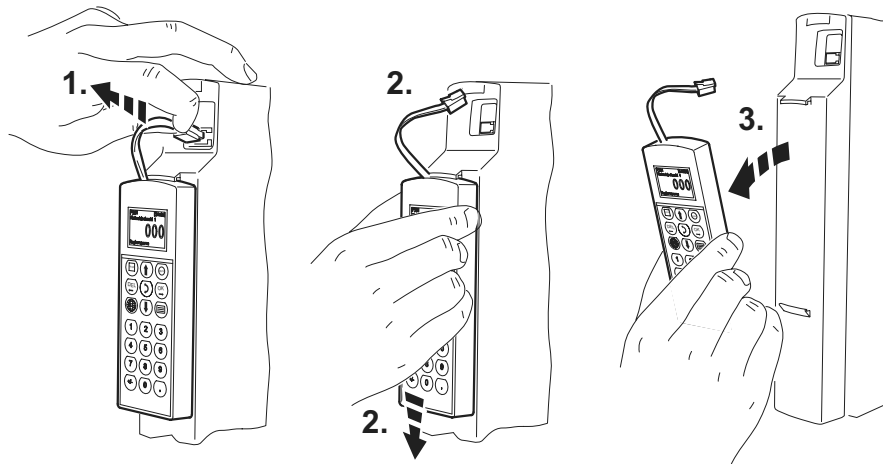


Figure 131: Removing the keypad

60032AXX

1. Unplug the connection cable from the XT slot.
2. Carefully push the keypad downwards until it comes off the upper fixture on the front cover.
3. Remove the keypad **forward** (not to the side!).

##### Installing the keypad

Proceed as follows to install the keypad:

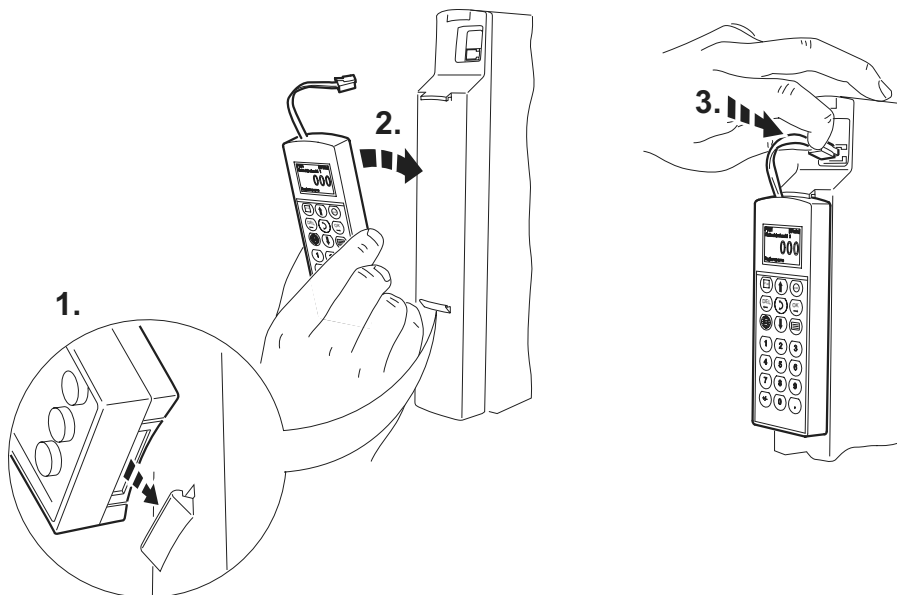


Figure 132: Installing the keypad

60033AXX

1. Place the underside of the keypad onto the lower fixture of the front cover.
2. Push the keypad into the upper fixture of the front cover.
3. Plug the connecting cable into the XT slot.



### 9.3 Removing/installing the front cover

#### Removing the front cover

Proceed as follows to remove the front cover:

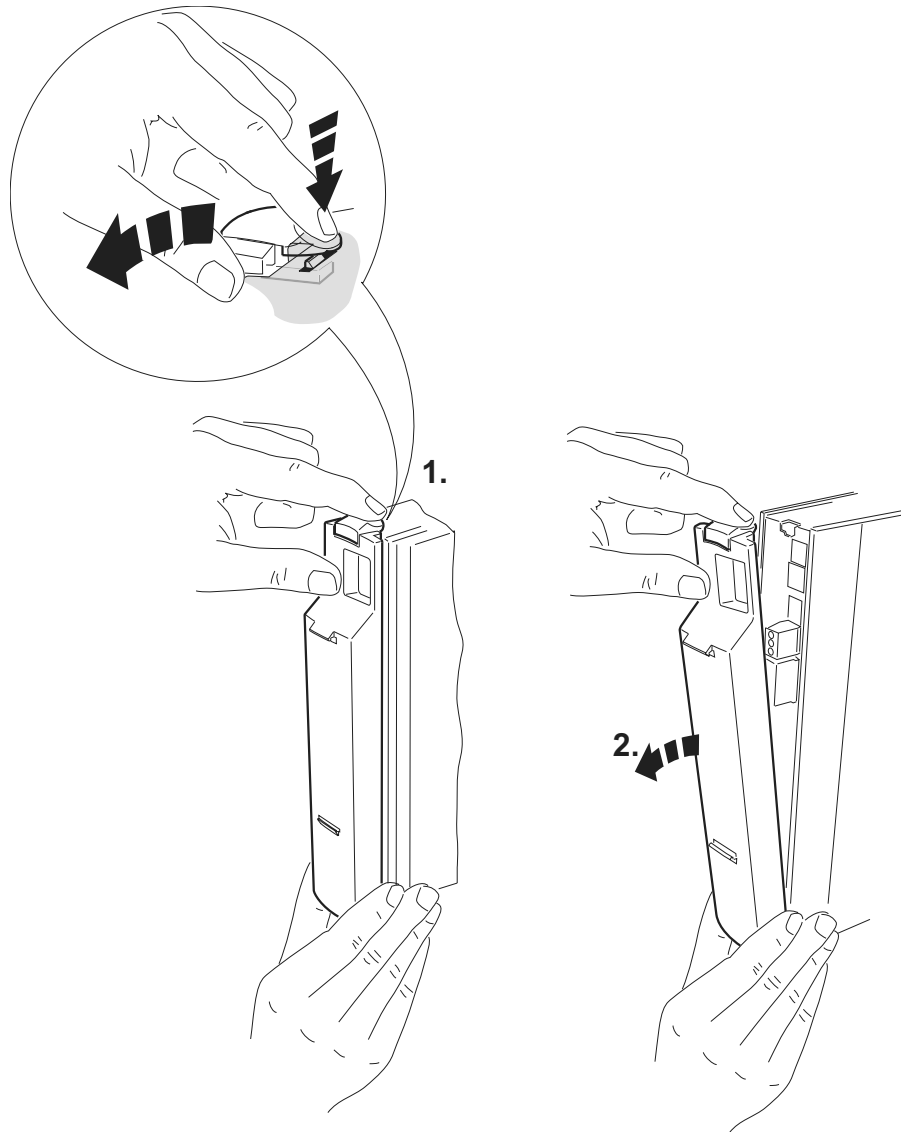


Figure 133: Removing the front cover

60034AXX

1. If a keypad is installed, remove it first (→ page 350).
2. Press the grooved clip on top of the front cover.
3. Keep the clip pressed down to remove the front cover.



## Installation

### Removing/installing the front cover

#### *Installing the front cover*

Proceed as follows to install the front cover:

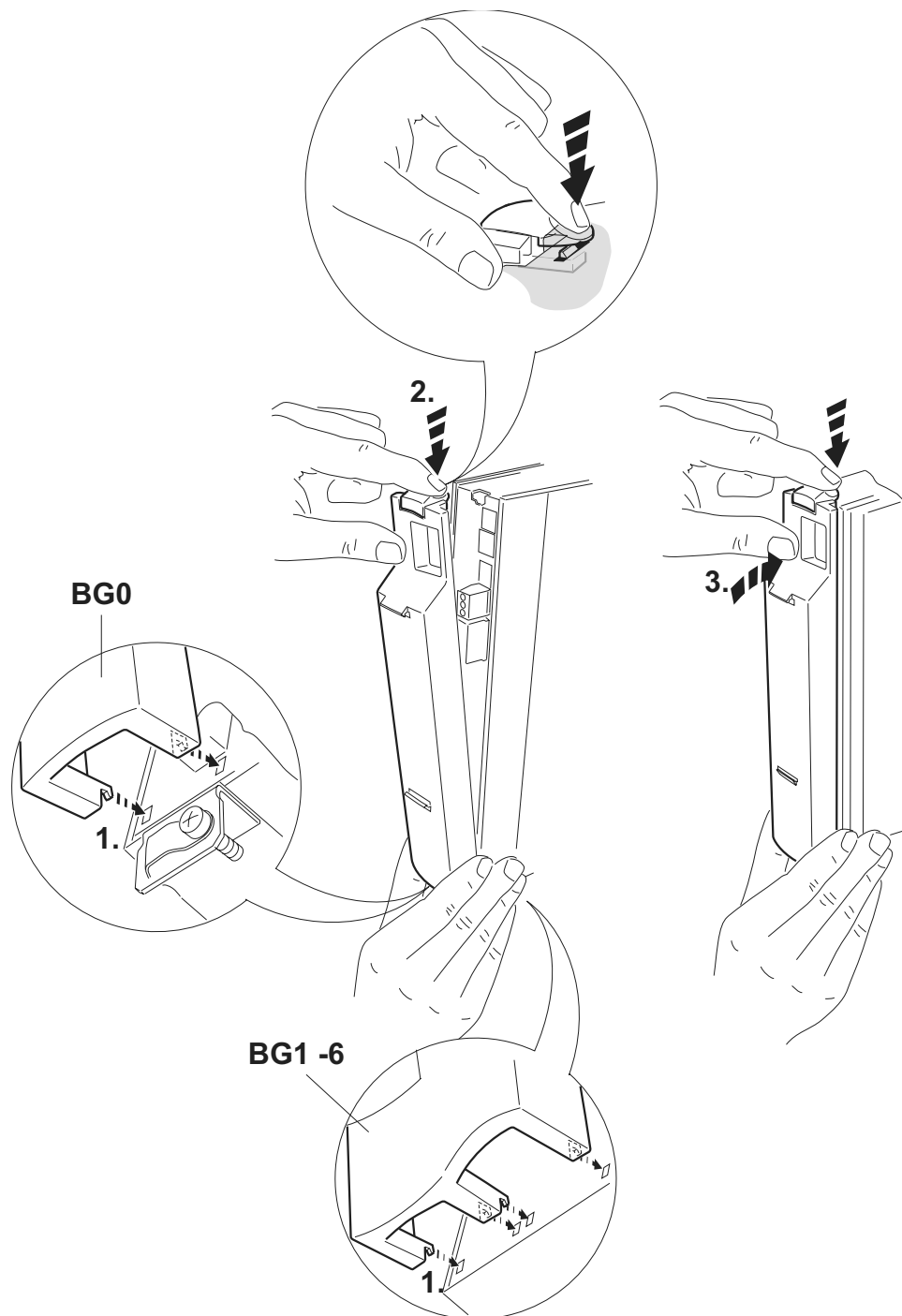
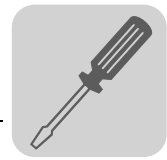


Figure 134: Installing the front cover

60035AXX

1. Insert the underside of the front cover into the support.
2. Keep the grooved clip on top of the front cover pressed down.
3. Push the front cover onto the unit.



## 9.4 UL-compliant installation

Note the following points for UL-compliant installation:

- Only use copper cables with the **following rated thermal values** as connection cables:
  - MOVIDRIVE® MDX60B/61B0005 ... 0300: Rated thermal value 60 °C / 75 °C
  - MOVIDRIVE® MDX61B0370 ... 1320: Rated thermal value 75 °C
- **Permitted tightening torques** for MOVIDRIVE® power terminals:
  - Sizes 0, 1 and 2S → 0.6 Nm
  - Size 2 → 1.5 Nm
  - Size 3 → 3.5 Nm
  - Sizes 4 and 5 → 14.0 Nm
  - Size 6 → 20.0 Nm
- MOVIDRIVE® drive inverters are **suitable for operation in voltage power systems with a grounded star point** (TN and TT systems) which can supply a max. supply current and a max. supply 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.

### 400/500 V units

MOVIDRIVE® MDX60B/61B...5_3	Max. supply current	Max. supply voltage	Fuses
0005/0008/0011/0014	AC 5000 A	AC 500 V	AC 15 A / 600 V
0015/0022/0030/0040	AC 10000 A	AC 500 V	AC 35 A / 600 V
0055/0075	AC 5000 A	AC 500 V	AC 60 A / 600 V
0110	AC 5000 A	AC 500 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
0900	AC 10000 A	AC 500 V	AC 250 A / 600 V
1100	AC 10000 A	AC 500 V	AC 300 A / 600 V
1320	AC 10000 A	AC 500 V	AC 400 A / 600 V



## Installation

### UL-compliant installation

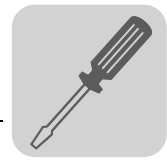
#### 230 V units

MOVIDRIVE® MDX61B...2_3	Max. supply current	Max. supply voltage	Fuses
0015/0022/0037	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
0220/0300	AC 10000 A	AC 240 V	AC 350 A / 250 V



#### NOTES

- Use only tested units with a **limited output voltage** ( $U_{\max} = \text{DC } 30 \text{ V}$ ) and **limited output current** ( $I \leq 8 \text{ A}$ ) as an **external DC 24 V voltage source**.
- **UL certification does not apply to operation in voltage supply systems with a non-grounded star point (IT systems).**



## 9.5 Shield clamps

### Shield clamp for power section, size 0

A set of shield clamps is supplied as standard for the power section of MOVIDRIVE® MDX60B/61B size 0. The shield clamps are not yet installed.

Install the shield clamps for the power section as follows:

- Secure the contact clips to the shield plates.
- Secure the shield clamps to the top and the bottom of the unit.

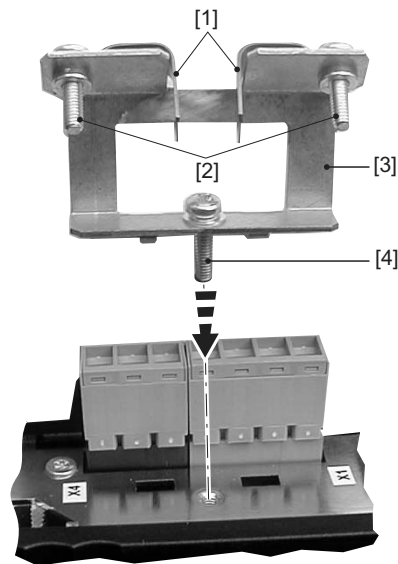


Figure 135: Securing the shield clamp of the power section (size 0)

60036AXX

- [1] Contact clips
- [2] Retaining screws for contact clip
- [3] Shield plate
- [4] Retaining screw of the shield clamp for the control unit

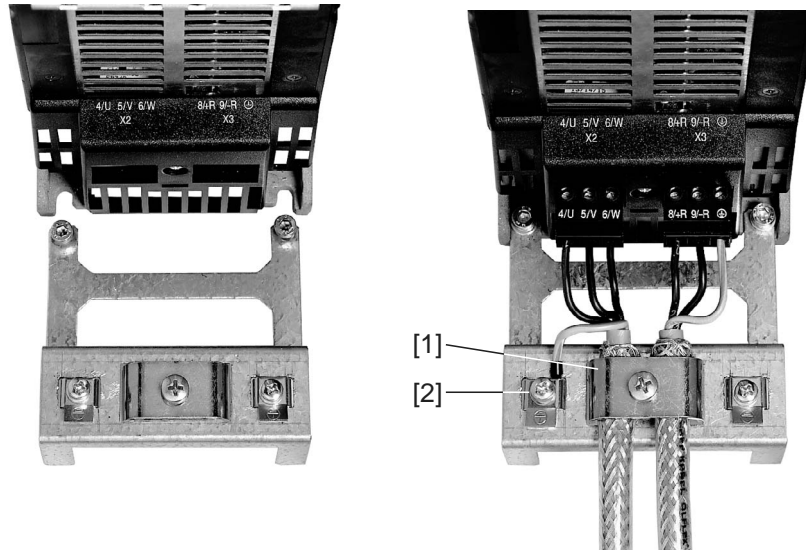


## Installation

### Shield clamps

#### Shield clamp for power section, size 1

A shield clamp is supplied as standard for the power section with MOVIDRIVE® MDX61B size 1. Install this shield clamp on the power section together with the unit's retaining screws.



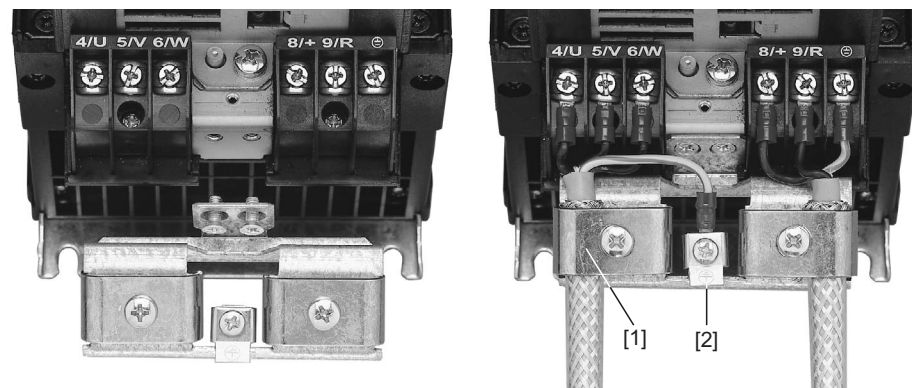
60019AXX

Figure 136: Securing the shield clamp on the power section (size 1)

[1] Power section shield clamp      [2] PE connection (⊕)

#### Shield clamp for power section, size 2S and 2

A shield clamp for the power section is supplied as standard with two retaining screws with MOVIDRIVE® MDX61B sizes 2S and 2. Install these shield clamp using the two retaining screws.



60020AXX

Figure 137: Securing the shield clamp on the power section (illustration shows size 2)

[1] Power section shield clamp      [2] PE connection (⊕)

The shield clamps for the power section provide you with a very convenient way of installing the shield for the motor and brake cables. Apply the shield and PE conductor as shown in the figures.

#### Shield clamp for power section, sizes 3 to 6

No shield clamps for the power section are supplied with MOVIDRIVE® MDX61B sizes 3 to 6. Use commercially available shield clamps for installing the shielding of motor and brake cables. Apply the shield as closely as possible to the inverter.



**Shield clamp for control unit**

Install the shield clamp for the control unit as follows:

- If installed, remove the keypad and the front cover.
- Size 0: Secure the shield clamp for the control unit to the bottom of the unit directly under the electronic terminal strip X14.
- Sizes 1 to 6: Secure the shield clamp for the control unit to the bottom of the unit.

Size 0

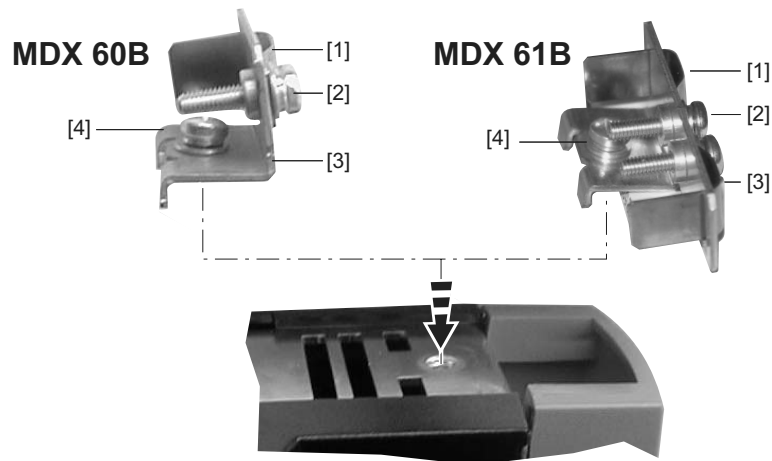


Figure 138: Installing the shield clamp for the control unit (size 0)

60037AXX

Sizes 1 to 6

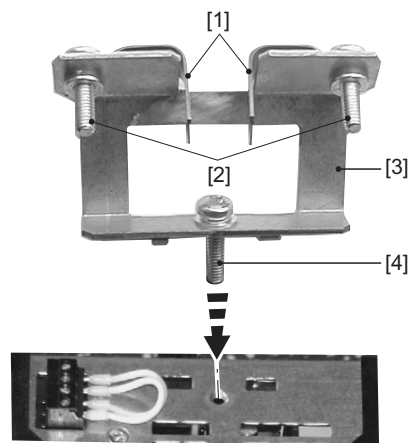


Figure 139: Securing the shield clamp for the control unit (sizes 1 - 6)

60038AXX

- [1] Contact clip(s)
- [2] Retaining screw(s) for contact clip
- [3] Shield plate
- [4] Retaining screw of shield clamp for control unit



#### 9.6 Touch guard

	<b>! DANGER!</b>
	<p>Uncovered power connections. Severe or fatal injuries from electric shock.</p> <ul style="list-style-type: none"> <li>• Install the touch guard according to the regulations.</li> <li>• Never start the unit if the touch guard is not installed.</li> </ul>

#### Size 2S

If the touch guard (→ following figure) is attached at the connections X4:-U<sub>Z</sub>/+U<sub>Z</sub> and X3:+R/-R, the MOVIDRIVE® MDX61B units size 2S have enclosure IP20; without touch guard they have enclosure IP10.

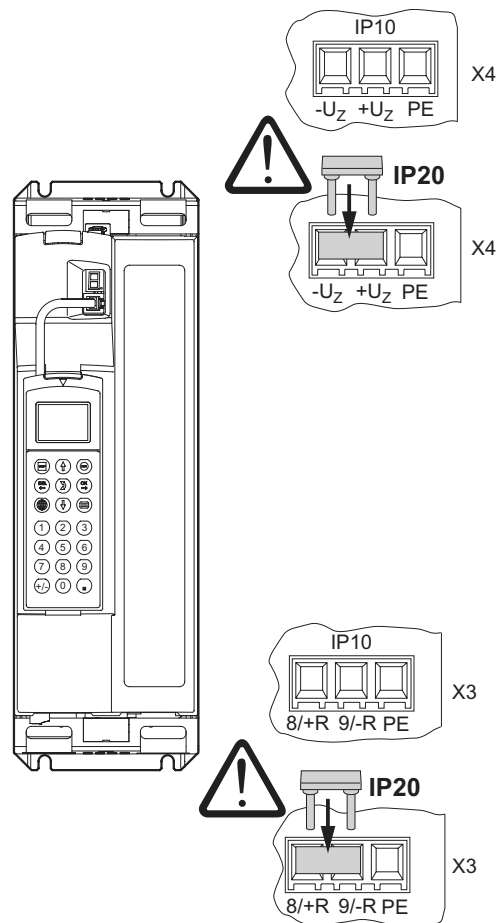
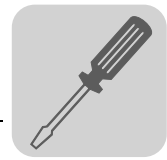


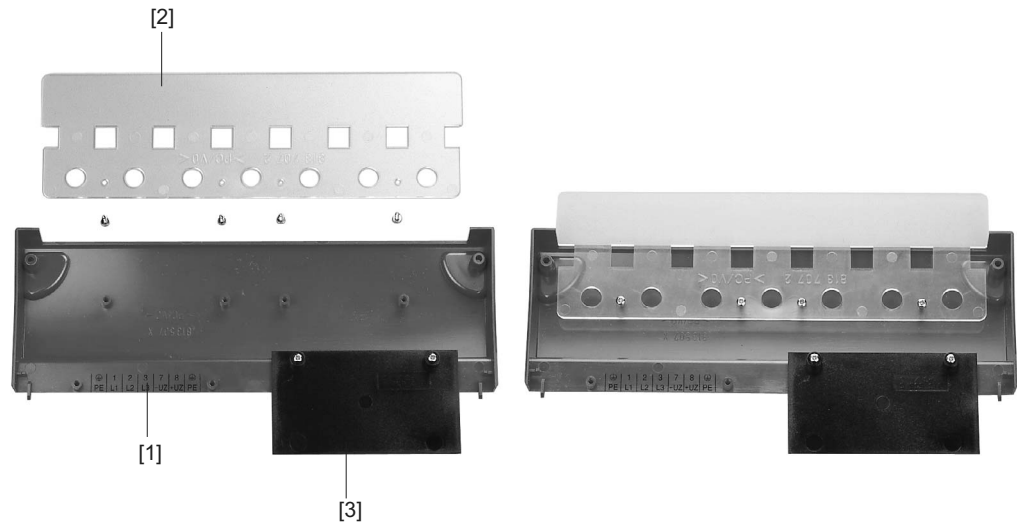
Figure 140: Touch guard for MOVIDRIVE® MDX61B size 2S

54408AXX



**Sizes 4-6**

For MOVIDRIVE® size 4 (AC 500 V units: MDX61B0370/0450; AC 230 V units: MDX61B0220/0300), size 5 (MDX61B0550/0750) and size 6 (MDX61B0900/1100/1320), two touch guards with eight retaining screws are supplied as standard. Install the touch guard on both covers of the power section terminals.



06624AXX

Figure 141: Touch guard for MOVIDRIVE® MDX61B sizes 4, 5 and 6

The touch guard comprises the following parts:

- [1] Cover plate
- [2] Connection plate
- [3] Screen (only for sizes 4 and 5)

The MOVIDRIVE® MDX61B units sizes 4, 5 and 6 can only achieve enclosure IP10 when the following conditions are met:

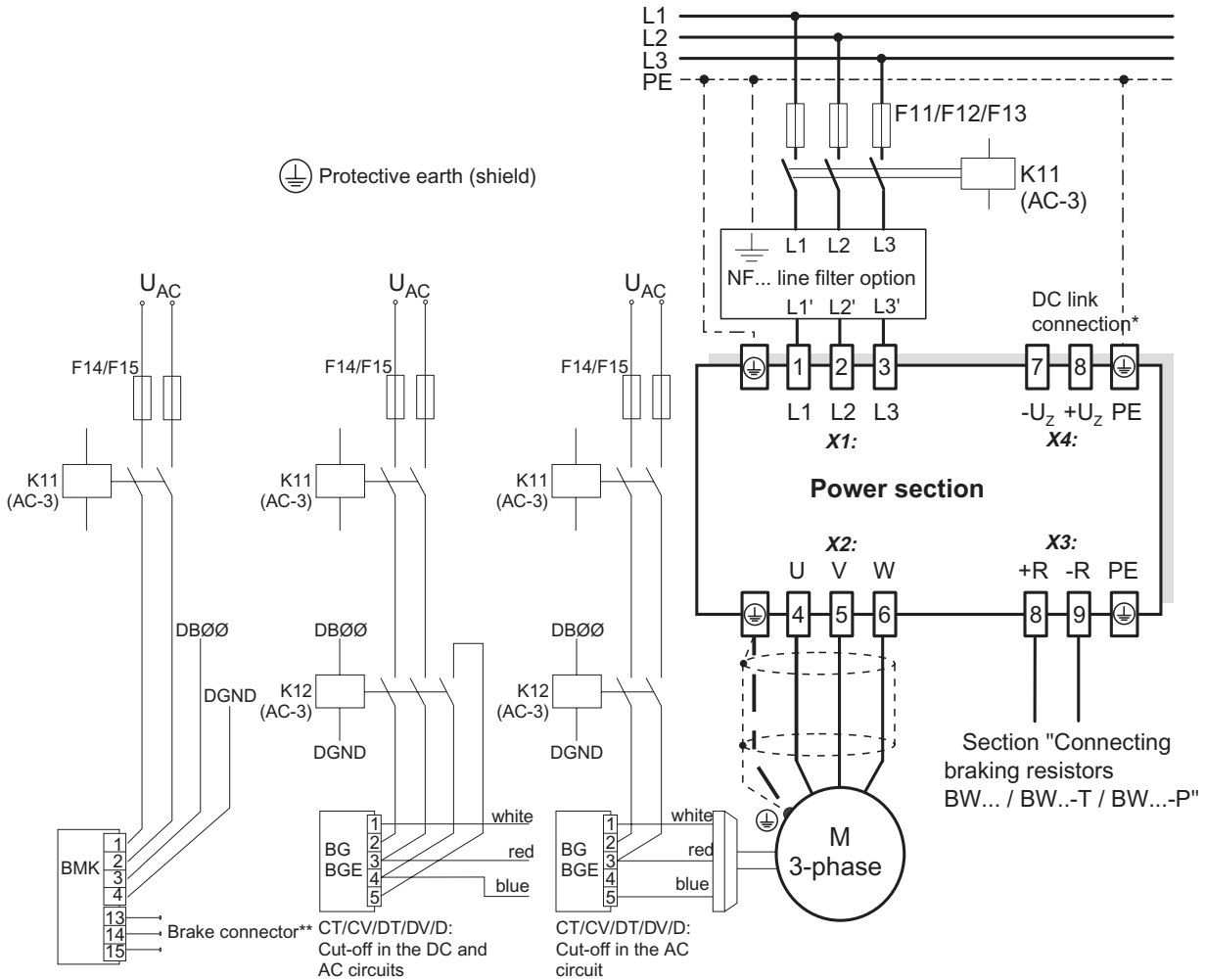
- Touch guard is fully installed
- Shrink tubing is installed on the power cables at all power terminals (X1, X2, X3, X4)

	<b>NOTE</b>
	If the above conditions are not met, MOVIDRIVE® units sizes 4, 5 and 6 have enclosure IP00.



**9.7 Wiring diagrams for basic unit**

**Power section and brake**



CT/CV, CM71 ... 112: Cut-off in the DC and AC circuits

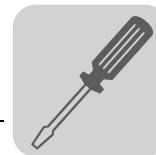
55310BEN

- \* With sizes 1, 2 and 2S, there is no PE connection next to the supply system connection terminals and motor connection terminals (X1, X2). In this case, use the PE terminal next to the DC link connection (X4).
- \*\* **You must adhere to the connection sequence of the brake connector.** Incorrect connection will cause irreparable damage to the brake. **Read the operating instructions for the motors** when connecting the brake using the terminal box.

	<b>NOTES</b>
	<ul style="list-style-type: none"> <li>• Connect the brake rectifier using a separate supply system lead.</li> <li>• <b>Supply via the motor voltage is not permitted!</b></li> </ul>

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

- All hoist applications
- Drives that require a rapid brake response time
- CFC and SERVO operating modes

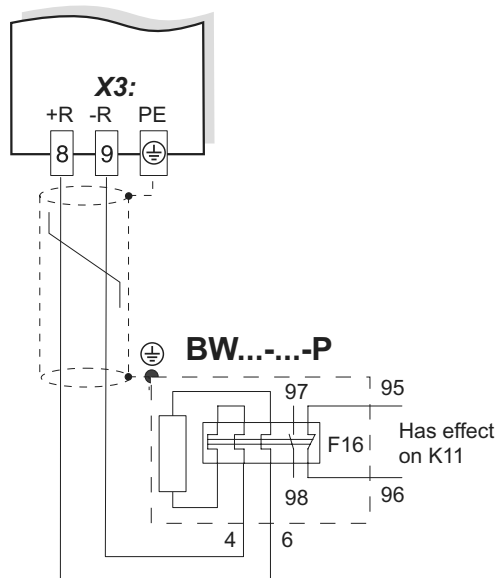


**Brake rectifier in control cabinet**

Install the connection cables between the brake rectifier and the brake separately from other power cables when installing the brake rectifier in the control cabinet. Joint installation is only permitted with shielded power cables.

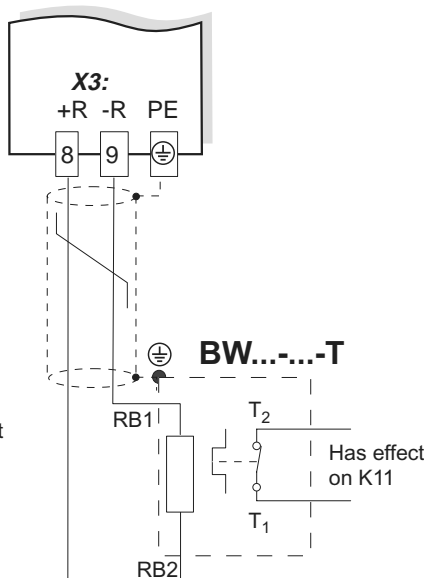
**Braking resistor BW... / BW...-...-T / BW...-...-P**

Power section



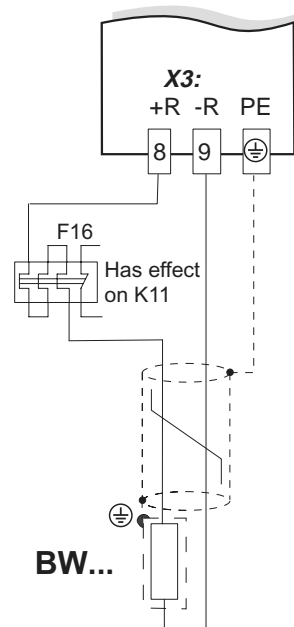
When the auxiliary contact trips, K11 must be opened and DIØØ"/Controller inhibit" assigned a "0" signal. Do not interrupt the resistor circuit!

Power section



When the internal temperature switch triggers, K11 must be opened and DIØØ"/Controller inhibit" assigned a "0" signal. Do not interrupt the resistor circuit!

Power section



When the external bimetallic relay (F16) triggers, K11 must be opened and DIØØ"/Controller inhibit" assigned a "0" signal. Do not interrupt the resistor circuit!

59500AEN

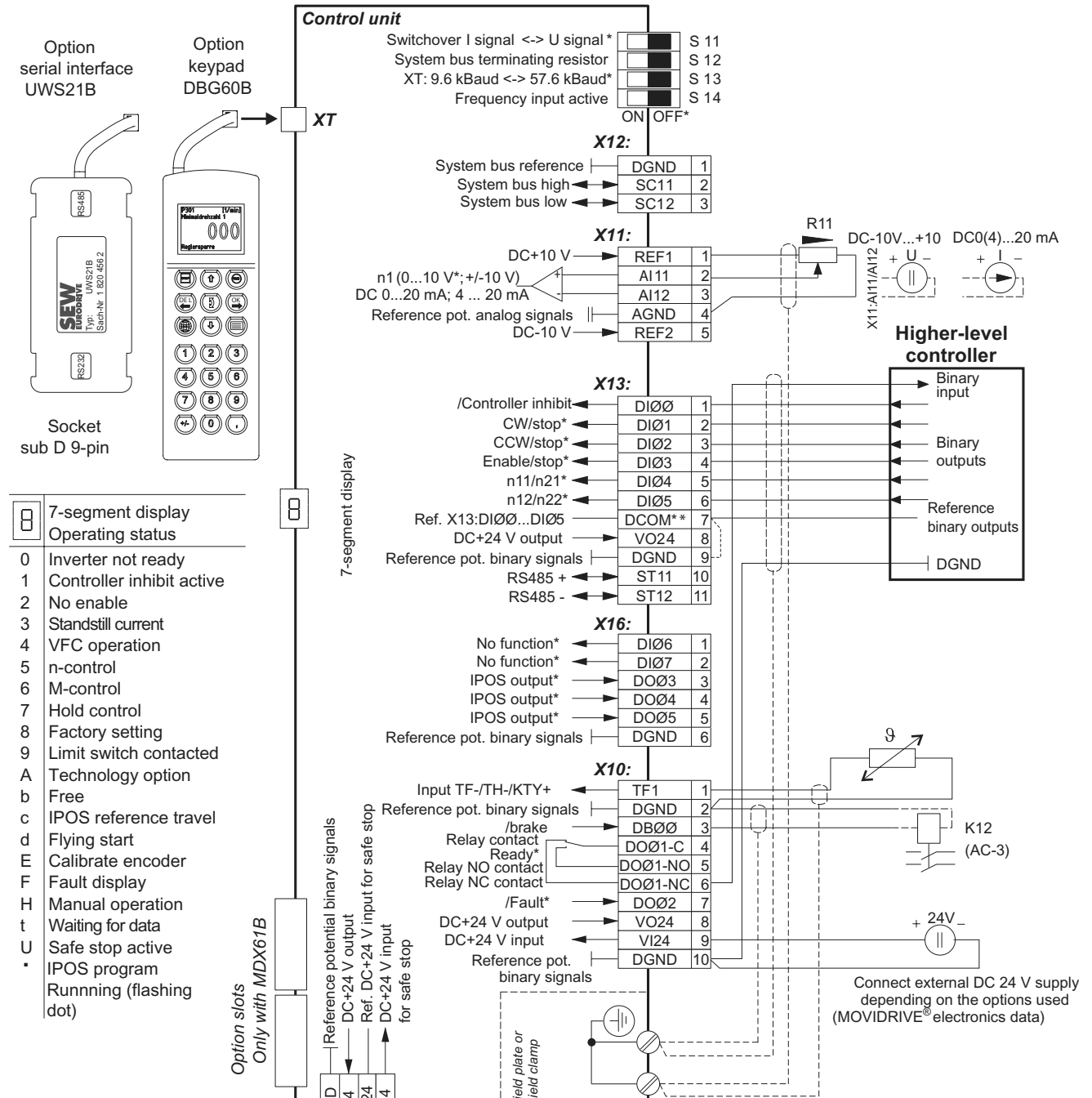
Braking resistor type	Design specified	Overload protection	
		Internal temperature switch (..T)	External bimetallic relay (F16)
BW...	-	-	Required
BW...-...-T	-	One of the two options (internal temperature switch / external bimetallic relay) is required.	
BW...-003 / BW...-005	Adequate	-	Permitted
BW090-P52B	Adequate	-	-



# Installation

## Wiring diagrams for basic unit

### Electronic terminals



59219AEN

\* Factory setting

\*\* If the binary inputs are connected to the DC 24 V voltage supply X13:8 "VO24", install a jumper between X13:7 (DCOM) and X13:9 (DGND) on MOVIDRIVE®.



**Description of terminal functions on the basic unit (power section and control unit)**

Terminal		Function	
X1:1/2/3 X2:4/5/6 X3:8/9 X4:	L1/L2/L3 (PE) U/V/W (PE) +R/-R (PE) +U <sub>Z</sub> /-U <sub>Z</sub> (PE)	Power supply connection Motor connection Braking resistor connection DC link connection	
S11 S12: S13: S14:		Change I-signal DC(0(4)...20 mA) ↔ V-signal DC(-10 V...0...10 V, 0...10 V), factory setting to V signal. Switching system bus terminating resistor on/off; factory setting: OFF. Set baud rate for the RS485 interface. Either 9.6 or 57.6 kBaud, factory setting: 75.6 kBaud. Switch frequency input on or off, factory setting: switched off.	
X12:1 X12:2 X12:3	DGND SC11 SC12	Reference potential system bus System bus high System bus low	
X11:1 X11:2/3 X11:4 X11:5	REF1 AI11/12 AGND REF2	DC+10 V (max. DC 3 mA) for setpoint potentiometer Setpoint input n1 (differential input or input with AGND reference potential), signal form → P11_ / S11 Reference potential for analog signals (REF1, REF2, AI..., AO...) DC-10 V (max. DC 3 mA) for setpoint potentiometer	
X13:1 X13:2 X13:3 X13:4 X13:5 X13:6	DI00 DI01 DI02 DI03 DI04 DI05	Binary input 1, with fixed assignment"/Controller inhibit" Binary input 2, factory setting to "CW/stop" Binary input 3, factory setting to "CCW/stop" Binary input 4, factory setting to "Enable/Stop" Binary input 5, factory setting to "n11/n21" Binary input 6, factory setting to "n11/n22"	<ul style="list-style-type: none"> <li>The binary inputs are electrically isolated by optocouplers.</li> <li>Selection options for binary inputs 2 to 6 (DI01 ... DI05) → Parameter menu P60_</li> </ul>
X13:7	DCOM	Reference for binary inputs X13:1 to X13:6 (DI00 ... DI05) and X16:1/X16:2 (DI06 ... DI07) <ul style="list-style-type: none"> <li>Switching binary inputs with DC+24 V external voltage: Connection X13:7 (DCOM) must be connected to the reference potential of the external voltage. <ul style="list-style-type: none"> <li>Without jumper X13:7-X13:9 (DCOM-DGND) → Isolated binary inputs</li> <li>With jumper X13:7-X13:9 (DCOM-DGND) → Non-isolated binary inputs</li> </ul> </li> <li>The binary inputs must be switched with DC+24 V from X13:8 or X10:8 (VO24) → Jumper required X13:7-X13:9 (DCOM-DGND).</li> </ul>	
X13:8 X13:9 X13:10 X13:11	VO24 DGND ST11 ST12	Auxiliary supply output DC+24 V (max. load X13:8 and X10:8 = 400 mA) for external command switches Reference potential for binary signals RS485+ RS485-	
X16:1 X16:2 X16:3 X16:4 X16:5 X16:6	DI06 DI07 DO03 DO04 DO05 DGND	Binary input 7, factory setting "no function" Binary input 8, factory setting "no function" Binary output 3, factory setting "IPOS output" Binary output 4, factory setting "IPOS output" Binary output 5, factory setting "IPOS output" <b>Do not connect external voltage to binary outputs X16:3 (DO03) and X16:5 (DO05)!</b> Reference potential for binary signals	<ul style="list-style-type: none"> <li>The binary inputs are electrically isolated by optocouplers.</li> <li>Selection options for binary inputs 7 and 8 (DI06/DI07) → Parameter menu P60_</li> <li>Selection option for binary inputs 3 to 5 (DO03...DO05) → Parameter menu P62_</li> </ul>
X10:1 X10:2 X10:3 X10:4 X10:5 X10:6 X10:7	TF1 DGND DB00 DO01-C DO01-NO DO01-NC DO02	KTY+/TF-/TH connection (connect to X10:2 via TF/TH), factory setting to "No response" (→ P835) Reference potential for binary signals / KTY- Binary output DB00 has fixed assignment "/Brake", load capacity max DC 150 mA (short-circuit proof, protected against external voltage to DC 30 V) Shared contact binary output 1, factory setting "Ready" Normally open contact binary output 1, max. load of relay contacts DC 30 V and DC 0.8 A NC contact binary output 1 Binary output DB02, factory setting "/Fault", max. load capacity DC 50 mA (short-circuit proof, protected against external voltage to DC 30 V). Selection options for binary outputs 1 and 2 (DO01 and DO02) → Parameter menu P62_. Do not apply external voltage to binary outputs X10:3 (DB00) and X10:7 (DO02).	
X10:8 X10:9 X10:10	VO24 VI24 DGND	Auxiliary supply output DC+24 V (max. load X13:8 and X10:8 = 400 mA) for external command switches Input DC+24 V voltage supply (backup voltage depending on options, unit diagnosis when supply system off) Reference potential for binary signals	
X17:1 X17:2 X17:3 X17:4	DGND VO24 SOV24 SVI24	Reference potential for X17:3 Auxiliary supply voltage DC+24 V, <b>only to supply X17:4 on the same unit</b> Reference potential for DC+24 V input "Safe stop" (safety contact) DC+24 V input "Safe stop" (safety contact)	
XT		Only service interface. Option slot: DBG60B / UWS21B / USB11A	



### 9.8 Assignment of braking resistors, chokes and filters

#### AC 400/500 V units, size 0

MOVIDRIVE® MDX60/61B...-5A3				0005	0008	0011	0014
Size				0			
Braking resistors BW... / BW...-T	Trip current	Part number BW...	Part number BW...-...-T				
BW090-P52B <sup>1)</sup>	-	824 563 0					
BW072-003	$I_F = 0.6 A_{RMS}$	826 058 3					
BW072-005	$I_F = 1.0 A_{RMS}$	826 060 5					
BW168/BW168-T	$I_F = 2.5 A_{RMS}$	820 604 X	1820 133 4				
BW100-006 BW100-006-T	$I_F = 2.4 A_{RMS}$	821 701 7	1820 419 8				
Line chokes				Part number			
ND020-013	$\Sigma I_{mains} = AC 20 A$	826 012 5					
Line filter				Part number			
NF009-503	$U_{max} = AC 550 V$	827 412 6					
Output chokes				Part number			
HD001	d = 50 mm	813 325 5		for cable cross sections 1.5 ... 16 mm <sup>2</sup> (AWG 16 ... 6)			
HD002	d = 23 mm	813 557 6		for cable cross sections ≤ 1.5 mm <sup>2</sup> (AWG 16)			
Output filter (only in VFC operating mode)				Part number			
HF008-503		826 029 X			A		
HF015-503		826 030 3			B		A
HF022-503		826 031 1					B

1) Internal thermal overload protection, no bimetallic relay required.

- A In rated operation (100 %)  
 B With variable torque load (125 %)



### AC 400/500 V units, size 1, 2S and 2

MOVIDRIVE® MDX61B...-5A3				0015	0022	0030	0040	0055	0075	0110
Size				1			2S		2	
Braking resistors BW... / BW...-T	Trip current	Part number BW...	Part number BW...-T							
BW100-005	$I_F = 0.8 A_{RMS}$	826 269 1								
BW100-006/ BW100-006-T	$I_F = 2.4 A_{RMS}$	821 701 7	1820 419 8							
BW168/BW168-T	$I_F = 3.4 A_{RMS}$	820 604 X	1820 133 4							
BW268/BW268-T	$I_F = 4.2 A_{RMS}$	820 715 1	1820 417 1							
BW147/BW147-T	$I_F = 5 A_{RMS}$	820 713 5	1820 134 2							
BW247/BW247-T	$I_F = 6.5 A_{RMS}$	820 714 3	1820 084 2							
BW347/BW347-T	$I_F = 9.2 A_{RMS}$	820 798 4	1820 135 0							
BW039-012/ BW039-012-T	$I_F = 5.5 A_{RMS}$	821 689 4	1820 136 9							
BW039-026-T	$I_F = 8.1 A_{RMS}$		1820 415 5							
BW039-050-T	$I_F = 11.3 A_{RMS}$		1820 137 7							
<b>Line chokes</b>										
		<b>Part number</b>								
ND020-013	$\Sigma I_{mains} = AC 20 A$	826 012 5								
ND045-013	$\Sigma I_{mains} = AC 45 A$	826 013 3								
<b>Line filter</b>										
		<b>Part number</b>								
NF009-503	$U_{max} = AC 550 V$	827 412 6					A			
NF014-503		827 116 X					B		A	
NF018-503		827 413 4							B	
NF035-503		827 128 3								
<b>Output chokes</b>										
	<b>Inside diameter</b>	<b>Part number</b>								
HD001	$d = 50 mm$	813 325 5		for cable cross sections $1.5 \dots 16 mm^2$ (AWG 16 ... 6)						
HD002	$d = 23 mm$	813 557 6		for cable cross sections $\leq 1.5 mm^2$ (AWG 16)						
HD003	$d = 88 mm$	813 558 4		for cable cross sections $> 16 mm^2$ (AWG 6)						
<b>Output filter (only in VFC operating mode)</b>										
		<b>Part number</b>								
HF015-503		826 030 3		A						
HF022-503		826 031 1		B	A					
HF030-503		826 032 X			B	A				
HF040-503		826 311 6				B	A			
HF055-503		826 312 4					B	A		
HF075-503		826 313 2						B	A	
HF023-403		825 784 1							B	A
HF033-403		825 785 X								B

- A In rated operation (100 %)
- B With variable torque load (125 %)



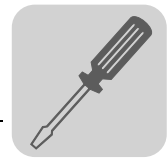
## Installation

### Assignment of braking resistors, chokes and filters

#### AC 400/500 V units, sizes 3 and 4

MOVIDRIVE® MDX61B...-503					0150	0220	0300	0370	0450
Size					3			4	
Braking resistors BW... / BW...-...-T BW...-...-P	Trip current	Part number BW...	Part number BW...-...-T	Part number BW...-...-P					
BW018-015/ BW018-015-P	$I_F = 9.1 A_{RMS}$	821 684 3		1 820 416 3				C	C
BW018-035-T	$I_F = 13.9 A_{RMS}$		1820 138 5					C	C
BW018-075-T	$I_F = 20.4 A_{RMS}$		1820 139 3					C	C
BW915-T	$I_F = 32.6 A_{RMS}$		1820 413 9						
BW012-025/ BW012-025-P	$I_F = 14.4 A_{RMS}$	821 680 0		1 820 414 7					
BW012-050-T	$I_F = 20.4 A_{RMS}$		1820 140 7						
BW012-100-T	$I_F = 28.8 A_{RMS}$		1820 141 5						
BW106-T	$I_F = 47.4 A_{RMS}$		1820 083 4						
BW206-T	$I_F = 54.7 A_{RMS}$		1820 412 0						
<b>Line chokes</b>									
		Part number							
ND045-013	$\Sigma I_{mains} = AC 45 A$	826 013 3				A			
ND085-013	$\Sigma I_{mains} = AC 85 A$	826 014 1				B			A
ND150-013	$\Sigma I_{mains} = AC 150 A$	825 548 2							B
ND300-0053	$\Sigma I_{mains} = AC 300 A$	827 721 4							

- A In rated operation (100 %)
- B With variable torque load (125 %)
- C Connect two braking resistors in parallel and set twice the trip current on F16 ( $2 \times I_F$ )



**AC 400/500 V units, sizes 5 and 6**

MOVIDRIVE® MDX61B...-503					0550	0750	0900	1100	1320
Size					5		6		
Braking resistors BW... / BW...-T BW...-P	Trip current	Part number BW...	Part number BW...-T	Part number BW...-P					
BW018-015/ BW018-015-P	$I_F = 9.1 A_{RMS}$	821 684 3		1 820 416 3					
BW018-035-T	$I_F = 13.9 A_{RMS}$		1820 138 5						
BW018-075-T	$I_F = 20.4 A_{RMS}$		1820 139 3						
BW915-T	$I_F = 32.6 A_{RMS}$		1820 413 9						
BW012-025/ BW012-025-P	$I_F = 14.4 A_{RMS}$	821 680 0		1 820 414 7					
BW012-050-T	$I_F = 20.4 A_{RMS}$		1820 140 7						
BW012-100-T	$I_F = 28.8 A_{RMS}$		1820 141 5						
BW106-T	$I_F = 47.7 A_{RMS}$		1820 083 4				C	C	C
BW206-T	$I_F = 54.7 A_{RMS}$		1820 412 0				C	C	C
<b>Line chokes</b>									
ND045-013	$\Sigma I_{mains} = AC 45 A$	826 013 3							
ND085-013	$\Sigma I_{mains} = AC 85 A$	826 014 1							
ND150-013	$\Sigma I_{mains} = AC 150 A$	825 548 2							
ND300-0053	$\Sigma I_{mains} = AC 300 A$	827 721 4							

- A In rated operation (100 %)
- B With variable torque load (125 %)
- C Connect two braking resistors in parallel and set twice the trip current on F16 ( $2 \times I_F$ )



## Installation

### Assignment of braking resistors, chokes and filters

#### AC 400/500 V units, sizes 3 to 6

MOVIDRIVE® MDX61B...-503			0150	0220	0300	0370	0450	0550	0750	0900	1100	1320	
Size			3			4		5		6			
Line filter		Part number											
NF035-503	U <sub>max</sub> = AC 550 V	827 128 3	A										
NF048-503		827 117 8	B	A									
NF063-503		827 414 2		B	A								
NF085-503		827 415 0			B		A						
NF115-503		827 416 9					B	A					
NF150-503		827 417 7						B					
NF210-503		827 418 5										A	
NF300-503		827 419 3										B	
Output chokes		Inside diameter	Part number										
HD001	d = 50 mm	813 325 5	for cable cross sections 1.5...16 mm <sup>2</sup> (AWG 16...6)										
HD003	d = 88 mm	813 558 4	for cable cross sections > 16 mm <sup>2</sup> (AWG 6)										
HD004	Connection with M12 bolt	816 885 7											
Output filter (only in VFC operating mode)		Part number											
HF033-403		825 785 X	A	B / D	A / D								
HF047-403		825 786 8	B	A									
HF450-503		826 948 3			B		E	D	D				

- A In rated operation (100 %)
- B With variable torque load (125 %)
- D Connect two output filters in parallel
- E In rated operation (100 %): One output filter  
With variable torque load (125 %): Connect two output filters in parallel



AC 230 V units, sizes 1 to 4

MOVIDRIVE® MDX61B...-2_3				0015	0022	0037	0055	0075	0110	0150	0220	0300
Size				1		2		3		4		
Braking resistors BW...-.../ BW...-...-T	Trip current	Part number BW...	Part number BW...-...-T									
BW039-003	$I_F = 2.7 A_{RMS}$	821 687 8										
BW039-006	$I_F = 3.9 A_{RMS}$	821 688 6										
BW039-012 BW039-012-T	$I_F = 5.5 A_{RMS}$	821 689 4	1 820 136 9									
BW039-026-T	$I_F = 8.1 A_{RMS}$		1 820 415 5									
BW027-006	$I_F = 4.7 A_{RMS}$	822 422 6										
BW027-012	$I_F = 6.6 A_{RMS}$	822 423 4										
BW018-015-T	$I_F = 9.1 A_{RMS}$		1 820 416 3						C	C	C	C
BW018-035-T	$I_F = 13.9 A_{RMS}$		1 820 138 5						C	C	C	C
BW018-075-T	$I_F = 20.4 A_{RMS}$		1 820 139 3						C	C	C	C
BW915-T	$I_F = 32.6 A_{RMS}$		1 820 413 9						C	C	C	C
BW012-025-T	$I_F = 14.4 A_{RMS}$		1 820 414 7									
BW012-050-T	$I_F = 20.4 A_{RMS}$		1 820 140 7									
BW012-100-T	$I_F = 28.8 A_{RMS}$		1 820 141 5									
BW106-T	$I_F = 47.4 A_{RMS}$		1 820 083 4								C	C
BW206-T	$I_F = 54.7 A_{RMS}$		1 820 412 0								C	C
<b>Line chokes</b>				<b>Part number</b>								
ND020-013	$\Sigma I_{mains} = AC 20 A$	826 012 5					A					
ND045-013	$\Sigma I_{mains} = AC 45 A$	826 013 3					B		A			
ND085-013	$\Sigma I_{mains} = AC 85 A$	826 014 1							B		A	
ND150-013	$\Sigma I_{mains} = AC 150 A$	825 548 2									B	
<b>Line filter</b>				<b>Part number</b>								
NF009-503	$U_{max} = AC 550 V$	827 412 6			A							
NF014-503		827 116 X			B	A						
NF018-503		827 413 4				B						
NF035-503		827 128 3										
NF048-503		827 117 8							A			
NF063-503		827 414 2							B			
NF085-503		827 415 0									A	
NF115-503		827 416 9									B	
<b>Output chokes</b>				<b>Part number</b>								
HD001	d = 50 mm	813 325 5	for cable cross sections 1.5 ... 16 mm <sup>2</sup> (AWG 16 ... 6)									
HD002	d = 23 mm	813 557 6	for cable cross sections ≤ 1.5 mm <sup>2</sup> (AWG 16)									
HD003	d = 88 mm	813 558 4	for cable cross sections > 16 mm <sup>2</sup> (AWG 6)									

- A In rated operation (100 %)
- B With variable torque load (125 %)
- C Connect two braking resistors in parallel and set twice the trip current on F16 ( $2 \times I_F$ )



## Installation

### Connecting the system bus (SBus 1)

#### 9.9 Connecting the system bus (SBus 1)



#### NOTE

Only if P884 "SBus baud rate" = 1000 kbaud:

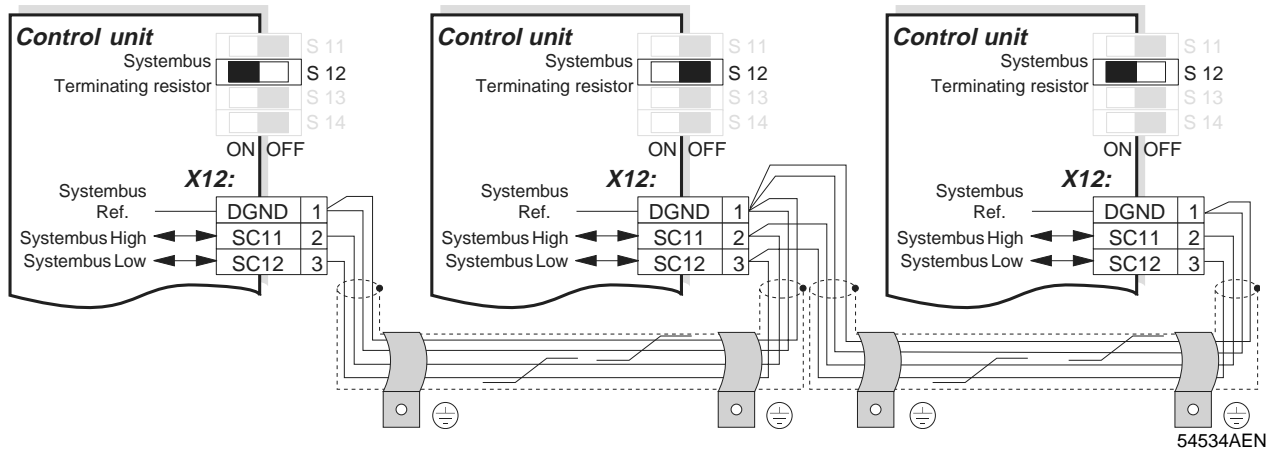
Do not combine MOVIDRIVE® compact MCH4\_A units with other MOVIDRIVE® units in the same system bus combination.

The units may be combined at baud rates  $\neq$  1000 kbaud.

Max. 64 CAN bus stations can be addressed using the system bus (SBus). Use a repeater after 20 or 30 stations, depending on the length of the cables and the cable capacity. The SBus supports transmission technology compliant with ISO 11898.

The "Serial Communication" manual contains detailed information about the system bus. This manual can be ordered from SEW-EURODRIVE.

#### SBus wiring diagram



**Cable specification**

- Use a 4-core twisted and shielded copper cable (data transmission cable with braided copper shield). The cable must meet the following specifications:

- Core cross section 0.25 ... 0.75 mm<sup>2</sup> (AWG 23 ... AWG 18)
- Line resistance 120 Ω at 1 MHz
- Capacitance per unit length  $\leq$  40 pF/m at 1 kHz

Suitable cables include CAN bus or DeviceNet cables.

#### Shielding

- Connect the shield to the electronics shield clamp on the inverter or master controller and make sure it is connected over a wide area at both ends.

#### Cable length

- The permitted total cable length depends on the baud rate setting of the SBus (P884):

- 125 kbaud → 320 m
- 250 kbaud → 160 m
- **500 kBaud** → **80 m**
- 1000 kbaud → 40 m



Terminating resistor

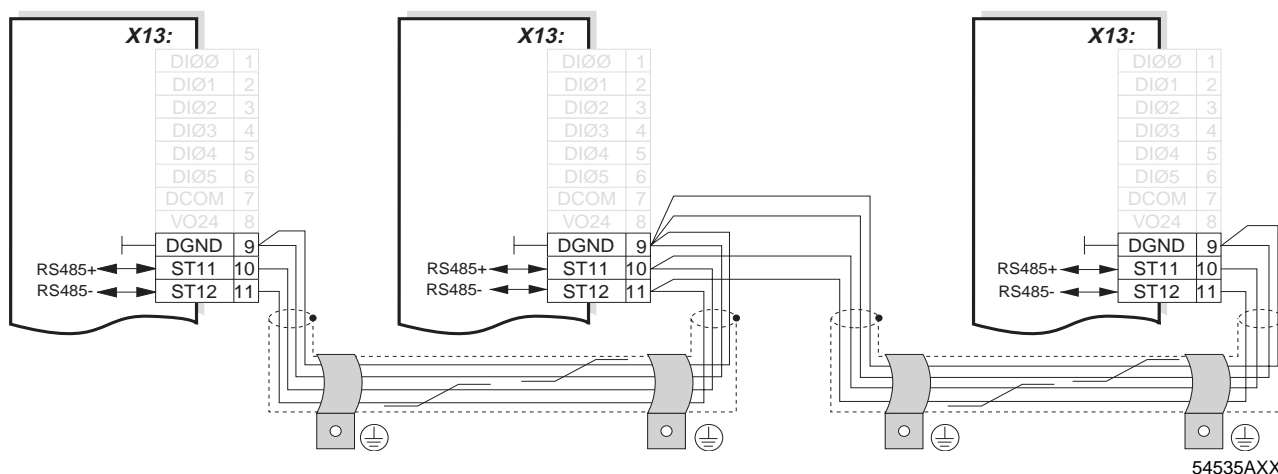
- Switch on the system bus terminating resistor (S12 = ON) at the start and end of the system bus connection. Switch off the terminating resistor on the other units (S12 = OFF).

	<b>STOP!</b>
	There must not be any potential displacement between the units connected with the SBus. This can restrict the functionality of the units.
	Take suitable measures to avoid a potential displacement, e.g. by connecting the unit ground connectors using a separate lead.

### 9.10 Connecting the RS485 interface

The RS485 interface can be used for connecting max. 32 MOVIDRIVE® units, e.g. for master/slave operation, or 31 MOVIDRIVE® units and a master control system (PLC).

#### Wiring diagram for RS485 interface



Cable specification

- Use a 4-core twisted and shielded copper cable (data transmission cable with braided copper shield). The cable must meet the following specifications:
  - Core cross section 0.25 ... 0.75 mm<sup>2</sup>
  - Cable resistance 100 ... 150 Ω at 1 MHz
  - Capacitance per unit length ≤ 40 pF/m at 1 kHz

Shielding

- Connect the shield to the electronics shield clamp on the inverter or higher-level controller and make sure it is connected over a wide area at both ends.

Cable length

- The permitted total cable length is 200 m.

Terminating resistor

- Dynamic terminating resistors are installed. **Do not connect any external terminating resistors.**

	<b>STOP!</b>
	There must not be any potential displacement between the units connected via the RS485. This can restrict the functionality of the units.
	Take suitable measures to avoid a potential displacement, e.g. by connecting the unit ground connectors using a separate lead.



## Installation

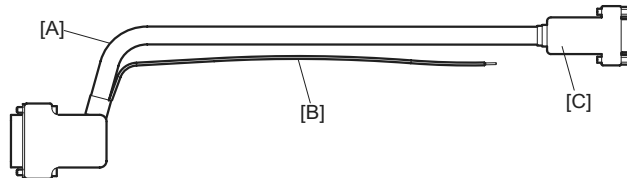
### Connecting the interface adapter type DWE11B/12B

#### 9.11 Connecting the interface adapter type DWE11B/12B

##### Part number and description

- DWE11B, part number 188 187 6

The interface adapter DWE11B (HTL→TTL) in the form of an adapter cable is used **to connect single-ended HTL encoders to the HIPERFACE® encoder card DEH11B**. Only the A, B and C tracks are connected. The interface adapter is suitable for all HTL encoders that were operated on MOVIDRIVE® A, MDV and MCV and can be connected without any rewiring effort.



58748AXX

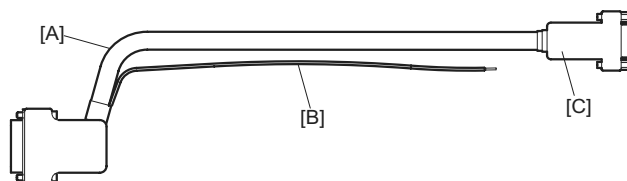
[A] 5 x 2 x 0.25 mm<sup>2</sup> / length 1000 mm / max. cable length between inverter - encoder: 100 m

[B] DC 24 V connection for HTL encoder; 1 x 0.5 mm<sup>2</sup> / 250 mm long

Signal	Terminal of 9-pin sub D socket [C] (encoder end)
A	1
B	2
C	3
UB	9
GND	5

- DWE12B, part number 188 180 9

The interface adapter DWE12B (HTL→TTL) in the form of an adapter cable is used **to connect push-pull HTL encoders to the HIPERFACE® encoder card DEH11B**. In addition to the A, B and C track, you will also have to connect the negated tracks ( $\bar{A}$ ,  $\bar{B}$ ,  $\bar{C}$ ). SEW-EURODRIVE recommends using this interface adapter for any new system.



58748XX

[A] 4 x 2 x 0,25 mm<sup>2</sup> / length 1000 mm / max. cable length between inverter - encoder: 200 m

[B] DC 24 V connection for HTL encoder; 1 x 0.5 mm<sup>2</sup> / 250 mm long

Signal	Terminal of 9-pin sub D socket [C] (encoder end)
A	1
$\bar{A}$	6
B	2
$\bar{B}$	7
C	3
$\bar{C}$	8
UB	9
GND	5



### 9.12 Connecting interface adapter UWS21B (RS232)

**Part number** Interface adapter UWS21B: 1 820 456 2

**Scope of delivery** The scope of delivery for the UWS21B option includes:

- UWS21B adapter
- CD-ROM with MOVITOOLS®
- Serial interface cable with 9-pin sub D socket and 9-pin sub D connector to connect the UWS21B option to the PC.
- Serial interface cable with two RJ10 connectors to connect UWS21B to MOVIDRIVE®.

**Connecting MOVIDRIVE® to UWS21B**

- Use the connection cable supplied to connect the UWS21B option to the MOVIDRIVE® unit.
- Plug the connection cable into the XT slot of the MOVIDRIVE® unit.
- Note that the DBG60B keypad and the UWS21B serial interface cannot be connected to the MOVIDRIVE® at the same time.

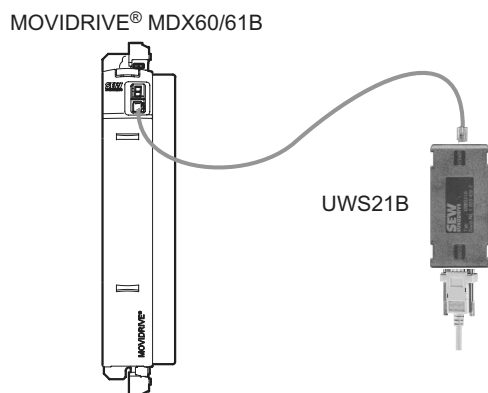


Figure 142: Connection cable between MOVIDRIVE® and UWS21B

59193AXX

**Connecting UWS21B to PC**

- Use the connection cable supplied (shielded RS232 standard interface cable) to connect the UWS21B option to the PC.

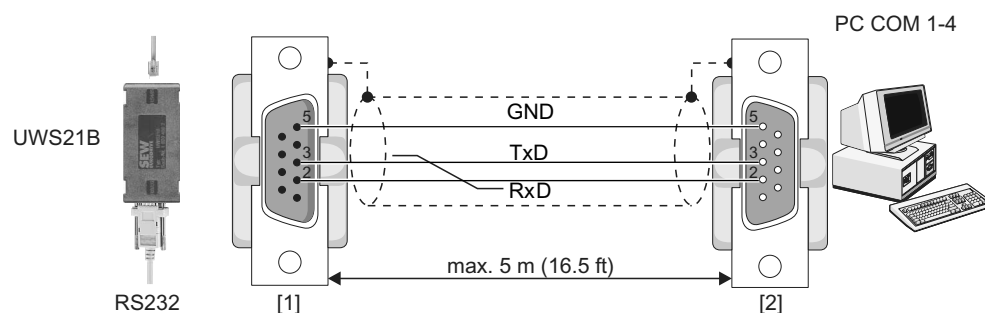


Figure 143: UWS21B-PC connection cable (1:1 connection assignment)

59194AXX

- [1] 9-pin sub D connector
- [2] 9-pin sub D socket



## Installation

### Connecting the interface adapter USB11A

#### 9.13 Connecting the interface adapter USB11A

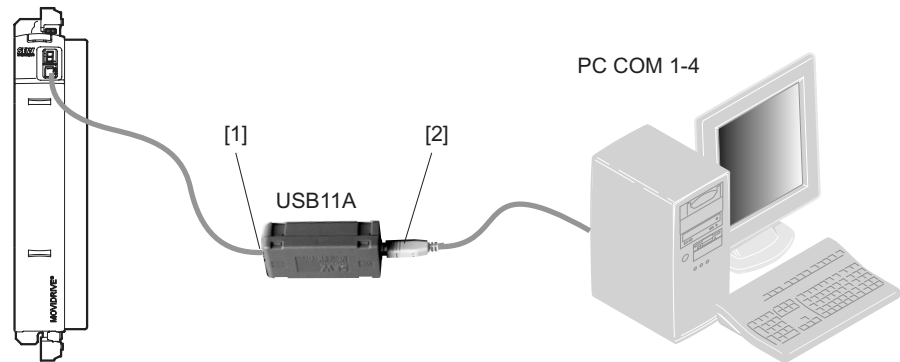
**Part number** Interface adapter USB11A: 824 831 1

- Scope of delivery**
- The scope of delivery for the USB11A includes:
    - USB11A interface adapter
    - USB connection cable PC - USB11A (type USB A-B)
    - Connection cable for MOVIDRIVE® MDX60B/61B - USB11A (cable RJ10-RJ10)
    - CD-ROM with drivers and MOVITOOLS®
  - The USB11A interface adapter supports USB 1.1 and USB 2.0.

#### Connecting MOVIDRIVE®-USB11A - PC

- Use the connection cable [1] (RJ10 - RJ10) supplied to connect the USB11A option to the MOVIDRIVE® unit.
- Plug the connection cable [1] into the XT slot of MOVIDRIVE® MDX60B/61B and into the RS485 slot of the USB11A.
- Note that the DBG60B keypad and the USB11A interface adapter cannot be connected to the MOVIDRIVE® at the same time.
- Use the USB connection cable [2] (type USB A-B) to connect the USB11A to the PC.

MOVIDRIVE® MDX60/61B



54532AXX

Figure 144: Connection cable for MOVIDRIVE® MDX60B/61B - USB11A

#### Installation

- Connect the USB11A to a PC and MOVIDRIVE® MDX60B/61B using the connection cables supplied.
- Insert the enclosed CD into the CD drive of your PC and install the driver. The first free COM port on the PC will be assigned to the USB11A interface adapter.

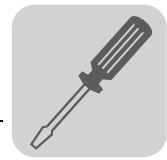
#### Operation with MOVITOOLS®

- After installation, the PC recognizes the USB11A interface converter after approximately 5 to 10 s.
- Start MOVITOOLS®.



#### NOTE

If the connection between the PC and USB11A is interrupted, you will have to restart MOVITOOLS®.

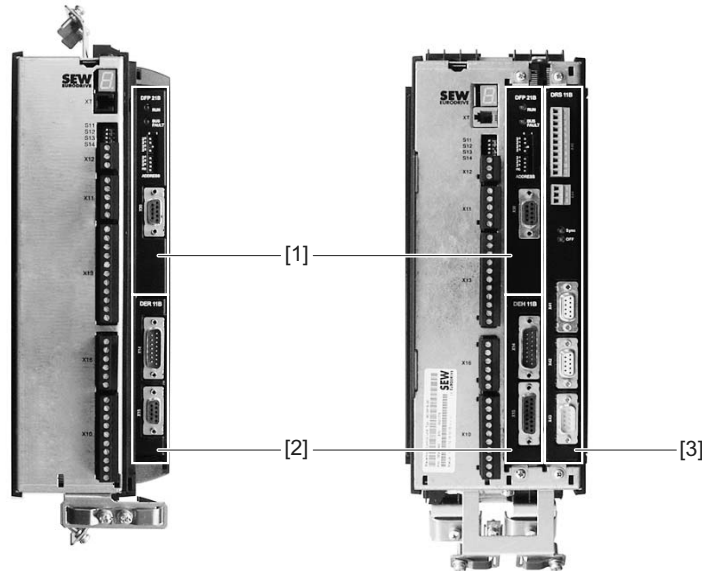


### 9.14 Option combinations for MDX61B

Arrangement of  
the option slots

Size 0 (0005 ... 0014)

Sizes 1 ... 6 (0015 ... 1320)



60004AXX

- [1] Fieldbus slot for communication options
- [2] Encoder slot for encoder options
- [3] Expansion slot for communication options (only sizes 1 to 6)

#### Option card combinations for MDX61B

The option cards are different sizes and can only be installed in the matching option slots. The following list shows the possible combinations of option cards for MOVIDRIVE® MDX61B.

Option card	Name	MOVIDRIVE® MDX61B		
		Encoder slot Size 0 - size 6	Fieldbus slot Size 0 - size 6	Expansion slot Size 1 - size 6
DEH11B	Encoder input incr. / Hiperface®	X		
DER11B	Encoder input resolver / Hiperface®	X		
DFP21B	Fieldbus interface Profibus		X	
DFI11B	Fieldbus interface Interbus		X	
DFI21B	Fieldbus interface Interbus LWL		X	
DFD11B	Fieldbus interface DeviceNet		X	
DFC11B	Fieldbus interface CAN/CANopen		X	
DFE11B DFE12B DFE13B	Fieldbus interface Ethernet		X	
DIO11B	I/O expansion		X	X <sup>1)</sup>
DRS11B	Phase-synchronous operation			X
DIP11B	SSI encoder interface			X
DHP11B	User-programmable MOVI-PLC® basic controller		X	
DHP11B + OST11B	DHP11B + OST11B (RS485 interface, only in combination with DHP11B)	OST11B	DHP11B	DHP11B + OST11B <sup>2)</sup>

- 1) When fieldbus slot is not available
- 2) When encoder slot is not available



### 9.15 Installing and removing options cards

	<b>NOTES</b>
	<ul style="list-style-type: none"> <li>• For MOVIDRIVE® MDX61B size 0, only SEW-EURODRIVE is authorized to install or remove option cards.</li> <li>• You can install or remove the option cards yourself for MOVIDRIVE® MDX61B sizes 1 to 6.</li> </ul>

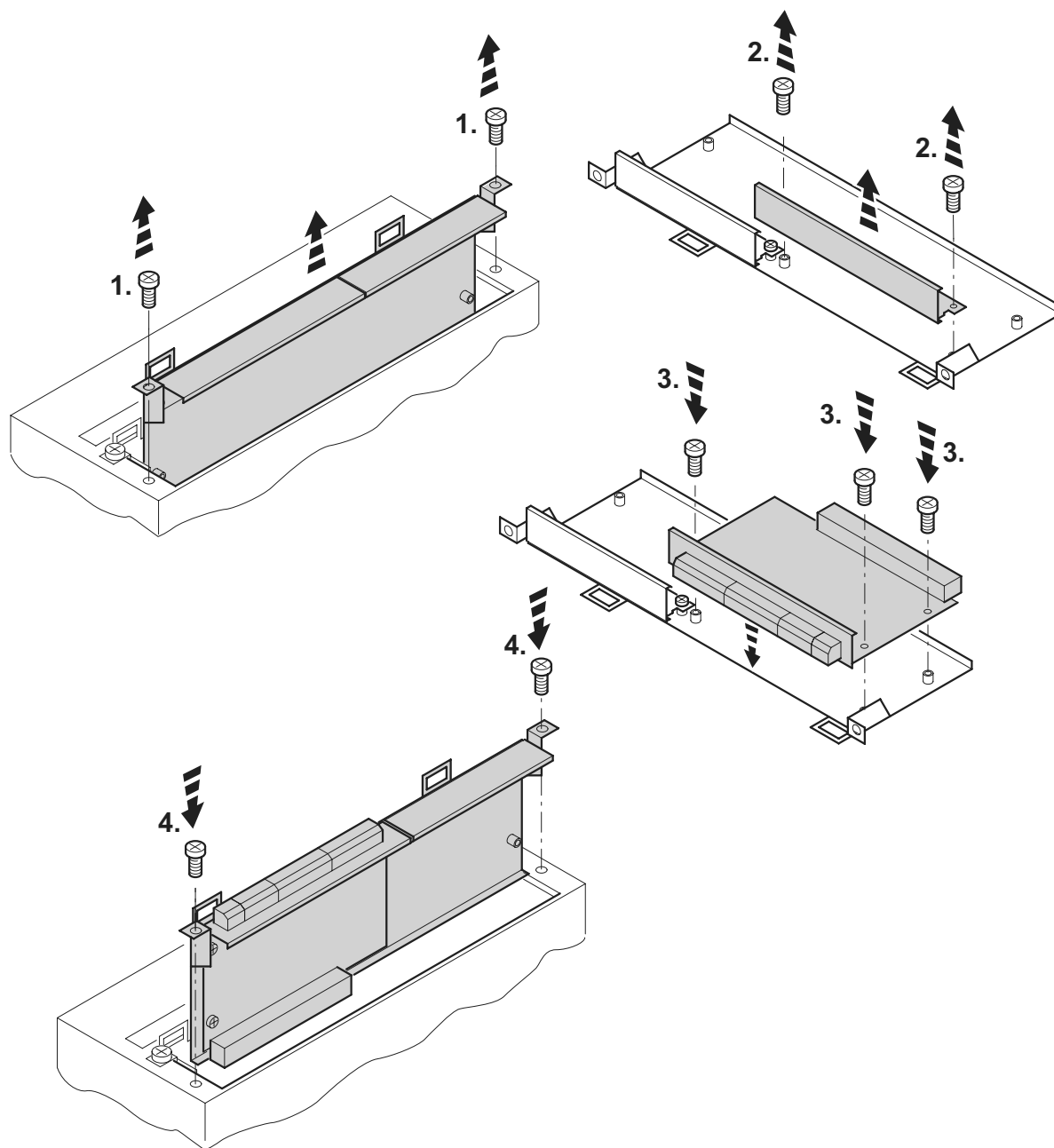
**Before you begin** Read the following notes before installing or removing an option card:

	<b>STOP!</b>
	<p>Electrostatic charge. Damage to electronic components.</p> <ul style="list-style-type: none"> <li>• Disconnect the inverter from the power. Switch off the DC 24 V and the supply voltage.</li> <li>• Take appropriate measures to protect the option card from electrostatic charge (use discharge strap, conductive shoes, etc.) before touching it.</li> </ul>

- **Before installing the option card**, remove the keypad (→ Sec. "Removing/installing the keypad") and the front cover (→ Sec. "Removing/installing the front cover").
- **After having installed the option card**, replace the keypad (→ Sec. "Removing/installing the keypad") and the front cover (→ Sec. "Removing/installing the front cover").
- Keep the option card in its original packaging until immediately before you are ready to install it.
- Hold the option card by its edges only. Do not touch any components.



**Basic procedure for installing/removing an option card (MDX61B, sizes 1 - 6)**



60039AXX

1. Remove the retaining screws holding the card retaining bracket. Pull the card retaining bracket out evenly from the slot (do not twist!).
2. Remove the retaining screws of the black cover plate on the card retaining bracket. Remove the black cover plate.
3. Position the option card onto the retaining bracket so that the retaining screws fit into the corresponding bores on the card retaining bracket.
4. Insert the retaining bracket with installed option card into the slot, pressing slightly so it is seated properly. Secure the card retaining bracket with the retaining screws.
5. To remove the option card, follow the instructions in reverse order.



## Installation

### Connecting the encoder and resolver

#### 9.16 Connecting the encoder and resolver



#### NOTES

- The wiring diagrams do now show the view onto the cable end. They show the connection to the motor or MOVIDRIVE®.
- The core colors specified in the wiring diagrams are in accordance with the IEC 757 color code and correspond to the core colors used in the prefabricated cables from SEW.

#### General installation information

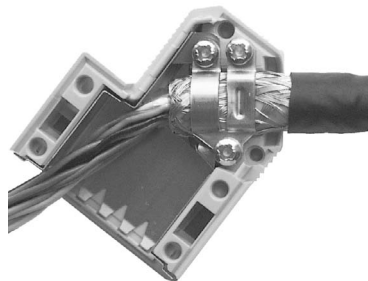
- The sub D connectors shown in the wiring diagrams have a 4/40 UNC thread.
- Max. line length from inverter - encoder/resolver: 100 m with a capacitance per unit length  $\leq 120$  nF/km.
- Core cross section: 0,20 ... 0.5 mm<sup>2</sup> (AWG 24 ... 20)
- If you cut a core of the encoder/resolver cable, isolate the cut-off end of the core.
- Use shielded cables with twisted pair conductors and make sure they are grounded on both ends over a large surface area:
  - At the encoder in the cable gland or in the encoder plug
  - At the inverter in the housing of the sub D connector
- Route the encoder/resolver cable separately from the power cables.

#### Shielding

##### On the inverter

Connect the shield of the encoder/resolver cable over a large area.

Connect the shield on the inverter end in the housing of the sub D connector (→ following illustration).

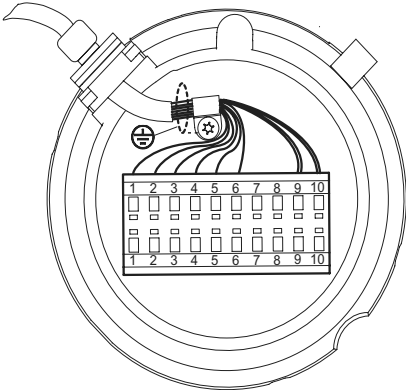


01939BXX



*On the encoder/resolver*

Connect the shield on the encoder/resolver side at the respective earthing clamps (→ following illustration). When using an EMC screw fitting, apply the shield over a wide area in the cable gland. For drives with a plug connector, connect the shield on the encoder plug.



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**Prefabricated cables**

SEW-EURODRIVE offers prefabricated cables for connecting encoders/resolvers. We recommend using these prefabricated cables.



## Installation

### Connecting option DEH11B (HIPERFACE®)

#### 9.17 Connecting option DEH11B (HIPERFACE®)

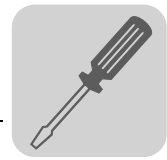
**Part number** HIPERFACE® encoder card type DEH11B: 824 310 7

	<b>NOTES</b>
	<ul style="list-style-type: none"> <li>The "HIPERFACE® encoder card type DEH11B" option is only possible in conjunction with MOVIDRIVE® MDX61B, not with MDX60B.</li> <li>The DEH11B option must be plugged into the encoder slot.</li> </ul>

Front view of DEH11B	Description	Terminal	Function
<p style="text-align: center;">59239AXX</p>	<p><b>X14: Input for external encoder or output for incremental encoder simulation</b></p> <p>Connection → page 387 to page 390</p> <p><b>Pulse count of the incremental encoder simulation:</b></p> <ul style="list-style-type: none"> <li>1024 pulses/revolution with HIPERFACE® encoder on X15</li> <li>as at X51: Motor encoder input with sin/cos encoder or TTL encoder on X15</li> </ul>	<p>X14:1 X14:2 X14:3 X14:4 X14:5/6 X14:7 X14:8 X14:9 X14:10 X14:11 X14:12 X14:13/14 X14:15</p>	<p>(COS+) signal track A (K1) (SIN+) signal track B (K2) Signal track C (K0) DATA + Reserved switchover Reference potential <u>DGND</u> (COS-) Signal track <u>A</u> (K1) (SIN-) Signal track <u>B</u> (K2) Signal track C (K0) DATA - Reserved DC+12 V (max. load X14:15 and X15:15 = DC 650 mA)</p>
	<p><b>X15: Motor encoder input</b></p>	<p>X15:1 X15:2 X15:3 X15:4 X15:5 X15:6 X15:7 X15:8 X15:9 X15:10 X15:11 X15:12 X15:13 X15:14 X15:15</p>	<p>(COS+) signal track A (K1) (SIN+) signal track B (K2) Signal track C (K0) DATA + Reserved Reference potential TF/TH/KTY- Reserved Reference potential <u>DGND</u> (COS-) Signal track <u>A</u> (K1) (SIN-) Signal track <u>B</u> (K2) Signal track C (K0) DATA - Reserved TF/TH/KTY+ connection DC+12 V (max. load X14:15 and X15:15 = DC 650 mA)</p>

	<b>STOP!</b>
	<p>The connections on X14 and X15 must not be installed or removed during operation. Electrical components in the encoder or on the encoder card could be destroyed.</p> <p>De-energize the inverter before plugging or removing the encoder connections. Switch off the supply voltage and the DC 24 V (X10:9).</p>

	<b>NOTES</b>
	<ul style="list-style-type: none"> <li>If X14 is used as an incremental encoder simulation output, the switchover (X14:7) must be jumpered with DGND (X14:8).</li> <li>The DC 12 V supply voltage from X14 and X15 is sufficient to operate SEW encoders (except HTL encoders) with a DC 24 V supply voltage. With all other encoders, check whether they can be connected to the DC 12 V supply voltage.</li> </ul>



	<b>STOP!</b>
	<p>Do not connect HTL encoders E..C to X15 of option DEH11B. Doing so can destroy the X15 (motor encoder input) on the DEH11B option. Only connect HTL encoders E..C to option DEH11B using the interface adapter DWE11B/12B (→ Sec. "Connecting the interface adapter type DWE11B/12B").</p>

**Permitted encoders**

The following encoders may be connected to the "HIPERFACE® encoder card type DEH11B" option:

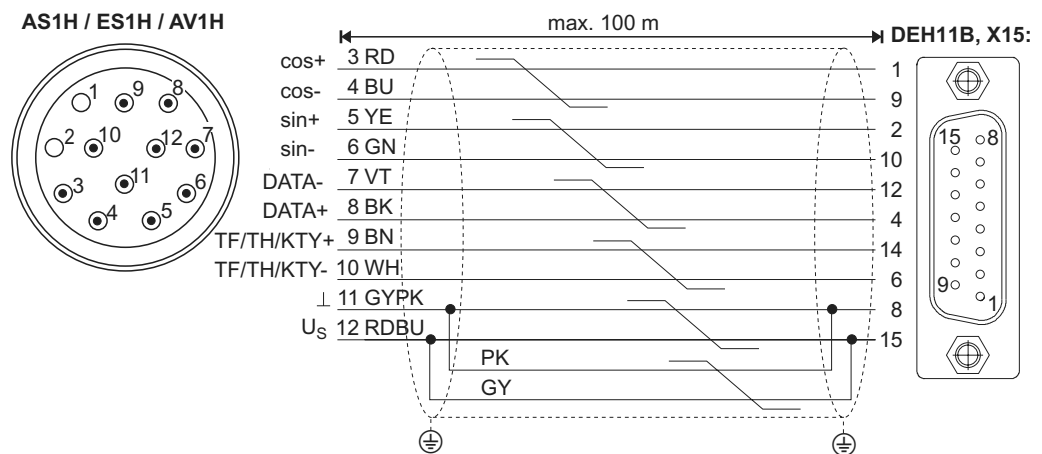
- HIPERFACE® encoder type AS1H, ES1H or AV1H
- sin/cos encoder type ES1S, ES2S, EV1S or EH1S
- DC 5 V TTL encoder with DC 24 V voltage supply type ES1R, ES2R, EV1R or EH1R
- DC 5 V TTL encoder with DC 5 V voltage supply type ES1T, ES2T, EV1T or EH1T via option DWI11A

**HIPERFACE® encoder connection**

HIPERFACE® encoders AS1H, ES1H and AV1H are recommended for operation with DEH11B. Depending on the motor type and motor configuration, the encoder is connected via plug connector or terminal box.

*DT../DV.., DS56, CT../CV.., CM71...112 with plug connector*

Connect the HIPERFACE® encoder to the option DEH11B as follows:



	<b>NOTE</b>
	<p>Important for DT/DV and CT/CV motors: The TF or TH is <b>not</b> connected to the encoder cable but must be connected using an additional 2-core shielded cable.</p>

Part numbers of the prefabricated cables:

- For fixed routing: 1332 453 5
- For cable carrier routing: 1332 455 1



## Installation

### Connecting option DEH11B (HIPERFACE®)

Part numbers of the prefabricated extension cables:

- For fixed routing: 199 539 1
- For cable carrier routing: 199 540 5

CM71...112 with terminal box

Connect the HIPERFACE® encoder to the option DEH11B as follows:

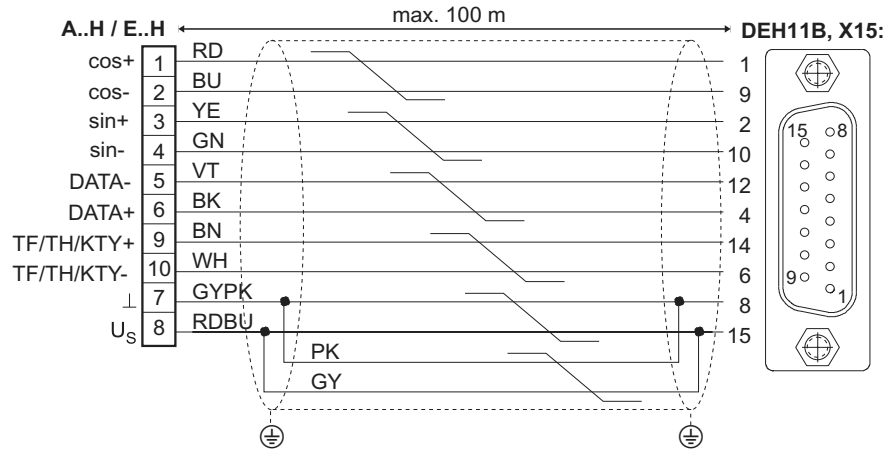


Figure 145: Connecting HIPERFACE® encoder to DEH11B as a motor encoder

54440CXX

Part numbers of the prefabricated cables:

- For fixed routing: 1332 457 8
- For cable carrier routing: 1332 454 3

### Connecting sin/cos encoder to DT../DV.., CT../CV motors

The high resolution sin/cos encoders EH1S, ES1S, ES2S or EV1S can also be connected to DEH11B. Connect the sin/cos encoder to the option DEH11B as follows:

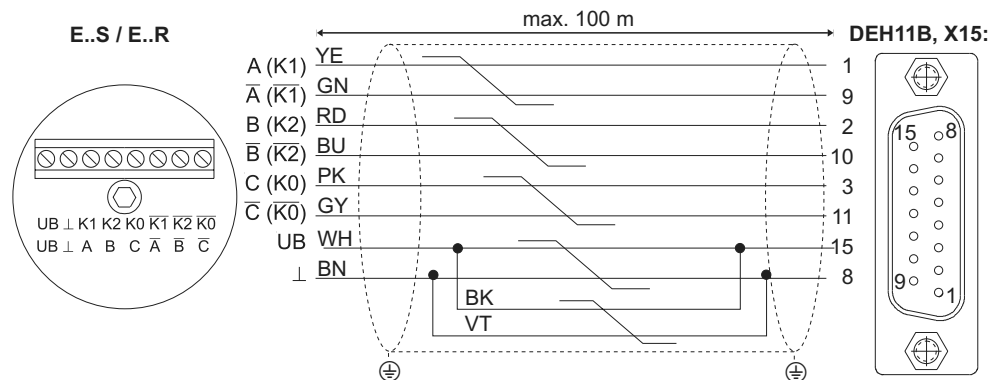


Figure 146: Connecting the sin/cos encoder to DEH11B as a motor encoder

54329CXX

Part numbers of the prefabricated cables:

- For fixed routing: 1332 459 4
- For cable carrier routing: 1332 458 6



**Connecting TTL encoders to DT../DV.. motors**

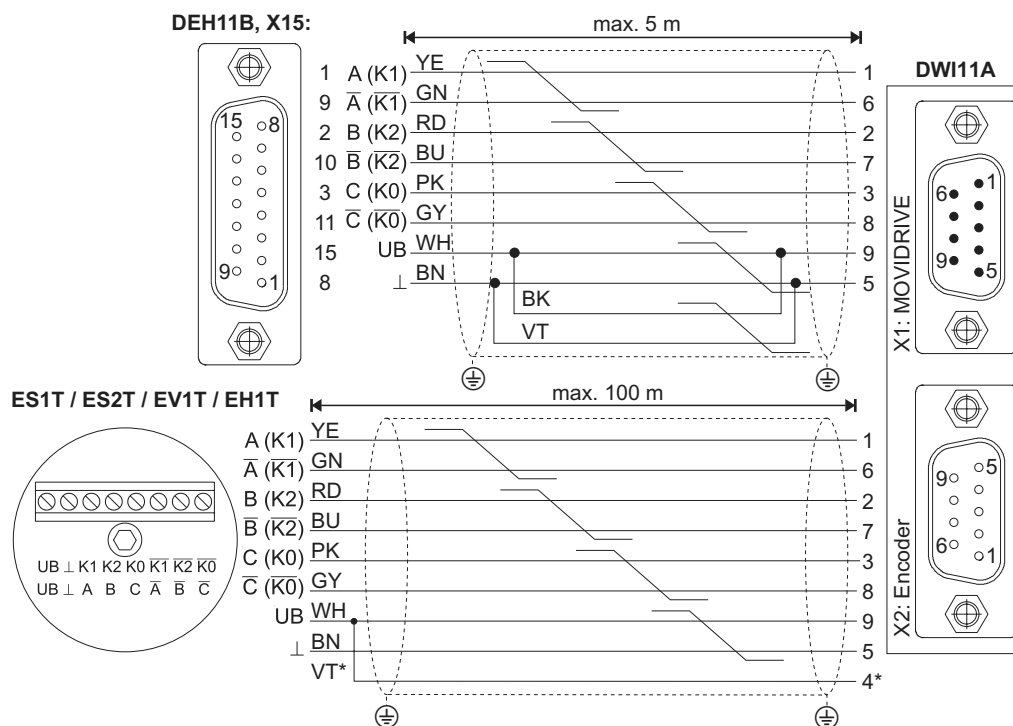
TTL encoders from SEW-EURODRIVE are available with DC 24 V and DC 5 V voltage supply.

**DC 24 V voltage supply**

Connect TTL encoders with DC 24 V voltage supply EH1R, ES1R, ES2R or EV1R in the same way as the high-resolution sin/cos encoders (→ Figure 146).

**DC 5 V voltage supply**

TTL encoders with a DC 5 V voltage supply ES1T, ES2T, EH1T or EV1T must be connected via the "DC 5 V encoder power supply type DWI11A" option (part number 822 759 4). The sensor cable must also be connected to correct the supply voltage of the encoder. Connect this encoder as follows:



54330BXX

Figure 147: Connecting the TTL encoder via DWI11A to DEH11B as a motor encoder

\* Connect the sensor cable (VT) on the encoder to UB, do not jumper on the DWI11A!

Part numbers of the prefabricated cables:

- HIPERFACE® encoder card type DEH11B X15 option: → DWI11A X1: MOVIDRIVE®
  - For fixed routing: 817 957 3
- Encoders ES1T / ES2T / EV1T / EH1T → DWI11A X2: Encoders
  - For fixed routing: 198 829 8
  - For cable carrier routing: 198 828 X



## Installation

### Connecting option DER11B (resolver)

#### 9.18 Connecting option DER11B (resolver)

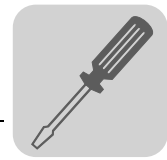
**Part number** Resolver card option type DER11B: 824 307 7

	<b>NOTES</b>
	<ul style="list-style-type: none"> <li>The "resolver card type DER11B" option is only possible in conjunction with MOVIDRIVE® MDX61B, not with MDX60B.</li> <li>The DER11B option must be plugged into the encoder slot.</li> </ul>

Front view of DER11B	Description	Terminal	Function
	<p><b>X14: Input for external encoder or output for incremental encoder simulation</b></p> <p>Connection → page 387 to page 390</p> <p>The pulse count of the incremental encoder simulation is always 1024 pulses per revolution</p>	<p>X14:1 X14:2 X14:3 X14:4 X14:5/6 X14:7 X14:8 X14:9 X14:10 X14:11 X14:12 X14:13/14 X14:15</p>	<p>(cos) signal track A (K1) (sin) signal track B (K2) Signal track C (K0) DATA + Reserved switchover Reference potential <math>\overline{DGND}</math> (cos-) Signal track <math>\overline{A}</math> (K1) (sin-) Signal track <math>\overline{B}</math> (K2) Signal track <math>\overline{C}</math> (K0) DATA - Reserved DC+12 V (max. load DC 650 mA)</p>
	<p><b>X15: Resolver input</b></p>	<p>X15:1 X15:2 X15:3 X15:4 X15:5 X15:6 X15:7 X15:8 X15:9</p>	<p>sin+ (S2) cos+ (S1) Ref.+ (R1) N.C. Reference potential TF/TH/KTY- sin- (S4) cos- (S3) Ref.- (R2) TF/TH/KTY+ connection</p>

	<b>STOP!</b>
	<p>The connections on X14 and X15 must not be installed or removed during operation. Electrical components in the encoder or on the encoder card could be destroyed.</p> <p>De-energize the inverter before plugging or removing the encoder connections. Switch off the supply voltage and the DC 24 V (X10:9).</p>

	<b>NOTES</b>
	<ul style="list-style-type: none"> <li>If X14 is used as an incremental encoder simulation output, the switchover (X14:7) must be jumpered with DGND (X14:8).</li> <li>The DC 12 V supply voltage from X14 is sufficient to operate SEW encoders (except HTL encoders) with a DC 24 V supply voltage. With all other encoders, check whether they can be connected to the DC 12 V supply voltage.</li> </ul>



**Permitted encoders**

The following encoders can be connected at X14 (external encoder inputs):

- HIPERFACE® encoder type AS1H, ES1H or AV1H
- sin/cos encoder type ES1S, ES2S, EV1S or EH1S
- DC 5 V TTL encoder with DC 24 V voltage supply type ES1R, ES2R, EV1R or EH1R
- DC 5 V TTL encoder with DC 5 V voltage supply type ES1T, ES2T, EV1T or EH1T via option DWI11A

**Resolver**

2-pole resolvers, AC 7 V<sub>eff</sub>, 7 kHz, can be connected at X15 (resolved input). The gear ratio of the resolver amplitudes must be approximately 0.5. The control dynamics decrease if the value is lower; the evaluation may be unstable if the value is higher.

SEW-EURODRIVE offers the following prefabricated cables for connecting resolvers to DER11B:

For motor type		Part number	
		Fixed routing	Cable carrier installation
DS56 CM71 ... 112	with plug connector	199 487 5	199 319 4
	Extension cable	199 542 1	199 541 3
CM71 ... 112	With terminal box	199 589 8	199 590 1
DS56	With terminal box	1332 817 4	1332 844 1

**Terminal / pin assignment**

CM motors: The resolver connections are located in a plug connector or on a 10-pin Wago terminal strip.

DS Motors: The resolver connections in the terminal box are either located on a 10-pin Phoenix terminal strip or in the plug connector.

CM plug connector DS56: Intercontec, type ASTA021NN00 10 000 5 000

Terminal / pin	Description		Core color in prefabricated cable
1	Ref.+	Reference	Pink (PK)
2	Ref.-		Gray (GY)
3	cos +	Cosine signal	Red (RD)
4	cos-		Blue (BU)
5	sin+	Sine signals	Yellow (YE)
6	sin-		Green (GN)
9	TF / TH / KTY +	Motor protection	Brown (BN) / violet (VT)
10	TF/TH/KTY-		White (WH) / black (BK)

The resolver signals have the same numbering on the 10-pin Phoenix terminal strip and in the plug connectors.

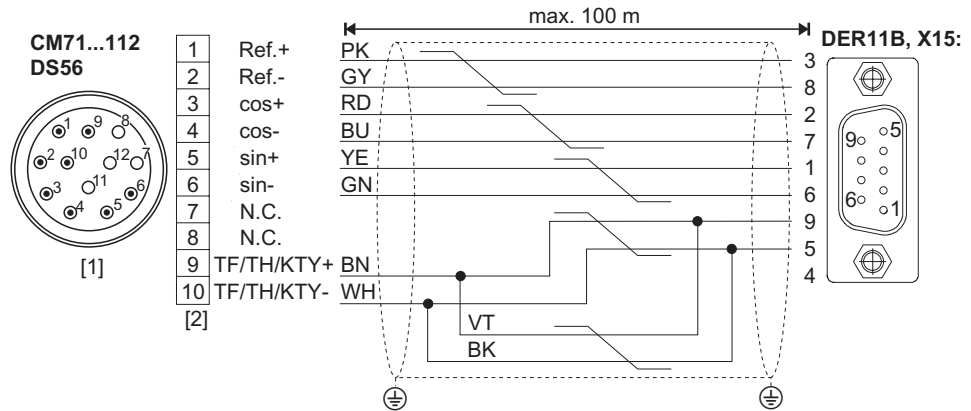


# Installation

## Connecting option DER11B (resolver)

Connection

Connect the resolver as follows:



54331BXX

- [1] Plug connector
- [2] Terminal strip



### 9.19 Connecting an external encoder

**External encoder** The following external encoders can be connected to connector X14 of the DEH11B option and the DER11B option.

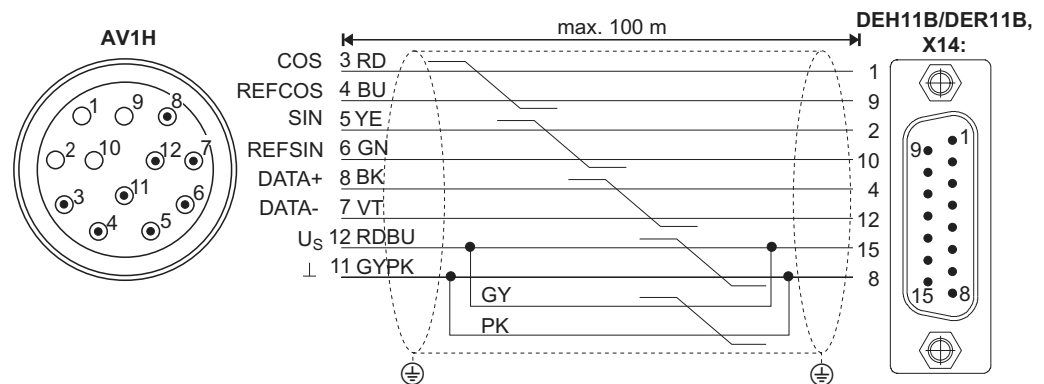
- HIPERFACE® encoder AV1H
- High-resolution sin/cos encoders with signal voltage 1 V<sub>SS</sub>
- DC 5 V encoder with signal level to RS422

**Voltage supply** SEW encoders with DC 24 V voltage supply (max. DC 180 mA) are connected directly to X14. . These SEW encoders are then powered by the inverter.

SEW encoders with a DC 5 V voltage supply must be connected via the "DC 5 V encoder power supply type DWI11A" option (part number 822 759 4).

**Connecting HIPERFACE® encoder AV1H**

Connect the HIPERFACE® encoder AV1H as follows:



54332BXX

Figure 148: Connecting the HIPERFACE® encoder AV1H to DEH11B/DER11B as external encoder

Part numbers of the prefabricated cables:

- For fixed routing: 818 015 6
- For cable carrier routing: 818 165 9

Part numbers of the prefabricated extension cables:

- For fixed routing: 199 539 1
- For cable carrier routing: 199 540 5

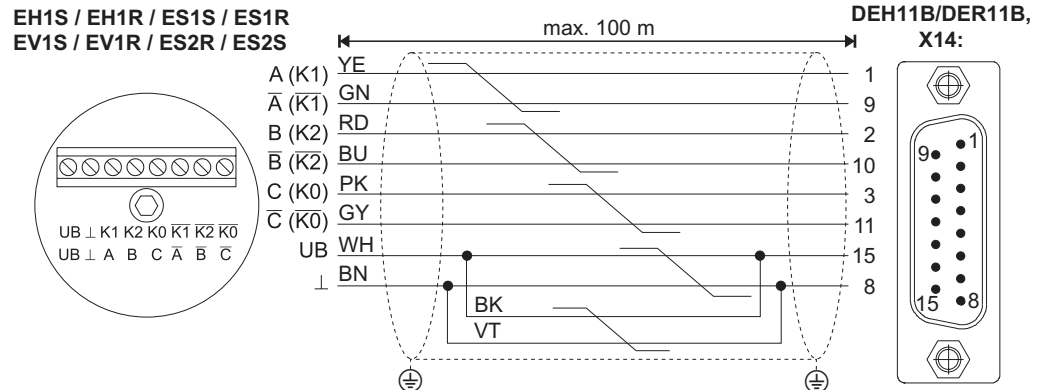


## Installation

### Connecting an external encoder

#### *sin/cos encoder connection*

Connect the sin/cos encoder as follows:



54333BXX

Figure 149: Connecting the sin/cos encoder to DEH11B/DER11B as an external encoder

Part numbers of the prefabricated cables:

- For fixed routing: 819 869 1
- For cable carrier routing: 818 168 3

#### *TTL encoder connection*

TTL encoders from SEW-EURODRIVE are available with DC 24 V and DC 5 V voltage supply.

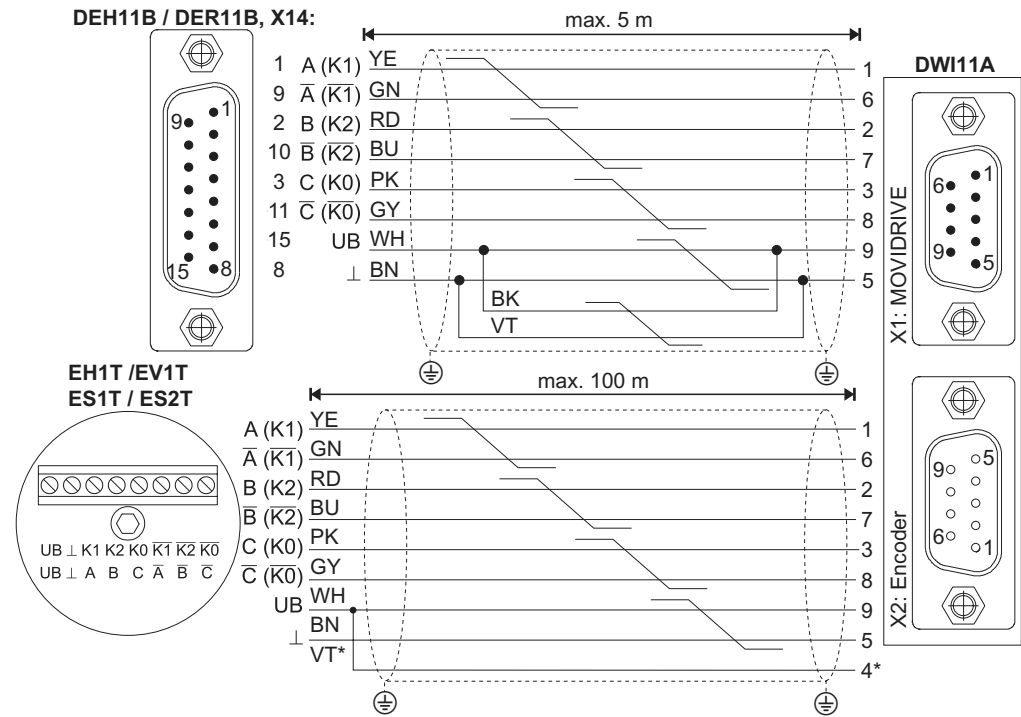
#### *DC 24 V voltage supply*

Connect TTL encoders with DC 24 V voltage supply EV1R in the same way as the high-resolution sin/cos encoders (→ Figure 146).



*DC 5 V voltage supply*

DC-5 V encoders with a DC 5 V voltage supply EV1T, EH1T, ES1T and ES2T must be connected via the "DC 5 V encoder power supply type DWI11A" option (part number 822 759 4). The sensor cable must also be connected to correct the supply voltage of the encoder. Connect this encoder as follows:



54335BXX

Figure 150: Connecting the TTL encoder EV1T to MDX via DWI11A as an external encoder

\* Connect the sensor cable (VT) on the encoder to UB, do not jumper with DWI11A!

Part numbers of the prefabricated cables:

- HIPERFACE® encoder card type DEH11B X14: → DWI11A X1: MOVIDRIVE®
  - For fixed routing: 818 164 0
- Encoder EV1T → DWI11A X2: Encoders
  - For fixed routing: 198 829 8
  - For cable carrier routing: 198 828 X



## Installation

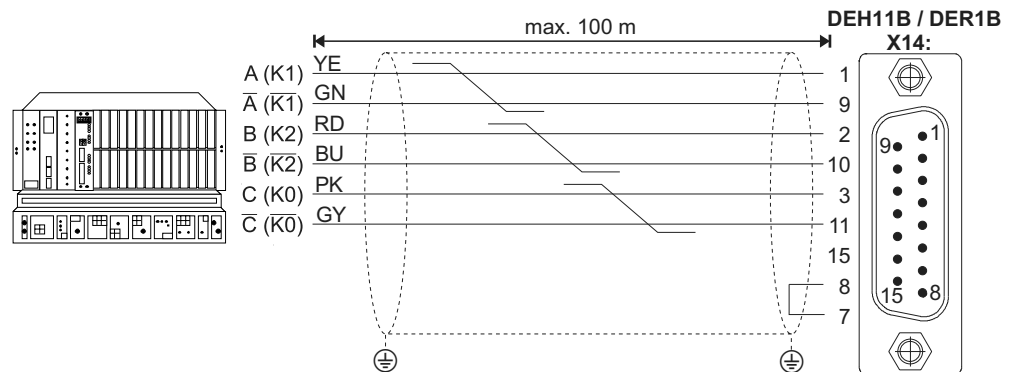
### Connection of incremental encoder simulation

#### 9.20 Connection of incremental encoder simulation

##### Incremental encoder simulation

Connector X14 of the DEH11B or DER11B option can also be used as the incremental encoder simulation output. For this purpose, you must jumper "switchover" (X14:7) with DGND (X14:8). X14 then delivers the incremental encoder signals with a signal level according to RS422. The number of pulses is:

- With DEH11B as on X15 motor encoder input
- With DER11B 1024 pulses/revolution



59307ADE

Figure 151: Incremental encoder simulation connection to DEH11B or DER11B

Part number of the prefabricated cable:

- Option type DEH/DER11B X14: → incremental encoder simulation
  - For fixed routing: 819 768 7

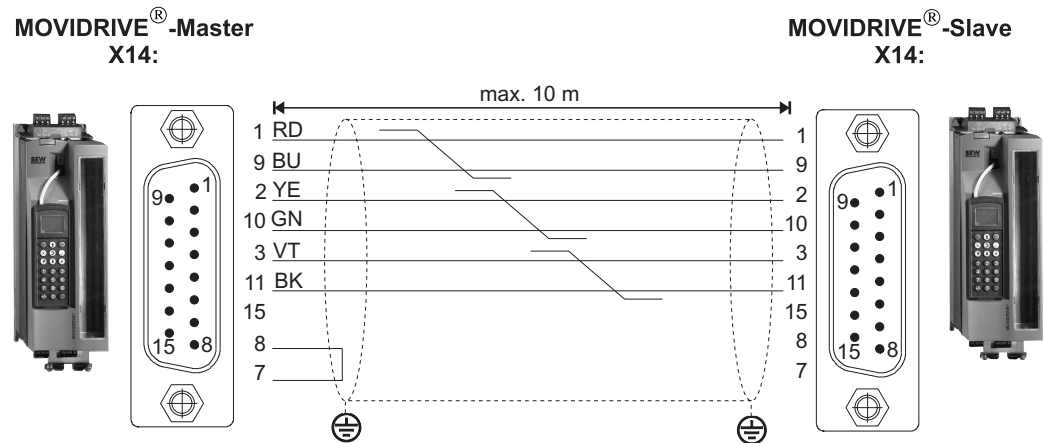


### 9.21 Master/slave connection

#### Master/slave connection

Connector X14 of the DEH11B or DER11B option can also be used for the "internal synchronous operation" application (master/slave connection of several MOVIDRIVE® units). For this purpose, you must jumper "switchover" (X14:7) with DGND (X14:8) on the master end.

The following figure shows an X14-X14 connection (= master/slave connection) between two MOVIDRIVE® units.



Part number of the prefabricated cable:

- For fixed routing: 817 958 1

<b>NOTES</b>	
	<ul style="list-style-type: none"> <li>• A <b>maximum of 3 slaves</b> can be connected to the <b>MOVIDRIVE® master</b>.</li> <li>• Important: <b>Do not connect X14:7</b> when connecting the individual <b>MOVIDRIVE® slaves together</b>. Only jumper the connections <b>X14:7 and X14:8 on the MOVIDRIVE® master</b>.</li> </ul>




## Installation

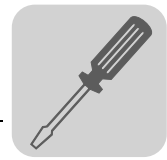
### Connection and terminal description of the DIO11B option

#### 9.22 Connection and terminal description of the DIO11B option

**Part number** Terminal expansion board type DIO11B: 824 308 5

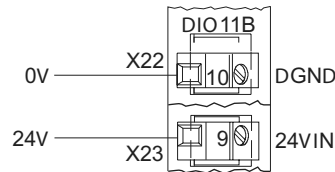
	<b>NOTES</b>
	<ul style="list-style-type: none"> <li>The "input/output board type DIO11B" option is only possible in conjunction with MOVIDRIVE® MDX61B, not with MDX60B.</li> <li>The DIO11B option must be plugged into the fieldbus slot. If the fieldbus slot is not available, you can plug the DIO11B expansion board in the expansion slot.</li> <li>The <b>extended handle end</b> of the plug connectors (terminals X20, X21, X22, X23) must <b>only</b> be used for <b>removing the plug connectors</b> (not for plugging them in!).</li> </ul>

Front view of DIO11B	Terminal	Function
<p style="text-align: center;">06193AXX</p>	<b>X20:1/2</b> <b>AI21/22</b> <b>X20:3</b> <b>AGND</b>	Setpoint input n2, DC-10 V...0...10 V or DC 0...10 V (Differential input or input with AGND reference potential) Reference potential for analog signals (REF1, REF2, AI.., AO..)
	<b>X21:1</b> <b>AOV1</b> <b>X21:4</b> <b>AOV2</b> <b>X21:2</b> <b>AOC1</b> <b>X21:5</b> <b>AOC2</b>	Analog voltage output V1, with factory setting to "actual speed" Analog voltage output V2, with factory setting to "output current" Load capacity of the analog voltage outputs: $I_{max} = DC\ 10\ mA$ Analog current output C1, with factory setting "actual speed" Analog current output C2, with factory setting "output current" P642/645 "Operating mode AO1/2" sets whether the voltage outputs V1/2 (DC-10 V...0...10 V) or the current outputs C1/2 DC(0(4)...20 mA) are in effect. Selection options for the analog outputs → Parameter menu P640/643 Max. permitted cable length: 10 m
	<b>X21:3/6</b> <b>AGND</b>	Reference potential for analog signals (REF1, REF2, AI.., AO..)
	<b>X22:1...8</b> <b>DI1Ø...17</b> <b>X22:9</b> <b>DCOM</b> <b>X22:10</b> <b>DGND</b>	Binary inputs 1...8, with factory setting "no function" The binary inputs are electrically isolated by optocouplers. Selection options for the binary inputs → Parameter menu P61_ Reference potential for the binary inputs DI1Ø...17 Reference potential for binary signals – Without jumper X22:9-X22:10 (DCOM-DGND) → Isolated binary inputs – With jumper X22:9-X22:10 (DCOM-DGND) → Non-isolated binary inputs
	<b>X23:1...8</b> <b>DO1Ø...17</b> <b>X23:9</b> <b>24VIN</b>	Binary outputs 1...8, with factory setting "no function" Load capacity of binary outputs: $I_{max} = DC\ 50\ mA$ (short-circuit proof, protected against external voltage to DC 30 V) <b>Do not apply external voltage to the binary outputs.</b> Supply voltage DC+24 V for binary outputs D01Ø ... D017, non-isolated (reference potential DGND)



**Voltage input 24VIN**

The 24VIN (X23:9) voltage input serves as DC+24 V supply voltage for the binary outputs DO1Ø ... DO17. Reference potential is DGND (X22:10). The binary outputs do not give a level if the DC+24 V supply voltage is not connected. The supply voltage DC+24 V can also be jumpered from the X10:8 connection of the basic unit if the load does not exceed DC 400 mA (current limitation in X10:8).



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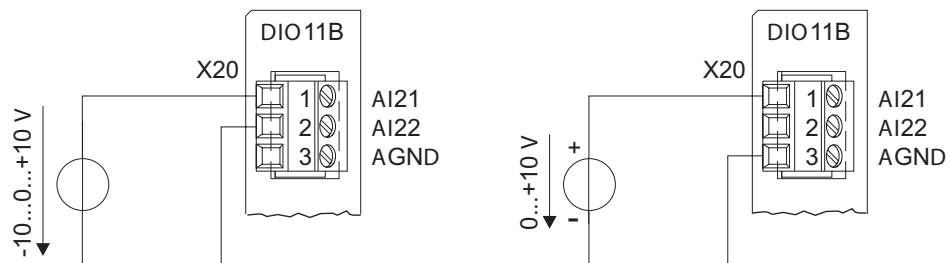
Figure 152: Voltage input 24VIN (X23:9) and reference potential DGND (X22:10)

**Voltage input n2**

The analog setpoint input n2 (AI21/22) can be used as a differential input or as an input with AGND reference potential.

Differential input

Input with AGND reference potential



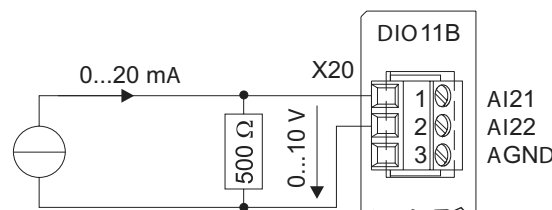
06668AXX

Figure 153: Setpoint input n2

**Current input n2**

You must use an external load if the analog setpoint input n2 (AI21/22) should be used as a current input.

For example  $R_B = 500 \Omega \rightarrow DC\ 0...20\ mA = DC\ 0...10\ V$



06669AXX

Figure 154: Current input with external load



## Installation

### Connection and terminal description of the DIO11B option

#### Voltage outputs AOV1 and AOV2

Assign the analog voltage outputs AOV1 and AOV2 in accordance with the following figure:

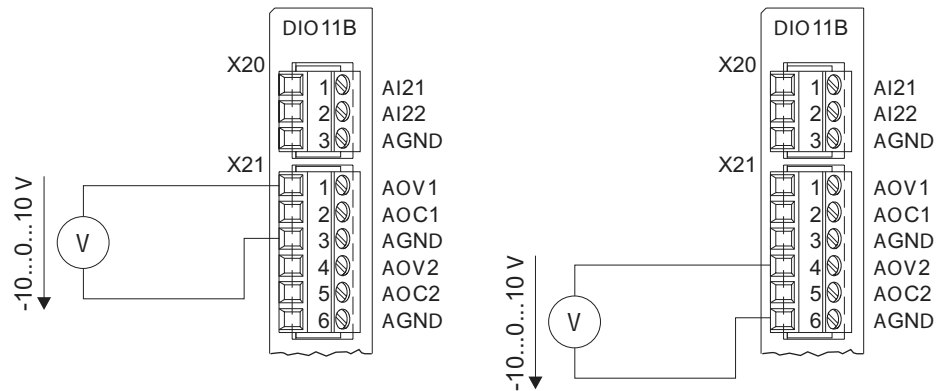


Figure 155: Voltage outputs AOV1 and AOV2

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#### Current outputs AOC1 and AOC2

Assign the analog current outputs AOC1 and AOC2 in accordance with the following figure:

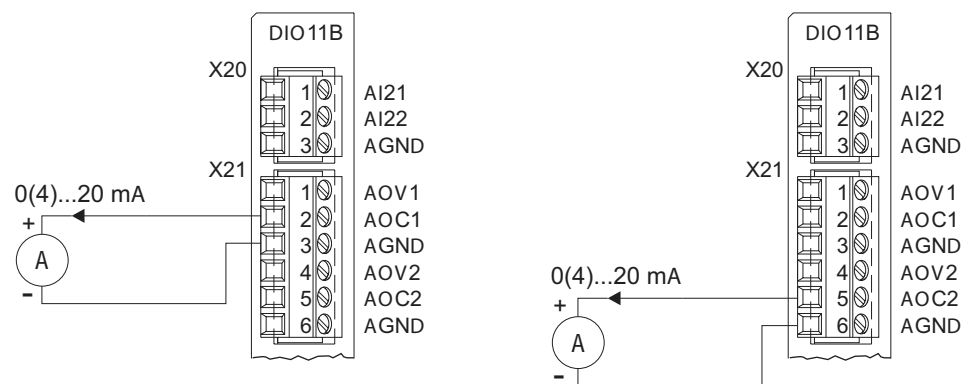
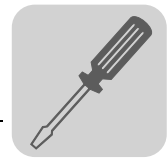



Figure 156: Current outputs AOC1 and AOC2

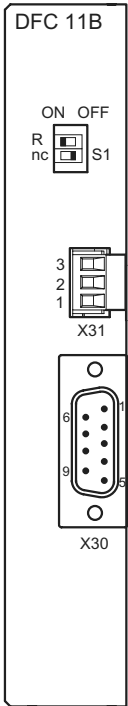
06197AXX



### 9.23 Connecting Option DFC11B

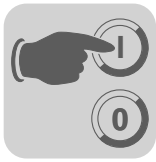
**Part number** CAN-Bus interface type DFC11B: 824 317 4

	<b>NOTES</b>
	<ul style="list-style-type: none"> <li>The "CAN-Bus interface type DFC11B" option is only possible in conjunction with MOVIDRIVE® MDX61B, not with MDX60B.</li> <li>The DFC11B option must be plugged into the fieldbus slot.</li> <li>The DFC11B option is powered via MOVIDRIVE® MDX61B. A separate voltage supply is not required.</li> </ul>

Front view of DFC11B	Description	DIP switches Terminal	Function
 <p>55405AXX</p>	<p><b>DIP switch block S1: Sets the terminating resistor</b></p>	<p>R nc</p>	<p>Terminating resistor for the CAN-Bus cable Reserved</p>
	<p><b>X31: CAN bus connection</b></p>	<p>X31:3 X31:2 X31:1</p>	<p>CAN Low (jumpered with X30:2) CAN High (jumpered with X30:7) DGND</p>
	<p><b>X30: CAN bus connection (Sub D9 to CiA standard)</b></p>	<p>X30:1 X30:2 X30:3 X30:4 X30:5 X30:6 X30:7 X30:8 X30:9</p>	<p>N.C. CAN Low (jumpered with X31:3) DGND N.C. N.C. DGND CAN High (jumpered with X31:2) N.C. N.C.</p>

**Connection  
MOVIDRIVE® -  
CAN**

The DFC11B option is connected to the CAN bus at X30 or X31 in the same way as the SBus (→ Sec. "System bus connection (SBus 1)") in the basic unit (X12). In contrast to the SBus1, SBus2 is electrically isolated and made available via option DFC11B.



## 10 Startup

### 10.1 General startup instructions

	<b>⚠ DANGER!</b>
	<p>Uncovered power connections. Severe or fatal injuries from electric shock.</p> <ul style="list-style-type: none"> <li>• Install the touch guard according to the regulations.</li> <li>• Never start the unit if the touch guard is not installed.</li> </ul>

#### **Prerequisites**

The drive must be configured correctly to ensure that startup is successful. Refer to the MOVIDRIVE® MDX60/61B System Manual for detailed project planning notes and an explanation of the parameters.

#### **VFC operating modes without speed control**

MOVIDRIVE® MDX60/61B drive inverters are designed to be taken into operation with the SEW motor which is adapted to the correct power level. The motor can be connected and the drive started immediately in accordance with the section "Starting the motor" (→ page 409) .

	<b>NOTE</b>
	<p>The startup functions described in this section are used for setting the inverter so it can be adapted optimally to the motor that is connected and to suit the basic conditions.</p>



**Inverter/motor combinations**

400/500 V units

The following tables indicate which inverter/motor combinations this applies to.

MOVIDRIVE® MDX60/61B in VFC mode	SEW motor
0005-5A3-4	DT80K4
0008-5A3-4	DT80N4
0011-5A3-4	DT90S4
0014-5A3-4	DT90L4
0015-5A3-4	DT90L4
0022-5A3-4	DV100M4
0030-5A3-4	DV100L4
0040-5A3-4	DV112M4
0055-5A3-4	DV132S4
0075-5A3-4	DV132M4
0110-5A3-4	DV160M4
0150-503-4	DV160L4
0220-503-4	DV180L4
0300-503-4	DV200L4
0370-503-4	DV225S4
0450-503-4	DV225M4
0550-503-4	DV250M4
0750-503-4	DV280S4
0900-503-4	DV280M4
1100-503-4	D315S4
1320-503-4	D315M4

10

230 V units

MOVIDRIVE® MDX60/61B in VFC mode	SEW motor
0015-2A3-4	DT90L4
0022-2A3-4	DV100M4
0037-2A3-4	DV112M4
0055-2A3-4	DV132S4
0075-2A3-4	DV132M4
0110-203-4	DV160M4
0150-203-4	DV160L4
0220-203-4	DV180L4
0300-203-4	DV200L4

**Hoist applications**

	<b>DANGER!</b>
	<p>Risk of fatal injury if the hoist falls. Severe or fatal injuries. MOVIDRIVE® MDX60B/61B is not designed for use as a safety device in hoist applications. Use monitoring systems or mechanical protection devices to ensure safety.</p>



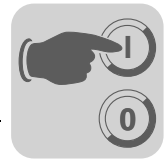
#### 10.2 Preliminary work and resources

- Check the installation.

	<b>DANGER!</b>
	<p>Risk of crushing if the motor starts up unintentionally. Severe or fatal injuries.</p> <ul style="list-style-type: none"> <li>• Ensure that the motor cannot start unintentionally, for example, by removing the electronics terminal block X13.</li> <li>• Additional safety precautions must be taken depending on the application to avoid injury to people and damage to machinery.</li> </ul>

- Performing **startup with the DBG60B keypad**:  
Plug the connector of the DBG60B keypad into the XT slot.
- Performing **startup with a PC and MOVITOOLS®**:  
Plug the UWS21B option into the XT slot and use an interface cable (RS232) to connect it to the PC. Install and start MOVITOOLS® on your PC.
- Switch on the supply voltage and, if necessary, the DC 24 V supply.
- Check that the default parameter settings are correct (e.g. factory setting).
- Check the terminal assignment that has been set (→ P60\_ / P61\_).

	<b>NOTE</b>
	<p>A group of <b>parameter values is changed automatically</b> at startup. The description of parameter P700 "Operating modes" explains which parameters are affected by this step. Refer to the MOVIDRIVE® MDX60/61B system manual, section "Parameters" for the <b>parameter description</b>.</p>



### 10.3 Startup with the DBG60B keypad

**General information**

Startup with the DBG60B keypad is only possible in VFC operating modes. Startup in CFC and SERVO operating modes is only possible using the MOVITOOLS® software.

**Required data**

The following data is required to ensure startup is successful:

- Motor type (SEW or non-SEW motor)
- Motor data
  - Rated voltage and rated frequency
  - Additionally for non-SEW motors: rated current, rated power, power factor  $\cos\phi$  and rated speed
- Rated supply voltage

The following data is also needed for startup with a speed controller:

- Encoder type and encoder resolution:

SEW encoder type	Startup parameter	
	Encoder type	Encoder resolution
AS1H, ES1H, AV1H	HIPERFACE®	1024
ES1S, ES2S, EV1S, EH1S	SINE ENCODER	1024
ES1R, ES2R, EV1R, EH1R ES1T <sup>1)</sup> , ES2T <sup>1)</sup> , EV1T <sup>1)</sup> , EH1T <sup>1)</sup>	INCREM. TTL ENCODER	1024

1) DC 5 V TTL encoders ES1T, ES2T, EV1T and EH1T must be connected via the DWI11A option (→ Sec. Installation).

- Motor data
  - SEW motor: Brake yes or no and flywheel fan yes or no.
  - Non-SEW motor: Mass moment of inertia of motor, brake and fan
- Stiffness of the control system (factory setting = 1; suitable for most applications)
  - If the drive tends to oscillate → setting < 1
  - Transient recovery time is too long → Setting > 1
  - Recommended setting range: 0,90 ... 1... 1.10 (factory setting = 1)
- Converted mass moment of inertia of the load (gear unit + driven machine) on the motor shaft
- Time required for the shortest ramp

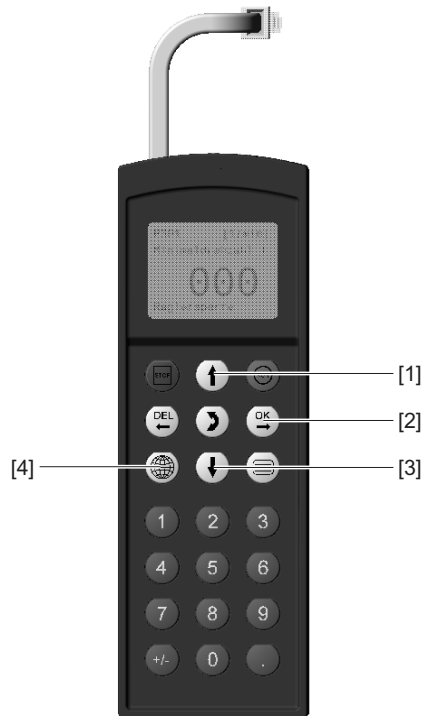
	<b>NOTES</b>
	<ul style="list-style-type: none"> <li>• Activate encoder monitoring (P504 = "ON") after completing startup. The function and voltage supply of the encoder will then be monitored.</li> <li>• If a Hiperface® encoder is connected, it is always monitored regardless of the setting of parameter P504. Encoder monitoring is not a safety function!</li> </ul>



## Startup

### Startup with the DBG60B keypad

**Select language** The figure below shows the keys for selecting the language.



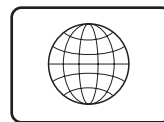
60008AXX

- [1] Key Move up to the next menu item
- [2] Key Confirm entry
- [3] Key Move down to the next menu item
- [4] Key A list of languages is displayed

The following text appears on the display when the keypad is switched on for the first time or after activating the start mode:

SEW  
EURODRIVE

The symbol for language selection then appears on the display.



54533AXX

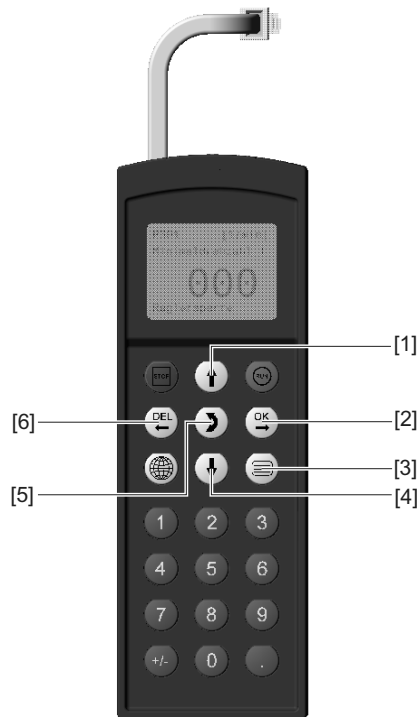
Proceed as follows to select the language:

- Press the key . A list of languages is displayed on the screen.
- Use the / keys to select the language you require.
- Confirm your selection using the key. The basic display is now shown in your chosen language.



**Startup**

The figure below shows the keys required for startup.



60010AXX

- [1] Key Move up to the next menu item
- [2] Key Confirm entry
- [3] Key Activate the context menu
- [4] Key Move down to the next menu item
- [5] Key Change the menu, display mode ↔ edit mode
- [6] Key Cancel or abort startup

**Startup procedure**

1. "0" signal at terminal X13:1 (DIØ "/CONTROL.INHIBIT"), e.g. by disconnecting the electronics terminal block X13.
2. Activate the context menu by pressing the key.
3. Use the key to scroll down to the "STARTUP PARAMET." menu item.

0.00rpm  
0.000Amp  
CONTROLLER INHIBIT

**PARAMETER MODE**  
VARIABLE MODE  
BASIC VIEW

**MANUAL MODE**  
**STARTUP PARAMET.**  
COPY TO DBG  
COPY TO MDX



## Startup

### Startup with the DBG60B keypad

4. Press the key to begin the startup procedure. The first parameter appears. The flashing cursor under the parameter number indicates that the keypad is in display mode.
  - Use the key to change to edit mode. The flashing cursor disappears.
  - Use the key or the key to select "PARAMETER SET 1" or "PARAMETER SET 2".
  - Confirm the setting using the key to confirm your selection.
  - Use the key to return to the display mode. The flashing cursor appears again.
  - Use the key to select the next parameter.

STARTUP PARAMET.  
PREPARE FOR STARTUP

5. Select the operating mode you require. Use the key to select the next parameter.

C00\*STARTUP  
**PARAMETER SET 1**  
PARAMETER SET 2

6. Select the motor type. If a 2 or 4-pole SEW motor is connected, select the correct motor from the list. If a non-SEW motor or an SEW motor with more than four poles is connected, select "NON-SEW MOTOR" from the list.  
Use the key to select the next parameter.

C01\*OPER. MODE 1  
**VFC1**  
VFC1&GROUP

C02\*MOTOR TYPE 1  
DT71D2  
**DT71D4**  
DT80K2

C02\*MOTOR TYPE 1  
**NON-SEW MOTOR**  
DT63K4/DR63S4

7. Enter the rated motor voltage for the selected connection type according to the value specified on the nameplate.

Example: Nameplate 230Δ/400∩ 50 Hz

∩ connection → Enter "400 V".

Δ connection, transition point at 50 Hz → enter "230 V".

Δ connection, transition point at 87 Hz → Also enter 230 V.

However, after startup first set parameter P302 "MAXIMUM SPEED 1" to the value for 87 Hz and then start the drive.

Example: Nameplate 400Δ/690∩ 50 Hz

Only Δ connection possible → Enter "400 V".

∩ connection is not possible.

Use the key to select the next parameter.

C03\* V  
MOT. RATED VOLT 1  
+400.000

8. Enter the rated frequency specified on the motor nameplate.  
Example: 230Δ/400∩ 50 Hz  
Enter "50 Hz" in ∩ and Δ connection.

Use the key to select the next parameter.

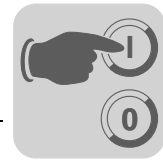
C04\* Hz  
MOT. RATED FREQ. 1  
+50.000

#### FOR SEW MOTORS

9. The motor values are stored for SEW 2 and 4-pole motors and need not be entered.

#### FOR NON-SEW MOTORS

9. Enter the following motor nameplate data:
  - C10\* rated motor current, note the connection type (∩ or Δ).
  - C11\* rated motor power
  - C12\* power factor cos φ
  - C13\* rated motor speed



10. Enter the rated power supply voltage (C05\* for SEW motor, C14\* for non-SEW motor).

C05\* V  
MAINS RAT. VOLT. 1  
+400.000

11. If no TF/TH is connected to X10:1/2 or X15 → Set "NO RESPONSE". If a TF/TH is connected, set the required fault response. To select the sensor, you must set *P530 sensor type 1* after startup.

835\* RESP. TF-SIG.  
**NO RESPONSE**  
DISPLAY ERROR

12. Start the calculation for the startup data by choosing "YES". The process lasts a few seconds.

C06\*CALCULATION  
**NO**  
YES

**FOR SEW MOTORS**

13. The calculation is performed. After calculation, the next menu item appears automatically.


C06\*SAVE  
**NO**  
YES

**FOR NON-SEW MOTORS**


13. For non-SEW motors, a calibration process is required to perform the calculation:
- When prompted, apply a "1" signal to terminal X13:1 (DIØØ "/CONTROL.INHIBIT").
  - Apply a "0" signal to terminal X13:1 again after the calibration is complete.
  - After calculation, the next menu item appears automatically.

14. Set "SAVE" to "YES". The data (motor parameters) are copied to the non-volatile memory of MOVIDRIVE®.


DATA IS  
BEING COPIED...

15. The startup procedure is now complete. Use the  key to return to the context menu.

MANUAL MODE  
**STARTUP PARAMET.**  
COPY TO DBG  
COPY TO MDX

16. Use the  key to scroll down to the "EXIT" menu item.

EXIT UNIT  
**SETTINGS**

17. Confirm the setting using the  key. The basic display appears.

0.00rpm  
0.000Amp  
CONTROLLER INHIBIT



## Startup

### Startup with the DBG60B keypad

#### Starting up the speed controller

Startup is performed without the speed controller first (→ Section "Startup procedure, steps 1 through 17").

**Important:** Set the VFC-n-CONTROL mode.

C01\*OPER. MODE 1  
VFC1&FLYSTART  
**VFC1-n-CONTROL**  
VFC-n-CTRL.GRP

1. Commence startup for the speed controller by choosing "YES".

C09\*STARTUPn-CTRL.  
**NO**  
YES

2. The selected operating mode is displayed. If the setting is correct, go to the next menu item.

C00\*STARTUP  
PARAMETER SET 2  
**VFC n-CONTROL**

3. Select the correct encoder type.

C15\*ENCODER TYPE  
INCREM. ENCOD. TTL  
**SINE ENCODER**  
INCREM. ENCOD. HTL

4. Set the correct encoder resolution.

C16\*ENC. RESOLUT.  
512 Inc  
**1024 Inc**  
2048 Inc

#### FOR SEW MOTORS

5. Enter whether the motor has a brake.

C17\*BRAKE  
**WITHOUT**  
WITH

6. Set the stiffness of the control system.  
If the drive tends to oscillate → setting < 1  
Transient recovery time is too long → Setting > 1  
Recommended setting range: 0,90 ... 1 ... 1,10

C18\*  
STIFFNESS  
+1.000

7. Enter whether the motor has a flywheel fan (Z fan).

C19\*Z FAN  
**WITHOUT**  
WITH

#### FOR NON-SEW MOTORS

5. Enter the moment of inertia of the motor.

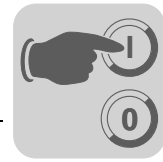
D00\* 10e-4kgm<sup>2</sup>  
J0 OF THE MOTOR  
+4.600

6. Set the stiffness of the control system.  
If the drive tends to oscillate → setting < 1  
Transient recovery time is too long → Setting > 1  
Recommended setting range: 0,90 ... 1 ... 1,10

C18\*  
STIFFNESS  
+1.000

7. Enter the moment of inertia of the brake and fan.

D00\* 10e-4kgm<sup>2</sup>  
J BRAKE+FAN  
+1.000




8. Enter the mass moment of inertia of the load (gear unit + driven machine) extrapolated for the motor shaft.
 


C20*	10e-4kgm <sup>2</sup>
LOAD MOMENT OF INERTIA	
	+0.200
  9. Enter the time for the shortest ramp you want.
 


C21*	s
SHORTEST RAMP	
	+0.100
  10. Start the calculation for the startup data by choosing "YES". The process lasts a few seconds.
 



C06*CALCULATION	
NO	
YES	
  11. The calculation is performed. After calculation, the next menu item appears automatically.
 

C06*SAVE	
NO	
YES	
  12. Set "SAVE" to "YES". The data (motor parameters) are copied to the non-volatile memory of MOVIDRIVE®.
 

DATA IS BEING COPIED...	
-------------------------	--
  13. The startup procedure is now complete. Use the  key to return to the context menu.
 

MANUAL MODE	
<b>STARTUP PARAMET.</b>	
COPY TO DBG	
COPY TO MDX	
  14. Use the  key to scroll down to the "EXIT" menu item.
 

EXIT UNIT	
<b>SETTINGS</b>	
  15. Confirm the setting using the  key. The basic display appears.
 

0.00rpm	
0.000Amp	
CONTROLLER INHIBIT	
- Once startup is complete, copy the parameter set from MOVIDRIVE® to the DBG60B keypad. You have the following options:
    - In the context menu, select the "COPY TO DBG" menu item. Confirm the setting using the  key. The parameter set is copied from MOVIDRIVE® to DBG60B.
    - In the context menu, select the "PARAMETER MODE" menu item. Select parameter P807 "MDX → DBG". The parameter set is copied from MOVIDRIVE® to DBG60B.
  - The parameter set can now be copied to other MOVIDRIVE® units using DBG60B. Plug the DBG60B keypad into the other inverter. You have the following options to copy the parameter set from DBG60B to another inverter:
    - In the context menu of the new inverter, choose the "COPY TO MDX" menu item and confirm your entry using the  key. The parameter set is copied from DBG60B to MOVIDRIVE®.
    - In the context menu, select the "PARAMETER MODE" menu item. Select parameter P806 "DBG → MDX". The parameter set is copied from DBG60B to MOVIDRIVE®.



## Startup

### Startup with the DBG60B keypad



#### **! DANGER!**

Parameter settings incorrect due to unsuitable data sets.









Severe or fatal injury.

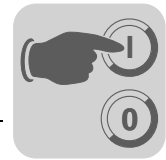
Make sure that the data set you copy is suitable for the application.

- Enter parameter settings that differ from the factory setting in the parameter list (→ page 413).
- In the case of non-SEW motors, set the correct brake application time (P732 / P735).
- For starting the motor, refer to the "Starting the motor" section (→ page 409).
- With  $\Delta$  connection and transition point at 87 Hz set parameter P302/312 "Maximum speed 1/2" to the value for 87 Hz.
- Activate encoder monitoring for TTL and sin/cos encoders (P504="ON"). **Encoder monitoring is not a safety function.**

#### **Setting parameters**

Proceed in this order to set the parameters:

- Call up the context menu using the  key. In the context menu, select the "PARAMETER MODE" menu item. Confirm your entry using the  key. The flashing cursor under the parameter number indicates that the keypad is in parameter mode.
- Use the  key to change to edit mode. The flashing cursor disappears.
- You can use the  key or the  key to select or set the correct parameter value.
- Confirm the setting using the  key.
- Use the  key to return to the parameter mode. The flashing cursor appears again.
- Use the  key to select the next parameter.

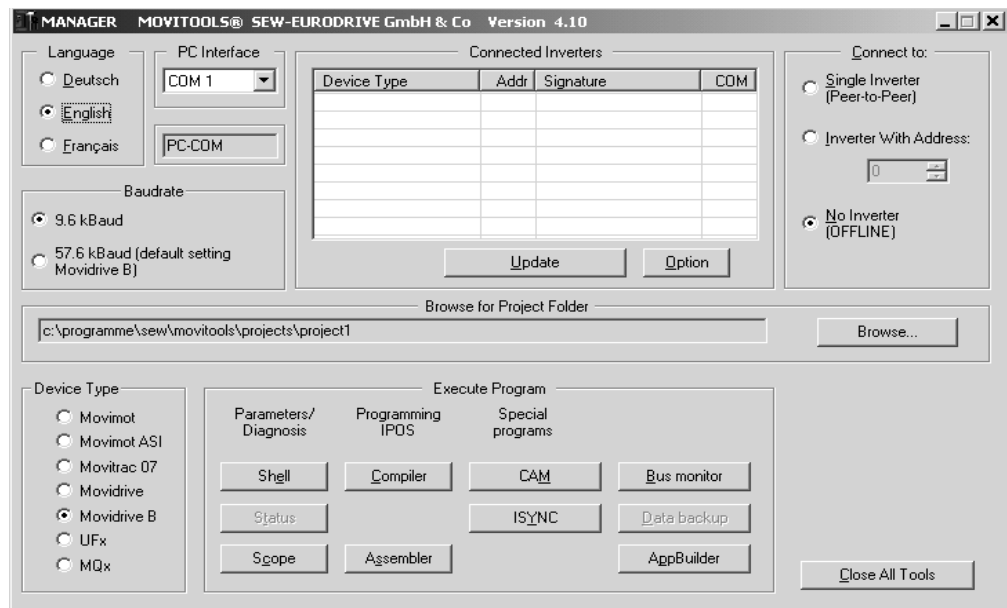


## 10.4 Startup with PC and MOVITOOLS®

MOVITOOLS® software version 4.20 or higher is required for startup with a PC.

### General information

- Terminal X13:1 (DIØØ "/CONTROL.INHIBIT") must receive a "0" signal!
- Start MOVITOOLS®.
- Select the language you want in the "Language" selection field.
- From the "PC-COM" drop down menu, select the PC port (e.g. COM 1) to which the inverter is connected.
- In the "Device type" field, select "Movidrive B".
- In the "Baudrate" field, select the baud rate set on the basic unit with the DIP switch S13 (standard setting → "57.6 kBaud").
- Press the <Update> button The connected inverter is displayed under "Connected devices."



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Figure 157: MOVITOOLS® initial screen

### Commencing startup

- In the "Execute Program" group box, press the <Shell> button under "Parameters/Diagnosis". The Shell program is started.
- In the Shell program, select the [Startup] / [Startup...] menu command. MOVITOOLS® opens the startup menu. Follow the instructions of the startup assistant. For questions on startup, refer to the MOVITOOLS® online help.



### Startup for HTL motor encoders

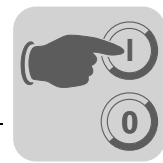
Adhere to the following startup instructions for starting an HTL motor encoder on the optional HIPERFACE® encoder card DEH11B of MOVIDRIVE® MDX61B.

Figure 158: Settings for startup of a motor with HTL motor encoder

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- [1] Dropdown menu "SEW encoder type"
- [2] Dropdown menu "Encoder type"
- [3] Dropdown menu "PPR count"

- Choose "Non-SEW encoder" from the [SEW encoder type] [1] dropdown menu.
- Choose "INCREM. ENCODER TTL" from the [encoder type] [2] in the dropdown menu.
- In the dropdown menu "PPR count" [3] select the PPR count (1024 for SEW HTL encoders) printed on the HTL motor encoder.



### 10.5 Starting the motor

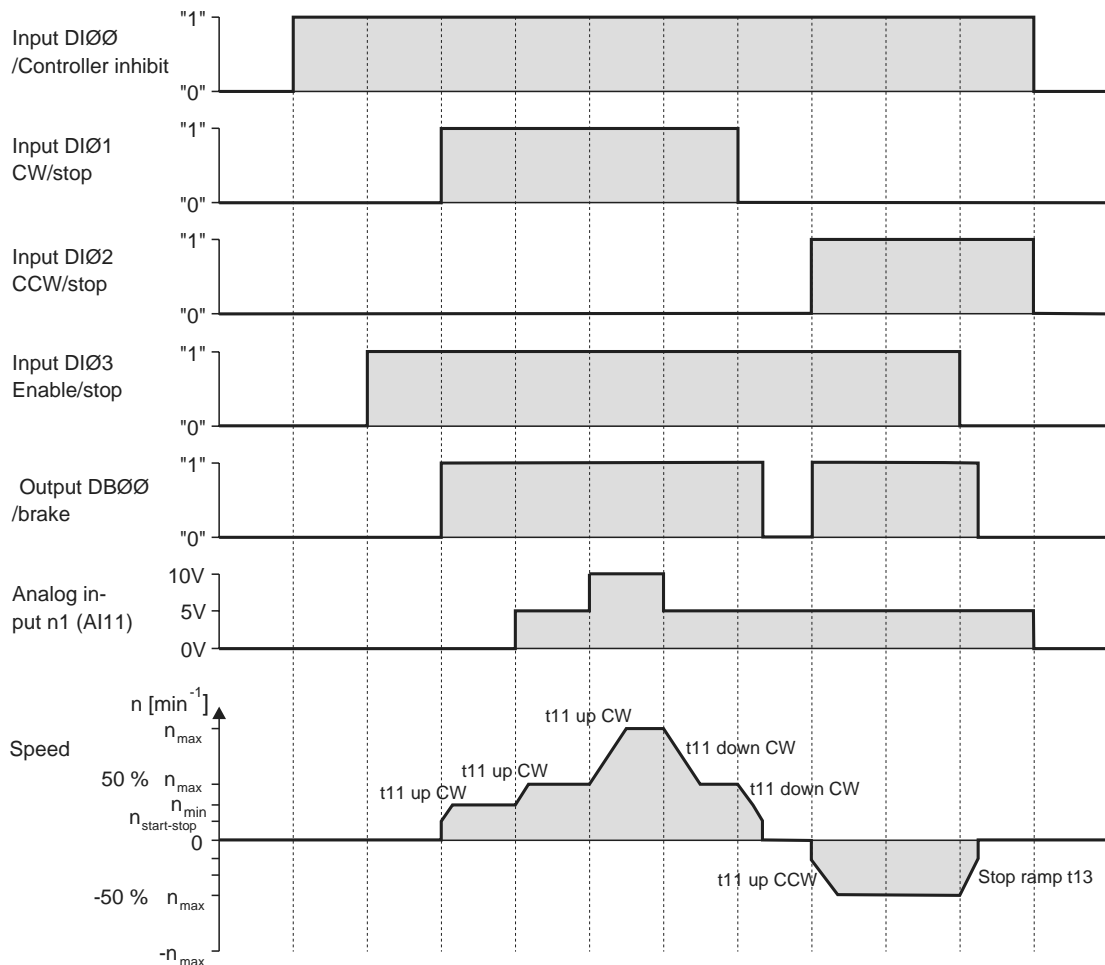
#### Analog setpoint selection

The following table shows the signals that must be present on terminals X11:2 (AI1) and X13:1...X13:6 (DIØØ...DIØ5) when the "UNIPOL/FIX.SETPT" setpoint is selected (P100) to operate the drive with an analog setpoint selection.

Function	X11:2 (AI1) Analog inp. n1	X13:1 (DIØØ) /Ctrn inhibit	X13:2 (DIØ1) CW/Stop	X13:3 (DIØ2) CCW/Stop	X13:4 (DIØ3) Enable/Stop	X13:5 (DIØ4) n11/n21	X13:6 (DIØ5) n12/n22
Controller inhibit	X	"0"	X	X	X	"0"	"0"
Stop	X	"1"	X	X	"0"	"0"	"0"
Enable and stop	X	"1"	"0"	"0"	"1"	"0"	"0"
Clockwise at 50 % $n_{max}$	5 V	"1"	"1"	"0"	"1"	"0"	"0"
Clockwise with $n_{max}$	10 V	"1"	"1"	"0"	"1"	"0"	"0"
CCW with 50 % $n_{max}$	5 V	"1"	"0"	"1"	"1"	"0"	"0"
CCW with $n_{max}$	10 V	"1"	"0"	"1"	"1"	"0"	"0"

#### Travel diagram

The following travel diagram shows by way of example how the motor is started with the wiring of terminals X13:1 to X13:4 and analog setpoints. Binary output X10:3 /DBØØ ("Brake") is used for switching brake contactor K12.



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#### NOTE



The motor is not energized in the event of controller inhibit (DIØØ = "0"). A motor without brake will coast to standstill.



## Startup

### Starting the motor

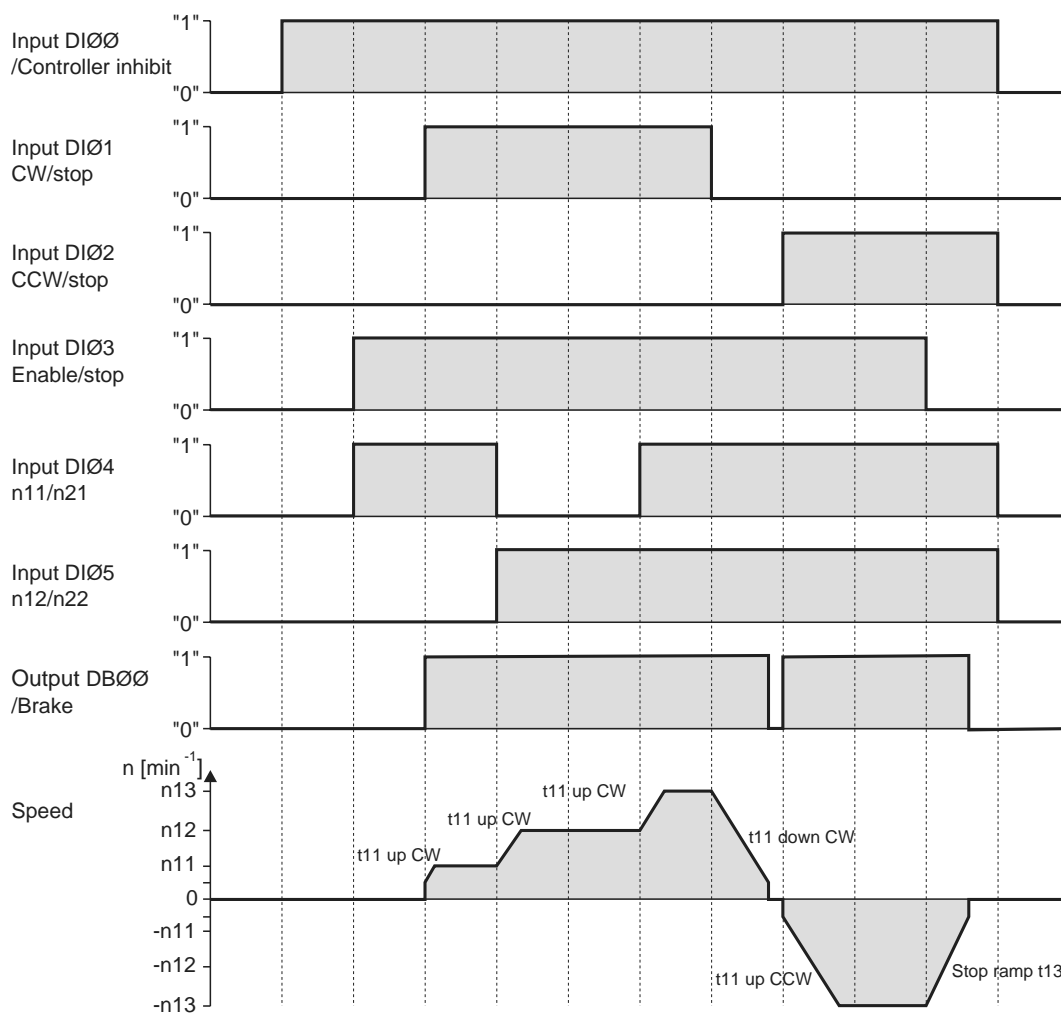
#### Fixed setpoints

The following table shows the signals that must be present on terminals X13:1 to X13:6 (DIØØ to DIØ5) when the "UNIPOL/FIX.SETPT" setpoint is selected (P100) to operate the drive with the fixed setpoints.

Function	X13:1 (DIØØ) /Ctrl inhibit	X13:2 (DIØ1) CW/Stop	X13:3 (DIØ2) CCW/Stop	X13:4 (DIØ3) Enable/Stop	X13:5 (DIØ4) n11/n21	X13:6 (DIØ5) n12/n22
Controller inhibit	"0"	X	X	X	X	X
Stop	"1"	X	X	"0"	X	X
Enable and stop	"1"	"0"	"0"	"1"	X	X
CW with n11	"1"	"1"	"0"	"1"	"1"	"0"
CW with n12	"1"	"1"	"0"	"1"	"0"	"1"
CW with n13	"1"	"1"	"0"	"1"	"1"	"1"
CCW with n11	"1"	"0"	"1"	"1"	"1"	"0"

#### Travel diagram

The following travel diagram shows an example of how the drive is started with the wiring of terminals X13:1 ... X13:6 and internal fixed setpoints. Binary output X10:3 (/DBØØ "/Brake") is used for switching brake contactor K12.

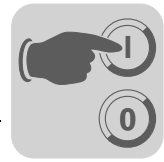


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#### NOTE

The motor is not energized in the event of controller inhibit (DIØØ = "0"). A motor without brake will coast to standstill.





**Manual operation** The inverter can be controlled using the DBG60B keypad with the manual operation function (Context menu → Manual operation). The 7-segment display on the unit shows "H" during manual mode.

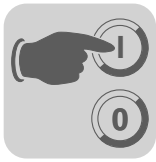
The binary inputs are then without any functions for the duration of manual operation, with the exception of X13:1 (DIØØ "/Controller inhibit"). Binary input X13:1 (DIØØ "/Controller inhibit") must receive a "1" signal to enable the drive to be started in manual operation. The drive can also be stopped in manual operation by setting X13:1 = "0".

The direction of rotation is not determined by the "CW/stop" or "CCW/stop" binary inputs. Instead, you select the direction of rotation using the DBG60B keypad. Enter the required speed and then the direction of rotation (+  $\Delta$  C W / -  $\Delta$  CCW) using the sign key (+/-).

Manual operation remains active when the power supply is switched off and on; however, the inverter is then inhibited. Use the "Run" key to enable and start the inverter at  $n_{min}$  in the selected direction of rotation. The speed is increased and decreased using the  $\uparrow$  and  $\downarrow$  keys.

	<b>NOTE</b>
	<p>The signals at the binary inputs take effect as soon as manual operation is finished. Binary input X13:1 (DIØØ) /Controller inhibit does not have to be switched from "1" to "0" and back to "1". The drive can start according to the signals at the binary inputs and the setpoint sources.</p>

	<b>⚠ DANGER!</b>
	<p>Risk of crushing if the motor starts up unintentionally. Severe or fatal injuries.</p> <ul style="list-style-type: none"> <li>• Ensure that the motor cannot start unintentionally, for example, by removing the electronics terminal block X13.</li> <li>• Additional safety precautions must be taken depending on the application to avoid injury to people and damage to machinery.</li> </ul>



#### **Startup in "VFC & Flying start" operating mode**

The parameter *P320 Automatic adjustment* is deactivated in the "VFC & Flying start" mode. It is important that the stator resistance (*P322 IxR compensation 1*) is set correctly to ensure that the flying start function is performed properly.

Note the following when performing startup for an **SEW motor** with DBG60B or MOVITOOLS®:

- The value of the stator resistance (*P322 IxR compensation 1*) is set for an SEW motor at operating temperature (winding temperature 80 °C). For flying start with a cold motor, you have to reduce the stator resistance (*P322 IxR compensation 1*) by 0.34 % per Kelvin.

Note the following when performing startup for a **non-SEW motor** with DBG60B or MOVITOOLS®:

Measure the stator resistance (*P322 IxR compensation 1*) at startup. Proceed as follows:

1. Start up the motor in "VFC" operation mode.
2. Enable the motor.
3. **Note** the value of *P322 IxR compensation 1* (stator resistance) for step 6.
4. Select the "VFC & Flying start " operating mode.
5. Set *P320 "Automatic adjustment 1* to "Off".
6. In *P322 IxR compensation 1* (stator resistance) enter the **value you noted** in step 3.



## 10.6 Complete parameter list

### General information

- The parameters in the quick menu are marked by a "/" (= display on the DBG60B keypad).
- The factory setting for the parameter is highlighted in bold.

Par.	Name	Value range
<b>DISPLAY VALUES</b>		
<b>00_</b>	<b>Process values</b>	
000	Speed	-6100 ... 0 ... 6100 1/min
\001	User display	[Text]
002	Frequency	0 ... 600 Hz
003	Actual position	0 ... 2 <sup>31</sup> -1 inc
004	Output current	0 ... 250 % I <sub>N</sub>
005	Active current	-250 ... 0 ... 250 % I <sub>N</sub>
\006	Motor utilization 1	0 ... 200 %
007	Motor utilization 2	0 ... 200 %
008	DC link voltage	0 ... 1000 V
009	Output current	A
<b>01_</b>	<b>Status displays</b>	
010	Inverter status	
011	Operating state	
012	Error status	
013	Current parameter set	1/2
014	Heat sink temperature	-20 ... 0 ... 100 °C
015	Hours of operation	h
016	Enable hours	h
017	Work	kWh
018	KTY capacity utilization 1	0 ... 200 %
019	KTY capacity utilization 2	0 ... 200 %
<b>02_</b>	<b>Analog setpoints</b>	
020	Analog input AI1	-10 ... 0 ... 10 V
021	Analog input AI2	-10 ... 0 ... 10 V
022	External current limitation	0 ... 100 %
<b>03_</b>	<b>Binary inputs basic unit</b>	
030	Binary input DI00	/CONTROL.INHIBIT
031	Binary input DI01	
032	Binary input DI02	
033	Binary input DI03	
034	Binary input DI04	Not in DBG60B
035	Binary input DI05	
036	Binary input DI06	
037	Binary input DI07	
\039	Status binary inputs DI00...DI07	
<b>04_</b>	<b>Binary input options</b>	
040	Binary input DI10	
041	Binary input DI11	
042	Binary input DI12	
043	Binary input DI13	
044	Binary input DI14	Not in DBG60B
045	Binary input DI15	
046	Binary input DI16	
047	Binary input DI17	
\048	Status binary inputs DI10...DI17	

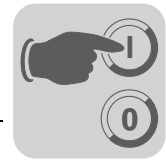
Par.	Name	Value range
<b>05_</b>	<b>Binary outputs basic unit</b>	
050	Binary output DB00	/BRAKE
051	Binary output DO01	
052	Binary output DO02	
053	Binary output DO03	Not in DBG60B
054	Binary output DO04	
055	Binary output DO05	
\059	Status binary outputs DB00, DO01...DO05	
<b>06_</b>	<b>Binary outputs option</b>	
060	Binary output DO10	
061	Binary output DO11	
062	Binary output DO12	
063	Binary output DO13	Not in DBG60B
064	Binary output DO14	
065	Binary output DO15	
066	Binary output DO16	
067	Binary output DO17	
\068	Status binary outputs DO10...DO17	
<b>07_</b>	<b>Unit data</b>	
070	Unit type	
071	Rated output current	
072	Option 1 encoder slot	
073	Option 2 fieldbus slot	
074	Option 3 extension slot	
076	Firmware basic unit	
077	DBG firmware	Only in DBG60B
078	Technology function	
079	Unit type	Standard Technology
<b>08_</b>	<b>Error memory</b>	
\080	Error t-0	
081	Error t-1	
082	Error t-2	
083	Error t-3	
084	Error t-4	
<b>09_</b>	<b>Bus diagnostics</b>	
090	PD configuration	
091	Fieldbus type	
092	Fieldbus baud rate	
093	Fieldbus address	
094	PO1 Setpoint	
095	PO2 Setpoint	
096	PO3 Setpoint	
097	PI1 Actual value	
098	PI2 Actual value	
099	PI3 Actual value	



## Startup

### Complete parameter list

Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
<b>1_</b>	<b>SETPOINTS / RAMP GENERATORS</b>		
<b>10_</b>	<b>Setpoint selection</b>		
\100	Setpoint source	<b>UNIPOL/FIX.SETPT</b>	
101	Control signal source	<b>TERMINALS</b>	
102	Frequency scaling	0.1 .. <b>10</b> ... 65 kHz	
<b>11_</b>	<b>Analog input AI1</b>		
110	AI1 scaling	-10 ... -0.1 / 0.1 ... <b>1</b> ...10	
111	AI1 Offset	-500 ... <b>0</b> ...500 mV	
112	AI1 operating mode	<b>Ref. N-MAX</b>	
113	AI1 voltage offset	-10 ... <b>0</b> ... 10 V	
114	AI1 speed offset	-6000 ... <b>0</b> ... 6000 1/min	
115	Filter speed setpoint	0 ... <b>5</b> ...100 ms 0 = Filter off	
<b>12_</b>	<b>Analog inputs (optional)</b>		
120	AI2 operating mode	<b>NO FUNCTION</b>	
<b>13_</b>	<b>Speed ramps 1</b>		
\130	Ramp t11 up CW	0 ... <b>2</b> ... 2000 s	
\131	Ramp t11 down CW	0 ... <b>2</b> ... 2000 s	
\132	Ramp t11 up CCW	0 ... <b>2</b> ... 2000 s	
\133	Ramp t11 down CCW	0 ... <b>2</b> ... 2000 s	
\134	Ramp t12 UP=DOWN	0 ... <b>10</b> ... 2000 s	
135	S pattern t12	<b>0</b> ... 3	
\136	Stop ramp t13	0 ... <b>2</b> ... 20 s	
\137	Emergency stop ramp t14	0 ... <b>2</b> ... 20 s	
138	Ramp limit VFC	<b>Yes</b> No	
139	Ramp monitoring 1	Yes <b>No</b>	
<b>14_</b>	<b>Speed ramps 2</b>		
140	Ramp t21 up CW	0 ... <b>2</b> ... 2000 s	
141	Ramp t21 down CW	0 ... <b>2</b> ... 2000 s	
142	Ramp t21 up CCW	0 ... <b>2</b> ... 2000 s	
143	Ramp t21 up CCW	0 ... <b>2</b> ... 2000 s	
144	Ramp t22 UP=DOWN	0 ... <b>10</b> ... 2000 s	
145	S pattern t22	<b>0</b> ... 3	
146	Stop ramp t23	0 ... <b>2</b> ... 20 s	
147	Emergency stop ramp t24	0 ... <b>2</b> ... 20 s	
149	Ramp monitoring 2	<b>No</b> Yes	
<b>15_</b>	<b>Motor potentiometer (parameter sets 1 and 2)</b>		
150	Ramp t3 up	0.2 ... <b>20</b> ... 50 s	
151	Ramp t3 down	0.2 ... <b>20</b> ... 50 s	
152	Save last setpoint	<b>OFF</b> ON	
<b>16_</b>	<b>Fixed setpoints 1</b>		
\160	Internal setpoint n11	-6000 ... <b>150</b> ... 6000 1/min (% I <sub>N</sub> )	
\161	Internal setpoint n12	-6000 ... <b>750</b> ... 6000 1/min (% I <sub>N</sub> )	
\162	Internal setpoint n13	-6000 ... <b>1500</b> ... 6000 1/min (% I <sub>N</sub> )	
<b>17_</b>	<b>Fixed setpoints 2</b>		
170	Internal setpoint n21	-6000 ... <b>150</b> ... 6000 1/min (% I <sub>N</sub> )	
171	Internal setpoint n22	-6000 ... <b>750</b> ... 6000 1/min (% I <sub>N</sub> )	
172	Internal setpoint n23	-6000 ... <b>1500</b> ... 6000 1/min (% I <sub>N</sub> )	



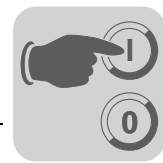
Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
<b>2_</b>	<b>CONTROLLER PARAMETERS</b>		
<b>20_</b>	<b>Speed control (only parameter set 1)</b>		
200	P-gain n-controller	0.01 ... 2 ... 32	
201	Time constant n-controller	0 ... 10 ... 300 ms	
202	Gain Accel. feedforw.	0 ... 65	
203	Filter acceleration feedforward	0 ... 100 ms	
204	Filter speed actual value	0 ... 32 ms	
205	Load feedforward CFC	- 150 % ... 0 ... 150 %	
206	Sampling time n-controller	1 ms 0.5 ms	
207	Load feedforward VFC	- 150 % ... 0 ... 150 %	
<b>21_</b>	<b>Hold controller</b>		
210	P gain hold controller	0.1 ... 0.5 ... 32	
<b>22_</b>	<b>Synchronous operation control (only parameter set 1)</b>		
220	P-gain (DRS)	1 ... 10 ... 200	
221	Master gear ratio factor	1 ... 3 999 999 999	
222	Slave gear ratio factor	1 ... 3 999 999 999	
223	Mode selection	Mode 1 Mode 2 Mode 3 Mode 4 Mode 5 Mode 6 Mode 7 Mode 8	
224	Slave counter	-99 999 999 ... -10 / 10 ... 99 999 999 inc	
225	Offset 1	-32 767 ... -10 / 10 ... 32 767 inc	
226	Offset 2	-32 767 ... -10 / 10 ... 32 767 inc	
227	Offset 3	-32 767 ... -10 / 10 ... 32 767 inc	
228	Feedforward filter (DRS)	0 ... 100 ms	Only with MOVITOOLS®. Not visible on the DBG60B keypad.
<b>23_</b>	<b>Synchronous operation with synchronous encoder</b>		
230	Synchronous encoder	OFF EQUAL-RANKING: CHAIN	
231	Factor slave encoder	1 ... 1000	
232	Factor slave synchronous encoder	1 ... 1000	
233	Synchronous encoder resolution	128 / 256 / 512 / 1024 / 2048	
234	Master encoder resolution	128 / 256 / 512 / 1024 / 2048	
<b>24_</b>	<b>Synchr. oper. w. catch up</b>		
240	Synchronous speed	-6000 ... 1500 ... 6000 1/min	
241	Synchronous ramp	0 ... 2 ... 50 s	
<b>26_</b>	<b>Process controller parameters</b>		
260	Operating mode	Controller off / Control / Step response	
261	Cycle time	1 / 5 / 10 ms	
262	Interruption	No response / Move closer to setpoint	
263	Factor K <sub>p</sub>	0 ... 1 ... 32.767	
264	Integrative time T <sub>n</sub>	0 ... 10 ... 65535 ms	
265	Derivative time T <sub>v</sub>	0 ... 1 ... 30 ms	
266	Feedforward	-32767 ... 0 ... 32767 [0.2/min]	
<b>27_</b>	<b>Process controller input values</b>		
270	Setpoint source	Parameter / IPOS variable / Analog 1 / Analog 2	
271	setpoint	-32767 ... 0 ... 32767 [0.2/min]	
272	IPOS setpoint address	0 ... 1023	
273	Time constant	0 ... 0.01 ... 2000 s	



## Startup

### Complete parameter list

Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
274	Scaling setpoint	-32.767 ... 1 ... 32.767	
275	Actual value source	<b>Analog 1</b> / Analog 2 / IPOS variable	
276	IPOS actual value address	0 ... 1023	
277	Actual scaling factor	-32.767 ... 1 ... 32.767	
278	Actual offset value	-32767 ... 0 ... 32767	
279	Actual time constant	0 ... 500 ms	
<b>28_</b>	<b>Process controller limits</b>		
280	Minimum offset + actual value	-32767 ... 0 ... 32767	
281	Maximum offset + actual value	-32767 ... <b>10000</b> ... 32767	
282	Minimum output PID controller	-32767 ... <b>-1000</b> ... 32767 [0.2/min]	
283	PID controller maximum output	-32767 ... <b>10000</b> ... 32767 [0.2 / min]	
284	Minimum output process controller	-32767 ... <b>0</b> ... 32767 [0.2/min]	
285	Maximum output process controller	-32767 ... <b>7500</b> ... 32767 [0.2/min]	
<b>3_</b>	<b>MOTOR PARAMETERS</b>		
<b>30_ / 31_</b>	<b>Limits 1 / 2</b>		
\300 / 310	Start/stop speed 1 / 2	0 ... 150 1/min	
\301 / 311	Minimum speed 1/2	0 ... <b>15</b> ..0.6100 1/min	
\302 / 312	Maximum speed 1 / 2	0 ... <b>1500</b> ... 6100 1/min	
\303 / 313	Current limit 1/2	0 ... 150 % (BG0: 0 ... 200 % I <sub>N</sub> )	
304	Torque limit	0 ... 150 % (BG0: 0 ... 200 %)	
<b>32_ / 33_</b>	<b>Motor compensation 1 / 2 (asynchronous)</b>		
\320 / 330	Automatic adjustment 1/2	Off On	
321 / 331	Boost 1/2	0 ... 100 %	
322 / 332	IxR compensation 1	0 ... 100 %	
323 / 333	Premagnetizing time 1 / 2	0 ... 2 s	
324 / 334	Slip compensation 1/2	0 ... 500 1/min	
<b>34_</b>	<b>Motor protection</b>		
340 / 342	Motor protection 1 / 2	Off On (asynchronous) On (synchronous)	
341 / 343	Cooling type 1/2	Fan cooled Forced cooling	
344	Interval for motor protection	0.1 ... <b>4</b> ... 20 s	
345 / 346	I <sub>N</sub> -U <sub>L</sub> monitoring 1 / 2	0.1 ... 500 A	
<b>35_</b>	<b>Direction of rotation of the motor</b>		
350 / 351	Change direction of rotation 1/2	Off On	
<b>36_</b>	<b>Startup (only available in DBG60B)</b>		
360	Startup	YES / NO	Only available in DBG60B, not in MOVITOOLS®/SHELL!
<b>4_</b>	<b>REFERENCE SIGNALS</b>		
<b>40_</b>	<b>Speed reference message</b>		
400	Speed reference value	0 ... <b>1500</b> ... 6000 1/min	
401	Hysteresis	0 ... <b>100</b> ... 500 1/min	
402	Delay time	0 ... 1 ... 9 s	
403	Signal = "1" if:	n < n <sub>ref</sub> n > n <sub>ref</sub>	
<b>41_</b>	<b>Speed window message</b>		
410	Window center	0 ... <b>1500</b> ... 6000 1/min	
411	Range width	0 ... 6000 1/min	
412	Delay time	0 ... 1 ... 9 s	
413	Signal = "1" if:	INSIDE OUTSIDE	
<b>42_</b>	<b>Speed setpoint/actual value comp</b>		
420	Hysteresis	0 ... <b>100</b> ... 300 1/min	



Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
421	Delay time	0 ... 1 ... 9 s	
422	Signal = "1" if:	$n \neq n_{setp}$ $n = n_{setp}$	
<b>43_</b>	<b>Current reference message</b>		
430	Current reference value	0 ... <b>100</b> ... 200 % $I_N$	
431	Hysteresis	0 ... <b>5</b> ... 30 % $I_N$	
432	Delay time	0 ... 1 ... 9 s	
433	Signal = "1" if:	$I < I_{ref}$ $I > I_{ref}$	
<b>44_</b>	<b>I<sub>max</sub> signal</b>		
440	Hysteresis	0 ... <b>5</b> ... 50 % $I_N$	
441	Delay time	0 ... 1 ... 9 s	
442	Signal = "1" if:	$I = I_{max} / I < I_{max}$	
<b>5_</b>	<b>MONITORING FUNCTIONS</b>		
<b>50_</b>	<b>Speed monitoring</b>		
500 / 502	Speed monitoring 1/2	OFF MOTOR MODE REGENERAT. MODE <b>MOT. &amp; REGEN.MODE</b>	
501 / 503	Delay time 1/2	0 ... 1 ... 10 s	
504	Encoder monitoring motor	No Yes	
505	Synchronous encoder monitoring	No Yes	
<b>51_</b>	<b>Synchr. operation monitoring</b>		
510	Positional tolerance slave	10 ... <b>25</b> ... 32 768 inc	
511	Prewarning lag error	<b>50</b> ... 99 999 999 inc	
512	Setpoint deviation limit	100 ... <b>4000</b> ... 99 999 999 inc	
513	Lag error delay message	0 ... 1 ... 99 s	
514	Counter LED display	10 ... <b>100</b> ... 32 768 inc	
515	Delay in-position signal	5 ... <b>10</b> ... 2000 ms	
516	X41 Encoder monitoring	YES NO	
517	X41 Pulse count monitoring	YES NO	
518	X42 Encoder monitoring	YES NO	
519	X42 Pulse count monitoring	YES NO	
<b>52_</b>	<b>Mains OFF monitoring</b>		
520	Mains OFF response time	<b>0</b> ... 5 s	
521	Mains OFF response	<b>CONTROLLER INHIBIT</b> EMERGENCY STOP	
522	Phase failure monitoring	<b>ON</b> Off	
<b>53_</b>	<b>Motor temperature protection</b>		
530	Sensor type 1	<b>No sensor</b> TF/TH/KTY (KTY: only for DS/CM motors)	
531	Sensor type 2	<b>No sensor</b> TF/TH/KTY (KTY: only for DS/CM motors)	



Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
<b>54_</b>	<b>Gear unit/motor monitoring</b>		
540	Response drive vibration/warning	Display fault	<b>The following error responses can be programmed:</b> NO RESPONSE • DISPLAY FAULT • IMM. STOP/FAULT • EMERG.STOP/FAULT • RAPID STOP/FAULT • IMM. STOP/WARN. • EMERG.STOP/WARNG • RAPID STOP/WARNG
541	Response drive vibration/fault	Rapid stop/Warning	
542	Response oil aging/warning	Display fault	
543	Response oil aging/fault	Display fault	
544	Response oil aging/overtemperature	Display fault	
545	Response oil aging/ready message	Display fault	
546	Response brake wear	Display fault	
<b>6_</b>	<b>TERMINAL ASSIGNMENT</b>		
<b>60_</b>	<b>Binary inputs basic unit</b>		
-	Binary input DIØØ	With fixed assignment with: /CONTROLLER INHIBIT	
600	Binary input DIØ1	CW/STOP	<b>The following functions can be programmed:</b> NO FUNCTION • ENABLE/STOP • CW/STOP • CCW/STOP • n11/n21 • n12/n22 • FIX SETPT SW.OV. • PAR. SWITCHOVER • RAMP SWITCHOVER • MOTOR POT UP • MOTOR POT DOWN • /EXT. FAULT • FAULT RESET • /HOLD CONTROL • /LIM. SWITCH CW • /LIM. SWITCH CCW • IPOS INPUT • REFERENCE CAM • REF.TRAVEL START • SLAVE FREE RUNN. • SETPOINT HOLD • MAINS ON • DRS SET ZERO • DRS SLAVE START • DRS TEACH IN • DRS MASTER STOP • OSC./WARNING • BRAKE WEAR • OIL AGING/WARN. • OIL AGING/FAULT • OIL AGING OVER-TEMP. • OIL AGING/READY
601	Binary input DIØ2	CCW/STOP	
602	Binary input DIØ3	ENABLE /STOP	
603	Binary input DIØ4	n11/n21	
604	Binary input DIØ5	n12/n22	
605	Binary input DIØ6	NO FUNCTION	
606	Binary input DIØ7	NO FUNCTION	
<b>61_</b>	<b>Binary inputs option</b>		
610	Binary input DI1Ø	NO FUNCTION	
611	Binary input DI11	NO FUNCTION	
612	Binary input DI12	NO FUNCTION	
613	Binary input DI13	NO FUNCTION	
614	Binary input DI14	NO FUNCTION	
615	Binary input DI15	NO FUNCTION	
616	Binary input DI16	NO FUNCTION	
617	Binary input DI17	NO FUNCTION	
<b>62_</b>	<b>Binary outputs basic unit</b>		
-	Binary output DBØØ	With fixed assignment with: /BRAKE	
620	Binary output DOØ1	READY FOR OPERATION	<b>The following signals can be programmed:</b> NO FUNCTION • /FAULT • READY • OUTP. STAGE ON • ROT. FIELD ON • BRAKE RELEASED • BRAKE APPLIED • MOTOR STAND-STILL • PARAMETER SET • SPEED REFERENCE • SPEED WINDOW • SP/ACT.VAL.COMP. • CURR. REFERENCE • I <sub>max</sub> SIGNAL • /MOTOR UTILIZ. 1 • /MOTOR UTILIZ. 2 • /DRS PREWARNING • /DRS LAG ERROR • DRS SLAVE IN POS • IPOS IN POSITION • IPOS REFERENCE • IPOS OUTPUT • /IPOS FAULT
621	Binary output DOØ2	/FAULT	
622	Binary output DOØ3	IPOS OUTPUT	
623	Binary output DOØ4	IPOS OUTPUT	
624	Binary output DOØ5	IPOS OUTPUT	
<b>63_</b>	<b>Binary outputs option</b>		
630	Binary output DO1Ø	NO FUNCTION	
631	Binary output DO11	NO FUNCTION	
632	Binary output DO12	NO FUNCTION	
633	Binary output DO13	NO FUNCTION	
634	Binary output DO14	NO FUNCTION	
635	Binary output DO15	NO FUNCTION	
636	Binary output DO16	NO FUNCTION	
637	Binary output DO17	NO FUNCTION	



Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
<b>64_</b>	<b>Optional analog outputs</b>		
640	Analog output AO1	<b>ACTUAL SPEED</b>	
641	Scaling AO1	-10 ... 0 ... 1 ... 10	<b>The following functions can be programmed:</b> NO FUNCTION • RAMP INPUT • SPEED SETPOINT • ACTUAL SPEED • ACTUAL FREQUENCY • OUTPUT CURRENT • ACTIVE CURRENT • UNIT UTILIZATION • IPOS OUTPUT • RELATED TORQUE • IPOS OUTPUT 2
642	Operating mode AO1	OFF / -10 ... +10 V / 0 ... 20 mA / 4 ... 20 mA	
643	Analog output AO2	<b>OUTPUT CURRENT</b>	
644	Scaling AO2	-10 ... 0 ... 1 ... 10	
645	Operating mode AO2	OFF / -10 ... +10 V / 0 ... 20 mA / 4 ... 20 mA	
<b>7_</b>	<b>CONTROL FUNCTIONS</b>		
<b>70_</b>	<b>Operating modes</b>		
700	Operating mode 1	<b>VFC 1</b> VFC 1 & GROUP VFC 1 & HOIST VFC 1 & DC BRAK. VFC 1 & FLYSTART VFC n-CONTROL VFC-n-CTRL&GRP. VFC-n-CTRL&HOIST VFC-n-CTRL&SYNC VFC-n-CTRL& IPOS CFC CFC & M-CONTROL CFC&IPOS CFC&SYNC. SERVO SERVO&M-CONTROL SERVO&IPOS SERVO&SYNC.	
701	Operating mode 2	<b>VFC 2</b> VFC 2 & GROUP VFC 2 & HOIST VFC 2 & DC BRAK. VFC 2 & FLYSTART	
<b>71_</b>	<b>Standstill current</b>		
710 / 711	Standstill current 1 / 2	0 ... 50 % I <sub>Mot</sub>	
<b>72_</b>	<b>Setpoint stop function</b>		
720 / 723	Setpoint stop function 1 / 2	Off On	
721 / 724	Stop setpoint 1 / 2	0 ... 30 ... 500 1/min	
722 / 725	Start offset 1/2	0 ... 30 ... 500 1/min	
<b>73_</b>	<b>Brake function</b>		
730 / 733	Brake function 1/2	Off On	
731 / 734	Brake release time 1/2	0 ... 2 s	
732 / 735	Brake application time 1/2	0 ... 2 s	
<b>74_</b>	<b>Speed hide</b>		
740 / 742	Skip window center 1/2	0 ... 1500 ... 6000 1/min	
741 / 743	Skip width 1/2	0 ... 300 1/min	
<b>75_</b>	<b>Master/slave function</b>		
750	Slave setpoint	<b>MASTER-SLAVE OFF SPEED (RS485)</b> SPEED (SBus) SPEED (485+SBus) TORQUE (RS485) TORQUE (SBus) TORQUE(485+SBus) LOAD SHARE (RS485) LOAD SHARE (SBus) LOAD S.(485+SBus)	
751	Scaling slave setpoint	- 10 ... 0 ... 1 ... 10	
<b>76_</b>	<b>Manual operation</b>		
760	Locking Run/Stop keys	No Yes	



## Startup

### Complete parameter list

Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
<b>77_</b>	<b>Energy-saving function</b>		
770	Energy-saving function	Off On	
<b>78_</b>	<b>Ethernet configuration</b>		
780	IP address	000.000.000.000 ... <b>192.168.10.x</b> ... 223.255.255.255	
781	Subnetwork mask	000.000.000.000 ... <b>255.255.255.000</b> ... 223.255.255.255	
782	Standard gateway	<b>000.000.000.000</b> ... 223.255.255.255	
783	Baud rate	Display value that cannot be changed (0 ... 100 ... 1000 MBaud)	
784	MAC address	Display value that cannot be changed (00-0F-69-XX-XX-XX)	
785	EtherNet/IP startup configuration	<b>DHCP</b> Saved IP parameter	
<b>8_</b>	<b>UNIT FUNCTIONS</b>		
<b>80_</b>	<b>Setup</b>		
800	User menu	<b>ON</b> / OFF (only in DBG60B)	
801	Language	Dependent on DBG60B version	
\802	Factory setting	<b>No</b> Default standard Delivery condition	
\803	Parameter lock	<b>Off</b> On	
804	Reset statistics data	<b>NO</b> ERROR MEMORY kWh COUNTER OPERATING HOURS	
806	Copy DBG60B → MDX	YES / <b>NO</b>	Only in DBG60B
807	Copy MDX → DBG60B	YES / <b>NO</b>	Only in DBG60B
<b>81_</b>	<b>Serial communication</b>		
810	RS-485 address	<b>0</b> ... 99	
811	RS485 groupsaddress	<b>100</b> ... 199	
812	RS485 timeout delay	<b>0</b> ... 650 s	
819	Fieldbus timeout delay	0 ... <b>0.5</b> ... 650 s	
<b>82_</b>	<b>Brake operation</b>		
\820 / 821	4-quadrant operation 1/2	Off <b>On</b>	
<b>83_</b>	<b>Error responses</b>		
830	Response EXT. ERROR	<b>EMERG.STOP/FAULT</b>	<b>The following error responses can be programmed:</b> NO RESPONSE • DISPLAY FAULT • IMM. STOP/FAULT • EMERG.STOP/FAULT • RAPID STOP/FAULT • IMM. STOP/WARN. • EMERG.STOP/WARNG • RAPID STOP/WARNG
831	Response FIELDBUS TIMEOUT	<b>RAPID STOP/WARNG</b>	
832	Response MOTOR OVERLOAD	<b>EMERG.STOP/FAULT</b>	
833	Response RS485 TIMEOUT	<b>RAPID STOP/WARNG</b>	
834	LAG ERROR response	<b>EMERG.STOP/FAULT</b>	
\835	Response TF sensor SIGNAL	<b>NO RESPONSE</b>	
836 / 837	Response SBus TIMEOUT 1 / 2	<b>EMERG.STOP/FAULT</b>	
838	SW limit switch	<b>EMERG.STOP/FAULT</b>	With P831 "Response FIELDBUS-TIMEOUT", fault response "PADATA = 0/WARN." is also available.
<b>84_</b>	<b>Reset behavior</b>		
\840	Manual reset	<b>No</b> Yes	
841	Auto reset	<b>Off</b> On	
842	Restart time	1 ... <b>3</b> ... 30 s	
<b>85_</b>	<b>Scaling actual speed value</b>		
850	Scaling factor numerator	<b>1</b> ... 65535	Can only be set using MOVITOOLS®
851	Scaling factor denominator	<b>1</b> ... 65535	
852	User-defined unit	<b>1/min</b>	



Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
<b>86_</b>	<b>Modulation</b>		
860 / 861	PWM frequency 1 / 2 VFC	4 kHz 8 kHz 12 kHz 16 kHz	
862 / 863	PWM fix 1/2	Off On	
864	PWM frequency CFC	4 kHz 8 kHz 16 kHz	
<b>87_</b>	<b>Process data description</b>		
870	Setpoint description PO1	<b>CONTROL WORD 1</b>	<b>The following PO assignment can be set:</b> NO FUNCTION • SPEED • CURRENT • POSITION LO • MAX: SPEED • MAX: CURRENT • SLIP • RAMP • CONTROL WORD 1 • CONTROL WORD 2 • SPEED [%] • IPOS ΠA-ΔATA
871	Setpoint description PO2	<b>SPEED</b>	
872	Setpoint description PO3	<b>NO FUNCTION</b>	
873	Actual value description PI1	<b>STATUS WORD 1</b>	<b>The following PI assignment can be set:</b> NO FUNCTION • SPEED • OUTPUT CURRENT • ACTIVE CURR. • POSITION LO • POSITION HI • STATUS WORD 1 • STATUS WORD 2 • SPEED [%] • IPOS ΠI-DATA • RESERVED • STATUS WORD 3
874	Actual value description PI2	<b>SPEED</b>	
875	Actual value description PI3	<b>OUTPUT CURRENT</b>	
876	PO data enable	Off On	
<b>88_ / 89_</b>	<b>Serial communication SBus 1 / 2</b>		
880 / 890	Protocol SBus 1 / 2	<b>SBus MOVILINK</b> CANopen	
881 / 891	SBus address 1 / 2	0...63	
882 / 892	SBus 1 / 2 groupaddress	0...63	
883 / 893	SBus timeout delay 1 / 2	0...650 s	
884 / 894	Baud rate SBus 1 / 2	125 kbaud 250 kbaud <b>500 kbaud</b> 1000 kbaud	
885 / 895	Synchronization ID SBus 1 / 2	0...2047	
886 / 896	CANopen address 1 / 2	1...127	
887	Synchronization ext. Control	Off On	
888	Synchronization time SBus 1/2	1 ... 5 ... 10 ms	
889 / 899	Parameter channel 2	Yes No	
<b>9_</b>	<b>IPOS PARAMETERS</b>		
<b>90_</b>	<b>IPOS Reference travel</b>		
900	Reference offset	$-(2^{31}-1) \dots 0 \dots 2^{31}-1$ Inc	
901	Reference speed 1	0 ... <b>200</b> ... 6000 1/min	
902	Reference speed 2	0 ... <b>50</b> ... 6000 1/min	
903	Reference travel type	0 ... 8	
904	Reference travel to zero pulse	Yes No	
905	HIPERFACE® Offset X15	$-(2^{31}-1) \dots 0 \dots 2^{31}-1$ Inc	
910	Gain X controller	0.1 ... <b>0.5</b> ... 32	
911	Positioning ramp 1	0.01 ... 1 ... 20 s	
912	Positioning ramp 2	0.01 ... 1 ... 20 s	
913	Positioning speed CW	0 ... <b>1500</b> ... 6000 1/min	



Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
914	Positioning speed CCW	0 ... <b>1500</b> ... 6000 1/min	
915	Speed feedforward	-199.99 ... 0 ... <b>100</b> ... 199.99 %	
916	Ramp function	<b>LINEAR</b> SINE SQUARED BUS RAMP JERK LIMITED ELECTRONIC CAM SYNCHRONOUS OPERATION CROSS CUTTER	
917	Ramp mode	<b>MODE 1</b> MODE 2	
<b>92_</b>	<b>IPOS Monitoring</b>		
920	CW SW limit switch	- ( $2^{31}-1$ ) ... <b>0</b> ... $2^{31}-1$ Inc	
921	CCW SW limit switch	- ( $2^{31}-1$ )... <b>0</b> ... $2^{31}-1$ Inc	
922	Position window	0 ... <b>50</b> ... 32767 inc	
923	Lag error window	0 ... <b>5000</b> ... $2^{31}-1$ Inc	
<b>93_</b>	<b>IPOS Special functions</b>		
930	Override	ON / <b>OFF</b>	
931	IPOS CTRL word Task 1	<b>STOP</b> / START / HOLD	Only available in DBG60B, not in MOVITOOLS®/SHELL!
932	IPOS CTRL word Task 2	START / <b>STOP</b>	Only available in DBG60B, not in MOVITOOLS®/SHELL!
933	Jerk time	<b>0.005</b> ... 2 s	
938	IPOS speed task 1	<b>0</b> ... 9 additional commands/ms	
939	IPOS speed task 2	<b>0</b> ... 9 additional commands/ms	
<b>94_</b>	<b>IPOS Variables/encoder</b>		
940	IPOS variables edit	ON / <b>OFF</b>	This parameter is only available on the DBG60B keypad, not in MOVITOOLS®!
941	Source actual position	<b>Motor encoder (X15)</b> Ext. encoder (X14) Absolute encoder (DIP)	
942	Encoder factor numerator	<b>1</b> ... 32767	
943	Encoder factor denominator	<b>1</b> ... 32767	
944	Encoder scaling ext. Encoder	<b>x1/x2/x4/x8/x16/x32/x64</b>	Only with MOVITOOLS®. Not visible on the DBG60B keypad.
945	Synchronous encoder type (X14)	<b>TTL</b> SIN/COS HIPERFACE	
946	Synchronous encoder counting direction (X14)	<b>NORMAL</b> INVERTED	
947	HIPERFACE® Offset (X14)	- ( $2^{31}-1$ )... <b>0</b> ... $2^{31}-1$ Inc	
<b>95_</b>	<b>DIP</b>		
950	Encoder type	<b>NO ENCODER</b>	
951	Counting direction	<b>NORMAL</b> INVERTED	
952	Cycle frequency	<b>1</b> ... 200 %	
953	Position offset	- ( $2^{31}-1$ )... <b>0</b> ... $2^{31}-1$ Inc	
954	Zero point offset	- ( $2^{31}-1$ )... <b>0</b> ... $2^{31}-1$ Inc	
955	Encoder scaling	<b>x1/x2/x4/x8/x16/x32/x64</b>	
<b>96_</b>	<b>IPOS Modulo function</b>		
960	Modulo function	<b>OFF</b> SHORT CW CCW	
961	Modulo numerator	0 ... <b>1</b> ... $2^{31}-1$	
962	Modulo denominator	0 ... <b>1</b> ... $2^{31}-1$	
963	Modulo encoder resolution	0 ... <b>4096</b> ... 20000	



Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
97_	<b>IPOS synchronization</b>		
970	DRAM synchronization	<b>NO</b> / YES	
971	Synchronization phase	-2 ... <b>0</b> ...2 ms	



## 11 Operation

### 11.1 Operating displays

#### 7-segment display

The 7-segment display shows the operating condition of MOVIDRIVE® and, in the event of a fault, a fault or warning code.

7-segment display	Unit status (high byte in status word 1)	Meaning
0	0	24 V operation (inverter not ready)
1	1	Controller inhibit active
2	2	No enable
3	3	Standstill current
4	4	Enable
5	5	n-control (speed control)
6	6	M-control (torque control)
7	7	Hold control
8	8	Factory setting
9	9	Limit switch contacted
A	10	Technologieoption
b	-	Unassigned
c	12	IPOS <sup>plus</sup> ® reference travel
d	13	Flying start
E	14	Adjust encoder
F	11	Fault display (flashing)
H	-	Manual operation
t	16	Inverter is waiting for data
U	17	"Safe Stop" active
• (blinking dot)	-	IPOS <sup>plus</sup> ® program is running
Flashing display	-	STOP via DBG60B



#### **! WARNING!**

Incorrect interpretation of display U = "Safe stop" active.

Severe or fatal injuries.

**The display U = "Safe stop" active is not safety-related and may not be used as a safety function!**



**DBG60B keypad**

**Basic displays:**

0.00rpm  
0.000Amp  
CONTROLLER INHIBIT

Display when X13:1 (DIØØ "/CONTROLLER INHIBIT") = "0".

0.00rpm  
0.000Amp  
NO ENABLE

Display for X13:1 (DIØØ "/CONTROLLER INHIBIT") = "1" and disabled inverter ("ENABLE/STOP" = "0").

950.00rpm  
0.990Amp  
ENABLE (VFC)

Display for enabled inverter.

NOTE 6:  
VALUE TOO HIGH

Information message

(DEL)=Quit  
ERROR 9  
STARTUP PARAMET.

Error display

**11.2 Information messages**

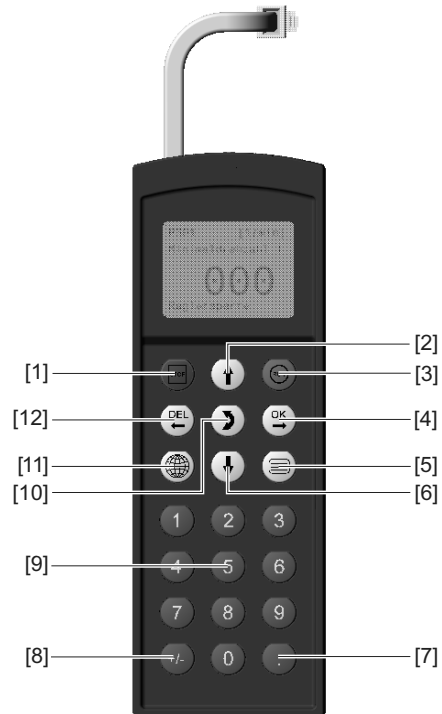
Information messages on the DBG60B (ca. 2 s long) or in MOVITOOLS®/SHELL (message can be acknowledged):

No.	Text in DBG60B/SHELL	Description
1	ILLEGAL INDEX	Index addressed via interface not available.
2	NOT IMPLEMENT.	<ul style="list-style-type: none"> <li>Attempt to execute a function that is not implemented.</li> <li>An incorrect communication service has been selected.</li> <li>Manual operation selected via invalid interface (e.g. fieldbus).</li> </ul>
3	READ ONLY VALUE	Attempt to modify a read only value.
4	PARAM. LOCKED	Parameter lock P803 = "ON", Parameter cannot be altered.
5	SETUP ACTIVE	Attempt to change parameters when factory setting is active.
6	VALUE TOO HIGH	Attempt to enter a value that is too high.
7	VALUE TOO LOW	Attempt to enter a value that is too low.
8	REQ. CARD MISSING	The option card required for the selected function is missing.
-		
10	ONLY VIA ST1	Manual mode must be exited via X13:ST11/ST12 (RS485).
11	ONLY TERMINAL	Manual mode must be exited via TERMINAL (DBG60B or UWS21B).
12	NO ACCESS	Access to selected parameter denied.
13	CTRL. INHIBIT MISSING	Set terminal DIØØ "/Controller inhibit" = "0" for the selected function.
14	INVALID VALUE	Attempt to enter an invalid value.
--		
16	PARAM. NOT SAVED	Overflow of EEPROM buffer, e.g. through cyclic write access. Parameter not stored in non-volatile EEPROM.
17	INVERTER ENABLED	<ul style="list-style-type: none"> <li>Parameter to be changed can only be set in the state "CONTROLLER INHIBIT."</li> <li>Attempt to change to manual mode during live operation</li> </ul>



### 11.3 Functions of the DBG60B keypad

#### Key assignments for DBG60B



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- |      |             |  |
|------|-------------|--|
| [1]  | Key         | Stop   |
| [2]  | Key         | Up arrow, moves up to the next menu item     |
| [3]  | Key         | Start  |
| [4]  | Key         | OK, confirms the entry                       |
| [5]  | Key         | Activate the context menu                    |
| [6]  | Key         | Down arrow, moves down to the next menu item |
| [7]  | Key         | Decimal point                                |
| [8]  | Key         | Sign reversal                                |
| [9]  | Key 0 ... 9 | Digits 0 ... 9                               |
| [10] | Key         | Change menu                                  |
| [11] | Key         | Select language                              |
| [12] | Key         | Delete previous entry                        |

#### Copy function of DBG60B

The DBG60B keypad can be used to copy complete parameter sets from one MOVIDRIVE® unit to other MOVIDRIVE® units. Proceed as follows:

- In the context menu, select the "COPY TO DBG" menu item. Confirm the setting using the key.
- After the copying process has finished, plug the keypad in the other inverter.
- In the context menu, select the "COPY TO MDX" menu item. Confirm the setting using the key.



**Parameter mode**

Proceed as follows to set the parameters in parameter mode:

1. Activate the context menu by pressing the key. The first menu item is "PARAMETER MODE".
2. Press the key to start the PARAMETER MODE. The first display parameter P000 "SPEED" appears. Use the key or the key to select the main parameter groups 0 to 9.
3. Use the key or the key to select the required main parameter group. The flashing cursor is positioned under the number of the main parameter group.
4. Activate parameter subgroup selection in the main parameter group by pressing the key. The flashing cursor moves one position to the right.
5. Use the key or the key to select the required parameter subgroup. The flashing cursor is positioned under the number of the parameter subgroup.
6. Activate parameter selection in the required parameter subgroup by pressing the key. The flashing cursor moves one position to the right.
7. Use the key or the key to select the desired parameter. The flashing cursor is positioned under the third digit of the parameter number.
8. Press the key to activate the setting mode for the selected parameter. The cursor is positioned under the parameter value.
9. Use the key or the key to select the desired parameter value.
10. Confirm the setting using the key. Exit the setting mode by pressing the key. The flashing cursor is positioned under the third digit of the parameter number again.
11. Use the key or the key to select another parameter or go back to the parameter subgroup menu using the key.
12. Use the key or the key to select another parameter subgroup or go back to the main parameter group menu using the key.
13. Use the key to return to the context menu.

```
PARAMETER MODE
VARIABLE MODE
BASIC VIEW
```

```
P 000          rpm
SPEED
                +0.0
CONTROLLER INHIBIT
```

```
P 1.. SETPOINTS/
RAMP GENERATORS
CONTROLLER INHIBIT
```

```
P 1.. SETPOINTS/
RAMP GENERATORS
CONTROLLER INHIBIT
```

```
\ 13. SPEED
RAMPS 1
CONTROLLER INHIBIT
```

```
\ 13. SPEED
RAMPS 1
CONTROLLER INHIBIT
```

```
\ 132          s
T11 UP CCW
                +0.13
CONTROLLER INHIBIT
```

```
\ 132          s
T11 UP CCW
                +0.13_
CONTROLLER INHIBIT
```

```
\ 132          s
T11 UP CCW
                +0.20_
CONTROLLER INHIBIT
```

```
\ 132          s
T11 UP CCW
                +0.20
CONTROLLER INHIBIT
```

```
\ 13. SPEED
RAMPS 1
CONTROLLER INHIBIT
```

```
P 1.. SETPOINTS/
RAMP GENERATORS
CONTROLLER INHIBIT
```

```
PARAMETER MODE
VARIABLE MODE
BASIC VIEW
```






## Operation

### Functions of the DBG60B keypad


#### **Variable mode**

H... variables are displayed in the variable mode. To call up the variable mode, proceed as follows:

- Use the  key to call up the context menu. Select the "VARIABLE MODE" menu item and use the  key. The variable mode display appears.
- You can use the  to edit the variables.





#### **User menu**

The DBG60B keypad has a standard user menu containing the parameters that are used most often. The parameters in the user menu are displayed with a "\" before the parameter number (→ Sec. "Complete parameter list"). You can add or delete parameters. You can save a maximum of 50 parameter entries. The parameters are displayed in the order in which they are stored in the inverter. The parameters are not sorted automatically.

- Use the  key to call up the context menu. Select the "USER MENU" menu item and confirm your entry by pressing OK. The user menu with the most frequently used parameters appears.





#### **Adding parameters to the user menu**

Proceed in this order to add parameters to the user menu:

- Use the  key to call up the context menu. Select the "PARAMETER MODE" menu item.
- Choose the parameter you require and confirm your entry using the  key.
- Use the  key to return to the context menu. In the context menu, select the "ADD Pxxx" menu item. "xxx" is the parameter you selected previously. Confirm the setting using the  key. The selected parameter is stored in the user menu.

#### **Deleting parameters from the user menu**

Proceed in this order to delete parameters from the user menu:

- Use the  key to call up the context menu. Select the "USER MODE" menu item.
- Select the parameter that is to be deleted. Confirm the setting using the  key.
- Use the  key to return to the context menu. In the context menu, select the "DELETE Pxxx" menu item. "xxx" is the parameter you selected previously. Confirm the setting using the  key. The selected parameter is deleted from the user menu.

#### **Wake-up parameters**

The wake up parameter is the parameter that is displayed when the DBG60B is switched on. The factory setting for the wake up parameter is the basic display. You can select which parameter should be the wake up parameter. The following options can be used as the wake up parameter:

- Parameter (→ Parameter mode)
- Parameter from the user menu (→ User menu)
- H variable (→ Variable mode)
- Basic display



Proceed as follows to save a wake-up parameter:

- First select the required parameter in parameter mode.
- In the context menu, select the "XXXX WAKE-UP PARAM." menu item. "XXXX" is the selected wake up parameter. Confirm the setting using the key.

**IPOS<sup>plus</sup>**

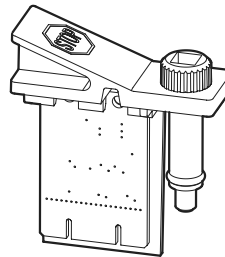
MOVITOOLS<sup>®</sup> is required to program IPOS<sup>plus</sup>. You can only use the DBG60B keypad to edit or change IPOS<sup>plus</sup> variables (H\_\_).

The IPOS<sup>plus</sup> program is also stored in the DBG60B keypad when it is saved and is consequently also transferred when the parameter set is copied to another MOVIDRIVE<sup>®</sup> unit.

Parameter P931 can be used to start and stop the IPOS<sup>plus</sup> program from the DBG60B keypad.

**11.4 Memory card**

The pluggable memory card is installed in the basic unit. The basic data is stored on the memory card and is always up-to-date. If a unit has to be replaced, the system/machine can be operated again quickly without a PC and data backup simply by replugging the memory card. You can install as many option cards as required.



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Figure 159: MDX60B/61B memory card

**Notes on replacing the memory card**

- Only plug in the memory card when the MOVIDRIVE<sup>®</sup> B unit is switched off.
- You can install the memory card from the original unit in a new inverter. The following combinations are permitted:

Original unit: MOVIDRIVE <sup>®</sup> MDX60B/61B...	New inverter: MOVIDRIVE <sup>®</sup> MDX60B/61B...
00	00 or 0T
0T	0T

- The same options that were available in the original unit must be installed in the new inverter.

If this is not the case, the error message "79 HW configuration" (hardware configuration) appears. You can remedy the error by calling up the "DELIVERY CONDITION" menu item (P802 factory setting) from the context menu. This resets the unit to its initial delivery condition. You must then restart the unit.

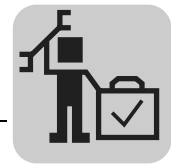


## Operation

### Memory card

---

- Counter status and data of the DRS11B and DHP11B options are not saved on the memory card. When you replace the memory card, you have to install the DRS11B and DHP11B option cards from the original unit in the new inverter.  
If the original unit was a MOVIDRIVE® B size 0 unit with the option DHP11, you have to use a new DHP11B option card with the configuration data set (file name.sew-copy) that you saved previously.
- If an absolute encoder is used as a motor or synchronous encoder, you must reference the encoder after you have replaced the unit.



## 12 Service

### 12.1 Fault information

**Fault memory** The error memory (P080) stores the last five error messages (errors t-0 to t-4). The oldest fault message is deleted whenever more than five fault messages have occurred. The following information is stored when a malfunction occurs:

Fault that occurred • Status of binary inputs/outputs • Operating status of the inverter • Inverter status • Heat sink temperature • Speed • Output current • Active current • Unit utilization • DC link voltage • ON hours • Enable hours • Parameter set • Motor utilization.

**Switch-off responses** There are three switch-off responses depending on the fault; the inverter remains inhibited in fault status:

**Immediate stop** The unit can no longer brake the drive; the output stage goes to high resistance in the event of a fault and the brake is applied immediately (DBØØ "/Brake" = "0").

**Rapid stop** The drive is braked with the stop ramp t13/t23. The brake is applied once the stop speed is reached (DBØØ "/Brake" = "0"). The output stage goes to high resistance after the brake reaction time has elapsed (P732 / P735).

**Emergency stop** The drive is braked with the emergency ramp t14/t24. The brake is applied once the stop speed is reached (DBØØ "/Brake" = "0"). The output stage goes to high resistance after the brake reaction time has elapsed (P732 / P735).

**Reset** An error message can be acknowledged by:

- Switching the supply system off and on again  
Recommendation: Observe a minimum switch-off time of 10 s for the supply system contactor K11.
- Reset via input terminals; that is, via an appropriately assigned binary input (DIØ1 to DIØ7 with the basic unit, DI1Ø to DI17 with the DIO11B option).
- Manual reset in SHELL (P840 = "YES" or [Parameter] / [Manual reset]).
- Manual reset using the DBG60B.
- Auto reset performs up to five unit resets with an adjustable restart time.

	<p><b>! DANGER!</b></p>
	<p>Risk of crushing if the motor starts up automatically after an auto reset. Severe or fatal injuries.</p> <ul style="list-style-type: none"> <li>• Do not use auto reset with drives where an automatic restart represents a danger to people or units.</li> <li>• Perform a manual reset.</li> </ul>

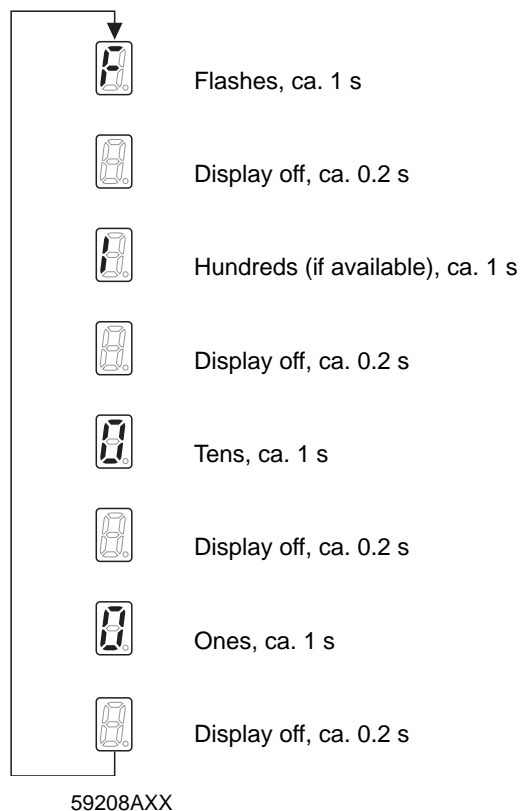
**Inverter is waiting for data** If the inverter is controlled via a communication interface (fieldbus, RS485 or SBus) and the power was switched off and back on again or a fault reset was performed, then the enable remains ineffective until the inverter receives valid data again via the interface, which is monitored with a timeout.



### 12.2 Fault messages and list of faults

#### Fault message in 7-segment display

The fault code is shown in a 7-segment display. The following display sequence is used (e.g. fault code 100):



Following a reset or if the fault code resumes the value "0", the display switches to the operating display.

#### Fault list

A dot in the "P" column indicates that the response is programmable (P83\_ Fault response). The factory set error response appears in the "Response" column.

Fault code	Name	Response	P	Possible cause	Measure
00	No error	-			
01	over-current	Immediate shut-off		<ul style="list-style-type: none"> <li>Short circuit output</li> <li>Motor too large</li> <li>Defective output stage</li> <li>Ramp limit is deactivated and set ramp time is too short</li> </ul>	<ul style="list-style-type: none"> <li>Rectify the short circuit</li> <li>Connect a smaller motor</li> <li>Contact SEW Service if the output stage is defective</li> <li>Activate P138 and/or increase ramp time</li> </ul>
03	Ground fault in the motor lead	Immediate shut-off		ground fault <ul style="list-style-type: none"> <li>In the motor lead</li> <li>in the inverter</li> <li>in the motor</li> </ul>	<ul style="list-style-type: none"> <li>Eliminate ground fault</li> <li>Consult SEW Service</li> </ul>
04	Brake chopper	Immediate switch-off		<ul style="list-style-type: none"> <li>Too much regenerative power</li> <li>Braking resistor circuit interrupted</li> <li>Short circuit in the braking resistor circuit</li> <li>Brake resistor has too high resistance</li> <li>Brake chopper is defective</li> </ul>	<ul style="list-style-type: none"> <li>Extend deceleration ramps</li> <li>Check supply cable to braking resistor</li> <li>Check technical data of braking resistor</li> <li>Install a new MOVIDRIVE® unit if the brake chopper is defective</li> </ul>
06	Mains phase failure	Immediate shut-off		Phase failure	Check the supply system lead



Fault code	Name	Response	P	Possible cause	Measure
07	U <sub>Z</sub> overvoltage	Immediate switch-off		DC link voltage too high	<ul style="list-style-type: none"> <li>Extend deceleration ramps</li> <li>Check supply cable to the braking resistor</li> <li>Check technical data of braking resistor</li> </ul>
08	n-monitoring	Immediate switch-off		<ul style="list-style-type: none"> <li>Speed controller or current controller (in VFC operating mode without encoder) operating at setting limit due to mechanical overload or phase failure in the power supply or motor.</li> <li>Encoder not connected correctly or incorrect direction of rotation.</li> <li>n<sub>max</sub> is exceeded during torque control.</li> <li>In operating mode VFC: Output frequency ≥ 150 Hz</li> <li>In operating mode U/f: Output frequency ≥ 600 Hz</li> </ul>	<ul style="list-style-type: none"> <li>Reduce load</li> <li>Increase deceleration time setting (P501 or P503).</li> <li>Check encoder connection, swap A/A and B/B pairs if necessary</li> <li>Check the voltage supply of the encoder</li> <li>Check current limitation</li> <li>Extend ramps if necessary</li> <li>Check motor cable and motor</li> <li>Check mains phases</li> </ul>
09	Startup	Immediate switch-off		Inverter has not been taken into operation for the selected operating mode.	Perform startup for the required operating mode.
10	IPOS-ILLOP	Emergency stop		<ul style="list-style-type: none"> <li>Incorrect command detected during running of IPOS<sup>plus</sup>® program.</li> <li>Incorrect conditions during command execution.</li> </ul>	<ul style="list-style-type: none"> <li>Check the content of the program memory and, if necessary, correct.</li> <li>Load the correct program into the program memory.</li> <li>Check program sequence (→ IPOS<sup>plus</sup>® manual)</li> </ul>
11	Excessive temperature	Emergency stop		<ul style="list-style-type: none"> <li>Thermal overload of inverter</li> </ul>	Reduce load and/or ensure adequate cooling.
13	Control signal source	Immediate switch-off		Control signal source not defined or defined incorrectly.	Set correct control signal source (P101).
14	Encoder	Immediate switch-off		<ul style="list-style-type: none"> <li>Encoder cable or shield not connected correctly</li> <li>Short circuit/broken encoder wire</li> <li>Encoder defective</li> </ul>	Check encoder cable and shield for correct connection, short circuit and broken wire.
17-24	System error	Immediate switch-off		Inverter electronics disrupted, possibly due to effect of EMC.	Check ground connections and shielding and correct, if necessary. Contact SEW service if this error occurs again.
25	EEPROM	Rapid stop		Access to the EEPROM of the memory card has failed	<ul style="list-style-type: none"> <li>Activate factory settings, perform reset and reset parameters.</li> <li>Contact SEW service if the error occurs again.</li> <li>Replace memory card.</li> </ul>
26	External terminal	Emergency stop		<ul style="list-style-type: none"> <li>Read in external error signal via programmable input.</li> </ul>	Eliminate specific cause of error; reprogram terminal if necessary.
27	No limit switches	Emergency stop		<ul style="list-style-type: none"> <li>Open circuit/both limit switches missing.</li> <li>Limit switches are swapped over in relation to direction of rotation of motor</li> </ul>	<ul style="list-style-type: none"> <li>Check wiring of limit switches.</li> <li>Swap over limit switch connections.</li> <li>Reprogram terminals</li> </ul>
28	Fieldbus Timeout	Rapid stop		No communication between master and slave within the projected response monitoring.	<ul style="list-style-type: none"> <li>Check the communication routine of the master</li> <li>Extend fieldbus timeout time (P819)/deactivate monitoring</li> </ul>
29	Limit switch contacted	Emergency stop		A limit switch was reached in IPOS <sup>plus</sup> ® operating mode.	<ul style="list-style-type: none"> <li>Check travel range.</li> <li>Correct user program.</li> </ul>
30	Emergency stop Timeout	Immediate switch-off		<ul style="list-style-type: none"> <li>Drive overloaded</li> <li>Emergency stop ramp too short.</li> </ul>	<ul style="list-style-type: none"> <li>Check project planning</li> <li>Extend emergency stop ramp</li> </ul>
31	TF/TH trip	No response		<ul style="list-style-type: none"> <li>Motor too hot, TF/TH has triggered</li> <li>TF/TH of the motor not connected or connected incorrectly</li> <li>Connection between MOVIDRIVE<sup>®</sup> and TF/TH on motor interrupted</li> </ul>	<ul style="list-style-type: none"> <li>Let motor cool down and reset error</li> <li>Check connection between MOVIDRIVE<sup>®</sup> and TF/TH.</li> <li>If a TF/TH is not connected: Jumper X10:1 with X10:2.</li> <li>Set P835 to "NO RESPONSE"</li> </ul>
32	IPOS Index overflow	Emergency stop		Programming principles violated leading to system internal stack overflow	Check and correct the IPOS <sup>plus</sup> ® user program (→ IPOS <sup>plus</sup> ® manual).
33	Setpoint source	Immediate switch-off		Setpoint source not defined or defined incorrectly	Set correct setpoint source (P100).
34	Ramps Timeout	Immediate switch-off		Time of downward ramps exceeded, e.g. due to overload.	<ul style="list-style-type: none"> <li>Extend the downwards ramps</li> <li>Eliminate overload</li> </ul>



## Service

### Fault messages and list of faults

Fault code	Name	Response	P	Possible cause	Measure
35	Operating mode	Immediate switch-off		<ul style="list-style-type: none"> <li>Operating mode not defined or defined incorrectly</li> <li>P916 was used to set a ramp function that is needed by a MOVIDRIVE® unit in technology version.</li> <li>P916 was used to set a ramp function that does not match the selected technology function.</li> <li>P916 was used to set a ramp type that does not match the selected synchronization time (P888).</li> </ul>	<ul style="list-style-type: none"> <li>Use P700 or P701 to set the correct operating mode.</li> <li>Use MOVIDRIVE® in technology version (.OT).</li> <li>From the "Startup → Select technology function..." menu, select the technology function that matches P916</li> <li>Check the settings of P916 and P888</li> </ul>
36	Option missing	Immediate switch-off		<ul style="list-style-type: none"> <li>Type of option card not allowed.</li> <li>Setpoint source, control signal source or operating mode not permitted for this option card.</li> <li>Incorrect encoder type set for DIP11B.</li> </ul>	<ul style="list-style-type: none"> <li>Use correct option card.</li> <li>Set correct setpoint source (P100).</li> <li>Set correct control signal source (P101).</li> <li>Set the correct operating mode (P700 or P701).</li> <li>Set the correct encoder type.</li> </ul>
37	System watchdog	Immediate switch-off		Error during execution of system software	Contact SEW Service.
38	System software	Immediate switch-off		System error	Contact SEW Service.
39	Reference travel	Immediate switch-off		<ul style="list-style-type: none"> <li>The reference cam is missing or does not switch</li> <li>Limit switches are connected incorrectly</li> <li>Reference travel type was changed during reference travel</li> </ul>	<ul style="list-style-type: none"> <li>Check reference cam</li> <li>Check limit switch connection</li> <li>Check reference travel type setting and required parameters.</li> </ul>
40	Boot synchronization	Immediate switch-off		<b>Only with DIP11B or DRS11B:</b> Error during boot synchronization between inverter and option.	Install a new option card if this fault reoccurs.
41	Watchdog option IPOS watchdog	Immediate switch-off		<ul style="list-style-type: none"> <li>Error in communication between system software and option software.</li> <li>Watchdog in the IPOS program.</li> <li>An application module without the application version has been loaded in a MOVIDRIVE® B unit</li> <li>The wrong technology function has been set if an application module is used</li> </ul>	<ul style="list-style-type: none"> <li>Contact SEW Service.</li> <li>Check IPOS program</li> <li>Check whether the unit has been activated for the application version (P079)</li> <li>Check the selected technology function (P078)</li> </ul>
42	Lag error	Immediate switch-off		<ul style="list-style-type: none"> <li>Encoder connected incorrectly</li> <li>Acceleration ramps too short</li> <li>P component of positioning controller too small</li> <li>Incorrectly set speed controller parameters</li> <li>Value of lag fault tolerance too small</li> </ul>	<ul style="list-style-type: none"> <li>Check encoder connection</li> <li>Extend ramps</li> <li>Set P component to higher value</li> <li>Reset speed controller parameters</li> <li>Increase lag fault tolerance</li> <li>Check encoder wiring, motor and mains phase wiring.</li> <li>Check whether mechanical system components can move freely or if they are blocked</li> </ul>
43	RS485 Timeout	Rapid stop		Error during communication via interface RS485	Check RS485 connection (e.g. inverter - PC, inverter - DBG60B). If necessary, contact SEW Service.
44	Unit utilization	Immediate switch-off		Unit utilization (IxT value) > 125 %	<ul style="list-style-type: none"> <li>Decrease power output</li> <li>Extend ramps</li> <li>If proposed actions are not possible, use larger inverter.</li> <li>Reduce load</li> </ul>
45	Initialization	Immediate switch-off		<ul style="list-style-type: none"> <li>No parameters set for EEPROM in power section, or parameters set incorrectly.</li> <li>Option card not in contact with backplane bus.</li> </ul>	<ul style="list-style-type: none"> <li>Restore factory settings Consult SEW Service if the fault still cannot be reset.</li> <li>Insert the option card correctly.</li> </ul>
46	System bus 2 timeout	Rapid stop		Fault during communication via system bus 2.	Check system bus connection.
47	System bus 1 timeout	Rapid stop		Fault during communication via system bus 1.	Check system bus connection.



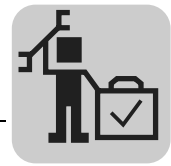
Fault code	Name	Response	P	Possible cause	Measure
48	Hardware DRS	Immediate switch-off		<b>Only with DRS11B:</b> <ul style="list-style-type: none"> <li>Encoder signal from master/synchronous encoder faulty.</li> <li>Hardware required for synchronous operation is faulty.</li> </ul>	<ul style="list-style-type: none"> <li>Check encoder signals of master/synchronous encoder.</li> <li>Check encoder wiring.</li> <li>Install a new synchronous operation board.</li> </ul>
77	IPOS <sup>plus</sup> ® control word	No response		<b>Only in IPOS<sup>plus</sup>® operating mode:</b> <ul style="list-style-type: none"> <li>An attempt was made to set an invalid automatic mode (via external controller).</li> <li>P916 = BUS RAMP is set.</li> </ul>	<ul style="list-style-type: none"> <li>Check serial connection to external control.</li> <li>Check write values of external control.</li> <li>Set correct value for P916.</li> </ul>
78	IPOS <sup>plus</sup> ® SW limit switches	No response		<b>Only in IPOS<sup>plus</sup>® operating mode:</b> <ul style="list-style-type: none"> <li>Programmed target position is outside travel range delimited by software limit switches.</li> </ul>	<ul style="list-style-type: none"> <li>Check the user program</li> <li>Check position of the software limit switches</li> </ul>
79	HW configuration (hardware configuration)	Immediate stop		The following items do not match anymore after having replaced the memory card: <ul style="list-style-type: none"> <li>Power</li> <li>Rated voltage</li> <li>Variant identification</li> <li>Unit series</li> <li>Technology or standard version</li> <li>Option cards</li> </ul>	Ensure identical hardware or restore factory setting (parameter = factory setting).
80	RAM test	Immediate switch-off		Internal unit fault, RAM defective.	Contact SEW Service.
81	Start condition	Immediate switch-off		<b>Only in "VFC hoist" operating mode:</b> The motor could not be supplied with the correct amount of current during the pre-magnetizing time: <ul style="list-style-type: none"> <li>Rated motor power too small in relation to rated inverter power.</li> <li>Motor cable cross section too small.</li> </ul>	<ul style="list-style-type: none"> <li>Check startup data and perform new startup, if necessary.</li> <li>Check connection between inverter and motor.</li> <li>Check cross section of motor cable and increase if necessary.</li> </ul>
82	Open output	Immediate switch-off		<b>Only in "VFC hoist" operating mode:</b> <ul style="list-style-type: none"> <li>Two or all output phases interrupted.</li> <li>Rated motor power too small in relation to rated inverter power.</li> </ul>	<ul style="list-style-type: none"> <li>Check connection between inverter and motor.</li> <li>Check startup data and perform new startup, if necessary.</li> </ul>
84	Motor protection	Emergency stop		<ul style="list-style-type: none"> <li>Motor utilization too high.</li> <li>I<sub>N</sub>-U<sub>L</sub> monitoring 1 triggered</li> <li>P530 set later to "KTY"</li> </ul>	<ul style="list-style-type: none"> <li>Reduce load.</li> <li>Extend ramps.</li> <li>Observe longer pause times.</li> <li>Check P345/346</li> <li>Select a larger motor</li> </ul>
86	Memory module	Immediate switch-off		<ul style="list-style-type: none"> <li>No memory card</li> <li>Memory card defective</li> </ul>	<ul style="list-style-type: none"> <li>Tighten knurled screw</li> <li>Insert and secure memory card</li> <li>Replace memory card</li> </ul>
87	Technology function	Immediate switch-off		A technology function was activated in a standard version.	Disable technology function
88	Flying start	Immediate switch-off		<b>Only in VFC n-CTRL operating mode:</b> Actual speed > 6000 1/min when inverter enabled.	Inverter not enabled before actual speed is ≤ 6000 1/min.
92	DIP encoder problem	Fault display		Encoder signals a fault	Possible cause: Encoder is dirty → clean encoder
93	DIP encoder fault	Emergency stop		<b>Only with DIP11B option:</b> The encoder signals a fault, e.g. power failure: <ul style="list-style-type: none"> <li>Connection cable between encoder and DIP does not meet the requirements (twisted pair, shielded).</li> <li>Cycle frequency for cable length too high.</li> <li>Permitted max. speed/acceleration of encoder exceeded.</li> <li>Encoder defective.</li> </ul>	<ul style="list-style-type: none"> <li>Check absolute encoder connection.</li> <li>Check connection cables.</li> <li>Set correct cycle frequency.</li> <li>Reduce maximum traveling velocity or ramp.</li> <li>Install new absolute encoder.</li> </ul>
94	EEPROM checksum	Immediate switch-off		Inverter electronics disrupted, possibly due to effect of EMC or a defect.	Send unit in for repair.



## Service

### Fault messages and list of faults

Fault code	Name	Response	P	Possible cause	Measure
95	DIP plausibility error	Emergency stop		<b>Only with DIP11B option:</b> No plausible position could be determined. <ul style="list-style-type: none"> <li>• Incorrect encoder type set.</li> <li>• IPOS<sup>plus</sup>® travel parameter set incorrectly.</li> <li>• Numerator/denominator factor set incorrectly.</li> <li>• Zero adjustment performed.</li> <li>• Encoder defective.</li> </ul>	<ul style="list-style-type: none"> <li>• Set the correct encoder type.</li> <li>• Check IPOS<sup>plus</sup>® travel parameters.</li> <li>• Check traveling velocity.</li> <li>• Correct numerator/denominator factor.</li> <li>• After zero adjustment reset.</li> <li>• Install new absolute encoder.</li> </ul>
97	Copy data	Immediate switch-off		<ul style="list-style-type: none"> <li>• Memory card cannot be written or read.</li> <li>• Error during data transmission</li> </ul>	<ul style="list-style-type: none"> <li>• Repeat copying process</li> <li>• Restore default setting (P802) and repeat copying process</li> </ul>
98	CRC error flash	Immediate switch-off		Internal unit fault Flash memory defective	Send unit in for repair.
99	IPOS ramp calculation error	Immediate switch-off		<b>Only in IPOS<sup>plus</sup>® operating mode:</b> Positioning ramp is sinusoidal or square and an attempt is made to change ramp times and traveling velocities with enabled inverter.	Rewrite the IPOS <sup>plus</sup> ® program so that ramp times and traveling velocities can only be altered when the inverter is inhibited.
100	Vibration/Warning	Display fault		• Vibration sensor warns (→ operating instructions for "DUV10A")	Determine cause of vibrations. Continue operation until F101 occurs.
101	Vibration fault	Rapid stop		• Vibration sensor reports fault	SEW-EURODRIVE recommends that you remedy the cause of the vibrations immediately
102	Oil aging/warning	Display fault		• Oil aging sensor warns	Schedule oil change
103	Oil aging/fault	Display fault		• Oil aging sensor reports fault	SEW-EURODRIVE recommends that you change the gear unit oil immediately.
104	Oil aging/over-temperature	Display fault		• Oil aging sensor reports overtemperature	<ul style="list-style-type: none"> <li>• Let oil cool down</li> <li>• Check if the gear unit cools properly</li> </ul>
105	Oil aging/ready message	Display fault		• Oil aging sensor is not ready for operation	<ul style="list-style-type: none"> <li>• Check the voltage supply of the oil aging sensor</li> <li>• Check and, if necessary, replace the oil aging sensor</li> </ul>
106	Brake wear	Display fault		• Brake lining worn down.	Change brake lining (→ operating instructions for "Motors")



### 12.3 SEW Electronics Service

**Send in for repair** Please contact the **SEW-EURODRIVE electronics service** if a fault cannot be rectified (→ "Customer and spare parts service").

When contacting SEW electronics service, always quote the digits on the status label so that our service personnel can assist you more effectively.

**Please provide the following information when sending the unit in for repair:**

- Serial number (→ nameplate)
- Unit designation
- Standard version or application version
- Digits on the status label
- Short description of application (drive application, control via terminals or serial)
- Connected motor (motor type, motor voltage,  $\Delta$  or  $\Delta$  connection)
- Nature of the error
- Accompanying circumstances
- Your own presumptions as to what has happened
- Any unusual events preceding the problem, etc.

### 12.4 Extended storage

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

**Procedure when maintenance has been neglected:**

Electrolytic capacitors are used in the inverters. They are subject to aging effects when deenergized. This effect can damage the capacitors if the unit is connected using the rated voltage after a longer period of storage.

If you have not performed maintenance regularly, SEW-EURODRIVE recommends that you increase the supply voltage slowly up to the maximum voltage. This can be done, for example, by using a variable transformer for which the output voltage has been set according to the following overview. We recommend that you increase the voltage from 0 V to the first stage after a few seconds.

The following stages are recommended:

AC 400/500 V units:

- Stage 1: AC 350 V for 15 minutes
- Stage 2: AC 420 V for 15 minutes
- Stage 3: AC 500 V for 1 hour

AC 230 V units:

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

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



### **12.5 Disposal**

Please follow the current regulations. Dispose of the individual materials separately in accordance with the regulations in force, for example as:

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



## 13 Abbreviation Key and Index

### 13.1 Abbreviation key

$\cos\varphi$	Power factor of motor	
$f_{\text{Netz}}$	Mains frequency	[Hz]
$h$	Installation altitude	[m above sea level]
$\eta$	Efficiency	
$I_d$	Magnetization current	[A]
$I_{\text{Netz}}$	Input current, mains current	[A]
$I_F$	Trip current	[A]
$I_N$	Rated current	[A]
$I_D$	Continuous output current	[A]
$I_q$	Torque-forming current	[A]
$I_{\text{ges}}$	Total current	[A]
IP..	Degree of protection	
$i_{\text{tot}}$	Gear ratios in total	
$\vartheta_{\text{Um}}g$	Ambient temperature	[°C]
$J_{\text{Last}}$	Mass moment of inertia to be driven	[kgm <sup>2</sup> ]
$J_{\text{Mot}}$	Mass moment of inertia of the motor	[kgm <sup>2</sup> ]
$J_X$	Mass moment of inertia reduced to the motor shaft	[kgm <sup>2</sup> ]
$k_T$	Torque constant	[Nm/A]
$n_A$	Output speed	[1/min]
$n_{\text{Eck}}$	Transition speed	[1/min]
$n_E$	Input speed	[1/min]
$n_M$	Motor speed	[1/min]
$n_N$	Rated speed	[1/min]
$P_a$	Output power	[W]
$P_e$	Mathematical input power of the gear unit	[W]
$P_N$	Rated power	[W]
$P_{\text{reduziert}}$	Reduced motor power	[W]
$P_v$	Power loss	[W]
$R_{\text{BWmin}}$	Minimum permitted braking resistance value for 4Q operation	[Ω]
S.., %cdf	Duty type and relative cyclic duration factor cdf	
T	Cycle duration	[min]
$U_{\text{Netz}}$	Supply voltage, mains voltage	[V]
$U_N$	Rated voltage	[V]
$U_A$	Output voltage	[V]
$f_A$	Output frequency	[Hz]
$S_N$	Apparent power	[VA]



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Taiwan (R.O.C.)			
<b>Sales</b>	<b>Nan Tou</b>	Ting Shou Trading Co., Ltd. No. 55 Kung Yeh N. Road Industrial District Nan Tou 540	Tel. +886 49 255353 Fax +886 49 257878
	<b>Taipei</b>	Ting Shou Trading Co., Ltd. 6F-3, No. 267, Sec. 2 Tung Hwa South Road, Taipei	Tel. +886 2 27383535 Fax +886 2 27368268 Telex 27 245 sewtwn@ms63.hinet.net



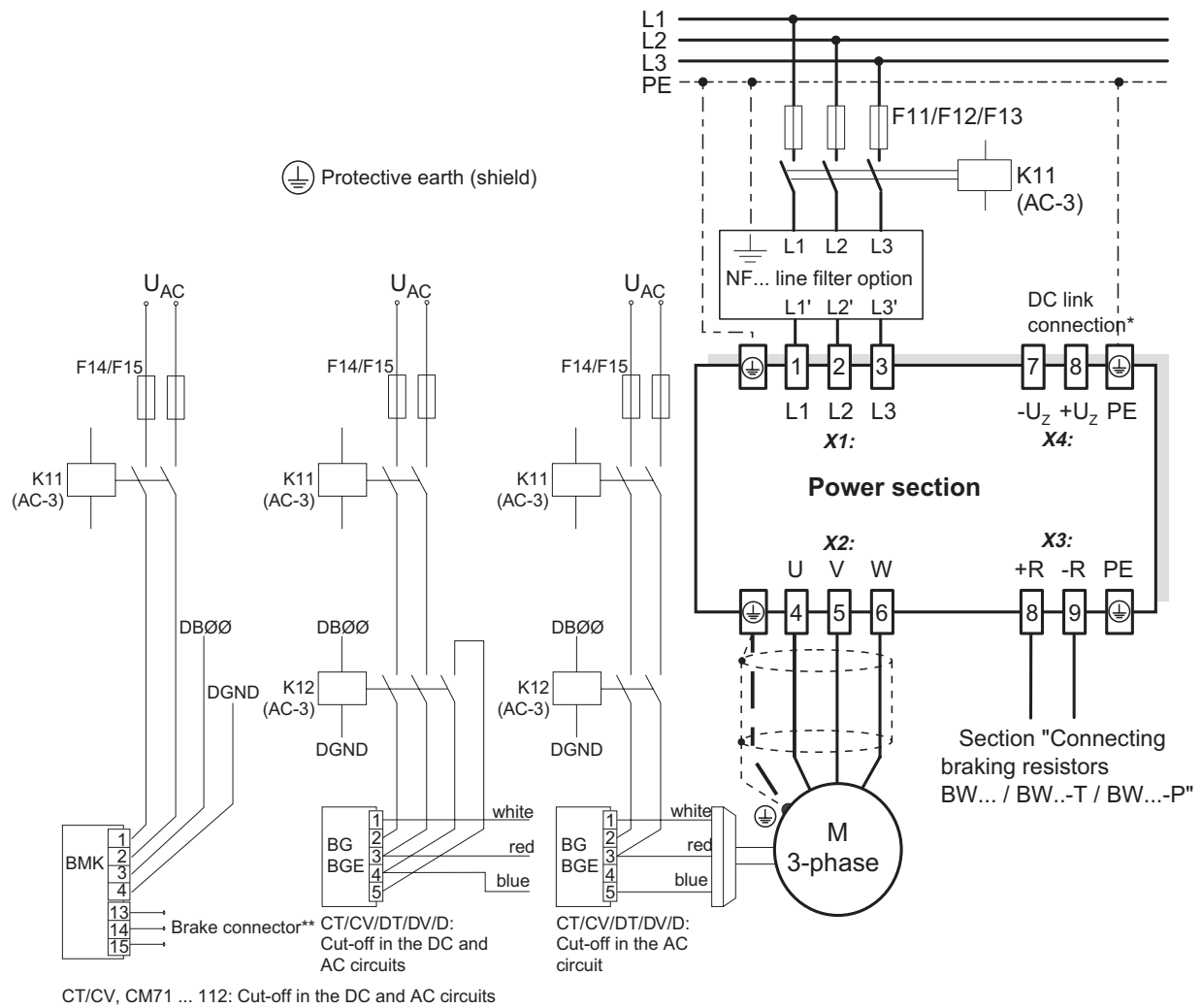
Thailand			
<b>Assembly Sales Service</b>	<b>Chon Buri</b>	SEW-EURODRIVE (Thailand) Ltd. Bangpakong Industrial Park 2 700/456, Moo.7, Tambol Donhuaroh Muang District Chon Buri 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com
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	<b>Hadyai</b>	SEW-EURODRIVE (Thailand) Ltd. Hadyai Country Home Condominium 59/101 Soi.17/1 Rachas-Utid Road. Hadyai, Songkhla 90110	Tel. +66 74 359441 Fax +66 74 359442 sewhdy@ksc.th.com
	<b>Khonkaen</b>	SEW-EURODRIVE (Thailand) Ltd. 4th Floor, Kaow-U-HA MOTOR Bldg, 359/2, Mitraphab Road. Muang District Khonkaen 40000	Tel. +66 43 225745 Fax +66 43 324871 sewkk@cscsoms.com
	<b>Lampang</b>	SEW-EURODRIVE (Thailand) Ltd. 264 Chatchai Road, sob-tuy, Muang, Lampang 52100	Tel. +66 54 310241 Fax +66 54 310242 sewthailand@sew-eurodrive.com
Tunisia			
<b>Sales</b>	<b>Tunis</b>	T. M.S. Technic Marketing Service 7, rue Ibn El Heithem Z.I. SMMT 2014 Mégrine Erriadh	Tel. +216 1 4340-64 + 1 4320-29 Fax +216 1 4329-76 tms@tms.com.tn
Turkey			
<b>Assembly Sales Service</b>	<b>Istanbul</b>	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 / 164 3838014/15 Fax +90 216 3055867 sew@sew-eurodrive.com.tr
<b>Technical Offices</b>	<b>Ankara</b>	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Özcelik Is Merkezi, 14. Sok. No. 4/42 TR-06370 Ostim/Ankara	Tel. +90 312 3853390 Fax +90 312 3853258
	<b>Bursa</b>	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Besevler Küçük Sanayi Parkoop Parçacılar Sitesi 48. Sokak No. 47 TR Nilüfer/Bursa	Tel. +90 224 443 4556 Fax +90 224 443 4558
	<b>Izmir</b>	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. 1203/11 Sok. No. 4/613 Hasan Atli Is Merkezi TR-35110 Yenisehir-Izmir	Tel. +90 232 4696264 Fax +90 232 4336105
Ukraine			
<b>Sales Service</b>	<b>Dnepropetrovsk</b>	SEW-EURODRIVE Str. Rabochaja 23-B, Office 409 49008 Dnepropetrovsk	Tel. +380 56 370 3211 Fax +380 56 372 2078 <a href="http://www.sew-eurodrive.ua">http://www.sew-eurodrive.ua</a> sew@sew-eurodrive.ua
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<b>Sales</b>	<b>Montevideo</b>	SEW-EURODRIVE Argentina S. A. Sucursal Uruguay German Barbato 1526 CP 11200 Montevideo	Tel. +598 2 90181-89 Fax +598 2 90181-88 sewuy@sew-eurodrive.com.uy



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<b>Assembly Sales Service</b>	<b>San Francisco</b>	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, California 94544-7101	Tel. +1 510 487-3560 Fax +1 510 487-6381 <a href="mailto:cshayward@seweurodrive.com">cshayward@seweurodrive.com</a>
	<b>Philadelphia/PA</b>	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 <a href="mailto:csbridgeport@seweurodrive.com">csbridgeport@seweurodrive.com</a>
	<b>Dayton</b>	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 440-3799 <a href="mailto:cstroy@seweurodrive.com">cstroy@seweurodrive.com</a>
	<b>Dallas</b>	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 <a href="mailto:csdallas@seweurodrive.com">csdallas@seweurodrive.com</a>
Additional addresses for service in the USA provided on request!			
Venezuela			
<b>Assembly Sales Service</b>	<b>Valencia</b>	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 <a href="http://www.sew-eurodrive.com.ve">http://www.sew-eurodrive.com.ve</a> <a href="mailto:sewventas@cantv.net">sewventas@cantv.net</a> <a href="mailto:sewfinanzas@cantv.net">sewfinanzas@cantv.net</a>


## Connection to the power section and brake



55310BEN

\* With sizes 1, 2 and 2S, there is no PE connection next to themains and motor connection terminals (X1, X2). In this case, use the PE terminal next to the DC link connection (X4).

\*\* **Important:** Adhere to the connection sequence of the brake connector. Incorrect connection will lead to irreparable damage of the brake. When connecting the brake via the terminal box, observe the the operating instructions of the respective motors!

<b>NOTES</b>	
	<ul style="list-style-type: none"> <li>• Connect the brake rectifier using a separate supply system lead.</li> <li>• <b>Powering it from the motor voltage is not permitted!</b></li> </ul>

Always switch off the brake on the DC and AC sides with


- all hoist applications,
- drives which require a rapid brake response time, and
- CFC and SERVO operating modes.

*Brake rectifier in the control cabinet*

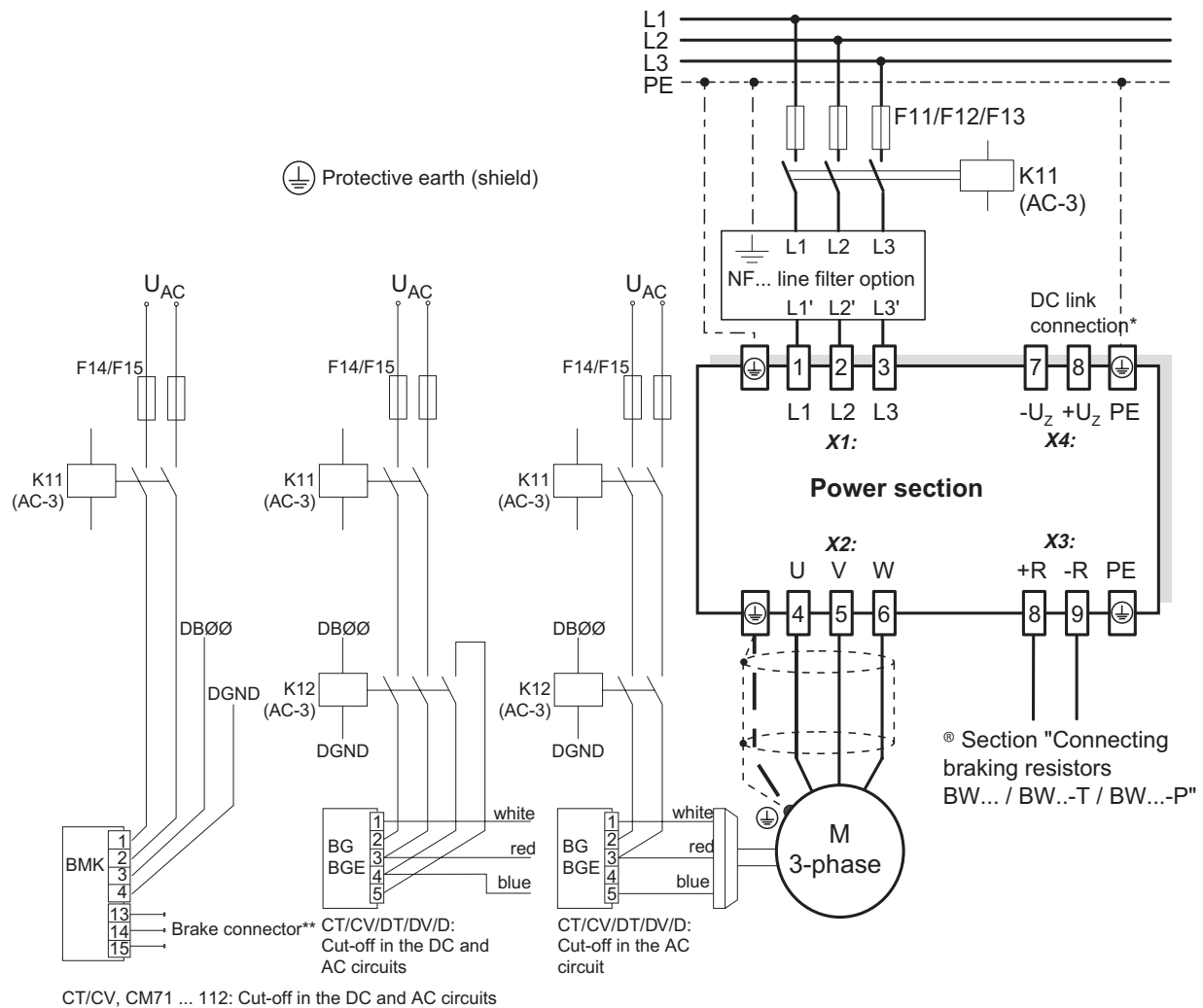
Route the connection cables between the brake rectifier and the brake separately from other power cables when installing the brake rectifier in the control cabinet. Joint installation is only permitted with shielded power cables.

## Functional description of the terminals in the basic unit (power section and control unit)

Terminal		Function	
X1:1/2/3 X2:4/5/6 X3:8/9 X4:	L1/L2/L3 (PE) U/V/W (PE) +R-/R (PE) +U <sub>Z</sub> /-U <sub>Z</sub> (PE)	Mains connection Motor connection Braking resistor connection DC link connection	
S11: S12: S13: S14:		Switching I-Signal DC(0(4)...20 mA) ↔ V signal DC(-10 V...0...10 V, 0...10 V), factory set to V signal. System bus terminating resistor on/off, factory set to off.. Set baud rate for RS485 interface. Either 9.6 or 57.6 kBaud, factory set to 57.6 kBaud. Switch frequency input on or off, factory set to off.	
X12:1 X12:2 X12:3	DGND SC11 SC12	Reference potential system bus System bus High System bus Low	
X11:1 X11:2/3 X11:4 X11:5	REF1 AI11/12 AGND REF2	DC+10 V (max. DC 3 mA) for setpoint potentiometer Setpoint input n1 (differential input or input with AGND reference potential), signal form → P11_ / S11 Reference potential for analog signals (REF1, REF2, AI..., AO...) DC-10 V (max. DC 3 mA) for setpoint potentiometer	
X13:1 X13:2 X13:3 X13:4 X13:5 X13:6	DIØØ DIØ1 DIØ2 DIØ3 DIØ4 DIØ5	Binary input 1, fixed assignment "/Controller inhibit" Binary input 2, factory set to "CW/Stop" Binary input 3, factory set to "CCW/Stop" Binary input 4, factory set to "Enable/Stop" Binary input 5, factory set to "n11/n21" Binary input 6, factory set to "n12/n22"	<ul style="list-style-type: none"> <li>The binary inputs are electrically isolated by optocouplers.</li> <li>Selection options for binary inputs 2 to 6 (DIØ1...DIØ5) → Parameter menu P60_</li> </ul>
X13:7	DCOM	Reference for binary inputs X13:1 to X13:6 (DIØØ...DIØ5) and X16:1/X16:2 (DIØ6...DIØ7) <ul style="list-style-type: none"> <li>Switching binary inputs with DC+24 V external voltage: Connection of X13:7 (DCOM) with reference potential of the external voltage required. <ul style="list-style-type: none"> <li>Without jumper X13:7-X13:9 (DCOM-DGND) → isolated binary inputs</li> <li>With jumper X13:7-X13:9 (DCOM-DGND) → non-isolated binary inputs</li> </ul> </li> <li>Switching the binary inputs with DC+24 V from X13:8 or X10:8 (VO24) → Jumper X13:7-X13:9 (DCOM-DGND) required.</li> </ul>	
X13:8 X13:9 X13:10 X13:11	VO24 DGND ST11 ST12	Auxiliary supply output DC+24 V (max. load X13:8 and X10:8 = 400 mA) for external command switch Reference potential for binary signals RS485+ RS485-	
X16:1 X16:2 X16:3 X16:4 X16:5 X16:6	DIØ6 DIØ7 DOØ3 DOØ4 DOØ5 DGND	Binary input 7, factory set to "No function" Binary input 8, factory set to "No function" Binary output 3, factory set to "IPOS output" Binary output 4, factory set to "IPOS output" Binary output 5, factory set to "IPOS output" <b>Do not apply external voltage to binary output X16:3 (DOØ3) to X16:5 (DOØ5)!</b> Reference potential for binary signals	<ul style="list-style-type: none"> <li>The binary inputs are electrically isolated by optocouplers.</li> <li>Selection options for binary inputs 7 and 8 (DIØ6/DIØ7) → Parameter menu P60_</li> <li>Selection options for binary outputs 3 to 5 (DOØ3...DOØ5) → Parameter menu P62_</li> </ul>
X10:1 X10:2 X10:3 X10:4 X10:5 X10:6 X10:7	TF1 DGND DBØØ DOØ1-C DOØ1-NO DOØ1-NC DOØ2	KTY+/TF-/TH connection (connect to X10:2 via TF/TH), factory set to "No response" (→ P835) Reference potential for binary signals / KTY- Binary output 0, fixed assignment "/Brake", load capacity max. DC 150 mA (short-circuit proof, protected against external voltage up to DC 30 V) Shared contact binary output 1, factory set to "Ready" NO contact binary output 1, load capacity of relay contacts max. DC 30 V and DC 0.8 A NC contact binary output 1 Binary output 2, factory set to "/Fault", load capacity max. DC 50 mA (short-circuit proof, protected against external voltage up to DC 30 V). Selection options for binary outputs 1 and 2 (DOØ1 and DOØ2) → Parameter menu P62_. Do not apply external voltage to binary outputs X10:3 (DBØØ) and X10:7 (DOØ2)!	
X10:8 X10:9 X10:10	VO24 VI24 DGND	Auxiliary voltage output DC+24 V (max. load X13:8 and X10:8 = 400 mA) for external command switches Input DC+24 V voltage supply (backup voltage depends on options, unit diagnostics for supply off) Reference potential for binary signals	
X17:1 X17:2 X17:3 X17:4	DGND VO24 SOV24 SVI24	Reference potential for X17:3 Auxiliary voltage output DC+24 V, <b>only to supply X17:4 of the same unit</b> Reference potential for DC+24 V input "Safe stop" (safety contact) DC+24 V input "Safe stop" (safety contact)	
XT		Service interface only. Slot for option: DBG60B / UWS21B / USB11A	
		3 slots for option cards (size 0: 2 slots for option cards)	

	<b>Note</b>
	<p><b>X17: For safety applications, comply with the information in the publications "Safe Disconnection for MOVIDRIVE® MDX60B/61B – Conditions" and "Safe Disconnection for MOVIDRIVE® MDX60B/61B – Applications."</b></p>


## Connection to the power section and brake



55310BEN

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\*\* **Important:** Adhere to the connection sequence of the brake connector. Incorrect connection will lead to irreparable damage of the brake. When connecting the brake via the terminal box, observe the the operating instructions of the respective motors!

<b>NOTES</b>	
	<ul style="list-style-type: none"> <li>• Connect the brake rectifier using a separate supply system lead.</li> <li>• <b>Powering it from the motor voltage is not permitted!</b></li> </ul>

Always switch off the brake on the DC and AC sides with

- all hoist applications,
- drives which require a rapid brake response time, and
- CFC and SERVO operating modes.

*Brake rectifier in the control cabinet*

Route the connection cables between the brake rectifier and the brake separately from other power cables when installing the brake rectifier in the control cabinet. Joint installation is only permitted with shielded power cables.

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With uncompromising quality that reduces the cost and complexity of daily operations.

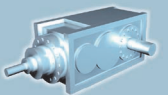
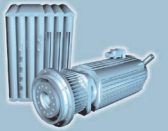


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With innovative technology that solves tomorrow's problems today.

With online information and software updates, via the Internet, available around the clock.

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