Drive Technology \ Drive Automation \ System Integration \ Services

System Manual

MOVIDRIVE® MDX60B/61B

Edition 09/2010

16838017 / EN




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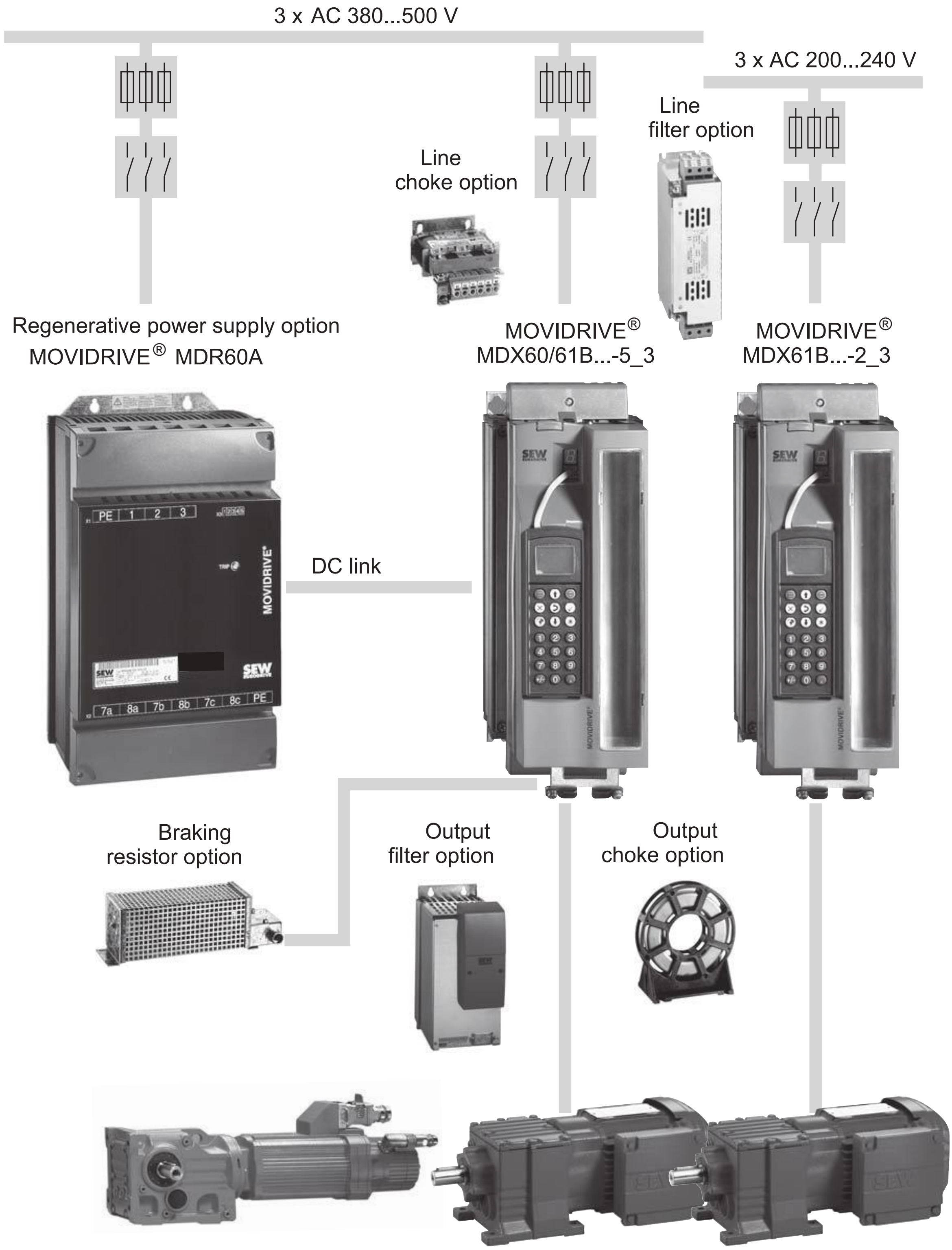

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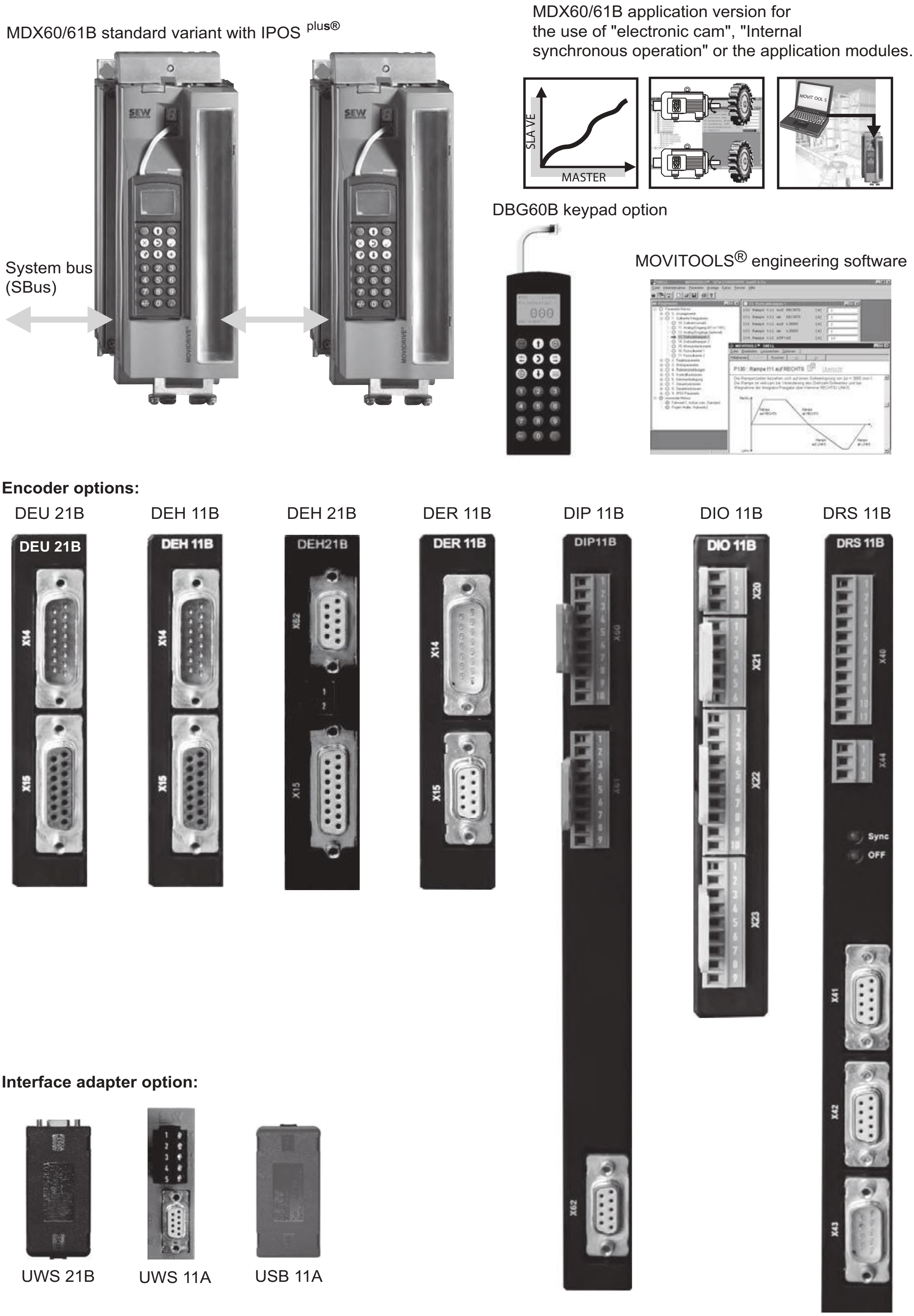
1.1.2 Encoder and communication options



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1.1.3 Fieldbus options

DFC 11B

DFD 11B

DFI 11B

DFI 21B

DFP 21B

DFE 24B

DFE 32B

DFE 33B

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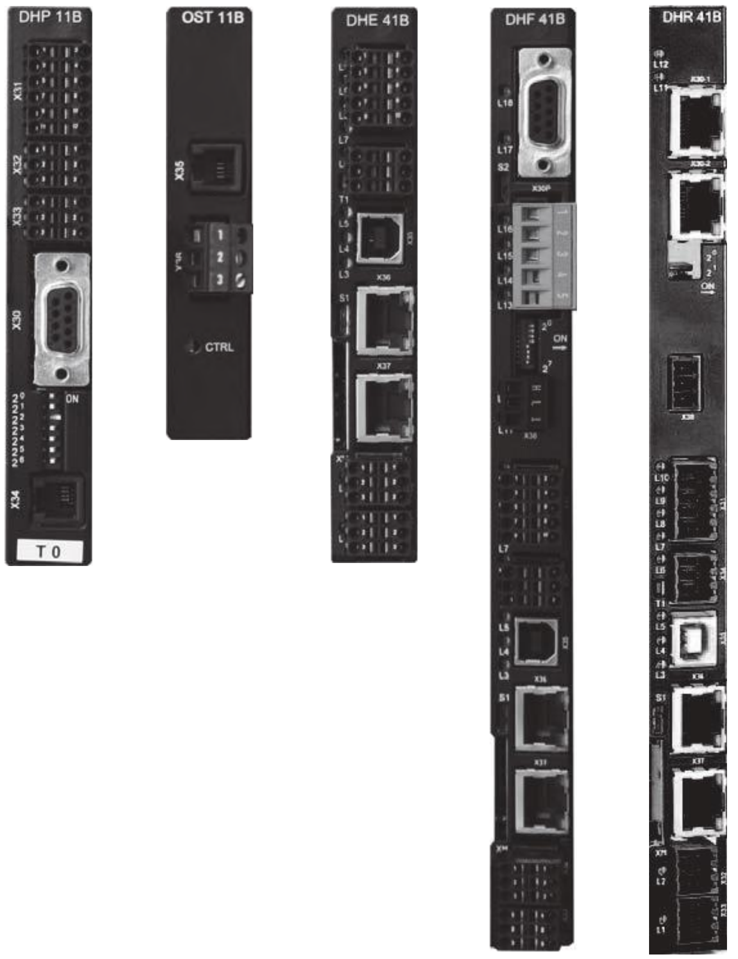
1.1.4 Control options

MOVI-PLC®

DHP 11B | OST 11B | DHE 41B | DHF 41B | DHR 41B



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1.1.5 Safety options

DFS 11B DFS 12B DFS 21B DFS 22B DCS 21B DCS 31B

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1.1.6 General description

MOVIDRIVE® MDX60B/61B is the new generation of drive inverters from SEW-EURODRIVE. The new MOVIDRIVE® B series 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 315 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 regard to the application range, project planning, startup and operation.

1.1.7 Low-emission

The MOVIDRIVE® MDX60B/61B 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.

1.1.8 Product family

The **MOVIDRIVE®** product family 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 servomotors. The units are option-capable.
- MOVIDRIVE® MDR60A: Regenerative power supply unit; MOVIDRIVE® inverters (400/500 V units) operate in regenerative mode to feed energy back into the supply system.

1.1.9 Unit variants

MOVIDRIVE® MDX60/61B size 0-6 inverters are available in two variants, namely the standard variant and the application variant. MOVIDRIVE® MDX60B/61B size 7 inverters are only available as application variants with coated pcbs (-0T/L).

Standard variant

The units are equipped with integrated IPOSplus® positioning and sequence control as standard. MOVIDRIVE® MDX61B can be expanded with the available options.

"00" at the end of the type designation indicates the standard variant.

Application variant

In addition to the features of the standard variant, these units include the technology functions "electronic cam" and "internal synchronous operation". Furthermore, you can use all the application modules available in the MOVITOOLS® MotionStudio engineering software with the application variants.

The application variant is indicated by "0T" following the type designation.

Variants with coated printed circuit boards

The units are designed for use in harsh environments. The coating of the printed circuit boards increases their resistivity against environmental conditions.

The variant with coated pcbs is indicated by "00/L" or "0T-/L" at the end of the type designation.

1.1.10 Modular unit concept

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

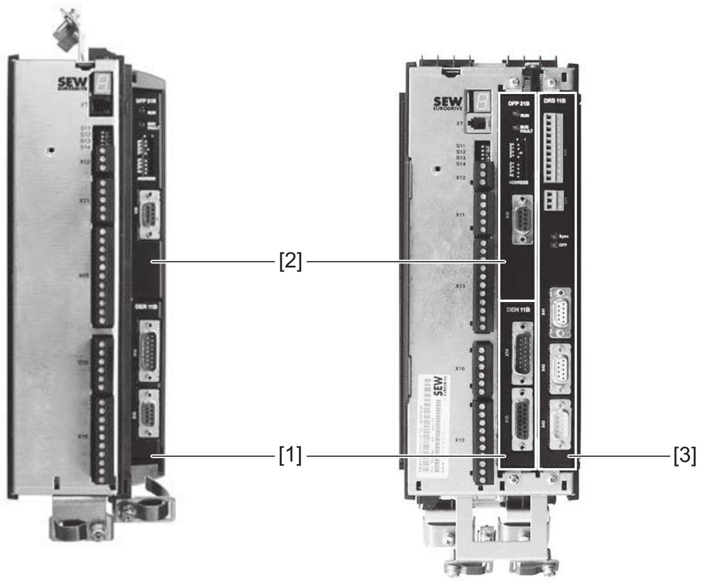
- Size 0 (0005 ... 0014) → 2 option card slots
  - 1 option card slot for encoder connection
  - 1 option card slot for a communication option
- Sizes 1 ... 7 (0015 ... 2500) → 3 option card slots
  - 1 option card slot for encoder connection
  - 1 option card slot for a communication option
  - 1 option card slot for an expansion option

INFORMATION

- **Customers can only install or remove option cards later on in MDX61B sizes 1 to 7. 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 on by SEW-EURODRIVE.** Please take this aspect into account when you place your order/perform project planning.

1.1.11 Option card slots of MOVIDRIVE® MDX61B

Size 0 (0005 ... 0014)   Size 1 ... 7 (0015 ... 2500)



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[1] Encoder slot for encoder option
[2] Fieldbus slot for communication option
[3] Expansion slot for communication option (only sizes 1 - 7)

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.

<table>
<tr><th>Use</th><th>Required option</th><th>Option card slot</th></tr>
<tr><td colspan="3">Encoder option</td></tr>
<tr><td>Asynchronous AC motor with encoder feedback (Hiperface®, sin/cos, TTL)</td><td rowspan="2">Hiperface® encoder card DEH11B</td><td rowspan="5">1</td></tr>
<tr><td>Asynchronous or synchronous servomotor with Hiperface® encoder</td></tr>
<tr><td>Synchronous servomotor with resolver</td><td>Resolver card type DER11B</td></tr>
<tr><td>Asynchronous or synchronous motors with absolute encoder</td><td>DEU21B multi-encoder card</td></tr>
<tr><td>SSI encoder interface</td><td>DEH21B absolute encoder card</td></tr>
<tr><td colspan="3">Communication options (fieldbus, control)</td></tr>
<tr><td>User-programmable MOVI-PLC® controller</td><td>MOVI-PLC® basic DHP11B controller</td><td>2
(3 only if slot 2 is occupied)</td></tr>
<tr><td>Additional RS485 interface (only in combination with option DHP11B)</td><td>DHP11B + OST11B</td><td>• DHP11B in 2, OST11B in 1
• If 1 is occupied: DHP11B + OST11B in 3</td></tr>
<tr><td rowspan="3">Freely programmable motion and logic controller (MOVI-PLC®)</td><td>Controller
• DHE21B (standard)
• DHE41B (advanced)</td><td>2
(3 only if slot 2 is occupied)</td></tr>
<tr><td>Controller
• DHF21B (standard)
• DHF41B (advanced)</td><td>3</td></tr>
<tr><td>Controller
• DHR21B (standard)
• DHR41B (advanced)</td><td>3</td></tr>
<tr><td>Additional analog and binary inputs/outputs are required</td><td>Input/output card type DIO11B</td><td>2
(3 only if slot 2 is occupied)</td></tr>
<tr><td>Integration into a PROFIBUS system</td><td>PROFIBUS interface type DFP21B</td><td rowspan="7">2</td></tr>
<tr><td>Integration into a PROFIBUS system with PROFIsafe</td><td>DFS11B fieldbus interface</td></tr>
<tr><td>Integration into an INTERBUS system</td><td>INTERBUS interface type DFI11B / DFI21B</td></tr>
<tr><td>Integration into an Ethernet system with PROFIsafe</td><td>DFS21B fieldbus interface</td></tr>
<tr><td>Integration into an EtherCAT® system</td><td>EtherCAT® interface type DFE24B</td></tr>
<tr><td>Integration into a DeviceNet system</td><td>DeviceNet interface type DFD11B</td></tr>
<tr><td>Integration into a CANopen ystem</td><td>CANopen interface type DFC11B</td></tr>
<tr><td colspan="3">Expansion option</td></tr>
<tr><td>SSI encoder interface</td><td>DIP11B absolute encoder card</td><td rowspan="3">3</td></tr>
<tr><td>Phase-synchronous operation</td><td>Synchronous operation card DRS11B</td></tr>
<tr><td>Safety module</td><td>DCS21B option (only in conjunction with DFS12B/22B option) / DCS31B</td></tr>
</table>

1.1.12 Control modes

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

VFC control mode **(Voltage Mode Flux Control)**	**Control modes** **CFC (Current Mode Flux Control)/SERVO**
Voltage-controlled control mode for asynchronous AC motors with and without encoder feedback. • With encoder feedback – At least 150% torque, with a power-matched, stopped motor – Characteristics similar to servo operation • Without encoder feedback – min. 150% torque up to 0.5 Hz, with a power-matched motor	Current-controlled control mode for asynchronous and synchronous servomotors. Encoder feedback is always required. • At least 160% torque, with a power-matched, stopped motor • Maximum precision and concentric running characteristics right down to standstill. • Servo characteristics and torque control even for asynchronous AC motors • Reacts to load changes within a few milliseconds

1.1.13 System bus (SBus)

The system bus (SBus), which is installed as standard, allows several MOVIDRIVE® 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 universal SEW-EURODRIVE standard for serial communication. The SBus can be switched to CANopen.

1.1.14 MOVILINK®

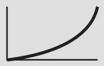
MOVILINK® always uses the same message format independent of the selected interface (SBus, RS232, RS485, fieldbus interfaces). As a result, the control software is independent of the selected interface.

1.1.15 IPOS$^{plus®}$

A significant feature of MOVIDRIVE® inverters is that the IPOS$^{plus®}$ positioning and sequence control system is integrated as standard. IPOS$^{plus®}$ enables you to control motion sequences directly in the inverter close to the machine. This way, load is taken off the higher-level controller and modular concepts can be implemented more easily.

1.1.16 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	MOVIDRIVE® type		Size
		(CFC)	MDX60B not option-capable	MDX61B option-capable	(techn. data)
4Q units (with brake chopper)					
0.55 kW (0.74 HP)	0.75 kW (1.0 HP)	AC 2.0 A	0005-5A3-4-..	0005-5A3-4-..	0 (page 42)
0.75 kW (1.0 HP)	1.1 kW (1.5 HP)	AC 2.4 A	0008-5A3-4-..	0008-5A3-4-..	
1.1 kW (1.5 HP)	1.5 kW (2.0 HP)	AC 3.1 A	0011-5A3-4-..	0011-5A3-4-..	
1.5 kW (2.0 HP)	2.2 kW (3.0 HP)	AC 4.0 A	0014-5A3-4-..	0014-5A3-4-..	
1.5 kW (2.0 HP)	2.2 kW (3.0 HP)	AC 4.0 A	-	0015-5A3-4-..	1 (page 44)
2.2 kW (3.0 HP)	3.0 kW (4.0 HP)	AC 5.5 A	-	0022-5A3-4-..	
3.0 kW (4.0 HP)	4.0 kW (5.4 HP)	AC 7.0 A	-	0030-5A3-4-..	
4.0 kW (5.4 HP)	5.5 kW (7.4 HP)	AC 9.5 A	-	0040-5A3-4-..	
5.5 kW (7.4 HP)	7.5 kW (10 HP)	AC 12.5 A	-	0055-5A3-4-..	2S, 2 (page 45)
7.5 kW (10 HP)	11 kW (15 HP)	AC 16 A	-	0075-5A3-4-..	
11 kW (15 HP)	15 kW (20 HP)	AC 24 A	-	0110-5A3-4-..	
15 kW (20 HP)	22 kW (30 HP)	AC 32 A	-	0150-503-4-..	3 (page 46)
22 kW (30 HP)	30 kW (40 HP)	AC 46 A	-	0220-503-4-..	
30 kW (40 HP)	37 kW (50 HP)	AC 60 A	-	0300-503-4-..	
37 kW (50 HP)	45 kW (60 HP)	AC 73 A	-	0370-503-4-..	4 (page 47)
45 kW (60 HP)	55 kW (74 HP)	AC 89 A	-	0450-503-4-..	
55 kW (74 HP)	75 kW (100 HP)	AC 105 A	-	0550-503-4-..	5 (page 48)
75 kW (100 HP)	90 kW (120 HP)	AC 130 A	-	0750-503-4-..	
90 kW (120 HP)	110 kW 148 HP)	AC 170 A	-	0900-503-4-..	6 (page 49)
110 kW (148 HP)	132 kW (177 HP)	AC 200 A	-	1100-503-4-..	
132 kW (177 HP)	160 kW (215 HP)	AC 250 A	-	1320-503-4-..	
-					
2Q units (without brake chopper)					
160 kW (215 HP)	200 kW (268 HP)	AC 300 A	-	1600-503-2-0T/L	7 (page 50)
200 kW (268 HP)	250 kW (335 HP)	AC 380 A	-	2000-503-2-0T/L	
250 kW (335 HP)	315 kW (422 HP)	AC 470 A	-	2500-503-2-0T/L	
4Q units (with brake chopper)					
160 kW (215 HP)	200 kW (268 HP)	AC 300 A	-	1600-503-4-0T/L	7 (page 50)
200 kW (268 HP)	250 kW (335 HP)	AC 380 A	-	2000-503-4-0T/L	
250 kW (335 HP)	315 kW (422 HP)	AC 470 A	-	2500-503-4-0T/L	

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

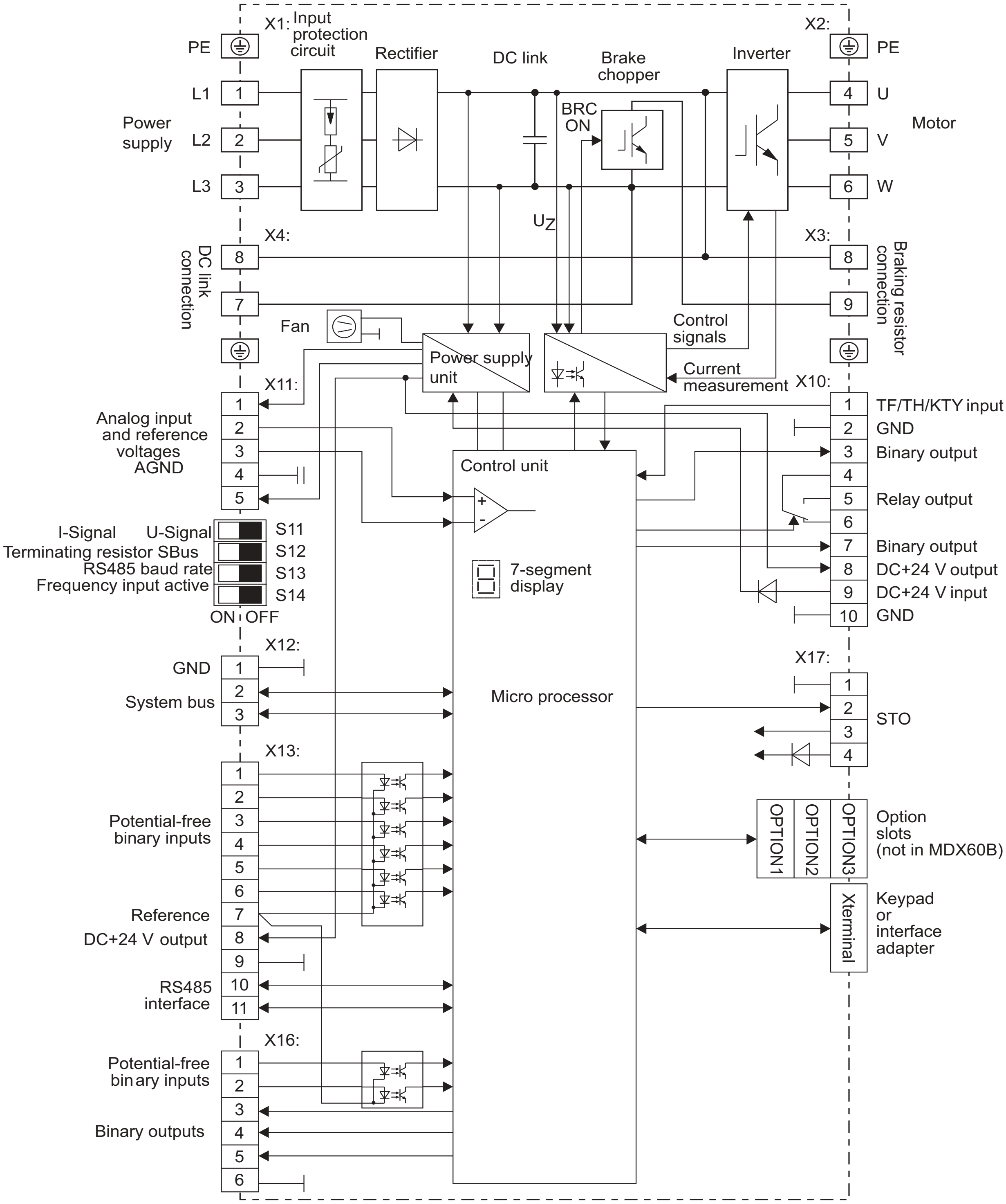
Recommended motor power (VFC)		Continuous output current (CFC)	MOVIDRIVE® type MDX61B option-capable	Size (technical data)
1.5 kW (2.0 HP)	2.2 kW (3.0 HP)	AC 7.3 A	0015-2A3-4-..	1 (page 51)
2.2 kW (3.0 HP)	3.7 kW (5.0 HP)	AC 8.6 A	0022-2A3-4-..	
3.7 kW (5.0 HP)	5.0 kW (7.0 HP)	AC 14.5 A	0037-2A3-4-..	
5.5 kW (7.4 HP)	7.5 kW (10 HP)	AC 22 A	0055-2A3-4-..	2 (page 52)
7.5 kW (10 HP)	11 kW (15 HP)	AC 29 A	0075-2A3-4-..	
11 kW (15 HP)	15 kW (20 HP)	AC 42 A	0110-203-4-..	3 (page 53)
15 kW (20 HP)	22 kW (30 HP)	AC 54 A	0150-203-4-..	
22 kW (30 HP)	30 kW (40 HP)	AC 80 A	0220-203-4-..	4 (page 54)
30 kW (40 HP)	37 kW (50 HP)	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
0150-503-01	I_{line} = AC 29 A, $I_{DC\ link}$ = DC 35 A	3, 4, 6 (page 76)	0005 ... 0150
0370-503-00	I_{line} = AC 66 A, $I_{DC\ link}$ = DC 70 A		0005 ... 0370
0750-503-00	I_{line} = AC 117 A, $I_{DC\ link}$ = DC 141 A		0005 ... 0750
1320-503-00	I_{line} = AC 225 A, $I_{DC\ link}$ = DC 270 A		0005 ... 1320
1320-503-00 As of series no. DCV2000100	I_{line} = AC 260 A, $I_{DC\ link}$ = DC 324 A		0005 ... 1600

1.1.17 Block circuit diagram

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



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1.2 Functions/features

1.2.1 Unit features

- Wide voltage range
  - 400/500 V units for the voltage range 3 × AC 380 ... 500 V
  - 230 V units for the voltage range 3 × 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, continuous operation without overload (pumps, fans)
- Sizes 0 ... 6:
  - With 4 kHz switching frequency, I_N is permitted for an ambient temperature of ϑ = 50 °C
  - 4Q capability due to integrated brake chopper installed as standard
- Size 7:
  - With 2.5 kHz switching frequency, I_N is permitted for an ambient temperature of ϑ = 50 °C
  - 2Q units without brake chopper or 4Q units with brake chopper can be selected
- Compact unit design 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 C2 limit on the input side without any additional measures
- 8 isolated binary inputs and 6 binary outputs, one of which is a relay output; programmable inputs/outputs
- 1 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
- STO in accordance with EN 61800-5-2, up to
  - Category 3 according to EN 954-1
  - Performance level d according to EN ISO 13849-1

1.2.2 Control functions

- VFC or CFC control modes for field-oriented operation (asynchronous servo)
- IPOS$^{plus®}$ 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 stationary speed accuracy, even without encoder feedback
- Flying restart function for synchronizing the inverter to an already rotating SEW 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 to avoid condensation build-up in the motor
- Parameter lock for protection against changes to parameters
- Speed controller and encoder input for incremental, Hiperface® or SSI encoders and resolvers. User-friendly controller setting tool in the operator interface.
- Protective functions for complete protection of the inverter and motor (short-circuit, overload, overvoltage/undervoltage, ground fault, excess temperature in the inverter, motor stall prevention, excess temperature 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 the time of the fault
- Operating hours 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

1.2.3 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 curve 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

1.2.4 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 a keypad or PC
- Pluggable memory module for quick unit replacement during service

1.2.5 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® MotionStudio with SCOPE process data visualization
- Application version with access to technology functions and application modules to solve drive tasks quickly and easily
- 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.

1.2.6 Standards and approvals

- UL, cUL, C-Tick approval. The MOVIDRIVE® MDR60A1320-503-00 unit does not have UL or cUL or C-Tick approval. The GOST-R certificate (Russia) has been approved for the MOVIDRIVE® range of units.
- Safe disconnection of power and electronic connections according to EN 61800-5-1
- Compliance with all the requirements for CE certification of machines and plants equipped with MOVIDRIVE® on the basis of the Low Voltage Directive 2006/95/EC and the EMC Directive 2004/108/EC. Complies with the EMC product standard EN 61800-3.
- STO in accordance with EN 61800-5-2, up to
  - Category 3 according to EN 954-1
  - Performance level d according to EN ISO 13849-1

1.3 Additional functions of the application variants

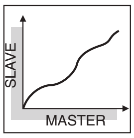
SEW-EURODRIVE offers additional functions for special applications. You can use these additional functions with the MOVIDRIVE® application variants (...-0T).

The following additional functions are available:

- Electronic cam
- Internal synchronous operation

	INFORMATION
	Please refer to the "Electronic Cam" and "Internal Synchronous Operation" manuals for detailed information about the additional functions.

1.3.1 Electronic cam



You can use the MOVIDRIVE® product series with the "electronic cam" module 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 the MOVIDRIVE® MDX61B 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.
- "Electronic cam" is only available in parameter set 1.
- The "DRS11B synchronous operation card" option cannot be used together with the "electronic cam" function.

Motors and encoders

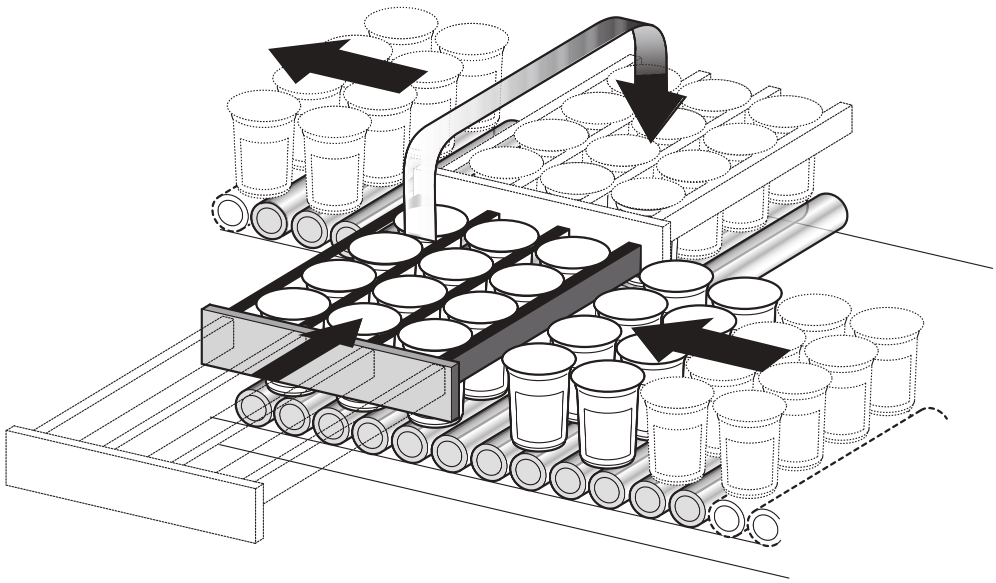
Use the following motor types:

- 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 series AC motor with incremental encoder, preferably high-resolution sin/cos encoder or Hiperface® encoder.
  - Synchronous servomotors DS/CM/CMD/CMP, resolver (installed as standard) or Hiperface® encoder

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

Example

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



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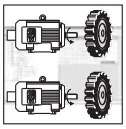
1.3.2 Internal synchronous operation



You can use the MOVIDRIVE® unit series 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 application versions (...-0T).
- Encoder feedback is mandatory. This is why "internal synchronization 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 "DRS11B synchronous operation card" option cannot be used together with "internal synchronous operation".

Motors and encoders

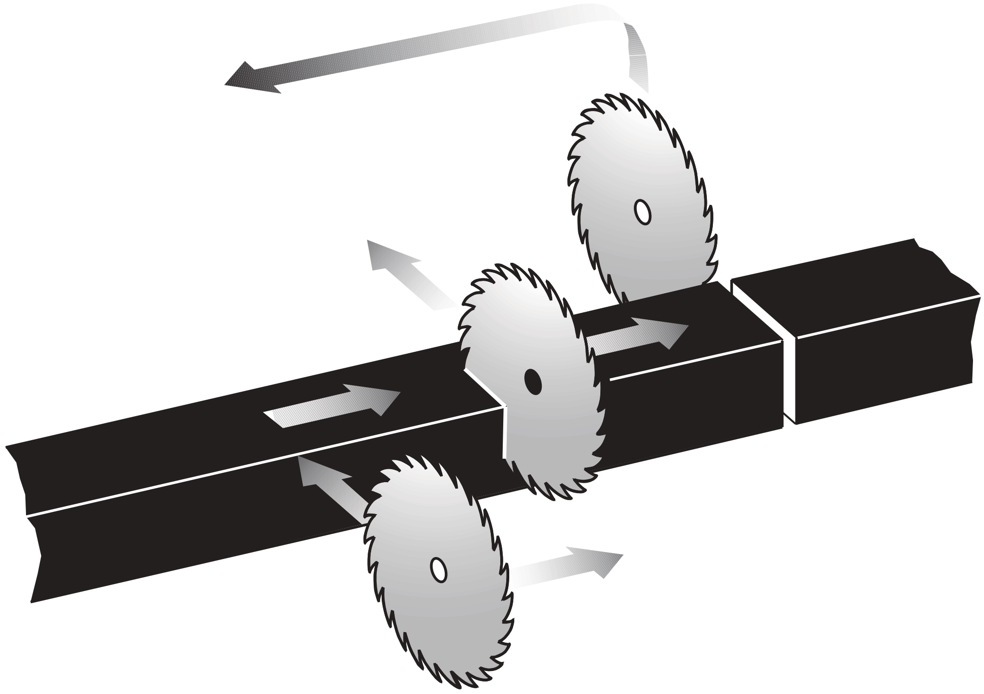
Use the following motor types for operation with MOVIDRIVE® MDX61B...-4-0T:

- CT/CV asynchronous servomotor, high-resolution sin/cos encoder installed as standard or Hiperface® encoder.
- DT/DV/D series AC motor with incremental encoder, preferably high-resolution sin/cos encoder or Hiperface® encoder.
- Synchronous servomotors DS/CM/CMD/CMP, resolver (installed as standard) or Hiperface® encoder

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

Example

The figure below shows a typical application with "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.



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1.4 Application modules for MOVIDRIVE® MDX61B

1.4.1 The drive task

The drive task 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. Increasingly complex drive applications have to be solved, without this resulting in lengthy configuration and startup processes.

1.4.2 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 incorporated into MOVITOOLS® MotionStudio and can be used with the application variants.

A user-friendly operator 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

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

1.4.3 Scope of delivery and documentation

The application modules are part of the MOVITOOLS® MotionStudio engineering software and can be used with MOVIDRIVE® MDX61B application versions (...-0T). The individual application manuals can also be downloaded as PDFs from the SEW website.

1.4.4 Available application modules

The application modules currently available are listed below. These application modules are explained on 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:

- Bus positioning
- Extended positioning via bus
- Absolute positioning (rapid/creep speed positioning)

Rotary movement:

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

Winding

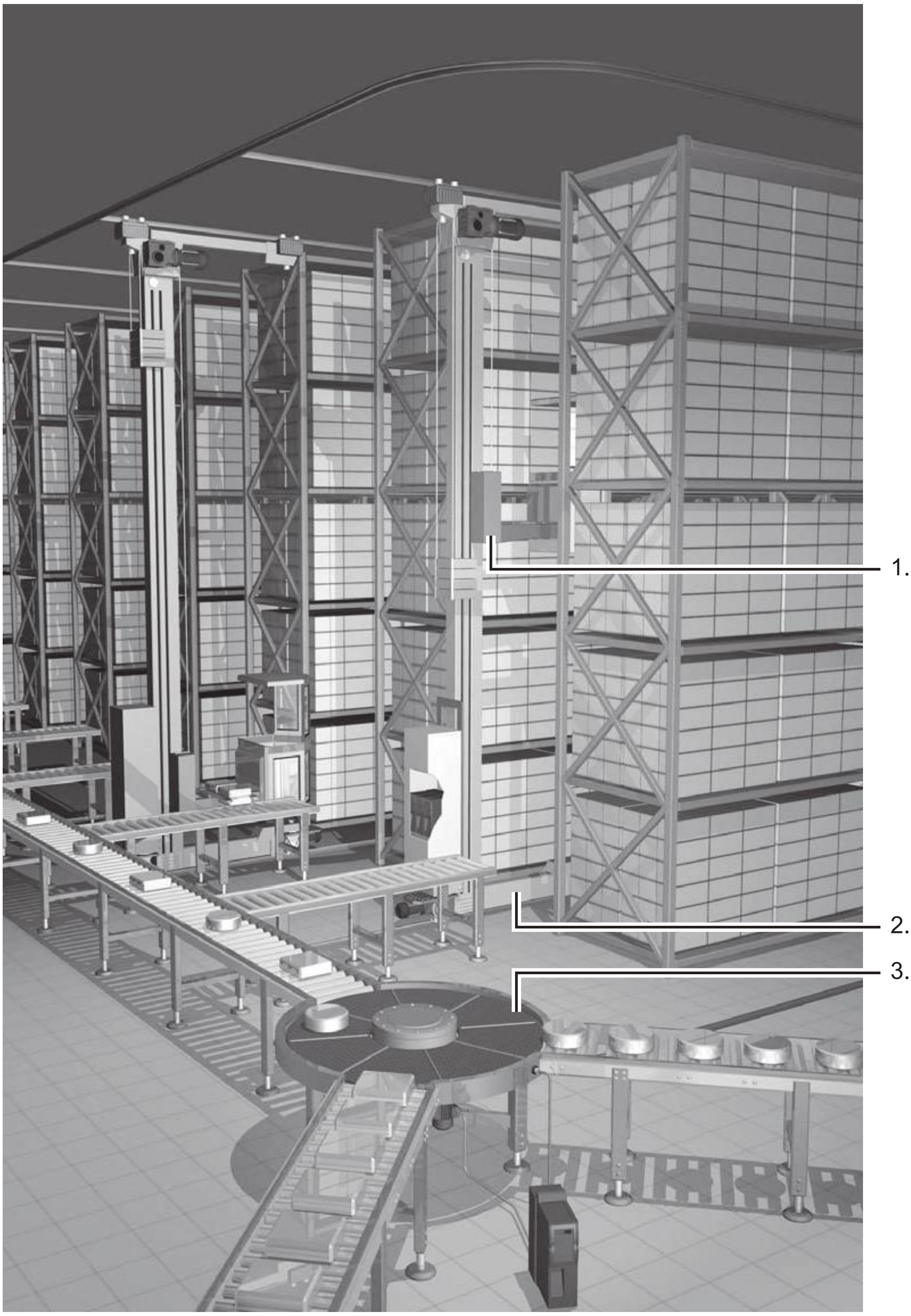
- Center winder

Control

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

1.4.5 Application

The following figure shows an example of how the various SEW application modules are used in a block warehouse.



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

1.4.6 Positioning

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

For example, trolleys, hoists, gantries, rotary tables, swiveling devices, and storage and retrieval systems.

1.4.7 Linear positioning

In the case of application modules for linear positioning, SEW-EURODRIVE distinguishes between whether the movement records are administered in the inverter or in the higher-level 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 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 have the following 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 incremental or absolute encoders can be evaluated.
- Guided startup and diagnostics.

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: The higher-level PLC controls the process automatically.

Movement records in the PLC

- **Bus positioning**
- **Extended positioning via bus**

These application modules are suited to applications with a high 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 have the following features:

- Any number of target positions can be defined and selected by means of a 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 incremental or absolute encoders can be evaluated.
- Easy connection to the higher-level controller.
- Guided startup and diagnostics.

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: The higher-level PLC controls the process automatically.

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

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 has the following 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.
- Easy connection to the higher-level controller.
- Guided startup and diagnostics.

Two operating modes are available for controlling the machine:

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

1.4.8 Rotatory positioning

- **Modulo positioning**

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

Rotary movements are often synchronized (rotary 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:

- A user-friendly GUI
- 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

1.4.9 Winding

- **Center winder**

The "Center 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 via the virtual terminals (fieldbus, system bus).

The "center winder" application module has the following 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 higher-level controller (PLC).
- Guided startup and diagnostics.

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.

1.4.10 Control

- **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 has the following features:

- Choice of fieldbus or terminal control.
- Cut edge protection or singling using the "Draw gap" function.
- Immediate cut function by manual interrupt.
- Counter for material length.
- Easy connection to the higher-level controller.
- Guided startup and diagnostics.

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 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 has the following features:

- Guided startup and extensive diagnostics functions.
- High degree of similarity with procedures learned for the “Extended positioning”.
- One program module for master and slave drive.
- The selected IPOS$^{plus®}$ encoder source is also effective in synchronous operation.
- The master value for "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 systems
  - Transverse carriages

1.5 MOVITOOLS® MotionStudio engineering software

1.5.1 Tasks

The software package enables you to perform the following tasks:

- Establishing communication with units
- Executing functions with the units

1.5.2 Establishing communication with the units

The SEW Communication Server is integrated into the MOVITOOLS® MotionStudio software package for establishing communication with the units.

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

MOVITOOLS® MotionStudio supports the following types of communication channels:

- Serial (RS-485) via interface adapters
- System bus (SBus) via interface adapters
- Ethernet
- EtherCAT®
- Fieldbus (PROFIBUS DP/DP-V1)
- Tool Calling Interface

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

1.5.3 Executing functions with the units

The software package offers uniformity in executing the following functions:

- Parameterization (for example in the parameter tree of the unit)
- Startup
- Visualization and diagnostics
- Programming

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

- MotionStudio
- MOVITOOLS®

All functions communicate using **tools**. MOVITOOLS® MotionStudio provides the right tools for every unit type.

1.5.4 Technical support

SEW-EURODRIVE offers you a 24-hour service hotline.

Simply dial **(+49) 0 18 05** and then enter the letters **SEWHELP** via the telephone keypad. Of course, you can also dial **(+49) 0 18 05 - 7 39 43 57**.

1.5.5 Online help

After installation, the following types of help are available to you:

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

  If the help window does not appear at the start, deactivate the "Display" control field, in the menu under [Settings] / [Options] / [Help].

  If the help window appears again, activate the "Display" control field, in the menu under [Settings] / [Options] / [Help].
- Context-sensitive help is available for the fields which require you to enter values. For example, you can use the <F1> key to display the ranges of values for the unit parameters.

2 Technical Data of Basic Unit

2.1 CE marking, UL approval and C-Tick

2.1.1 CE-marking

- Low voltage directive

  MOVIDRIVE® MDX60B/61B inverters comply with the regulations of the Low Voltage Directive 2006/95/EC.

- Electromagnetic compatibility (EMC)

  The designated use of MOVIDRIVE® inverters and regenerative power supply units is as components for installation in machinery and systems. They comply with the EMC product standard EN 61800-3 "Variable-speed electrical drives". Provided that you comply with the installation instructions for the SEW components, the CE marking requirements for the entire machine/system in which they are installed are satisfied on the basis of the EMC directive 2004/108/EC. For detailed information on EMC compliant installation, refer to the publication "Electromagnetic Compatibility in Drive Engineering" from SEW-EURODRIVE.

- Compliance with limit classes C1, C2 or C3 has been tested in a CE-typical drive system. SEW-EURODRIVE can provide detailed information on request.

The CE-mark on the nameplate indicates conformity with the low voltage directive 2006/95/EC. We can provide a declaration of conformity on request.

2.1.2 UL / cUL / GOST-R

UL, cUL approval (USA) and the GOST-R certificate (Russia) have been granted for the entire MOVIDRIVE® unit series. cUL is equivalent to CSA approval.

2.1.3 C-Tick

C-Tick approval has been granted for the entire MOVIDRIVE® range of units. C-Tick certifies conformity with ACMA (Australian Communications and Media Authority) standards.

2.2 General technical data

The following table lists the technical data applicable to all MOVIDRIVE® MDX60B/61B inverters, regardless of their type, version, size and performance.

MOVIDRIVE® MDX60B/61B	**All sizes**
Interference immunity	Meets EN 61800-3
Interference emission with EMC compliant installation	Sizes 0 to 7 meet EN 61800-3 Sizes 0 to 5: According to limit value class C1 to EN 61800-3 with a corresponding line filter Sizes 0, 1, 2S, and 2 in accordance with limit value class C2 to EN 61800-3 without additional measures Size 6 and 7 in accordance with limit value class C2 to EN 61800-3 with corresponding line filter
Ambient temperature ϑ_U **I_N reduction** **Ambient temperature** **Climate class**	0 °C...+50 °C at I_D = 100% I_N and f_{PWM} = 4 kHz / size 7: 2.5 kHz 0 °C...+40 °C at I_D = 125% I_N and f_{PWM} = 4 kHz / size 7: 2.5 kHz 0 °C...+40 °C at I_D = 100% I_N and f_{PWM} = 8 kHz (sizes 0 to 5) 2.5% I_N per K between 40 °C - 50 °C 3% I_N per K at 50 °C - 60 °C EN 60721-3-3, class 3K3
Storage temperature[1] ϑ_L	–25 °C ... +70 °C (EN 60721-3-3, class 3K3) DBG keypad: –20 °C ... +60 °C
Cooling type (DIN 41751)	Forced cooling (temperature-controlled fan, response threshold 45 °C)
Degree of protection EN 60529 (NEMA1) **Sizes 0 to 3** **Sizes 4 to 6** **Size 7**	 IP20 IP00 (power connections) IP10 (power connections) with • fitted Plexiglas cover supplied as standard and • shrink tubing (not included in scope of delivery) IP00 (power connections) IP20 (plug connector) with • installed DLB21B touch guard
Duty cycle	Continuous duty with 50% overload capacity (size 0: 100%)
Overvoltage category	III according to IEC 60664-1 (VDE 0110-1)
Pollution class	2 according to IEC 60664-1 (VDE 0110-1)
Protection against mechanically active substances	3S1
Protection against chemically active substances	3C2
Installation altitude h	Up to h ≤ 1000 m (3281 ft) without restrictions. The following restrictions apply at h ≥ 1000 m (3281 ft): • from 1000 m (3281 ft) to max. 4000 m (13120 ft): – I_N reduction by 1% per 100 m (328 ft) • from 2000 m (6562 ft) to max. 4000 m (13120 ft): – The safe disconnection of power and electronics connections can no longer be assured above 2000 m. This requires external measures (IEC 60664-1/EN 61800-5-1). – You have to connect an overvoltage protection device to reduce the overvoltages from category III to category II.

1) For long-term storage, connect the unit to the power supply for at least 5 minutes every two years, otherwise the unit's service life may be reduced.

2.2.1 MOVIDRIVE® MDX61B unit series, sizes 0 to 7

The following figure shows the MOVIDRIVE® MDX61B unit series, sizes 0 to 7

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

2.3.1 Size 0

MOVIDRIVE® MDX60/61B		0005-5A3-4-0_	0008-5A3-4-0_	0011-5A3-4-0_	0014-5A3-4-0_
Size		0S		0M	
INPUT					
Nominal line voltage (to EN 50160)	V_{line}	3 × AC 380 V - 500 V			
Line frequency	f_{line}	50 Hz ... 60 Hz ± 5%			
Nominal line current[1] **(at V_{line} = 3 × AC 400 V)**	I_{line} **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[2] **(at V_{supply} = 3 × AC 380...500 V)**	S_N	1.4 kVA	1.6 kVA	2.1 kVA	2.8 kVA
Rated output current[1] **(at V_{line} = 3 × AC 400 V)**	I_N	AC 2 A	AC 2.4 A	AC 3.1 A	AC 4 A
Continuous output current (= 125% I_N) **(at V_{line} = 3 × AC 400 V and f_{PWM} = 4 kHz)**	I_D	AC 2.5 A	AC 3 A	AC 3.8 A	AC 5 A
Continuous output current (= 100% I_N) **(at V_{line} = 3 × AC 400 V and f_{PWM} = 8 kHz)**	I_D	AC 2 A	AC 2.4 A	AC 3.1 A	AC 4 A
Current limitation I_{max}		Motor and regenerative 200% I_N, duration depending on capacity utilization			
Internal current limitation		I_{max} = 0...200% adjustable			
Minimum permitted brake resistance value (4Q operation)	R_{BWmin}	68 Ω			
Output voltage	V_O	Max. V_{line}			
PWM frequency	f_{PWM}	Adjustable: 4/8/12/16 kHz			
Speed range/resolution	n_A / Δn_A	–6000 ... 0 ... +6000 rpm / 0.2 rpm across the entire range			
GENERAL INFORMATION					
Power loss at S_N [2]	P_{Vmax}	42 W	48 W	58 W	74 W
Cooling air consumption		3 m^3/h		9 m^3/h	
Cross section of unit terminals X1, X2, X3, X4		Terminal blocks 4 mm^2 conductor end sleeves DIN 46228			
Tightening torque		0.6 Nm			

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

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

MDX60B standard version Variants with coated printed circuit boards	0005-5A3-4-00 0005-5A3-4-00/L	0008-5A3-4-00 0008-5A3-4-00/L	0011-5A3-4-00 0011-5A3-4-00/L	0014-5A3-4-00 0014-5A3-4-00/L
Part number	827 722 2 828 947 6	827 723 0 828 948 4	827 724 9 828 949 2	827 725 7 828 950 6
MDX60B Application version Variants with coated printed circuit boards	**0005-5A3-4-0T 0005-5A3-4-0T/L**	**0008-5A3-4-0T 0008-5A3-4-0T/L**	**0011-5A3-4-0T 0011-5A3-4-0T/L**	**0014-5A3-4-0T 0014-5A3-4-0T/L**
Part number	827 726 5 828 951 4	827 727 3 828 952 2	827 728 1 828 953 0	827 729 X 828 954 9
Constant load Recommended motor power P_{Mot}	0.55 kW (0.74 HP)	0.75 kW (1.0 HP)	1.1 kW (1.5 HP)	1.5 kW (2.0 HP)
Variable torque load or constant load without overload recommended motor power P_{Mot}	0.75 kW (1.0 HP)	1.1 kW (1.5 HP)	1.5 kW (2.0 HP)	2.2 kW (3.0 HP)
Weight	2.0 kg (4.4 lb)		2.5 kg (5.5 lb)	
Dimensions W × H × D	45 mm × 317 mm × 260 mm (1.8 in x 12.5 in x 10.2 in)		67.5 mm × 317 mm × 260 mm (2.66 in x 12.5 in x 10.2 in)	

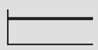
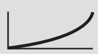
MDX61B standard version (VFC/CFC/SERVO) Variants with coated printed circuit boards	0005-5A3-4-00 0005-5A3-4-00/L	0008-5A3-4-00 0008-5A3-4-00/L	0011-5A3-4-00 0011-5A3-4-00/L	0014-5A3-4-00 0014-5A3-4-00/L
Part number	827 730 3 828 955 7	827 731 1 828 956 5	827 732 X 828 957 3	827 733 8 828 958 1
MDX61B Application version (VFC/CFC/SERVO) Variants with coated printed circuit boards MDX61B standard version (VFC/CFC/SERVO) Variants with coated printed circuit boards	**0005-5A3-4-0T 0005-5A3-4-0T/L 0005-5A3-4-00 0005-5A3-4-00/L**	**0008-5A3-4-0T 0008-5A3-4-0T/L 0008-5A3-4-00 0008-5A3-4-00/L**	**0011-5A3-4-0T 0011-5A3-4-0T/L 0011-5A3-4-00 0011-5A3-4-00/L**	**0014-5A3-4-0T 0014-5A3-4-0T/L 0014-5A3-4-00 0014-5A3-4-00/L**
Part number	827 734 6 828 960 3	827 735 4 828 961 1	827 736 2 828 963 8	827 737 0 828 964 6
Weight	2.3 kg (5.1 lb)		2.8 kg (6.2 lb)	
Dimensions W × H × D	72.5 mm × 317 mm × 260 mm (2.85 in × 12.5 in × 10.2 in)		95 mm × 317 mm × 260 mm (3.7 in × 12.5 in × 10.2 in)	
Recommended motor power	→ MOVIDRIVE® B system manual or catalog, chapter "Motor selection"			

2.3.2 Size 1 (AC 400/500 V units)

MOVIDRIVE® MDX61B		0015-5A3-4-0_	0022-5A3-4-0_	0030-5A3-4-0_	0040-5A3-4-0_
INPUT					
Nominal line voltage (to EN 50160)	V_{line}	3 × AC 380 V - 500 V			
Line frequency	f_{line}	50 Hz ... 60 Hz ± 5%			
Nominal line current[1)] (at V_{line} = 3 × AC 400 V)	I_{line} 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	AC 8.6 A AC 10.7 A
OUTPUT					
Apparent output power[2)] (at V_{supply} = 3 × AC 380...500 V)	S_N	2.8 kVA	3.8 kVA	4.9 kVA	6.6 kVA
Rated output current[1)] (at V_{line} = 3 × AC 400 V)	I_N	AC 4 A	AC 5.5 A	AC 7 A	AC 9.5 A
Continuous output current (= 125% I_N) (at V_{line} = 3 × AC 400 V and f_{PWM} = 4 kHz)	I_D	AC 5 A	AC 6.9 A	AC 8.8 A	AC 11.9 A
Continuous output current (= 100% I_N) (at V_{line} = 3 × AC 400 V and f_{PWM} = 8 kHz)	I_D	AC 4 A	AC 5.5 A	AC 7 A	AC 9.5 A
Current limitation	I_{max}	Motor and regenerative 150% I_N, duration depending on capacity utilization			
Internal current limitation		I_{max} = 0...150% adjustable			
Minimum permitted brake resistance value (4Q operation)	R_{BWmin}	68 Ω			
Output voltage	V_O	Max. V_{line}			
PWM frequency	f_{PWM}	Adjustable: 4/8/12/16 kHz			
Speed range/resolution	n_A / Δn_A	–6000 ... 0 ... +6000 rpm / 0.2 rpm across the entire range			
GENERAL INFORMATION					
Power loss at S_N [2)]	P_{Vmax}	85 W	105 W	130 W	180 W
Cooling air consumption		40 m^3/h			
Weight		3.5 kg (7.7 lb)			
Dimensions W × H × D		105 mm × 314 mm × 234 mm (4.13 in × 12.4 in × 9.21 in)			
Cross section of unit terminals X1, X2, X3, X4		Terminal blocks 4 mm^2 conductor end sleeves DIN 46228			
Tightening torque		0.6 Nm			

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

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

MDX61B Standard version Variants with coated printed circuit boards	0015-5A3-4-00 0015-5A3-4-00/L	0022-5A3-4-00 0022-5A3-4-00/L	0030-5A3-4-00 0030-5A3-4-00/L	0040-5A3-4-00 0040-5A3-4-00/L
Part number	827 957 8 1840 013 2	827 958 6 1840 014 0	827 959 4 1840 015 9	827 960 8 1840 016 7
MDX61B Application version Variants with coated printed circuit boards	**0015-5A3-4-0T 0015-5A3-4-0T/L**	**0022-5A3-4-0T 0022-5A3-4-0T/L**	**0030-5A3-4-0T 0030-5A3-4-0T/L**	**0040-5A3-4-0T 0040-5A3-4-0T/L**
Part number	827 975 6 1840 031 0	827 976 4 1840 032 9	827 977 2 1840 033 7	827 978 0 1840 034 5
 Constant load Recommended motor power P_{Mot}	1.5 kW (2.0 HP)	2.2 kW (3.0 HP)	3.0 kW (4.0 HP)	4.0 kW (5.4 HP)
 Variable torque load or constant load without overload recommended motor power P_{Mot}	2.2 kW (3.0 HP)	3.0 kW (4.0 HP)	4.0 kW (5.4 HP)	5.5 kW (7.4 HP)
Recommended motor power	→ MOVIDRIVE® B system manual or catalog, chapter "Motor selection"			

2.3.3 Sizes 2S and 2 (AC 400/500 V units)

MOVIDRIVE® MDX61B		0055-5A3-4-0_	0075-5A3-4-0_	0110-5A3-4-0_
Size		2S		2
INPUT				
Nominal line voltage (to EN 50160)	V_{line}	3 × AC 380 V - 500 V		
Line frequency	f_{line}	50 Hz ... 60 Hz ± 5%		
Nominal line current[1)] (at V_{line} = 3 × AC 400 V)	I_{line} 100% 125%	AC 11.3 A AC 14.1 A	AC 14.4 A AC 18.0 A	AC 21.6 A AC 27.0 A
OUTPUT				
Apparent output power[2)] (at V_{supply} = 3 × AC 380...500 V)	S_N	8.7 kVA	11.2 kVA	16.8 kVA
Rated output current[1)] (at V_{line} = 3 × AC 400 V)	I_N	AC 12.5 A	AC 16 A	AC 24 A
Continuous output current (= 125% I_N) (at V_{supply} = 3 × AC 400 V with f_{PWM} = 4 kHz)	I_D	AC 15.6 A	AC 20 A	AC 30 A
Continuous output current (= 100% I_N) (at V_{supply} = 3 × AC 400 V with f_{PWM} = 8 kHz)	I_D	AC 12.5 A	AC 16 A	AC 24 A
Current limitation	I_{max}	Motor and regenerative 150% I_N, duration depending on capacity utilization		
Internal current limitation		I_{max} = 0...150% adjustable		
Minimum permitted brake resistance value (4Q operation)	R_{BWmin}	47 Ω		22 Ω
Output voltage	V_O	Max. V_{line}		
PWM frequency	f_{PWM}	Adjustable: 4/8/12/16 kHz		
Speed range/resolution	n_A / Δn_A	–6000 ... 0 ... +6000 rpm / 0.2 rpm across the entire range		
GENERAL INFORMATION				
Power loss at S_N [2)]	P_{Vmax}	220 W	290 W	400 W
Cooling air consumption		80 m^3/h		
Weight		6.6 kg (15 lb)		
Dimensions W × H × D		105 mm × 335 mm × 294 mm (4.13 in × 13.2 in × 11.6 in)		135 mm × 315 mm × 285 mm (5.31 in × 12.4 in × 11.2 in)
Cross section of unit terminals X1, X2, X3, X4		Terminal blocks 4 mm^2 conductor end sleeves DIN 46228		M4 screw and washer assembly with terminal clip 4 mm^2 conductor end sleeve DIN 46228 6 mm^2 crimp cable lug DIN 46234
Tightening torque		0.6 Nm		1.5 Nm

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

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

MDX61B Standard version Variants with coated printed circuit boards	0055-5A3-4-00 0055-5A3-4-00/L	0075-5A3-4-00 0075-5A3-4-00/L	0110-5A3-4-00 0110-5A3-4-00/L
Part number	827 961 6 1840 017 5	827 962 4 1840 018 3	827 963 2 1840 019 1
MDX61B Application version Variants with coated printed circuit boards	**0055-5A3-4-0T 0055-5A3-4-0T/L**	**0075-5A3-4-0T 0075-5A3-4-0T/L**	**0110-5A3-4-0T 0110-5A3-4-0T/L**
Part number	827 979 9 1840 035 3	827 980 2 1840 036 1	827 981 0 1840 038 8
Constant load **Recommended motor power P_{Mot}**	5.5 kW (7.4 HP)	7.5 kW (10 HP)	11 kW (15 HP)
Variable torque load or constant load without overload recommended motor power P_{Mot}	7.5 kW (10 HP)	11 kW (15 HP)	15 kW (20 HP)
Recommended motor power	→ MOVIDRIVE® B system manual or catalog, chapter "Motor selection"		

2.3.4 Size 3 (AC 400/500 V units)

MOVIDRIVE® MDX61B		0150-503-4-0_	0220-503-4-0_	0300-503-4-0_
INPUT				
Nominal line voltage (to EN 50160)	V_{line}	3 × AC 380 V - 500 V		
Line frequency	f_{line}	50 Hz ... 60 Hz ± 5%		
Nominal line current[1)] I_{line} (at V_{line} = 3 × AC 400 V)	100% 125%	AC 28.8 A AC 36 A	AC 41.4 A AC 51.7 A	AC 54 A AC 67.5 A
OUTPUT				
Apparent output power[2)] (at V_{supply} = 3 × AC 380...500 V)	S_N	22.2 kVA	31.9 kVA	41.6 kVA
Rated output current[1)] (at V_{line} = 3 × AC 400 V)	I_N	AC 32 A	AC 46 A	AC 60 A
Continuous output current (= 125% I_N) (at V_{supply} = 3 × AC 400 V with f_{PWM} = 4 kHz)	I_D	AC 40 A	AC 57.5 A	AC 75 A
Continuous output current (= 100% I_N) (at V_{supply} = 3 × AC 400 V with f_{PWM} = 8 kHz)	I_D	AC 32 A	AC 46 A	AC 60 A
Current limitation	I_{max}	Motor and regenerative 150% I_N, duration depending on capacity utilization		
Internal current limitation		I_{max} = 0...150% adjustable		
Minimum permitted brake resistance value (4Q operation)	R_{BWmin}	15 Ω	12 Ω	
Output voltage	V_O	Max. V_{line}		
PWM frequency	f_{PWM}	Adjustable: 4/8/12/16 kHz		
Speed range/resolution	n_A / Δn_A	–6000 ... 0 ... +6000 rpm / 0.2 rpm across the entire range		
GENERAL INFORMATION				
Power loss at S_N [2)]	P_{Vmax}	550 W	750 W	950 W
Cooling air consumption		180 m^3/h		
Weight		15.0 kg (33 lb)		
Dimensions W × H × D		200 mm × 465 mm × 308 mm (7.87 in × 18.3 in × 12.1 in)		
Cross section of unit terminals X1, X2, X3, X4		M6 screw with washer max. 25 mm^2 Crimp cable lug DIN 46234		
Tightening torque		3.5 Nm		

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

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

MDX61B Standard version Variants with coated printed circuit boards	0150-503-4-00 0150-503-4-00/L	0220-503-4-00 0220-503-4-00/L	0300-503-4-00 0300-503-4-00/L
Part number	827 964 0 1840 020 5	827 965 9 1840 021 3	827 966 7 1840 022 1
MDX61B Application version Variants with coated printed circuit boards	**0150-503-4-0T 0150-503-4-0T/L**	**0220-503-4-0T 0220-503-4-0T/L**	**0300-503-4-0T 0300-503-4-0T/L**
Part number	827 982 9 1840 039 6	827 983 7 1840 041 8	827 984 5 1840 042 6
Constant load Recommended motor power P_{Mot}	15 kW (20 HP)	22 kW (30 HP)	30 kW (40 HP)
Variable torque load or constant load without overload recommended motor power P_{Mot}	22 kW (30 HP)	30 kW (40 HP)	37 kW (50 HP)
Recommended motor power	→ MOVIDRIVE® B system manual or catalog, chapter "Motor selection"		

2.3.5 Size 4 (AC 400/500 V units)

MOVIDRIVE® MDX61B		0370-503-4-0_	0450-503-4-0_
INPUT			
Nominal line voltage (to EN 50160)	V_{line}	3 × AC 380 V - 500 V	
Line frequency	f_{line}	50 Hz ... 60 Hz ± 5%	
Nominal line current[1] I_{line} (at V_{line} = 3 × AC 400 V)	100% 125%	AC 65.7 A AC 81.9 A	AC 80.1 A AC 100.1 A
OUTPUT			
Apparent output power[2] (at V_{supply} = 3 × AC 380...500 V)	S_N	51.1 kVA	62.3 kVA
Rated output current[1] (at V_{line} = 3 × AC 400 V)	I_N	AC 73 A	AC 89 A
Continuous output current (= 125% I_N) (at V_{supply} = 3 × AC 400 V with f_{PWM} = 4 kHz)	I_D	AC 91 A	AC 111 A
Continuous output current (= 100% I_N) (at V_{supply} = 3 × AC 400 V with f_{PWM} = 8 kHz)	I_D	AC 73 A	AC 89 A
Current limitation	I_{max}	Motor and regenerative 150% I_N, duration depending on capacity utilization	
Internal current limitation		I_{max} = 0...150% adjustable	
Minimum permitted brake resistance value (4Q operation)	R_{BWmin}	6 Ω	
Output voltage	V_O	Max. V_{line}	
PWM frequency	f_{PWM}	Adjustable: 4/8/12/16 kHz	
Speed range/resolution	n_A / Δn_A	–6000 ... 0 ... +6000 rpm / 0.2 rpm across the entire range	
GENERAL INFORMATION			
Power loss at S_N [2]	P_{Vmax}	1200 W	1450 W
Cooling air consumption		180 m^3/h	
Weight		27 kg (60 lb)	
Dimensions W × H × D		280 mm × 522 mm × 307 mm (11.0 in × 20.6 in × 12.1 in)	
Cross section of unit terminals X1, X2, X3, X4		M10 bolt with nut Max. 70 mm^2 Press cable lug DIN 46235	
Tightening torque		14 Nm	

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

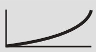
MDX61B Standard version Variants with coated printed circuit boards	0370-503-4-00 0370-503-4-00/L	0450-503-4-00 0450-503-4-00/L
Part number	827 967 5 1840 024 8	827 968 3 1840 025 6
MDX61B Application version Variants with coated printed circuit boards	**0370-503-4-0T 0370-503-4-0T/L**	**0450-503-4-0T 0450-503-4-0T/L**
Part number	827 985 3 1840 043 4	827 986 1 1840 044 2
Constant load Recommended motor power P_{Mot}	37 kW (50 HP)	45 kW (60 HP)
Variable torque load or constant load without overload recommended motor power P_{Mot}	45 kW (60 HP)	55 kW (74 HP)
Recommended motor power	→ MOVIDRIVE® B system manual or catalog, chapter "Motor selection"	

2.3.6 Size 5 (AC 400/500 V units)

MOVIDRIVE® MDX61B		0550-503-4-0_	0750-503-4-0_
INPUT			
Nominal line voltage (to EN 50160)	V_{line}	3 × AC 380 V - 500 V	
Line frequency	f_{line}	50 Hz ... 60 Hz ± 5%	
Nominal line current1) (at V_{line} = 3 × AC 400 V)	I_{line} 100% 125%	AC 94.5 A AC 118.1 A	AC 117 A AC 146.3 A
OUTPUT			
Apparent output power2) (at V_{line} = 3 × AC 380...500 V)	S_N	73.5 kVA	91.0 kVA
Rated output current1) (at V_{line} = 3 × AC 400 V)	I_N	AC 105 A	AC 130 A
Continuous output current (= 125% I_N) (at V_{line} = 3 × AC 400 V with f_{PWM} = 4 kHz)	I_D	AC 131 A	AC 162 A
Continuous output current (= 100% I_N) (at V_{line} = 3 × AC 400 V with f_{PWM} = 8 kHz)	I_D	AC 105 A	AC 130 A
Current limitation I_{max}		Motor and regenerative 150% I_N, duration depending on capacity utilization	
Internal current limitation		I_{max} = 0...150% adjustable	
Minimum permitted brake resistance value (4Q operation)	R_{BWmin}	6 Ω	4 Ω
Output voltage	V_O	Max. V_{line}	
PWM frequency	f_{PWM}	Adjustable: 4/8/12/16 kHz	
Speed range/resolution	n_A / Δn_A	–6000 ... 0 ... +6000 rpm / 0.2 rpm across the entire range	
GENERAL INFORMATION			
Power loss at S_N 2)	P_{Vmax}	1700 W	2000 W
Cooling air consumption		360 m^3/h	
Weight		35 kg (77 lb)	
Dimensions W × H × D		280 mm × 610 mm × 330 mm (11.0 in × 24.0 in × 13.0 in)	
Cross section of unit terminals X1, X2, X3, X4		M10 bolt with nut Max. 70 mm^2 Press cable lug DIN 46235	
Tightening torque		14 Nm	

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

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

MDX61B Standard version Variants with coated printed circuit boards	0550-503-4-00 0550-503-4-00/L	0750-503-4-00 0750-503-4-00/L
Part number	827 969 1 1840 026 4	827 970 5 1840 027 2
MDX61B Application version Variant with coated printed circuit boards	**0550-503-4-0T 0550-503-4-0T/L**	**0750-503-4-0T 0750-503-4-0T/L**
Part number	827 988 8 1840 045 0	827 989 6 1840 046 9
 Constant load Recommended motor power P_{Mot}	55 kW (74 HP)	75 kW (100 HP)
 Variable torque load or constant load without overload recommended motor power P_{Mot}	75 kW (100 HP)	90 kW (120 HP)
Recommended motor power	→ MOVIDRIVE® B system manual or catalog, chapter "Motor selection"	

2.3.7 Size 6 (AC 400/500 V units)

MOVIDRIVE® MDX61B	0900-503-4-0_	1100-503-4-0_	1320-503-4-0_
INPUT			
Nominal line voltage (to EN 50160) V_{line}	3 × AC 380 V - 500 V		
Line frequency f_{line}	50 Hz ... 60 Hz ± 5%		
Nominal line current[1] I_{line} 100% (at V_{line} = 3 × AC 400 V) 125%	AC 153 A AC 191 A	AC 180 A AC 225 A	AC 225 A AC 281 A
OUTPUT			
Apparent output power[2] S_N (at V_{supply} = 3 × AC 380...500 V)	118 kVA	139 kVA	174 kVA
Rated output current[1] I_N (at V_{line} = 3 × AC 400 V)	AC 170 A	AC 200 A	AC 250 A
Continuous output current (= 125% I_N) I_D (at V_{supply} = 3 × AC 400 V with f_{PWM} = 4 kHz)	AC 212 A	AC 250 A	AC 312 A
Continuous output current (= 100% I_N) I_D (at V_{supply} = 3 × AC 400 V with f_{PWM} = 4 kHz) Temperature range 0 °C ... +50 °C	AC 170 A	AC 200 A	AC 250 A
Current limitation I_{max}	Motor and regenerative 150% I_N, duration depending on capacity utilization		
Internal current limitation	I_{max} = 0...150% adjustable		
Minimum permitted brake resistance value (4Q operation) R_{BWmin}	2.7 Ω		
Output voltage V_O	Max. V_{line}		
PWM frequency f_{PWM}	Adjustable: 4 or 8 kHz		
Speed range/resolution n_A / Δn_A	–6000 ... 0 ... +6000 rpm / 0.2 rpm across the entire range		
GENERAL INFORMATION			
Power loss at S_N [2] P_{Vmax}	2300 W	2500 W	2700 W
Cooling air consumption	600 m^3/h		
Weight	60 kg (130 lb)		
Dimensions W × H × D	280 mm × 1000 mm × 382 mm (11.0 in × 39.37 in × 15.0 in)		
Cross section of unit terminals X1, X2, X3, X4	M12 bolt with nut Max. 185 mm^2 Press cable lug DIN 46235		
Tightening torque	20 Nm		

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

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

MDX61B Standard version Variants with coated printed circuit boards	0900-503-4-00 0900-503-4-00/L	1100-503-4-00 1100-503-4-00/L	1320-503-4-00 1320-503-4-00/L
Part number	827 971 3 1840 028 0	827 972 1 1840 029 9	827 974 8 1840 030 2
MDX61B Application version Variants with coated printed circuit boards	**0900-503-4-0T 0900-503-4-0T/L**	**1100-503-4-0T 1100-503-4-0T/L**	**1320-503-4-0T 1320-503-4-0T/L**
Part number	827 991 8 1840 047 7	827 992 6 1840 048 5	827 993 4 1840 049 3
Constant load Recommended motor power P_{Mot}	90 kW (120 HP)	110 kW (148 HP)	132 kW (177 HP)
Variable torque load or constant load without overload recommended motor power P_{Mot}	110 kW (148 HP)	132 kW (177 HP)	160 kW (215 HP)
Recommended motor power	→ MOVIDRIVE® B system manual or catalog, chapter "Motor selection"		

2.3.8 Size 7 (AC 400/500 V units)

MOVIDRIVE® MDX61B		1600-503-2-0T/L 1600-503-4-0T/L	2000-503-2-0T/L 2000-503-4-0T/L	2500-503-2-0T/L 2500-503-4-0T/L
INPUT				
Nominal line voltage (to EN 50160)	V_{line}	3 × AC 380 V - 500 V		
Line frequency	f_{line}	50 Hz ... 60 Hz ± 5%		
Nominal line current[1] I_{line} (at V_{line} = 3 × AC 400 V)	100% 125%	AC 280 A AC 340 A	AC 340 A AC 425 A	AC 435 A AC 535 A
OUTPUT				
Apparent output power[2] (at V_{line} = 3 × AC 380...500 V)	S_N	208 kVA	263 kVA	326 kVA
Rated output current[1] (at V_{line} = 3 × AC 400 V)	I_N	AC 300 A	AC 380 A	AC 470 A
Continuous output current (= 125% I_N) (at V_{line} = 3 × AC 400 V with f_{PWM} = 2.5 kHz)	I_D	AC 375 A	AC 475 A	AC 588 A
Continuous output current (= 100% I_N) (at V_{line} = 3 × AC 400 V with f_{PWM} = 2.5 kHz) Temperature range 0 °C ... +50 °C	I_D	AC 300 A	AC 380 A	AC 470 A
Current limitation	I_{max}	Motor and regenerative 150% I_N, duration depending on capacity utilization		
Internal current limitation		I_{max} = 0...150% adjustable		
Minimum permitted brake resistance value (4Q operation)	R_{BWmin}	1.1 Ω		
Output voltage	V_O	Max. V_{line}		
PWM frequency	f_{PWM}	Adjustable: 2.5 or 4 kHz		
Speed range/resolution	n_A / Δn_A	–6000 ... 0 ... +6000 rpm / 0.2 rpm across the entire range		
GENERAL INFORMATION				
Power loss at S_N [2]	P_{Vmax}	3000 W	3600 W	4400 W
Cooling air consumption		1200 m^3/h		
Weight		2Q variant: 260 kg (573 lb) 4Q variant: 280 kg (617 lb)		
Dimensions W × H × D		700 mm × 1490 mm × 470 mm (27.6 in × 58.7 in × 18.5 in)		
Conductor rails	X1, X2, X3	Connection rail with bore for M12 Max. 2 x 240 mm^2 Press cable lug DIN 46235		
Tightening torque		70 Nm (620 lb in)		

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

2) The performance data applies to f_{PWM} = 2.5 kHz.

MDX61B Application version With coated printed circuit boards	1600-503-2-0T/L 1600-503-4-0T/L	2000-503-2-0T/L 2000-503-4-0T/L	2500-503-2-0T/L 2500-503-4-0T/L
Part number	829 976 5 829 980 3	829 977 3 829 981 1	829 978 1 829 983 8
Constant load Recommended motor power P_{Mot}	160 kW (215 HP)	200 kW (268 HP)	250 kW (335 HP)
Variable torque load or constant load without overload Recommended motor power P_{Mot}	200 kW (268 HP)	250 kW (335 HP)	315 kW (422 HP)
Recommended motor power	→ MOVIDRIVE® B system manual or catalog, chapter "Motor selection"		

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

2.4.1 Size 1 (AC 230 V units)

MOVIDRIVE® MDX61B		0015-2A3-4-0_	0022-2A3-4-0_	0037-2A3-4-0_
INPUT				
Nominal line voltage (to EN 50160)	V_{line}	3 × AC 200 V - 240 V		
Line frequency	f_{line}	50 Hz ... 60 Hz ± 5%		
Rated supply current I_{line} (at V_{line} = 3 × AC 230 V)	100% 125%	AC 6.7 A AC 8.4 A	AC 7.8 A AC 9.8 A	AC 12.9 A AC 16.1 A
OUTPUT				
Apparent output power[1] (at V_{line} = 3 × AC 230...240 V)	S_N	2.7 kVA	3.4 kVA	5.8 kVA
Nominal output current (at V_{line} = 3 × AC 230 V)	I_N	AC 7.3 A	AC 8.6 A	AC 14.5 A
Continuous output current (= 125% I_N) (at V_{line} = 3 × AC 230 V with f_{PWM} = 4 kHz)	I_D	AC 9.1 A	AC 10.8 A	AC 18.1 A
Continuous output current (= 100% I_N) (at V_{line} = 3 × AC 230 V with f_{PWM} = 8 kHz)	I_D	AC 7.3 A	AC 8.6 A	AC 14.5 A
Current limitation	I_{max}	Motor and regenerative 150% I_N, duration depending on capacity utilization		
Internal current limitation		I_{max} = 0...150% adjustable		
Minimum permitted brake resistance value (4Q operation)	R_{BWmin}	27 Ω		
Output voltage	V_O	Max. V_{line}		
PWM frequency	f_{PWM}	Adjustable: 4/8/12/16 kHz		
Speed range/resolution	n_A / Δn_A	–6000 ... 0 ... +6000 rpm / 0.2 rpm across the entire range		
GENERAL INFORMATION				
Power loss at S_N [1]	P_{Vmax}	110 W	126 W	210 W
Cooling air consumption		40 m^3/h		
Weight		2.8 kg (6.2 lb)		
Dimensions W × H × D		105 mm × 314 mm × 234 mm (4.13 in × 12.4 in × 9.21 in)		
Cross section of unit terminals X1, X2, X3, X4		Separable terminal strip 4 mm^2 conductor end sleeve DIN 46228		
Tightening torque		0.6 Nm		

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

MDX61B Standard version	0015-2A3-4-00	0022-2A3-4-00	0037-2A3-4-00
Part number	827 994 2	827 995 0	827 996 9
MDX61B Application version	**0015-2A3-4-0T**	**0022-2A3-4-0T**	**0037-2A3-4-0T**
Part number	828 003 7	828 004 5	828 005 3
Constant load Recommended motor power P_{Mot}	1.5 kW (2.0 HP)	2.2 kW (3.0 HP)	3.7 kW (5.0 HP)
Variable torque load or constant load without overload recommended motor power P_{Mot}	2.2 kW (3.0 HP)	3.7 kW (5.0 HP)	5.0 kW (6.7 HP)
Recommended motor power	→ MOVIDRIVE® B system manual, section "Motor selection"		

2.4.2 Size 2 (AC 230 V units)

MOVIDRIVE® MDX61B		0055-2A3-4-0_	0075-2A3-4-0_
INPUT			
Nominal line voltage (to EN 50160)	V_{line}	3 × AC 200 V - 240 V	
Line frequency	f_{line}	50 Hz ... 60 Hz ± 5%	
Rated supply current (at V_{line} = 3 × AC 230 V)	I_{supply} 100% 125%	AC 19.5 A AC 24.4 A	AC 27.4 A AC 34.3 A
OUTPUT			
Apparent output power[1)] (at V_{line} = 3 × AC 230...240 V)	S_N	8.8 kVA	11.6 kVA
Nominal output current (at V_{line} = 3 × AC 230 V)	I_N	AC 22 A	AC 29 A
Continuous output current (= 125% I_N) (at V_{line} = 3 × AC 230 V with f_{PWM} = 4 kHz)	I_D	AC 27.5 A	AC 36.3 A
Continuous output current (= 100% I_N) (at V_{line} = 3 × AC 230 V with f_{PWM} = 8 kHz)	I_D	AC 22 A	AC 29 A
Current limitation	I_{max}	Motor and regenerative 150% I_N, duration depending on capacity utilization	
Internal current limitation		I_{max} = 0...150% adjustable	
Minimum permitted brake resistance value (4Q operation)	R_{BWmin}	12 Ω	
Output voltage	V_O	Max. V_{line}	
PWM frequency	f_{PWM}	Adjustable: 4/8/12/16 kHz	
Speed range/resolution	n_A / Δ n_A	–6000 ... 0 ... +6000 rpm / 0.2 rpm across the entire range	
GENERAL INFORMATION			
Power loss at S_N [1)]	P_{Vmax}	300 W	380 W
Cooling air consumption		80 m^3/h	
Weight		5.9 kg (13 lb)	
Dimensions W × H × D		135 mm × 315 mm × 285 mm (5.31 in × 12.4 in × 11.2 in)	
Cross section of unit terminals X1, X2, X3, X4		M4 screw and washer assembly with terminal clip 4 mm^2 conductor end sleeve DIN 46228 6 mm^2 crimp cable lug DIN 46234	
Tightening torque		1.5 Nm	

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

MDX61B Standard version	0055-2A3-4-00	0075-2A3-4-00
Part number	827 997 7	827 998 5
MDX61B Application version	0055-2A3-4-0T	0075-2A3-4-0T
Part number	828 006 1	828 008 8
Constant load Recommended motor power P_{Mot}	5.5 kW (7.4 HP)	7.5 kW (10 HP)
Variable torque load or constant load without overload recommended motor power P_{Mot}	7.5 kW (10 HP)	11 kW (15 HP)
Recommended motor power	→ MOVIDRIVE® B system manual, section "Motor selection"	

2.4.3 Size 3 (AC 230 V units)

MOVIDRIVE® MDX61B	0110-203-4-0_	0150-203-4-0_
INPUT		
Nominal line voltage (to EN 50160) V_{line}	3 × AC 200 V - 240 V	
Line frequency f_{line}	50 Hz ... 60 Hz ± 5%	
Rated supply current I_{line} **100%** **(at V_{line} = 3 × AC 230 V)** **125%**	AC 40 A AC 50 A	AC 49 A AC 61 A
OUTPUT		
Apparent output power[1] S_N **(at V_{line} = 3 × AC 230...240 V)**	17.1 kVA	21.5 kVA
Nominal output current I_N **(at V_{line} = 3 × AC 230 V)**	AC 42 A	AC 54 A
Continuous output current (= 125% I_N) I_D **(at V_{line} = 3 × AC 230 V with f_{PWM} = 4 kHz)**	AC 52.5 A	AC 67.5 A
Continuous output current (= 100% I_N) I_D **(at V_{line} = 3 × AC 230 V with f_{PWM} = 8 kHz)**	AC 42 A	AC 54 A
Current limitation I_{max}	Motor and regenerative 150% I_N, duration depending on capacity utilization	
Internal current limitation	I_{max} = 0...150% adjustable	
Minimum permitted brake resistance value (4Q operation) R_{BWmin}	7.5 Ω	5.6 Ω
Output voltage V_O	Max. V_{line}	
PWM frequency f_{PWM}	Adjustable: 4/8/12/16 kHz	
Speed range/resolution n_A / Δn_A	–6000 ... 0 ... +6000 rpm / 0.2 rpm across the entire range	
GENERAL INFORMATION		
Power loss at S_N[1] P_{Vmax}	580 W	720 W
Cooling air consumption	180 m^3/h	
Weight	14.3 kg (31.5 lb)	
Dimensions W × H × D	200 mm × 465 mm × 308 mm (7.87 in × 18.3 in × 12.1 in)	
Cross section of unit terminals X1, X2, X3, X4	M6 screw and washer assembly with washer max. 25 mm^2 Crimp cable lug DIN 46234	
Tightening torque	3.5 Nm	

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

MDX61B Standard version	0110-203-4-00	0150-203-4-00
Part number	827 999 3	828 000 2
MDX61B Application version	**0110-203-4-0T**	**0150-203-4-0T**
Part number	828 009 6	828 011 8
Constant load **Recommended motor power P_{Mot}**	11 kW (15 HP)	15 kW (20 HP)
Variable torque load or constant load without overload recommended motor power P_{Mot}	15 kW (20 HP)	22 kW (30 HP)
Recommended motor power	→ MOVIDRIVE® B system manual, section "Motor selection"	

2.4.4 Size 4 (AC 230 V units)

MOVIDRIVE® MDX61B		0220-203-4-0_	0300-203-4-0_
INPUT			
Nominal line voltage (to EN 50160)	V_{line}	3 × AC 200 V - 240 V	
Line frequency	f_{line}	50 Hz ... 60 Hz ± 5%	
Rated supply current (at V_{line} = 3 × AC 230 V)	I_{line} 100% 125 %	AC 72 A AC 90 A	AC 86 A AC 107 A
OUTPUT			
Apparent output power[1)] (at V_{line} = 3 × AC 230...240 V)	S_N	31.8 kVA	37.8 kVA
Nominal output current (at V_{line} = 3 × AC 230 V)	I_N	AC 80 A	AC 95 A
Continuous output current (= 125 % I_N) (at V_{line} = 3 × AC 230 V with f_{PWM} = 4 kHz)	I_D	AC 100 A	AC 118 A
Continuous output current (= 100 % I_N) (at V_{line} = 3 × AC 230 V with f_{PWM} = 4 kHz)	I_D	AC 80 A	AC 95 A
Current limitation	I_{max}	Motor and regenerative 150% I_N, duration depending on capacity utilization	
Internal current limitation		I_{max} = 0...150 % adjustable	
Minimum permitted brake resistance value (4Q operation)	R_{BWmin}	3 Ω	
Output voltage	V_O	Max. V_{line}	
PWM frequency	f_{PWM}	Adjustable: 4/8/12/16 kHz	
Speed range/resolution	n_A / Δn_A	–6000 ... 0 ... +6000 rpm / 0.2 rpm across the entire range	
GENERAL INFORMATION			
Power loss at S_N [1)]	P_{Vmax}	1100 W	1300 W
Cooling air consumption		180 m^3/h	
Weight		26.3 kg (57 lb)	
Dimensions W × H × D		280 mm × 522 mm × 307mm (11.0 in × 20.6 in × 12.1 in)	
Cross section of unit terminals X1, X2, X3, X4		M10 bolt with nut max. 70 mm^2 Press cable lug DIN 46235	
Tightening torque		3.5 Nm	

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

MDX61B Standard version	0220-203-4-00	0300-203-4-00
Part number	828 001 0	828 002 9
MDX61B Application version	**0220-203-4-0T**	**0300-203-4-0T**
Part number	828 012 6	828 013 4
Constant load Recommended motor power P_{Mot}	22 kW (30 HP)	30 kW (40 HP)
Variable torque load or constant load without overload recommended motor power P_{Mot}	30 kW (40 HP)	37 kW (50 HP)
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 X11:1 for setpoint input X11:5	REF1: DC+10 V +5% / –0%, I_{max} = DC 3 mA REF2: DC–10 V +0% / –5%, I_{max} = DC 3 mA	Reference voltages for setpoint potentiometer
Setpoint input n1 X11:2/X11:3	AI11/AI12: Voltage or current input, can be set with S11 and P11_, sampling interval 1 ms	
(differential input) Operating mode AI11/AI12 Resolution Internal resistance	Voltage input: n1 = DC 0...+10 V or DC –10 V...0...+10 V 12 bit R_i = 40 kΩ (external voltage supply) R_i = 20 kΩ (supply from REF1/REF2)	Current input: n1 = DC 0...20 mA or DC 4...20 mA 11 bit R_i = 250 Ω
Internal setpoints	Parameter set 1: n11/n12/n13 = –6000...0...+6000 rpm Parameter set 2: n21/n22/n23 = –6000...0...+6000 rpm	
Time ranges of the speed ramps at Δn = 3000 rpm	1st ramp t11/t21 up: 0...2000 s down: 0..2000 s 2nd 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[1)] X13:8/X10:8	VO24: V_{OUT} = DC 24 V, maximum current carrying capacity I_{max} = DC 400 mA	
External voltage supply[1)] X10:9	VI24: V_{IN} = DC 24 V –15% / +20% according to EN 61131-2 With size 7, connect 24 V backup voltage via the DC power supply unit. No connection at the control unit.	
Binary inputs X13:1...X13:6 and X16:1/X16:2 Internal resistance	Isolated (optocoupler), PLC-compatible (EN 61131), sampling interval 1 ms DIØØ...DIØ5 and DIØ6/DIØ7 R_i ≈ 3 kΩ, I_E ≈ DC 10 mA	
Signal level	DC +13 V...+30 V = "1" = Contact closed DC –3 V...+5 V = "0" = Contact open	according to EN 61131
Function X13:1 X13:2...X13:6, X16:1/X16:2	DIØØ: With fixed assignment "/Controller inhibit" DIØ1...DIØ5, DIØ6/DIØ7: Selection option → Parameter menu P60_	
Binary outputs[1)] X10:3/X10:7 and X16:3...X16:5	PLC-compatible (EN 61131-2), response time 1 ms DBØØ/DOØ2 and DOØ3...DOØ5	
Signal level	"0" = DC 0 V "1" = DC +24 V **Important:** Do not apply external voltage!	
Function X10:3 X10:7, X16:3...X16:5	DBØØ: With fixed assignment "/Brake", I_{max} = DC 150 mA, short-circuit proof, protected against external voltage to DC 30 V DOØ2, DOØ3...DOØ5: Selection option → Parameter menu P62_, I_{max} = DC 50 mA, short-circuit proof, protected against external voltage to DC 30 V	
Relay output X10:4...X10:6	DOØ1: Load capacity of the relay contacts U_{max} = DC 30 V, I_{max} = DC 800 mA	
Function X10:4 X10:5 X10:6	DOØ1-C: Shared relay contact DOØ1-NO: Normally open contact DOØ1-NC: NC 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 (120 Ω) can be activated using DIP switches
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} ≥ 2.9 kΩ ± 10%	

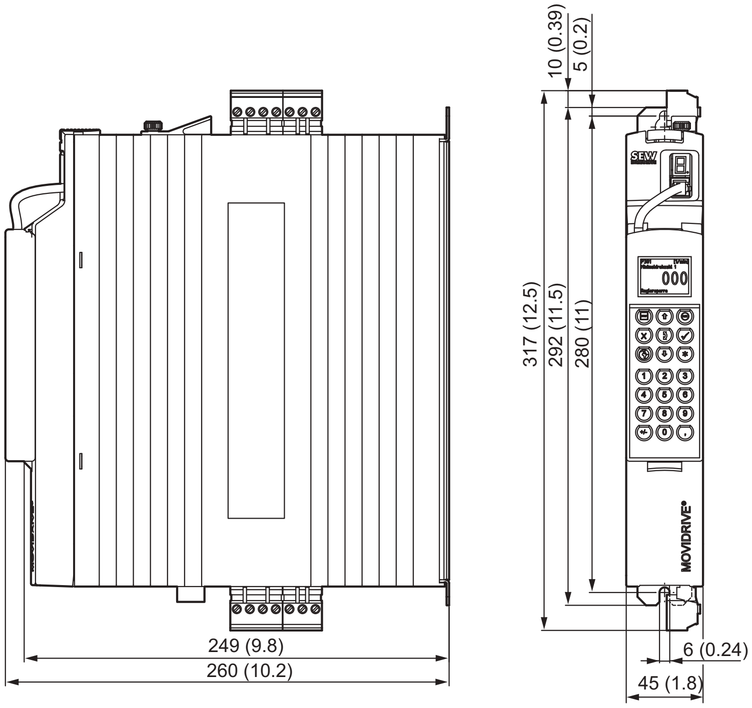
1) The unit provides a current of I_{max} = DC 400 mA for the DC+24 V outputs (VO24, binary outputs). If this value is insufficient, a DC 24 V voltage supply must be connected to X10:9 (VI24).

MOVIDRIVE® MDX60/61B	General electronics data
Reference terminals X11:4 X12:1/X13:9/X16:6/X10:2/X10:10 X13:7	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)
Permitted cable cross section	One core per terminal: 0.20...2.5 mm^2 (AWG 24...12) Two cores per terminal: 0.25...1 mm^2 (AWG 22...17)
Safety contact X17:1 X17:2 X17:3 X17:4	DGND: Reference potential for X17:2 VO24: : V_{OUT} = DC 24 V, only to supply X17:4 of the same unit; **cannot be used** to supply other units. SOV24: Reference potential for DC +24 V "STO" input (safety contact) SVI24: DC+24 V "STO" input (safety contact)
Permitted cable cross section	One core per terminal: 0.08...1.5 mm^2 (AWG28...16) Two cores per terminal: 0.25 ... 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 Size 7: 6 W
Input capacitance X17:4	Size 0: 27 µF Sizes 1...7: 270 µF
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*

2.6.1 Size 0S

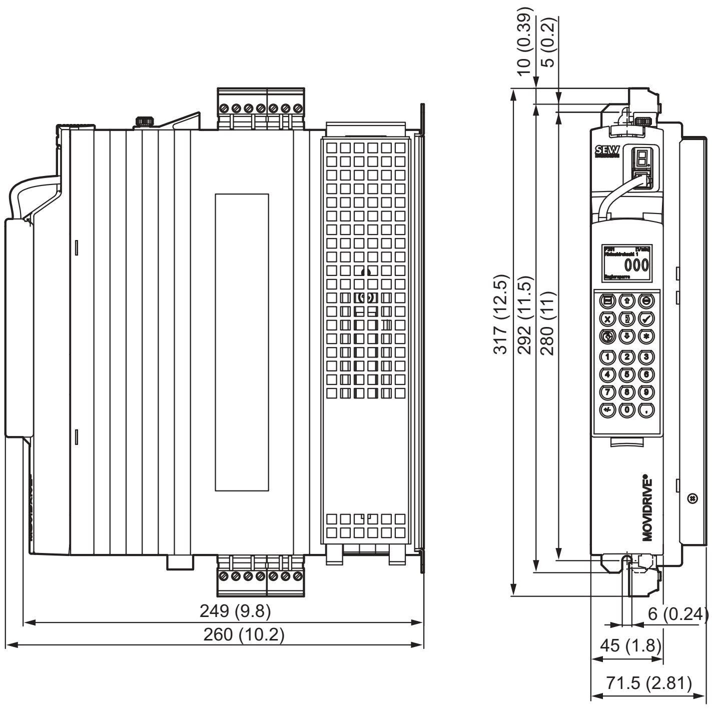
The following dimension drawing shows MDX60B size 0S, dimensions in mm (in)



1940795915

2.6.2 Size 0S with mounted braking resistor

The following dimension drawing shows MDX60B size 0S with braking resistor, dimensions in mm (in)



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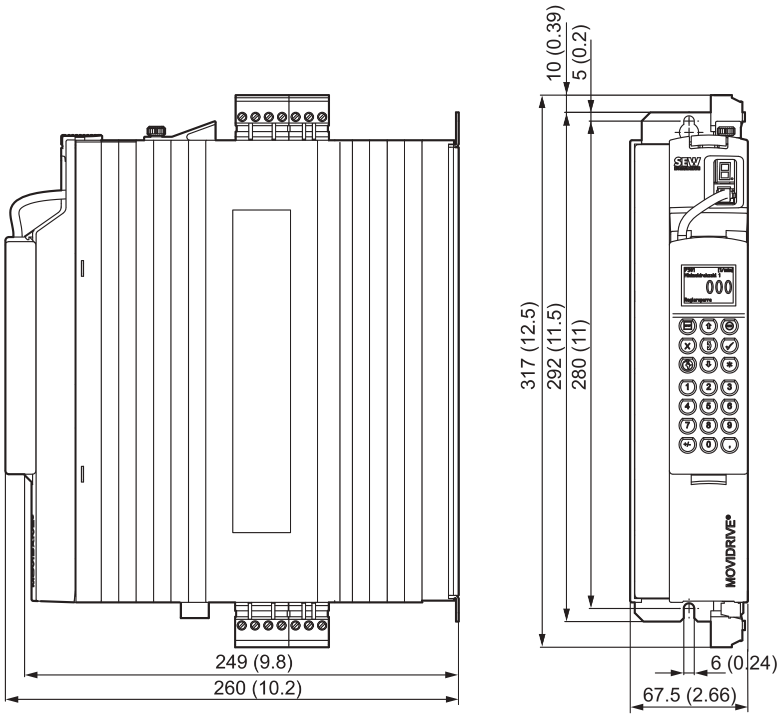
2.6.3 Size 0M

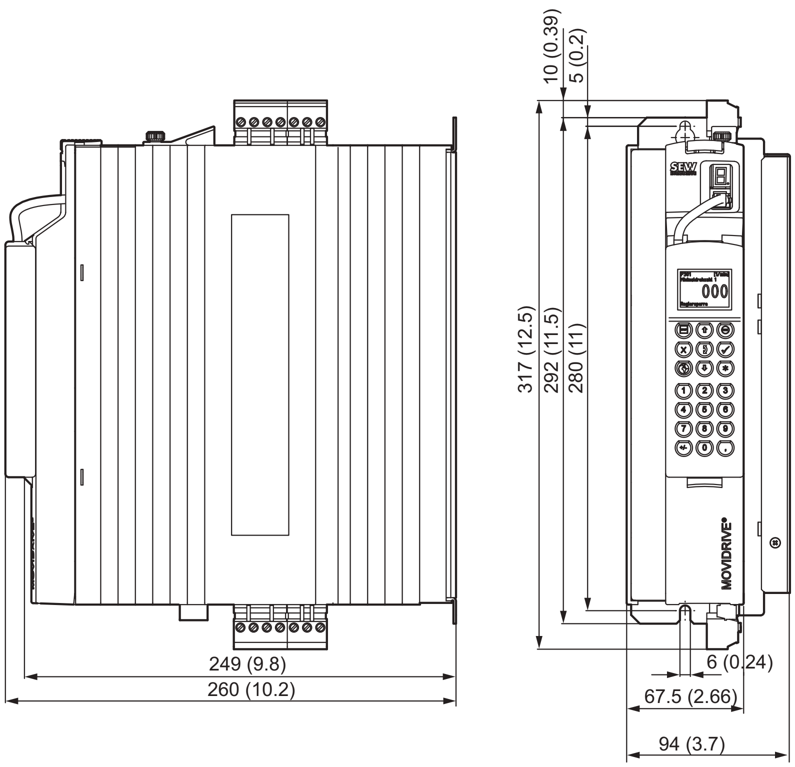
The following dimension drawing shows MDX60B size 0M, dimensions in mm (in)



1940843915

2.6.4 Size 0M with mounted braking resistor

The following dimension drawing shows MDX60B size 0M with braking resistor, dimensions in mm (in)



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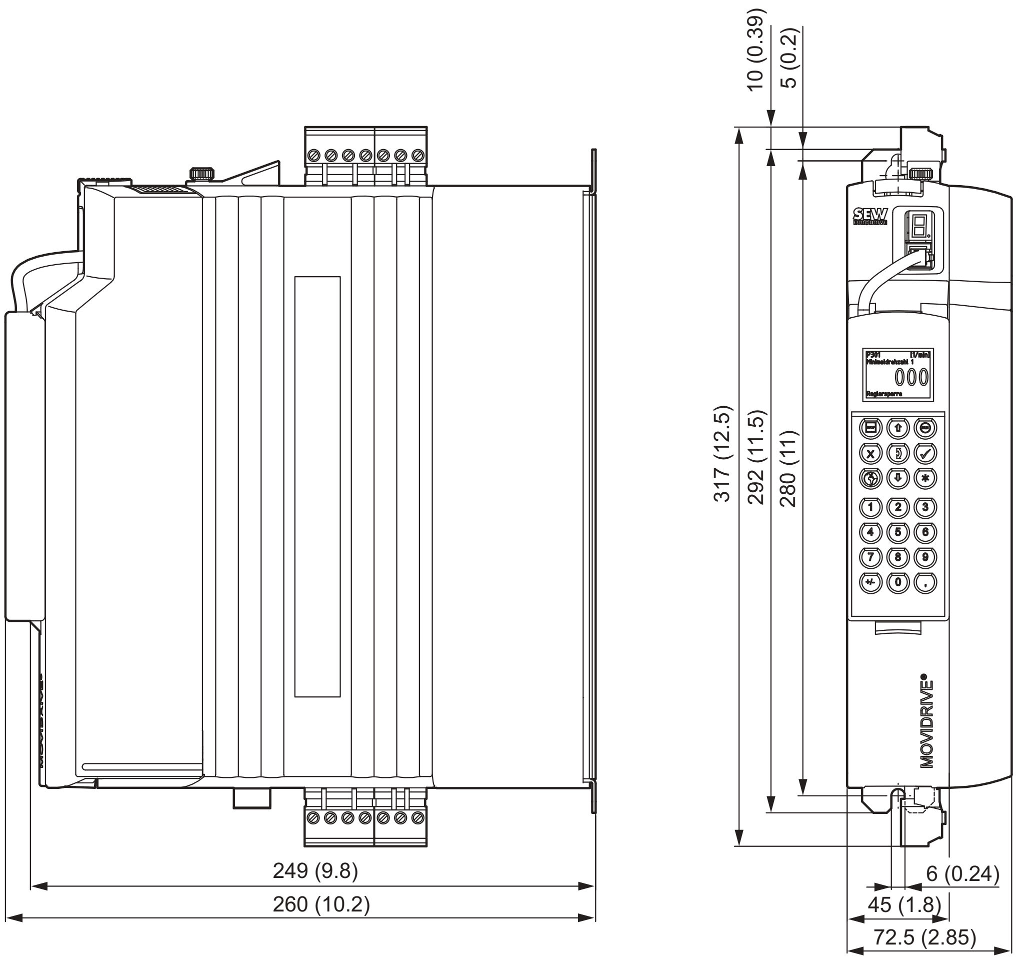
2.7 MOVIDRIVE® MDX61B dimension drawings

	INFORMATION
	For MOVIDRIVE® MDX61B size 0, installing a braking resistor does not affect the dimensions. Therefore, MOVIDRIVE® MDX61B size 0 dimensions are displayed without an installed braking resistor.

2.7.1 Size 0S

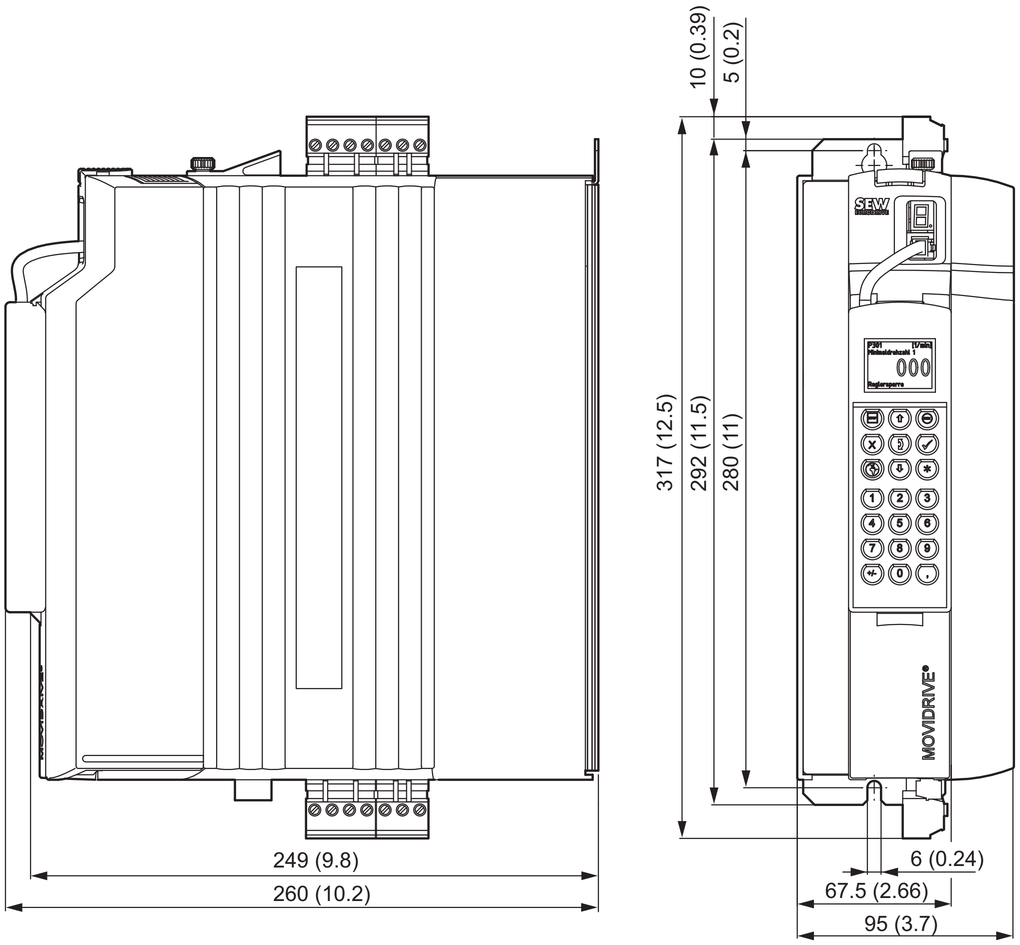
The following dimension drawing shows MDX61B size 0S, dimensions in mm (in)



1940851339

2.7.2 Size 0M

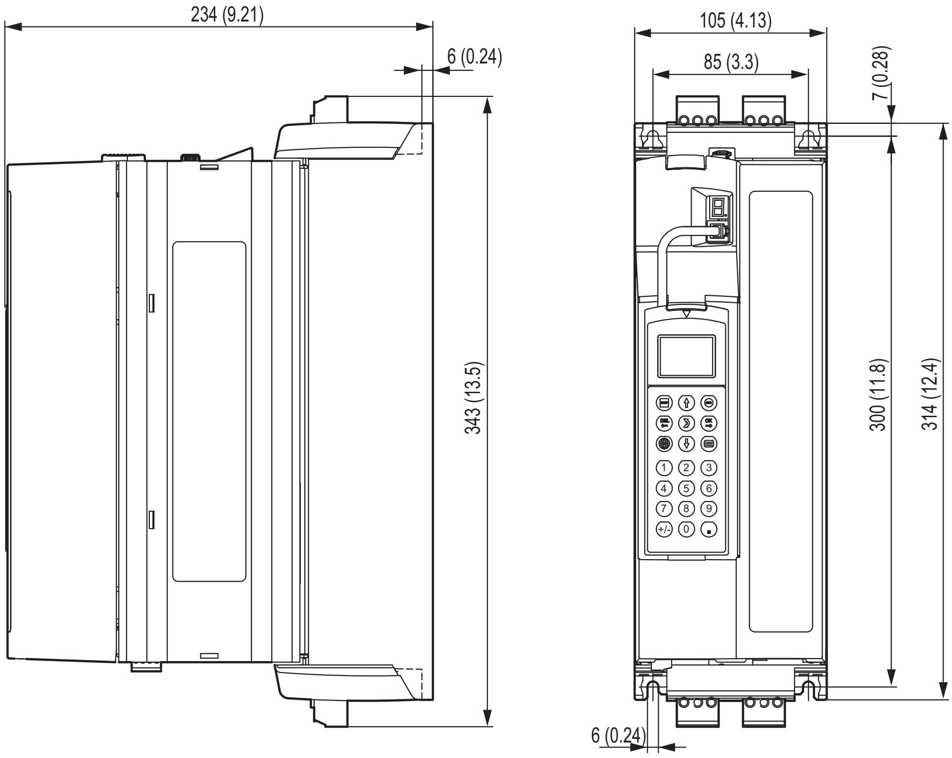
The following dimension drawing shows MDX61B size 0M, dimensions in mm (in)



2058928651

2.7.3 Size 1

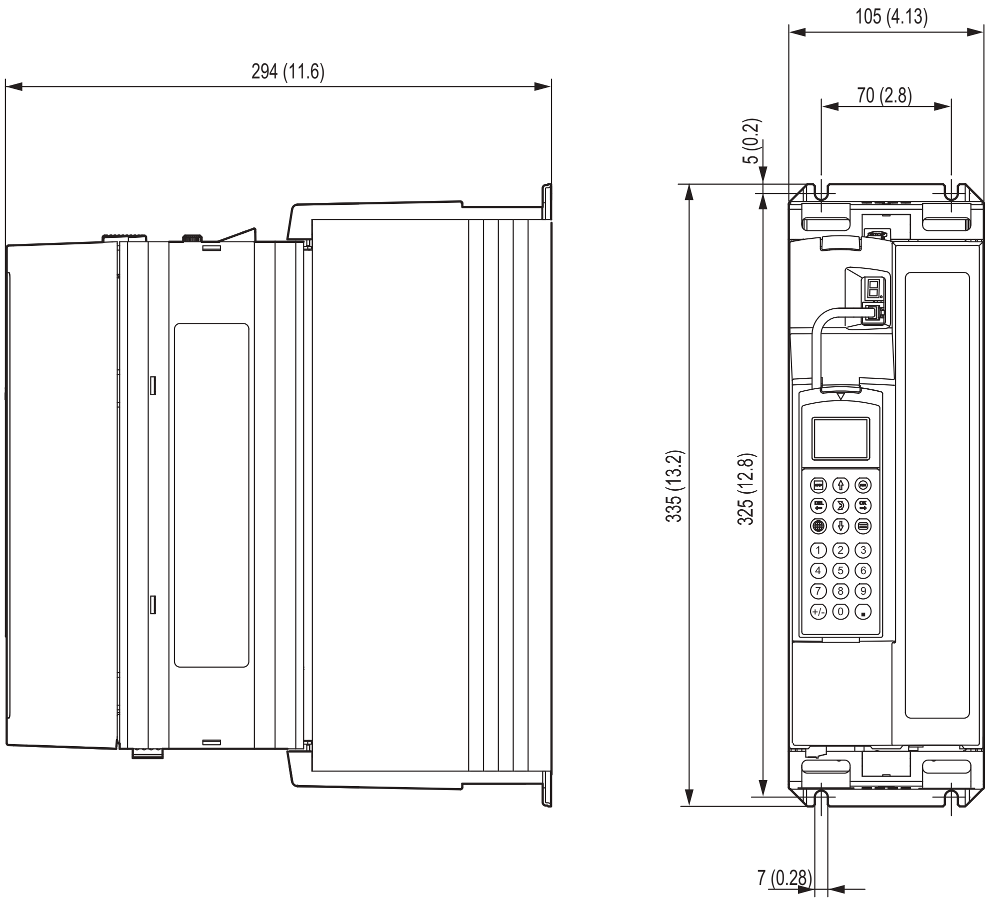
The following dimension drawing shows MDX61B size 1, dimensions in mm (in)



2058933131

2.7.4 Size 2S

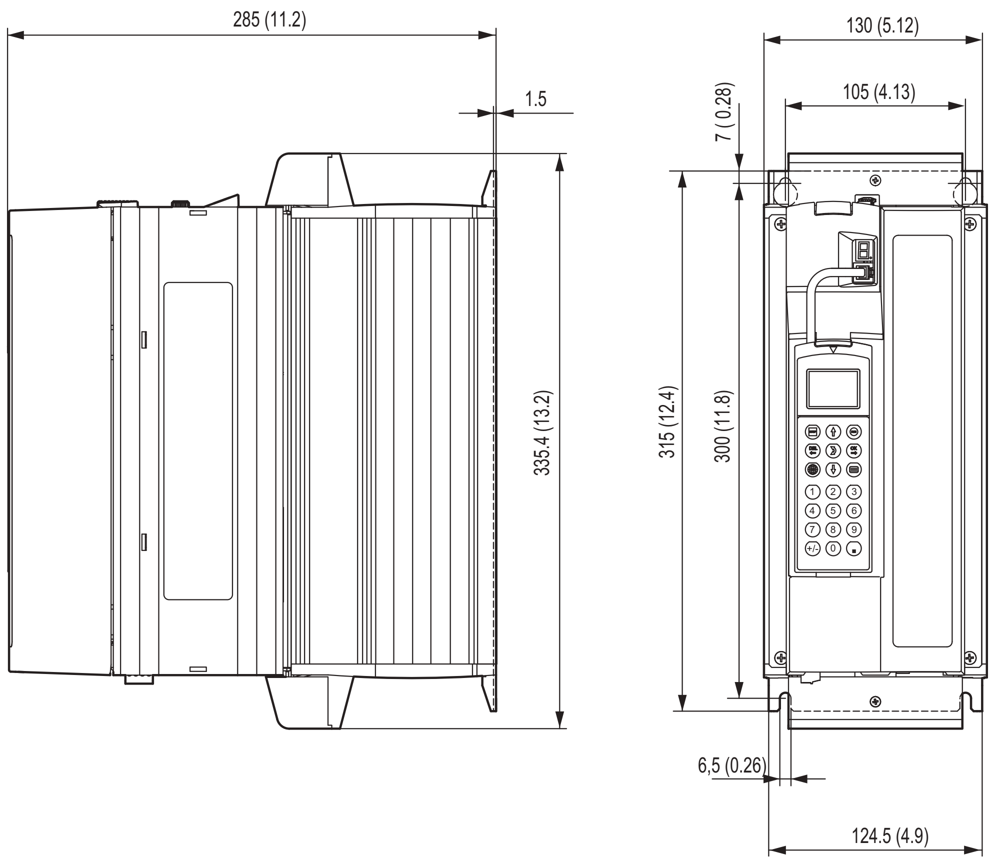
The following dimension drawing shows MDX61B size 2S, dimensions in mm (in)



2058949003

2.7.5 Size 2S

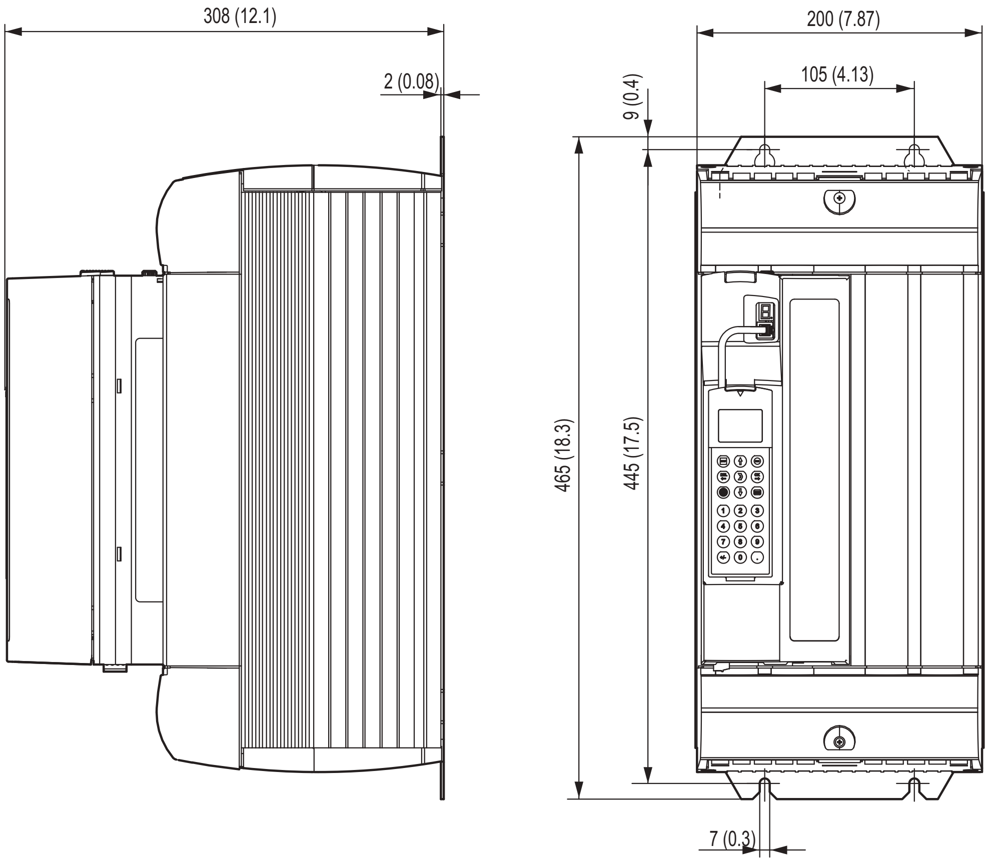
The following dimension drawing shows MDX61B size 2, dimensions in mm (in)



2058953099

2.7.6 Size 3

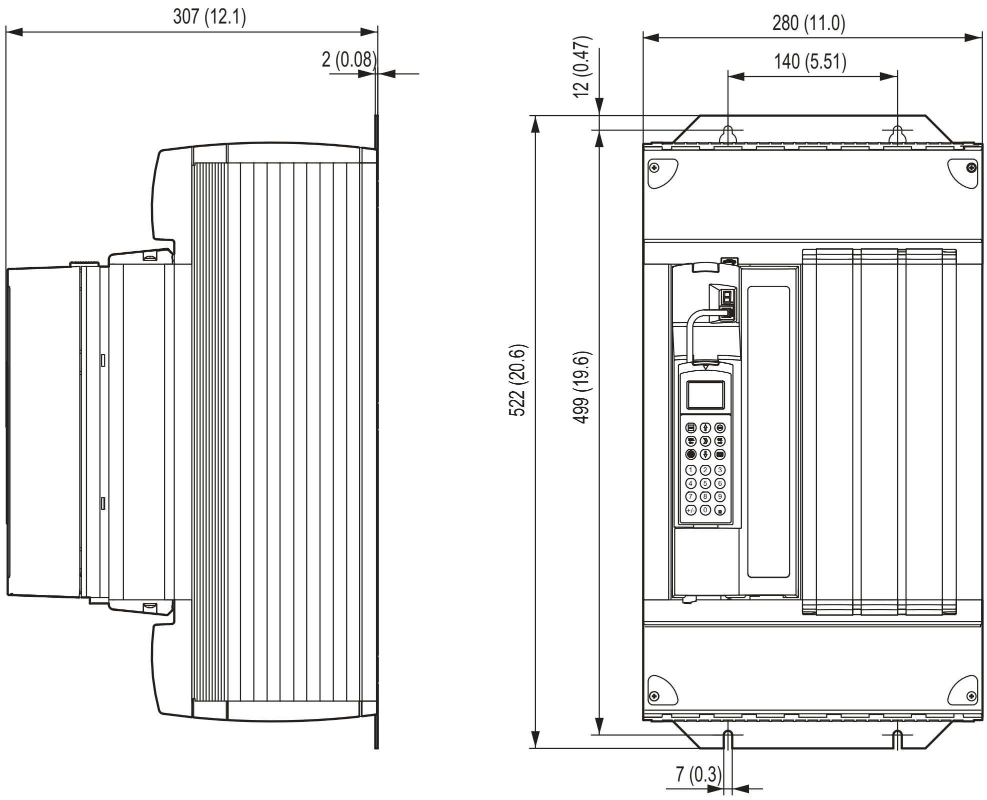
The following dimension drawing shows MDX61B size 3, dimensions in mm (in)



2058956683

2.7.7 Size 4

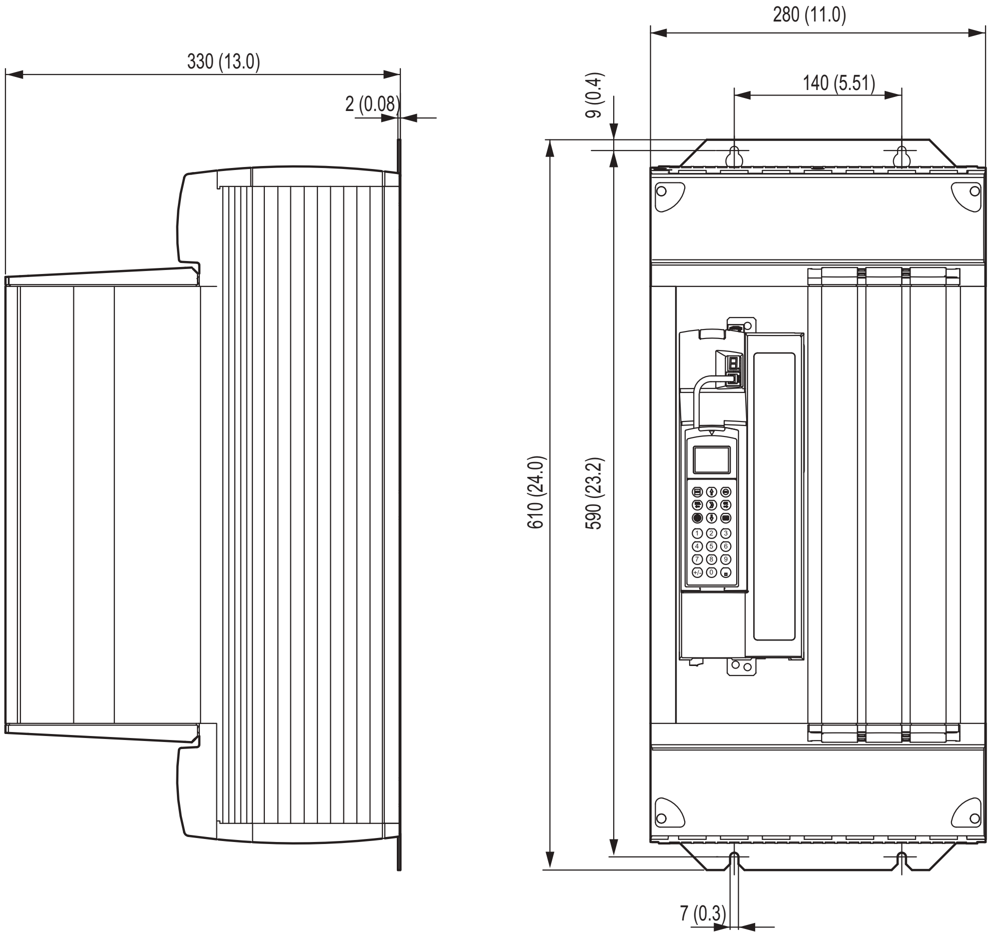
The following dimension drawing shows MDX61B size 4, dimensions in mm (in)



2058960267

2.7.8 Size 5

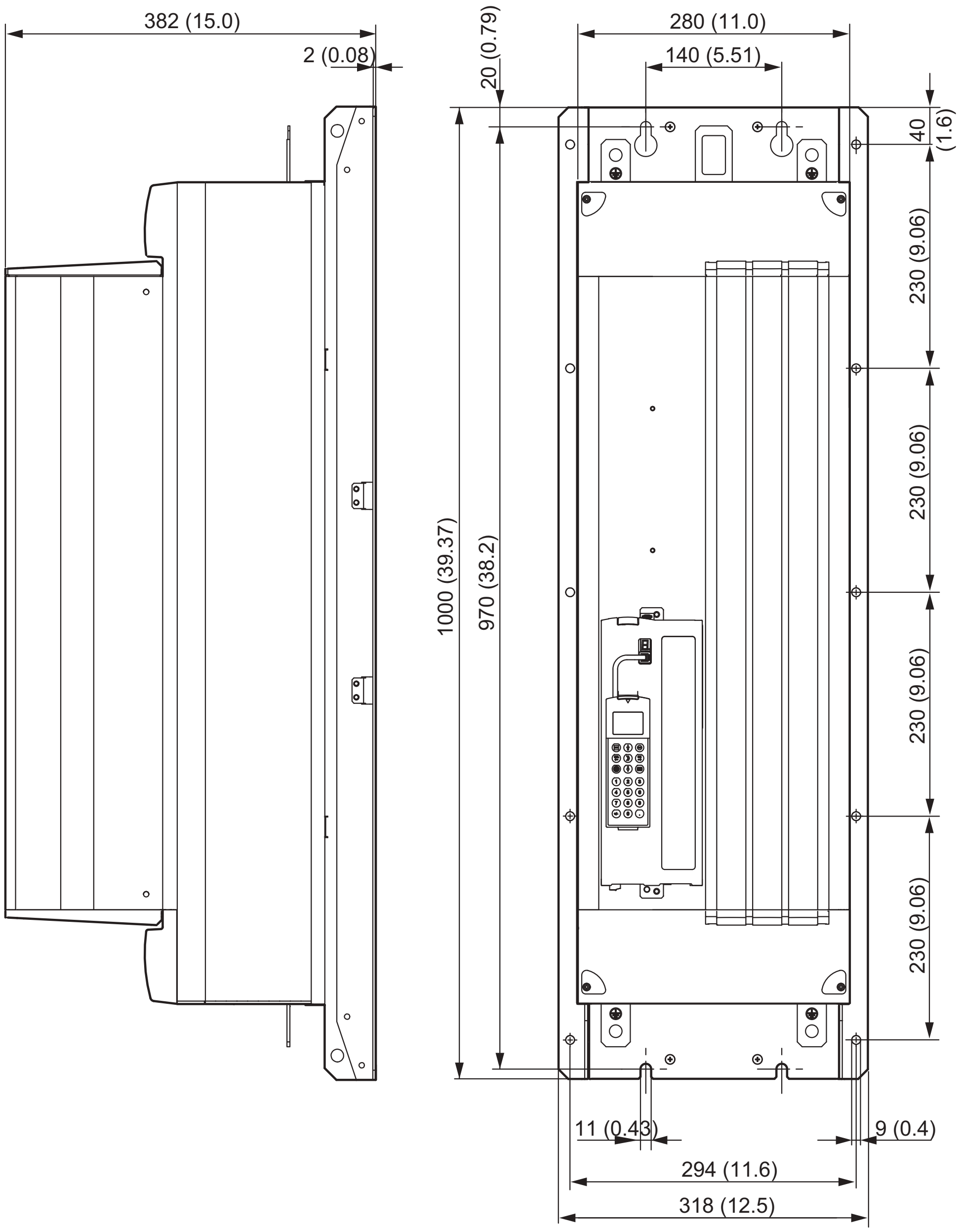
The following dimension drawing shows MDX61B size 5, dimensions in mm (in)



2058963851

2.7.9 Size 6

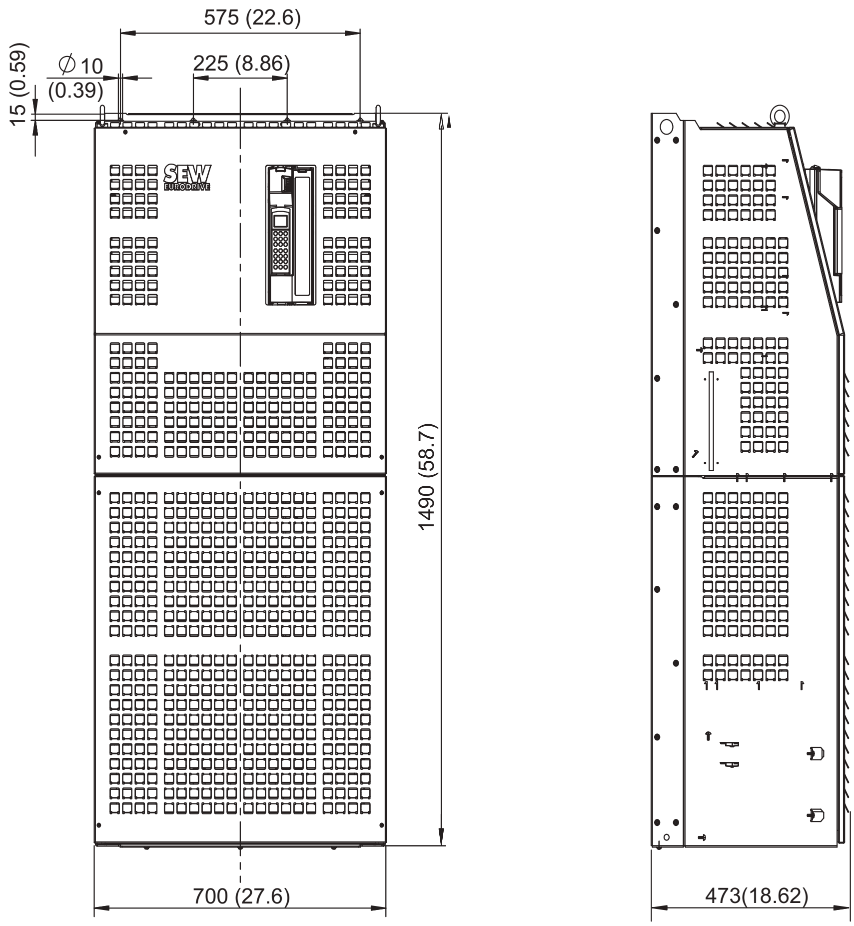
The following dimension drawing shows MDX61B size 6, dimensions in mm (in)



2058967435

2.7.10 Size 7

The following dimension drawing shows MDX61B size 7, dimensions in mm (in)



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2.8 IPOSplus®

2.8.1 Description

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

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

2.8.2 Characteristics

- 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

With encoder feedback only

- Positioning with selectable travel speed, positioning ramp and jerk limitation
- Precontrol 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
- "Endless positioning" is possible
- Override function
- Cam controller
- Synchronous operation and electronic cam

Max. program length of task 1, task 2 and task 3	**Total of ca. 3200 program lines**
Command processing time per program line	Task 1: 1 ... 10 commands/ms can be configured Task 2: 2 ... 11 commands/ms can be configured Task 3: At least 1 command/ms (typical is 40 commands/ms)
Variables	1024, of which 128 (0 ... 127) can be stored to non-volatile memory; range of values: $-2^{31}...+(2^{31}-1)$
Touch probe inputs	2 inputs, processing time < 100 µs
Sampling cycle 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, DC ± 10 V) 2 outputs (DC 0...20 mA, DC 4...20 mA, DC ± 10 V)

2.9 *DBG60B keypad option*

2.9.1 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
 1454354443	**DBG60B-01**	DE / EN / FR / IT / ES / PT / NL (German / English / French / Italian / Spanish / Portuguese / Dutch)	1820 403 1
	DBG60B-02	DE / EN / FR / FI / SV / DA / TR (German / English / French / Finnish / Swedish / Danish / Turkish)	1820 405 8
	DBG60B-03	DE / EN / FR / RU / PL / CS (German / English / French / Russian / Polish / Czech)	1820 406 6
	DBG60B-04	DE / EN / FR / ZH (German / English / French / Chinese)	1820 850 9
	Door installation set1)	**Description (= scope of delivery)**	**Part number**
	DBM60B	• Housing for DBG60B (IP65) • DKG60B extension cable, length 5 m	824 853 2
	Extension cable	**Description (= scope of delivery)**	**Part number**
	DKG60B	• Length 5 m • 4-core, shielded cable	817 583 7

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

2.9.2 Functions

- Display process values and status
- Display status of binary inputs/outputs
- Error memory queries and error reset
- 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 of MOVIDRIVE® B and MOVITRAC® B
- Manual operation of MOVIMOT® (→ Decentralized technology documentation)

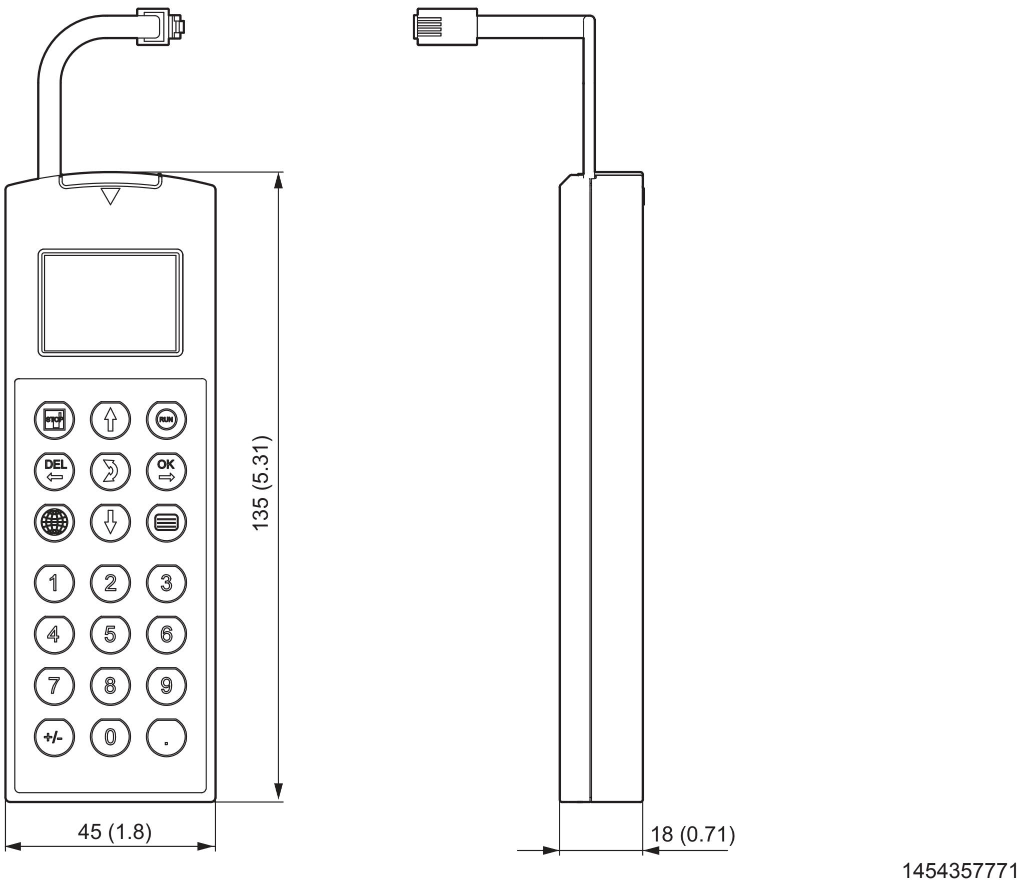
2.9.3 Features

- 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)

INFORMATION

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.

2.9.4 Dimension drawing of DBG60B



All dimensions in mm (in)

2.10 DBM60B/DKG60B housing option for DBG60B

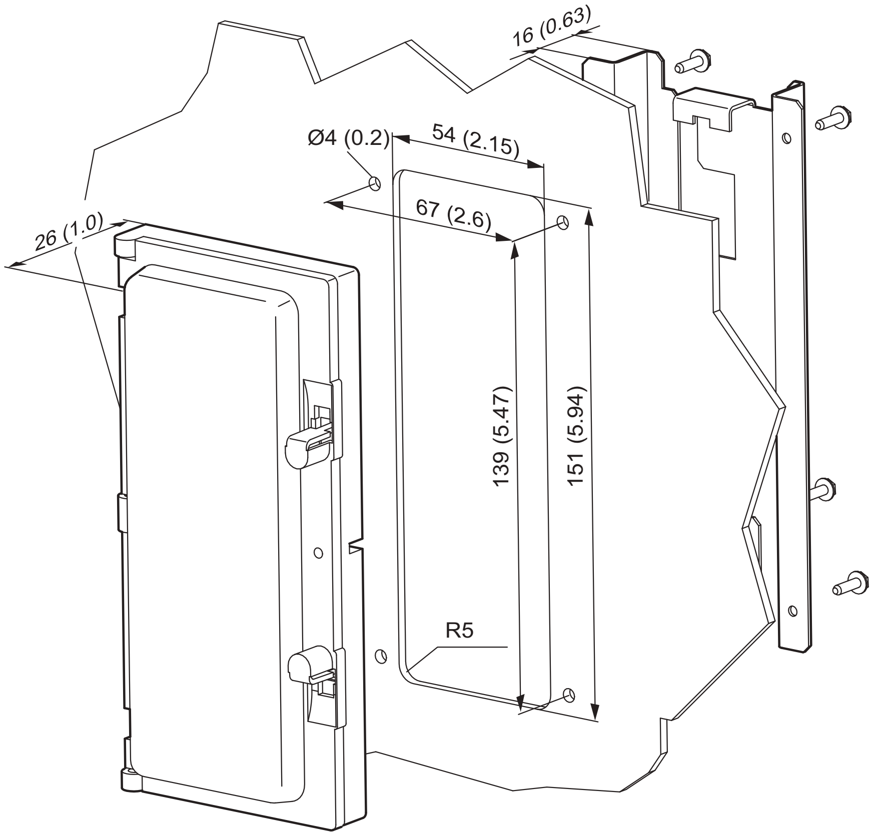
2.10.1 Part numbers

- DBM60B 08248532
- DKG60B 08175837

2.10.2 Description

The DBM60B option can be used to mount the keypad close to the inverter (e.g. in the control cabinet door). The DBM60B option consists of housing in degree of protection IP65 and a 5 m (20 ft) long DKG60B extension cable.

2.10.3 Dimension drawing of DBM60B/DKG60B



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All dimensions in mm (in)

3 Technical Data of Regenerative Power Supply Units

3.1 MOVIDRIVE® MDR60A regenerative power supply units

MOVIDRIVE® inverters operating in regenerative mode (4Q operation) can use the MOVIDRIVE® MDR60A regenerative power supply unit 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® inverter with electrical power from the supply system in motor operation and returns regenerative power to the supply system in regenerative operation.

3.1.1 UL approval

UL and cUL approval has been granted for MOVIDRIVE® MDR60A0150-503-01, MDR60A0370-503-00 and MDR60A0750-503-00 units. cUL is equivalent to CSA approval. The MOVIDRIVE® MDR60A1320-503-00 unit does not have UL or cUL approval.

3.1.2 Protection and monitoring functions

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

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3.1.3 Characteristics of the 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 with several inverters (network and braking resistor connections). However, a braking resistor is required to bring the drive to a controlled stop in case there is a disruption in the supply system.
- Reduction in use of control cabinet capacity and ventilator power if the braking resistor used to have to be installed in the control cabinet.

3.1.4 General technical data

MOVIDRIVE® MDR60A	0150-503-01 (size 3) 0370-503-00 (size 3) 0750-503-00 (size 4)	1320-503-00 (size 6)
Interference immunity	Meets EN 61800-3	Meets EN 61000-6-1 and EN 61000-6-2
Interference emission with EMC-compliant installation	Meets EN 61800-3: • with NF035-503 line filter (MDR60A0150-503-01) • with NF085-503 line filter (MDR60A0370-503-00) • with NF150-503 line filter (MDR60A0750-503-00)	Meets EN 61000-6-4 with NF300503 line filter
Ambient temperature ϑ_U **Ambient temperature derating**	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[1)] ϑ_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)
Degree of protection size 3 **EN 60529** size 4 **(NEMA1)**	IP20 IP00 (power connections) IP10 (power connections) • With fitted plexiglass cover supplied as standard • With fitted shrink tubing (not included in scope of delivery)	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	At h ≤ 1000 m without restrictions. The following restrictions apply to heights ≥ 1000: • From 1000 m to max. 4000 m: – I_N reduction by 1% per 100 m • from 2000 m (6562 ft) to max. 4000 m (13120 ft): – The safe disconnection of power and electronics connections can no longer be assured above 2000 m. This requires external measures (IEC 60664-1/ EN 61800-5-1). – You have to connect an overvoltage protection device in order to reduce the overvoltages from category III to category II.	h ≤ 1000 m: No limitation From 1000 m to max. 4000 m: I_N reduction: 0.5% per 100 m

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

3.1.5 Technical Data MOVIDRIVE® MDR60A Regenerative Power Supply

MOVIDRIVE® MDR60A size 3

MOVIDRIVE® MDR60A		0150-503-01 (size 3)	0370-503-00 (size 3)
Part number		1825 012 2	826 658 1
INPUT			
Rated supply voltage (according to EN 50160)	V_{line}	3 × AC 380 V - 500 V	
Line frequency	f_{line}	50 Hz - 60 Hz ±5%	
Rated connected load	P_N	15 kW	37 kW
Rated supply current (at V_{line} = 3 × AC 400 V)	I_{line}	AC 29 A	AC 66 A
DC LINK			
Apparent output power (at V_{line} = 3 × AC 380...500 V)	S_A	25 kVA	50 kVA
DC link	V_{DC}	DC 560 V - 780 V	
Rated DC link current	I_{DCL}	DC 35 A	DC 70 A
Max. DC link current	I_{DCL_max}	DC 53 A	DC 105 A
GENERAL INFORMATION			
Power loss at P_N	P_{Vmax}	500 W	950 W
Cooling air consumption		100 m³/h	180 m³/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 (31 in-lb) 25 mm² (AWG4)	
Electronics terminals connection X3 (X2 for size 6)		Permitted cable cross-section: • One core per terminal: 0.20 – 2.5 mm² (AWG 24 – 13) • Two cores per terminal: 0.20 – 1 mm² (AWG 23 – 17)	
Weight		16 kg (35 lb)	16 kg (35 lb)
Dimensions W × H × D		200 mm × 465 mm × 221 mm (7.87 in × 18.3 in × 8.7 in)	
Line choke (always required)		ND045-013, L_N = 0.1 mH Part number 826 013 3	ND085-013 L_N = 0.1 mH Part number 826 014 1
Line filter (optional)		NF035-503, Part number 827 128 3	NF085-503, Part number 827 415 0
For MOVIDRIVE® MDX60B/61B...-5_3		0005 ... 0150	0005 ... 0370

MOVIDRIVE® MDR60A size 4 and size 6

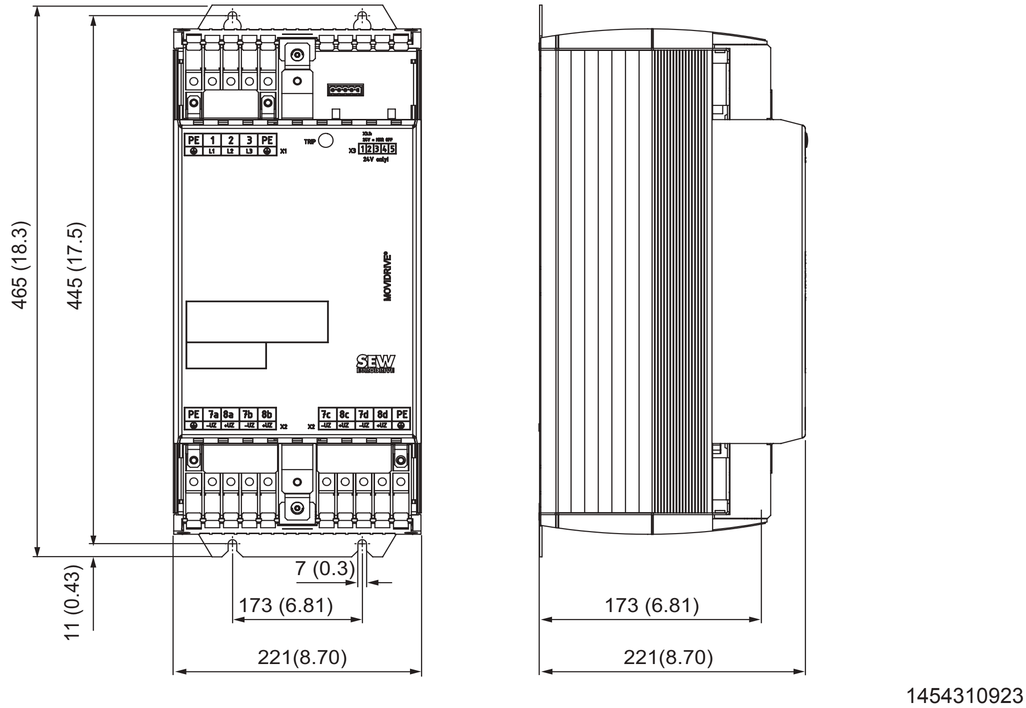
MOVIDRIVE® MDR60A		0750-503-00 (size 4)	1320-503-00[1] (size 6)
Part number		826 556 9	827 952 7
INPUT			
Nominal line voltage (according to EN 50160)	V_{line}	3 × AC 380 V - 500 V	
Line frequency	f_{line}	50 Hz - 60 Hz ±5%	40 Hz - 60 Hz ±10%
Rated connected load P_N		75 kW	160 kW
Rated supply current (at V_{line} = 3 × AC 400 V)	I_{line}	AC 117 A	AC 260 V
DC LINK			
Apparent output power (at V_{line} = 3 × AC 380...500 V)	S_A	90 kVA	175 kVA
DC link	V_{DC}	DC 560 V - 780 V	
Rated DC link current	I_{DCL}	DC 141 A	DC 324 A
Max. DC link current	I_{DCL_max}	DC 212 A	Motive: • DC 486 A Regenerative: • DC 410 A
GENERAL INFORMATION			
Power loss at P_N	P_{Vmax}	1700 W	2400 W
Cooling air consumption		360 m^3/h	880 m^3/h
Connection for power terminals X1, X2 (L1, L2, L3 for size 6) **Permitted tightening torque** **Permitted cable cross section**		M10 terminal studs 14 Nm (120 in-lb) 70 mm^2 (AWG2/0)	M10 terminal studs 150 mm^2 (line connection) / 30 Nm (270 in-lb)[2] 185 mm^2 (DC link connection) / 32 Nm (280 in-lb)[1]
Electronics terminals connection X3 (X2 for size 6)		Permitted cable cross-section: • One core per terminal: 0.20 – 2.5 mm^2 (AWG 24 – 13) • Two cores per terminal: 0.20 – 1 mm^2 (AWG 23 – 17)	Permitted cable cross-section: • 0.75 – 2.5 mm^2 (AWG18 – 14) Terminals A1 / A2: • 0.75 – 4 mm^2 (AWG18 – 12)
Weight		24 kg (53 lb)	100 kg (200 lb)
Dimensions W × H × D		280 mm × 522 mm × 205 mm (11 in × 20.6 in × 8.07 in)	378 mm × 942 mm × 389.5 mm (14.9 in × 37.1 in × 15.3 in)
Line choke (always required)		ND200-0033 L_N = 0.03 mH Part number 826 579 8	Already installed
Line filter (optional)		NF150-503, Part number 827 417 7	NF300-503, Part number 827 419 3
For MOVIDRIVE® MDX60B/61B...-5_3		0005 ... 0750	0005 ... 1600
Recommended line fuse		-	500 A

1) The listed technical data applies to units with series no. DCV200xxx. For units of the previous series with no. DCV185xxx, refer to the provided documentation and the data on the nameplate.

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

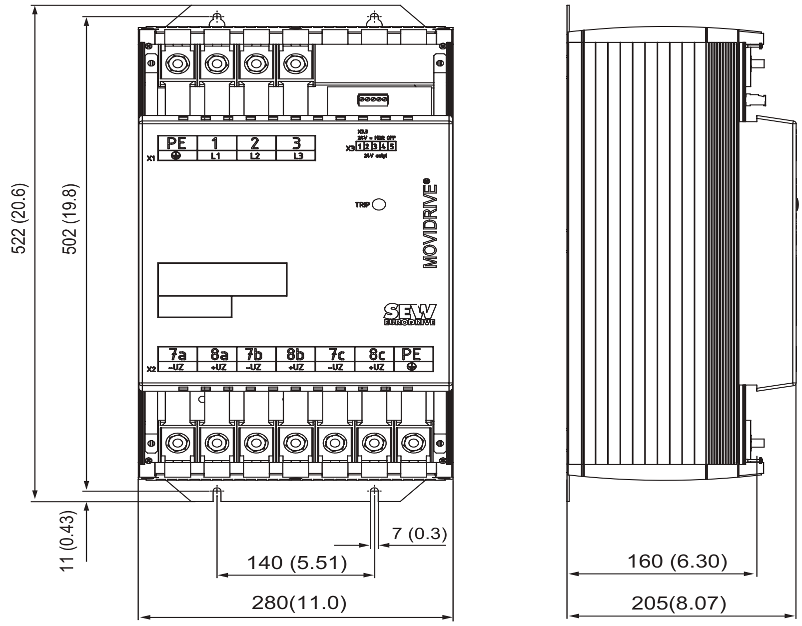
3.1.6 Dimension drawings of MDR60A

Size 3



All dimensions in mm (in)

Size 4



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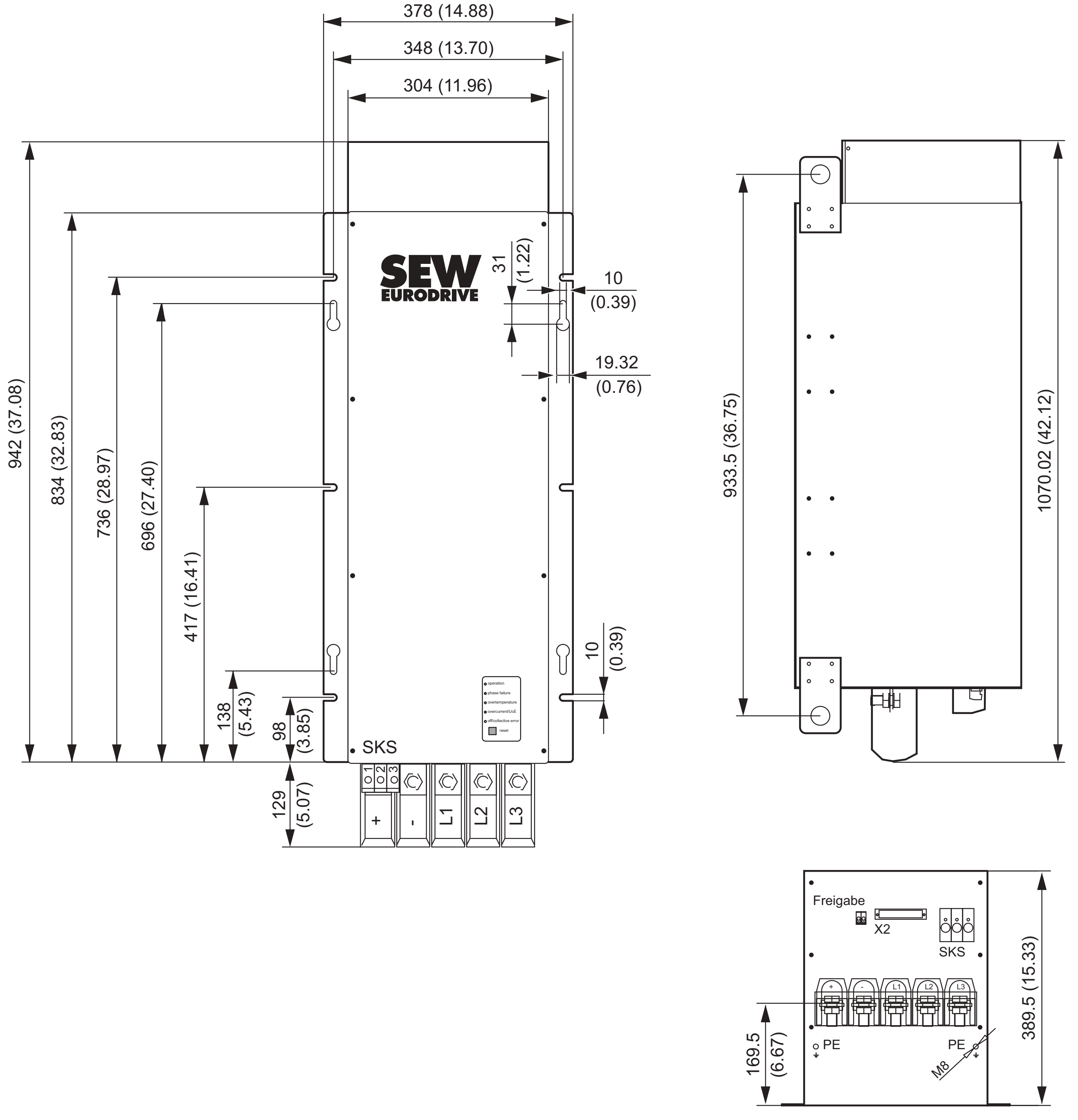
All dimensions in mm (in)

Size 6



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All dimensions in mm (in)

3.1.7 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

INFORMATION

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

4 Technical Data of Options

4.1 DEH11B Hiperface® encoder card option

4.1.1 Part number

824 310 7

4.1.2 Description

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

4.1.3 Electronics data

Option DEH11B			
 2058970635	Output for incremental encoder simulation or External encoder input X14:	Output for incremental encoder simulation: • Signal level to RS422 • The number of pulses is the same as on X15 motor encoder input	External encoder input (max. 200 kHz): Permitted encoder types: • Hiperface® encoder • Sin/cos encoder V_{PP} = AC 1V • TTL encoder with negated tracks • Encoder with signal level to RS422 Encoder power supply • DC+12 V (tolerance range DC 10.5 - 13 V) • I_{max} = DC 650 mA[1)]
	Motor encoder input X15:	Permitted encoder types: • Hiperface® encoder • Sin/cos encoder V_{PP} = AC 1 V • TTL encoder with negated tracks • Encoder with signal level to RS422 • Permitted PPR count: 128/256/512/1024/2048 increments Encoder power supply • DC+12 V (tolerance range DC 10.5 - 13 V) • I_{max} = DC 650 mA	

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

4.2 *DER11B resolver card option*

4.2.1 Part number

824 307 7

4.2.2 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 distance encoder. The input for the external encoder can also be used as an output for incremental encoder simulation.

4.2.3 Electronics data

Option DER11B			
 2058990603	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: • Hiperface® encoder • Sin/cos encoder V_{PP} = AC 1 V • TTL encoder with negated tracks • Encoder with signal level to RS422 Encoder power supply • DC+12 V (tolerance range DC 10.5 - 13 V) • I_{max} = DC 650 mA
	Motor encoder input X15:	Resolver 2-pole, V_{ref} = AC 7 V, 7 kHz V_{in} / V_{ref} = 0.5 ± 10%	
	Maximum cable length:	100 m (328 ft)	

4.3 *DEU21B multi-encoder card option*

4.3.1 Part number

1822 169 6

4.3.2 Description

Option-capable MOVIDRIVE® MDX61B units can be equipped with a DEU21B multi-encoder card. The encoder card offers one input for the motor encoder and one input for an external encoder, also referred to as distance encoder.

Both encoder inputs can evaluate incremental and absolute encoders. The input for the external encoder can also be used as an output for incremental encoder simulation.

4.3.3 Electronics data

DEU21B option		
	**External encoder connection X14:** **Output for incremental encoder simulation:** • **Signal level to RS422** • **The number of pulses is the same as on X15 motor encoder input**	Permitted encoder types: • Hiperface® encoder • Sin/cos encoder V_{PP} = AC 1 V • CANopen encoder • TTL encoder with negated tracks • HTL encoder • SSI encoder • SSI combination encoder • EnDat encoder • Encoder with signal level to RS422 • Permitted PPR count: 2-4096 increments Encoder power supply • DC 24 V encoder supply[1)] • DC 12 V encoder supply[2)]
	Motor encoder connection X15:	Permitted encoder types: • Hiperface® encoder • Sin/cos encoder V_{PP} = AC 1 V • TTL encoder with negated tracks • HTL encoder • SSI encoder • SSI combination encoder • EnDat encoder • Encoder with signal level to RS422 • Permitted PPR count: 2-4096 increments Encoder power supply • DC 24 V voltage supply[1)] • DC 12 V voltage supply[2)]

1) If the overall unit load on the 24 V level exceeds 400 mA, you must connect an external DC 24 V supply to X10:9/X10:10. Observe the "Project planning" chapter in the "MOVIDRIVE® MDX60B/61B" system manual.

2) The maximum load on X14:15 and X15:15 is DC 650 mA in total.

4.4 DEH21B/DIP11B absolute encoder card option

4.4.1 Part numbers

- DEH21B: 1820 818 5
- DIP11B: 824 969 5

4.4.2 Description

The DEH21B and DIP11B options extend the MOVIDRIVE® B system to include an SSI interface for absolute encoders. This option allows the following possibilities for IPOS^plus® 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^plus® program
- In addition to the basic unit, 8 digital inputs and 8 digital outputs are available with the DIP1B option.
- 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

4.4.3 Electronics data for DEH21B

DEH21B option		
 2058987019	Motor encoder connection X15:	Permitted encoder types: • Hiperface® encoder • Sin/cos encoder V_{PP} = AC 1 V • TTL encoder with negated tracks • Encoder with signal level to RS422 • Permitted PPR count: 128/256/512/1024/2048 increments Encoder power supply , • DC+12 V (tolerance range DC 10.5 ... 13 V) • I_{max} = DC 650 mA
	Encoder connection X62:	SSI encoder input
	Voltage supply connection X60:1	24VIN: DC 24 V power supply for encoder connected to X62
	Reference terminal X60:2	Reference potential 24VIN

4.4.4 Electronics data for DIP11B

DIP11B option			
 1454658571	Binary input connection	X60:1 ... 8	DI10 ... DI17 isolated via optocoupler, PLC compatible (EN 61131), scanning cycle 1 ms
	Internal resistance		R_i ≈ 3 kΩ, I_E ≈ DC 10 mA
	Signal level (EN 61131)		DC+13 V ... +30 V = "1" / DC 3 V ... +5 V = "0"
	Function	X60:1 ... 8	DI10 ... DI17: Selection option → Parameter menu P61_
	Binary output connection	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
	Signal level (EN 61131)		DC+24 V = "1" DC 0 V = "0" **Important**: Do not apply external voltage!
	Function	X61:1 ... 8	DO10 ... DO17: Selection option → Parameter menu P63_
	Encoder connection	X62:	SSI encoder input
	Reference terminals	X60:9 X60:10	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
	Permitted cable cross-section		One core per terminal: 0.08 ... 1.5 mm^2 (AWG28 ... 16) Two cores per terminal: 0.25 ... 1 mm^2 (AWG22 .. 17)
	Voltage input	X61:9	24VIN: Supply voltage DC+24 V for binary outputs DO10 ... DO17 and encoder (mandatory)

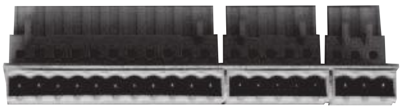
4.5 Connector adapter for unit replacement MD_60A - MDX60B/61B

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

  If the TF/TH option is connected to X10 when using MOVIDRIVE® MD_A, then X10 can be directly replugged. The jumper between X10:1 and X10:2 must be removed if a TF/TH option is connected to encoder input X15. 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 have to be connected to MOVIDRIVE® B with the DWE11B/12B option (→ chapter "DWE11B/12B interface adapter option").

  DAE15B

  1454699659

  Length of DAE15B: 200 mm ± 20 mm (7.87 in ± 0.79 in)

  Cable cross section: 6 x 2 x 0.25 mm^2 (AWG 23)

Terminal of the 15-pin sub D connector (MOVIDRIVE® MDX61B, DEH11B option, 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 distance 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 plug, 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 option. This step makes for fail-safe and fast connection of existing drives.

DAE14B

1454702731

Length of DAE14B: 200 mm ± 20 mm (7.87 in ± 0.79 in)

Cable cross section: 6 x 2 x 0.25 mm^2 (AWG 23)

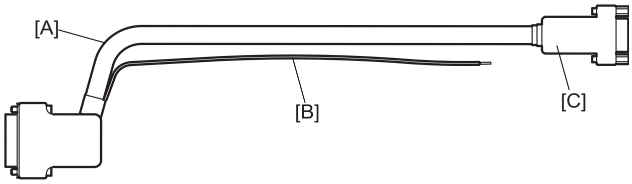
Terminal of 15-pin sub D socket (MOVIDRIVE® MDX61B, DEH11B/DER11B option, X14)	Core color in prefabricated cable	Terminal of the 9-pin sub D connector (encoder end)
1	Yellow (YE)	1
2	Red (RD)	2
3	Pink (PK)	3
7	Violet (VT)	4
8	Brown (BN)	5
9	Green (GN)	6
10	Blue (BU)	7
11	Gray (GY)	8
15	White (WH)	9

4.6 DWE11B/12B interface adapter option

4.6.1 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 DEH11B/DEH21B option**. 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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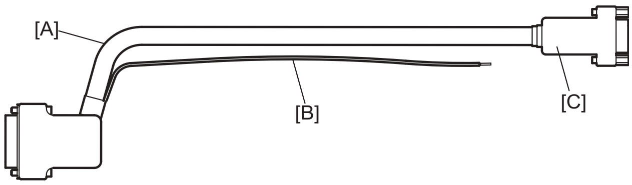
[A] 5 x 2 x 0.25 mm² (AWG 23) / length 1000 mm (39.37 in) /
Max. line length inverter - encoder: 100 m (328 ft)

[B] DC 24 V connection for HTL encoder; 1 x 0.5 mm² (AWG 20) / length 250 mm (9.84 in)

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 single-ended HTL encoders to the DEH11B/DEH21B option**. In addition to the A, B and C track, you will also have to connect the negated tracks ($\overline{A}$, $\overline{B}$, $\overline{C}$). SEW-EURODRIVE recommends using this interface adapter for any new system.



1805896331

[A] 4 x 2 x 0.25 mm^2 (AWG 23 / length 1000 mm (39.37 in)
Max. line length inverter - encoder: 200 m (656 ft)

[B] DC 24 V connection for HTL encoder; 1 x 0.5 mm^2 (AWG 20) / length 250 mm (9.84 in)

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

4.7 *UWS11A interface adapter option*

4.7.1 Part number

822 689 X

4.7.2 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 mA).

4.7.3 RS232 interface

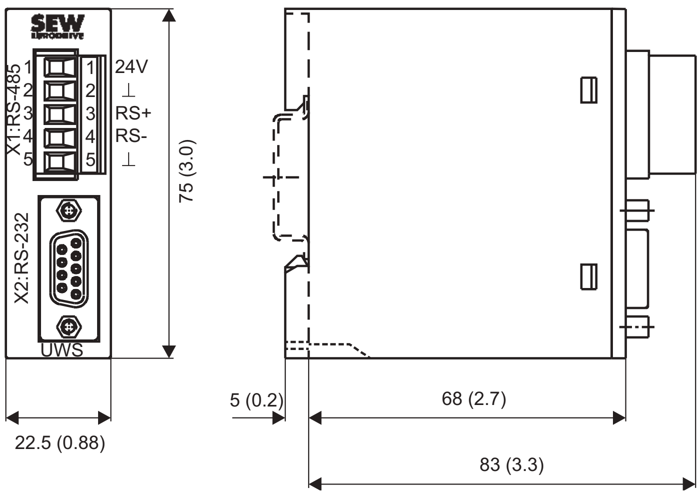
The connection between UWS11A and PC is made using a commercially available serial interface cable (shielded!).

4.7.4 RS485 interface

Max. 32 MOVIDRIVE® units can be networked for communication (max. line length 200 m (656 ft)) 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^2 (AWG 24...12)
	Two cores per terminal 0.20...1 mm^2 (AWG 24...17)

4.7.5 Dimension drawing of UWS11A



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All dimensions in mm (in)

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

4.7.6 Technical data

UWS11A	
Part number	822 689 X
Ambient temperature	0 ... 40 °C
Storage temperature	-25 °C ... +70 °C (according to EN 60721-3-3, class 3K3)
Degree of protection	IP20
Current consumption	Max. DC 50 mA
Weight	150 g (0.35 lb)
Dimensions	83 mm x 75 mm x 22.5 mm (3.3 in x 3.0 in x 0.866 in)

4.8 *UWS21B interface adapter option*

4.8.1 Part number

1820 456 2

4.8.2 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.

4.8.3 RS232 interface

The connection of UWS21B with PC is made using a standard serial interface cable (shielded).

4.8.4 RS485 interface

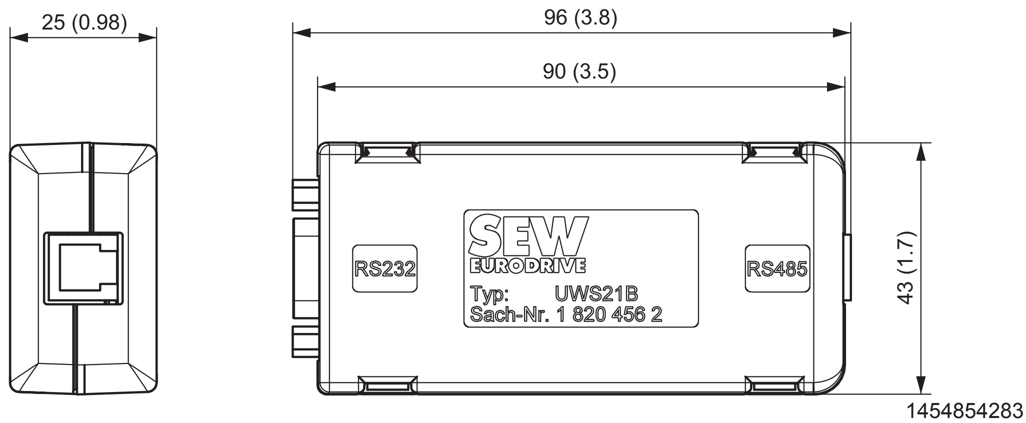
UWS21B and MOVIDRIVE® B are connected using a serial interface cable with RJ10 connectors.

4.8.5 Scope of delivery

The scope of delivery for the UWS21B option includes:

- UWS21B
- 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® MotionStudio engineering software

4.8.6 Dimension drawing of UWS21B



All dimensions in mm (in)

4.8.7 Technical data

UWS21B	
Part number	1 820 456 2
Ambient temperature	0 ... 40 °C
Storage temperature	-25 °C ... +70 °C (according to EN 60721-3-3, class 3K3)
Degree of protection	IP20
Weight	300 g (0.7 lb)
Dimensions	96 mm x 43 mm x 25 mm (3.8 in x 1.7 in x 0.98 in)

4.9 *USB11A interface adapter option*

4.9.1 Part number

824 831 1

4.9.2 Description

Option USB11A can be used to connect a PC or laptop with a USB interface to the XT slot of MOVIDRIVE® B. The USB11A interface adapter supports USB 1.1 and USB 2.0.

4.9.3 USB11A - PC

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

4.9.4 MOVIDRIVE® - USB11A

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

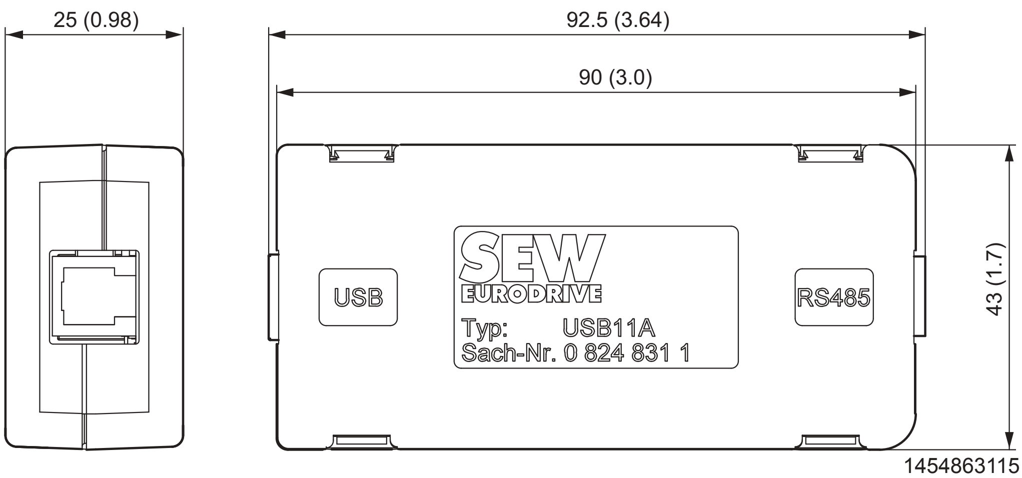
4.9.5 Scope of delivery

The scope of delivery for the USB11A option includes:

- USB11A interface adapter
- USB connection cable to connect USB11A - PC
- Serial interface cable with 2 RJ10 connectors to connect USB11A and MOVIDRIVE® B
- CD-ROM with drivers and MOVITOOLS® MotionStudio engineering software

4.9.6 Dimension drawing

All dimensions in mm (in)



All dimensions in mm (in)

4.9.7 Technical data

USB11A	
Part number	824 831 1
Ambient temperature	0 ... 40 °C
Storage temperature	-25 °C ... +70 °C (according to EN 60721-3-3, class 3K3)
Degree of protection	IP20
Weight	300 g (0.7 lb)
Dimensions	92.5 mm x 43 mm x 25 mm (3.64 in x 1.7 in x 0.98 in)

4.10 DWI11A DC 5 V encoders supply option

4.10.1 Part number

822 759 4

4.10.2 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.

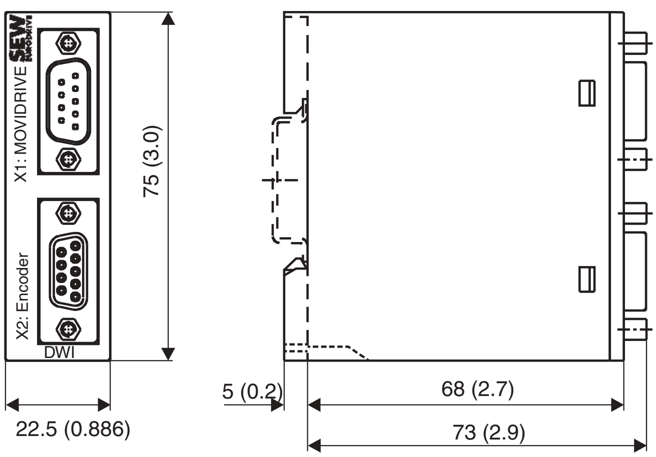
INFORMATION

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

4.10.3 Recommendation

Use prefabricated cables from SEW for the encoder connection.

4.10.4 Dimension drawing



1454869899

All dimensions in mm (in)

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

4.10.5 Technical data

DWI11A DC 5 V encoder supply option	
Part number	822 759 4
Voltage input	DC 10...30 V, I_{max} = DC 120 mA
Encoder power supply	DC +5 V (up to V_{max} ≈ +10 V), I_{max} = DC 300 mA
Max. line length that can be connected	100 m (328 ft) total Use a shielded twisted-pair cable (A and $\overline{A}$, B and $\overline{B}$, C and $\overline{C}$) for connecting the encoder to the DWI11A and the DWI11A to MOVIDRIVE®.

4.11 DIO11B input/output card option

4.11.1 Part number

824 308 5

4.11.2 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 the basic unit (→ parameter group P6__, Terminal assignment).

4.11.3 Electronics data

Option DIO11B			
	Setpoint input n2 X20:1/X20:2 AI21/AI22 operating mode Resolution Internal resistance	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_i = 40 kΩ	
	Analog outputs X21:1/X21:4 X21:2/X21:5 Response time Resolution	AOV1/AOV2: Voltage outputs DC-10 V...0...+10 V, I_{max} = 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, max. output voltage DC 15 V, short-circuit proof and protected against external voltages up to DC 30 V, selection option → parameter menu P64_ 5 ms 12 bit	
	Binary inputs X22:1...X22:8 Internal resistance	Isolated (optocoupler), PLC compatible (EN 61131) DI1Ø...DI17 R_i ≈ 3 kΩ, I_E ≈ DC 10 mA Sampling time 1 ms	
	Signal level	DC+13 V...+30 V= "1" = Contact closed DC -3 V...+5 V = "0" = Contact open	Complies with EN 61131
	Function X22:1...X22:8	DI10...DI17: Selection option → Parameter menu P61_	
	Binary outputs X23:1...X23:8	DO1Ø...DO17: PLC-compatible (EN 61131-2), response time 1 ms	
	Signal level	"0" = DC 0 V "1" = DC+24 V	
	Function X23:1...X23:8	DO10...DO17: Selection option → Parameter menu P63_, I_{max} = DC 50 mA, short-circuit proof and protected against external voltage to DC 30 V	
1454878091	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 cable cross-section	One core per terminal: 0.08...1.5 mm^2 (AWG 28...16) Two cores per terminal: 0.25...1 mm^2 (AWG 22...17)	

4.11.4 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)

4.12 DFP21B PROFIBUS fieldbus interface option

4.12.1 Part number

824 240 2

4.12.2 Description

MOVIDRIVE® B can be equipped with a 12 Mbaud fieldbus interface for the PROFIBUS-DP serial bus system. The device master data (GSD) and type files for MOVIDRIVE® B are available from the SEW homepage (http://www.sew-eurodrive.de) under "Software" to help with project planning and 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 rapid cyclic data exchange; e.g. setpoints or binary commands, between central automation units (PROFIBUS master) and decentralized peripheral units (e.g. drive inverters). The DFP21B option supports PROFIBUS-DP and DP-V1. Consequently, MOVIDRIVE® B can be controlled via PLC and PROFIBUS-DP / DP-V1.

4.12.3 Electronics data

DFP21B option		
	Protocol variant	PROFIBUS-DP and DPV1 to IEC 61158
	Baud rate	Automatic baud rate detection from 9.6 kbaud to 12 Mbaud
	Connection technology	9-pin sub D socket, pin assignment to IEC 61158
	Bus termination	Not integrated, implement using suitable PROFIBUS connector with terminating resistors that can be activated
	Station address	1 ... 125, adjustable via DIP switches
	GSD file name	DP: SEW_6003.GSD DP-V1: SEWA6003.GSD
	DP ID number	6003_{hex} (24579_{dec})
	Max. number of process data	10 process data
1455119627		

4.13 DFI11B INTERBUS fieldbus interface option

4.13.1 Part number

824 309 3

4.13.2 Description

MOVIDRIVE® B can be equipped with a fieldbus interface for the non-proprietary and standardized INTERBUS sensor/actuator bus system.

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 inverter can be controlled and configured in a user-friendly way.

4.13.3 Electronics data

DFI11B option		
 1455126155	Supported baud rates	500 kBaud and 2 MBaud, can be selected via DIP switch
	Connection technology	Remote bus input: 9-pin D-sub connector Remote bus output: 9-pin D-sub socket RS485 transmission technology, 6-core shielded and twisted-pair cable
	DP identity numbers	$E3_{hex} = 227_{dec}$ (1 PCP word) $E0_{hex} = 224_{dec}$ (2 PCP words) $E1_{hex} = 225_{dec}$ (4 PCP words) $38_{hex} = 56_{dec}$ (microprocessor not ready) $03_{hex} = 3_{dec}$ (no PCP word)
	Max. number of process data	6 process data

4.14 DFI21B INTERBUS optical fiber fieldbus interface option

4.14.1 Part number

824 311 5

4.14.2 Description

MOVIDRIVE® B can be equipped with a fieldbus interface for the non-proprietary and standardized sensor/actuator bus system INTERBUS / INTERBUS with optical fibers (INTERBUS optical fiber).

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 inverter can be controlled and configured in a user-friendly way.

4.14.3 Electronics data

DFI21B option		
 1455171339	Supported baud rates	500 kBaud and 2 MBaud, can be selected via DIP switch
	Connection technology	F-SMA connector
	DP identity numbers	$E3_{hex} = 227_{dec}$ (1 PCP word) $E0_{hex} = 224_{dec}$ (2 PCP words) $E1_{hex} = 225_{dec}$ (4 PCP words) $38_{hex} = 56_{dec}$ (microprocessor not ready) $03_{hex} = 3_{dec}$ (no PCP word)
	Max. number of process data	6 process data

4.15 DFE32B PROFINET IO RT fieldbus interface option

4.15.1 Part number

1821 345 6

4.15.2 Description

The MOVIDRIVE® MDX61B inverter enables you to use the DFE32B option to connect to higher-level automation, project planning and visualization systems via Ethernet (PROFINET/IO protocol) thanks to its powerful, universal fieldbus interface. You can use option DFE32B to communicate directly with the inverters via Ethernet and operate the MOVITOOLS® MotionStudio software to change parameters and $\text{IPOS}^{\text{plus®}}$ programs. An integrated Web server makes it possible for the user to access diagnostic values quickly and easily using a standard browser (e.g. Internet Explorer).

4.15.3 Electronics data

DFE32B option		
 1455229707	Application protocols	• **PROFINET IO** (Ethernet frames with frame identification 8892_{hex}) to control and parameterize the inverter. • **HTTP** (Hypertext Transfer Protocol) for diagnostics using a Web browser. • **SMLP** (Simple MOVILINK Protocol), protocol used by MOVITOOLS® MotionStudio.
	Port numbers used	• 300 (SMLP) • 80 (HTTP)
	Ethernet services	• ARP • ICMP (ping)
	ISO / OSI layer 2	Ethernet II
	Baud rate	100 Mbaud in full duplex mode
	Connection technology	Two RJ45 plug connectors with integrated switch and auto-crossing
	Addressing	4 byte IP address or MAC-ID (00:0F:69:xx:xx:xx)
	Manufacturer ID (Vendor ID)	$010A_{hex}$
	Tools for startup	• MOVITOOLS® MotionStudio engineering software version 5.40 or higher. • DBG60B keypad
	Firmware status of MOVIDRIVE® MDX61B	Firmware version 824 854 0.17 or higher (→ display with P076)

4.15.4 Functions

- PROFINET IO protocol
- Two RJ45 plug connectors for star or line 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® MotionStudio via Ethernet TCP/IP
- Inverter diagnostics using a standard browser (e.g. Internet Explorer) via the integrated Web server:
  – Transfer display values
  – DFE32B configuration (after login)

4.16 DFE33B EtherNet/IP and Modbus/TCP fieldbus interface option

4.16.1 Part number

1821 346 4

4.16.2 Description

The MOVIDRIVE® MDX61B inverter enables you to use the DFE33B option to connect to higher-level automation, project planning and visualization systems via Ethernet (EtherNet/IP and Modbus/TCP protocol) thanks to its powerful, universal fieldbus interface. You can use option DFE33B to communicate directly with the inverters via Ethernet and operate the MOVITOOLS® MotionStudio engineering software to change parameters and IPOS$^{plus®}$ programs. An integrated Web server makes it possible for the user to access diagnostic values quickly and easily using a standard browser (e.g. Internet Explorer).

4.16.3 Electronics data

DFE33B option

1455412875

Application protocols		• **EtherNet/IP** (Ethernet Industrial Protocol) or **Modbus/TCP** to control and parameterize the inverter. • **HTTP** (Hypertext Transfer Protocol) for diagnostics using a Web browser. • **SMLP** (Simple MOVILINK Protocol), protocol used by MOVITOOLS® Motion-Studio. • **DHCP** (Dynamic Host Configuration Protocol) to assign address parameter automatically.
Port numbers used		• 44818 EtherNet/IP (TCP) • 2222 EtherNet/IP (UDP) • 502 Modbus/TCP • 300 SMLP (TCP, UDP) • 80 HTTP • 67 / 68 DHCP
Ethernet services		• ARP • ICMP (ping)
ISO / OSI layer 1/2 **ISO / OSI layer 4/5**		Ethernet II TCP/IP and UDP/IP
Automatic baud rate detection		10 MBaud / 100 MBaud
Connection technology		2 x RJ45 with integrated switch and autocrossing
Addressing		4 byte IP address or MAC-ID (00-0F-69-xx-xx-xx)
Manufacturer ID (Vendor ID)		• $013B_{hex}$ (EtherNet/IP) • "SEW-EURODRIVE" (Modbus/TCP)
Tools for startup		• MOVITOOLS® MotionStudio engineering software version 5.40 or higher. • DBG60B keypad
Firmware status of MOVIDRIVE® MDX61B		Firmware version 824 854 0.17 or higher (→ display with P076)

4.16.4 Functions

- EtherNet/IP protocol
- Two RJ45 plug connectors for star or line 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. Using the DBG60B keypad and MOVITOOLS® MotionStudio
  2. Using the DHCP server
- Engineering access using MOVITOOLS® MotionStudio via Ethernet TCP/IP
- Inverter diagnostics using a standard browser (e.g. Internet Explorer) via the integrated Web server:
  – Transfer display values
  – DFE33B configuration (after login)

4.17 DFE24B EtherCAT® fieldbus interface option

4.17.1 Part number

1821 126 7

4.17.2 Description

The MOVIDRIVE® MDX61B inverter enables you to use the DFE24B option to connect to higher-level automation, project planning and visualization systems via EtherCAT® thanks to its powerful, universal fieldbus interface. You can use the DFE24B option to communicate with the inverters via the EtherCAT® master and operate the MOVITOOLS® MotionStudio engineering software via EtherCAT® to change parameters and IPOS^plus®^ programs.

4.17.3 Electronics data

DFE24B option		
 1455419915	Standards	IEC 61158, IEC 61784-2
	Baud rate	100 Mbaud full duplex
	Connection technology	Two RJ45 plug connectors
	Bus termination	Not integrated because bus termination is automatically activated.
	OSI layer	Ethernet II
	Station address	Setting via EtherCAT® master (→ Display with P093)
	XML file name	SEW_DFE24B.xml
	Vendor ID	0x59 (CANopenVendor ID)
	EtherCAT® services	• CoE (CANopen over EtherCAT®) • VoE (Simple MOVILINK® Protocol over EtherCAT®)
	Firmware status of MOVIDRIVE® B	824 854 0.18 or higher (→ display with P076)
	Tools for startup	• MOVITOOLS® MotionStudio engineering software version 5.40 or higher. • DBG60B keypad

4.17.4 Functions

- EtherCAT®
- Two RJ45 plug connectors for line type cabling
- Simultaneous communication of up to 10 process data and parameter data as well as access (Rx, Tx) to 8 IPOS^plus®^ variables
- Automatic addressing via EtherCAT® master
- Engineering access using MOVITOOLS® MotionStudio via EtherCAT®

4.18 DFD11B DeviceNet fieldbus interface option

4.18.1 Part number

824 972 5

4.18.2 Description

The MOVIDRIVE® MDX61B 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 integrated the DFD11B in the machine control. You can download this file from the SEW homepage in the Software section.

4.18.3 Electronics data

DFD11B option		
	Communication protocol	Master/slave connection set according to DeviceNet specification version 2.0
	Number of process data words	Can be set via DIP switch: • 1 ... 10 process data words • 1 ... 4 process data words with bit-strobe I/O
	Baud rate	125, 250 or 500 kbaud, can be set using DIP switch
	Bus cable length	For thick cable according to DeviceNet specification 2.0 appendix B: • 500 m at 125 kbaud • 250 m at 250 kbaud • 100 m at 500 kbaud
	Transmission level	ISO 11 98 - 24 V
	Connection technology	• 2-wire bus and 2-wire supply voltage DC 24 V with 5-pole Phoenix terminal • Pin assignment according to DeviceNet specification
	MAC ID	0 ... 63, can be set using DIP switch Max. 64 stations
	Supported services	• Polled I/O: 1 ... 10 words • Bit-strobe I/O: 1 ... 4 words • Explicit messages: – Get_Attribute_Single – Set_Attribute_Single – Reset – Allocate_MS_Connection_Set – Release_MS_Connection_Set
1455438859	Tools for startup	• MOVITOOLS® MotionStudio engineering software • DBG60B keypad

4.19 *DFC11B CAN/CANopen fieldbus interface option*

4.19.1 Part number

824 317 4

4.19.2 Description

The MOVIDRIVE® MDX61B 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 and process data using the MOVILINK® protocol designed especially for units from SEW-EURODRIVE.

The DFC11B fieldbus interface type 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.

4.19.3 Electronics data

DFC11B option		
 1455445515	Communication profile	• SEW-MOVILINK® • CANopen • CAN Layer 2
	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	9-pole Sub-D plug connector X30 (plug assigned to CIA standard) or terminal X31
	Permitted cable cross section X31 (CAN bus connection)	One core per terminal: 0.20 ... 2.5 mm^2 (AWG24 ... 12) Two cores per terminal: 0.25 ...1 mm^2 (AWG22 ... 17)
	Terminating resistor	120 Ω (set using DIP switch S1-R)
	Addressing	Setting via parameter P891 (SBus MOVILINK®) or P896 (CANopen)
	Tools for startup	• MOVITOOLS® MotionStudio engineering software • DBG60B keypad

4.19.4 Functions

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

INFORMATION

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.

4.20 *DRS11B synchronous operation card option*

4.20.1 Part number

824 672 6

4.20.2 Description

The DRS11B option enables a group of motors to run in angular synchronous operation or in an adjustable proportional relationship. For detailed information, refer to the "DRS11B Synchronous Operation Card" 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 slave motors. The motors must be equipped with encoders. The DRS11B option is plugged into the expansion slot.

Option DRS11B		
	Binary inputs X40:1...X40:6 Internal resistance	INPØ...INP5: Isolated (optocoupler) PLC compatible (EN 61131) $R_i \approx 3\ k\Omega$, $I_E \approx$ DC 10 mA Sampling time 5 ms
	Signal level	DC+13 V...+30 V= "1" = Contact closed DC- 3 V...+5 V = "0" = contact open
	Function	Fixed assignment with: • INPØ = Free-running • INP1 = Offset 1 • INP2 = Offset 2 • INP3 = Offset 3 • INP4 = IPOS$^{plus®}$ variable H477.0 • INP5 = IPOS$^{plus®}$ variable H477.1
	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 **Important:** Do not apply any external voltage!
	Function	Fixed assignment with: • OUTPØ = IPOS$^{plus®}$ variable H476.0 • OUTP1 = IPOS$^{plus®}$ variable H476.1 I_{max} = DC 50 mA, short-circuit proof, protected against external voltage to DC 30 V
	Reference terminals X40:11 X40:7 Voltage output X40:8	DGND: Reference potential for binary signals DCOM: Reference potential for binary inputs X40:1...X40:6 (INPØ...INP5) VO24: Voltage output DC +24 V, max. DC 100 mA
	Distance encoder input X41: Encoder power supply	Max. 200 kHz, signal level according to RS422 or sin/cos DC +24 V, I_{max} = 650 mA[1)] 9-pin D-sub socket
	Master encoder input X42: Encoder power supply	Max. 200 kHz, signal level according to RS422 or sin/cos DC+24 V, I_{max} = DC 650 mA 9-pin D-sub socket
	Encoder simulation output X43:	Signal level to RS422 9-pin D-sub connector
	Voltage input X44:1 X44:2 X44:3	GND DC+24 V supply voltage for binary outputs X40:9/X40:10 and encoder GND
1455477899	Permitted cable cross-section	One core per terminal: 0.08 ... 1.5 mm^2 (AWG28 ... 16) Two cores per terminal: 0.25 ... 1 mm^2 (AWG22 .. 17)

1) Total current load (X41 **and** X42) of the DC 24 V encoder supply ≤ DC 650 mA

4.21 DFS11B fieldbus interface option PROFIBUS DP-V1 with PROFIsafe

4.21.1 Part number

1820 962 9

4.21.2 Description

MOVIDRIVE® B can be equipped with the 12 Mbaud fieldbus interface DFS11B for the serial bus system PROFIBUS-DP-V1 with PROFIsafe. In addition to cyclical and acyclical data exchange, safety-oriented communication takes place that allows to switch a safe F-DO output. The device master data (GSD) and type files for MOVIDRIVE® B are available from the SEW homepage (http://www.sew-eurodrive.com) under "Software" to help with project planning and facilitate startup.

For more detailed information, refer to the "DFS11B Fieldbus Interface PROFIBUS DP-V1 with PROFIsafe" manual. You can order this manual from SEW-EURODRIVE.

4.21.3 Electronics data

DFS11B option		
 1455484171	PROFIBUS protocol options	PROFIBUS DP and DP-V1 to IEC 61158
	Automatic baud rate detection	9.6 kbaud ... 12 Mbaud
	Connection technology	• 9-pin D-sub socket • Pin assignment acc. to IEC 61158
	Bus termination	Not integrated, implement using suitable PROFIBUS plug with terminating resistors that can be switched on.
	Station address	1 ... 125, adjustable via DIP switches
	GSD file name	SEW_600C.GSD
	DP ID number	600C = 24588_{hex}
	Diagnostics data	• Max. 8 bytes • Standard diagnostics: 6 bytes
	Tools for startup	• MOVITOOLS® MotionStudio engineering software • DBG60B keypad
	F address	1 ... 1022 DIP switch for setting the failsafe address
	Ambient temperature	0 ... 55 °C

4.21.4 Safety part

Safety characteristics	
Maximum possible safety class	• SIL 3 according to EN 61508 • Category 4 according to EN 954-1 • Performance level e according to EN ISO 13849-1
System structure	2 channels with diagnostics (1002D)
Operating mode selection	"High demand" rate according to EN 61508
Probability of dangerous failure per hour (PFH value)	<1.00E-09 (1 FIT)
Proof test interval (EN61508)	10 years, after which the component must be replaced with a new one
Repair time	100 hours
Safe condition	Value "0" for all safety-oriented F-DO process values (output disabled)
Safe output	
P-M switch (from load voltage supply)	DC 24 V output according to EN 61131-2, protected against short circuits and overloads
Rated current	1A
Leakage current ("0" signal)	Typically -2 mA (with 2 V / 1 kΩ load resistance) (Note: Current flows from F-DO_M to F-DO_P)
Internal voltage drop (P and M output)	Max. 3 V
Short circuit protection	Electronic, response value: 2.8 A ... 9 A
Overload protection	Response value: 1.4 A ... 1.6 A
Load resistance range	24 kΩ ... 1 kΩ
Voltage limitation when switching off inductive loads	Typically -70 V
Response time (command via PROFIsafe → output switches)	≤ 25 ms
Maximum line length	30 m

4.22 *DFS12B fieldbus interface option PROFIBUS DP-V1 with PROFIsafe*

4.22.1 Part number

1820 963 7

4.22.2 Description

MOVIDRIVE® B can be equipped with the 12 Mbaud fieldbus interface DFS12B for the serial bus system PROFIBUS DP-V1 with PROFIsafe. In addition to cyclical and acyclical data exchange, safety-oriented communication takes place in conjunction with the DCS21B option. The device master data (GSD) and type files for MOVIDRIVE® B are available from the SEW homepage (http://www.sew-eurodrive.com) under "Software" to help with project planning and facilitate startup.

For more detailed information, refer to the "DFS12B Fieldbus Interface PROFIBUS DP-V1 with PROFIsafe" manual. You can order this manual from SEW-EURODRIVE.

4.22.3 Electronics data

DFS12B option

1455516939

DFS12B option	
PROFIBUS protocol options	PROFIBUS DP and DP-V1 to IEC 61158
Automatic baud rate detection	9.6 kbaud ... 12 Mbaud
Connection technology	• 9-pin D-sub socket • Pin assignment acc. to IEC 61158
Bus termination	Not integrated, implement using suitable PROFIBUS plug with terminating resistors that can be switched on.
Station address	1 ... 125, adjustable via DIP switches
GSD file name	SEW_600C.GSD
DP ID number	600C = 24588_{hex}
Diagnostics data	• Max. 8 bytes • Standard diagnostics: 6 bytes
Tools for startup	• MOVITOOLS® MotionStudio engineering software • DBG60B keypad
F address	The failsafe address is set using the DCS21B option
Ambient temperature	0 ... 55 °C

4.23 *DFS21B fieldbus interface option PROFINET IO with PROFIsafe*

4.23.1 Part number

1821 183 6

4.23.2 Description

The MOVIDRIVE® MDX61B inverter enables you to use the DFS21B option to connect to higher-level automation, project planning and visualization systems via Ethernet (PROFINET/IO RT protocol) thanks to its powerful, universal fieldbus interface. In addition to cyclical and acyclical data exchange, safety-oriented communication takes place that allows to switch a safe F-DO output. You can use option DFS21B to communicate directly with the inverters via Ethernet and operate the MOVITOOLS® MotionStudio engineering software to change parameters and IPOS$^{plus®}$ programs. An integrated Web server makes it possible for the user to access diagnostic values quickly and easily using a standard browser (e.g. Internet Explorer).

For more detailed information, refer to the "DFS21B Fieldbus Interface PROFINET IO with PROFIsafe" manual. You can order this manual from SEW-EURODRIVE.

4.23.3 Electronics data

DFS21B option		
	Application protocols	• **PROFINET IO** (Ethernet frames with frame identification 8892_{hex}) to control and parameterize the inverter. • **HTTP** (Hypertext Transfer Protocol) for diagnostics using a Web browser. • **SMLP** (Simple MOVILINK Protocol), protocol used by MOVITOOLS® MotionStudio.
	Port numbers used	• 300 (SMLP) • 80 (HTTP)
	Ethernet services	• ARP • ICMP (ping)
	ISO / OSI layer 2	Ethernet II
	Baud rate	100 Mbaud in full duplex mode
	Connection technology	Two RJ45 plug connectors with integrated switch and auto-crossing
	Addressing	4 byte IP address or MAC-ID (00:0F:69:xx:xx:xx)
	Manufacturer ID (Vendor ID)	$010A_{hex}$
	Tools for startup	• MOVITOOLS® MotionStudio engineering software version 5.40 or higher. • DBG60B keypad
	F address	1 ... 1022 DIP switch for setting the failsafe address
	Firmware status of MOVIDRIVE® MDX61B	Firmware version 824 854 0.17 or higher (→ display with P076)
1455523979	Ambient temperature	0 ... 55 °C

4.23.4 Safety part

Safety characteristics	
Maximum possible safety class	• SIL 3 according to EN 61508 • Category 4 according to EN 954-1 • Performance level e according to EN ISO 13849-1
System structure	2 channels with diagnostics (1oo2D)
Operating mode selection	"High demand" rate according to EN 61508
Probability of dangerous failure per hour (PFH value)	<1.00E-09 (1 FIT)
Proof test interval (EN61508)	10 years, after which the component must be replaced with a new one
Repair time	100 hours
Safe condition	Value "0" for all safety-oriented F-DO process values (output disabled)
Safe output	
P-M switch (from load voltage supply)	DC 24 V output according to EN 61131-2, protected against short circuits and overloads
Rated current	1A
Leakage current ("0" signal)	Typically -2 mA (with 2 V / 1 kΩ load resistance) (Note: Current flows from F-DO_M to F-DO_P)
Internal voltage drop (P and M output)	Max. 3 V
Short circuit protection	Electronic, response value: 2.8 A ... 9 A
Overload protection	Response value: 1.4 A ... 1.6 A
Load resistance range	24 kΩ ... 1 kΩ
Voltage limitation when switching off inductive loads	Typically -70 V
Response time (command via PROFIsafe® → output switches)	≤ 25 ms
Maximum line length	30 m

4.24 DFS22B fieldbus interface option PROFINET IO with PROFIsafe

4.24.1 Part number

1821 184 4

4.24.2 Description

The MOVIDRIVE® MDX61B inverter enables you to use the DFS22B option to connect to higher-level automation, project planning and visualization systems via Ethernet (PROFINET IO RT protocol) thanks to its powerful, universal fieldbus interface. In addition to cyclical and acyclical data exchange, safety-oriented communication takes place in conjunction with the DCS21B option. You can use option DFS22B to communicate directly with the inverters via Ethernet and operate the MOVITOOLS® MotionStudio engineering software to change parameters and IPOS$^{plus®}$ programs. An integrated Web server makes it possible for the user to access diagnostic values quickly and easily using a standard browser (e.g. Internet Explorer).

For more detailed information, refer to the "DFS22B Fieldbus Interface PROFINET IO with PROFIsafe" manual. You can order this manual from SEW-EURODRIVE.

4.24.3 Electronics data

DFS22B option		
 1455645707	Application protocols	• **PROFINET IO** (Ethernet frames with frame identification 8892_{hex}) to control and parameterize the inverter. • **HTTP** (Hypertext Transfer Protocol) for diagnostics using a Web browser. • **SMLP** (Simple MOVILINK Protocol), protocol used by MOVITOOLS® MotionStudio.
	Port numbers used	• 300 (SMLP) • 80 (HTTP)
	Ethernet services	• ARP • ICMP (ping)
	ISO / OSI layer 2	Ethernet II
	Baud rate	100 Mbaud in full duplex mode
	Connection technology	Two RJ45 plug connectors with integrated switch and auto-crossing
	Addressing	4 byte IP address or MAC-ID (00:0F:69:xx:xx:xx)
	Manufacturer ID (Vendor ID)	$010A_{hex}$
	Tools for startup	• MOVITOOLS® MotionStudio engineering software version 5.40 or higher. • DBG60B keypad
	F address	The failsafe address is set using the DCS21B option
	Firmware status of MOVIDRIVE® MDX61B	Firmware version 824 854 0.17 or higher (→ display with P076)
	Ambient temperature	0 ... 55 °C

4.25 *MOVISAFE® DCS21B/31B safety module option*

4.25.1 Part numbers

- DCS21B complete with prefabricated cable DAE34B (CAN bus connection between DCS21B X86 and DFS21B X31): 1821 895 4
- DCS21B without prefabricated cable: 1820 392 2
- DCS31B: 1820 958 0

4.25.2 Description

The DCS21B and DCS31B options of the MOVISAFE® series are designed as expansion options for functional safety. They are capable of performing various drive monitoring functions, such as standstill, speed, direction of rotation or position monitoring. Additionally, sensor signals can be processed via safe inputs and outputs and MOVIDRIVE® B can be switched off according to stop categories 0, 1, or 2.

To being able to communicate with a higher-level safety controller in a safety-oriented manner, the DCS21B option must be used together with the DFS12B fieldbus interface (PROFIBUS DP-V1) or DFS22B (PROFINET IO). The DCS21B/31B option is plugged into the expansion slot.

For detailed information, refer to the "DCS21B/31B Safety Monitor" manual, which you can order from SEW-EURODRIVE.

Overview of prefabricated cables

For connecting an encoder to both MOVIDRIVE® B and the DCS21B/31B option, you can order prefabricated cables from SEW-EURODRIVE.

Prefabricated cables allow you to split the encoder signals and to connect the encoder to the options DCS21B/31B **and** DEH11B/21B or DEU21B.

Encoder cables				
Type	**DCS units**		**Part number**	**Length**
DAE31B[1]	SIN/COS splitting to DEH X15 - DCS X84/X85		1810 053 8	300 mm ± 30 mm (1 ft ± 0.1 ft)
DAE32B[1]	SSI absolute splitting to X62 - DCS X84/X85		1810 625 0	
DAE33B[1]	Conversion from D-sub 15-pole Hiperface® encoder to D-sub 9-pole DCS card X84/85		1810 785 0	
DAE34B[2]	CAN cable (still used for cards with S no. > 1500)		1821 307 3	150 mm ± 30 mm (0.5 ft ± 0.1 ft)
Type	**DCS units**	**Inverter → DCSB X84/85**	**Part number**	**Length**
DAE40B	SIN/COS splitting Asynchronous	DEH11B → X14 DEU21B → X14 DER11B → X14	1811 601 9	200 mm to 6 m (0.66 ft – 19.7 ft)
DAE41B	SIN/COS splitting Synchronous	DEU21B → X14 DER11B → X14	1811 468 7	
DAE42B	SIN/COS splitting Asynchronous	DEH11B → X15 DEU21B → X15	1811 602 7	
DAE43B	SIN/COS splitting Synchronous	DEH11B → X15 DEU21B → X15	1811 467 9	
DAE44B	Splitting SSI 9-pole	DEH21B → X62	1810 625 0	
DAE45B	Splitting SSI	DEU21B → X15	1811 709 0	
DAE47B	Sin/cos encoder adapter 15-pin to 9-pin	Cable with resistors	1811 604 3	
DAE48B	SSI encoder adapter 9-pin to 9-pin	Cable with 1 x resistor	1811 917 4	
DAE49B	SSI encoder adapter 15-pin to 9-pin	Cable with 1 x resistor	1811 918 2	

1) Can only be used for DCS21B/31B with serial number ≤ 001499
2) CAN bus connection between X86 of option DCS21B and X31 of option DFS12B/22B.

4.25.3 Electronics data

DCS21B/31B option		
 1455652235	 1455668107	LED alarm/error LED watchdog LED system B LED system A X80: Power supply connection X81: Connection binary inputs X82: Connection of binary outputs DO0, DO1 X83: Terminal for binary output DO2 X84: Connection of incremental, sin/cos or absolute encoder (encoder 1) X85: Connection of incremental, sin/cos or absolute encoder (encoder 2) X86: CAN bus connection (only for DCS21B) X87: Connection for service interface

4.26 MOVI-PLC® basic DHP11B controller option

4.26.1 Part numbers

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

Part number	MOVI-PLC®*basic* DHP11B unit variant	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)

4.26.2 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* DHP11B controller 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® B/compact, MOVITRAC® B, MOVIAXIS®, MOVIMOT®).

4.26.3 Electronics data

MOVI-PLC® *basic* DHP11B option

1455674379

	Status displays	LEDs for I/O voltage supply, firmware, program, PROFIBUS, system buses
	Fieldbus	• PROFIBUS DP and DP-V1 to IEC 61158 • Automatic baud rate detection from 9.6 kbaud to 12 Mbaud • Bus connection implemented with suitable connector • GSD file SEW_6007.GSD • DP ident. number 6007_{hex} (24579_{dec}) • Maximum 32 process data
	System bus	• 2 system buses (CAN) to control 12 inverters and CANopen I/O modules • CAN layer 2 (SCOM cyclic, acyclic) or via the SEW MOVILINK® protocol • Baud rate: 125 kbaud ... 1 Mbaud • External bus terminator • Address range: 0 ... 127
	Engineering	Via RS485, PROFIBUS and the system buses
	Panel operation	Via RS485 and CAN 2 (in preparation)
	Connection technology	• PROFIBUS: 9-pole D-sub connector according to IEC 61158 • System buses and I/Os: plug-in terminals • RS485: RJ10
	Binary inputs/outputs	• 8 I/Os to IEC 61131-2; can be configured as inputs or outputs. Five are interrupt-capable
	Memory	• Program: 512 kB • Data: 128 kB • Retain: 24 kB
	Tools for startup	MOVITOOLS® MotionStudio with integrated PLC Editor (Programming languages IL, ST, LD, FBD, CFC, SFC; libraries to optimize control of the inverters)

4.27 *OST11B option*

4.27.1 Part number

1820 544 5

4.27.2 Description

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

4.27.3 Electronics data

OST11B option		
 1455757707	RS485 interface COM2 X35:1 ... X35:4 X36:1 ... X36:3	• For connection of an Engineering PC, a DOP11A/B operator terminal or a gearmotor with integrated frequency inverter MOVIMOT® • I/O standard, 57.6 kBd, max. total cable length 200 m, integrated dynamic terminating resistor permanently installed
	Potential level	COM2 is isolated from the MOVI-PLC®*basic* DHP11B controller.

4.28 DHE/DHF/DHR21 and DHE/DHF/DHR41B controller option

Three types of DH.21B/41B controllers are available, which differ in the fieldbus interfaces:

DH.21B/41B type	Fieldbus interfaces
DHE21B/41B	Ethernet TCP/IP, UDP
DHF21B/41B	Ethernet TCP/IP, UDP, PROFIBUS DP-V1, DeviceNet
DHR21B/41B	Ethernet TCP/IP, UDP, PROFINET, EtherNet/IP, ModbusTCP/IP

4.28.1 Description

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

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

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

MOVI-PLC® standard performance class

- DH.21B controllers enable coordinated single axis movements and integration of external inputs/outputs as well as Drive Operator Panels (DOP). The DH.21B.. option is therefore suitable for use as a module controller or stand-alone controller for machines of medium complexity.

MOVI-PLC® advanced performance class

- The DH.41B controller is characterized by a greater variety of interfaces and a higher performance level, which allows complex calculations and interpolated movements, for example. The DH.41B option is therefore suitable for the automation of cells and machines. The integrated Ethernet interface enables direct connection of the DH.41B controller to the control level.

Configurable application controller (CCU)

The controller can be used as configurable application controller (CCU) by using SD cards of the type OMC41B. Only standardized application modules created by SEW-EURODRIVE can be executed. The application modules can be started up quickly and conveniently by graphical configuration. A defined process data interface provides this functionality to a higher-level controller. A process data monitor with control mode is available to support the startup procedure.

CCU standard performance class

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

- Speed specification
- Cam positioning
- Bus positioning with 6 process data
- Single-axis universal module

CCU advanced performance class

The "CCU advanced" performance class is intended for application modules with single-axis and multi-axis functionality and fast response times. The following application modules are available:

- Single-axis functionality:
  - Speed specification
  - Cam positioning
  - Bus positioning with 6 process data words
  - Single-axis universal module
- Multi-axis functionality:
  - SyncCrane
  - Energy-efficient SRU

4.28.2 DHE21B/41B electronics data

DHE21B/41B option		
 1455764363	Part number	• DHE21B option: 1823 607 3 DHE41B option: 1821 160 7
	Electrical supply	The following applies to all units (MDX, MX, compact controller): • You have to supply the binary inputs and outputs separately with DC 24 V (X31:1/2). Installed in MOVIDRIVE® MDX61B: • Power consumption: P_{max} = 6.8 W • Option DHE21B/41B is supplied by MOVIDRIVE® MDX61B via backplane connector. • In the case of disconnection from the power supply, continued function is guaranteed by the DC 24 backup mode (external DC 24 V supply to X10:9/10 of MOVIDRIVE® MDX61B required). Installed in the MOVIAXIS® master module (MXM): • Power consumption: P_{max} = 8.5 W • U = DC 24 V (–15% / +20%) • I_{max} = 600 mA • Option DHE21B/41B can be supplied from the MOVIAXIS® switched-mode power supply (MXS) or from an external voltage source. To do so, connect X5 between the individual units. • If the DHE21B/41B option is supplied with DC 24 V from the MOVIAXIS® switched-mode power supply, then the function of the DHE21B/41B option is ensured when power supply is switched off (external DC 24 V supply at X16 of the MOVIAXIS® switched-mode power supply).
	Potential levels	Option DHE21B/41B has the following potential levels: • Potential control / CAN 1 / COM1 • Potential COM2 • Potential binary inputs and outputs • Potential system bus CAN 2
	Memory	• Retain data: 32 kB • System variables (retain): 8 kB Program memory: • DHE21B: 2 MB (for application program, incl. IEC libraries) • DHE41B: 6 MB (for user program, incl. IEC libraries) Data memory: • DHE21B: 4 MB (for IEC application) • DHE41B: 8 MB (for IEC application)

DHE21B/41B option		
	CAN 2 system bus X32:1 ... X32:3 CAN 1 system bus X33:1 ... X33:3	• System bus CAN 1 and CAN 2 to CAN specification 2.0, parts A and B, transmission technology to ISO 11898 • The CAN 2 system bus is electrically isolated • Max. 64 stations per CAN system bus • Max. 64 SCOM transmit objects / 32 receive objects per CAN system bus • Address range 0 – 127 • Baud rate: 125 kBd - 1 MBd • If X32 or X33 is the bus terminator, you must connect a terminating resistor (120 Ω) externally. • You can remove connector X32 or X33 without interrupting the system bus. • The system bus can be run in layer 2 (SCOM cyclic, acyclic) or in accordance with the SEW MOVILINK® protocol.
	Ethernet 1 X36	System bus, reserved
	Ethernet 2 X37	• TCP/IP • Connection options: Engineering PC, other controller, Intranet
	USB	USB 1.0 for connecting an engineering PC (in preparation)
	RS485 interface COM1/2 X34:1 ... X34:4	• For connection of a DOP11A/B operator terminal or a gearmotor with integrated MOVIMOT® frequency inverter • I/O standard, 57.6 / 9.6 kBd, max. total cable length 200 m • Dynamic terminating resistor with fixed installation
	SD memory card	• PC-readable • Includes: – Firmware – IEC program – Data • At least 128 MB memory • Designs, part numbers, and functions: – OMH41B-T0: 1821 204 2 Functions: Handling of speed control, positioning, e.g. with the MPLCMotion_MDX library – OMH41B-T1: 1821 205 0 Functions: Additional: cam disk, electronic gear, cam controller, for example – OMH41B-T2: 1821 206 9 Functions: Additional: material handling, for example
	Engineering	Engineering takes place via one of the following interfaces: • Ethernet 2 (X37) • In preparation: USB (X35) Engineering for all SEW components connected to the MOVI-PLC® *advanced* DHE41B control card can be performed using the MOVI-PLC® *advanced* DHE41B control card. Engineering of the MOVI-PLC® *advanced* DHE41B controller cannot be performed via the inverters. • MOVITOOLS® MotionStudio engineering software with PLC Editor

4.28.3 DHF21B/41B electronics data

	INFORMATION
	For connections identical with DHE41B, refer to the "DHE41B electronics data" section.

DHF21B/41B option		
 1455767819	Part number	• DHF21B: 1823 608 1 • DHF41B: 1821 161 5
	Electrical supply	Installed in MOVIDRIVE® MDX61B: • Power consumption: P_{max} = 8 W Installed in the MOVIAXIS® master module (MXM): • Power consumption: P_{max} = 10 W
	Potential levels	Option DHF21B/41B has the following potential levels: • Potential control / CAN 1 / COM1 • Potential COM2 • Potential binary inputs and outputs • Potential system bus CAN 2 • Potential PROFIBUS
	PROFIBUS connection X30P:1 – X30P:9	Via 9-pin D-sub connector, pin assignment to IEC 61158
	Bus termination	Not integrated. Implement bus termination with suitable PROFIBUS connector with switchable terminating resistors.
	Automatic baud rate detection	9.6 kBd – 12 MBd
	DeviceNet connection X30D:1 – X30D:5	• 2-wire bus and 2-wire supply voltage DC 24 V with 5-pole Phoenix terminal • Pin assignment according to DeviceNet specification

4.28.4 DHR21B/41B electronics data

	INFORMATION
	Connections identical with those of the DHE21B/41B and DHF21B/41B options are described in the chapters "DHE21B/41B option" and "DHF21B/41B option".

DHR21B/41B option		
 2859931531	**Part number**	• DHR21B: 1823 610 3 • DHR41B: 1821 632 3
	Electrical supply	Installed in MOVIDRIVE® MDX61B: • Power consumption: P_{max} = 9.5 W Installed in the MOVIAXIS® master module (MXM): • Power consumption: P_{max} = 12 W
	Ethernet connection X30-1, X30-2	Via RJ45 socket, pin assignment according to IEC 11801 Integrated Ethernet switch with autocrossing and autonegotiation functionality.
	Engineering	Additional engineering access via PROFINET, EtherNet/IP and Modbus TCP/IP interface (X30:1/2)

4.29 BST safety-related brake module option

4.29.1 Part numbers

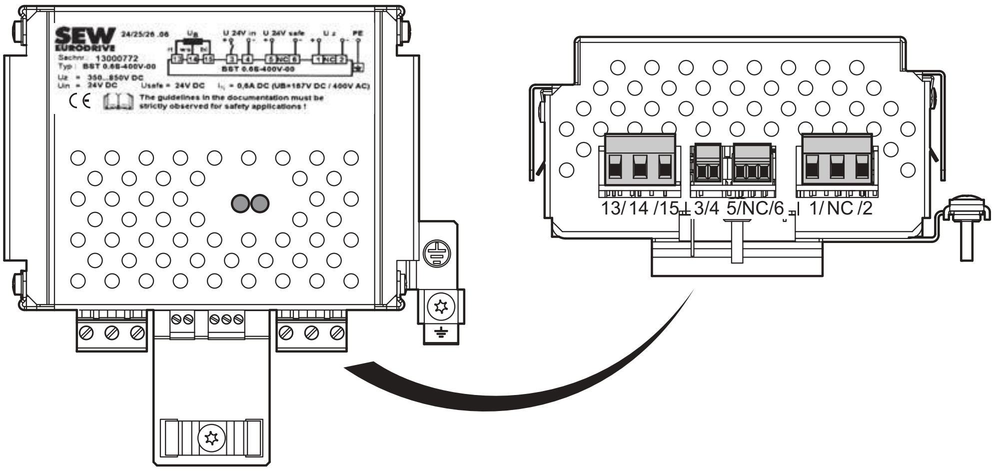
The safety-related brake module is available in three variants:

Type designation	Part number	Approved SEW disk brakes
BST 0.6S-460V-00	0 829 971 4	All brake coils with a brake coil voltage of AC 460 V and a coil power ≤ 120 W. Several brake coils can be connected for redundant systems. In this case, the total power must not exceed 120 W.
BST 0.7S-400V-00	1 300 077 2	All brake coils with a brake coil voltage of AC 400 V and a coil power ≤ 120 W. Several brake coils can be connected for redundant systems. In this case, the total power must not exceed 120 W.
BST 1.2S-230V-00	1 300 133 7	All brake coils with a brake coil voltage of AC 230 V and a coil power ≤ 120 W. Several brake coils can be connected for redundant systems. In this case, the total power must not exceed 120 W.

4.29.2 Description

- The safety-relevant BST brake module enables the connection of an external fail-safe safety switching device/safety controller. The safety switching device disconnects the safe control voltage $V_{24\ V\ safe}$ when a connected control device (e.g. emergency stop device) is activated.
- Disconnecting the safe control voltage $V_{24\ V\ safe}$ means the connected brake is disconnected from the power supply. The power supply required for releasing the connected brake is interrupted safely.
- Instead of separating the brake control galvanically from the power supply using contactors or switches, the disconnection procedure described here prevents the power semiconductors in the safety-relevant BST brake module from being activated, in this way ensuring safe disconnection. This means that all connected brakes are de-energized although the supply voltage is still present at the safety-relevant BST brake module.

4.29.3 Electronics data



Terminal		Function
1 2	$+U_Z$ $-U_Z$	DC link voltage input
5 6	SVI24 S0V24	Safety-relevant control voltage $V_{24\ V\ safe}$ input Reference potential for safety-relevant control voltage $V_{24\ V\ safe}$
3 4	DBI24 DGND	Functional control voltage $V_{24\ V\ in}$ input: Reference potential for functional control voltage $V_{24\ V\ in}$
13 14 15	RD WH BU	Brake output
⏚		Protective grounding

5 Technical Data of External Accessories

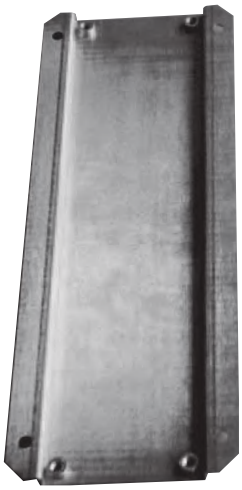
5.1 DMP11B mounting panel option

5.1.1 Part number

818 398 8

5.1.2 Description

DMP11B



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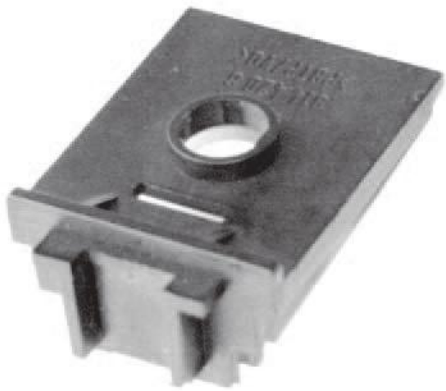
If a MOVIDRIVE® MD_60A size 2 unit is to be replaced by MOVIDRIVE® MDX61B size 2S, the MDX61B size 2S can be fitted on the existing mounting plate with the DMP11B mounting panel. New retaining holes do not have to be drilled.

5.2 DLB11B touch guard option

5.2.1 Part number

823 111 7 (12 pieces included in the scope of delivery)

5.2.2 Description



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Degree of protection IP20 can be achieved with touch guard DLB11B for the following units:

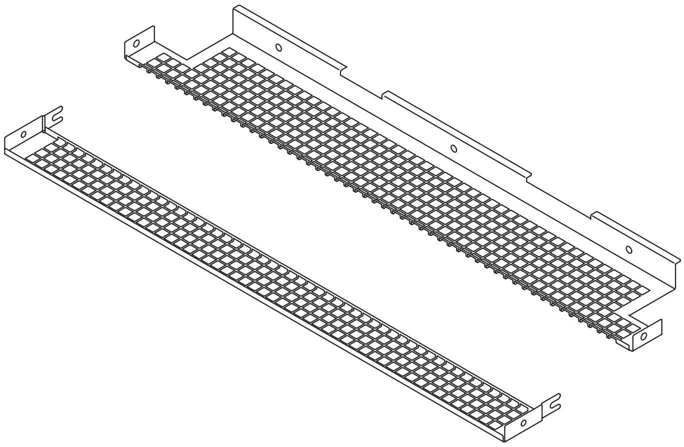
- MOVIDRIVE® MDX61B size 4 (AC 500 V units: MDX61B0370/0450; AC 230 V units: MDX61B0220/0300)
- MOVIDRIVE® MDX61B size 5 (AC 500 V units: MDX61B0550/0750)
- Regenerative power supply MOVIDRIVE® MDR60A size 4 (MDR600750-503-00)

5.3 *DLB21B touch guard option (for size 7)*

5.3.1 Part number

1 822 608 6

5.3.2 Description



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You can use the DLB21B touch guard to achieve degree of protection IP20 for the following units:

- MOVIDRIVE® MDX61B size 7

  (AC 500 V units: MDX61B1600/2000/2500)

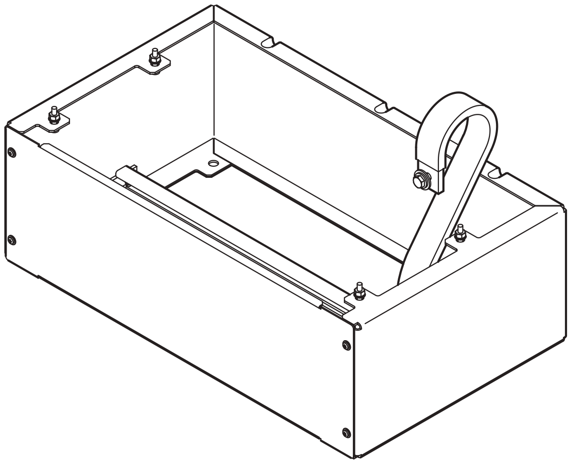
Fixing material for the touch guard is included in the scope of delivery. The customer must adapt the touch guard to the individual cable routing (cutting the hole matrix for supply system and motor cables).

5.4 DLS11B mounting base option (for size 7)

5.4.1 Part number

1 822 602 7

5.4.2 Description



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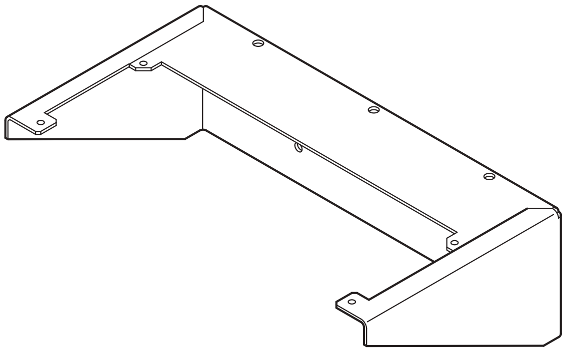
The mounting base is designed specifically for installation of MOVIDRIVE® B size 7 (MDX61B1600/2000/2500) in the control cabinet. The base is equipped with an integrated cable clamping rail. It ensures sufficient space for connecting the supply system and motor cables. The front cover can be removed for installation work. Fixing material for mounting the inverter to the mounting base is included in the scope of delivery.

5.5 DLH11B wall bracket (for size 7)

5.5.1 Part number

1 822 610 8

5.5.2 Description



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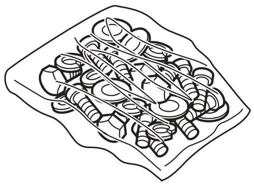
The wall bracket is used for attaching MOVIDRIVE® B size 7 (MDX61B1600/2000/2500) to a wall. The fixing material for mounting the inverter to the wall bracket is included in the scope of delivery. The fixing material for mounting the bracket to the wall is not included in the scope of delivery.

5.6 DLA11B connection kit option (for size 7)

5.6.1 Part number

1 822 312 5

5.6.2 Description



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Connection material for connecting supply system and motor cables with cross sections up to 240 mm² to the following units:

- MOVIDRIVE® MDX61B size 7
  (AC 500 V units: MDX61B1600/2000/2500)

The connection kit includes the following material:

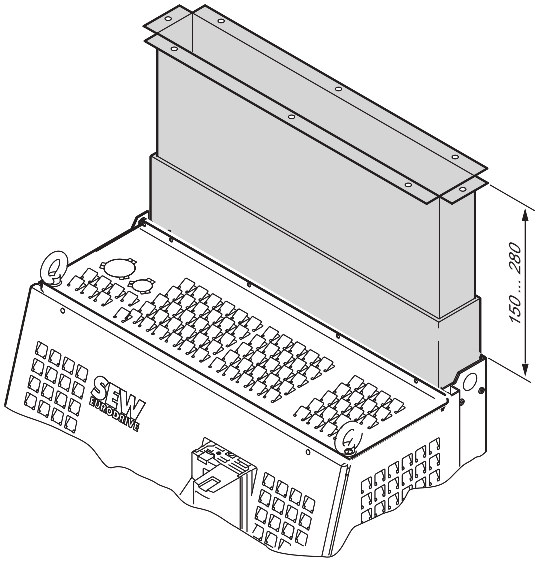
- 9 × bolts M12×30
- 9 × M12 nuts
- Lock washers
- Washers
- 3 × PE terminals for PE bus bar (up to 240 mm²)

5.7 DLK11B air duct option (for size 7)

5.7.1 Part number

1 822 603 5

5.7.2 Description



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Air duct for dissipating heat from MOVIDRIVE® B size 7 (MDX61B1600/2000/2500).

The air duct extends the integrated unit air duct of size 7 to the control cabinet roof to dissipate heat from the control cabinet. It improves the temperature management. A prerequisite is that air can be dissipated via the control cabinet roof (dust protection, etc.).

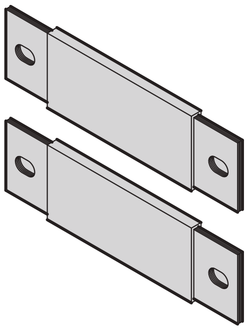
5.8 *DLZ11B DC link coupling option (for size 7)*

5.8.1 Part number

The DLZ11B DC link coupling is available in three different lengths:

Type	Part number
DLZ11B / 100 mm	1 823 193 4
DLZ11B / 200 mm	1 823 566 2
DLZ11B / 300 mm	1 823 567 0

5.8.2 Description



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DC link coupling for connecting 2 inverters side by side.

- MOVIDRIVE® MDX61B size 7

  (AC 500 V units: MDX61B1600/2000/2500)

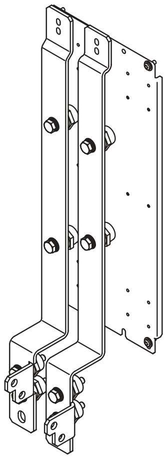
The DC link (+U_Z; -U_Z) of size 7 can be connected on the side as standard. The DLZ11B DC link coupling allows for two MOVIDRIVE® B size 7 inverters to be connected. Depending on the DC link coupling, the inverters must be installed at a distance of 100 mm, 200 mm, or 300 mm; the tolerance is about 4 mm. Two insulated bus bars and fixing material are included in the scope of delivery.

5.9 2Q DLZ12B DC link adapter option (for size 7)

5.9.1 Part number

1 822 729 5

5.9.2 Description



2422222347

DC link adapter for routing the DC link connection to the bottom of the unit. Only for size 7 (160 kW…250 kW).

For units:

- MDX61B1600-503-2-0T/L
- MDX61B2000-503-2-0T/L
- MDX61B2500-503-2-0T/L

The DC link ($+U_Z$; $-U_Z$) of size 7 can be connected on the side as standard. The 2Q DC link adapter provides a connection option for $+U_Z$ and $-U_Z$ at the bottom of the unit.

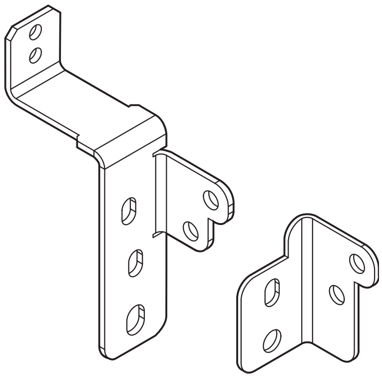
The DC link adapter should be used for DC link coupling with MOVIDRIVE® B sizes 0 to 6.

5.10 4Q DLZ14B DC link adapter option (for size 7)

5.10.1 Part number

1 822 728 7

5.10.2 Description



2435823499

DC link adapter for routing the DC link connection to the bottom of the unit. Only for size 7 (160 kW…250 kW).

For units:

- MDX61B1600-503-4-0T/L
- MDX61B2000-503-4-0T/L
- MDX61B2500-503-4-0T/L

The DC link ($+U_Z$; $-U_Z$) of size 7 can be connected on the side as standard. The 4Q DC link adapter provides a connection option for $+U_Z$ and $-U_Z$ at the bottom of the unit. The DC link adapter should be used for DC link coupling with MOVIDRIVE® B sizes 0 to 6.

6 Technical Data of Braking Resistors, Chokes and Filters

6.1 BW... braking resistor option / BW...-T / BW...-P

6.1.1 General information

- Braking resistors BW... / BW...-T and BW...-P match the technical features of the MOVIDRIVE® inverters.
- Take account of a power reduction of 4% per 10 K from an ambient temperature of 40 °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) (→ chapter "MOVIDRIVE® MDX60B dimension drawings")
- 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 wire and grid resistors is higher than in flat-type braking resistors (→ MOVIDRIVE® MDX60B/61B system manual, chapter "Braking resistor selection")
- A temperature switch is integrated in the BW...-T braking resistor
- A thermal overcurrent relay is integrated in the BW...-P braking resistor

SEW-EURODRIVE recommends implementing additional protection against overload for the wire and grid resistors by 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/overcurrent relay 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 reach high temperatures under load with P_N. Make sure that you 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 ≤ 120 s).

6.1.2 UL and cUL approval

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

6.1.3 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.

6.1.4 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			**BW100-006-T**			**BW168-T**	**BW268-T**
Part number			1820 419 8			1820 133 4	1820 417 1
Continuous 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[1]	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 the **regenerative power limit** 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	2.4 A	0.6 A	1 A	3.4 A	4.2 A
Design	PTC	Flat-design	Wire resistor on ceramic core	Flat-design		Wire resistor on ceramic core	
Connections / Tightening torque	Cable	Cable	Ceramic terminals 2.5 mm² (AWG13) 0.5 Nm	Cable		Ceramic terminals 2.5 mm² (AWG13) 0.5 Nm	
Degree of protection	IP20	IP54	IP20 (when installed)	IP54		IP20 (when installed)	
Ambient temperature ϑ_U	-20 ... +40 °C						
Type of cooling	KS = self-cooling						
For MOVIDRIVE® (recommended)	0005 ... 0014	0005 ... 0022	0015 ... 0040	0005 ... 0014		0005 ... 0040	0015 ... 0040

1) cdf = Cyclic duration factor of the braking resistor in relation to 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	1820 134 2	1820 084 2	1820 135 0	1820 136 9	1820 415 5	1820 137 7
Continuous 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[1]	2.2 kW	3.6 kW	7.2 kW	2.1 kW	4.7 kW	8.5 kW
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[2]	7.2 kW	15.6 kW	24.0 kW
6% cdf	11 kW	19 kW	20 kW	11.4 kW	24.0 kW	24.0 kW
	Observe the **regenerative power limit** 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	6.5 A	9.2 A	5.5 A	8.1 A	11.3 A
Design	Wire resistor on ceramic core					Grid resistor
Connections / Tightening torque	Ceramic terminals 2.5 mm² (AWG13) / 0.5 Nm BW347-T: Ceramic terminals 10 mm² (AWG18) / 1.6 Nm					M8 stud / 6 Nm
Degree of protection	IP20 (when installed)					
Ambient temperature ϑ_U	-20 ... +40 °C					
Type of cooling	KS = self-cooling					
For MOVIDRIVE® (recommended)	0055/0075			0110		

1) cdf = Cyclic duration factor of the braking resistor in relation to 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
Continuous braking power (= 100% cdf)	1.5 kW	3.5 kW	7.5 kW	16 kW
Load capacity At 50% cdf[1]	2.5 kW	5.9 kW	12.7 kW	27.2 kW
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
6% cdf	11.4 kW	26.6 kW	52.2 kW[2]	62.7 kW
	Observe the **regenerative power limit** 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	13.9 A	20.4 A	32.6 A
Design	Wire resistor on ceramic core	Grid resistor		
Connections / Tightening torque	BW018-015: Ceramic terminals 2.5 mm² (AWG13) / 0.5 Nm BW018-015-P: Terminal 2.5 mm² (AWG13) / 1 Nm	Bolt M8 / 6 Nm		
Degree of protection	IP20 (when installed)			
Ambient temperature ϑ_U	-20 ... +40 °C			
Type of cooling	KS = self-cooling			
For MOVIDRIVE® (recommended)	0150/0220 and 2 × parallel with 0370/0450[3]			0220

1) cdf = Cyclic duration factor of the braking resistor in relation to a cycle duration T_D ≤ 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**
Part number	1820 414 7	1820 140 7	1820 141 5
Continuous braking power (= 100% cdf)	2.5 kW	5.0 kW	10 kW
Load capacity At 50% cdf[1]	4.2 kW	8.5 kW	17 kW
25% cdf	7.5 kW	15.0 kW	30 kW
12% cdf	11.2 kW	22.5 kW	45 kW
6% cdf	19.0 kW	38.0 kW	76 kW
	Observe the **regenerative power limit** of the inverter! (= 150% of the recommended motor power → technical data)		
Resistance value R_{BW}	12 Ω ±10%		
Trip current (of F16) I_F	14.4 A	20.4 A	28.8 A
Design	Grid resistor		
Connections / Tightening torque	Bolt M8 / 6 Nm		
Degree of protection	IP20 (when installed)		
Ambient temperature ϑ_U	-20 ... +40 °C		
Type of cooling	KS = self-cooling		
For MOVIDRIVE® (recommended)	0300		

1) cdf = Cyclic duration factor of the braking resistor in relation to a cycle duration T_D ≤ 120 s.

Braking resistor type BW...-T/-P	BW106-T	BW206-T	BW1.4-170	BW003-420-T
Part number	1820 083 4	1820 412 0	1330 152 7	1330 124 5
Continuous braking power (= 100% cdf)	13.5 kW	18 kW	17 kW	42kW
Load capacity At 50% cdf[1]	23 kW	30.6 kW	30.6 kW	75.6 kW
25% cdf	40 kW	54 kW	51 kW	126 kW
12% cdf	61 kW	81 kW	85 kW	210 kW
6% cdf	102 kW	136.8 kW	270 kW	360 kW
Resistance value R_{BW}	6 Ω ±10%		1.4 Ω ±10%	2.5 Ω ±10%
Trip current (of F16) I_F	47.4 A	54.7 A	110 A	129 A
Design	Grid resistor			
Connections / Tightening torque	Bolt M8 / 6 Nm		Bolt M12 / 15.5 Nm	
Degree of protection	IP20 (when installed)			
Ambient temperature ϑ_U	-20 ... +40 °C			
Type of cooling	KS = self-cooling			
For MOVIDRIVE® (recommended)	0370...0750 and 2 × parallel with 0900/1100/1320[2]		1600/2000/2500	

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

2) When connected in parallel, the load capacity and trip current are doubled.

6.1.5 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-P**	**BW018-035-T**
Part number			1820 136 9	1820 415 5			1820 416 3	1820 138 5
Continuous 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[1]	0.5 kW	1.1 kW	2.1 kW	4.6 kW	1.1 kW	2.1 kW	2.5 kW	5.9 kW
25% cdf	1.0 kW	1.9 kW	3.8 kW	6.0 kW	1.9 kW	3.8 kW	4.5 kW	10.5 kW
12% cdf	1.8 kW	3.6 kW	6.0 kW[2]	6.0 kW	3.6 kW	7.2 kW	6.7 kW	13.0 kW
6% cdf	2.8 kW	5.7 kW	6.0 kW	6.0 kW	5.7 kW	8.7 kW	11.4 kW	13.0 kW
	Observe the **regenerative power limit** 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	3.9 A	5.5 A	8.1 A	4.7 A	6.6 A	9.1 A	13.9 A
Design	Wire resistor						Grid resistor	
Connections / Tightening torque	Ceramic terminals 2.5 mm² (AWG12) / 0.5 Nm							M8 stud / 6 Nm
Degree of protection	IP20 (when installed)							
Ambient temperature ϑ_U	-20 ... +40 °C							
Type of cooling	KS = self-cooling							
For MOVIDRIVE® (recommended)	0015/0022				0015...0037		2 × parallel with 0110[3]	

1) cdf = Cyclic duration factor of the braking resistor in relation to a cycle duration of $T_D \leq 120$ 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.

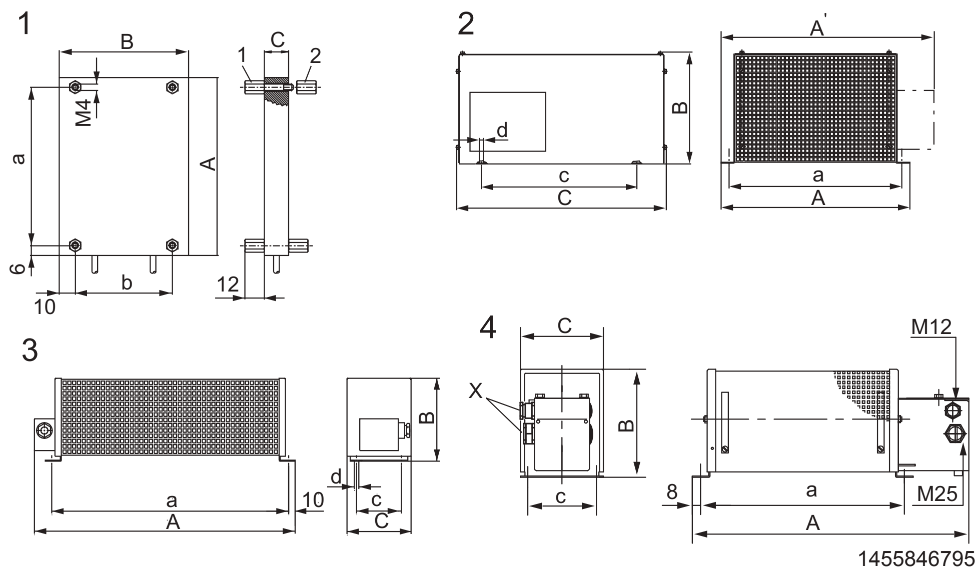
Braking resistor type BW...-T/-P	BW018-075-T	BW915-T	BW012-025-P	BW012-050-T	BW012-100-T	BW106-T	BW206-T
Part number	1820 139 3	1820 413 9	1820 414 7	1820 140 7	1820141 5	1820 083 4	1820 412 0
Continuous braking power (= 100% cdf)	7.5 kW	15.6 kW	2.5 kW	5.0 kW	10 kW	13.5 kW	18 kW
Load capacity At 50% cdf[1]	12.7 kW	15.6 kW	4.2 kW	8.5 kW	17 kW	23 kW	30.6 kW
25% cdf	13.0 kW	15.6 kW	7.5 kW	15.0 kW	19.6 kW	39.2 kW	39.2 kW
12% cdf	13.0 kW[2]	15.6 kW	11.2 kW	19.6 kW	19.6 kW	39.2 kW	39.2 kW
6% cdf	13.0 kW	15.6 kW	19.0 kW	19.6 kW	19.6 kW	39.2 kW	39.2 kW
	Observe the **regenerative power limit** 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	32.6 A	14.4 A	20.4 A	28.8 A	47.4 A	54.7 A
Design	Grid resistor						
Connections / Tightening torque	M8 stud / 6 Nm						
Degree of protection	IP20 (when installed)						
Ambient temperature ϑ_U	-20 ... +40 °C						
Type of cooling	KS = self-cooling						
For MOVIDRIVE® (recommended)	2 × parallel with 0110		0055/0075			0150 and 2 × parallel with 0220/0300[3]	

1) cdf = Cyclic duration factor of the braking resistor in relation to a cycle duration T_D ≤ 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.

6.1.6 Technical data of BW...-T / BW...-P braking resistors

BW...-T / BW...-P	
Connection cross section for signal contact/tightening torque	1 x 2.5 mm²/ 1 Nm
Switching capability of the thermostat's signal contact	• DC 2 A / DC 24 V (DC11) • AC 2 A / AC 230V (AC11)
Switch contact (NC)	according to EN 61800-5-1

6.1.7 Dimension drawing of BW.. braking resistors / BW...-T / BW...-P



BW... :

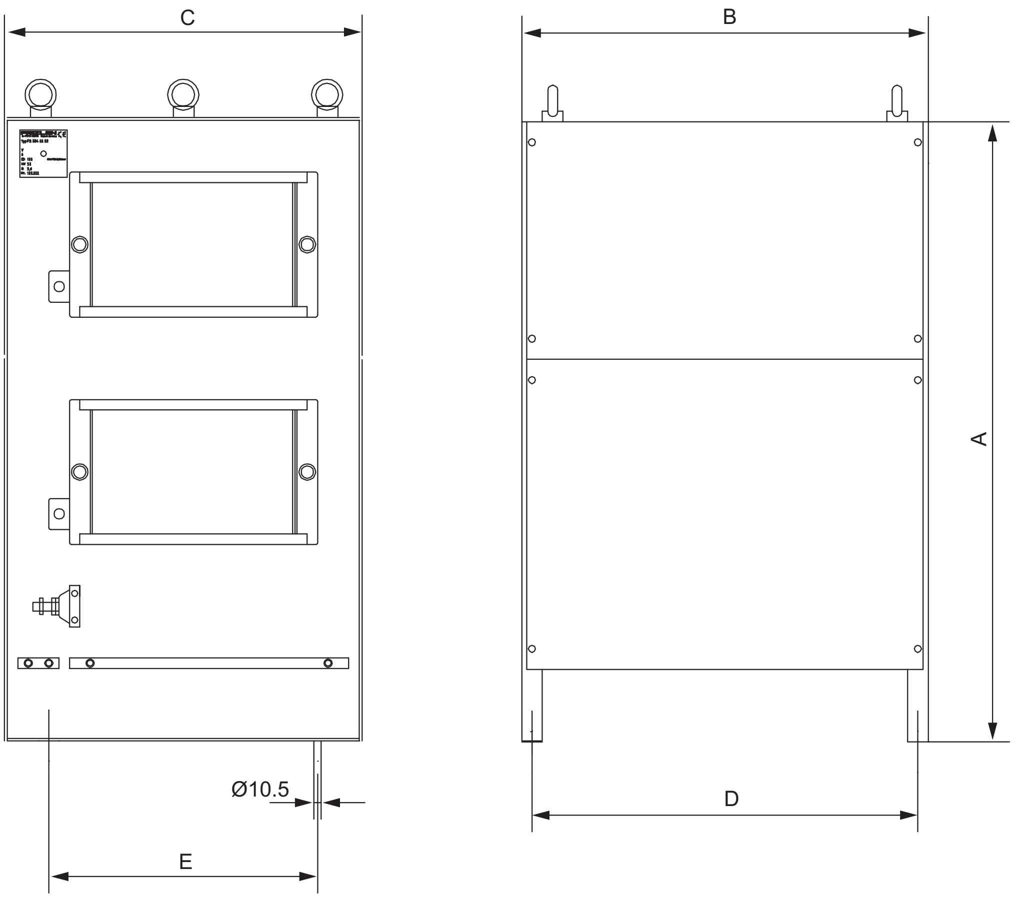
- 1 = Flat design
  The connecting lead is 500 mm (19.7 in) long. The scope of delivery includes four M4 stud bolts each of type 1 and 2.
- 2 = Grid resistor
- 3 = Wire resistor
- 4 = Wire resistor with temperature switch (-T/-P)
  Cable entry (X) is possible from both sides.

BW... type BW..-T/ BW...-P	Mounting position	Main dimensions mm (in) A/A'	B	C	Fastening parts mm (in) a	b/c	d	Cable gland	Weight kg (lb)
BW106-T	2	795 (31.3)	270 (10.6)	490 (19.3)	770(30.3)	380 (15)	10.5 (0.41)	-	32 (71)
BW206-T	2	995 (39.2)	270 (10.6)	490 (19.3)	970 (38.2)	380 (15)	10.5 (0.41)	-	40 (88)
BW012-025	2	295 (11.6)	260 (10.2)	490 (19.3)	270 (10.6)	380 (15)	10.5 (0.41)	M12 + M25	8.0 (18)
BW012-025-P	2	295/355 (11.6)/(14)	260 (10.2)	490 (19.3)	270 (10.6)	380 (15)	10.5 (0.41)	M12 + M25	8.0 (18)
BW012-050-T	2	395 (15.6)	260 (10.2)	490 (19.3)	370 (14.6)	380 (15)	10.5 (0.41)	-	12 (26)
BW012-100-T	2	595 (23.4)	270 (10.6)	490 (19.3)	570 (22.4)	380 (15)	10.5 (0.41)	-	21 (46)
BW915-T	2	795 (31.3)	270 (10.6)	490 (19.3)	770 (30.3)	380 (15)	10.5 (0.41)	-	30 (66)
BW018-015	3	620 (24.4)	120 (4.72)	92 (3.6)	544 (21.4)	64 (2.5)	6.5 (0.26)	PG11	4.0 (8.8)
BW018-015-P	4	649 (25.6)	120 (4.72)	185 (7.28)	530 (20.9)	150 (5.91)	6.5 (0.26)	M12 + M25	5.8 (13)
BW018-035-T	2	295 (11.6)	270 (10.6)	490 (19.3)	270 (10.6)	380 (15)	10.5 (0.41)	-	9.0 (20)
BW018-075-T	2	595 (23.4)	270 (10.6)	490 (19.3)	570 (22.4)	380 (15)	10.5 (0.41)	-	18.5 (40.8)
BW027-006	3	486 (19.1)	120 (4.72)	92 (3.6)	430 (16.9)	64 (2.5)	6.5 (0.26)	PG11	2.2 (4.9)
BW027-012	3	486 (19.1)	120 (4.72)	185 (7.28)	426 (16.8)	150 (5.91)	6.5 (0.26)	PG11	4.3 (9.5)
BW039-003	3	286 (11.3)	120 (4.72)	92 (3.6)	230 (9.06)	64 (2.5)	6.5 (0.26)	PG11	1.5 (3.3)
BW039-006	3	486 (19.1)	120 (4.72)	92 (3.6)	430 (16.9)	64 (2.5)	6.5 (0.26)	PG11	2.2 (4.9)
BW039-012	3	486 (19.1)	120 (4.72)	185 (7.28)	426 (16.8)	150 (5.91)	6.5 (0.26)	PG11	4.3 (9.5)
BW039-012-T	4	549 (21.6)	120 (4.72)	185 (7.28)	426 (16.8)	150 (5.91)	6.5 (0.26)	M12 + M25	4.9 (11)
BW039-026-T	4	649 (25.6)	120 (4.72)	275 (10.8)	530 (20.9)	240 (9.45)	6.5 (0.26)	M12 + M25	7.5 (17)
BW039-050-T	2	395 (15.6)	260 (10.2)	490 (19.3)	370 (14.6)	380 (15)	10.5 (0.41)	-	12 (26)
BW147	3	465 (18.3)	120 (4.72)	185 (7.28)	426 (16.8)	150 (5.91)	6.5 (0.26)	PG13.5	4.3 (9.5)
BW147-T	4	549 (21.6)	120 (4.72)	185 (7.28)	426 (16.8)	150 (5.91)	6.5 (0.26)	M12 + M25	4.9 (11)
BW247	3	665 (26.2)	120 (4.72)	185 (7.28)	626 (24.6)	150 (5.91)	6.5 (0.26)	PG13.5	6.1 (13)
BW247-T	4	749 (29.5)	120 (4.72)	185 (7.28)	626 (24.6)	150 (5.91)	6.5 (0.26)	M12 + M25	9.2 (20)
BW347	3	670 (26.4)	145 (5.71)	340 (13.4)	630 (24.8)	300 (11.8)	6.5 (0.26)	PG13.5	13.2 (29.1)
BW347-T	4	749 (29.5)	210 (8.27)	185 (7.28)	630 (24.8)	150 (5.91)	6.5 (0.26)	M12 + M25	12.4 (27.3)
BW168	3	365 (14.4)	120 4.72)	185 (7.28)	326 (12.8)	150 (5.91)	6.5 (0.26)	PG13.5	3.5 (7.7)
BW168-T	4	449 (17.7)	120 (4.72)	185 (7.28)	326 (12.8)	150 (5.91)	6.5 (0.26)	M12 + M25	3.6 (7.9)
BW268	3	465 (18.3)	120 (4.72)	185 (7.28)	426 (16.8)	150 (5.91)	6.5 (0.26)	PG13.5	4.3 (9.5)
BW268-T	4	549 (21.6)	120 (4.72)	185 (7.28)	426 (16.8)	150 (5.91)	6.5 (0.26)	M12 + M25	4.9 (11)
BW072-003	1	110 (4.33)	80 (3.1)	15 (0.59)	98 (3.9)	60 (2.4)	-	-	0.3 (0.7)
BW072-005	1	216 (8.5)	80 (3.1)	15 (0.59)	204 (8.03)	60 (2.4)	-	-	0.6 (1)
BW100-005	1	216 (8.5)	80 (3.1)	15 (0.59)	204 (8.03)	60 (2.4)	-	-	0.6 (1)
BW100-006	4	486 (19.1)	120 (4.72)	92 (3.6)	430 (16.9)	64 (2.5)	6.5 (0.26)	PG11	2.2 (4.9)

BW... type	Mounting position	Main dimensions mm (in)			Fastening parts mm (in)			Cable gland	Weight kg (lb)
BW..-T/ BW...-P		A/A'	B	C	a	b/c	d		
BW100-006-T	4	549 (21.6)	120 (4.72)	92 (3.6)	430 (16.9)	80 (3.1)	6.5 (0.26)	M12 + M25	3.0 (6.6)
BW206-120-T	2	595 (23.4)	270 (10.6)	490 (19.3)	570 (22.4)	380 (15.0)	10.5 (0.41)	2×2×M8	22.0

6.1.8 Dimension drawings of BW1.4-170 and BW003-420-T braking resistors

The following figure shows the dimensions of the braking resistors BW1.4-170 and BW003-420-T.



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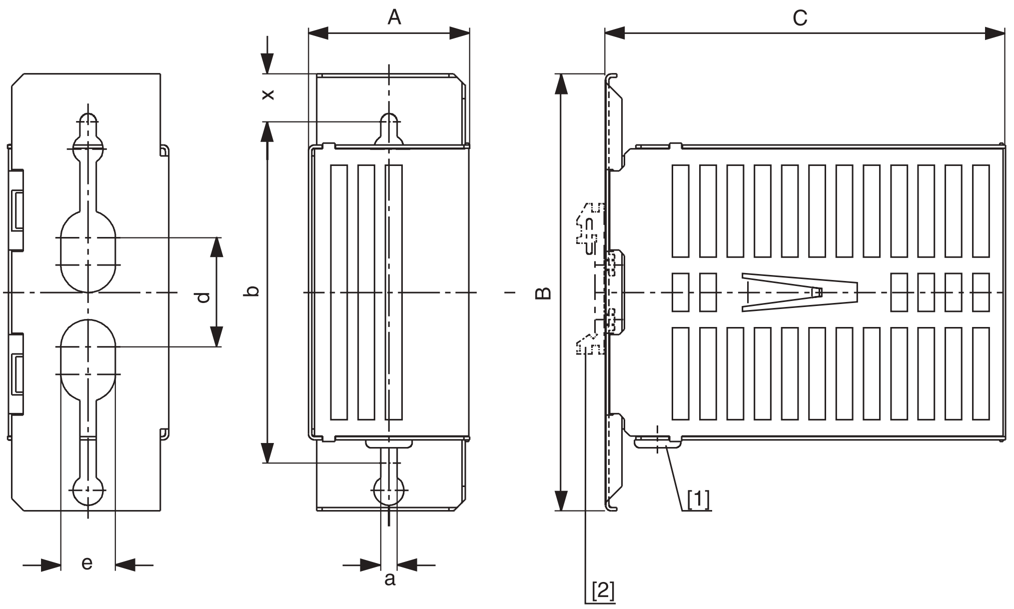
BW... type	Main dimensions mm (in)					Terminal stud / tighten-ing torque	Weight kg (lb)
BW..-T/ BW...-P	A	B	C	D	E		
BW1.4-170	460 (18.1)	795 (31.3)	490 (19.3)	770 (30.3)	380 (15.0)	M12 / 15.5 Nm	51 (112)
BW003-420-T	710 (28.0)	995 (39.2)	490 (19.3)	970 (38.2)	380 (15.0)	M12 / 15.5 Nm	93 (205)

6.1.9 BS... touch guard

A BS.. touch guard is 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

6.1.10 Dimension drawing of BS...



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[1] Grommet
[2] Support rail mounting

Type	Main dimensions mm (in)			Mounting dimensions mm (in)					Weight kg (lb)
	A	B	C	b	d	e	a	x	
BS-003	60 (2.4)	160 (6.3)	146 (5.75)	125 (4.92)	40 (1.6)	20 (0.79)	6 (0.2)	17.5 (0.69)	0.35 (0.77)
BS-005	60 (2.4)	160 (6.3)	252 (9.92)	125 (4.92)	4 (1.6)	20 (0.79)	6 (0.2)	17.5 (0.69)	0.5 (1)

Support rail installation

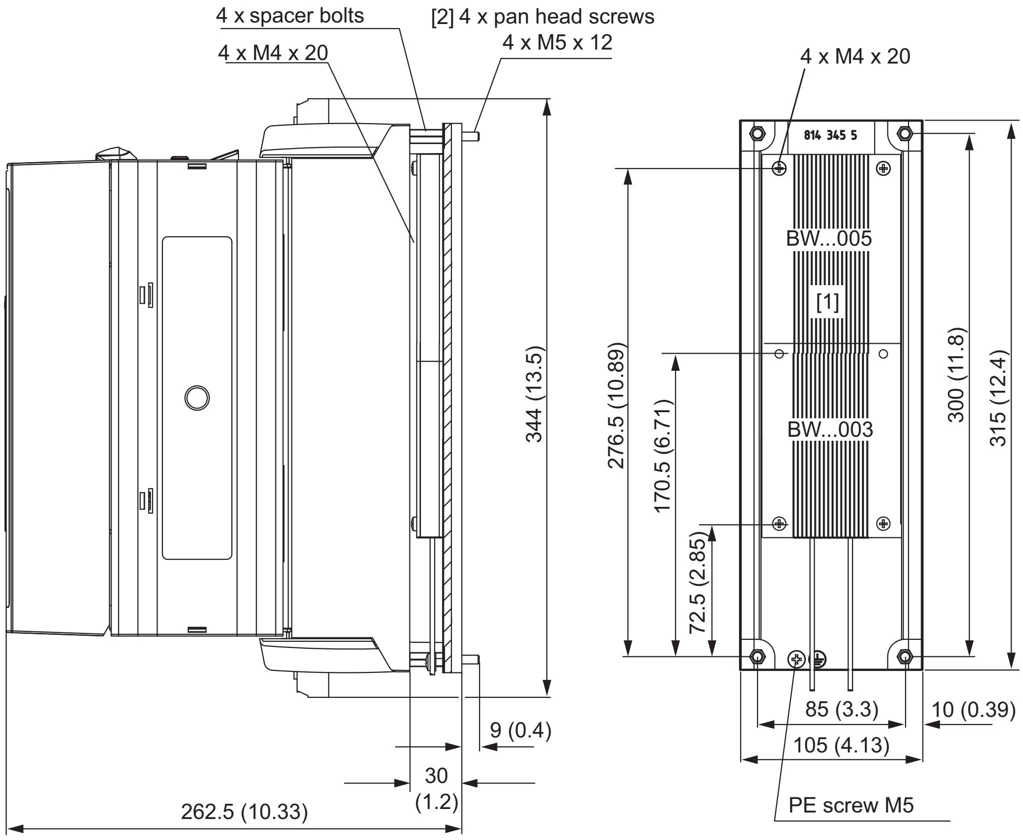
A mounting rail attachment HS001 is available from SEW-EURODRIVE, part number 822 194 4, for mounting the touch guard on a mounting rail.

6.1.11 DKB11A heat sink for braking resistors in flatpack design

Part number 814 345 5

Description The DKB11A heat sink for braking resistors in flat design provides a space-saving means for mounting the braking resistors (BW072-005, BW100-005) beneath MOVIDRIVE® size 1 units (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



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All dimensions in mm (in)

[1] Mounting surface for the braking resistor
[2] You need 4 × M5 × 12 screws to mount the unit on the heat sink. These screws are not included in the scope of delivery.

6.2 ND.. line choke option

Using line chokes is optional in the following instances:

- To support overvoltage protection
- To smoothen the line current, to reduce harmonics
- Protection in the event of distorted line voltage
- To limit the charging current when several inverters are connected together in parallel on the input end with shared line contactors (nominal current of line choke = total of inverter currents).

ND.. line filters have cRUus approval independent of the MOVIDRIVE® inverter.

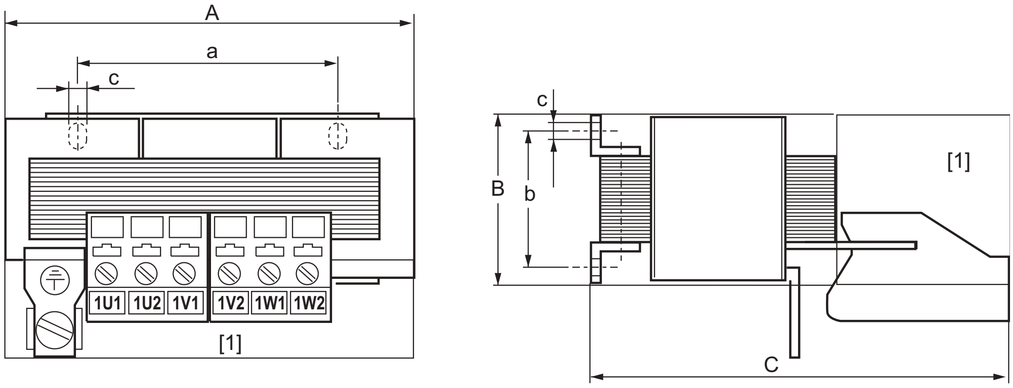
Line choke type	ND020-013	ND030-023[1)]	ND045-013	ND085-013	ND150-013	ND200-0033	ND300-0053
Part number	826 012 5	827 151 8	826 013 3	826 014 1	825 548 2	826 579 8	827 721 4
Rated line voltage V_{line} (according to EN 50160)	3 × AC 380 V - 500 V, 50/60 Hz						
Rated current[2)] I_N	AC 20 A	AC 30 A	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 ϑ_U	-25 ... +45 °C						
Degree of protection	IP00 (EN 60529)						
Connections	Terminal strips 4 mm² (AWG12)	Terminal strips 2.5 mm²... 10 mm² (AWG13 ... AWG8)	Terminal strips 10 mm² (AWG8)	Terminal strips 35 mm² (AWG2)	M10 stud PE: M8 stud		M12 stud PE: 2 × M10
Tightening torque	0.6 ... 0.8 Nm	max. 2.5 Nm		3.2 ... 3.7 Nm	M10 stud: 10 Nm PE: 6 Nm		M12 stud: 15.5 Nm PE: 10 Nm
Assignment to AC 400/500 V units (MDX60/61B...-5_3)							
Rated operation (100%)	0005...0075	0110...0220		0300...0450 and MDR60A0370	0550/0750	MDR60A 0750	0900...1320
Increased power (125%)	0005...0075	0110/0150		0220...0370	0450...0750		
Assignment to AC 230 V units (MDX61B...-2_3)							
Rated operation (100%)	0015...0055	-	0075/0110	0150/0220	0300	-	-
Increased power (125%)	0015...0037	-	0055/0075	0110/0150	0220/0300	-	-

1) Use ND030-023 for DC link connection without regenerative power supply unit in connection type A or B (→ system manual MOVIDRIVE® MDR60A regenerative power supply)

2) 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 nominal current of the line choke.

6.2.1 ND.. dimension drawings

Dimension drawing for line chokes ND020.. / ND030.. / ND045.. / ND085..



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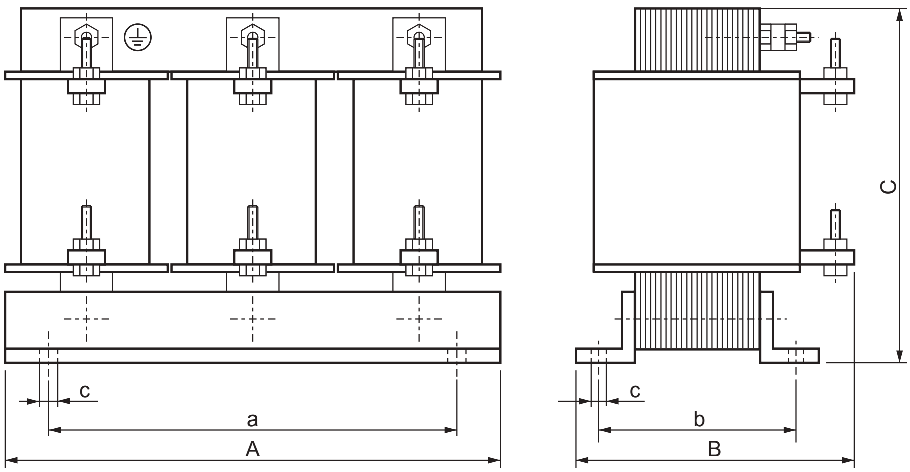
[1] Space for installation terminals
Any mounting position

Input: 1U1, 1V1, 1W1
Output: 1U2, 1V2, 1W2

Dimension drawing for line chokes ND150.. / ND200.. / ND300..



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Line choke type	Main dimensions mm (in)			Mounting dimensions mm (in)		Hole dimension mm (in)	Weight
	A	B	C	a	b	c	kg (lb)
ND020-013	85 (3.3)	60 (2.4)	120 (4.72)	50 (2)	31 - 42 (1.2 - 1.7)	5 - 10 (0.2 - 0.39)	0.5 (1)
ND030-023 **ND045-013**	125 (4.92)	95 (3.7)	170 (6.69)	84 (3.3)	55-75 (2.2 - 3)	6 (0.24)	2.5 (5.5)
ND085-013	185 (7.28)	115 (4.53)	235 (9.25)	136 (5.35)	56 - 88 (2.2 - 3.5)	7 (0.28)	8 (18)
ND150-013	255 (10)	140 (5.51)	230 (9.06)	170 (6.69)	77 (3)	8 (0.31)	17 (37)
ND200-0033	250 (9.84)	160 (6.3)	230 (9.06)	180 (7.09)	98 (3.9)	8 (0.31)	15 (33)
ND300-0053	300 (11.8)	190 (7.48)	295 (11.6)	255 (10)	145 (5.71)	11 (0.43)	35 (77)

6.3 NF..-... line filter option

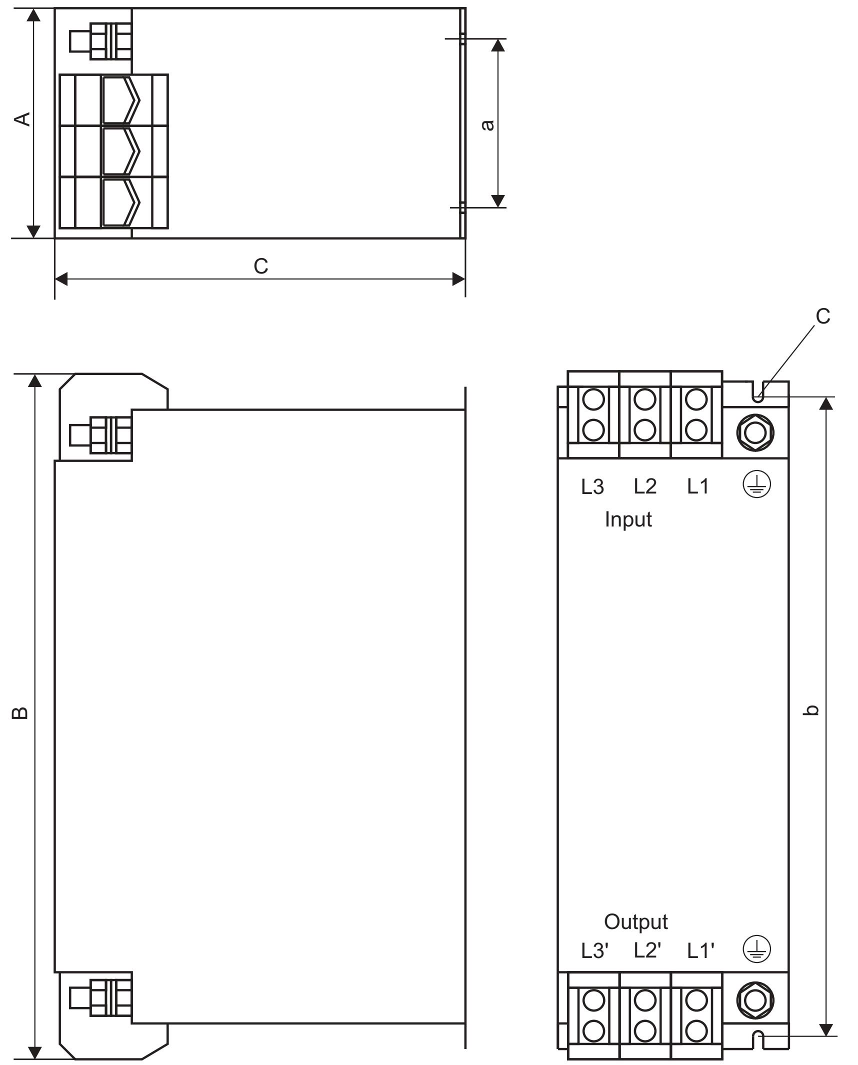
- To suppress interference emission on the line side of inverters.
- Do not switch between the NF... line filter and MOVIDRIVE®.
- NF.. line filters have cRUus approval independent of the MOVIDRIVE® inverter.

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 line voltage (according to EN 50160)	V_{line}	3 × AC 380 V - 500 V, 50/60 Hz				
Nominal 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	ϑ_U	-25 ... +40 °C				
Degree of protection		IP20 (EN 60529)				
Connections L1-L3/L1'-L3' Tightening torque L1-L3/L1'-L3' Connection Tightening torque	 PE PE	4 mm² (AWG 10) 0.8 Nm M5 stud 3.4 Nm			10 mm² (AWG 8) 1.8 Nm M5 stud 3.4 Nm	10 mm² (AWG 8) 1.8 Nm M6 stud 5.5 Nm
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
Part number		827 414 2	827 415 0	827 416 9	827 417 7	827 418 5
Rated line voltage (according to EN 50160)	V_{line}	3 × AC 380 V - 500 V, 50/60 Hz				
Nominal current	I_N	AC 63 A	AC 85 A	AC 115 A	AC 150 A	AC 210 A
Power loss at I_N	P_V	30 W	35 W	60 W	90 W	150 W
Earth-leakage current at	V_N	< 30 mA	< 30 mA	< 30 mA	< 30 mA	< 40 mA
Ambient temperature	ϑ_U	-25 ... +40 °C				
Degree of protection		IP20 (EN 60529)				
Connections L1-L3/L1'-L3' Tightening torque L1-L3/L1'-L3' Connection Tightening torque	 PE PE	16 mm² (AWG 6) 3 Nm M6 5.5 Nm	35 mm² (AWG 2) 3.7 Nm M8 12.8 Nm	50 mm² (AWG1/0) 3.7 Nm M10 23.8 Nm	50 mm² (AWG1/0) 3.7 Nm M10 23.8 Nm	95 mm² (AWG4/0) 20 Nm M10 23.8 Nm
Assignment to AC 400/500 V units (MDX60/61B...-5_3)						
Rated operation (100%)		0300	0370/0450	0550	0750	0900/1100
Increased power (125%)		0220	0300/0370	0450	0550/0750	0900
Assignment to AC 230 V units (MDX61B...-2_3)						
Rated operation (100%)		0150	0220	0300	-	-
Increased power (125%)		0110/0150	-	0220/0300	-	-

Line filter type	NF300-503	NF600-503
Part number	827 419 3	1 796 338 9
Rated line voltage V_{line} **(according to EN 50160)**	3 × AC 380 V - 500 V, 50/60 Hz	
Nominal current I_N	AC 300 A	AC 600 A
Power loss at I_N P_V	180 W	44 W
Earth-leakage current at V_N	< 45 mA	< 6 mA
Ambient temperature ϑ_U	-25 ... +40 °C	
Degree of protection	IP20 (EN 60529)	
Connections L1-L3/L1'-L3' **Tightening torque L1-L3/L1'-L3'** **Connection PE** **Tightening torque PE**	150 mm^2 (AWG300-2) 30 Nm M12 36 Nm	M12 cable lugs 70 Nm M12 36 Nm
Assignment to AC 400/500 V units (MDX60/61B...-5_3)		
Rated operation (100%)	1320	2500
Increased power (125%)	1100/1320	1600/2000/2500
Assignment to AC 230 V units (MDX61B...-2_3)		
Rated operation (100%)	-	-
Increased power (125%)	-	-

6.3.1 Dimension drawing for NF line filter



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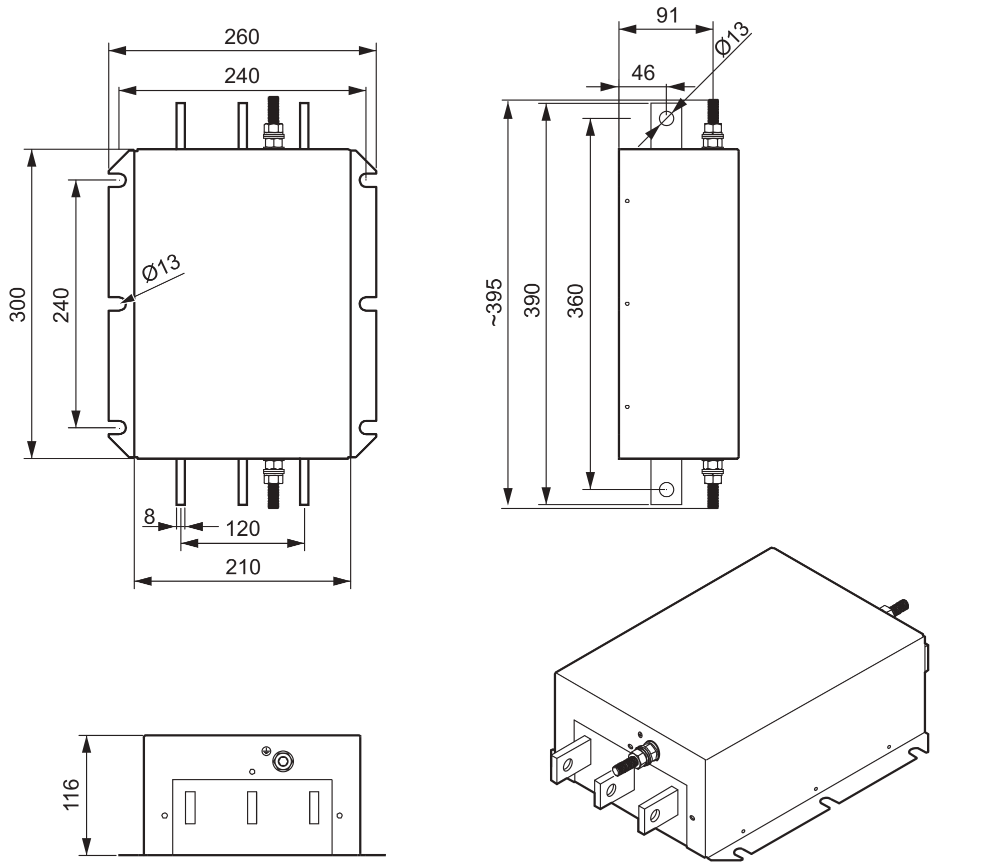
Any mounting position

Line filter type	Main dimensions mm (in)			Mounting dimensions mm (in)		Hole dimension mm (in)	PE connection	Weight
	A	B	C	a	b	c		kg (lb)
NF009-503	55 (2.2)	195 (7.68)	80 (3.1)	20 (0.78)	180 (7.09)	5.5 (0.22)	M5	0.8 (2)
NF014-503		225 (8.86)			210 (8.27)			0.9 (2)
NF018-503	50 (1.97)	255 (10)			240 (9.45)			1.1 (2.4)
NF035-503	60 (2.36)	275 (10.8)	100 (3.94)	30 (1.18)	255 (10)			1.7 (3.7)
NF048-503		315 (12.4)			295 (11.6)		M6	2.1 (4.6)
NF063-503	90 (3.54)	260 (10.2)		60 (2.36)	235 (9.25)	6.5 (0.26)		2.4 (5.3)
NF085-503		320 (12.6)	140 (5.51)		255 (10)		M8	3.5 (7.7)
NF115-503	100 (3.94)	330 (13)	155 (6.1)	65 (2.56)			M10	4.8 (11)
NF150-503								5.6 (12.3)
NF210-503	140 (5.51)	450 (17.7)	190 (7.48)	102 (4.02)	365 (14.4)			8.9 (20)
NF300-503	170 (6.69)	540 (21.3)	230 (9.06)	125 (4.92)	435 (17.1)		M12	12.2 (26.9)

6.3.2 Dimension drawing of NF600-503 line filter



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Any mounting position

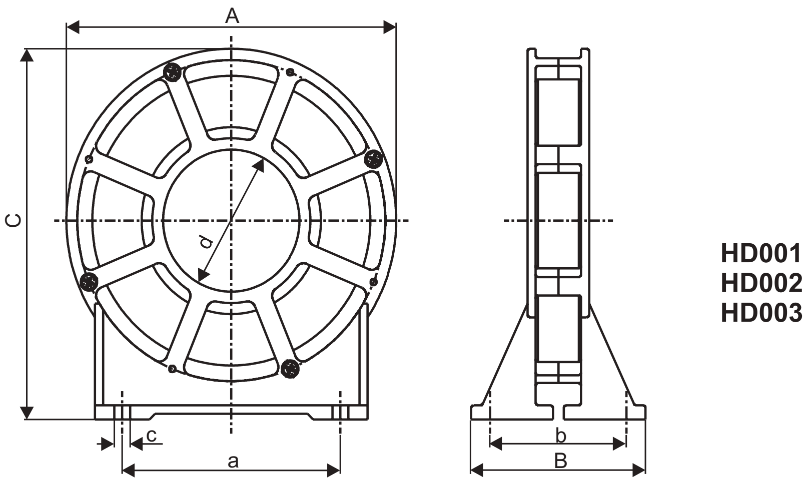
Line filter type	PE connection	Weight kg (lb)
NF600-503	M12	16.8 (37)

6.4 HD... output choke option

- 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. You can use less than 5 loops if the cable has a large diameter. Instead, connect 2 or 3 output chokes in series. If you use 4 loops, connect 2 output chokes in series, and if you use 3 loops, connect 3 output chokes.
- Output chokes HD001 to HD003 are allocated using the cable cross sections of the motor cables. 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).
- The HD005 output choke is assigned to size 7 units (1600... 2500).

Output choke type	HD001	HD002	HD003	HD004	HD005
Part number	813 325 5	813 557 6	813 558 4	816 885 7	1 796 336 2
Max. power loss P_{Vmax}	15 W	8 W	30 W	100 W	162
For cable cross sections/ connections/ Tightening torque	1.5...16 mm^2 (AWG 16...6)	≤ 1.5 mm^2 (AWG 16)	≥ 16 mm^2 (AWG 6)	Terminal stud M12 36 Nm	M12 cable lugs 70 Nm PE connection M12 36 Nm
Degree of protection	-	-	-	IP10	IP00
UL/cUL approval	No UL/cUL relevant component			Yes	In preparation

6.4.1 Dimension drawing of HD001 – HD003



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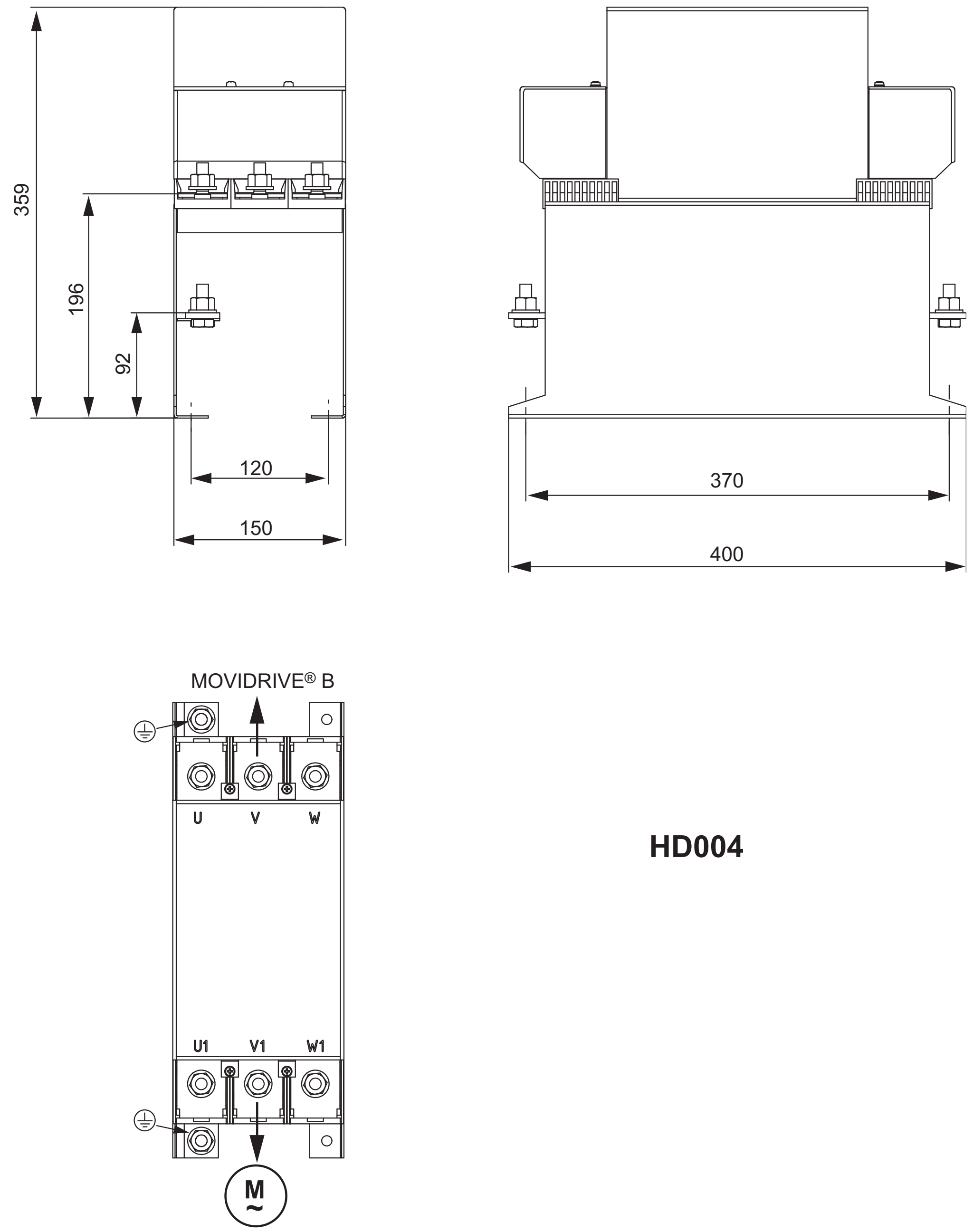
Output choke type	Main dimensions mm (in)			Mounting dimensions mm (in)		Inner Ø mm (in)	Hole dimension mm (in)	Weight
	A	B	C	a	b	d	c	kg (lb)
HD001	121 (4.76)	64 (2.5)	131 (5.16)	80 (3.1)	50 (2.0)	50 (2.0)	5.8 (0.23)	0.5 (1)
HD002	66 (2.6)	49 (1.9)	73 (2.9)	44 (1.7)	38 (1.5)	23 (0.91)		0.2 (0.4)
HD003	170 (6.69)	64 (2.5)	185 (7.28)	120 (4.72)	50 (2.0)	88 (3.5)	7.0 (0.28)	1.1 (2.4)

6.4.2 Dimension drawing of HD004



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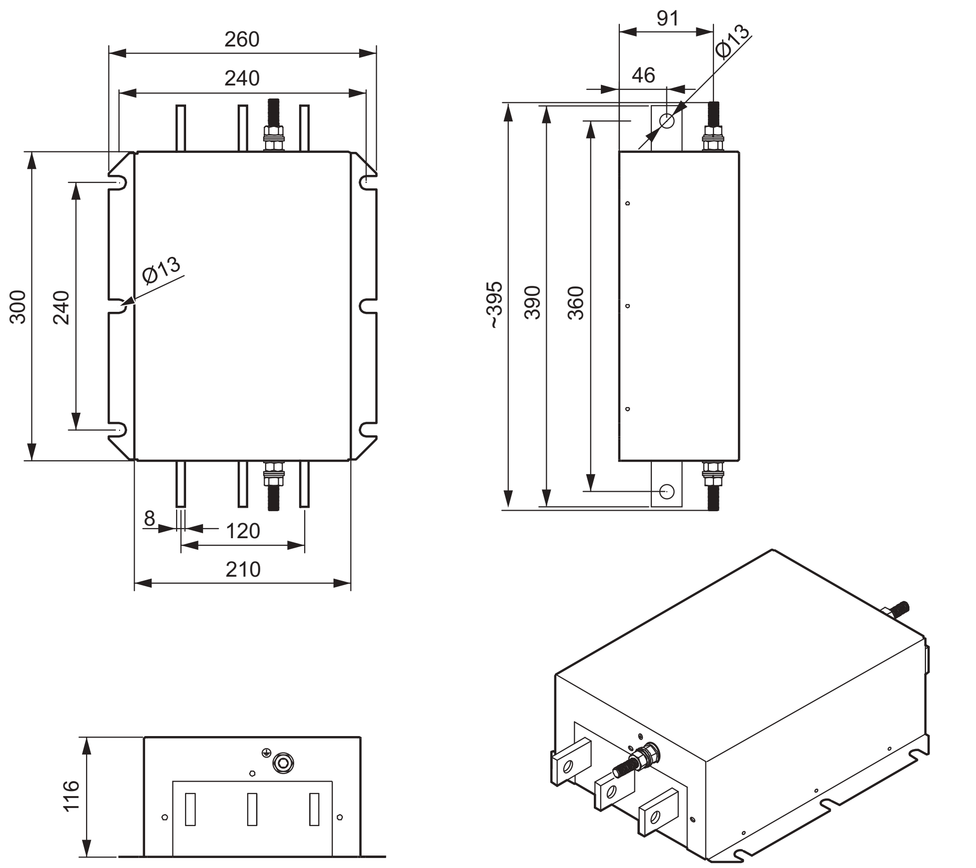
Output choke type	Main dimensions mm (in)			Mounting dimensions mm (in)		Inner Ø mm (in)	Hole dimension mm (in)	Weight
	A	B	C	a	b	d	c	kg (lb)
HD004	150 (5.91)	400 (15.7)	360 (14.2)	120 (4.72)	370 (14.6)	-	9.0 (0.35)	12.5 (27.6)

6.4.3 Dimension drawing of HD005



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Output choke type	PE connection	Weight kg (lb)
HD005	M12	16 (35.3)

6.5 HF... output filter option

HF... output filters are sine filters used to smooth output voltage of inverters. HF... output filters (with the exception of HF450-503, HF180-403, HF325-403) are approved to UL/cUL in combination with MOVIDRIVE® 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 spikes in long motor cables (> 100 m).

Observe the following notes:

INFORMATION

- Operate output filters in V/f and VFC operating modes only. Do not use output filters in CFC and SERVO operating modes.
- Do not use output filters in hoist applications.
- During project planning of the drive, take the voltage drop in the output filter into account and the reduced motor torque that results. This applies particularly to AC 230 V units with output filters.

Output filter type	HF008-503[1]	HF015-503[1]	HF022-503[1]	HF030-503[1]	HF040-503[1]	HF055-503[1]
Part number	826 029 X	826 030 3	826 031 1	826 032 X	826 311 6	826 312 4
Nominal voltage V_N	3 × AC 230 V - 500 V, 50/60 Hz[2]					
Earth-leakage current at U_N ΔI	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 limit value class C1/C2 in accordance with EN 61800-3[3]					
Ambient temperature ϑ_U	0 ... +45 °C (reduction: 3% I_N per K to max. 60 °C)					
Degree of protection (EN 60529)	IP20					
Connections / Tightening torque	M4 terminal studs 1.6 Nm ± 20%					
Weight	3.1 kg (6.8 lb)	4.4 kg (9.7 lb)			10.8 kg (23.8 lb)	
Assignment to AC 400/500 V units (MDX60/61B...-5_3)						
Voltage drop at I_N ΔU	< 6.5% (7.5%) at AC 400 V / < 4% (5%) at AC 500 V and f_{Amax} = 50 Hz (60 Hz)					
Nom. through current[4] $I_{N\,400\,V}$ (at V_{line} = 3 × AC 400 V)	AC 2.5 A	AC 4 A	AC 6 A	AC 8 A	AC 10 A	AC 12 A
Nominal through current $I_{N\,500\,V}$ (at V_{line} = 3 × AC 500 V)	AC 2 A	AC 3 A	AC 5 A	AC 6 A	AC 8 A	AC 10 A
Nominal operation (100%) [3]	0005 ... 0011	0014 / 0015	0022	0030	0040	0055
Increased power (125%) [3]	0005	0008 / 0011	0014 / 0015	0022	0030	0040
Assignment to AC 230 V units (MDX61B...-2_3)						
Voltage drop at I_N ΔU	-	< 18.5% (19%) at AC 230 V with f_{Amax} = 50 Hz (60 Hz)				
Nominal through current $I_{N\,230\,V}$ (at V_{line} = 3 × AC 230 V)	AC 4.3 A	AC 6.5 A	AC 10.8 A	AC 13 A	AC 17.3 A	AC 22 A
Nominal operation (100%) [3]	-	-	0015/0022	-	0037	0055
Increased power (125%) [3]	-	-	0015/0022	-	-	0037

1) Approved to UL/cUL in combination with MOVIDRIVE® inverters. SEW-EURODRIVE will provide certification on request.

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

3) Observe the chapter on EMC-compliant installation according to EN 61800-3 in the SEW documentation

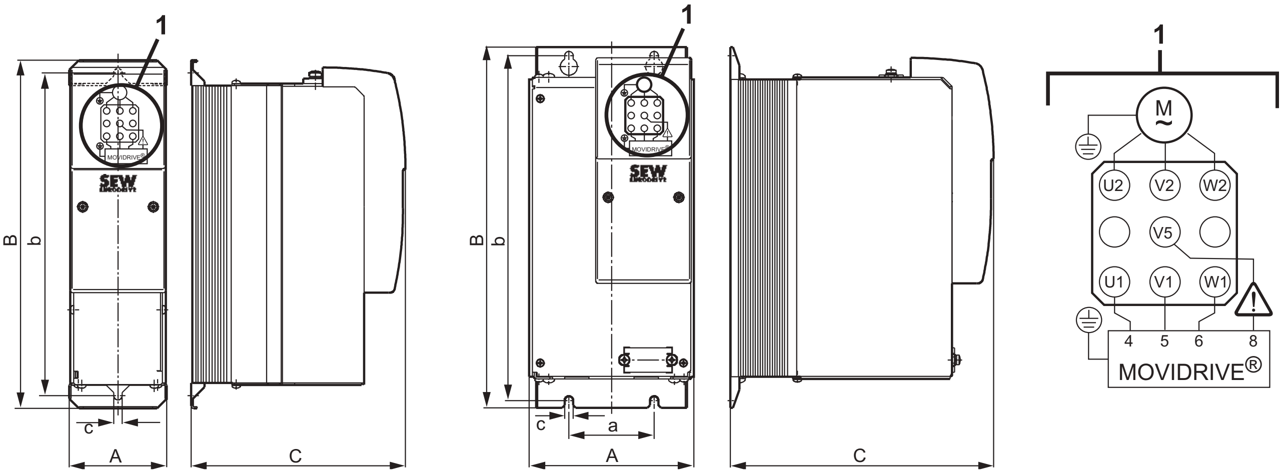
4) Only applies for operation without $V_{DC\,link}$ connection. For operating the inverter with $V_{DC\,link}$ connection, observe the project planning notes in the system manual of the respective inverter.

Output filter type	HF075-503[1]	HF023-403[1]	HF033-403[1]	HF047-403[1]	HF450-503	HF180-403	HF325-403
Part number	826 313 2	825 784 1	825 785 X	825 786 8	826 948 3	0 829 909 9	0 829 910 2
Nominal voltage V_N	3 × AC 230 V - 500 V, 50/60 Hz[2]						
Earth-leakage current at U_N ΔI	0 mA						
Power loss at I_N P_V	135 W	90 W	120 W	200 W	400 W	860 W	1430 W
Interference emission via unshielded motor cable	According to limit value class C1/C2 in accordance with EN 61800-3[3]						
Ambient temperature ϑ_U	0 ... +45 °C (reduction: 3% I_N per K to max. 60 °C)					−25 ... +85 °C	
Degree of protection (EN 60529)	IP 20	IP20			IP 10	IP00	IP00
Connections / Tightening torque	M4 terminal studs 1.6 Nm ± 20%	35 mm^2 (AWG 2) 3.2 Nm				M10 terminal studs / 70 mm^2 (AWG 3/0) 30 Nm (270 lb in)	
Weight	10.8 kg (23.8 lb)	15.9 kg (35.1 lb)	16.5 kg (36.4 lb)	23 kg (51 lb)	32 kg (71 lb)	85.3 kg (188 lb)	170 kg (375) lb
Assignment to AC 400/500 V units (MDX60/61B...-5_3)							
Voltage drop at I_N ΔU	< 6.5% (7.5%) at AC 400 V / < 4% (5%) at AC 500 V and f_{Amax} = 50 Hz (60 Hz)						
Nom. through current[4] $I_{N\ 400\ V}$ (at V_{line} = 3 × AC 400 V)	AC 16 A	AC 23 A	AC 33 A	AC 47 A	AC 90 A	AC 180 A	AC 325 A
Nominal through current $I_{N\ 500\ V}$ (at V_{line} = 3 × AC 500 V)	AC 13 A	AC 19 A	AC 26 A	AC 38 A	AC 72 A	AC 180 A	AC 325 A
Nominal operation (100%) [3]	0075	0110	0150/0300	0220	0370/0450/ 0550[5]/ 0750[4]/ 0900[4]	0550/0750/ 0900	1100/1320
Increased power (125%) [3]	0055	0075	0110/0220	0150	0300/0370/ 0450 /0550[4]/ 0750[4]	0550/0750	0990/110/ 1320
Assignment to AC 230 V units (MDX61B...-2_3)							
Voltage drop at I_N ΔU	< 18.5% (19%) at AC 230 V with f_{Amax} = 50 Hz (60 Hz)						
Nominal through current $I_{N\ 230\ V}$ (at V_{line} = 3 × AC 230 V)	AC 29 A	AC 42 A	AC 56.5 A	AC 82.6 A	AC 156 A	-	-
Nominal operation (100%) [3]	0075	0110	0150/0300[4]	0220	0300	-	-
Increased power (125%) [3]	0055	0075	0110/0220[4]	0150	0220/0300	-	-

1) Approved to UL/cUL in combination with MOVIDRIVE® inverters. SEW-EURODRIVE will provide certification on request.
2) A reduction of 6% I_N per 10 Hz applies above f_A = 60 Hz for the nominal through current I_N.
3) Observe the chapter on EMC-compliant installation according to EN 61800-3 in the SEW documentation
4) Only applies for operation without DC link connection. For operation with DC link connection, observe the project planning instructions in the MOVIDRIVE® MDX60/61B system manual, chapter "Project planning/connecting the optional power components".
5) Connect two HF...-... output filters in parallel for operation with these MOVIDRIVE® units.

6.5.1 Dimension drawings of HF...-503 output filters

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



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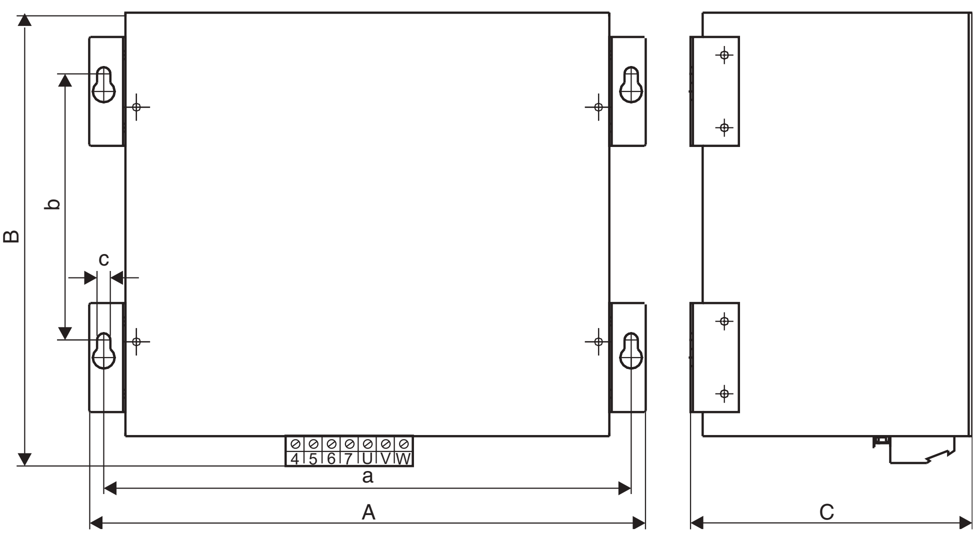
Only the mounting position shown in the dimension drawing is permitted.

Output filter type	Main dimensions mm (in)			Mounting dimensions mm (in)		Hole dimension mm (in)	Ventilation clearances[1] mm (in)	
	A	B	C	a	b	c	Above	Below
HF008 / 015 / 022 / 030-503	80 (3.1)	286 (11.3)	176 (6.93)	-	265 (10.4)	7 (0.3)	100 (3.94)	100 (3.94)
HF040/055/075-503	135 (5.31)	296 (11.7)	216 (8.5)	70 (2.8)	283 (11.1)			

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

HF450-503



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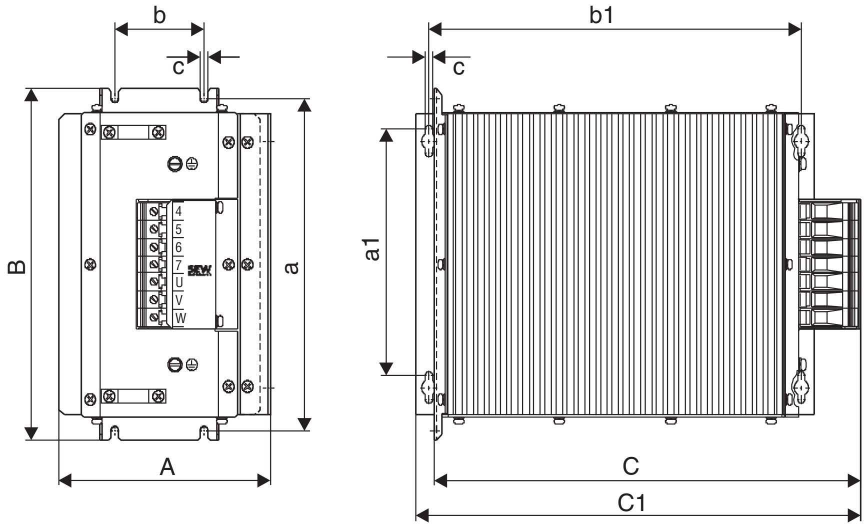
Only the mounting position shown in the dimension drawing is permitted

Output filter type	Main dimensions mm (in)			Mounting dimensions mm (in)		Hole dimension mm (in)	Ventilation clearances mm (in)	
	A	B	C	a	b	c	Above	Below
HF450-503	465 (18.3)	385 (15.2)	240 (9.45)	436 (17.2)	220 (8.66)	8.5 (0.33)	100 (3.94)	100 (3.94)

6.5.2 Dimension drawings of HF...-403 output filters



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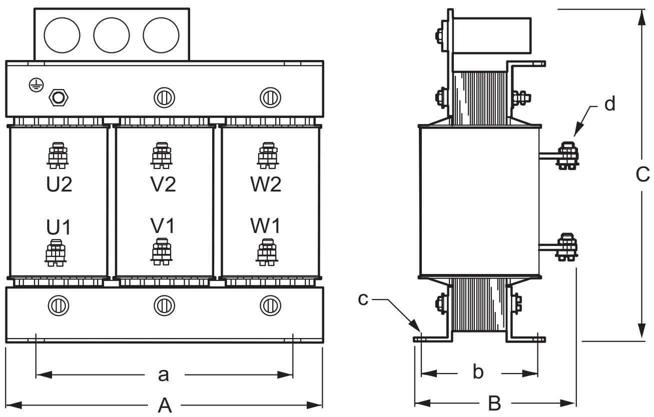
Type	Main dimensions mm (in)			Mounting dimensions mm (in)				Hole dimens. mm (in)	Ventilation clearances mm (in)		
				Standard mounting position		Horizontal mounting pos.					
	A	B	C/C1	a	b	a1	a2	c	Side	Above	Below
HF023-403	145 (5.71)	284 (11.2)	365/390 (14.4/15.4)	268 (10.6)	60 (2.4)	210 (8.27)	334 (13.1)	6.5 (0.26)	30 (1.2) each	150 (5.91)	150 (5.91)
HF033-403											
HF047-403	190 (7.48)	300 (11.8)	385/400 (15.2/15.7)	284 (11.2)	80 (3.1)						



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

Output filter type	Main dimensions mm (in)			Mounting dimensions mm (in)		Hole dimension mm (in)		Ventilation clearances mm (in)		
	A	B	C	a	b	c	d	Side	Above	Below
HF180-403	480 (18.9)	260 (10.2)	510 (20.1)	430 (16.9)	180 (7.1)	18 x 13 (0.71 x 0.51)	11 (0.43)	192 each (7.6)	510 (20.1)	510 (20.1)
HF325-403	480 (18.9)	300 (11.8)	730 (28.7)	430 (16.9)	230 (9.1)	18 x 13 (0.71 x 0.51)	11 (0.43)	192 each (7.6)	730 (28.7)	730 (28.7)

7 Prefabricated Cables

7.1 Overview

SEW-EURODRIVE offers cable sets and prefabricated cables for straightforward and fault-free connection of various system components to MOVIDRIVE®. The cables are pre-fabricated 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. Connection to DEH11B/DEH21B/DEU21B/DER11B: Encoder cable and extensions cable (Hiperface®, incremental encoder), resolver cable and extension cable in plug and terminal box design for motors.

7.2 Cable sets for DC link connection MDR → MDX

7.2.1 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 bus bar subdistributor if the DC link terminals of the regenerative power supply unit are not sufficient.

7.2.2 Installation 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

7.3 CM motor cables with connector on motor end

7.3.1 Motor cables:

Number of cores and Cable cross section	Part number	Installation type	for motor
4×1.5 mm^2	199 179 5	Fixed installation	CM..SM51/61
4×2.5 mm^2	199 181 7		CM..SM52/62
4×4 mm^2	199 183 3		CM..SM54/64
4×6 mm^2	199 185 X		CM..SM56/66
4×10 mm^2	199 187 6		CM..SM59/59

Number of cores and Cable cross section	Part number	Installation type	for motor
4×1.5 mm^2	1 333 114 0	Cable carrier installa-tion	CM..SM51/61
4×2.5 mm^2	1 333 115 9		CM..SM52/62
4×4 mm^2	0 199 184 1		CM..SM54/64
4×6 mm^2	0 199 186 8		CM..SM56/66
4×10 mm^2	0 199 188 4		CM..SM59/59

7.3.2 Extension cables:

Number of cores and Cable cross section	Part number	Installation type	for motor
4×1.5 mm^2	199 549 9	Fixed installation	CM..SM51/61
4×2.5 mm^2	199 551 0		CM..SM52/62
4×4 mm^2	199 553 7		CM..SM54/64
4×6 mm^2	199 555 3		CM..SM56/66
4×10 mm^2	199 557 X		CM..SM59/59

Number of cores and Cable cross section	Part number	Installation type	for motor
4×1.5 mm^2	1 333 118 3	Cable carrier installa-tion	CM..SM51/61
4×2.5 mm^2	1 333 119 1		CM..SM52/62
4×4 mm^2	0 199 554 5		CM..SM54/64
4×6 mm^2	0 199 556 1		CM..SM56/66
4×10 mm^2	0 199 558 8		CM..SM59/59

7.4 CM brakemotor cables with connector on motor end

7.4.1 Motor cables:

Number of cores and Cable cross section	Part number	Installation type	for motor
4×1.5 mm^2 + 3×1.0 mm^2	199 189 2	Fixed installation	CM..BR SB51/61
4×2.5 mm^2 + 3×1.0 mm^2	199 191 4		CM..BR SB52/62
4×4 mm^2 + 3×1.0 mm^2	199 193 0		CM..BR SB54/64
4×6 mm^2 + 3×1.5 mm^2	199 195 7		CM..BR SB56/66
4×10 mm^2 + 3×1.5 mm^2	199 197 3		CM..BR SB59/69

Number of cores and Cable cross section	Part number	Installation type	for motor
4×1.5 mm^2 + 3×1.0 mm^2	1 333 116 7	Cable carrier installation	CM..BR SB51/61
4×2.5 mm^2 + 3×1.0 mm^2	1 333 117 5		CM..BR SB52/62
4×4 mm^2 + 3×1.0 mm^2	0 199 194 9		CM..BR SB54/64
4×6 mm^2 + 3×1.5 mm^2	0 199 196 5		CM..BR SB56/66
4×10 mm^2 + 3×1.5 mm^2	0 199 198 1		CM..BR SB59/69

7.4.2 Extension cables:

Number of cores and Cable cross section	Part number	Installation type	for motor
4×1.5 mm^2 + 3×1.0 mm^2	199 199 X	Fixed installation	CM..BR SB51/61
4×2.5 mm^2 + 3×1.0 mm^2	199 201 5		CM..BR SB52/62
4×4 mm^2 + 3×1.0 mm^2	199 203 1		CM..BR SB54/64
4×6 mm^2 + 3×1.5 mm^2	199 205 8		CM..BR SB56/66
4×10 mm^2 + 3×1.5 mm^2	199 207 4		CM..BR SB59/69

Number of cores and Cable cross section	Part number	Installation type	for motor
4×1.5 mm^2 + 3×1.0 mm^2	1 333 120 5	Cable carrier installation	CM..BR SB51/61
4×2.5 mm^2 + 3×1.0 mm^2	1 333 121 3		CM..BR SB52/62
4×4 mm^2 + 3×1.0 mm^2	0 199 204 X		CM..BR SB54/64
4×6 mm^2 + 3×1.5 mm^2	0 199 206 6		CM..BR SB56/66
4×10 mm^2 + 3×1.5 mm^2	0 199 208 2		CM..BR SB59/69

7.5 CMD/CMP motor cables with connector on motor end

7.5.1 Motor cables:

Number of cores and Cable cross section	Part number	Installation type	for motor
4×1.5 mm^2	0 590 454 4		CMD.. / CMP.. SM11
4×2.5 mm^2	0 590 455 2	Fixed installation	CMD.. / CMP.. SM12
4×4 mm^2	0 590 456 0		CMD.. / CMP.. SM14

Number of cores and Cable cross section	Part number	Installation type	for motor
4×1.5 mm^2	0 590 624 5		CMD.. / CMP.. SM11
4×2.5 mm^2	0 590 625 3	Cable carrier installation	CMD.. / CMP.. SM12
4×4 mm^2	0 590 480 3		CMD.. / CMP.. SM14

7.5.2 Extension cables:

Number of cores and Cable cross section	Part number	Installation type	for motor
4×1.5 mm^2	1 333 245 7		CMD.. / CMP.. SM11
4×2.5 mm^2	1 333 246 5	Cable carrier installation	CMD.. / CMP.. SM12
4×4 mm^2	1 333 247 3		CMD.. / CMP.. SM14

7.6 CMP brakemotor cables for BP brake with connector at motor end

7.6.1 Brakemotor cables:

Number of cores and Cable cross section	Part number	Installation type	for motor
4×1.5 mm^2 + 3×1 mm^2	1 335 434 5		SB11
4×2.5 mm^2 + 3×1 mm^2	1 335 435 3		SB12
4×4 mm^2 + 3×1 mm^2	1 335 436 1	Fixed installation	SB14
4×6 mm^2 + 3×1.5 mm^2	1 335 019 6		SBB6
4×10 mm^2 + 3×1.5 mm^2	1 335 021 8		SBB10
4×16 mm^2 + 3×1.5 mm^2	1 335 022 6		SBB16

Number of cores and Cable cross section	Part number	Installation type	for motor
4×1.5 mm^2 + 3×1 mm^2	1 335 438 8		SB11
4×2.5 mm^2 + 3×1 mm^2	1 335 439 6		SB12
4×4 mm^2 + 3×1 mm^2	1 342 160 3	Cable carrier installation	SB14
4×6 mm^2 + 3×1.5 mm^2	1 335 023 4		SBB6
4×10 mm^2 + 3×1.5 mm^2	1 335 024 2		SBB10
4×16 mm^2 + 3×1.5 mm^2	1 335 025 0		SBB16

7.6.2 Extension cables:

Number of cores and Cable cross section	Part number	Installation type	for motor
4×1.5 mm^2 + 3×1 mm^2	1 335 422 1	Cable carrier installation	SB11
4×2.5 mm^2 + 3×1 mm^2	1 335 424 8		SB12
4×4 mm^2 + 3×1 mm^2	1 335 433 7		SB14
4×6 mm^2 + 3×1.5 mm^2	1 335 009 9		SBB6
4×10 mm^2 + 3×1.5 mm^2	1 335 010 2		SBB10
4×16 mm^2 + 3×1.5 mm^2	1 335 011 0		SBB16

7.7 *CMP brakemotor cables for BY brake with connector at motor end*

7.7.1 Brakemotor cables:

Number of cores and Cable cross section	Part number	Installation type	for motor
4×1.5 mm^2 + 3×1 mm^2	1 335 427 2	Fixed installation	SB11
4×2.5 mm^2 + 3×1 mm^2	1 335 428 0		SB12
4×4 mm^2 + 3×1 mm^2	1 335 429 9		SB14
4×6 mm^2 + 3×1.5 mm^2	1 335 012 9		SBB6
4×10 mm^2 + 3×1.5 mm^2	1 335 013 7		SBB10
4 × 16 mm^2 + 3×1.5 mm^2	1 335 014 5		SBB16

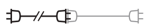
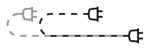
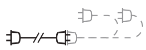
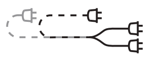
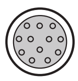
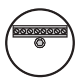
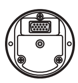
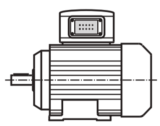
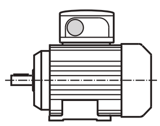
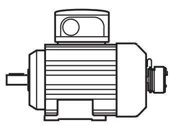
Number of cores and Cable cross section	Part number	Installation type	for motor
4×1.5 mm^2 + 3×1 mm^2	1 335 430 2	Cable carrier installation	SB11
4×2.5 mm^2 + 3×1 mm^2	1 335 431 0		SB12
4×4 mm^2 + 3×1 mm^2	1 342 432 9		SB14
4×6 mm^2 + 3×1.5 mm^2	1 335 015 3		SBB6
4×10 mm^2 + 3×1.5 mm^2	1 335 016 1		SBB10
4×16 mm^2 + 3×1.5 mm^2	1 335 018 8		SBB16

7.7.2 Extension cables:

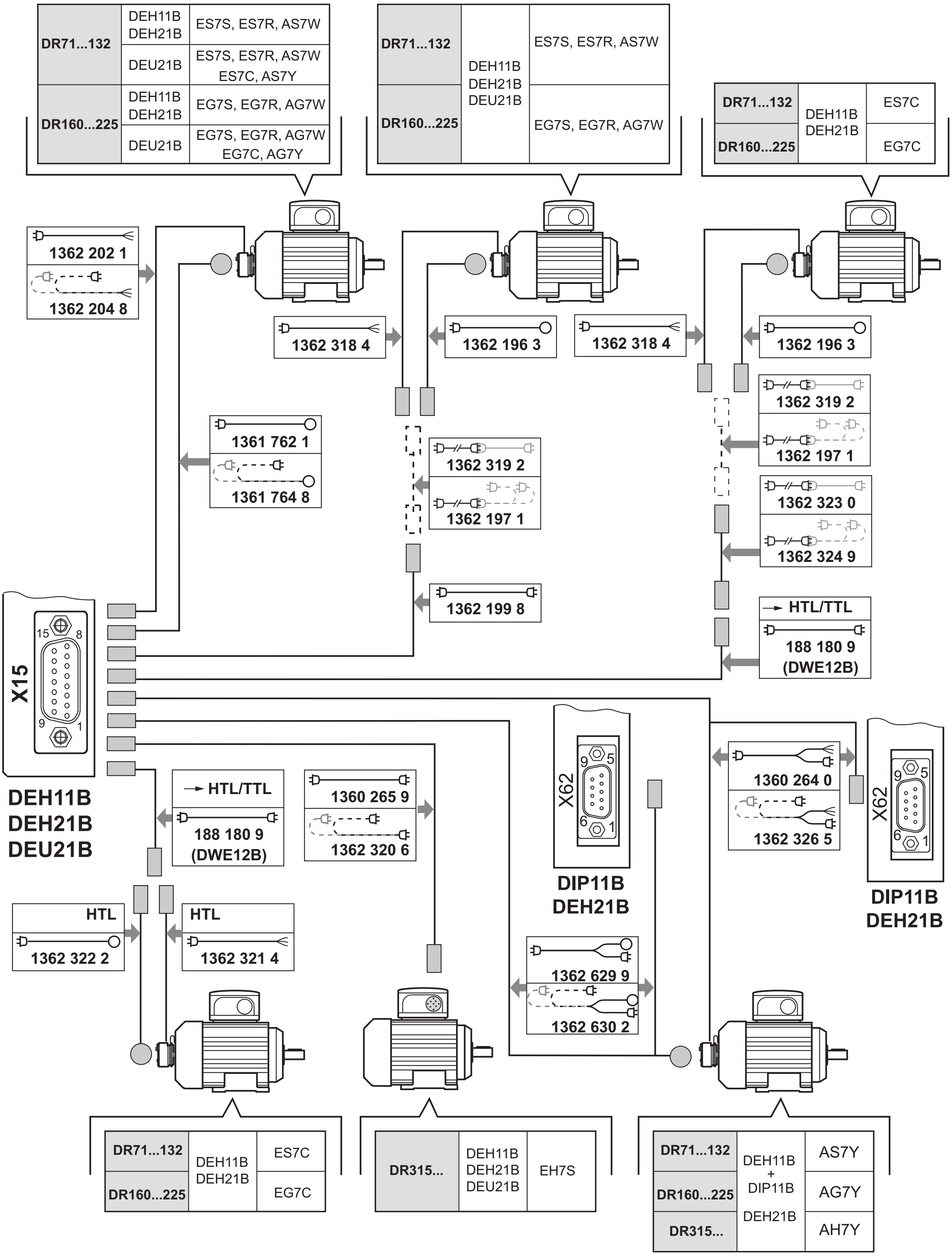
Number of cores and Cable cross section	Part number	Installation type	for motor
4×1.5 mm^2 + 3×1 mm^2	1 335 422 1	Cable carrier installation	SB11
4×2.5 mm^2 + 3×1 mm^2	1 335 424 8		SB12
4×4 mm^2 + 3×1 mm^2	1 335 433 7		SB14
4×6 mm^2 + 3×1.5 mm^2	1 335 009 9		SBB6
4×10 mm^2 + 3×1.5 mm^2	1 335 010 2		SBB10
4×16 mm^2 + 3×1.5 mm^2	1 335 011 0		SBB16

7.8 *Encoder cable selection: Meaning of the symbols*

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

Symbol	Meaning
	Connection cable connector → connector for fixed installation
	Extension connection cable connector → connector for fixed installation
	Connection cable connector → connector for cable carrier installation
	Extension connection cable connector → connector for cable carrier installation
	Connection cable connector → terminal box for fixed installation
	Connection cable connector → terminal box for cable carrier installation
	Connection cable connector → Y connector for fixed installation
	Connection cable connector → Y connector for cable carrier installation
	Connection cable connector → connector with crossed A/B track for reversing the direction of rotation (for fixed installation)
	Connection cable connector → encoder connection cover for fixed installation
	Connection cable connector → encoder connection cover for cable carrier installation
	Encoder connection via plug connector
	Encoder connection via encoder terminal strip
	Encoder connection via encoder connection cover
	Connection via plug connector on the motor side
	Connection via terminal box on the motor side
	Connection via encoder connection cover on the motor side

7.9 Encoder cables for DR motors on X15 DEH11B/DEH21B/DEU21B



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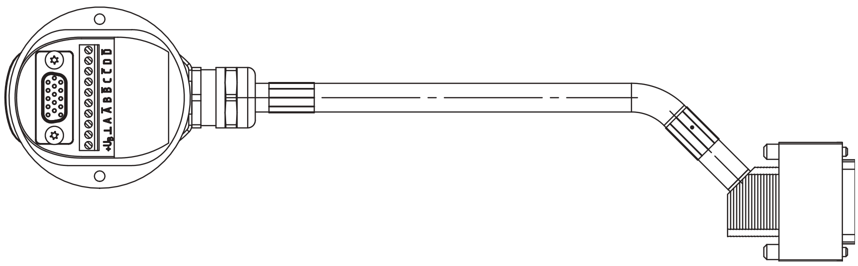
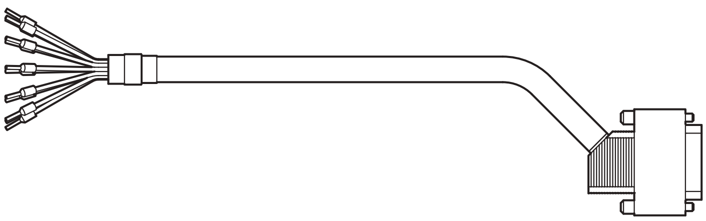
For the individual wiring diagrams, refer to the "Installation" chapter in the MOVIDRIVE® MDX60B/61B operating instructions.

7.9.1 Required prefabricated cables

- Part number: 1361 762 1 or 1361 764 8
- Cable with D-sub 15 plug connector and encoder connection cover:

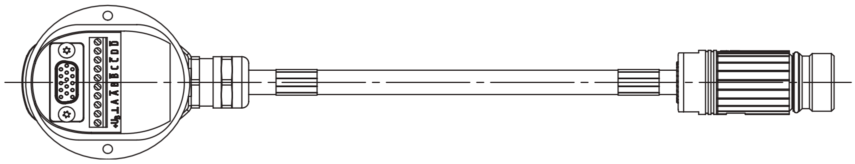


- Part number 1362 202 1 or 1362 204 8
- Cable with D-sub 15 plug connector and conductor end sleeves:

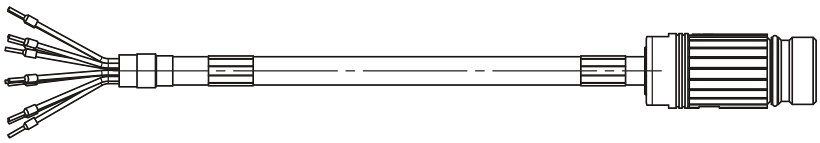


Motor size	Encoder type	Encoder cables	
		Installation	Part number
DR71 – 132 DR160 – 225 DR315	ES7S, ES7R, ES7C, AS7W, AS7Y EG7S, EG7R, EG7C, AG7W, AG7Y, AH7Y		1361 762 1
			1361 764 8
DR71 – 132 DR160 – 225 DR315	ES7S, ES7R, ES7C, AS7W, AS7Y EG7S, EG7R, EG7C, AG7W, AG7Y, AH7Y		1362 202 1
			1362 204 8

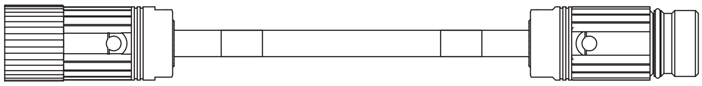
- Part number: 1362 196 3
- Cable with encoder connection cover and M23 plug connector:



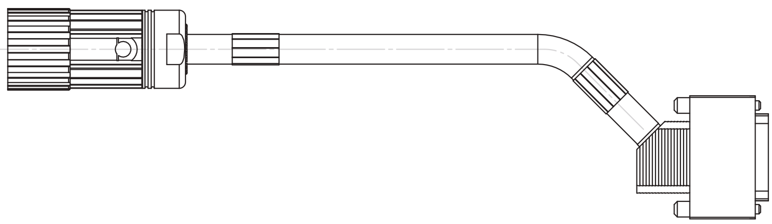
- Part number: 1362 318 4
- Cable with conductor end sleeves and M23 plug connector:

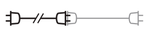
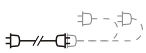


- Part number: 1362 319 2 or 1362 197 1
- Optional: Extension cable with M23 plug connector on both sides:

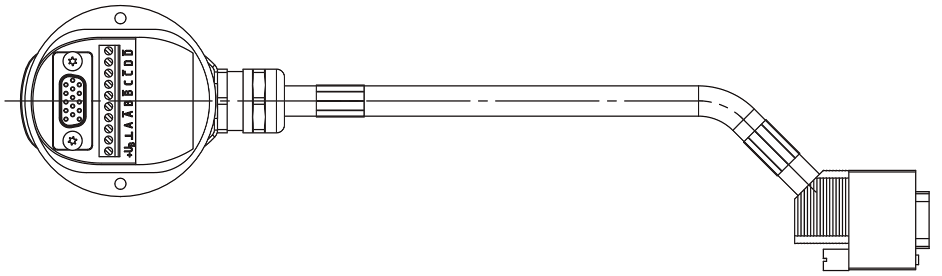


- Part number: 1362 199 8
- Cable with M23 plug connector and D-sub 15 plug connector:

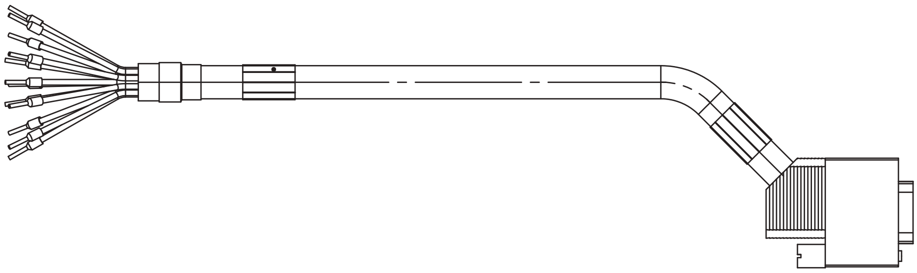


		Encoder cables	
Motor size	Encoder type	Installation	Part number
DR71 – 132 DR160 – 225	ES7S, ES7R, ES7C, AS7W, AS7Y, EG7S, EG7R, EG7C, AG7W, AG7Y		1362 196 3
			1362 318 4
			1362 319 2
			1362 197 1
			1362 199 8

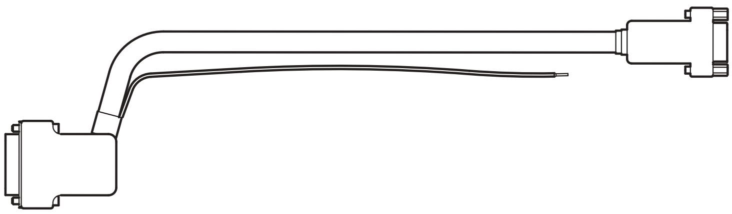
- Part number: 1362 322 2
- Cable with D-sub 9 plug connector and encoder connection cover:



- Part number: 1362 321 4
- Cable with D-sub 9 plug connector and conductor end sleeves:

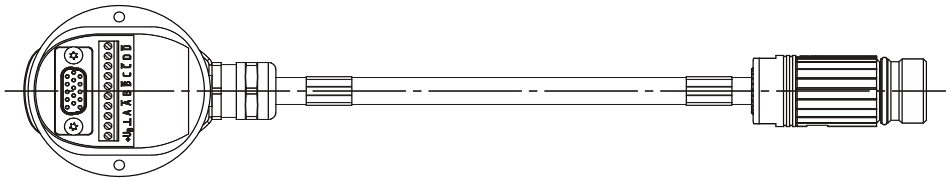


- Part number 188 180 9
- DWE12B option, interface adapter HTL→ TTL (length: 1 m):

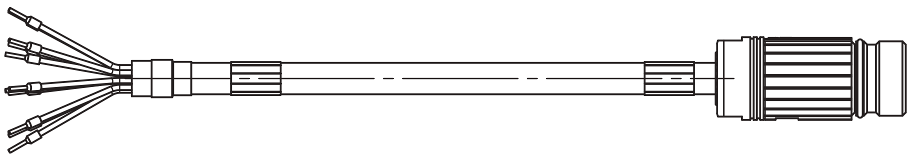


Motor size	Encoder type	Encoder cables	
		Installation	Part number
DR71 – 132 DR160 – 225	ES7C, EG7C,		1362 322 2
			1362 321 4
			188 180 9 (DWE12B)

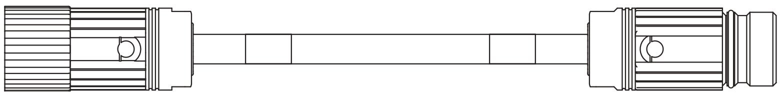
- Part number: 1362 196 3
- Possibility 1: Cable with encoder connection cover and M23 plug connector:



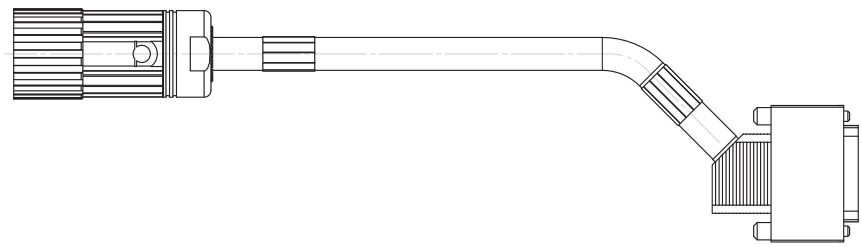
- Part number: 1362 318 4
- Cable with M23 plug connector and conductor end sleeves:



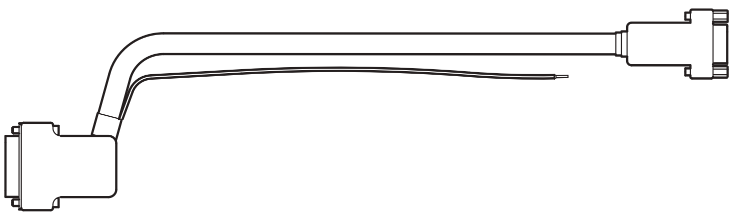
- Part number: 1362 197 1
- Extension cable with M23 plug connector on both sides:



- Part number: 1362 323 0 or 1362 324 9
- Extension cable with M23 plug connector and D-sub 9 plug connector:

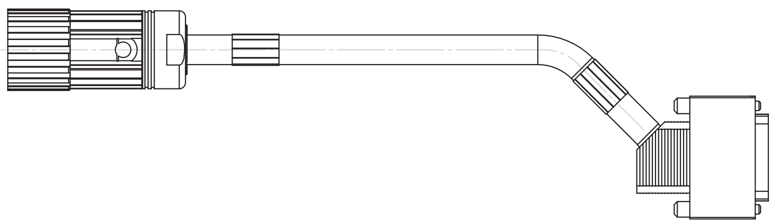


- Part number: 188 180 9
- DWE12B option, interface adapter HTL→ TTL (length: 1 m):



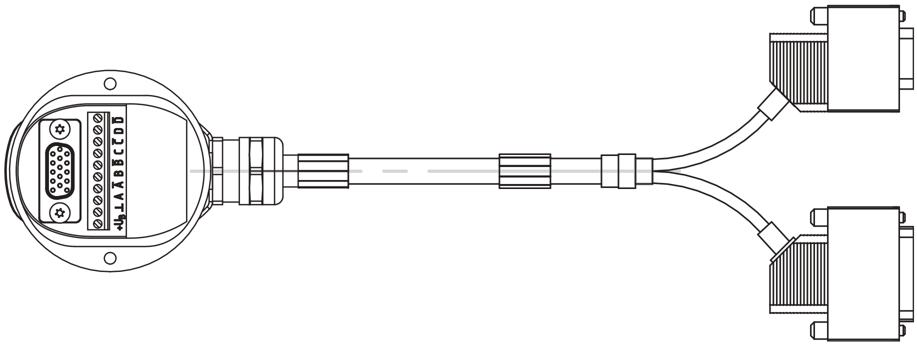
Motor size	Encoder type	Encoder cables Installation	 Part number
DR71 – 132 DR160 – 225	ES7C, EG7C,		1362 196 3
			1362 318 4
			1362 319 2
			1362 197 1
			1362 323 0
			1362 324 9
			188 180 9 (DWE12B)

- Part number: 1360 265 9 or 1362 320 6
- Cable with M23 plug connector and D-sub 15 plug connector:

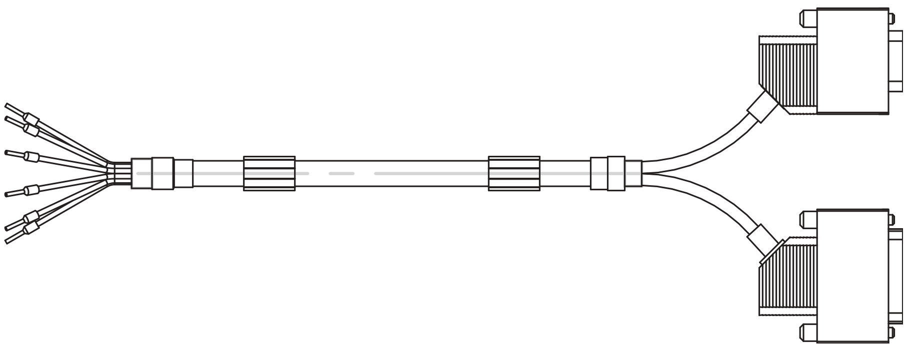


Motor size	Encoder type	Encoder cables Installation	 Part number
DR315	EH7S		1360 265 9
			1362 320 6

- Part number: 1362 629 9 or 1362 630 2
- Possibility 1: Y-cable with D-sub 15 plug connector, D-sub 9 plug connector and encoder connection cover:

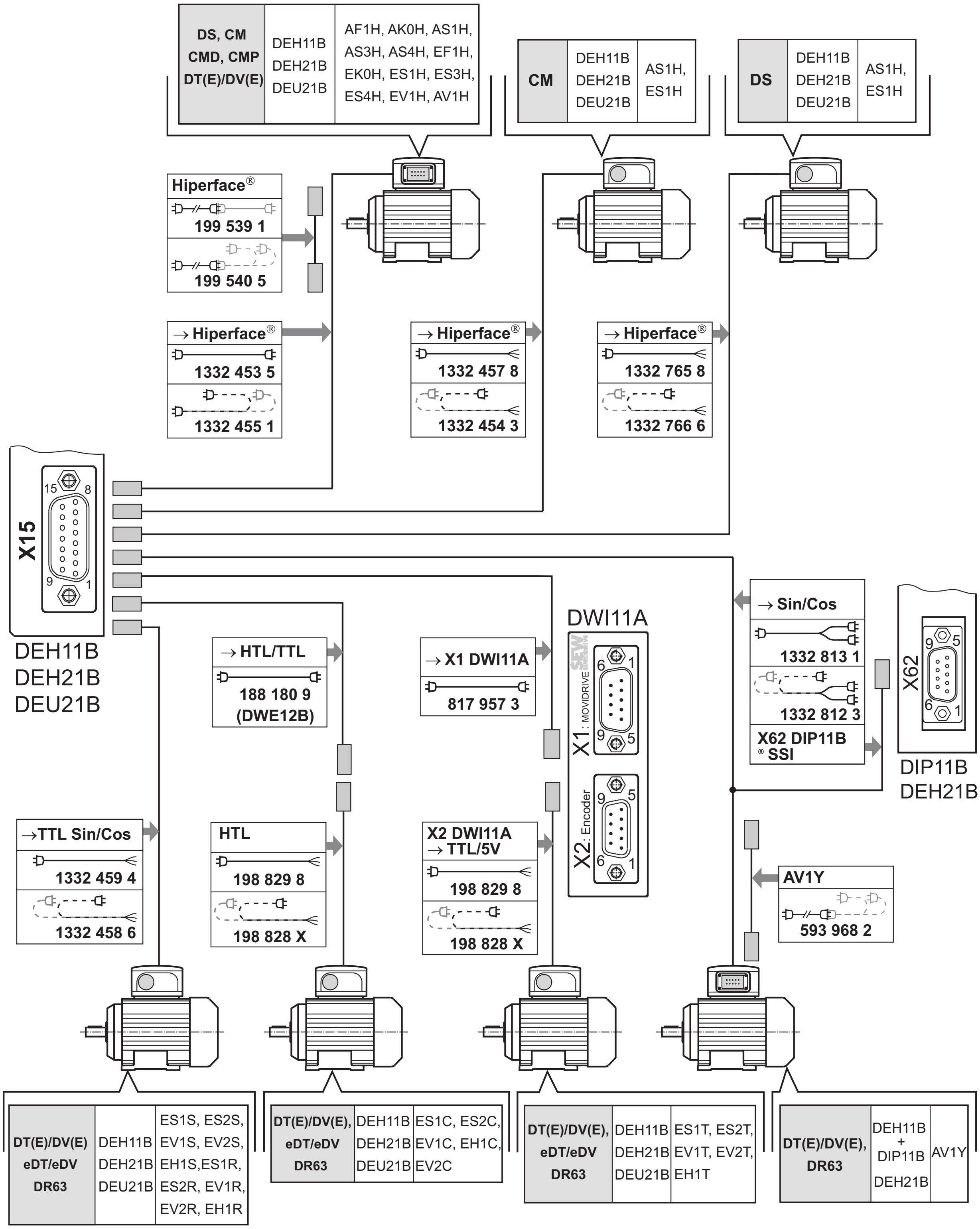


- Part number: 13660 264 0 or 1362 326 5
- Possibility 2: Y-cable with D-sub 15 plug connector, D-sub 9 plug connector and conductor end sleeves:



Motor size	Encoder type	Encoder cables	
		Installation	Part number
DR71 – 132 DR160 – 225 DR315	AS7Y AG7Y AH7Y		1362 629 9
			1362 630 2
			1360 264 0
			1362 326 5

7.10 Encoder cable for DT/DV/CMP, CM, (DS) motors on X15 DEH11B/DEH21B and DEU21B



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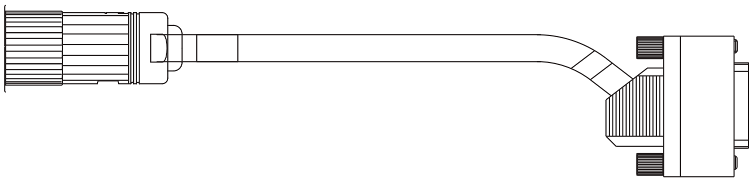
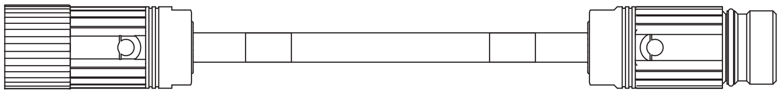
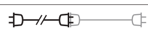
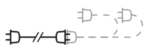
For the individual wiring diagrams, refer to the section "Installation" in the MOVIDRIVE® MDX60B/61B operating instructions. When combining SSI or HTL encoders with the DEU21B multi-encoder card, refer to the "MOVIDRIVE® DEU21B Multi-Encoder Card" manual.

- Part number: 1332 453 5 or 1332 455 1
- Cable for encoder connection with plug connector on motor end.

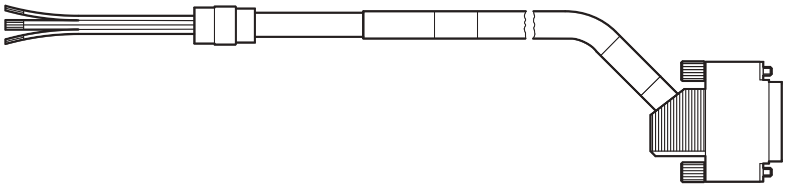


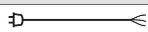
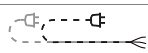
- Part number: 199 539 1 or 199 540 5
- Extension cable for encoder connection with plug connector on motor end.



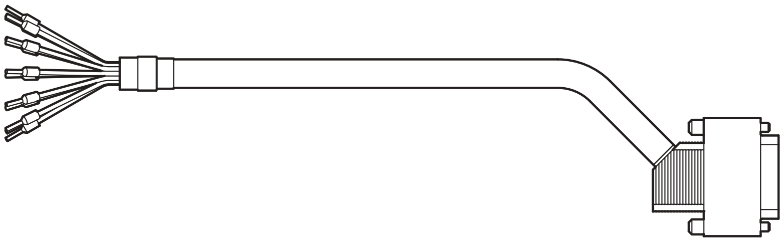
Motor series	Encoder type	Encoder cable Installation	Encoder cable Part number
DS/CM/CMD/CMP/DT/ DV/DT(E)/DV(E) motors	AF1H, AK0H, AS1H, AS3H, AS4H, EF1H, EK0H, ES1H, ES3H, ES4H, EV1H, AV1H		1332 453 5
			1332 455 1
			199 539 1
			199 540 5

- Part number: 1332 457 8 or 1332 454 3
- Cable for encoder connection with terminal box connection on motor end.



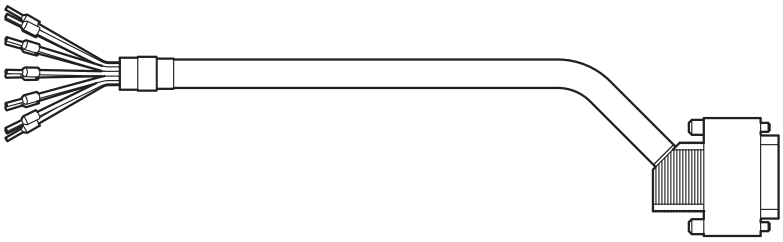
Motor series	Encoder type	Encoder cable Installation	Encoder cable Part number
CM motors	AS1H, ES1H, AF1H, EF1H		1332 457 8
			1332 454 3

- Part number: 1332 765 8 or 1332 766 6
- Cable for encoder connection with terminal box connection on motor end.



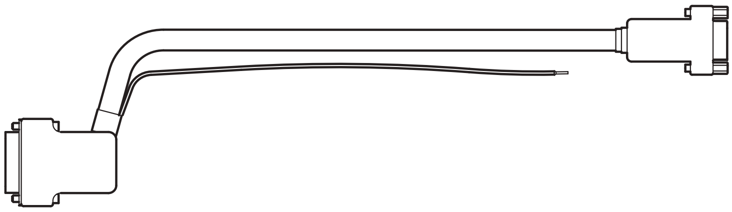
Motor series	Encoder type	Encoder cable	
		Installation	Part number
DS motors	AS1H, ES1H, AF1H, EF1H		1332 765 8
			1332 766 6

- Part number: 1332 459 4 or 1332 458 6
- Cable for encoder connection with terminal box connection on motor end.



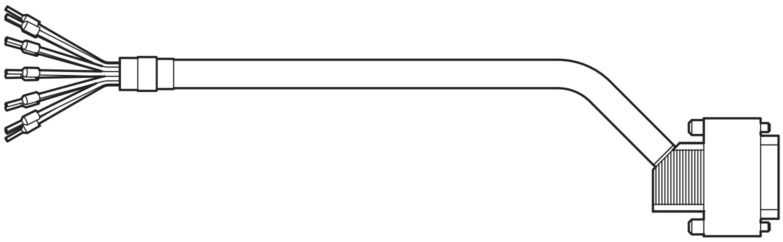
Motor series	Encoder type	Encoder cable	
		Installation	Part number
DT(E)/DV(E)//DR motors	ES1S, ES2S, EV1S, EV2S, EH1S, ES1R, ES2R, EV1R, EV2R, EH1R		1332 459 4
			1332 458 6

- Part number: 188 180 9
- Cable (option DWE12B, interface adapter HTL → TTL) to connect push-pull HTL encoders at X15 of the DEH11B/21B option (→ chapter "DWE11B/12B interface adapter option").



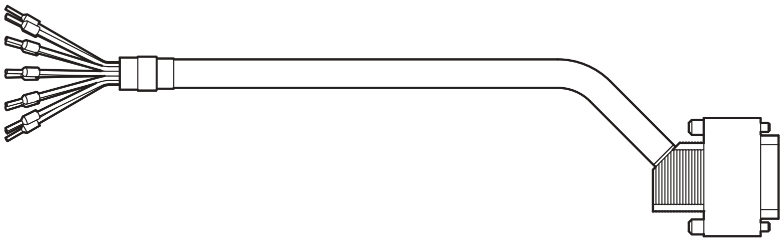
Type	Installation	Part number
DWE12B option (Connection of push-pull HTL encoders)		188 180 9

- Part number: 198 829 8 or 198 828 X
- Cable for push-pull HTL encoder connection with terminal box connection on motor end.



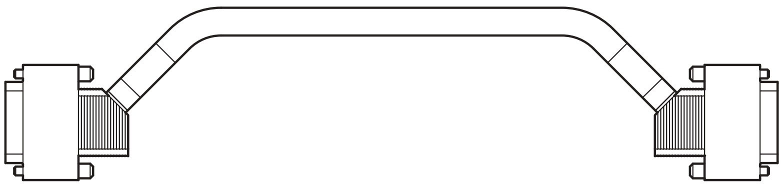
Type	Installation	Part number
Push-pull HTL encoders ES1C, ES2C, EV1C, EV2C, EH1C → DT(E)/DV(E)/DR motors		198 829 8
		198 828 X

- Part number: 198 829 8 or 198 828 X
- Cable to connect an external DC 5 V TTL encoder with terminal box connection on the motor end to the DC 5 V encoder power supply DWI11A.



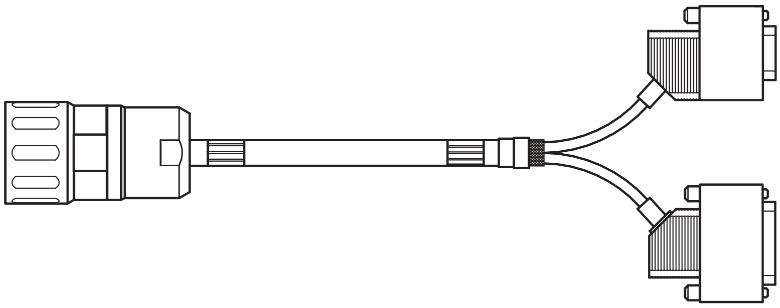
Type	Installation	Part number
DC 5 V TTL sensors ES1T, ES2T, EV1T, EV2T, EH1T→ DWI11A X2		198 829 8
		198 828 X

- Part number: 817 957 3
- Cable to connect the DC 5 V encoder power supply type DWI11A via plug connector.



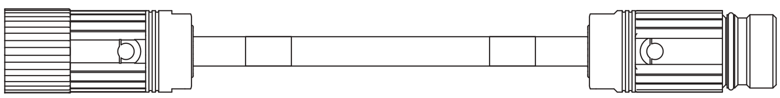
Type	Installation	Part number
DEH11B/21B X15 → DWI11A X1		817 957 3

- Part number: 1332 813 1 or 1332 812 3
- Y cable to connect the AV1Y absolute encoder with plug connector on the motor side. The following encoder tracks are evaluated with the Y cable:
  – SSI track of the AV1Y absolute encoder and at DIP11B/DEH21B X62
  – sin/cos track of the AV1Y absolute encoder at DEH11B X15



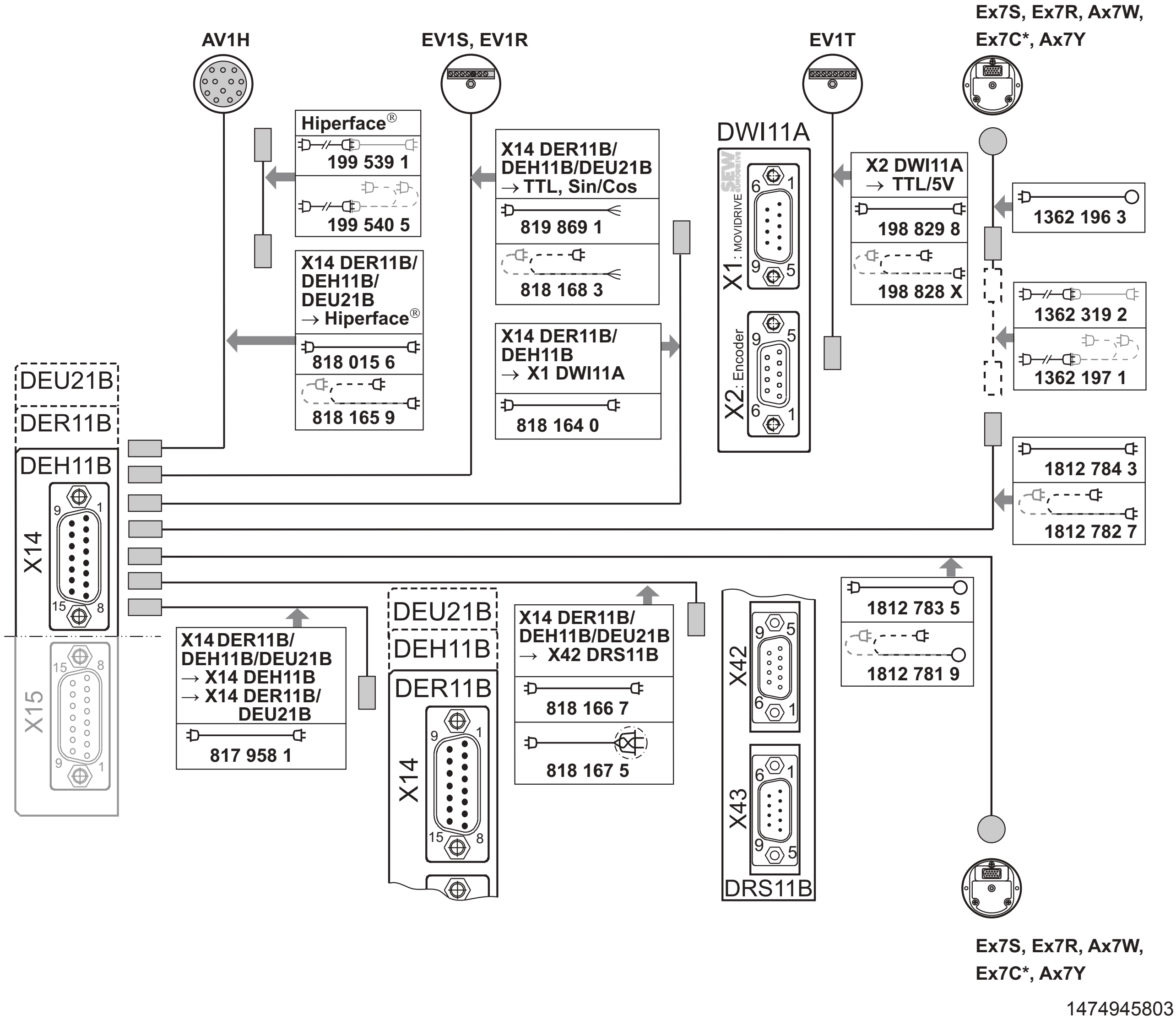
Type	Installation	Part number
DEH11B X15 → AV1Y and DIP11B/DEH21B X62		1332 813 1
		1332 812 3

- Part number: 593 968 2
- Extension cable to connect the AV1Y absolute encoder with plug connector on the motor end.



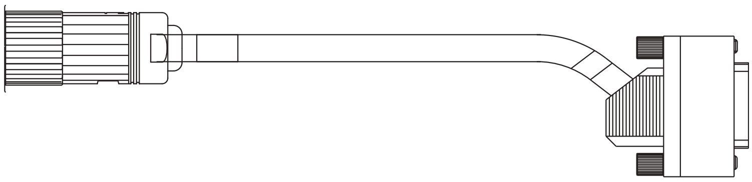
Type	Installation	Part number
DT(E)/DV(E)/DR motors → AV1Y		593 968 2

7.11 Encoder cables for distance encoders on X14, DEH11B / DER11B / DEU21B

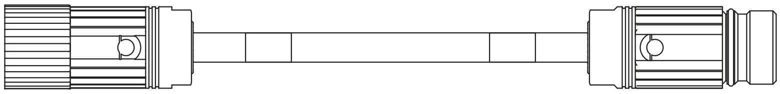


	INFORMATION
	* ES7C and EG7C may only be used in connection with the DEU21B multi-encoder card. For the individual wiring diagrams, refer to the "Installation" chapter in the MOVIDRIVE® MDX60B/61B operating instructions.

- Part number: 818 015 6 or 818 165 9
- Cable to connect external encoders via plug connectors.

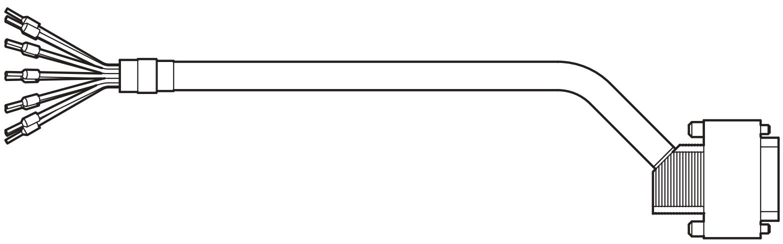


- Part number: 199 539 1 or 199 540 5
- Extension cable to connect external encoders via plug connectors.



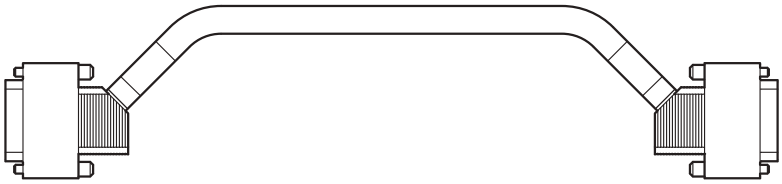
Type	Installation	Part number
DEH11B / DER11B / DEU21B X14 → AV1H, AS1H, ES1H, AF1H, EF1H		818 015 6
		818 165 9
		199 539 1
		199 540 5

- Part number: 819 869 1 or 818 168 3
- Cable to connect external encoders via encoder terminal strip.



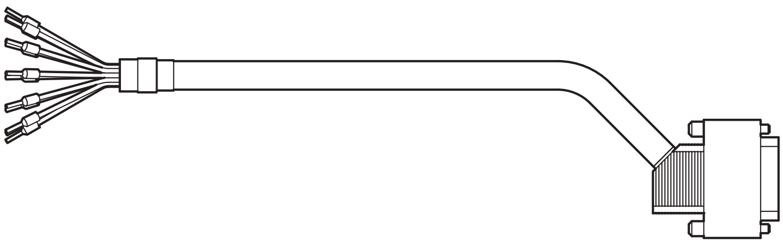
Type	Installation	Part number
DEH11B / DER11B / DEU21 B X14 → sin/cos encoder		819 869 1
		818 168 3

- Part number: 818 164 0
- Cable to connect the DC 5 V encoder power supply type DWI11A via plug connector.



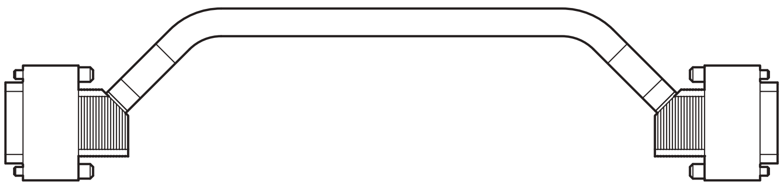
Type	Installation	Part number
DEH11B / DER11B / DEU21 B X14 → DWI11A X1		818 164 0

- Part number: 198 829 8 or 198 828 X
- Cable to connect an external DC 5 V TTL sensor to the DC 5 V encoder power supply type DWI11A via encoder terminal strip.



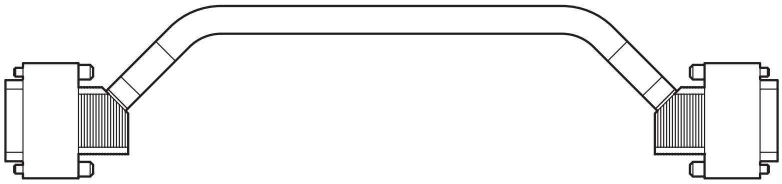
Type	Installation	Part number
DC 5 V TTL sensor → DWI11A X2		198 829 8
		198 828 X

- Part number: 817 958 1
- Cable to connect a master/slave connection.



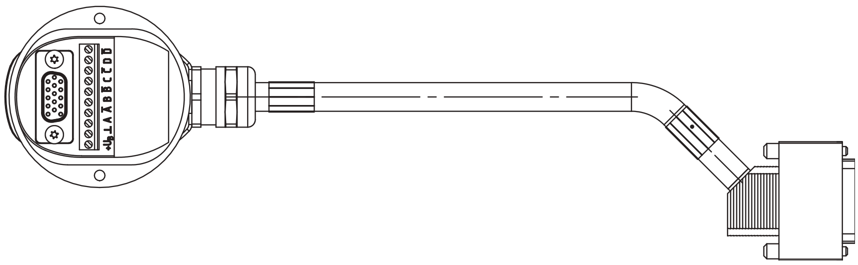
Type	Installation	Part number
DEH11B / DER11B / DEU21B X14 → DEH11B / DER11B / DEU21B X14		817 958 1

- Part number: 0818 166 7 or 0818 167 5
- Cable to connect the encoder simulation (DEH11B/DER11B:X14) of the master to terminal X42 of option DRS11B.



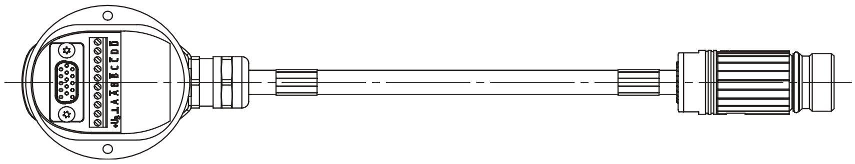
Type	Installation	Part number
DEH11B / DER11B / DEU21B X14 → DRS11B X42 (master and slave turn in the same direction)		0818 166 7
DEH11B / DER11B / DEU21B X14 → DRS11B X42 (master and slave turn in opposite directions)		0818 167 5

- Part number: 1812 783 5 or 1812 781 9
- Cable with D-sub 15 plug connector and encoder connection cover:

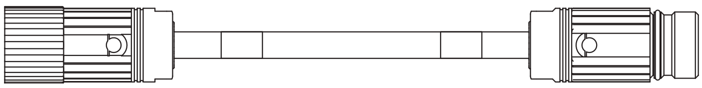


Encoder type	Encoder cables	
	Installation	Part number
ES7S, ES7R, ES7C, AS7W, AS7Y EG7S, EG7R, EG7C, AG7W, AG7Y,		1812 783 5
		1812 781 9

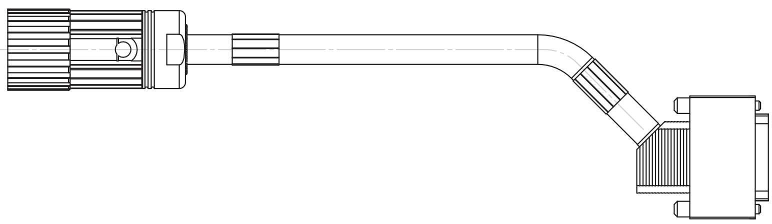
- Part number: 1362 196 3
- Cable with encoder connection cover and M23 plug connector:



- Part number: 1362 319 2 or 1362 197 1
- Optional: Extension cable with M23 plug connector on both sides:

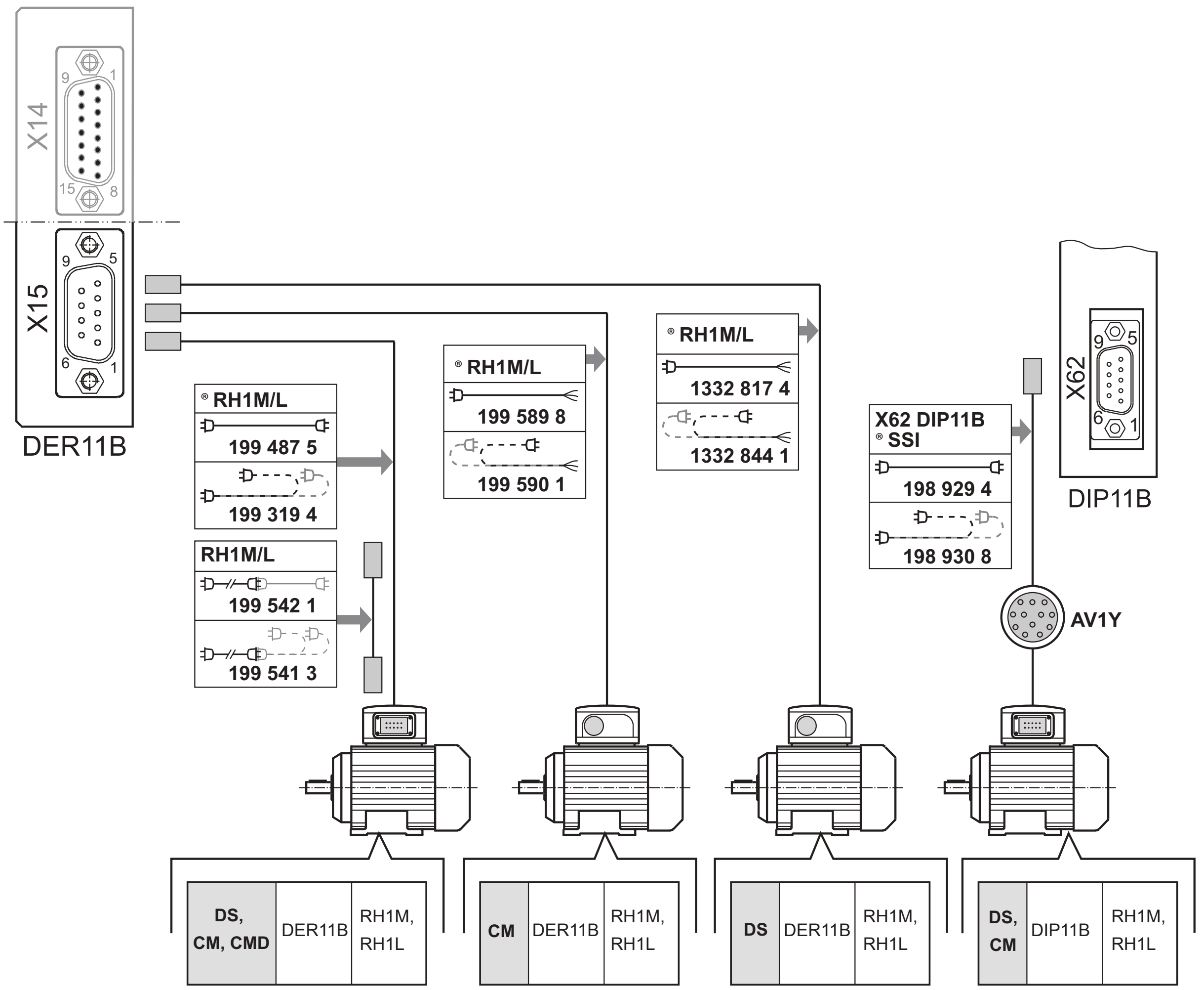


- Part number: 1812 784 3 or 1812 782 7
- Cable with M23 plug connector and D-sub 15 plug connector:



Encoder type	Encoder cables	
	Installation	Part number
ES7S, ES7R, ES7C, AS7W, AS7Y, EG7S, EG7R, EG7C, AG7W, AG7Y		1362 196 3
		1362 319 2
		1362 197 1
		1812 784 3
		1812 782 7

7.12 Encoder cables for resolvers on X15 DER11B



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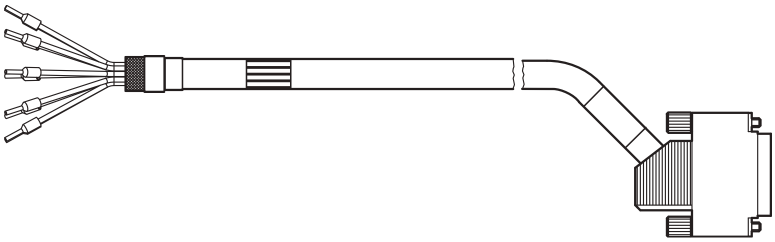
For the individual wiring diagrams, refer to the "Installation" chapter in the MOVIDRIVE® MDX60B/61B operating instructions.

- Part number: 199 487 5 or 199 319 4
- Cable to connect resolvers RH1M / RH1L with plug connector connection on the motor side to DS, CM, CMD or CMP motors.

- Part number: 199 542 1 or 199 541 3
- Extension cable to connect resolvers RH1M / RH1L with plug connector connection on the motor side to DS, CM, CMD or CMP motors.

Type	Installation	Part number
DER11B X15 → DS/CM/CMD/CMP motors with RH1M/RH1L		199 487 5
		199 319 4
		199 542 1
		199 541 3

- Part numbers:
  - For CM motors: 199 589 8 or 199 590 1
  - For DS motors: 1332 817 4 or 1332 844 1
- Cable to connect resolvers RH1M / RH1L with terminal box connection on the motor side to CM and DS motors.



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

- Part number: 198 929 4 or 198 930 8
- 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.

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

8 Parameters

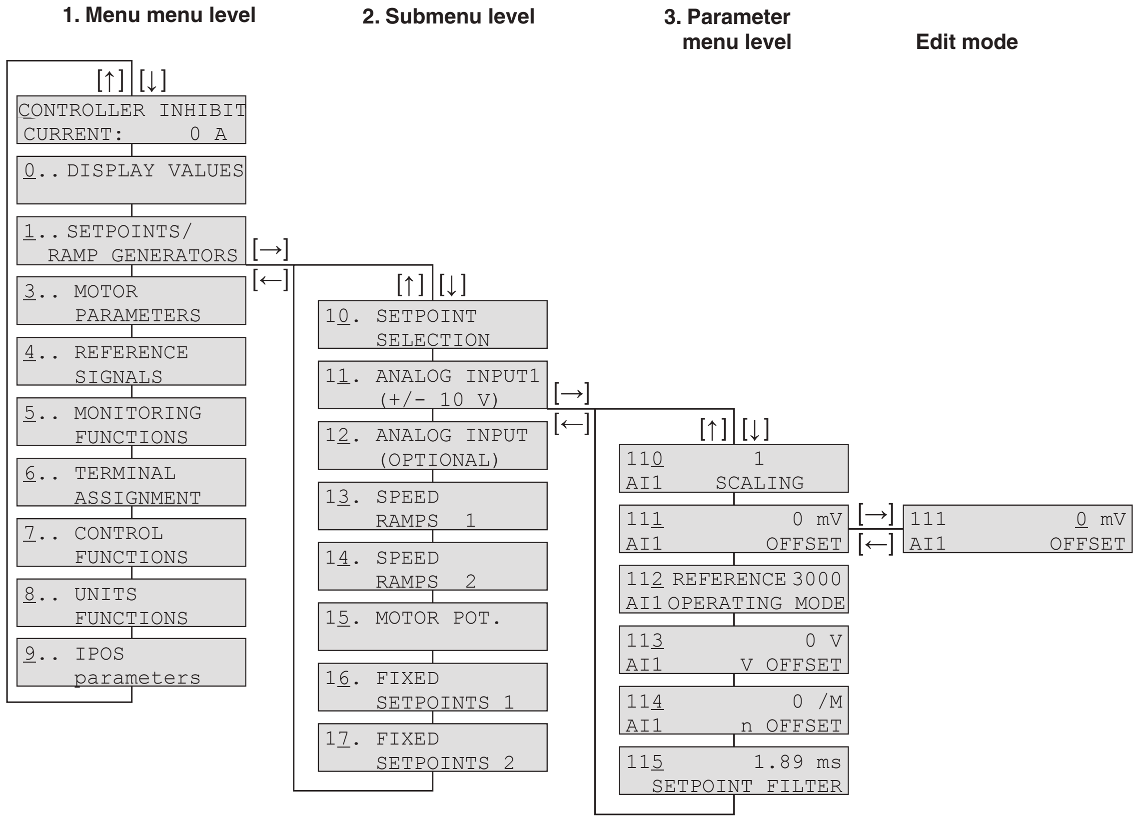
You usually need the parameter menu only for startup and in case of service. MOVIDRIVE® is therefore designed as a basic unit without keypad. If required, you can equip the MOVIDRIVE® with a PC connection or a keypad.

You can set the MOVIDRIVE® parameters in various ways:

- Using the optional keypad type DBG60B.
- Using the MOVITOOLS® MotionStudio engineering software (includes SHELL, SCOPE and IPOS$^{plus®}$ programming).
- Using the serial interfaces.
- Using the fieldbus interfaces.
- Using IPOS$^{plus®}$.

You can download the latest version of the MOVITOOLS® MotionStudio engineering software from the SEW homepage (www.sew-eurodrive.com).

8.1 Menu structure in DBG60B



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8.2 Overview of parameters

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

P0xx Display values	
P00x Process values	
P000 Speed	
P001 User display	
P002 Frequency	
P003 Actual position	
P004 Output current	
P005 Active current	
P006 / P007 Motor utilization 1 / 2	
P008 DC link voltage	
P009 Output current	
P01x Status displays	
P010 Inverter status	
P011 Operating state	
P012 Fault status	
P013 Current parameter set	
P014 Heat sink temperature	

P015 Operating hours	
P016 Enable hours	
P017 Work	
P018 / P019 KTY utilization 1 / 2	
P02x Analog setpoints	
P020 / P021 Analog input AI1/AI2	
P022 External current limitation	
P03x Binary inputs of basic unit	
P030 – P037 Binary inputs DI00 – DI07	
P039 Binary inputs DI00 – DI07	
P04x Binary inputs option	
P040 – P047 Binary inputs DI10 – DI17	
P048 Binary inputs DI10 – DI17	
P05x Binary outputs of basic unit	
P050 – P055 Binary outputs DB00, DO01 – DO05	
P050 – P055 Binary outputs DB00, DO01 – DO05	
P059 Binary outputs DB00, DO01 – DO05	
P06x Binary outputs option	
P060 – P067 Binary outputs DO10 – DO17	
P068 Binary outputs DO10 – DO17	
P07x Unit data	
P070 Unit type	
P071 Rated output current	
P072 Encoder slot option / firmware	
P073 Fieldbus slot option / firmware	
P074 Option / firmware expansion slot	
P076 Basic unit firmware	
P078 Technology function	
P079 Unit version	
P08x Fault memory	
P080 – P084 Faults t-0 – t-4	
P09x Bus diagnostics	
P090 PD configuration	
P091 Fieldbus type	
P092 Fieldbus baud rate	
P093 Fieldbus address	
P094 – P096 PO1 – PO3 setpoint	
P097 – P099 PI1 – PI3 actual value	
P1xx Setpoints/ramp generators	
P10x Setpoint preselection	
P100 Setpoint source	UNIPOL./FIX.SETPT.
P101 Control signal source	TERMINALS
P102 Frequency scaling	0.1 - 10 - 65 kHz
P105 Error response to wire breakage AI1	No response
P11x Analog input AI1	
P110 AI1 Scaling	−10 - 0 - 1 - 10
P111 AI1 Offset	−500 - 0 - 500 mV
P112 AI1 Operating mode	Ref. N-MAX

P113 AI1 voltage offset	−10 - <u>0</u> - 10 V
P114 AI1 speed offset	−6000 - <u>0</u> - 6000 rpm
P115 Filter setpoint	0 - <u>5</u> - 100 ms, 0 = OFF
P12x Analog inputs option	
P120 AI2 Operating mode (optional)	<u>NO FUNCTION</u>
P13x / P14x Speed ramps 1 / 2	
P130 – P133 / P140 – P143 ramp t11 / t21 up/down CW/CCW	0 - <u>2</u> - 2000 s
P130 – P133 / P140 – P143 ramp t11 / t21 up/down CW/CCW	0 - <u>2</u> - 2000 s
P130 – P133 / P140 – P143 ramp t11 / t21 up/down CW/CCW	0 - <u>2</u> - 2000 s
P130 – P133 / P140 – P143 ramp t11 / t21 up/down CW/CCW	0 - <u>2</u> - 2000 s
P134 / P144 Ramp t12 / t22 UP=DOWN	0 - <u>10</u> - 2000 s
P135 / P145 S pattern t12 / t22	<u>0</u> - 3
P136 / P146 Stop ramp t13 / t23	0 - <u>2</u> - 20 s
P137 / P147 Emergency stop ramp t14 / t24	0 - <u>2</u> - 20 s
P138 Ramp limit VFC	<u>YES</u>
P139 / P149 Ramp monitoring 1 / 2	<u>NO</u>
P15x Motor potentiometer	
P150 / P151 Ramp t3 up / down	0.2 - <u>20</u> - 50 s
P150 / P151 Ramp t3 up / down	0.2 - <u>20</u> - 50 s
P152 Save last setpoint	<u>OFF</u>
P16x / P17x Fixed setpoints 1 / 2	
P16x / P17x Fixed setpoints 1 / 2	−6000 - <u>150</u> - 6000 rpm (% I_N)
P16x / P17x Fixed setpoints 1 / 2	−6000 - <u>750</u> - 6000 rpm (% I_N)
P16x / P17x Fixed setpoints 1 / 2	−6000 - <u>1500</u> - 6000 rpm (% I_N)
P2xx Controller parameters	
P20x Speed control	
P200 P-gain n-controller	0.01 - <u>2</u> - 32
P201 Time constant n-controller	0 - <u>10</u> - 3000 ms
P202 Gain acceleration precontrol	<u>0</u> - 65
P203 Filter acceleration precontrol	<u>0</u> - 100 ms
P204 Filter actual speed value	<u>0</u> - 32 ms
P205 Load precontrol CFC	-150 - <u>0</u> - 150%
P206 Sampling time n-controller	<u>1 ms</u> / 0.5 ms
P207 Load precontrol VFC	−150 - <u>0</u> - 150%
P21x Hold controller	
P210 P gain hold controller	0.1 - <u>0.5</u> - 32
P22x Synchronous operation control	
P220 P-gain DRS	1 - <u>10</u> - 200
P221 / P222 Master gear ratio factor / slave gear ratio factor	<u>1</u> - 3 999 999 999
P221 / P222 Master gear ratio factor / slave gear ratio factor	<u>1</u> - 3 999 999 999
P223 Mode selection	<u>Mode 1</u> - Mode 8
P224 Slave counter	−9 999 999 - <u>10</u> - 99 999 999
P225 / P226 / P227 Offset 1/2/3	−2 767 - <u>10</u> - 32 767
P225 / P226 / P227 Offset 1/2/3	−2 767 - <u>10</u> - 32 767
P225 / P226 / P227 Offset 1/2/3	−2 767 - <u>10</u> - 32 767

P228 Filter precontrol DRS	0 - 100 ms
P23x Synchronous encoder with synchronous encoder	
P230 Distance encoder	OFF
P231 / P232 Factor slave encoder / factor slave synchronous encoder	1 - 1000
P231 / P232 Factor slave encoder / factor slave synchronous encoder	1 - 1000
P233 Synchronous encoder resolution	128 / 256 / 512 / 1024 / 2048
P234 Master encoder resolution	128 / 256 / 512 / 1024 / 2048
P24x Synchronous operation with catch up	
P240 Synchronous speed	−000 - 1500 - 6000 rpm
P241 Synchronization ramp	0 - 2 - 50 s
P26x Process controller parameters	
P260 Operating mode	Controller off
P261 Cycle time	1 / 5 / 10 ms
P262 Interruption	No response
P263 Factor KP	0 - 1 - 32,767
P264 Integrative time TN	0 - 10 - 65535 ms
P265 Derivative time TV	0 - 1 - 30 ms
P266 Precontrol	−2767 - 0 - 32767
P27x Process controller input values	
P270 Setpoint source	Parameter
P271 Setpoint	−2767 - 0 - 32767
P272 IPOS setpoint address	0 - 1023
P273 Time constant	0 - 0.01 - 2000 s
P274 Scaling setpoint	−2.767 - 1 - 32.767
P275 Actual value source	Analog 1
P276 IPOS actual value address	0 - 1023
P277 Scaling actual value	−2.767 - 1 - 32.767
P278 Offset actual value	−2767 - 0 - 32767
P279 Time constant actual value	0 - 500 ms
P28x Process controller limits	
P280 Minimum offset + actual value	−2767 - 0 - 32767
P281 Maximum offset + actual value	−2767 - 10000 - 32767
P282 PID controller minimum output	−2767 - −000 - 32767
P283 PID controller maximum output	−2767 - 10000 - 32767
P284 Process controller minimum output	−2767 - 0 - 32767
P285 Process controller maximum output	−2767 - 7500 - 32767
P3xx Motor parameters	
P30x / P31x Limits 1 / 2	
P300 / P310 Start/stop speed 1/2	0 - 150 rpm
P301 / P311 Minimum speed 1/2	0 - 15 - 6100 rpm
P302/P312 Maximum speed 1/2	0 - 1500 - 6100 rpm
P303/P313 Current limit 1/2	0 - 150% I_N (size 0: 0 - 200% I_N)
P304 Torque limit	0 - 150% (size 0: 0 - 200%)
P32x / P33x Motor compensation 1 / 2 (asynchronous)	
P320/P330 Automatic adjustment 1/2	ON
P321/P331 Boost 1/2	0 - 100%
P322/P332 IxR adjustment 1/2	0 - 100%

P323/P333 Premagnetization time 1/2	0 - 2 s
P324/P334 Slip compensation 1/2	0 - 500 rpm
P34x Motor protection	
P340/P342 Motor protection 1/2	OFF
P341/P343 Type of cooling 1/2	FAN COOLED
P344 Motor protection interval	0.1 - 4 - 20 s
P345 / 346 IN / UL monitoring 1/2	0.1 - 500 A
P35x Motor direction of rotation	
P350/P351 Direction of rotation reversal 1/2	OFF
P36x Startup	
P360 Startup	NO
P4xx Reference signals	
P40x Speed reference signal	
P400 Speed reference value	0 - 1500 - 6000 rpm
P401 Hysteresis	0 - 100 - 500 rpm
P402 Delay time	0 - 1 - 9 s
P403 Signal = “1“ when:	$n < n_{ref}$ / $n > n_{ref}$
P41x Speed window signal	
P410 Window center	0 - 1500 - 6000 rpm
P411 Range width	0 - 6000 rpm
P412 Delay time	0 - 1 - 9 s
P413 Signal = “1“ if:	INSIDE
P42x Speed setpoint/actual value comparison	
P420 Hysteresis	0 - 100 - 300 rpm
P421 Delay time	0 - 1 - 9 s
P422 Signal = “1“ if:	$n \neq n_{setpt}$ / $n = n_{setpt}$
P43x Current reference signal	
P430 Current reference value	0 - 100 - 200% I_N
P431 Hysteresis	0 - 5 - 30% I_N
P432 Delay time	0 - 1 - 9 s
P433 Signal = “1“ if:	$I < I_{ref}$ / $I > I_{ref}$
P44x Imax signal	
P440 Hysteresis	0 - 5 - 50% I_N
P441 Delay time	0 - 1 - 9 s
P442 Signal = “1“ if:	$I = I_{max}$ / $I < I_{max}$
P5xx Monitoring functions	
P50x Speed monitoring	
P500/P502 Speed monitoring 1/2	MOT.&REGEN.
P501/P503 Delay time 1/2	0 - 1 - 10 s
P504 Encoder monitoring motor	NO
P505 Synchronous encoder monitoring	NO
P51x Synchronous operation monitoring	
P510 Positioning tolerance slave	10 - 25 - 32 768 increments
P511 Lag error prewarning	50 - 99 999 999 increments
P512 Lag error limit	100 - 4000 - 99 999 999
P513 Delay time lag error message	0 - 1 - 99 s
P514 Counter LED display	10 - 100 - 32 768 increments
P515 Delay in-position signal	5 - 10 - 2000 ms

P516 X41 Encoder monitoring	NO
P517 X41 Pulse count monitoring	NO
P518 X42 Encoder monitoring	NO
P519 X42 Pulse count monitoring	NO
P52x Mains OFF monitoring	
P520 Mains OFF response time	0 - 5 s
P521 Mains OFF response	CONTROLLER INHIBIT
P522 Phase failure monitoring	ON
P53x Motor temperature protection	
P530 Sensor type 1	No sensor / TF-TH / KTY / TF-TH DEU / KTY DEU
P531 Sensor type 2	No sensor / TF-TH / KTY /
P54x Gear unit/motor monitoring	
P540 Drive vibration / response / warning	Display error
P541 Drive vibration response / fault	Rapid stop/warning
P542 Response to oil aging / warning	Display error
P543 Response to oil aging / fault	Display error
P544 Oil aging / overtemperature	Display error
P545 Oil aging / ready signal	Display error
P549 Response to brake wear	Display error
P55x Safety monitor DCS	
P550 DCS safety monitor status	Display value
P551 Binary inputs DCS DI1 – DI8	Display value
P552 Binary outputs DCS DO0_P – DO2_M	Display value
P553 DCS series number	Display value
P554 CRC DCS	Display value
P555 Error response DCS / P556 Alarm response DCS	Immediate stop/malfunction
P555 Error response DCS / P556 Alarm response DCS	Rapid stop/warning
P557 DCS actual position source	Motor encoder (X15)
P56x Current limitation Ex-e motor	
P560 Current limit Ex-e motor	Off
P561 Frequency A	0 - 5 - 60
P562 Current limit A	0 - 50 - 150%
P563 Frequency B	0 - 10 - 104 Hz
P564 Current limit B	0 - 80 - 200%
P565 Frequeny C	0 - 25 - 104 Hz
P566 Current limit C	0 - 100 - 200%
P6xx Terminal assignment	
P60x Binary inputs of basic unit	
P600 – P606 Binary input DIØ1 – DIØ7	CW/STOP
P600 – P606 Binary input DIØ1 – DIØ7	CCW/STOP
P600 – P606 Binary input DIØ1 – DIØ7	ENABLE/STOP
P600 – P606 Binary input DIØ1 – DIØ7	n11/n21
P600 – P606 Binary input DIØ1 – DIØ7	n12/n22
P600 – P606 Binary input DIØ1 – DIØ7	NO FUNCTION
P600 – P606 Binary input DIØ1 – DIØ7	NO FUNCTION
P61x Binary inputs of option	
P610 – P617 Binary inputs DI1Ø – DI17	NO FUNCTION
P62x Binary outputs of basic unit	

P620 – P624 Binary outputs DOØ1 – DOØ5	READY FOR OPERATION
P620 – P624 Binary outputs DOØ1 – DOØ5	/FAULT
P620 – P624 Binary outputs DOØ1 – DOØ5	IPOS OUTPUT
P620 – P624 Binary outputs DOØ1 – DOØ5	IPOS OUTPUT
P620 – P624 Binary outputs DOØ1 – DOØ5	IPOS OUTPUT
P63x Binary outputs of option	
P630 – P637 Binary outputs DO1Ø – DO17	NO FUNCTION
P64x Optional analog outputs	
P640 / P643 Analog output AO1 / AO2	ACTUAL SPEED
P641 / P644 Scaling AO1 / AO2	−0 - 0 - 1 - 10
P642 / P645 Operating mode AO1 / AO2	OFF / −0 V - +10 V / 0(4) - 20 mA
P640 / P643 Analog output AO1 / AO2	OUTP.CURRENT
P641 / P644 Scaling AO1 / AO2	−0 - 0 - 1 - 10
P642 / P645 Operating mode AO1 / AO2	OFF / −0 V - +10 V / 0(4) - 20 mA
P7xx Control functions	
P70x Operating modes	
P700/P701 Operating mode 1/2	VFC 1 / 2
P702 Motor category	Rotatory/Linear
P71x Standstill current	
P710/P711 Standstill current 1/2	0 - 50% I_{Mot}
P72x Setpoint stop function	
P720/P723 Setpoint stop function 1/2	OFF
P721/P724 Stop setpoint 1/2	0 - 30 - 500 rpm
P722/P725 Start offset 1/2	0 - 30 - 500 rpm
P73x Brake function	
P730 / P733 Brake function 1 / 2	ON
P731 / P734 Brake release time 1 / 2	0 - 2 s
P732 / P735 Brake application time 1 / 2	0 - 2 s
P74x Speed skip	
P740/P742 Skip center 1/2	0 - 1500 - 6000 rpm
P741 / P743 Skip width 1 / 2	0 - 300 rpm
P75x Master-slave function	
P750 Slave setpoint	MASTER-SLAVE OFF
P751 Scaling slave setpoint	−0 - 0 - 1 - 10
P76x Manual operation	
P760 Lockout run/stop keys	NO
P77x Energy-saving function	
P770 Energy-saving function	OFF
P78x Ethernet configuration	
P780 IP address	000.000.000.000 - 192.168.10.x - 223.255.255.255
P781 Subnet mask	000.000.000.000 - 255.255.255.000 - 255.255.255.255
P782 Standard gateway	000.000.000.000 - 223.255.255.255
P783 Baud rate	
P784 MAC address	
P785 Ethernet / IP startup configuration	DHCP

P8xx Unit functions	
P80x Setup	
P800 User menu	ON (only in DBG60B)
P801 Language	Dependent on DBG60B version
P802 Factory setting	NO
P803 Parameter lock	OFF
P804 Reset statistics data	NO
P806 Copy DBG -> MDX	NO (only in DBG60B)
P807 Copy MDX -> DBG	NO (only in DBG60B)
P81x Serial communication	
P810 RS485 address	0 - 99
P811 RS485 group address	100 - 199
P812 RS485 timeout interval	0 - 650 s
P819 Fieldbus timeout interval	0 - 0.5 - 650 s
P82x Brake operation	
P820/P821 4-quadrant operation 1/2	ON
P83x Fault responses	
P830 Response to 'External fault'	EMERG. ST/FAULT
P831 Response to FIELDBUS TIMEOUT	RAPID STOP/FAULT
P832 Response to MOTOR OVERLOAD	EMERG. ST/FAULT
P833 Response to RS485 TIMEOUT	RAPID STOP/WARN.
P834 Response to LAG ERROR	EMERG. ST/FAULT
P835 Response to TF SIGNAL	NO RESPONSE
P836/P837 Response to SBus TIMEOUT 1/2	EMERG. ST/FAULT
P838 Response to SW LIMIT SWITCH	EMERG. ST/FAULT
P839 Response to positioning interruption	EMERG.STOP/ WARNING
P84x Reset behavior	
P840 Manual reset	NO
P841 Auto reset	OFF
P842 Restart time	1 - 3 - 30 s
P85x Scaling actual speed value	
P850 Scaling factor numerator	1 - 65 535
P851 Scaling factor denominator	1 - 65 535
P852 User-defined unit	rpm
P86x Modulation	
P860 / P861 PWM frequency 1 / 2 VFC	2.5 / 4 / 8 / 12 / 16 kHz
P862 / P863 PWM fix 1 / 2	OFF
P864 PWM frequency CFC	2.5 / 4 / 8 / 12 / 16 kHz
P87x Process data description	
P870 / P871 / P872 Setpoint description PO1 / PO2 / PO3	CONTROL WORD 1
P870 / P871 / P872 Setpoint description PO1 / PO2 / PO3	SPEED
P870 / P871 / P872 Setpoint description PO1 / PO2 / PO3	NO FUNCTION
P873 / P874 / P875 Actual value description PI1 / PI2 / PI3	STATUS WORD 1
P873 / P874 / P875 Actual value description PI1 / PI2 / PI3	SPEED
P873 / P874 / P875 Actual value description PI1 / PI2 / PI3	OUTP.CURRENT
P876 PO data enable	ON
P88x / P89x Serial communication SBus 1 / 2	
P880 / P890 Protocol SBus 1/2	SBus MOVILINK

P881 / P891 Address SBus 1/2	0 - 63
P882/P892 Group address SBus 1/2	0 - 63
P883/P893 Timeout interval SBus 1/2	0 - 650 s
P884/P894 Baud rate SBus 1/2	125 / 250 / 500/1000 kBaud
P885 / P895 Synchronization ID SBus 1/2	0 - 2047
P886/P896 Address CANopen 1/2	1 - 127
P887 Synchronization ext. control	OFF
P888 Synchronization time	1 - 5 - 10 ms
P889 / P899 Parameter channel 2	NO
P9xx IPOS parameters	
P90x IPOS reference travel	
P900 Reference offset	$-(2^{31}-)$ - 0 - $2^{31}-$ increments
P901 Reference speed 1	0 - 200 - 6000 rpm
P902 Reference speed 2	0 - 50 - 6000 rpm
P903 Reference travel type	0 - 8
P904 Reference to zero pulse	YES
P905 Hiperface offset X15	$-(2^{31}-)$ - 0 - $2^{31}-$ increments
P906 Cam distance	Display value
P91x IPOS travel parameters	
P910 Gain X controller	0.1 - 0.5 - 32
P911/912 Positioning ramp 1/2	0.01 - 1 - 20 s
P911/912 Positioning ramp 1/2	0.01 - 1 - 20 s
P913/P914 Travel speed CW/CCW	0 - 1500 - 6000 rpm
P913/P914 Travel speed CW/CCW	0 - 1500 - 6000 rpm
P915 Velocity precontrol	−99.99 - 0 - 100 - 199.99%
P916 Ramp type	LINEAR
P917 Ramp mode	MODE 1
P918 Bus setpoint source	0 – 499 – 1023
P92x IPOS monitoring	
P920 / P921 SW limit switch CW/CCW	$-(2^{31}-)$ - 0 - $2^{31}-$ increments
P920 / P921 SW limit switch CW/CCW	$-(2^{31}-)$ - 0 - $2^{31}-$ increments
P922 Position window	0 - 50 - 32 767 increments
P923 Lag error window	0 - 5000 - $2^{31}-$ increments
P924 Positioning interruption detection	OFF
P93x IPOS special functions	
P930 Override	OFF
P931 IPOS CTRL.W Task 1	STOP (only with DBG60B)
P932 IPOS CTRL.W Task 2	STOP (only with DBG60B)
P933 Jerk time	0.005 - 2 s
P938 Speed task 1	0 - 9 additional commands/ms
P939 Speed task 2	0 - 9 additional commands/ms
P94x IPOS encoder	
P940 IPOS variable edit	OFF
P941 Actual position source	Motor encoder (X15)
P942 / P943 Encoder factor numerator / denominator	1 - 32 767
P942 / P943 Encoder factor numerator / denominator	1 - 32 767
P944 Encoder scaling ext. encoder	x1 / x2 / x4 / x8 / x16 / x32 / x64
P945 Synchronous encoder type (X14)	TTL

P946 Distance encoder counting direction (X14)	NORMAL
P947 Hiperface offset X14	$-(2^{31}-)$ - 0 - $2^{31}-$ increments
P948 Automatic encoder replacement detection	On
P95x Absolute encoder	
P950 Encoder type	NO ENCODER
P951 Counting direction	NORMAL
P952 Cycle frequency	1 - 200%
P953 Position offset	$-(2^{31}-)$ - 0 - $2^{31}-$ increments
P954 Zero offset	$-(2^{31}-)$ - 0 - $2^{31}-$ increments
P955 Encoder scaling	x1 / x2 / x4 / x8 / x16 / x32 / x64
P96x IPOSplus® modulo function	
P960 Modulo function	OFF
P961 Modulo numerator	1 - 2^{31} - 1
P962 Modulo denominator	1 - 2^{31} - 1
P963 Modulo encoder resolution	1 - 4096 - 65535
P97x IPOS synchronization	
P970 DPRAM synchronization	ON
P971 Synchronization phase	−2 - 0 - 2 ms

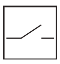
8.3 Explanation of the parameters

The parameters are explained below. The parameters are divided into 10 groups. The parameter names correspond to their representation in the parameter tree. The factory setting is underlined.

8.3.1 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.

8.3.2 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

Resolution with DBG60B: +/– 1 rpm; with SHELL: +/– 0.2 rpm

In VFC or U/f mode without connected encoder, the speed results from the setpoint speed and the set slip compensation. The speed is established from the encoder or resolver signals and is displayed when there is an encoder connection.

P001 User display

The user display is defined by the following parameters:

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

P002 Frequency

Output frequency of the inverter.

P003 Actual position

Position of the drive as a value in increments observing the signs in the range 0 – ± 2^{31}– 1 increments (with encoder connection). Without encoder connection, the value is zero.

P004 Output current

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

P005 Active current

Active current in the range 0 – 200% I_N (size 0: 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

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

The displayed value is the present motor utilization for the motor in parameter set 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

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

P009 Output current

Apparent current, displayed in AC A.

P01x Status displays

P010 Inverter status

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

P011 Operating state

The following operating states are possible (7 segment display):

- 0: 24 V OPERATION (inverter not ready for operation)
- 1: CONTROLLER INHIBIT
- 2: NO ENABLE
- 3: STANDSTILL CURRENT
- 4: ENABLE (VFC)
- 5: ENABLE (N-CONTROL)
- 6: TORQUE CONTROL
- 7: HOLD CONTROL
- 8: FACTORY SETTING
- 9: LIMIT SWITCH
- A: TECHNOLOGY OPTION
- c: REFERENCE MODE
- d: FLYING START IS RUNNING

- E: CALIBRATE ENCODER
- F: ERROR
- H: MANUAL MODE
- t: WAITING ON DATA
- U: STO

P012 Fault status	Fault number and fault in plain text. The fault number also appears on the inverter's 7-segment display.
P013 Current parameter set	Parameter set 1 or 2.
P014 Heat sink temperature	Heat sink temperature of the inverter in the range −40 – 125 °C.
P015 Operating hours	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.
P016 Enable hours	Total number of hours for which the inverter was in ENABLE operating state; storage cycle every 15 min.
P017 Work	Total of the active electrical energy the motor has consumed; storage cycle every 15 min.
P018 / P019 KTY utilization 1 / 2	Display 0%: Motor is not in operation at max. ambient temperature. Display 110%: Cut-off point of motor.

P02x Analog setpoints

P020 / P021 Analog input AI1/AI2	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 *P020* 0(1) – 5 V = 0(4) – 20 mA will be displayed.
P022 External current limitation	If *P120 AI2 operating mode (optional)* = 0 – 10 V I-limit, then *P022* is used to display the active external current limitation.

P03x Binary inputs of basic unit

P030 – P037 Binary inputs DI00 – DI07	Displays the current status of input terminals DI00 – DI07 and the current function assignment. Binary input DI00 is always assigned with controller inhibit. Menu selection see *P60x Binary inputs of basic unit*.
P039 Binary inputs DI00 – DI07	Displays the standard binary inputs DI00 to DI07 in this sequence.

P04x Binary inputs option

P040 – P047 Binary inputs DI10 – DI17	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 installed, the display will show "–". Menu selection see *P61x Binary inputs of option*.

P048 Binary inputs DI10 – DI17	Shows the optional binary inputs DO10 – DO17 in this sequence.

P05x Binary outputs of basic unit

P050 – P055 Binary outputs DB00, DO01 – DO05	Displays the current state of the binary output on the basic unit with the current function assignment. Output DB00 is always programmed to the "/Brake" function. Menu selection see *P62x Binary outputs of basic unit*.
P059 Binary outputs DB00, DO01 – DO05	Displays the binary outputs DB00 and DO01 – DO05 in this sequence.

P06x Binary outputs option

P060 – P067 Binary outputs DO10 – DO17	Displays the current state of the binary output on an option card (e.g. DIO) with the current function assignment. If the option is not installed, the display will show "–". Menu selection see *P63x Binary outputs of option*.
P068 Binary outputs DO10 – DO17	Shows the optional binary outputs DO10 – DO17 in this sequence.

P07x Unit data

P070 Unit type	Displays the complete designation of the unit, e.g. MDX60B0014-5A3.
P071 Rated output current	Displays the r.m.s. value of the rated output current.
P072 Encoder slot option / firmware	Displays the encoder card currently installed in the encoder slot and the program version.
P073 Fieldbus slot option / firmware	Displays the fieldbus card currently installed in the fieldbus slot and the program version.
P074 Option / firmware expansion slot	Displays the option card currently installed in the expansion slot and the program version, if this option has a program memory.
P076 Basic unit firmware	Displays the program version of the firmware used in the basic unit.

P078 Technology function

Displays the currently set technology function.

This function is set in MOVITOOLS® MotionStudio under "Startup – Select technology function".

- STANDARD: Setting for operating the inverter with the functions described in the system manual (positioning, speed control, etc.).
- ELECTRONIC CAM: Setting for using the technology function "Electronic cam" to coordinate the operation of several drives. Requirements:
  – Motor with encoder feedback
  – "Technology" type inverter

- ISYNCH: Setting for using the technology function "Electronic synchronous operation" to synchronize the operation of several drives with accurate positioning. Requirements:
  – Motor with encoder feedback
  – "Technology" type inverter
- AUTO / ASR: Special solution for optimum load distribution of the drive power for running gear with multiple-axis drive.
- SBUS / TP: Special solution for sending data in an event-controlled manner depending on touch probe events.
- Cross cutter: Special solution for synchronizing a slave that follows the master using a certain travel profile.

P079 Unit version

Displays the unit version.

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

P08x Fault memory

P080 – P084 Faults t-0 – t-4

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

Programmable error responses: see table *P83x Fault responses*.

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

- Status ("0" or "1") of the binary inputs/outputs
- Operating state of the inverter
- Inverter state
- Heat sink temperature
- Speed
- Output current
- Active current
- Unit utilization
- DC link voltage
- Operating hours
- Enable hours
- Parameter set
- Motor utilization 1 and 2

P09x Bus diagnostics

P090 PD configuration

Set process data word 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 PI1 – 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*

8.3.3 P1xx Setpoints/ramp generators

P10x Setpoint preselection

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

Fixed setpoints always have priority over other setpoints.

If the inverter is in "t = Waiting for data" state, check the timeout intervals of parameters *P812 RS485 timeout interval*, 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 derived from the analog inputs (AI1/AI2) or from *P16x / P17x Fixed setpoints 1 / 2*, if these were selected via *P60x Binary inputs of basic unit* / *P61x Binary inputs of option*. The setpoints are processed according to their value. A positive setpoint results in CW rotation, a negative setpoint in CCW rotation.

- UNIPOL./FIXED 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 to their values. The direction of rotation is set using *P60x Binary inputs of basic unit* / *P61x Binary inputs of option*.
- RS485: The setpoint is obtained from the RS485 interface.
- FIELDBUS: The setpoint is obtained 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. The binary inputs must be activated accordingly. The direction of rotation is specified by the binary inputs CW/stop and CCW/stop. See *P15x Motor potentiometer*.
- MOTORPOT+ANALOG1: The setpoint is defined by the total of the motor 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. Also, the settings of *P112 AI1 Operating mode* apply. See *P15x Motor potentiometer*.
- 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 total is negative or if a fixed setpoint has not been selected, n_{min} applies. The direction of rotation is specified using binary inputs. See *P16x / P17x Fixed setpoints 1 / 2*.
- FIXEDSETxANALOG1: The value at analog input AI1 serves as evaluation factor (0 – 10 V = 0 – 100%) for the selected fixed setpoint. The fixed setpoint is processed without sign (= according to its value). 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 / P17x Fixed setpoints 1 / 2*.
- MASTER SBus1: In master/slave mode, the setpoint is provided by the master 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$^{plus®}$ manual.
- FREQUENCY INPUT: Setting P100 Setpoint source to the function "Frequency input" causes the setpoint speed to be set via digital input DI04 in the form of a frequency. For this purpose, binary input DI04 (*P600 – P606 Binary input DIØ1 – DIØ7*) 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 device. 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. Use *P102 Frequency scaling* to determine at which input frequency the system setpoint (torque or speed) 100% is reached. The reference of the system setpoint is set via *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.

	INFORMATION
	IPOS variable H508 is also used when *P916 Ramp type* is set to "Position interpolation 16 bit". IPOS variable H508 only provides meaningful values when • DIP switch S14 = "ON" or • P916 Ramp type = "Position interpolation 16 bit"

- SBus 2: The setpoint is specified using system bus 2. (See IPOS$^{plus®}$ 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/P701 Operating mode 1/2*.
  - If a speed control operating mode (CFC, servo, VFC, VFC n-control, VFC & group, VFC & hoist, VFC & flying start, VFC & DC Braking) is set via *P700/P701 Operating mode 1/2*, the setpoint will be interpreted as speed. The following formula applies: H524 = Set speed rpm x 5.
  - If a torque control operating mode (CFC & M-ctrl., Servo & M-ctrl.) is set using *P700/P701 Operating mode 1/2*, the setpoint will be interpreted as torque value. The following formula applies: H524 = Set current in % I_N x 100.
  - Setting P100 to the IPOS setpoint function will have no effect in the following operating modes: CFC & IPOS, CFC & Sync, Servo & IPOS, Servo & Sync, VFC & n-control & IPOS, VFC & n-control & Sync.

P101 Control signal source

This parameter is used to set the source of the control signals for the inverter (CONTROLLER INHIBIT, ENABLE, CW, CCW, etc.). Control via IPOS$^{plus®}$ is taken into account disregarding 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

Only effective, if *P100 Setpoint source* is set to "Frequency input". Is set to determine at which input frequency the system setpoint (torque or speed) of 100% is reached.

P105 Error response to wire breakage AI1

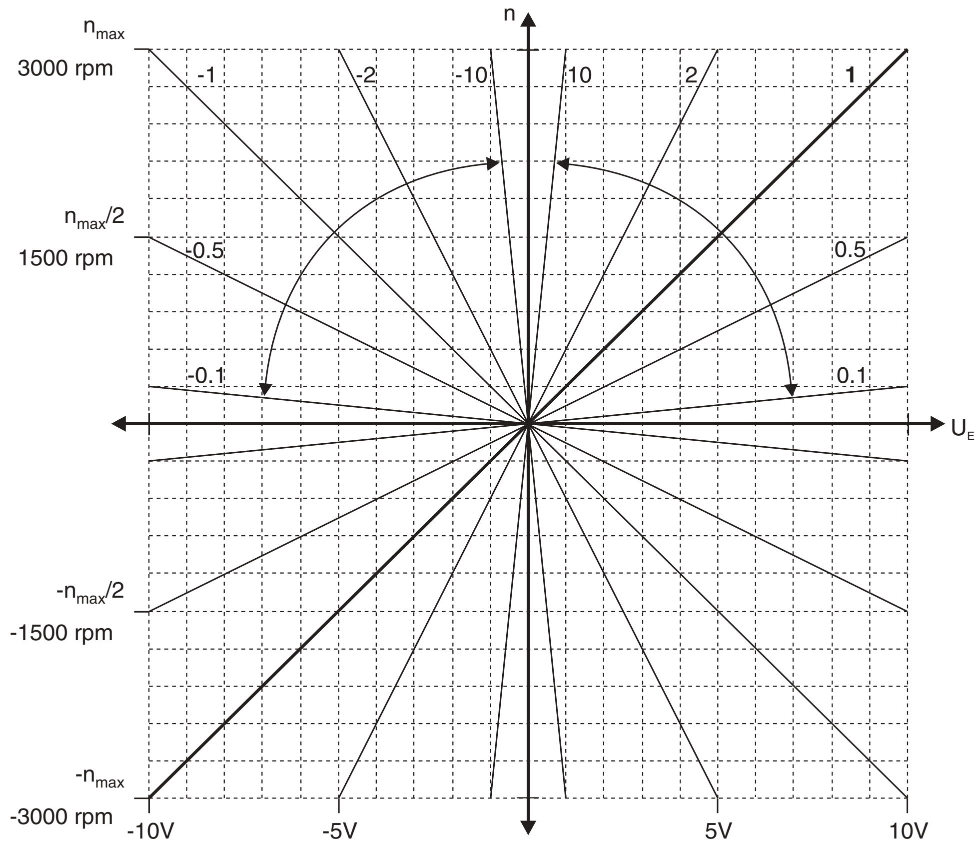
Setting range: No response / Immediate stop/Fault / Rapid stop/Fault / Rapid stop/ Warning

Only effective if *P112 AI1 Operating mode* is set to "N-MAX, 4-20 mA". If analog input AI1 is used as current input 4 – 20 mA, the set response will be triggered in the event of a wire breakage (measured current < 2 mA). If a response is set, error message F113 will be issued.

P11x Analog input AI1

P110 AI1 Scaling Setting range: –10 – 0 – 1 – 10

The slope of the setpoint characteristic curve is defined. Depending on *P112 AI1 Operating mode* with AI1 scaling = 1 and an input voltage V_I of +/–10 V, the setpoint +/–3000 rpm or +/–n_{max} is set.



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With *P100 Setpoint source* = UNIPOL./FIXED SETP., only the first quadrant can be used; negative setpoint selections will result in a setpoint of zero. If a current input is set in *P112 AI1 Operating mode*, P110 AI1 Scaling is ineffective.

P111 AI1 Offset Setting range: –500 – 0 – 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. Setting this parameter causes calibration of the coordinate basic origin. This setting takes effect in all AI1 operating modes.

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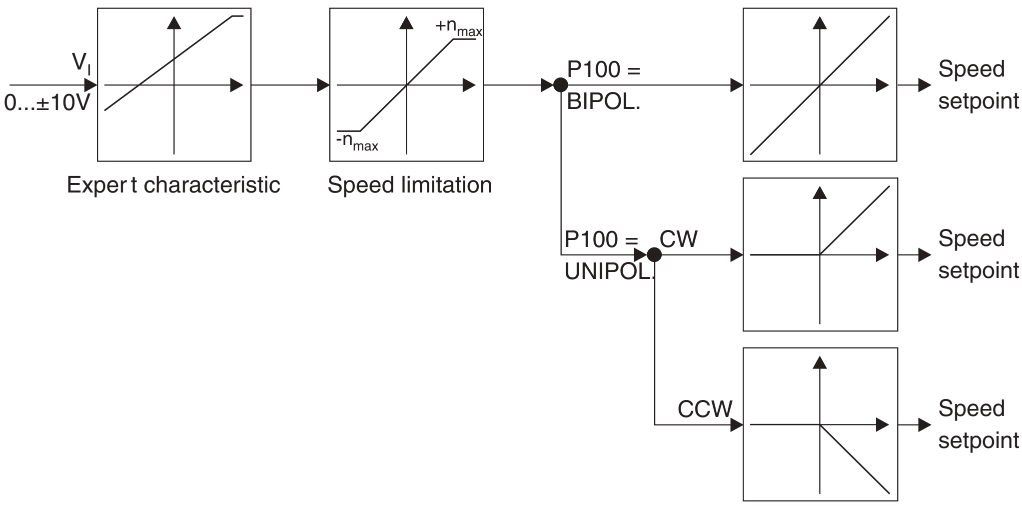
P112 AI1 Operating mode

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

- Ref. N-MAX: Voltage input with reference n_{max} (*P302/P312 Maximum speed 1/2*). The characteristic can be adapted with *P110 AI1 Scaling*. *P113 AI1 voltage offset* and *P114 AI1 speed offset* are ineffective.
- Ref. 3000 rpm: Voltage input with reference 3000 rpm. The characteristic can be adapted with *P110 AI1 Scaling*. *P113 AI1 voltage offset* and *P114 AI1 speed offset* are ineffective.
- V-Off., N-MAX Voltage input with reference n_{max}. The characteristic can be adapted with *P113 AI1 voltage offset*. *P110 AI1 Scaling* and *P114 AI1 speed offset* are ineffective.
- N-Off., N-MAX Voltage input with reference n_{max}. The characteristic can be adapted with *P114 AI1 speed offset*. *P110 AI1 Scaling* and *P113 AI1 voltage offset* are ineffective.
- N-MAX, 0-20mA: Current input 0 – 20 mA = 0 – n_{max}, no setting options (*P110 AI1 Scaling* ineffective). Set the internal load (250 Ω) "S11 = ON".
- N-MAX, 4-20mA: Current input 4 – 20 mA = 0 – n_{max}, no setting options (*P110 AI1 Scaling* ineffective). Set the internal load (250 Ω) "S11 = ON". This setting means that analog input AI1 is monitored for wire breakage (*P105 Error response to wire breakage AI1*).
- Expert characteristic curve: Free choice of reference between setpoint voltage and speed. The characteristic can be adapted with *P110 AI1 Scaling* (reference 3000 rpm), *P113 AI1 voltage offset* and *P114 AI1 speed offset*. The following structural diagram shows how a speed setpoint is created from an expert characteristic curve.



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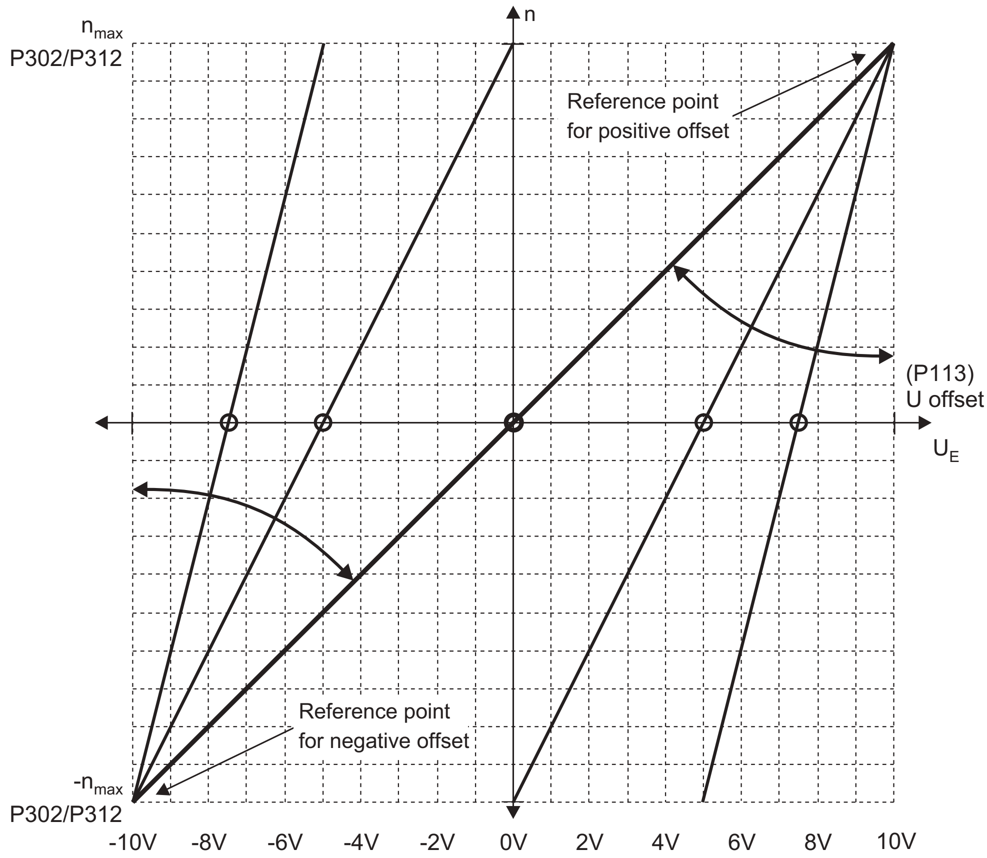
P113 AI1 voltage offset

Setting range: –10 – 0 – 10 V

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



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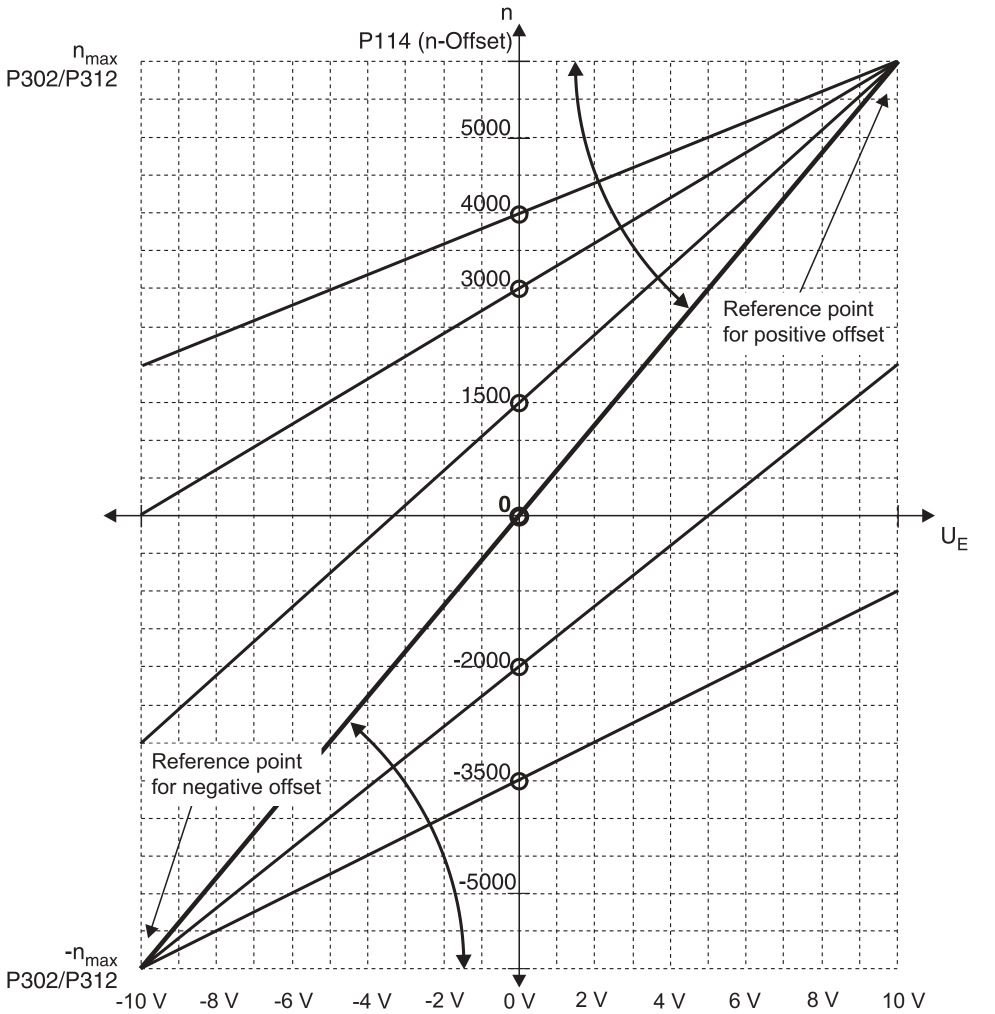
P114 AI1 speed offset

Setting range: –6000 – 0 – 6000 rpm

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



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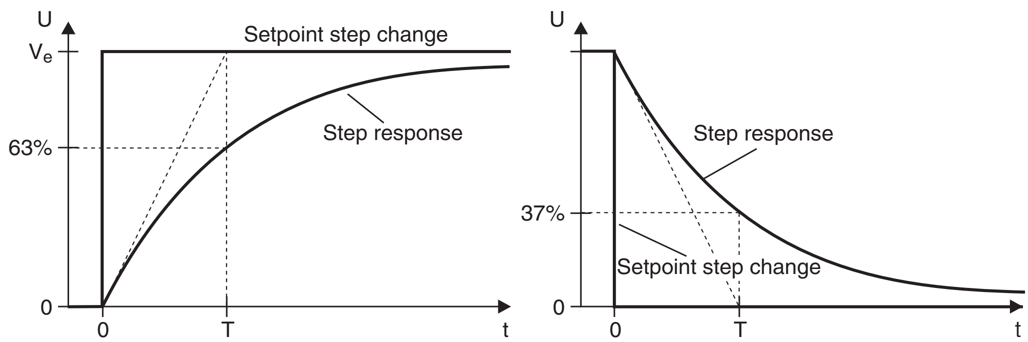
P115 Filter setpoint

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 with torque control.



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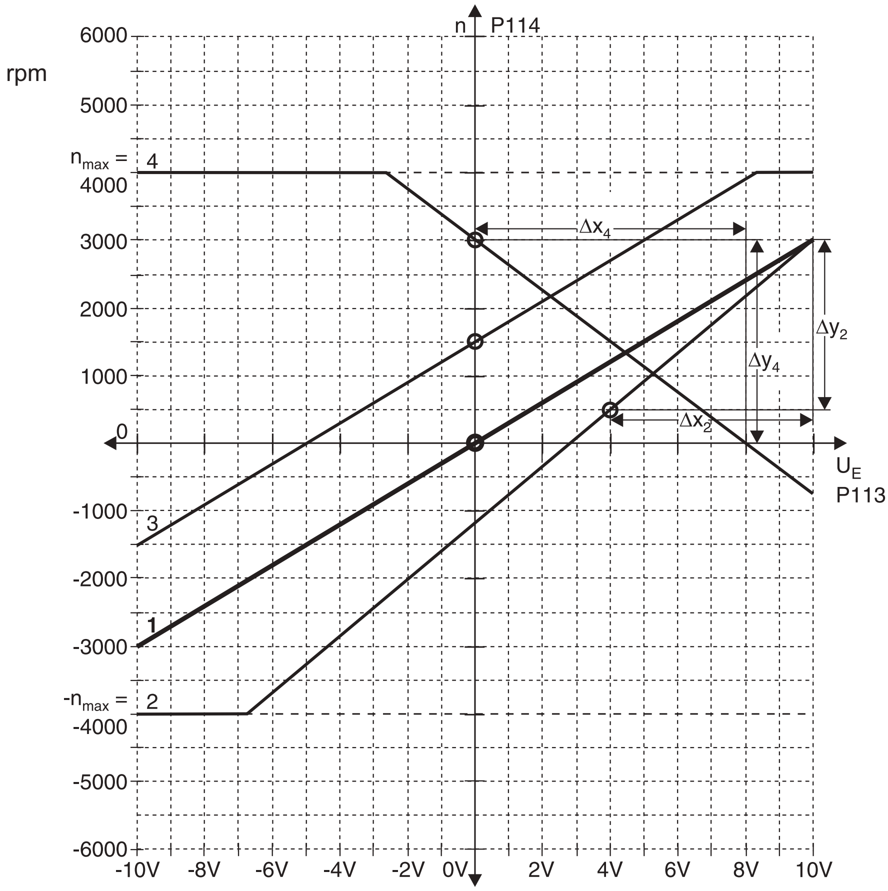
Sample expert characteristics (*P112 AI1 Operating mode* = Expert characteristic):

Free choice of reference between setpoint voltage and speed for the expert characteristic curve. Set parameter *P100 Setpoint source* = BIPOL./FIX.SETPT to make full use of the possibilities of the expert characteristic.

One point in the characteristic curve (in the following figure indicated with a circle) will be determined with P113 AI1 voltage offset and *P113 AI1 voltage offset*; the slope will then be set with *P110 AI1 Scaling*. Reference 3000 rpm always applies to scaling with the expert characteristic.

The speed range is limited by *P302/P312 Maximum speed 1/2*. In the following figure, *P302/P312 Maximum speed 1/2* is set to 4000 rpm. Setting the maximum speed does not change the slope.

The voltage value of the x-axis must be converted to a speed value for calculating the slope triangle Δy/Δx = slope = setting value for *P110 AI1 Scaling*. The following applies: 10 V = 3000 rpm.



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The following slope triangles are calculated for characteristic curves 2 and 4 in the previous figure. This determines the settings for *P110 AI1 Scaling*.

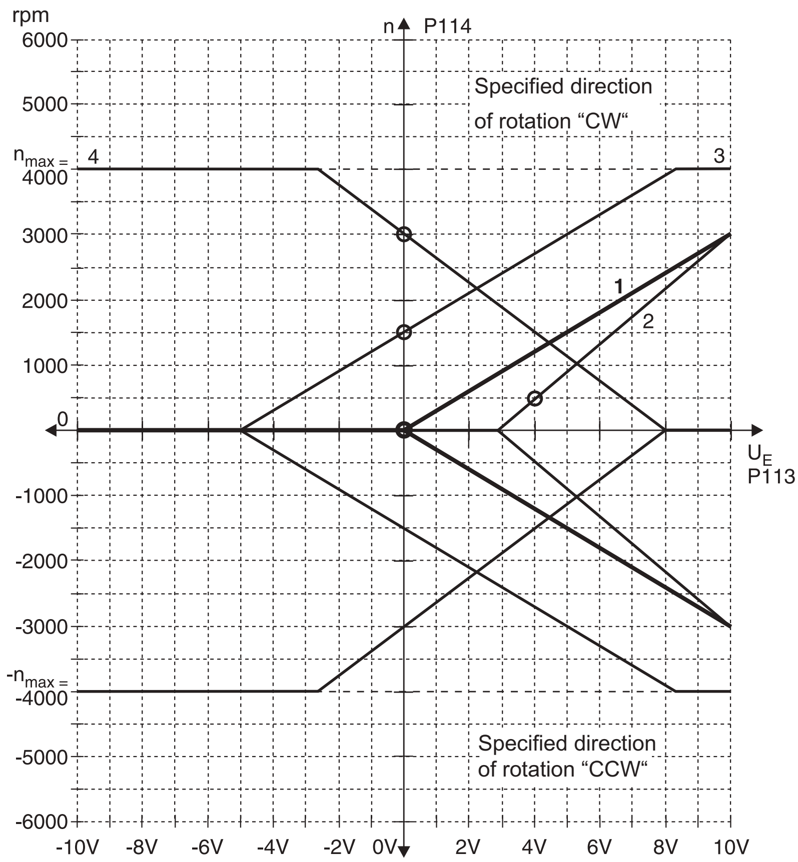
Characteristic curve 2: Δy_2 = 2500 rpm, Δx_2 = 6 V = 1800 rpm, $\Delta y_2/\Delta x_2$ = 2500/1800 = 1.39

Characteristic curve 4: Δy_4 = –3000 rpm, Δx_4 = 8 V = 2400 rpm, $\Delta y_4/\Delta x_4$ = –3000/2400 = –1.25

The shown expert characteristics are created as follows:

Char-acter-istics curve	*P113 AI1 voltage offset* V	*P114 AI1 speed offset* rpm	*P110 AI1 Scaling* (slope)
1	0	0	1
2	4	500	1.39
3	0	1500	1
4	0	3000	–1.25

The expert characteristic can also be used with *P100 Setpoint source* = UNIPOL/FIX.SETPT. The direction of rotation is specified using binary inputs. The expert characteristic curve is reflected on 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. The following figure shows the expert characteristic curve from the previous figure with the setting *P100 Setpoint source* = UNIPOL./FIXED SETPOINT.



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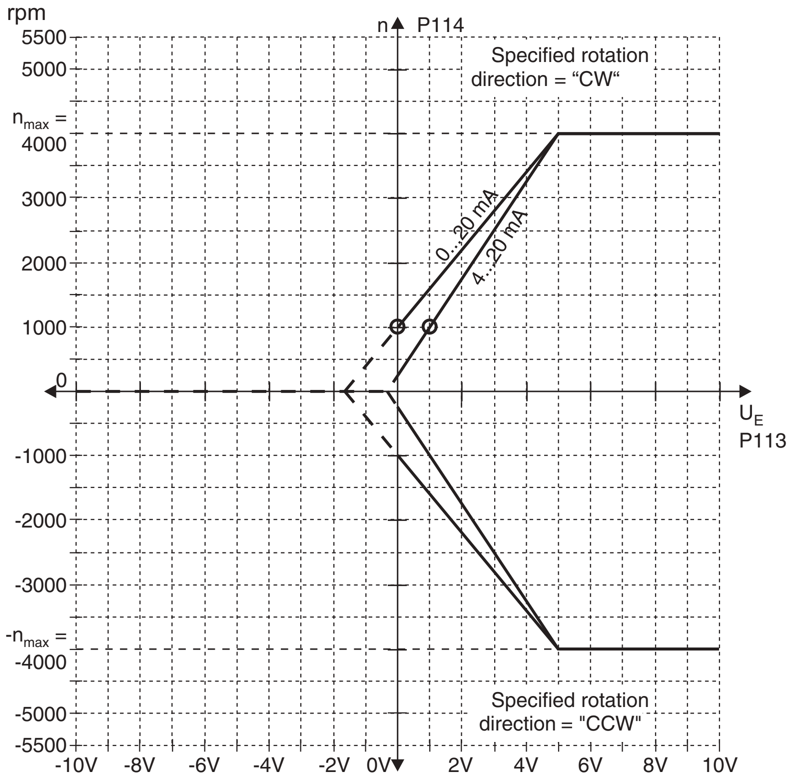
The shown expert characteristics are created as follows:

Char-acter-istics curve	*P113 AI1 voltage offset* V	*P114 AI1 speed offset* rpm	*P110 AI1 Scaling* (slope)
1	0	0	1
2	4	500	1.39

Char-acter-istics curve	*P113 AI1 voltage offset* V	*P114 AI1 speed offset* rpm	*P110 AI1 Scaling* (slope)
3	0	1500	1
4	0	3000	–1.25

Expert characteristic curve with current setpoints:

Voltage signals are required at the AI11/AI12 analog input for the expert characteristic function. Switch S11 (changeover I-signal / U-signal) must be set to ON and the current signal routed to X11:2 AI11 if an impressed current of 0(4) – 20 mA is available as the setpoint. The internal load (250 Ω) converts the 0(4) – 20 mA setpoints into 0 (1) – 5 V voltage signals.



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You have to set the expert characteristic as follows if you want to achieve speeds of 1000 – 4000 rpm, for example, with 0 (4) – 20 mA:

for 0 – 20 mA:	*P110* = 2	*P113* = 0 V	*P114* = 1000 rpm	*P302* (n_{max}) = 4000 rpm
for 4 – 20 mA:	*P110* = 2.5	*P113* = 1 V	*P114* = 1000 rpm	*P302* (n_{max}) = 4000 rpm

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

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 on AI2 is not used.

- 0 – +/- 10 V + setpoint: The setpoint at AI2 is added to setpoint 1 (= AI1) observing the signs. +/–10 V = +/–n_{max} (reference n_{max}).
- 0 – 10 V I-limit: The input serves as external current limitation. 0 – 10 V = 0 – 100% of the internally set current limitation:
  - In V/f and VFC operating modes: *P303/P313 Current limit 1/2*
  - In CFC and SERVO operating modes: *P304 Torque limit*
- ACTUAL VALUE PID CONTROLLER: Feedback of actual value for process controller (→ *P275*).

P13x / P14x Speed ramps 1 / 2

P130 – P133 / P140 – P143 ramp t11 / t21 up/down CW/CCW

1 2

P130 Ramp t11 up CW / *P140 Ramp t21 up CW*

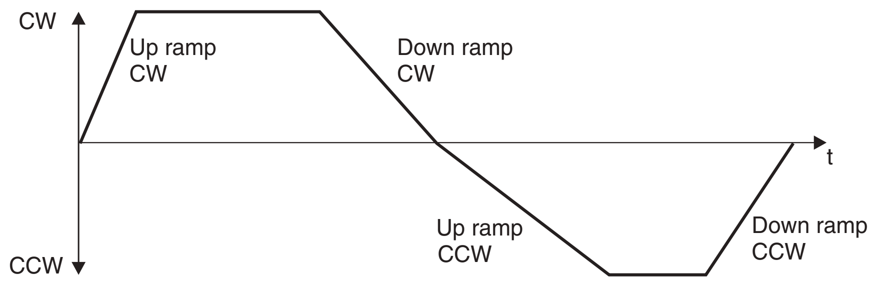
P131 Ramp t11 down CW / *P141 Ramp t21 down CW*

P132 Ramp t11 up CCW / *P142 Ramp t21 up CCW*

P133 Ramp t11 down CCW / *P143 Ramp t21 down CCW*

Setting range: 0 – <u>2</u> – 2000 s

The ramp times refer to a setpoint change of Δn = 3000 rpm. The ramp takes effect when the speed setpoint is changed and the enable is withdrawn via the CW/CCW terminal.



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P134 / P144 Ramp t12 / t22 UP=DOWN

1 2

Setting range: 0 – <u>10</u> – 2000 s

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

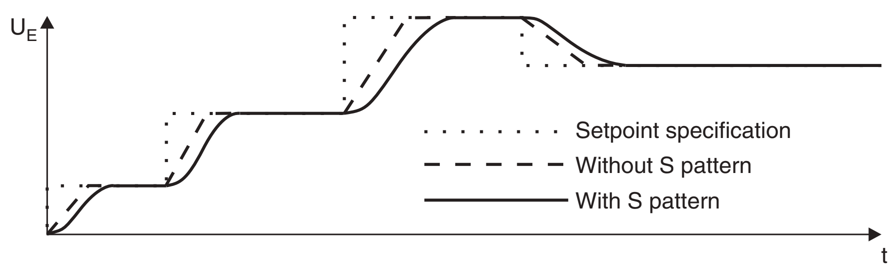
Ramps t12/t22 are activated via a binary input (→ *P600 – P606 Binary input DIØ1 – DIØ7 – P610 – P617 Binary inputs DI1Ø – DI17*), which is set using the "Ramp switchover" function.

P135 / P145 S pattern t12 / t22

1 2

Setting range: <u>0</u> / 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.



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A started S pattern is interrupted by the stop ramp t13 / t23 and a changeover to ramp t11 / t21. Withdrawing the setpoint or a stop using the input terminals causes the started S curve to be completed. This allows the drive to continue to accelerate despite the fact that the setpoint has been withdrawn.

P136 / P146 Stop ramp t13 / t23

1 2

Setting range: 0 – 2 – 20 s

The stop ramp is activated by withdrawing the ENABLE terminal or by an error (*P83x Fault responses*).

P137 / P147 Emergency stop ramp t14 / t24

1 2 AUTO

Setting range: 0 – 2 – 20 s

The emergency stop ramp is activated by an error (*P83x Fault responses*). The system monitors whether the drive reaches zero speed within the set time. After the set time expires, the output stage is inhibited and the brake applied even if zero speed has not yet been reached.

P138 Ramp limit VFC

1 2

Setting range: YES / NO

The ramp limit restricts the smallest possible ramp time to 100 ms in the VFC and V/F operating modes (*P700/P701 Operating mode 1/2*) (reference: Δn = 3000 rpm). Values smaller than 100 ms will be ignored. In this case, the ramp time is 100 ms. The ramp limitation limits the maximum output current to the value set in *P303/P313 Current limit 1/2*. Active stall protection is implemented for the connected motor using the current limiting controller when ramp limitation is activated.

INFORMATION

There is no active stall protection for the connected motor when ramp limitation is deactivated and ramp times of less than 100 ms are used. Parameters *P303/P313 Current limit 1/2* will be ineffective. If a maximum output current of 185% of the rated output current is exceeded (applies to sizes 1 to 6; 225% apply to size 0) for more than 60 ms, the inverter will switch off indicating fault F01 Overcurrent and according to the "Immediate switch-off" fault response.

P139 / P149 Ramp monitoring 1 / 2

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.

The respective ramp time also has to be increased, if the ramp timeout is definitely triggered by a preset ramp that cannot be traveled.

This parameter is an additional monitoring function for speed monitoring. This parameter only applies to the deceleration 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.

P15x Motor potentiometer

The ramp times refer to a setpoint step change of Δn = 3000 rpm.

P150 / P151 Ramp t3 up / down

1 2

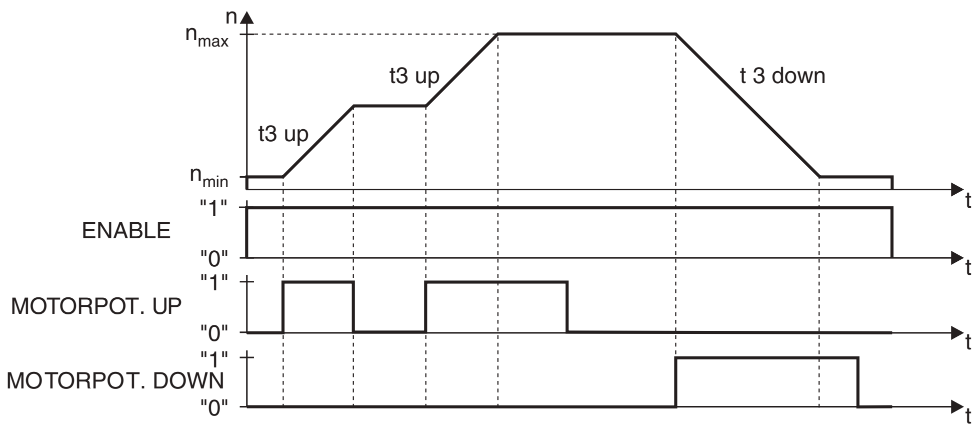
Setting range: 0,2 – 20 – 50 s

The ramp is active when the setpoint source *P100 Setpoint source* is set to MOTOR POT. or MOT.POT.+ANALOG1 and an input terminal programmed to MOTOR POT UP or MOTOR POT DOWN *P6xx Terminal assignment* has a "1" signal.

P152 Save last setpoint

Setting range: ON / OFF

- 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 motor potentiometer setpoint takes effect again after power off and power on.
- OFF: The inverter starts with *P301 / P311 Minimum speed 1/2* following power off/on or after withdrawal of the enable.



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P16x / P17x Fixed setpoints 1 / 2

Setting range: –6000 – +6000 rpm

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 rpm

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

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"

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

8.3.4 P2xx Controller parameters

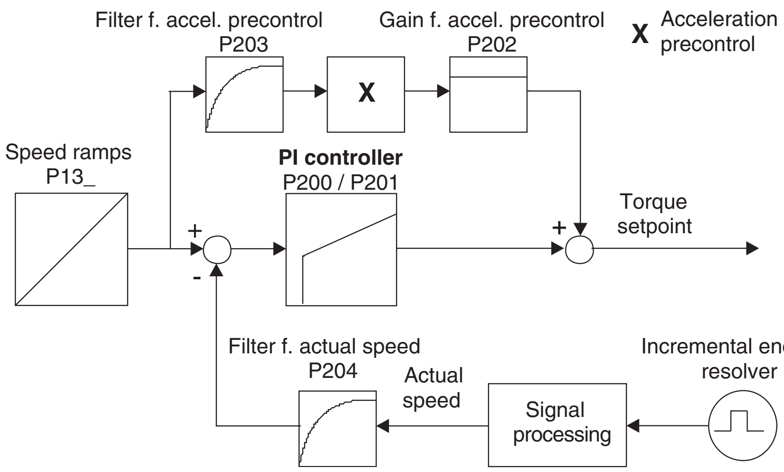
P20x Speed control

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.



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P200 P-gain n-controller

AUTO

Setting range: 0,01 – 2 – 32

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

P201 Time constant n-controller

AUTO

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.

P202 Gain acceleration precontrol

AUTO

Setting range: 0 – 65

Amplification factor of acceleration precontrol. This parameter improves the control response of the speed controller.

P203 Filter acceleration precontrol

AUTO

Setting range: 0 – 100 ms

Filter time constant of acceleration precontrol. This constant influences the control response of the speed controller. The differentiator is programmed.

P204 Filter actual speed value

AUTO

Setting range: 0 – 32 ms

Filter time constant of the actual speed value filter.

P205 Load precontrol CFC

Load precontrol CFC is only effective in CFC and SERVO operating modes.

Setting range: –150 – 0 – 150%

This parameter determines the initial value of the torque setpoint upon enable. The parameter must be set if increased starting torque is required when the drive is enabled. For example, a setting 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.

Recommended setting: Value of the active current (*P005 Active current*) when n = 0 is specified.

P206 Sampling time n-controller

Sampling time n-controller is only effective in CFC and SERVO operating modes.

Setting range: 1 ms / 0.5 ms

Setting the time to 0.5 ms improves speed control for dynamic drives with low moment of inertia.

P207 Load precontrol VFC

Load precontrol VFC is only effective in VFC-n-CTRL operating modes.

Setting range: –150 – OFF – 150%

This parameter determines the initial value of slip control upon enable. A setting greater than 0% causes the slip control to be subject to pre-stressing, which means that the motor develops higher torque when it is enabled. This setting can, for example, prevent the unwanted sagging of hoists when the brake is released. This function should only be used in hoists without counterweight.

Setting values greater than 150% switches off the function (no pre-stressing).

In VFC & HOIST mode and with a value greater than 150% set, pre-stressing of 0.5 x s_N is in effect.

Recommended setting: Active current value (*P005 Active current*) at minimal speed.

P21x Hold controller

Hold control only in parameter set 1.

The hold control function is used to make sure that the drive does not drift during standstill. It can only be activated for 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. If the drive reaches speed zero, it is held in the position that is valid at this point. The gain factor setting is supported in the **startup function** of the speed controller in MOVITOOLS® MotionStudio\SHELL or in the DBG60B keypad. The 7-segment display shows status "7" when hold control is active.

P210 P gain hold controller

AUTO

Setting range: 0.1 – 0.5 – 32

The parameter corresponds to the proportional gain of a position controller and is only effective in conjunction with the activated "Hold control" function.

P22x Synchronous operation control

Synchronous operation control only in parameter set 1 and with the DRS11B option.

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

P220 P-gain DRS

Setting range: 1 – 10 – 200

Gain of the synchronous operation controller in the slave drive. This determines the control response of the slave drive depending on the angle differentials in relation to the master drive.

P221 / P222 Master gear ratio factor / slave gear ratio factor

Setting range: 1 – 3 999 999 999

These settings are only required with the slave inverter. These parameters are used to set the position measurement ratio between master and slave. The ratio is entered as the quotient of master to slave drive to include non-integer ratios.

Note that position measurement of the master and slave drives can only occur using the motor encoders if there is **positive power transmission (without slip)**. Position measurement has to take place using an **additional encoder (external encoder)** in all applications in which power between motor shaft and machine is transmitted **over non-positive connections** and therefore slip is to be expected. The encoder must be installed on the moving machine component with a positive connection.

P223 Mode selection

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 responds 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 Slave counter*
  - 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 Slave counter* 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 Slave counter* 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 Slave counter* 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 Slave counter*.
  - 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 X40:2, X40:3 or X40:4 on DRS11B activates an angular offset. Each angular offset is stored in parameters *P225 / P226 / P227 Offset 1/2/3*.
  - 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 X40:2, X40:3 or X40:4 on DRS11B activates an angular offset. Each angular offset is stored in parameters *P225 / P226 / P227 Offset 1/2/3*.
  - 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 Slave counter*
  - 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 Slave counter*.

P224 Slave counter

Setting range: –99 999 999 – <u>10</u> – 99 999 999 increments

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 – <u>10</u> – 32 767 increments (only effective in mode 6 or 7)

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

P228 Filter precontrol DRS

Setting range: <u>0</u> – 100 ms

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

P23x Synchronous encoder with synchronous encoder

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

For a detailed description, refer to the "MDX61B - Synchronous Operation Card 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.

P230 Distance encoder

Setting range: <u>OFF</u> / EQUAL-RANKING / CHAIN

- <u>OFF</u>: Synchronous operation control with the signals at X15: "Motor encoder". *P231 / P232 Factor slave encoder / factor slave synchronous encoder* are ineffective.
- EQUAL-RANKING: Forwarding of X42 signals: "Master encoder" at X43: "Incremental encoder output". Evaluation of *P231 / P232 Factor slave encoder / factor slave synchronous encoder*.
- CHAIN: Forwarding of X41 signals: "Distance encoder input" at X43: "Incremental encoder output". Evaluation of *P231 / P232 Factor slave encoder / factor slave synchronous encoder*.

P231 / P232 Factor slave encoder / factor slave synchronous encoder

Setting range: <u>1</u> .. 1000

In most cases there is a mechanical gear ratio between both encoders. This gear ratio has to be set with the parameters.

P233 Synchronous encoder resolution

Setting range: 128 / 256 / 512 / <u>1024</u> / 2048

Setting the resolution of the connected synchronous encoder.

P234 Master encoder resolution

Setting range: 128 / 256 / 512 / <u>1024</u> / 2048

Setting the resolution of the connected master encoder.

P24x Synchronous operation with catch up

Synchr operation with catch up only in parameter set 1 and with the DRS11B option.

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

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. In order for this catch up procedure to be performed in a controlled way, it is possible to set parameters for both the synchronization speed and the synchronization ramp.

P240 Synchronous speed

Setting range: 0 – <u>1500</u> – 6000 rpm

This parameter indicates the duration of the synchronization procedure.

P241 Synchronization ramp

Setting range: 0 – <u>2</u> – 50 s

Value of the acceleration ramp for synchronizing the slave with the master. A value of 0 means maximum possible acceleration.

P26x Process controller parameters

P260 Operating mode

Setting range: <u>Controller off</u> / Control / Step response

- <u>Controller off</u>: The PID controller is deactivated.
- Control: The PID controller is active and determines the required motor speed using the control deviation and its parameters.
- Step response: A step can be specified via the setpoint (*P271 Setpoint*). The filtered and scaled actual value can be included for purposes of evaluation.
- *P260* and the IPOS variable H543 are identical.

P261 Cycle time

Setting range: 1 / <u>5</u> / 10 ms

This parameter sets the cycle time of the PID controller.

P262 Interruption

Setting range: <u>No response</u> / Move closer to setpoint

This parameter specifies how the PID controller responds to an interruption (controller inhibit).

- <u>No response:</u> The PID controller is not affected and continues to operate as usual.
- 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.

P263 Factor K_P

Setting range: 0 – <u>1</u> – 32,767

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.

P264 Integrative time T_N

Setting range: <u>0</u> – 65535 ms

This parameter is used to set the integrative time (time constant) of the integrating part of the PID controller:

- 1 ms ≤ T_N ≤ 65535 ms
- T_N = 0 → no I-component

P265 Derivative time T_V

Setting range: 0 – 30 ms

This parameter is used to set the derivative time (time constant) of the differential part of the PID controller:

- 1 ms ≤ T_V ≤ 30 ms
- T_V = 0 → no D-component

P266 Precontrol

Setting range: –32767 – 0 – 32767

The precontrol value is added to the result of the PID controller. P266 and the IPOS variable H545 are identical.

P27x Process controller input values

P270 Setpoint source

Setting range: Parameters / IPOS variable / Analog 1 / Analog 2

This parameter is used to set the source from which the setpoint should be read.

P271 Setpoint

Setting range: –32767 – 0 – 32767

If *P270 Setpoint source* is set to "Parameter", the value of the parameter *P271* is used as the setpoint. *P271* and the IPOS variable H546 are identical.

P272 IPOS setpoint address

Setting range: 0 – 1023

If *P270 Setpoint source* is set to "IPOS variable", the address of the variable to be used is stored in *P271 Setpoint*. *P272* and the IPOS variable H547 are identical.

P273 Time constant

Setting range: 0 – 0.01 – 2000 s

This parameter is used to set the ramp for the setpoint ramp generator (reference 15000 units).

- Time constant $T_{setpoint}$ = 0 → ramp is deactivated.

P274 Scaling setpoint

Setting range: –32,767 – 1 – 32,767

Factor for scaling the setpoint. *P274* and the IPOS variable H548 are identical.

P275 Actual value source

Setting range: Analog 1 / Analog 2 / IPOS Variable

This parameter is used to set the source from which the actual value should be read.

P276 IPOS actual value address

Setting range: 0 – 1023

If *P275 Actual value source* 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.

P277 Scaling actual value

Setting range: –32,767 – 1 – 32,767

Scaling factor of the filtered actual value. *P277* and the IPOS variable H550 are identical.

P278 Offset actual value

Setting range: –32767 – 0 – 32767

This parameter is used to set an integer, permanent offset of the actual value. *P278* and the IPOS variable H552 are identical.

P279 Time constant actual value

Setting range: 0 – 1 – 500 ms

This parameter is used to set the time constant of the actual value filter. When the parameter is set to "0", the filter is deactivated.

P28x Process controller limits

The output value of the process controller is stored in the IPOS variable H524. To use the output value of the process controller as setpoint for MOVIDRIVE® B, *P100 Setpoint source* must be set to "IPOS setpoint".

P280 Minimum offset + actual value

Setting range: –32767 – 0 – 32767

Minimum value for the offset. *P280* and the IPOS variable H553 are identical.

P281 Maximum offset + actual value

Setting range: –32767 – 10000 – 32767

Maximum value for offset. *P281* and the IPOS variable H554 are identical.

P282 PID controller minimum output

Setting range: –32767 – –1000 – 32767

Minimum output value of the P, I and D components. *P282* and the IPOS variable H555 are identical. For PI and PID controllers, you have to enter a negative value to enable downward integration.

P283 PID controller maximum output

Setting range: –32767 – 10000 – 32767

Maximum output value of the P, I and D components. *P283* and the IPOS variable H556 are identical.

P284 Process controller minimum output

Setting range: –32767 – 0 – 32767

Minimum output value of the process controller (PID controller + *P266 Precontrol*). *P284* and the IPOS variable H557 are identical.

P285 Process controller maximum output

Setting range: –32767 – 7500 – 32767

Maximum output value of the process controller (PID controller + *P266 Precontrol*). *P285* and the IPOS variable H558 are identical.

8.3.5 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

1 2 AUTO

Setting range: 0 – 150 rpm

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

Only effective in the VFC and V/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 lowest speed at which the motor power is switched off or the post-magnetization triggered and, if applicable, the brake applied.

P301 / P311 Minimum speed 1/2

Setting range: 0 – <u>15</u> – 6100 rpm

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

Important:

- If the hoist function is active, the slowest speed is 15 rpm 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 – <u>1500</u> – 6100 rpm

The value set here cannot be exceeded by a setpoint selection. If $n_{min} > n_{max}$ is set, then n_{max} applies. The maximum speed depends on the set operating mode (see the "Operating modes" chapter).

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 superordinate to the external current limitation (*P120 AI2 Operating mode (optional)* = 0 – 10 V I limit). Consequently, the entry determines the 100% value within which the external current limitation can take effect. In the field weakening range, the current limit is reduced automatically above the frequency of 1.15 x f_{trans} (only applies to V/f and VFC operating modes without speed control). 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:

Current limit = (1.15 × f_{base} / f_{act}) × setting value of *P303*/*P313*

f_{act} is the current speed frequency.

P304 Torque limit

Setting range: <u>0</u> – 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).

INFORMATION

In the CFC and SERVO operating modes, the *P303/P313 Current limit 1/2* must always be set ≥ *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/P332 IxR adjustment 1/2* automatically at each enable and stores 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 premagnetization time. The motor is **not** calibrated if:

- *P320/P330 Automatic adjustment* 1/2 = OFF
- *P700/P701 Operating mode 1/2* = VFC & GROUP or VFC & FLYING START
- *P323/P333 Premagnetization time 1/2* has been reduced by more than 30 ms in relation to the proposed value.
- Operating mode VFC-n-CONTROL is selected and *P730 / P733 Brake function 1 / 2* is set to OFF.

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

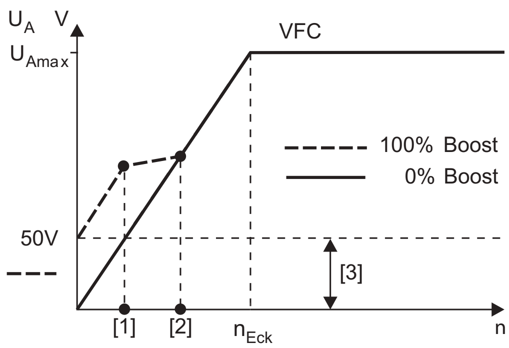
- ON: Automatic adjustment.
- OFF: No automatic adjustment.

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 the 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%**.



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[1] n_{slip}
[2] $2 \times n_{slip}$
[3] Boost setting range

P322/P332 IxR adjustment 1/2

AUTO

Setting range: 0 – 100%

The I×R 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 that create the torque. An automatic setting takes place with *P320/P330 Automatic adjustment 1/2* = ON. 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 Premagnetization time 1/2

1 2 AUTO

Setting range: 0 – 2 s

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

Premagnetization 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 / P733 Brake function 1 / 2*
- *P710/P711 Standstill current 1/2*

P324/P334 Slip compensation 1/2

1 2 AUTO

Setting range: 0 – 500 rpm

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

Only effective in VFC 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

1 2

Setting range: <u>OFF</u> / ON ASYNCHRONOUS / ON SERVO

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

<u>OFF</u>: 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® MotionStudio/DBG60B) and when the operating conditions specified for the motor are observed.

INFORMATION

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.

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

Parameter	Signal and display function
P006 / P007 Motor utilization 1 / 2	Display of the motor utilization for parameter set 1/2.
P832 Response to MOTOR OVERLOAD	Error response of the inverter when reaching *P006 / P007 Motor utilization 1 / 2* of 110%. Factory setting: Emergency stop/malfunction.

Set the following parameters:

Parameter	Setting/meaning
P341/P343 Type of cooling 1/2	Self-ventilation or forced cooling

Parameter	Setting/meaning
Binary output can be programmed to: /Motor utilization 1 /Motor utilization 2	Prewarning if *P006 / P007 Motor utilization 1 / 2* 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 must **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 error 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®plus or from a PLC.
P007 Motor utilization 2	In setting P340 = ON SERVO without function
P832 Response to 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

INFORMATION

Activating the function does not trigger monitoring or protection of the connected motor. Protection must be guaranteed via TF/TH.

Setting a binary output to "Motor utilization_1" or "Motor utilization_2" also has no effect when *P340* is set to ON SERVO.

- SEW motor **with** KTY temperature sensor: Motor utilization is calculated using a motor model stored in MOVIDRIVE® (*P006 Motor utilization 1*, *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 to motor overload. In this case, the settings in *P341* and *P344* are not relevant.

P341/P343 Type of cooling 1/2

1 2

Setting range: FAN COOLED / FORCED COOLING

You need to know the cooling type of the motor to calculate the thermal load on the motor as exactly as possible, as described in *P340/P342 Motor protection 1/2*.

P344 Motor protection interval

1 2

Setting range: 0,1 – 4 – 20 s

P344 is not relevant for asynchronous motors. This parameter corresponds to the cycle time of the travel and is used for the function *P006 / P007 Motor utilization 1 / 2*. The setting range is 100 ms – 20000 ms.

You should always set the time for forward and backward movement.

P345 / 346 I_N / U_L monitoring 1/2

1 2 AUTO

Setting range: 0.1 – 500 A

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

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

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

P35x Motor direction 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 implemented when the motor is connected according to the SEW designation.

P350/P351 Direction of rotation reversal 1/2

1 2 AUTO

Setting range: ON / OFF

Direction of rotation reversal	Positive setpoint (positive direction of travel)	Negative setpoint (negative direction of travel)
OFF	Motor turns clockwise	Motor turns counterclockwise
ON	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. When using this parameter, it is important to carefully check that the limit switch is connected properly and the reference point and travel positions are defined correctly.

INFORMATION

Altering the "Direction of rotation reversal" parameter after the system has been referenced causes the system to lose its reference point for the absolute position. The result may be undesirable movement of the axis.

- OFF: The SEW definition applies.

P36x Startup

Startup (only available in the DBG60B keypad).

P360 Startup

Setting range: YES / NO

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

INFORMATION

With *P360*, MOVIDRIVE® B can only be started up in VFC operating modes. Startup in CFC and SERVO operating modes must be performed using MOVITOOLS® MotionStudio/SHELL.

- NO: The startup function is not started.

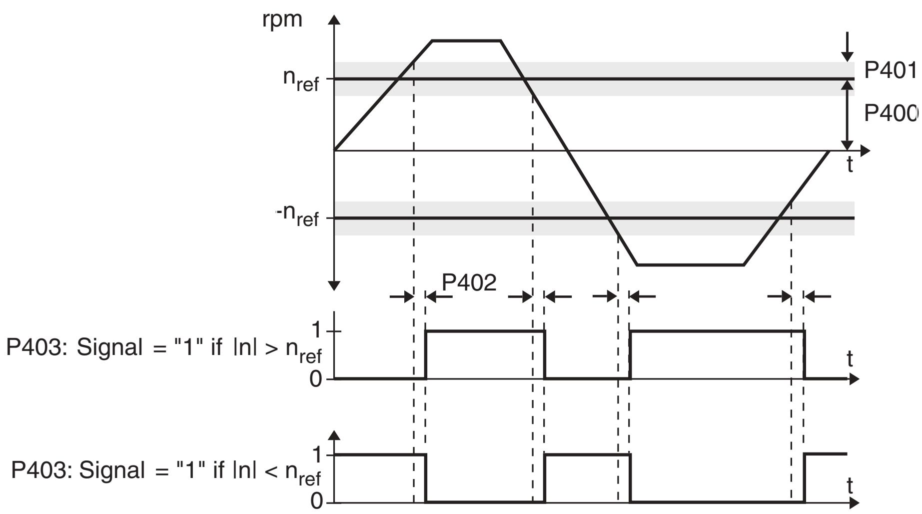
8.3.6 P4xx Reference signals

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

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

P40x Speed reference signal

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



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P400 Speed reference value

Setting range: 0 – 1500 – 6000 rpm

P401 Hysteresis

Setting range: 0 – 100 – 500 rpm

P402 Delay time

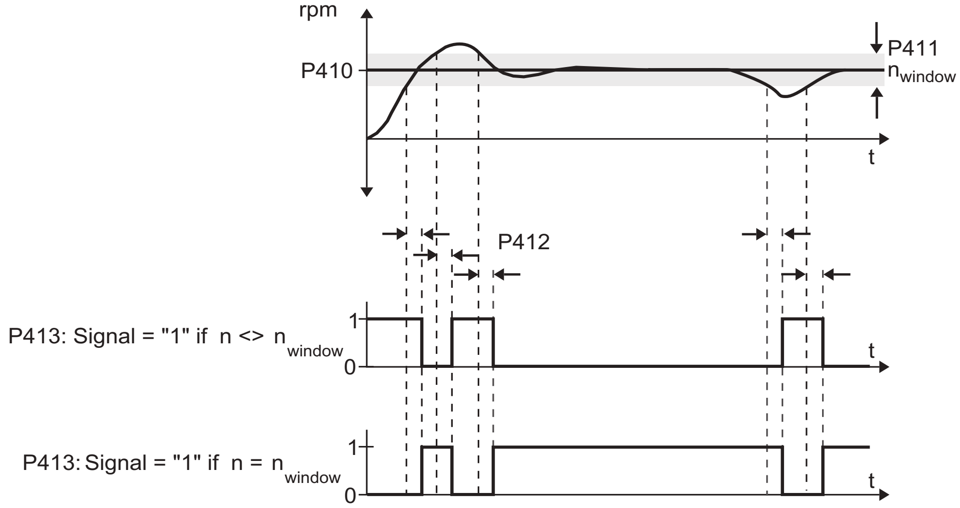
Setting range: 0 – 1 – 9 s

P403 Signal = "1" when:

$n < n_{ref}$ / $n > n_{ref}$

P41x Speed window signal

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



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P410 Window center

Setting range: 0 – <u>1500</u> – 6000 rpm

P411 Range width

Setting range: <u>0</u> – 6000 rpm

P412 Delay time

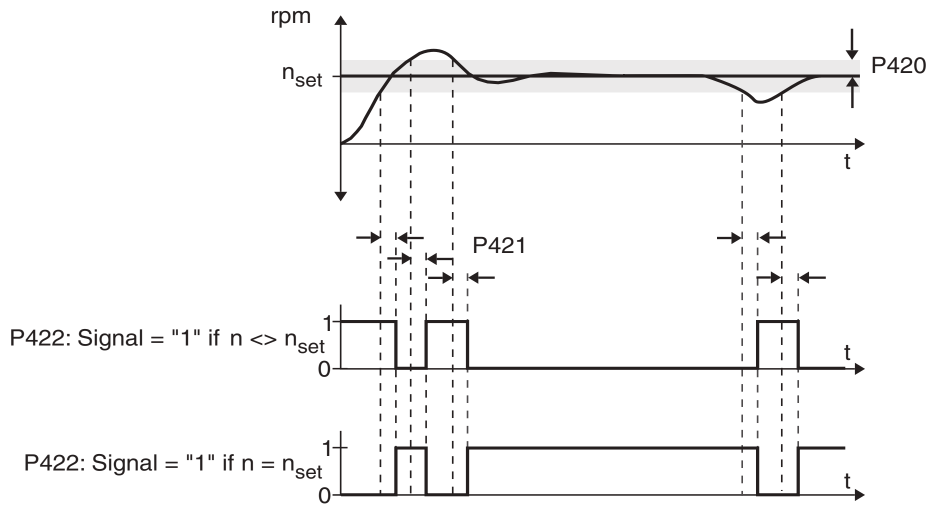
Setting range: 0 – <u>1</u> – 9 s

P413 Signal = “1“ if:

Setting range: <u>WITHIN</u> / OUTSIDE

P42x Speed setpoint/actual value comparison

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



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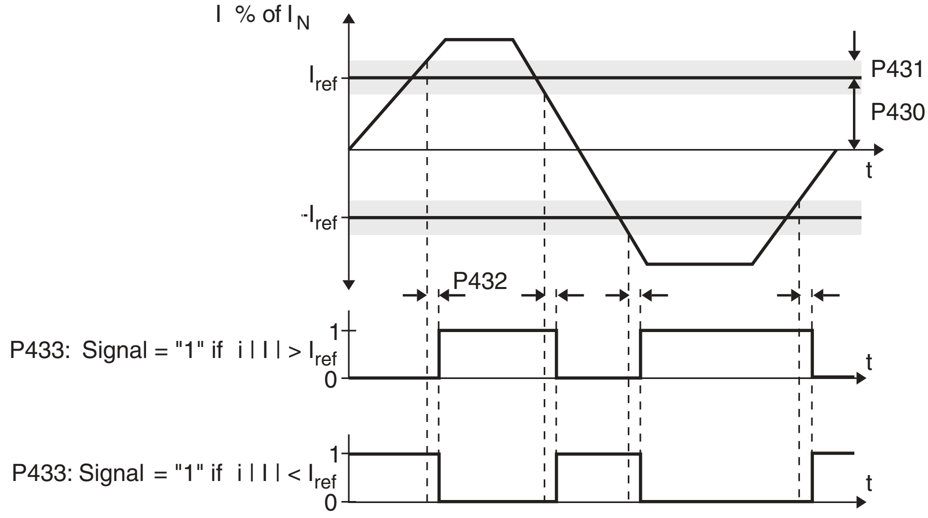
P420 Hysteresis

Setting range: 1 – <u>100</u> – 300 rpm

P421 Delay time Setting range: 0 – 1 – 9 s

P422 Signal = "1" if: Setting range: n = n_{setpt} / n <> n_{setpt}

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



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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" if: I < I_{ref} / I > I_{ref}

P44x Imax signal Signals when the inverter has reached the current limit.

P440 Hysteresis Setting range: 5 – 50% I_N

P441 Delay time Setting range: 0 – 1 – 9 s

P442 Signal = "1" if: I < I_{max} / I = I_{max}

8.3.7 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 control functions can be set with *P83x Fault responses*.

P50x Speed monitoring

P500/P502 Speed monitoring 1/2

Setting range: OFF / MOTOR MODE / REGENERAT. MODE / MOT.& REGEN.MODE

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

P501/P503 Delay time 1/2

Setting range: 0 – 1 – 10 s

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

P504 Encoder monitoring motor

Setting range: YES / NO

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

INFORMATION

Encoder monitoring is not a safety function!

If you use a Hiperface® encoder, encoder monitoring is always active (also for the track) irrespective of the setting in *P504*.

P505 Synchronous encoder monitoring

Setting range: YES / NO

- NO: Wire breakage between frequency inverter and synchronous encoder is not recognized directly. In case of a defective connection, error F08 speed monitoring will be issued in enabled state unless it was deactivated.
- YES: A wire breakge 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 if a fault occurs. This fault will also be generated in inhibited state.

P51x Synchronous 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 Card DRS11B" manual.

P510 Positioning tolerance slave

Setting range: 10 – <u>25</u> – 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 standstill and is located within the positioning window

P511 Lag error prewarning

Setting range: <u>50</u> – 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.

P512 Lag error limit

Setting range: 100 – <u>4000</u> – 99 999 999 inc

Error message F42 "Lag error" is issued if the angular misalignment exceeds the value set here. The error message is issued regardless of whether the slave drive is operating in free running or synchronous running mode.

P513 Delay time lag error message

Setting range: 0 – <u>1</u> – 99 s

For an adjustable hold time, the messages "Prewarn. lag error" and "Lag error limit" as error messages or as signal at a binary output can be suppressed during transition from free-running to synchronous operation.

P514 Counter LED display

Setting range: 10 – <u>100</u> – 32 768 inc

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.

P515 Delay in-position signal

Setting range: 5 – <u>10</u> – 2000 ms

The DRS SLAVE IN POS binary output signal is not issued unless the master and slave are located within the *P510 Positioning tolerance slave* for the time set here.

P516 X41 Encoder monitoring

Setting range: <u>NO</u> / YES

- <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 was deactivated.
- YES: 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 error will also be generated in inhibited state.

Encoder monitoring is not a safety function!

P517 X41 Pulse count monitoring

Setting range: <u>NO</u> / YES

The number of pulses of the encoder connected at X41 is checked using the resolution set in *P233 Synchronous encoder resolution* through evaluation of the C track. If increments are lost, the fault message F48 "Hardware DRS" is generated.

- <u>NO</u>: Pulse count monitoring is not active.
- YES: Pulse count monitoring is active.

P518 X42 Encoder monitoring

Setting range: NO / YES

- NO: 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.
- YES: 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 error will also be generated in inhibited state.

Encoder monitoring is not a safety function!

P519 X42 Pulse count monitoring

Setting range: NO / YES

The number of pulses of the encoder connected at X42 is checked using the resolution set in *P234 Master encoder resolution* through evaluation of the C track. If increments are lost, the fault message F48 "Hardware DRS" is generated.

- NO: Pulse count monitoring is not active.
- YES: Pulse count monitoring is active.

P52x Mains OFF monitoring

The setting of *P520 Mains OFF response time* / *P521 Mains OFF response* is important when programming a binary input to “MAINS ON” and using MOVIDRIVE® line regeneration (see MOVIDRIVE® line regeneration MDR manual).

P520 Mains OFF response time

Setting range: 0 – 5 s

If a binary input is programmed to "Mains off", the response set in *P521 Mains OFF response* will be triggered after this time.

P521 Mains OFF response

Setting range: CONTROL.INHIBIT EMERGENCY STOP

If the binary input is programmed to "Power on", the response set here will be triggered when the binary input receives a "0" signal. The 7-segment display of MOVIDRIVE® B indicates "0" (unit status 24 V operation).

P522 Phase failure monitoring

Setting range: 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 supply system disconnection. Since the line input phases cannot be monitored directly, monitoring has to be done indirectly via the DC link ripple, 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 detecting a phase failure:

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

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

P53x Motor temperature protection

P530 Sensor type 1

AUTO

Setting range: <u>No sensor</u> / TF/TH / KTY / TF/TH DEU / KTY DEU

(KTY only for SEW synchronous motors)

Selection of the sensor used for motor protection in parameter set 1. When using the DEU multi-encoder card, select "TF/TH DEU" or "KTY DEU".

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

P531 Sensor type 2

AUTO

Setting range: <u>No sensor</u> / TF-TH / KTY (KTY not implemented)

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

INFORMATION

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

P54x Gear unit/motor monitoring

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
NO RESPONSE	Neither an error is displayed nor an error response is performed. The signaled error is ignored.
DISPLAY ERROR	The error is displayed (in 7-segment display and SHELL), the fault output is set (if programmed). The unit performs no other error responses. The error can be reset (terminal, RS485, fieldbus, auto-reset).
IMMEDIATE STOP/FAULT	The inverter switches off immediately and an error is signaled. The output stage is inhibited and the brake is applied. The ready signal is revoked and the error output is set, if programmed. A restart is only possible after the error has been reset during which the inverter is reinitialized.
EMERGENCY STOP/ FAULT	The drive is braked with the set emergency stop ramp t14/t24. Once the stop speed is reached, the output stage is inhibited and the brake is applied. The error is signaled immediately. The ready signal is revoked and the error output is set, if programmed. A restart is only possible after the error has been reset during which the inverter is reinitialized.
RAPID STOP/ FAULT	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 error is signaled immediately. The ready signal is revoked and the error output is set, if programmed. A restart is only possible after the error has been reset during which the inverter is reinitialized.
IMM. STOP/ WARN.	The inverter switches off immediately and an error is signaled. The output stage is inhibited and the brake is applied. The error is signaled via the terminal, if programmed. The ready signal is not revoked. The drive restarts without unit re-initialization if the error is rectified by an internal procedure or by an error reset.
EMERGENCY STOP/ WARNG	The drive is braked with the set emergency stop ramp t14/t24. Once the stop speed is reached, the output stage is inhibited and the brake applied. The error is signaled immediately. The error is signaled via the terminal, if programmed. The ready signal is not revoked. The drive restarts without unit re-initialization if the error is rectified by an internal procedure or by an error reset.
RAPID STOP/ WARN.	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 error is signaled immediately. The error is signaled via the terminal, if programmed. The ready signal is not revoked. The drive restarts without unit re-initialization if the error is rectified by an internal procedure or by an error reset.

P540 Drive vibration / response / warning

Factory setting: Display fault

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

P541 Drive vibration response / fault

Factory setting: Rapid stop warning

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

P542 Response to oil aging / warning

Factory setting: Display fault

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

P543 Response to oil aging / fault

Factory setting: Display fault

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

P544 Oil aging / overtemperature

Factory setting: Display fault

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

P545 Oil aging / ready signal

Factory setting: Display fault

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

P549 Response to brake wear

Factory setting: Display fault

If the brake wear sensor trips, the inverter will respond with the set response.

P55x Safety monitor DCS

The parameter group *P55x DCS safety monitor* includes display and setting values that are specific to the DCS21B/31B option. For more detailed information, refer to the "MOVIDRIVE® MDX 61B Safety Module DCS21B/31B Option" manual.

P550 DCS safety monitor status

Display value that cannot be changed.

Parameter *P550* shows the current status of the DCS21B/31B option.

- RUN: Normal operation.
- STOP: Operation of option DCS21B/31B was stopped via programming interface.
- ALARM: The DCS21B/31B option has issued an alarm.
- ERROR: Option DCS21B/31B has signaled an error.

  You have the following options to read the corresponding error or alarm message from the error memory of option DCS21B/31B:

  – Via the service interface X87
  – With the DBG60B keypad
  – With the MOVISAFE® CONFIG/ASSIST parameter setting software, if *P555 Error response DCS / P556 Alarm response DCS* is set to "NO RESPONSE".

P551 Binary inputs DCS DI1 – DI8

Display value that cannot be changed.

Parameter *P551* shows the present status of the binary inputs of option DCS21B/31B in the order DI1 – DI8.

P552 Binary outputs DCS DO0_P – DO2_M

Display value that cannot be changed.

Parameter *P552* shows the present status of the binary outputs of option DCS21B/31B in the following order:

- DO0_P
- DO0_M
- DO1_P
- DO1_M
- DO2_P
- DO2_M

P553 DCS series number

Display value that cannot be changed.

Parameter *P553* shows the serial number of option DCS21B/31B. The displayed serial number must be identical with the serial number on the nameplate of the DCS21B/31B option, which is attached to MOVIDRIVE® MDX61B. You have to enter the serial number in the validation report.

P554 CRC DCS

Display value that cannot be changed.

The parameter CRC DCS shows the CRC (cyclic redundancy check) of the program stored on the DCS21B/31B option. You have to enter the CRC in the validation report.

P555 Error response DCS / P556 Alarm response DCS

Setting range *P555*: No response / Display error / <u>Immediate stop / Fault</u> / Emergency stop/Fault / Rapid stop/Fault / Immediate stop/Warning / Emergency stop/Warning / Rapid stop/Warning

Setting range *P556*: No response / Display error / Rapid stop / Fault / Emergency stop/ Fault / Rapid stop/Fault / Immediate stop/Warning / Emergency stop/Warning / <u>Rapid stop/Warning</u>

If option DCS21B/31B signals an error (*P555*) or an alarm (*P556*), the inverter performs the set response (No response / Display error). As the safety-oriented switching off is performed by the DCS21B/31B option or a higher-level safety controller, SEW-EURODRIVE recommends to set *P555* and *P556* to "Display error".

P557 DCS actual position source

Setting range: <u>Motor encoder (X15)</u> / Ext. encoder (X14) absolute encoder

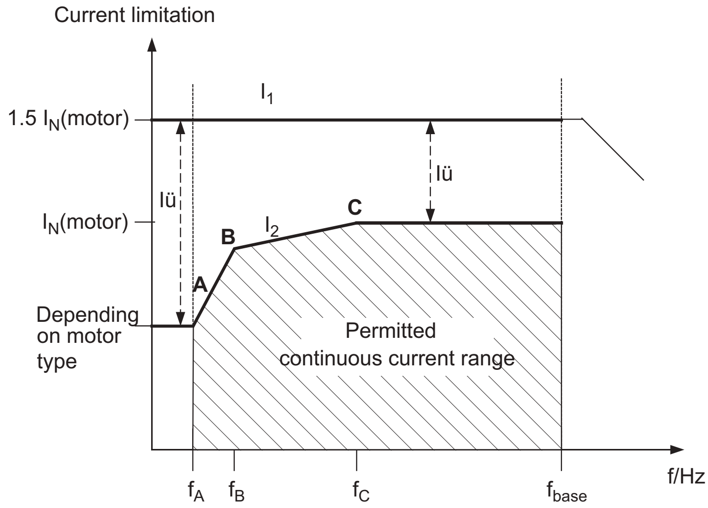
If the option "Inverter encoder" is set as encoder 1 in the MOVISAFE® CONFIG/ASSIST parameter setting software, the setting in *P557* determines which encoder signal is evaluated by the DCS21B/31B option.

P56x Current limitation Ex-e motor

The parameter group *P56x Current limitation Ex e motor* contains display and setting values that are specific to the "current limitation in the Ex e motor on the inverter" function. The factory setting is indicated by underline. The factory settings apply to the delivery status.

Frequencies below frequency A are only permitted to a limited extent. Frequencies higher than the rated motor frequency are not permitted. Refer to the "Explosion-Proof AC Motors" operating instructions for more information. The following rules always apply:

- Frequency A < frequency B < frequency C < rated motor frequency
- Current limit A < current limit B < current limit C



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P560 Current limit Ex-e motor

AUTO

Setting range: On/off

ON: Current limitation for Ex-e motors active.

OFF: Current limitation for Ex-e motors inactive.

On startup, the current limitation for Ex-e motors is automatically activated for motors selected and approved for operation in potentially explosive areas.

P561 Frequency A

AUTO

Setting range: 0 – 5 – 60 Hz

Value for minimum operating frequency f_A. The operation time with frequency A is 60 seconds, regardless of the current value. After this time, the inverter switches off and issues the "F110 Ex-e protection" error message.

P562 Current limit A

AUTO

Setting range: 0 – 50 – 150%

Current limitation that is permitted with operating frequency f_A. There is a linear gradient between current limitation A and current limitation B.

P563 Frequency B AUTO

Setting range: 0 – 10 – 104 Hz

Value for operating frequency f_B.

P564 Current limit B AUTO

Setting range: 0 – 80 – 200%

Current limitation that is permitted with operating frequency f_B. There is a linear gradient between current limit B and current limit C.

P565 Frequeny C AUTO

Setting range: 0 – 25 – 104 Hz

Value for operating frequency f_C.

P566 Current limit C AUTO

Setting range: 0 – 100 – 200%

Current limit that is permitted between operating frequency f_C and rated motor frequency. The rated motor frequency is 50 Hz for star connection and 87 Hz for delta connection. After startup with an Ex-e motor, the current limit C is approximately equal to the rated motor frequency I_N.

8.3.8 P6xx Terminal assignment

P60x Binary inputs of basic unit

Binary input DIØØ with fixed assignment "/CONTROLLER INHIBIT".

P600 – P606 Binary input DIØ1 – DIØ7

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

P61x Binary inputs of option

P610 – P617 Binary inputs DI1Ø – DI17

The binary inputs can be programmed to the following functions:

Function	Effect when "0" signal	Effect when "1" signal	Effective when Inverter state: Inhibited	Effective when Inverter state: Enabled	Factory set to	See also
NO FUNCTION	–	–	–	–	DIØ6 DIØ7	
ENABLE/STOP	Stop on t13/t23	Enable	No	Yes	DIØ3	*P13x / P14x*
CW/STOP	Stop on t11/t21 or t12/t22	Enable CW	No	Yes	DIØ1	
CCW/STOP	Stop on t11/t21 or t12/t22	Enable CCW	No	Yes	DIØ2	
n11/n21 n13/n23	External setpoints only	n11/n21 n13/n23	No	Yes	DIØ4	*P16x / P17x*
n12/n22	External setpoints only	n12/n22	No	Yes	DIØ5	
FIXED SETP. SELECT	Fixed setpoints of the active parameter set selected	Fixed setpoints of the active parameter set selected	Yes	Yes		
PARAM. SELECT.[1)]	Parameter set 1	Parameter set 2	Yes	No		
RAMP SELECT	1. ramp (t11/t21) active	2. ramp (t12/t22) active	Yes	Yes		*P13x / P14x*
MOTOR POT UP	–	Increase setpoint	No	Yes		*P15x*
MOTOR POT DOWN	–	Decrease setpoint	No	Yes		

Function	Effect when: "0" signal	Effect when: "1" signal	Effective when Inverter state: Inhibited	Effective when Inverter state: Enabled	Factory set to	See also
/EXT. ERROR	External error	–	No	Yes		
ERROR RESET	Reset on positive edge ("0" to "1")		Yes	Yes		
/HOLD CONTROL	Hold control active	–	No	Yes		*P210*
/LS CW	Right limit switch reached	Not reached	No	Yes		
/LS CCW	Left limit switch reached	Not reached	No	Yes		
IPOS INPUT	Function depends on IPOS function					IPOS-plus® manual
REFERENCE CAM	Not activated	Activated	No	Yes		
START REF.TRAVEL	–	Start referencing for IPOS	No	Yes		
SLAVE FREE RUNNING	Master/slave operation	Slave free running	Yes	Yes		
ACCEPT SETPOINT	Do not accept	Accept setpoint	No	Yes		
POWER ON	see *P521 Mains OFF response*	Ext. POWER ON signal	Yes	Yes		*P52x*
SET DRS ZERO PT.	"1" to "0": sets new zero point	Delete angular offset	Yes	Yes		Synchronous operation manual
START DRS SLAVE	No enable	Enable	No	Yes		
DRS TEACH IN	–	Adopt angular offset in *P224 Slave counter*	Yes	Yes		
DRS MASTER STOP	Master drive turns	Master drive at a standstill	Yes	Yes		
/Vibration warning	Vibration sensor signals warning	Vibration sensor does not signal warning	Yes	Yes		
/Vibration fault	Vibration sensor reports fault	Vibration sensor does not report 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 signals 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 signal	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 two seconds.

P62x Binary outputs of 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.

INFORMATION

The binary signals are only valid if the inverter has signaled "ready" after switch-on and there is no error display. Binary signals have "0" status while MOVIDRIVE® is being initialized.

Several terminals can be assigned the same function.

P620 – P624
Binary outputs
DOØ1 – DOØ5

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

P63x Binary outputs of option

P630 – P637
Binary outputs
DO1Ø – DO17

The following functions can be assigned to the binary outputs:

Function	Binary output has "0" signal	Binary output has "1" signal	Factory set to	See also
NO FUNCTION	Always "0" signal	–		
/FAULT	Collective fault signal	–	DOØ2	
READY FOR OPERATION	Not ready	Ready	DOØ1	
OUTPUT STAGE ON	Unit inhibited	Unit enabled and motor energized		
ROTATING FIELD ON	No rotating field	Rotating field		
BRAKE RELEASED[1)]	Brake applied	Brake released		
BRAKE APPLIED[1)]	Brake released	Brake applied		
MOTOR STANDSTILL	Motor is turning	Motor stopped		
PARAMETER SET	Parameter set 1 active	Parameter set 2 active		
SPEED REFERENCE ***P403 Signal = “1“ when:* = $n < n_{ref}$ ($n > n_{ref}$)**	$n > n_{ref}$ ($n < n_{ref}$)	$n < n_{ref}$ ($n > n_{ref}$)		*P40x*
SPEED WINDOW ***P413 Signal = “1“ if:* = INSIDE (OUTSIDE)**	Speed is outside (within) speed window	Speed is within (outside) speed window		*P41x*
SP/ACT.VAL.COMP. ***P422 Signal = “1“ if:* = $n = n_{set}$ ($n <> n_{set}$)**	$n <> n_{set}$ ($n = n_{set}$)	$n = n_{set}$ ($n <> n_{set}$)		*P42x*
CURRENT REFERENCE ***P433 Signal = “1“ if:* = $I < I_{ref}$ ($I > I_{ref}$)**	$I > I_{ref}$ ($I < I_{ref}$)	I < Iref ($I > I_{ref}$)		*P43x*
Imax SIGNAL ***P442 Signal = “1“ if:* = $I = I_{max}$ ($I < I_{max}$)**	$I < I_{max}$ ($I = I_{max}$)	$I = I_{max}$ ($I < I_{max}$)		*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 PREWARN.	Value for lag error prewarning (*P511 Lag error prewarning*) exceeded	–		Synchronous operation manual
/DRS LAG ERROR	Lag error limit (*P512 Lag error limit*) exceeded	–		
DRS SLAVE IN POS	Position not reached	Position reached		

Function	Binary output has		Factory set to	See also
	"0" signal	"1" signal		
IPOS IN POSITION	Position not reached	Position reached		IPOS$^{plus®}$ manual
IPOS REFERENCE	No referencing	Referencing finished		
IPOS OUTPUT	Depends on IPOS program		DOØ3 DOØ4 DOØ5	
/IPOS ERROR	IPOS program error message	–		
Ex-e current limit	Not active	Active	-	*P56x*
LSM commutation	Not commutated	Commutated	-	-
S pattern	S pattern is not calculated	S pattern is calculated	-	*P135/145*
STO	Not active	Active	-	-

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.

INFORMATION

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

Several terminals can be assigned the same function.

P64x Optional analog outputs

P640 / P643 Analog output AO1 / AO2

Depending on *P642 / P645 Operating mode AO1 / AO2*, the signal range is –10 – 0 – 10 V (AOV1 / AOV2) and 0 (4) – 20 mA (AOC1 / AOC2).

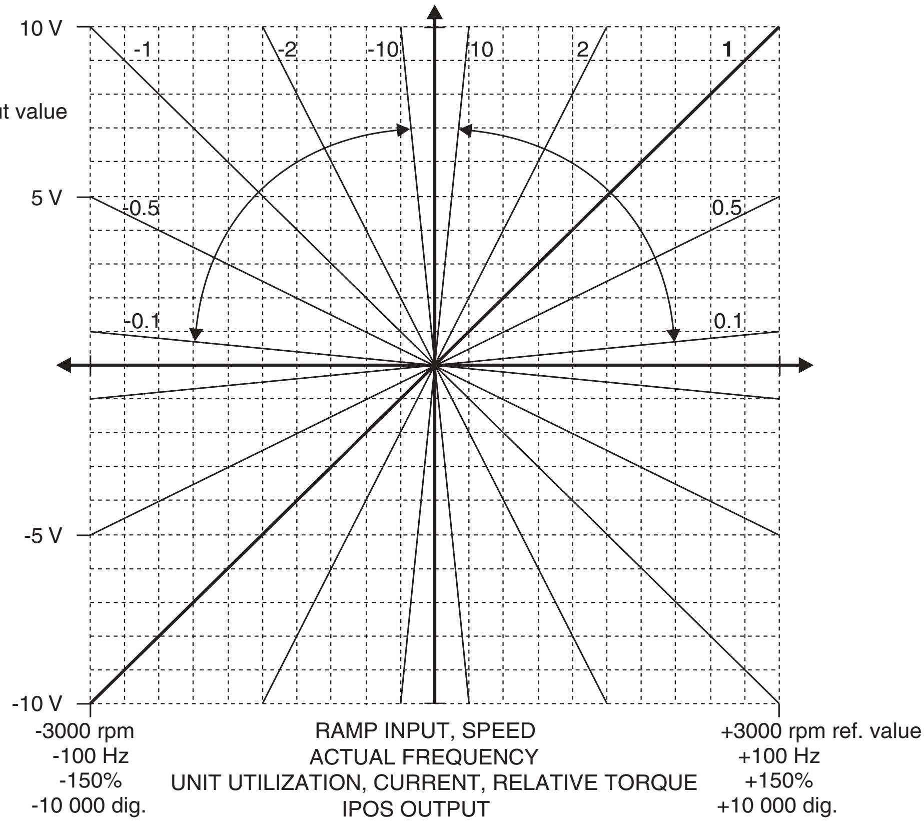
The following functions can be assigned to the analog outputs:

Function	Scaling (when *P641 / P644 Scaling AO1 / AO2* = 1)		Explanation	Factory set to
	Reference value	Output value		
NO FUNCTION	always 0 V or 0 mA		–	
RAMP INPUT	+/–3000 rpm	+/–10 V or 20 mA	Setpoint speed at the input of the internal ramp generator	
SETPOINT SPEED	+/–3000 rpm	+/–10 V or 20 mA	Valid setpoint speed (output ramp generator or correcting variable of the higher-level controller)	
ACTUAL SPEED	+/–3000 rpm	+/–10 V or 20 mA	Actual speed	AO1
ACTUAL FREQUENCY	+/–100 Hz	+/–10 V or 20 mA	Rotating field frequency	
OUTP.CURRENT	150% I_N (Size 0: 200% I_N)	10 V or 20 mA	Apparent current	AO2
ACTIVE CURRENT	+/–150% I_N (Size 0: +/–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.	
RELATIVE TORQUE	+/–150% I_N (Size 0: +/–200% I_N	+/–10 V or 20 mA	Active current that forms the torque; the value "0" is always output in VFC operating modes.	
UNIT UTILIZATION	150% (Size 0: 200%)	10 V or 20 mA	Current unit utilization	
IPOS OUTPUT	+/–10 000 digit	+/–10 V or 20 mA	Internal IPOS values (see IPOS$^{plus®}$ manual)	
IPOS OUTPUT 2	+/–10 000 digit	+/–10 V or 20 mA	Internal IPOS values (see IPOS$^{plus®}$ manual)	

P641 / P644 Scaling AO1 / AO2

Setting range: –10 – 0 – 1 – 10

The slope of the characteristic curve for the analog outputs is defined. The value for unit utilization, current and relative torque is 200% for each in size 0.



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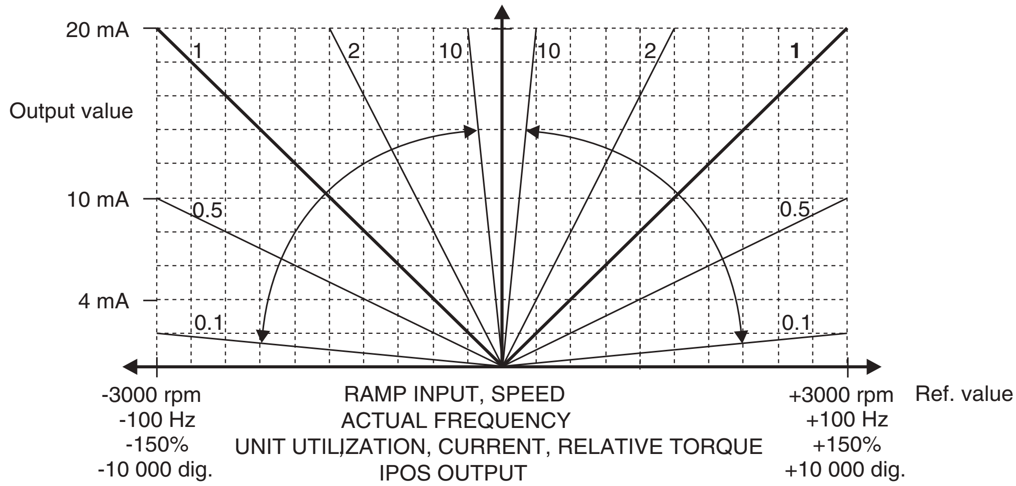
P642 / P645 Operating mode AO1 / AO2

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 – 0 – 10 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 – 20 mA: Output of the value of the reference value as current value 0 – 20 mA on AOC1 / AOC2, the voltage output AOV1 is not valid. *P641 / P644 Scaling AO1 / AO2* is evaluated on the basis of the value.
- 4 – 20 mA: Output of the value of the reference value as current value 4 – 20 mA on AOC1 / AOC2, the voltage output AOV1 is not valid. The slope of the characteristic curves is flatter than in the 0 – 20 mA operating mode. The characteristic has an offset of 4 mA and the value of *P641 / P644 Scaling AO1 / AO2* refers to the value

range of 16 mA. The value for unit utilization, current and relative torque is 200% for each in size 0.



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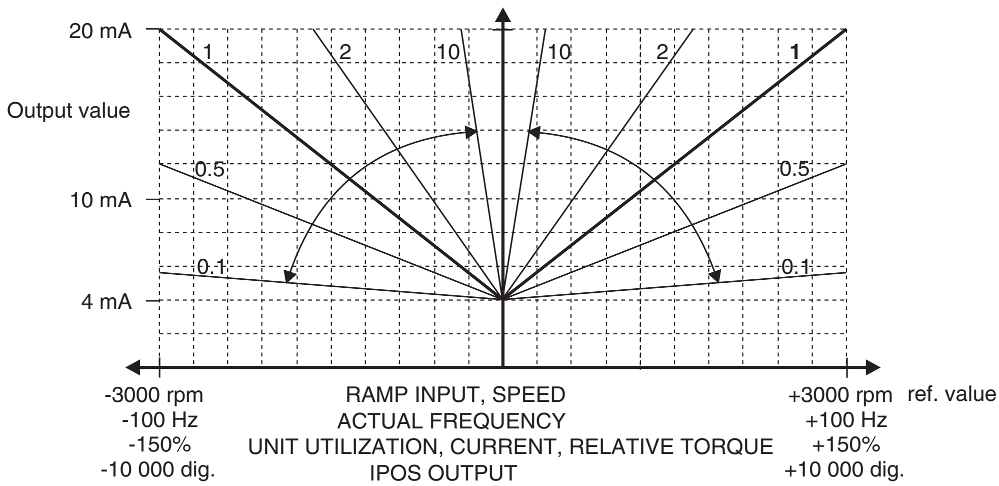

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8.3.9 P7xx Control functions

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 executes automatically when activated. They affect how the inverter responds in certain operating modes.

INFORMATION

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

1 2 AUTO

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 group 1). Without new startup, the operating mode may only be changed within a group.

Group	Parameter set 1/2 P700 Operating mode 1 P701 Operating mode 2	Unit type and option	Motor
1	**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 curve** **V/f & DC BRAKING**	MDX, no option required	DT/DV without incremental encoder
2	**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	
3	**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	
4	**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 about the individual operating modes in the "Operating modes" chapter.

P702 Motor category

AUTO

Setting range: Rotatory/Linear

This parameter is set automatically during startup. It shows the connected motor type.

Parameter set 2 is not available when operating a linear motor.

P71x Standstill current

P710/P711 Standstill current 1/2

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:

- At low ambient temperatures of the motor, it is possible to prevent the danger of condensation formation and freezing (in particular of the disk brake). Overheating the motor must be avoided when setting the 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% for hoists.

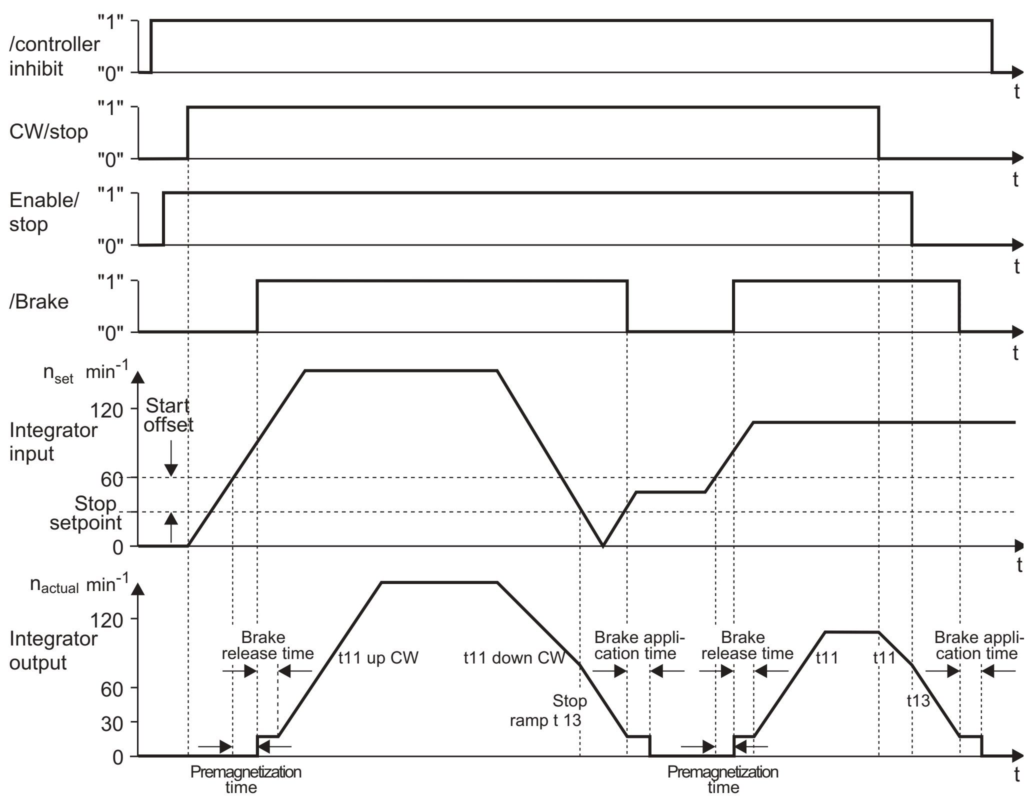
The standstill current function is deactivated by P710/P711 = 0. The setting is made in % of the rated motor current. The standstill current is monitored for *P303/P313 Current limit 1/2* in any case.

- In the CFC operating mode, if no other setting is made, the lowest magnetization current according to the motor model is always used. This higher value will be valid if *P710 Standstill current 1* / *P711 Standstill current 2* were set to a higher value.
- This function does not have any effect in SERVO operating mode. No current is impressed.
- The rated magnetizing current will always be set for operating modes VFC & hoist, and VFC n-control & hoist if *P710* is active.
- Else, a rapid start will only take place if 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 allows for an enable function created automatically by the inverter 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.



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P720/P723 Setpoint stop function 1/2

Setting range: ON / OFF

P721/P724 Stop setpoint 1/2

Setting range: 0 – 30 – 500 rpm

In the "VFC & Hoist" operating mode, the minimum stop setpoint is internally limited to 16 rpm.

P722/P725 Start offset 1/2

Setting range: 0 – 30 – 500 rpm

There is no enable for stop setpoint + start offset (start setpoint) > n_{max}.

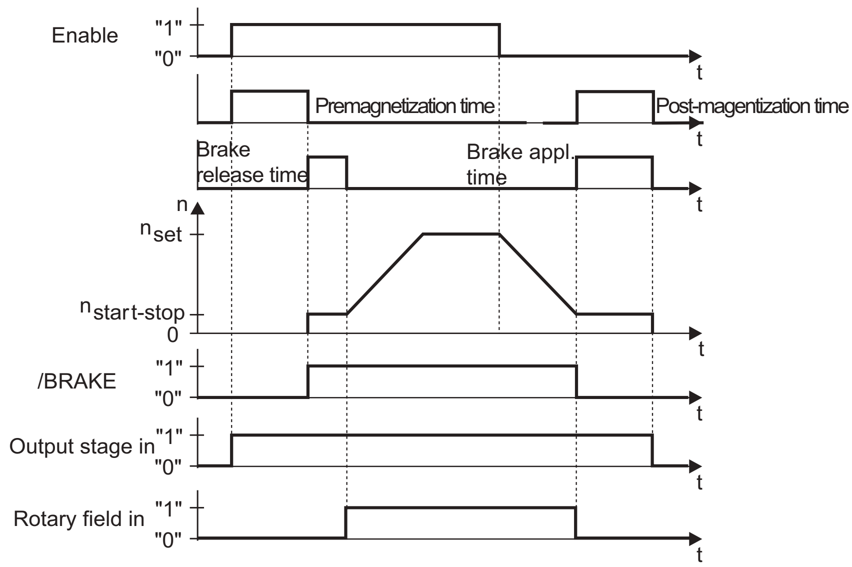
Movement with n_{min} is never possible if the stop setpoint is > n_{min}.

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.

INFORMATION

- The brake is **always** applied when /CONTROL.INHIBIT = 0.
- When activating "safe stop" with X17:4 = DC 0 V, the brake is **always** applied.



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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

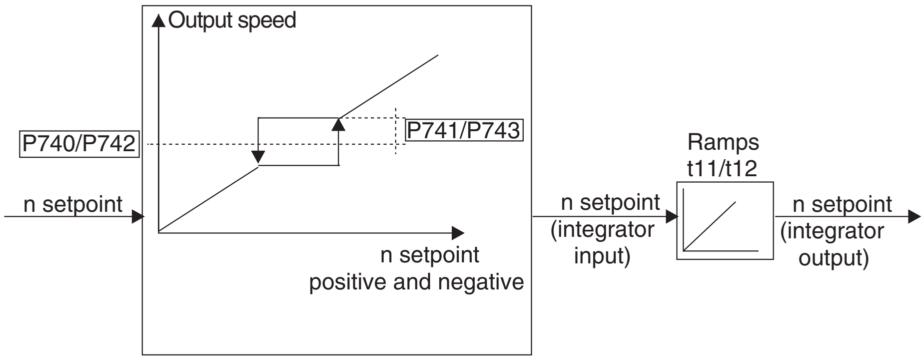
Setting range: 0 – 2 s

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

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.



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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 center 1/2

Setting range: 0 – <u>1500</u> – 6000 rpm

P741 / P743 Skip width 1 / 2

Setting range: <u>0</u> – 300 rpm

P75x Master-slave function

The master-slave function allows for implementing automatic 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. *P100 Setpoint source* = Master SBus or *P100 Setpoint source* = Master RS485 must be set on the slave. The process output data PO1 – PO3 (*P870 / P871 / P872 Setpoint description PO1 / PO2 / PO3*) are automatically set by the firmware. A programmable terminal function "Slave free run." *P60x Binary inputs of basic unit* / *P61x Binary* *inputs of option*, it is possible to separate the slave from the master setpoint and switch to local control mode.

INFORMATION

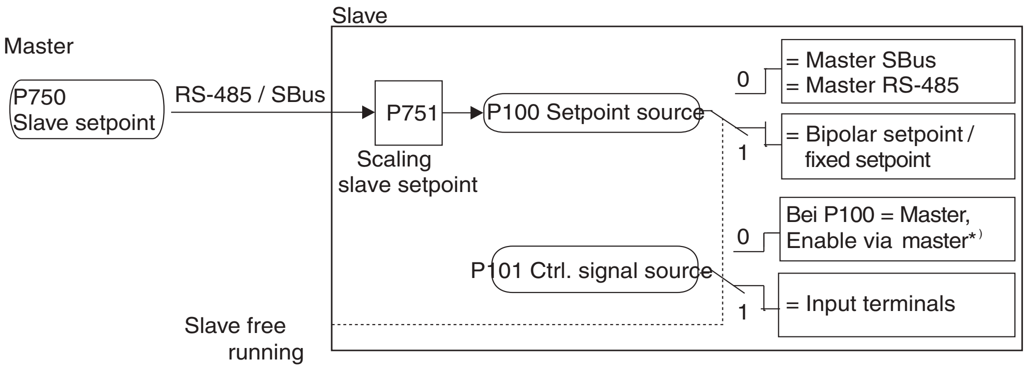
For the slave, the process data *P87x Process data description* are automatically assigned as follows:

– PO1 = Control word 1
– PO2 = Speed or current in M-control
– PO3 = IPOS PO data
– PI1 = Status word 1
– PI2 = Speed
– PI3 = IPOS PI data

PI3 and PO3 are not used. They are available in IPOS$^{plus®}$ as required.

If a fieldbus card is plugged in the slave, only the parameter channel is available for the output data. The master can read the automatically assigned process input data via fieldbus.

*) DIØØ "/Controller inhibit" and the programmed binary inputs Enable, CW, and CCW must also receive a "1" signal.



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INFORMATION

P811 RS485 group address or *P882/P892 Group address SBus 1/2* must be set to the same value in master and slave. For master/slave operation via RS485 interface, set *P811 RS485 group address* to a value 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): *P883/P893 Timeout interval SBus 1/2* is in effect when there is a communication link via the SBus. If *P883/P893 Timeout interval SBus 1/2* = 0, data transmission via SBus is not monitored.
- RS485 interface: A connection check is always in effect if the communication link takes place via the RS485 interface; *P812 RS485 timeout interval* does not have any function. The slave inverters must receive a valid RS485 telegram within the fixed time interval of t = 500 ms. If the time is exceeded, the slave drives are stopped at the emergency stop ramp and fault message F43 "RS485 timeout" is issued.

- In case of communication via SBus 2, parameter *P883/P893 Timeout interval SBus 1/2* should be set to ≥ 10 ms (recommendation: 100 ms).

	INFORMATION
	The error is automatically reset and the drives are enabled when the slave inverters once again receive a valid telegram. 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 error.

Overview of functions of master/slave operation

Function	Master		Slave	
	P750 Slave setpoint	*P700/P701 Operating mode 1/2*	*P100 Setpoint source*	*P700/P701 Operating mode 1/2*
Speed synchronization: • **Master controlled** • **Slave controlled**	SPEED (RS485+SBus1) SPEED (RS485) SPEED (SBus1)	VFC VFC & GROUP VFC & HOIST V/f CHARACTERIS-TICS V/f & DC BRAKING	MASTER SBus1 MASTER RS485:	VFC VFC & GROUP VFC & HOIST V/f CHARACTERIS-TICS V/f & DC BRAKING
Speed synchronization: • **Master speed controlled** • **Slave controlled**	SPEED (485+SBus1) SPEED (RS485) SPEED (SBus1)	VFC n-CONTROL VFC n-REG & ... CFC CFC/SERVO & IPOS CFC/SERVO & SYNC	MASTER SBus1 MASTER RS485:	VFC VFC & GROUP VFC & HOIST
Speed synchronization: • **Master speed controlled** • **Slave speed controlled** • **Drives do not have a rigid mechanical connection.**	SPEED (485+SBus1) SPEED (RS485) SPEED (SBus1)	VFC n-CONTROL VFC n-REG & ... CFC/SERVO CFC/SERVO & IPOS CFC/SERVO & SYNC	MASTER SBus1 MASTER RS485:	VFC n-CONTROL VFC n-CTRL & GROUP VFC n-CTRL & HOIST CFC SERVO
Speed synchronization: • **Master controlled** • **Slave speed controlled** • **Drives do not have a rigid mechanical connection.**	SPEED (485+SBus1) SPEED (RS485) SPEED (SBus1)	VFC VFC & GROUP VFC & HOIST	MASTER SBus1 MASTER RS485:	VFC n-CONTROL VFC n-CTRL & GROUP VFC n-CTRL & HOIST CFC SERVO
Load distribution: • **Master controlled** • **Slave controlled**	LOAD DISTR. (RS485+SBus1) LOAD DISTR. (RS485) LOAD DISTR. (SBus1)	VFC VFC & GROUP VFC & HOIST	MASTER SBus1 MASTER RS485:	VFC VFC & GROUP VFC & HOIST
Load distribution: • **Master speed controlled** • **Slave controlled**	LOAD DISTR. (RS485+SBus1) LOAD DISTR. (RS485) LOAD DISTR. (SBus1)	VFC n-CONTROL VFC n-REG & ... CFC/SERVO CFC/SERVO & IPOS CFC/SERVO & SYNC	MASTER SBus1 MASTER RS485:	VFC VFC & GROUP VFC & HOIST VFC & FLYING START
Load distribution: • **Master speed controlled** • **Slave speed controlled**	Not possible			
Load distribution: • **Master controlled** • **Slave speed controlled**	Not possible			
Torque control of the slave: • **Master speed controlled** • **Slave torque controlled**	TORQUE (RS485+SBus1) TORQUE (RS485) TORQUE (SBus1)	CFC/SERVO CFC/SERVO & IPOS CFC/SERVO & SYNC	MASTER SBus1 MASTER RS485:	CFC/SERVO & M-CTRL.

Speed synchronization

Speed synchronization (SPEED (RS485) / SPEED (SBus) / SPEED (485+SBus)):

The actual speed of the master is transferred to the slave. Set the torque ratio for the slave inverter using *P751 Scaling slave setpoint*. Leave *P324/P334 Slip compensation 1/2* of the slave at the value as 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/P701 Operating mode 1/2	VFC n-CONTROL	VFC 1
P750 Slave setpoint	SPEED (SBus)	MASTER-SLAVE OFF
P751 Scaling slave setpoint	Not in effect	1 (then 1 : 1)
P810 RS485 address	Set different values	
P811 RS485 group address	Not in effect	
P881 / P891 Address SBus 1/2	Set different values	
P882/P892 Group address SBus 1/2	Set the same value (0 – 63)	
P884/P894 Baud rate SBus 1/2	Set the same value (125, 250, 500 or 1000 kBaud)	

Load distribution

Load distribution (LOAD DISTR. (RS485) / LOAD DISTR. (SBus) / LOAD DISTR. (485+SBus)):

This function lets two inverters control the same load. The rotating field frequency of the master is transferred to the slave. It is assumed in this case that the shafts of the motors corresponding to the master and the slave are rigidly connected. 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. *P751 Scaling slave setpoint* must be set to the value "1".

INFORMATION

P324/P334 Slip compensation 1/2 of the slave must be set to 0.

Better behavior can be accomplished by setting the slave as follows:

- *P138 Ramp limit VFC*: OFF
- *P115 Filter setpoint*: 0 s
- Ramps *P130* / *P131* / *P132* / *P133*: 0 s
- *P301 / P311 Minimum speed 1/2*: 0 rpm

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/P334 Slip compensation 1/2	Do not change	0
P700/P701 Operating mode 1/2	VFC 1	VFC 1
P750 Slave setpoint	LOAD DISTR. (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)	
P881 / P891 Address SBus 1/2	Set different values	
P882/P892 Group address SBus 1/2	Not in effect	
P884/P894 Baud rate SBus 1/2	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 enables high quality load distribution, for example. This load distribution setting should be preferred if the drive configuration permits it. Set the torque ratio using *P751 Scaling slave setpoint*. Example:

Parameter	Setting on the master	Setting on the slave
P100 Setpoint source	e.g. UNIPOL./FIXED SETP	MASTER RS485
P101 Control signal source	e.g. TERMINALS	Not in effect
P700/P701 Operating mode 1/2	CFC	CFC & M-CONTROL
P750 Slave setpoint	TORQUE (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)	
P881 / P891 Address SBus 1/2	Set different values	
P882/P892 Group address SBus 1/2	Not in effect	
P884/P894 Baud rate SBus 1/2	Not in effect	

P750 Slave setpoint

The setpoint to be transmitted to the master 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 DISTR. (RS485)
- LOAD DISTR. (SBus1)
- LOAD DISTR. (485+SBus1)

P751 Scaling slave setpoint

Setting range: –10 – 1 – 10

When this setting is made in the slave, the setpoint transferred from the master is multiplied by this factor.

P76x Manual operation

P760 Lockout run/stop keys

Setting range: YES / NO

NO: The run/stop keys of the DBG60B keypad are active and can be used for starting and stopping the motor.

YES: The run/stop keys of the DBG60B keypad are locked and are therefore without function.

P77x Energy-saving function

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.

P770 Energy-saving function

Setting range: ON / OFF

The energy-saving function can be activated for the following operating modes: VFC / VFC & GROUP / VFC & FLYING START/ V/f CHARACTERISTIC. During no-load operation, the power consumption of the inverter can be reduced by up to 70%.

Note the following limitations:

- The energy-saving function only offers advantages in the part-load range
- No large changes in load should occur during operation

P78x Ethernet configuration

The parameter group P78x includes display and setting values that are specific for the DFE11B option card.

P780 IP address

Setting range: 000.000.000.000 – 192.168.10.x – 223.255.255.255

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 using P780 as well. If the value is set using the DIP switch of the DHCP (Dynamic Host Configuration Protocol) option, the value specified by the DHCP server will be displayed.

P781 Subnet mask

Setting range: 000.000.000.000 – 255.255.255.0 – 255.255.255.255

Factory setting at delivery is a class C network.

The subnet 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.

P782 Standard gateway

Setting range: 000.000.000.000 – 255.255.255.255

The standard gateway is addressed if the desired communication partner is not within the actual network. The standard gateway has 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.

P783 Baud rate

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.

P784 MAC address

Display value, cannot be altered. Displays the MAC address, i.e. the unique layer-2 Ethernet address of the interface.

P785 Ethernet / IP startup configuration

Setting range: DHCP / Saved IP parameters

Only available with DFE13B EtherNet/IP option.

- DHCP: The DFE13B option is assigned its IP parameters (*P780 IP address – P782 Standard gateway*) by a DHCP server when the supply voltage is switched on.
- Saved IP parameters: The DFE13B option is started with the saved IP parameters when the supply voltage is switched on.

8.3.10 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 switched 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 in the factory set user menu are indicated by a "\" in the parameter list. The previously selected menu is active after having switched MOVIDRIVE® B 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 CONDITION

You can use *P802* to reset the factory settings stored in the EEPROM for almost all parameters. The following data are not reset when default standard is selected:

- *P9xx IPOS parameters*
- *P20x Speed control*
- *P210 P gain hold controller*
- *P26x Process controller parameters*
- *P27x Process controller input values*
- *P28x Process controller limits*
- *P30x / P31x Limits 1 / 2*
- *P32x / P33x Motor compensation 1 / 2 (asynchronous)*
- *P345 / 346 IN / UL monitoring 1/2*
- *P557 DCS actual position source*
- *P70x Operating modes*
- *P73x Brake function*
- *P78x Ethernet configuration*
- *P810 RS485 address*
- *P811 RS485 group address*
- *P88x / P89x Serial communication SBus 1 / 2* (except for *P883/P893 Timeout interval SBus 1/2*, *P885 / P895 Synchronization ID SBus 1/2*)
- *P88x / P89x Serial communication SBus 1 / 2* (except for *P883/P893 Timeout interval SBus 1/2*, *P885 / P895 Synchronization ID SBus 1/2*)
- *P905 Hiperface offset X15*
- *P910 Gain X controller*
- *P938 Speed task 1*
- *P94x IPOS encoder* (except for *P944 Encoder scaling ext. encoder*)
- *P95x Absolute encoder* (except for *P955 Encoder scaling*)

- Fault memory
- Statistical data
- PROFINET device name

The "delivery state" setting also resets the data listed above.

An "8" appears on the 7-segment display during reset. The previous operating state of the inverter appears on the display after the factory settings have been restored. *P802* automatically reverts to "NO".

	INFORMATION
	The "Default standard" setting overwrites almost all parameter values; the "delivery condition" setting 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.

P803 Parameter lock

Setting range: ON / <u>OFF</u>

Setting *P803* to "ON" makes it possible to prevent any change to the parameters (except for *P840 Manual reset* and the parameter lock itself). This makes sense, for example, after the MOVIDRIVE® B setting has been optimized. *P803* must be set to "OFF" to enable changes to parameters again.

Important: Startup is not possible when *P803* is set to ON. The parameter lock also acts on the RS485, fieldbus and SBus interfaces, and on IPOS$^{plus®}$.

The parameter lock does not have any effect on the following parameters:

- *P780 IP address*
- *P781 Subnet mask*
- *P782 Standard gateway*
- *P785 Ethernet / IP startup configuration*
- *P803 Parameter lock*
- *P819 Fieldbus timeout interval*
- *P840 Manual reset*
- *P876 PO data enable*
- *P931 IPOS CTRL.W Task 1*

P804 Reset statistics data

Setting range: <u>NO</u> / FAULT MEMORY / kWh COUNTER / 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 affected when selecting "Default standard" for *P802 Factory setting*.

P806 Copy DBG -> MDX

Setting range: YES / <u>NO</u>

The parameter data in the DBG60B are transferred to MOVIDRIVE®.

P807 Copy MDX -> DBG

Setting range: YES / <u>NO</u>

The parameterd set in MOVIDRIVE® are transferred 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® via the serial interfaces. A maximum of 32 stations can be linked.

	INFORMATION
	MOVIDRIVE® 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.

P811 RS485 group address

Setting range: 100 – 199

P811 makes it possible to group together several MOVIDRIVE® B units for communication via the serial interface. In this way, all MOVIDRIVE® B units with the same RS485 group address can be addressed via this address using a multicast telegram. The data received via group address are not acknowledged by MOVIDRIVE® B. For example, the RS485 group address allows for sending setpoint selections to a group of MOVIDRIVE® B inverters simultaneously. Group address 100 means that no group is assigned to the inverter.

P812 RS485 timeout interval

Setting range: 0 – 650 s

P812 sets the monitoring time for data transmission via the serial interface. MOVIDRIVE® performs the error response set in *P833 Response to RS485 TIMEOUT* if there is no cyclical process data exchange via the serial interface for the period set in parameter 812. Serial data transmission is not monitored when *P812* is set to 0. Monitoring is activated with the first cyclical data exchange.

P819 Fieldbus timeout interval

Setting range: 0 – 0.5 – 650 s

P819 sets the monitoring time for data transmission via the implemented fieldbus (DFx). MOVIDRIVE® performs the error response set in *P831 Response to FIELDBUS TIMEOUT* if there is no data traffic via the fieldbus for the period set in P819. When *P819* is set to the value 0 or 65, data transmission via fieldbus is not monitored. The timeout interval 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 operation 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® (CCW/CW; motor/regenerative). *P820*/*P821* must be set to "OFF" 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 regenerated 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 error message F07 ($V_{DC\ link}$ overvoltage). In this case you have to extend the deceleration ramps manually.

P83x Fault responses

The following responses can be programmed:

Response	Description
NO RESPONSE	Neither an error is displayed nor an error response is performed. The signaled error is ignored.
DISPLAY ERROR	The error is displayed (in 7-segment display and SHELL), the fault output is set (if programmed). The unit performs no other error responses. The error can be reset (terminal, RS485, fieldbus, auto-reset).
IMMEDIATE STOP/FAULT	The inverter switches off immediately and an error is signaled. The output stage is inhibited and the brake is applied. The ready signal is revoked and the error output is set, if programmed. A restart is only possible after the error has been reset during which the inverter is reinitialized.
EMERGENCY STOP/ FAULT	The drive is braked with the set emergency stop ramp t14/t24. Once the stop speed is reached, the output stage is inhibited and the brake is applied. The error is signaled immediately. The ready signal is revoked and the error output is set, if programmed. A restart is only possible after an error reset has been performed during which the inverter is reinitialized.
RAPID STOP/ FAULT	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 error is signaled immediately. The ready signal is revoked and the error output is set, if programmed. A restart is only possible after an error reset has been performed during which the inverter is reinitialized.
IMM. STOP/ WARN.	The inverter switches off immediately and an error is signaled. The output stage is inhibited and the brake is applied. The error is signaled via the terminal, if programmed. The ready signal is not revoked. The drive restarts without unit re-initialization if the error is rectified by an internal procedure or by an error reset.
EMERGENCY STOP/ WARNG	The drive is braked with the set emergency stop ramp t14/t24. Once the stop speed is reached, the output stage is inhibited and the brake applied. The error is signaled immediately. The error is signaled via the terminal, if programmed. The ready signal is not revoked. The drive restarts without unit re-initialization if the error is rectified by an internal procedure or by an error reset.
RAPID STOP/ WARN.	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 error is signaled immediately. The error is signaled via the terminal, if programmed. The ready signal is not revoked. The drive restarts without unit re-initialization if the error is rectified by an internal procedure or by an error reset.

P830 Response to 'External fault'

Factory setting: EMERG. ST/FAULT

The error is only triggered in the ENABLED inverter status. *P830* programs the error response that is triggered by an input terminal programmed to "/EXT. FAULT".

P831 Response to FIELDBUS TIMEOUT

Factory setting: RAPID STOP/WARN.

The error is only triggered in the ENABLED inverter status. *P831* programs the error response which is triggered by fieldbus timeout monitoring. The response time of the monitoring process can be set with *P819 Fieldbus timeout interval* (see "Fieldbus unit profile" manual for a more detailed description).

P832 Response to MOTOR OVERLOAD

Factory setting: EMERG. ST/FAULT

P832 programs the error response that is triggered in the event of motor overload. Make one of the following settings to monitor motor overload:

- *P340/P342 Motor protection 1/2* set to ON ASYNCHRONOUS
- *P340/P342 Motor protection 1/2* set to ON SERVO and *P530 Sensor type 1* set to KTY

P833 Response to RS485 TIMEOUT

Factory setting: RAPID STOP/WARN.

P833 programs the eror response that is triggered by the RS485 timeout monitoring. The response time of the monitoring process can be set with *P812 RS485 timeout interval*.

P834 Response to LAG ERROR

Response to lag error with DRS11B and IPOS$^{plus®}$ only.

Factory setting: EMERG. ST/FAULT

P834 is used to program the error response that is triggered by lag error monitoring of the "synchronous operation option DRS11B" option and of positioning mode with IPOS$^{plus®}$. Various settings are available in *P51x Synchronous operation monitoring*.

P835 Response to TF SIGNAL

AUTO

Factory setting: NO RESPONSE

P835 programs the error 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 to SBus TIMEOUT 1/2

Factory setting: EMERG. ST/FAULT

P836/*P837* programs the error response that is triggered by the system bus timeout monitoring. The response time of the monitoring process can be set with *P883/P893 Timeout interval SBus 1/2*.

Important: If the DCS21B/31B option is plugged, *P837* is automatically set to "Emergency stop/Warning" after each restart.

P838 Response to SW LIMIT SWITCH

Factory setting: EMERG. ST/FAULT

P838 programs the error 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 using parameters *P920 / P921 SW limit switch CW/CCW*.

P839 Response to positioning interruption

Factory setting: EMERG.STOP/ WARNING.

The response set here would be carried out if *P924 Positioning interruption detection* is set to "ON" and if the target is exceeded after resuming positioning.

P84x Reset behavior

P840 Manual reset

Setting range: YES / NO

- YES: The error in the MOVIDRIVE® B unit is reset. In case of an error, you can 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 error present.
- NO: No reset.

P841 Auto reset

Setting range: ON / OFF

- ON: The auto reset function is activated. In case of an error, this function automatically resets the unit after *P842 Restart time*. A maximum of five auto resets is possible during an auto reset phase. If five errors 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, DBGT60B, master controller),
- there is a transition to 24 V backup mode, or the inverter is switched off.

Five automatic resets are then possible.

DANGER

Risk of crushing if the motor starts up automatically after an auto reset.

Severe or fatal injuries.

- Do not use auto reset with drives where an automatic restart represents a danger to people or units.
- Perform a manual reset.

- OFF: No auto reset.

P842 Restart time

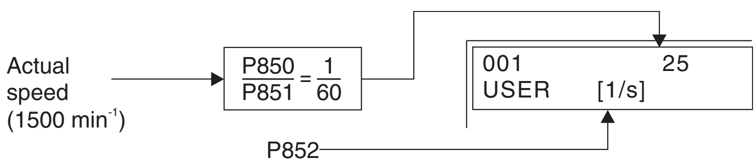
Setting range: 1 – 3 – 30 s

P842 is used to set the time to be waited between the time an error occurs and the execution of an automatic reset.

P85x Scaling actual speed value

Scaling of the actual speed value with SHELL only.

Scaling actual speed value defines 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. The scaling unit 1/2 is entered in *P852 User-defined unit*.



279044491

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-defined unit

Factory setting: rpm (can be set with SHELL only)

Up to eight ASCII characters; is displayed in *P001 User display*.

P86x Modulation

P860 / P861 PWM frequency 1 / 2 VFC

1 2

Setting range for sizes 0 to 5: 4 / 8 / 12 / 16 kHz

Setting range for size 6: 4 / 8 kHz

Setting range for size 7: 2.5 / 4 kHz

P860 / *P861* can be used in VFC mode to set the switching frequency at the inverter output for parameter set 1/2. The inverter automatically switches back to lower switching frequencies when the unit utilization reaches a specific level if the clock frequency for parameter set 1/2 is not fixed to the set value using *P862 / P863 PWM fix 1 / 2*. 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: Use *P862*/*P863* = "ON" for parameter sets 1/2 to fix the PWM frequency set with *P860 / P861 PWM frequency 1 / 2 VFC* when an automatic reduction of the PWM frequency is undesirable (e.g. when output filters are used).
- OFF: MOVIDRIVE® 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 when the "Unit utilization" error occurs.

P864 PWM frequency CFC

Setting range for sizes 0 to 5: 4 / 8 / 12 / 16 kHz

Setting range for size 6: 4 / 8 kHz

Setting range for size 7: 2.5 / 4 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* is used to define the content of the process output data words PO1/PO2/PO3. This is necessary so MOVIDRIVE® B can allocate the appropriate setpoints.

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
NO FUNCTION	The content of the process output data word is ignored.
SPEED	Speed setpoint entry in rpm.
CURRENT [% I_N]	Current setpoint selection (for torque control)
POSITION LO	Setpoint position low word
POSITION HI	Setpoint position high word
MAX. SPEED	Maximum system speed (*P302/P312 Maximum speed 1/2*).
MAX. CURRENT [% I_N]	Current limitation in % of I_N of the inverter (*P303/P313 Current limit 1/2*)
SLIP	Slip compensation (*P324/P334 Slip compensation 1/2*).
RAMP	Ramp time for setpoint selection
CONTROL WORD 1	Control signals for start/stop, etc.
CONTROL WORD 2	Control signals for start/stop, etc.
SPEED [%]	Selection of a speed setpoint in % of n_{max}
IPOS PO-DATA	Specification of a 16-bit coded value for IPOS$^{plus®}$

See the "Fieldbus unit profile with parameter list" manual for a detailed explanation.

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

The following PI assignments are available:

<table>
<tr><th>Assignment</th><th colspan="2">Description</th></tr>
<tr><td>NO FUNCTION</td><td colspan="2">The content of the process input data word is 0000_{hex}.</td></tr>
<tr><td>SPEED</td><td colspan="2">Present actual speed value of the drive in rpm</td></tr>
<tr><td>OUTP.CURRENT</td><td colspan="2">Present output current of the system in % of I_N.</td></tr>
<tr><td>ACTIVE CURRENT</td><td colspan="2">Present active current of the system in % of I_N:
• Positive sign = positive torque
• Negative sign = negative torque</td></tr>
<tr><td>POSITION LOW[1)]</td><td>Current actual position low word</td><td rowspan="2">The actual position is read from: P941 Actual position source.</td></tr>
<tr><td>POSITION HIGH[1)]</td><td>Present actual position high word</td></tr>
<tr><td>STATUS WORD 1</td><td colspan="2">Status information of the inverter</td></tr>
<tr><td>STATUS WORD 2</td><td colspan="2">Status information of the inverter</td></tr>
<tr><td>SPEED [%]</td><td colspan="2">Present actual speed value in % of n_{max}</td></tr>
<tr><td>IPOS PI-DATA</td><td colspan="2">Feedback of a 16-bit coded value for IPOS[plus®].</td></tr>
<tr><td>STATUS WORD 3</td><td colspan="2">Status information of the inverter</td></tr>
</table>

1) Both assignments must always be set.

See the "Fieldbus unit profile with parameter list" manual for a detailed explanation.

P876 PO data enable

Setting range: ON / OFF

- ON: The process output data that was last sent from the fieldbus controller becomes effective.
- OFF: The last valid process output data remain in effect.

INFORMATION

If the process data assignment is changed, *P876* is automatically set to "OFF".

P88x / P89x Serial communication SBus 1 / 2

P880 / P890 Protocol SBus 1/2

Setting range: SBus MOVILINK / CANopen / Protocol DCS

P881 / P891 Address SBus 1/2

Setting range: 0 – 63

Use *P881*/*P891* to set the system bus address of MOVIDRIVE® B. MOVIDRIVE® B can communicate with other MOVIDRIVE® B units using the system bus (SC11/SC12) by means of the address set here.

P882/P892 Group address SBus 1/2

Setting range: 0 – 63

P882/*P892* is used to set the system bus group address for multicast telegrams of MOVIDRIVE® B.

P883/P893 Timeout interval SBus 1/2

Setting range: 0 – 650 s

P883/*P893* is used to set the monitoring time for data transmission via system bus. If there is no data traffic via the system bus during the time period set in *P883*/*P893*, MOVIDRIVE® will execute the error response set in *P836/P837 Response to SBus TIMEOUT 1/2*. Data transmission via the system bus is not monitored when *P883*/*P893* are set to the value 0.

P884/P894 Baud rate SBus 1/2

Setting range: 125 / 250 / 500/1000 kBaud

P884/P894 is used to set the transmission speed of the system bus. The total of the baud rates specified in P884/P894 must not exceed 1125 kBaud.

P885 / P895 Synchronization ID SBus 1/2

Setting range: 0 – 1 – 2047

The drives can be synchronized for transmitting process data and parameter data via the optional CAN bus. 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.

INFORMATION

The inverters may either be synchronized by SBus 1 or SBus 2 or by DPRAM (P970). The inverters must **not be synchronized from several interfaces at the same time**.

P886/P896 Address CANopen 1/2

Setting range: 1 – 127

P886/*P896* is used to set the serial communication with the SBus.

P887 Synchronization 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.

The synchronization of MOVIDRIVE® and control takes place via *P885 / P895 Synchronization ID SBus 1/2*; the time dial is set using *P887*.

You have to set *P916 Ramp type* to BUS RAMP for cyclical presetting of the position setpoint.

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 has 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 Synchronization time

Setting range: 1 – 5 – 10 ms

Cycle time for new setpoints of a master controller.

See also *P885 / P895 Synchronization ID SBus 1/2 / P887 Synchronization ext. control*.

P889 / P899 Parameter channel 2

Setting range: YES / NO

8.3.11 P9xx IPOS parameters

The IPOS$^{plus®}$ parameters are described in detail in the IPOS$^{plus®}$ manual.

DANGER

Risk of crushing if the motor starts up unintentionally.

Severe or fatal injuries.

- Ensure that the motor cannot start unintentionally.
- Note that modifying these parameters without knowledge of the IPOS$^{plus®}$ 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$^{plus®}$ manual to make the setting for these parameters.

P90x IPOS reference travel

Reference travel is used to establish a **machine zero** to which all absolute positioning commands refer. It is possible to select from various strategies, referred to as reference travel strategies *P903 Reference travel type*. These strategies define appropriate travel modes, for example to search for a reference cam. Using the **reference point** determined by reference travel, the machine zero point can be changed using *P900 Reference offset* according to the following equation:

Machine zero = reference position + reference offset

.

The speeds of the travel movements required on the basis of the **reference travel type** are set using *P901 Reference speed 1* and *P902 Reference speed 2*.

P900 Reference offset

Setting range: $-(2^{31}-1)$ – 0 – $2^{31}-1$

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 Actual position source*.

This encoder can be a motor encoder, an external encoder or a DIP encoder. The corresponding actual positions are indicated by IPOS$^{plus®®}$ variables.

- H509 Actual position, DIP encoder
- H510 Actual position, external encoder
- H511 Actual position, motor encoder

Reference offset becomes active after reference travel has been completed successfully.

	INFORMATION
	In case of reference travel of a drive system with absolute encoder (Hiperface® or DIP), the position offset will be recalculated and overwritten by the reference travel *P905 Hiperface offset X15* / *P947 Hiperface offset X14* or DIP offset *P953 Position offset*, depending on the source set for the actual position.

P901 Reference speed 1

Setting range: 0 – 200 – 6000 rpm

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 rpm

Reference speed 2 determines the travel speed for the second part of the reference travel. Stop ramp t13 is always used to change the speed. 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 to zero pulse* to determine if the reference travel takes place to the edge change of the reference cam or 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
- **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 to zero pulse

Setting range: <u>YES</u> / NO

- <u>YES</u>: Reference travel takes place to the zero pulse of the selected IPOS$^{plus®}$ encoder.
- NO: Reference travel takes place to the falling edge of the reference cam.

P905 Hiperface offset X15

Setting range: $-(2^{31} - 1)$ – <u>0</u> – $2^{31} - 1$

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* affects 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 referenced 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 Hiperface offsets (*P905* or *P947*) are recalculated and overwritten due to the reference travel depending on the set actual position source.

The following applies:

- *P905* = Encoder value – *P900*
- *P947 Hiperface offset X14* = Encoder value – *P900*

P906 Cam distance

The parameter contains the number of increments from the reference cam to the zero pulse of the motor encoder. The cam distance is displayed after a successful reference travel. Ideally, it is half of the encoder resolution after 4-fold evaluation. Relocate the cam if necessary.

P91x IPOS travel parameters

P910 Gain X controller

Setting range: 0.1 – <u>0.5</u> – 32

Setting value for the P controller of the position control loop in IPOS^plus®^. The value from *P210 P gain hold controller* is adopted here in the default setting.

P911/912 Positioning ramp 1/2

Setting range: 0.01 – <u>1</u> – 20 s

Value set for the ramp used during the positioning operation. The same ramp (positioning ramp 1) is always used for acceleration and deceleration when the ramp type setting is *P916 Ramp type* SINE and SQUARED. With LINEAR ramp function, deceleration will be 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 – <u>1500</u> – 6000 rpm

Specifies the speed used for positioning. The setting must be adjusted to the maximum motor speed.

INFORMATION

P302/P312 Maximum speed 1/2 limits *P913*/*P914*. Therefore, always set *P302/P312 Maximum speed 1/2* greater (by about 10%) than *P913* / *P914*, else a lag error might occur!

P915 Velocity precontrol

Setting range: –199.99 – 0 – 100 – 199.99%

When the setting is 100%, the drive moves at an optimum speed with a linear speed 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.

INFORMATION

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".

P916 Ramp type

This parameter specifies the type of the positioning ramp. This influences the speed or acceleration characteristics during positioning.

INFORMATION

The following ramp types are not supported when *P702 Motor category* is set to "linear":

- SPEED INTERPOLATION
- POSITION INTERPOLATION 12 BIT
- POSITION INTERPOLATION 16 BIT

Ramp type	Positioning characteristics
LINEAR	Time-optimal but block-shaped acceleration profile.
SQUARED	Softer acceleration and higher torque demand than LINEAR.
SINE	Very soft acceleration profile, required torque higher than with SQUARED acceleration profile.
BUS RAMP	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 position specifications sent cyclically by the external controller are interpolated linearly. For configuration, one process output data word must be set to "position HIGH" and another one to "position LOW".
JERK LIMITED	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 is extended by the set jerk time in comparison to the linear ramp. The acceleration and torque do not increase in comparison with the linear ramp.
ELECTRONIC CAM	Activating the technology function "Electronic cam".
I SYNCHRONOUS OPERATION	Activating the technology function "Electronic cam".
CROSS CUTTER	Activating the technology function "Cross cutter".

Ramp type	Positioning characteristics
SPEED INTERPOLATION	The speed values sent cyclically by the external controller are interpolated linearly. • Speed specification via process data: – Set *P888 Synchronization time SBus* to 5 ms or 10 ms – Set the *P100 Setpoint source* to "SBus" or "Fieldbus" – You have to set a process output data word to "Speed". • Speed specification via SBus/SCOM object: – Set *P888 Synchronization time SBus* to 1 to 10 ms. – Set the *P100 Setpoint source* to "BIPOL. FIXED SETPT". – You must not set a process output data word to "Speed". – Create a SCOM receive object (using the SCOM receive command → IPOS$^{plus®}$ manual) with the target variable *SetpPosBus* (H499).
POSITION INTERPOLATION 12 BIT	The position specifications sent cyclically by the external controller are interpolated. Position resolution: 1 revolution corresponds to 4096 increments (12 bit). • Position specification using process data: – Set *P888 Synchronization time SBus* to 5 ms or 10 ms – Set *P100 Setpoint source* to "SBus" or "Fieldbus" – Set one process output data word to "position HIGH" and another one to "position LOW". • Position specification via SBus/SCOM object: – Set *P888 Synchronization time SBus* to 1 to 10 ms. – Set *P100 Setpoint source* to "BIPOL. FIXED SETPT". – Do not set a process output data word to "position HIGH" or "position LOW". – Create a SCOM receive object (using the SCOM receive command → IPOS$^{plus®}$ manual) with the target variable *SetpPosBus* (H499).

Ramp type	Positioning characteristics
POSITION INTERPOLATION 16 BIT	The position specifications sent cyclically by the external controller are interpolated. Position resolution: 1 revolution corresponds to 65536 increments (16 bit). • Position specification using process data: – Set *P888 Synchronization time SBus* to 5 ms or 10 ms – Set *P100 Setpoint source* to "SBus" or "Fieldbus" – Set one process output data word to "position HIGH" and another one to "position LOW". **Important:** Position resolution via PI data assignment is 4096 increments per revolution (= 12 bit). IPOS$^{plus®}$ variable H508 provides the motor position, extended to 16 bits. The IPOS$^{plus®}$ variable *ActPos_Mot* (H511) has a position resolution of 4096 increments per revolution (= 12 bit) • Position specification via SBus/SCOM object: – Set *P888 Synchronization time SBus* to 1 to 10 ms. – Set *P100 Setpoint source* to "BIPOL. FIXED SETPT". – Do not set a process output data word to "position HIGH" or "position LOW". – Create a SCOM receive object (using the SCOM receive command → IPOS$^{plus®}$ manual) with the target variable *SetPosBus* (H499). **Important:** Position resolution via PI data assignment is 4096 increments per revolution (= 12 bit). The position resolution of 4096 increments per revolution (= 12 bit) expanded to 16 bit is available on IPOS$^{plus®}$ variable H508. The IPOS$^{plus®}$ variable *ActPos_Mot* (H511) has a position resolution of 4096 increments per revolution (= 12 bit)

INFORMATION

Note the following for the POSITION "INTERPOLATION 16 BIT" ramp type:

- IPOS variable H508 is also used when S14 is set to ON.
  IPOS variable H508 only provides meaningful values when
  – DIP switch S14 = "ON" **or**
  – *P916 Ramp type* = "Position interpolation 16 bit"

P917 Ramp mode

Setting range: MODE 1 / MODE 2

This parameter determines the use of *P911/912 Positioning ramp 1/2* with ramp type set to LINEAR.

- P917 = MODE 1: Deceleration for travel to target position (spot braking) takes place with *P911/912 Positioning ramp 1/2*. *P911/912 Positioning ramp 1/2* is used for all other positioning operations. If position interpolation 12 bit or 16 bit is active, it runs in mode 1 without dead time compensation.
- P917 = MODE 2: *P911/912 Positioning ramp 1/2* is used for decelerating the speed during travel. *P911/912 Positioning ramp 1/2* is used for acceleration. If position interpolation 12 bit or 16 bit is active, mode 2 activates a dead time compensation.

P918 Bus setpoint source

Setting range: 0 – 499 – 1023

In conjunction with EtherCAT®, parameter P918 can be used to set the source for the setpoint in IPOS$^{plus®}$.

P92x IPOS monitoring

P920 / P921 SW limit switch CW/ CCW

Setting range: –(2^{31} –1) – 0 – 2^{31} –1

The software limit switches let the user limit the range in which travel commands are accepted. This is implemented via software. The limits of the movement range are specified using these two parameters (software limit switches). If *P941 Actual position source* is set to motor encoder or external encoder, then these do not take effect until after performance of a reference travel. If *P941 Actual position source* is set to absolute encoder DIP, then these are 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 error response set in *P838 Response to SW LIMIT SWITCH*. If *P838 Response to SW LIMIT SWITCH* is set to "... / Warning" or "... / Fault", then fault message F78 (IPOS SW limit switch) is generated. The software limit switches are only monitored in the "...& IPOS" (*P700/P701 Operating mode 1/2*) operating modes and ramp types LINEAR, SINE or SQUARED.

If *P838 Response to 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 have no effect. They are only activated again after the drive has been referenced.

If *P838 Response to SW LIMIT SWITCH* is set to ".../Warning", the drive remains referenced following a reset. The drive can move past the target specified due to the mass moment of inertia of the machine or if the parameter settings are set incorrectly in the controller. Software limit switches cannot prevent this from happening.

Deactivation: Set both parameter values to 0 for endless travel so that the 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 message or lag error response will be triggered. You can set the responses with *P834 Response to LAG ERROR*.

Deactivation: Set value = 0 deactivates lag error monitoring

P924 Positioning interruption detection

Factory set to "OFF"

This parameter determines whether the positioning process is monitored for interruptions (e.g. enable signal revoked). If the target is exceeded after having resumed positioning, the response set in *P924 Positioning interruption detection* will be triggered.

Target monitoring is in effect for the ramp types LINEAR, SINE, SQUARED and JERK LIMITED.

P93x IPOS 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$^{plus®}$ program. The speed can be altered within the range from 0 to 150% of the specifically programmed speed. This requires an analog input, with 0 to 150% corresponding to 0 – 10 V at the analog input. The maximum speed value is limited by *P302/P312 Maximum speed 1/2*.

P931 IPOS CTRL.W Task 1

Setting range: STOP / START / HALT

IPOS CTRL.W Task 1 in the DBG60B keypad only, not in SHELL.

STOP: Task 1 of the IPOS$^{plus®}$ program is stopped.

START: Task 1 of the IPOS$^{plus®}$ program is started.

HALT: Tasks 1, 2 and 3 of the IPOS$^{plus®}$ program are stopped.

P932 IPOS CTRL.W Task 2

Display range: START / STOP

IPOS CTRL.W Task 2 in the DBG60B keypad only, not in SHELL.

Display parameter, cannot be set using DBG60B.

START = Task 2 of the IPOS$^{plus®}$ program is currently being processed.

STOP = Task 2 of the IPOS$^{plus®}$ 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. Make sure that *P911/912 Positioning ramp 1/2* is of a greater or equal value.

P933 ≤ *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 additional assembler commands/ms with *P938*. *P938* and *P939 Speed task 2* 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 Speed task 1* 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

P94x IPOS encoder

P940 IPOS variable edit

Setting range: ON / OFF

IPOS$^{plus®}$ variables edit with DBG60B keypad only, not in SHELL.

IPOS$^{plus®}$ variables can be changed if *P940* is set to "ON".

P941 Actual position source

Setting range: Motor encoder (X15) / Ext. encoder (X14) absolute encoder (X62)

Defines the encoder to which IPOS$^{plus®}$ positions.

P942 / P943 Encoder factor numerator / denominator

Setting range: 1 – 32767

This parameter does not apply to the DEU multi-encoder card.

First set the parameter *P944 Encoder scaling ext. encoder* or*P955 Encoder scaling* (when using DIP11B or DEH21B option). Then continue with the settings for *P942*/*P943*.

In the event of positioning to an external encoder (X14) or an absolute encoder (X62), 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 absolute 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

This parameter does not apply to the DEU multi-encoder card.

Parameter *P944* is only effective on the encoder connected to X14.

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. First set the parameter 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 from H511 difference divided by H510 difference. Set the parameter P944 Encoder scaling ext. to the value that is closest to the calculated quotient.

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Important: Encoder scaling directly affects the parameters *P900 Reference offset*, *P942 / P943 Encoder factor numerator / denominator* as well as the parameter group *P92x IPOS monitoring*. All positions of the IPOS$^{plus®}$ 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.

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, contact SEW-EURODRIVE.

P945 Synchronous encoder type (X14)

Setting range: TTL / SIN/COS / HIPERFACE/RS485

This parameter does not apply to the DEU multi-encoder card.

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_{PP})
- HIPERFACE/RS485: Encoder with designation AV1H, AS1H, ES1H, EV1H
- SSI: Encoder with SSI protocol

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. ENCODER TTL / 1024
ES1T[1)] / ES2T[1)] / EV1T[1)] / EH1T[1)]	INCREM. ENCODER TTL / 1024
AV1H / AS1H / ES1H / EV1H	HIPERFACE®
AS7W / AG7W	RS485

1) Only via DWI11A

P946 Distance encoder counting direction (X14)

Setting range: NORMAL / INVERTED

This parameter does not apply to the DEU multi-encoder card.

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: $-(2^{31} - 1) - \underline{0} - 2^{31} - 1$

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 Hiperface offset X15*
- *P947 Hiperface offset X14* affects 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 a Hipferface® encoder, the Hipferface® offsets (*P905 Hiperface offset X15* or P947) are recalculated and overwritten due to the reference travel depending on the set actual position source.

The following applies:

- *P905 Hiperface offset X15* = Encoder value – *P900 Reference offset*
- *P947* = Encoder value – *P900 Reference offset*

P948 Automatic encoder replacement detection

Setting range: ON / OFF

This parameter is only effective with Hiperface® multi-turn encoders.

- ON: A replaced Hiperface® multi-turn encoder is detected. Reference travel is required before the "IPOS referenced" bit is set.

  Note the following when operating a linear motor with AL1H motor encoder:

  If the linear motor was commutated in the dialog "Encoder adjustment" during initial startup, the "LSM commutated" bit will be cleared in the IPOS status word after encoder replacement. A new commutation travel must be triggered to enable the inverter. Doing so will reset the "LSM commutated" bit. Commutation travel is triggered automatically if the "/CONTROLLER INHIBIT" terminal is set to "1" and no terminal set to "Enable" receives a "1 signal". If a terminal set to "Enable" receives a "1 signal", or if no terminal is set to "Enable", error message F81 will be issued.

  For linear motors with AL1H motor encoder, SEW-EURODRIVE recommends to set parameter *P948* to "OFF". After having replaced the encoder, test the drive system with reduced velocity and force in jog mode.
- OFF: The Hiperface® multi-turn encoder is always referenced. The "IPOS referenced" bit is set.

  Note the following when operating a linear motor with AL1H motor encoder:

  If the linear motor was commutated in the dialog "Encoder adjustment" during initial startup, the "LSM commutated" bit will be maintained in the IPOS status word. The drive system can be enabled immediately.

INFORMATION

If P948 is switched off and on again, the "IPOS referenced" bit is set to "0" once you have restarted the MOVIDRIVE®.

Reference travel is necessary to reset the "IPOS referenced" bit to "1".

P95x Absolute encoder

The DIP parameters are described in detail in the "MOVIDRIVE® MDX61B Absolute Encoder Card DIP11B/DEH21B" manual. The DIP11B option cannot be used with MOVIDRIVE® MDX61B size 0.

These parameters apply only to encoders that are connected to X62 (DIP11B or DEH21B).

P950 Encoder type

The absolute encoder connected to the DEH21B/DIP11B option (X62) is selected. At present, encoders can be selected from the following list:

- VISOLUX: EDM
- TR: CE58, CE65, CE100MSSI, ZE65M, LA41KSSI, LA66KSSI
- TR: LE100 SSI, LE200
- HEIDENHAIN: AV1Y / ROQ424
- SICK/STEGMANN: ATM60, DME 3000, DME 4000, DME 5000
- SICK/STEGMANN: AG100MSSI, AG626, Pomux KH53

- STAHL: WCS2, WCS3
- IVO: GM401, GXMMW
- LEUZE: BPS37, OMS1, OMS2, AMS200
- KÜBLER: 9081
- MTS: Temposonics RP, RH, RF, RD3
- HÜBNER: AH7Y / HMG161-S24 H2048
- HÜBNER: AS7Y, AG7Y
- ELGO: LIMAX2-00-030-0125-SSG1-D9M3
- BALLUF: BTL5-S112-M1500-P-S32
- Pepperl & Fuchs: AVM58X1212, WCS2A, WCS3A, EDM, VDM100

P951 Counting direction

Setting range: NORMAL / INVERTED

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.

P952 Cycle frequency

Setting range: 1 – 200%

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.

P953 Position offset

Setting range: $-(2^{31} - 1)$ – 0 – $2^{31} - 1$

The position offset P953 only needs to be set on incremental encoders; it should be set to 0 for other encoders.

Note: The position value will be recalculated and overwritten automatically after successful completion of the reference travel.

P954 Zero offset

Setting range: $-(2^{31} - 1)$ – 0 – $2^{31} - 1$

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 (2^{31}) 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.

The required value is the display value you wish to have for the current position.

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. First set the parameter 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 from H511 difference divided by H509 difference. Set parameter *P955* Encoder scaling to the value that is closest to the calculated quotient.

Important: Encoder scaling directly influences parameters *P900 Reference offset*, *P942 / P943 Encoder factor numerator / denominator*, *P954 Zero offset* and the parameter group *P92x IPOS monitoring*. All positions of the IPOS$^{plus®}$ 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$^{plus®}$ modulo function

The IPOS$^{plus®}$ modulo function is used for endless positioning, for example with circular indexing tables or chain conveyors. Refer to the IPOS$^{plus®}$ manual for detailed information.

Observe that the maximum target position must be < 2^{31}/(P963 × P961).

P960 Modulo function

Setting range: <u>OFF</u> / SHORT / CW / CCW

- <u>OFF</u>: The modulo function is deactivated.
- SHORT: The "short distance" 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. "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. "CW" direction of rotation is not possible.

P961 Modulo numerator

Setting range: <u>1</u> – 2^{31} – 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 × numerator additional gear i

P962 Modulo denominator

Setting range: <u>1</u> – 2^{31} – 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 × denominator additional gear i

P963 Modulo encoder resolution

Setting range: 1 – <u>4096</u> – 65535

Resolution of the selected IPOS$^{plus®}$ encoder system in increments.

The IPOS$^{plus®}$ encoder resolution for positioning to the motor encoder will be set to 4,096 increments (prerequisite is an encoder resolution of 512 to 2048).

P97x IPOS synchronization

P970 DPRAM synchronization

Setting range: ON / OFF

MOVIDRIVE® B allows for synchronized operation with option cards (e.g. DHP11B, DFE24B).

ON: Synchronized operation with option card is activated.

Important: The inverters may either be synchronized by SBus1, SBus2 or by DPRAM. The inverters must **not be synchronized from several interfaces at the same time**. SEW-EURODRIVE recommends to set *P885* / *P895* 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: Synchronized operation with the option card is not activated.

P971 Synchronization phase

Setting range: −2 – 0 – 2 ms

Time interval between clock signal and data transfer

8.4 Operating modes

INFORMATION

- For operating modes with encoder feedback, parameters must not be changed in cycles faster than 2 seconds. The reason is to ensure that the encoders can be initialized.
- The maximum output frequency in the VFC operating modes without encoder feedback is 150 Hz.
- The maximum output frequency in the V/f operating mode and all operating modes with encoder feedback is 600 Hz.
- If the maximum output frequency is exceeded, error 08 "Speed monitoring" is displayed.

8.4.1 VFC 1/2 and V/f characteristic

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 MOVITOOLS® MotionStudio 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/P313 Current limit 1/2	I_{max} (inverter) = 150% I_{N_mot}
P302/P312 Maximum speed 1/2	Depends on number of poles and rated motor frequency e. g. 2-pole / 50 Hz -> 3000 rpm e. g. 4-pole / 60 Hz -> 1800 rpm
P301 / P311 Minimum speed 1/2	15 rpm
P130 – P133 / P140 – P143 ramp t11 / t21 up/down CW/ CCWP130 – P133 / P140 – P143 ramp t11 / t21 up/down CW/CCW	2 s

Settings after the startup function	
P136 / P146 Stop ramp t13 / t23	2 s
P137 / P147 Emergency stop ramp t14 / t24	2 s
P500/P502 Speed monitoring 1/2	MOTOR & REGENERATIVE
P501/P503 Delay time 1/2	1 s
P100 Setpoint source	UNIPOL./FIX.SETPT
P101 Control signal source	TERMINALS
P730 / P733 Brake function 1 / 2	ON
P731 / P734 Brake release time 1 / 2	For SEW motors: Setting in accordance with motor data. **For non-SEW motors: Set the correct value manually!**
P732 / P735 Brake application time 1 / 2	
P300 / P310 Start/stop speed 1/2	15 rpm
P820/P821 4-quadrant operation 1/2	ON
P324/P334 Slip compensation 1/2	Setting in accordance with specified motor data
P321/P331 Boost 1/2	0
P322/P332 IxR adjustment 1/2	Setting in accordance with specified motor data
P320/P330 Automatic adjustment 1/2	ON
P323/P333 Premagnetization time 1/2	Setting in accordance with specified motor data

INFORMATION

- SEW-EURODRIVE recommends using the *P320/P330 Automatic adjustment 1/2* parameter activated in the factory setting. This means the *P322/P332 IxR adjustment 1/2* parameter is set automatically during the pre-magnetization time through the calibration of the motor.
- SEW-EURODRIVE recommends not changing the *P321/P331 Boost 1/2* parameter from its factory setting (=0).

8.4.2 VFC 1 / 2 & Group

Select 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 according to *P730 / P733 Brake function 1 / 2*. Set the data for the largest motor in the group during startup. Once startup is finished, adapt the *P303/P313 Current limit 1/2* to the total current of all connected motors. We recommend a basic setting of *P321/P331 Boost 1/2* to the same value as *P322/P332 IxR adjustment 1/2*.

Settings after the startup function	
P303/P313 Current limit 1/2	I_{max} (inverter) = 150% ΣI_{N_Mot}
P302/P312 Maximum speed 1/2	Depends on number of poles and rated motor frequency e. g. 2-pole / 50 Hz -> 3000 rpm e. g. 4-pole / 60 Hz -> 1800 rpm
P301 / P311 Minimum speed 1/2	15 rpm
P130 – P133 / P140 – P143 ramp t11 / t21 up/down CW/CCW	2 s
P136 / P146 Stop ramp t13 / t23	2 s
P137 / P147 Emergency stop ramp t14 / t24	2 s
P500/P502 Speed monitoring 1/2	MOTOR & REGENERATIVE
P501/P503 Delay time 1/2	1 s
P100 Setpoint source	UNIPOL./FIX.SETPT
P101 Control signal source	TERMINALS
P730 / P733 Brake function 1 / 2	ON

Settings after the startup function	
P731 / P734 Brake release time 1 / 2	For SEW motors: Setting in accordance with motor data. **For non-SEW motors: Set the correct value manually!**
P732 / P735 Brake application time 1 / 2	
P300 / P310 Start/stop speed 1/2	Setting in accordance with specified motor data
P820/P821 4-quadrant operation 1/2	ON

INFORMATION

- 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.

8.4.3 VFC 1 / 2 & hoist/ VFC n-control & hoist

VFC n-control & hoist in parameter set 1 only. Disabling 4Q operation (*P820/P821 4-quadrant operation 1/2*) will be ignored.

In VFC&Hoist operating mode, the start/stop speed (*P300 / P310 Start/stop speed 1/2*) is set to the slip speed of the motor; in the VFC n-control & hoist operating mode it is set to 15 rpm.

The minimum speed (*P301 / P311 Minimum speed 1/2*) is internally limited to 15 rpm in 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.

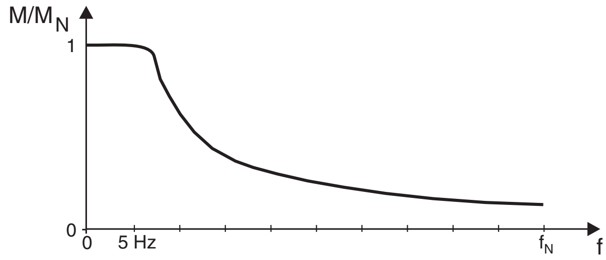
Faulty constellations	Triggered fault
2 or 3-phase motor phase failure	F82 = Output open
Premagnetization time too short or incorrect motor/inverter combination.	F81 = Start condition error
Motor phase failure due to active speed monitoring (factory setting) ***P500/P502 Speed monitoring 1/2, P501/P503 Delay time 1/2***	F08 = n-monitoring error

INFORMATION

- A single-phase motor phase failure cannot always be detected reliably.
- SEW-EURODRIVE strongly recommends activating speed monitoring (factory setting).
- Correct performance of the hoist function requires the motor brake to be controlled via the inverter.
- The control must be designed in such a way that the direction of rotation of the drive can only be changed when it is at a standstill.

8.4.4 VFC 1 / 2 & DC BRAKING and V/f & DC BRAKING

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.



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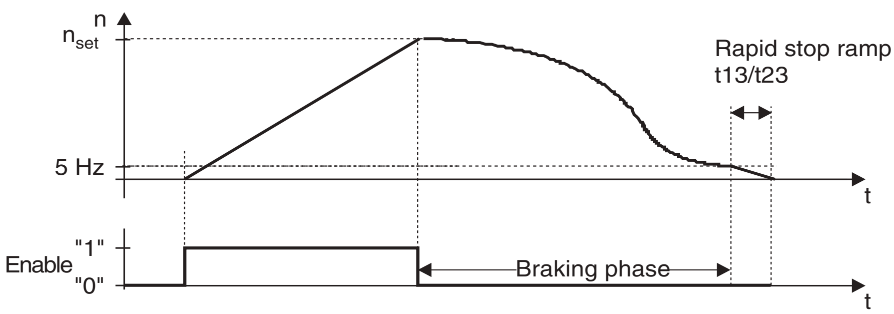
A constant current with a rotating field frequency of 5 Hz is supplied during the braking process. The braking torque = 0 at standstill. A greater braking torque acts at a slower speed; the braking torque drops as the speed increases. The braking time and consequently the duration of the braking current 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 impressed with rated motor current according to the startup function. In all cases, the inverter limits the current to max. 125% I_N. For controlling the brake, see the braking function.

CAUTION

No guided stop.

The system can 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.



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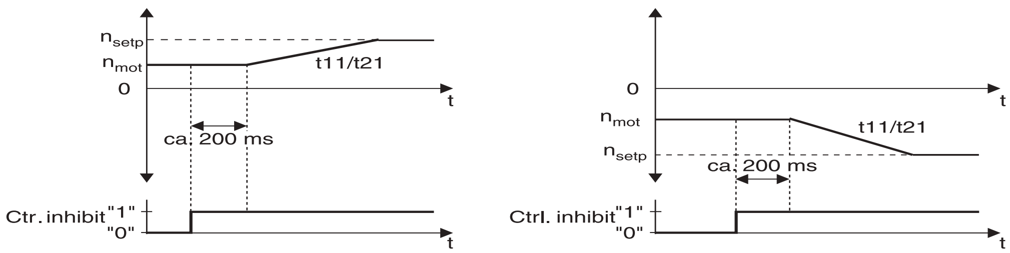
INFORMATION

- The **braking procedure is not interrupted** if the binary input "Enable" receives a "1" signal again during the braking phase. The DC braking is completed before the drive is accelerated.
- 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 then binary input "Enable" 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 before "CW/Stop (CCW/Stop)" is switched from "1" to "0".

8.4.5 VFC 1 / 2 & flying start

The flying start function lets you synchronize the inverter to a motor that is already running. This function is used in particular with drives that are not braked actively, run on for a long time or are turned by a flowing medium, e.g. pumps and fans. The maximum flying start time is approx. 200 ms.



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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 rpm (4-pole motor).

DANGER

Risk of crushing if the motor starts up unintentionally in hoist applications.

Severe or fatal injuries.

- **Do not use the flying start function in hoist applications!**
- Ensure that the motor cannot start unintentionally.

INFORMATION

- The flying restart function does not function if there is an output filter connected to the inverter.
- Due to exact motor data, the proper function of the flying start function has only been tested with SEW motors. SEW-EURODRIVE does not guarantee a proper function of the flying start function for non-SEW motors.

8.4.6 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_{PP}
- HTL encoder with DWE12B option

SEW-EURODRIVE recommends the use of encoders with 1024 increments/revolution as standard. Speed control results in the following characteristics:

- Increased static control accuracy and higher dynamic response.
- Hold control: Programming a binary input to "/Hold control" (*P60x Binary inputs of basic unit* / *P61x Binary inputs of option*) enables the motor to be brought to a standstill with position control even when under load. Set hold control with *P210 P gain hold controller*.
- Synchronous operation is possible with DRS11B.

The startup function of MOVITOOLS® MotionStudio 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/P313 Current limit 1/2	I_{max} (inverter) = 150% I_{motor}
P302/P312 Maximum speed 1/2	Depends on number of poles and rated motor frequency e. g. 2-pole / 50 Hz -> 3000 rpm e. g. 4-pole / 60 Hz -> 1800 rpm
P301 / P311 Minimum speed 1/2	0 rpm
P500/P502 Speed monitoring 1/2	MOTOR & REGENERATIVE
P501/P503 Delay time 1/2	0.1 s
P100 Setpoint source	UNIPOL./FIX.SETPT
P101 Control signal source	TERMINALS
P730 / P733 Brake function 1 / 2	ON
P731 / P734 Brake release time 1 / 2	For SEW motors: Setting in accordance with motor data. **For non-SEW motors: Set the correct value manually!**
P732 / P735 Brake application time 1 / 2	
P323/P333 Premagnetization time 1/2	Setting in accordance with specified motor data

Settings after the startup function of the speed controller	
P200 P-gain n-controller	Setting in accordance with specified data
P201 Time constant n-controller	
P202 Gain acceleration precontrol	
P204 Filter actual speed value	
P115 Filter setpoint	
P203 Filter acceleration precontrol	
P210 P gain hold controller	Position controller gain for the hold control function
P910 Gain X controller	Position controller gain for IPOS$^{plus®}$ (positioning mode)

Settings after the startup function of the speed controller	
P130 – P133 / P140 – P143 ramp t11 / t21 up/down CW/CCW	Setting in accordance with specified data
P136 / P146 Stop ramp t13 / t23	
P137 / P147 Emergency stop ramp t14 / t24	

Setting of *P820/P821 4-quadrant operation 1/2* is ignored; 4-Q operation is always active.

8.4.7 VFC n-control & group

VFC n-control & group in parameter set 1 only.

Select 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_{PP}
- HTL encoder with DWE12B option

SEW-EURODRIVE recommends the use of encoders with 1024 increments/revolution as standard.

The startup function of MOVITOOLS® MotionStudio 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/P313 Current limit 1/2	I_{max} (inverter) = 150% ΣI_{N_Mot}
P302/P312 Maximum speed 1/2	Depends on number of poles and rated motor frequency e. g. 2-pole / 50 Hz -> 3000 rpm e. g. 4-pole / 60 Hz -> 1800 rpm
P301 / P311 Minimum speed 1/2	0 rpm
P500/P502 Speed monitoring 1/2	MOTOR & REGENERATIVE
P501/P503 Delay time 1/2	0.1 s
P100 Setpoint source	UNIPOL./FIX.SETPT
P101 Control signal source	TERMINALS
P730 / P733 Brake function 1 / 2	ON
P731 / P734 Brake release time 1 / 2	For SEW motors: Setting in accordance with motor data. **For non-SEW motors: Set the correct value manually!**
P732 / P735 Brake application time 1 / 2	
P323/P333 Premagnetization time 1/2	Setting in accordance with specified motor data

Settings after the startup function of the speed controller	
P200 P-gain n-controller	Setting in accordance with specified data
P201 Time constant n-controller	
P202 Gain acceleration precontrol	
P204 Filter actual speed value	
P115 Filter setpoint	
P203 Filter acceleration precontrol	
P210 P gain hold controller	Position controller gain for the hold control function

Settings after the startup function of the speed controller	
P910 Gain X controller	Position controller gain for IPOS$^{plus®}$ (positioning mode)
P130 – P133 / P140 – P143 ramp t11 / t21 up/down CW/CCW	Setting in accordance with specified data
P136 / P146 Stop ramp t13 / t23	
P137 / P147 Emergency stop ramp t14 / t24	

Setting of *P820/P821 4-quadrant operation 1/2* is ignored; 4-Q operation is always active.

8.4.8 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.

8.4.9 VFC n-control & IPOS

VFC n-control & IPOS in parameter set 1 only.

Must be set if IPOS$^{plus®}$ positioning commands are to be processed. Refer to the "IPOS$^{plus®}$ Positioning and Sequence Control System" manual for detailed descriptions of IPOS$^{plus®}$. This manual can be obtained from SEW-EURODRIVE.

8.4.10 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_{PP}
- 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/P334 Slip compensation 1/2, *P321/P331 Boost 1/2* and *P322/P332 IxR adjustment 1/2* are ineffective.

The MOVITOOLS® MotionStudio 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/P313 Current limit 1/2	I_{max} (inverter) = 150% I_{motor}
P302/P312 Maximum speed 1/2	Depends on number of poles and rated motor frequency e. g. 2-pole / 50 Hz -> 3000 rpm e. g. 4-pole / 60 Hz -> 1800 rpm
P301 / P311 Minimum speed 1/2	0 rpm

Settings after the startup function	
P500/P502 Speed monitoring 1/2	MOTOR & REGENERATIVE
P501/P503 Delay time 1/2	0.1 s
P100 Setpoint source	UNIPOL./FIX.SETPT
P101 Control signal source	TERMINALS
P730 / P733 Brake function 1 / 2	ON
P731 / P734 Brake release time 1 / 2	Setting in accordance with specified motor data
P732 / P735 Brake application time 1 / 2	
P323/P333 Premagnetization time 1/2	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 n-controller	Setting in accordance with specified data
P201 Time constant n-controller	
P202 Gain acceleration precontrol	
P204 Filter actual speed value	
P115 Filter setpoint	
P203 Filter acceleration precontrol	
P210 P gain hold controller	Position controller gain for the hold control function
P910 Gain X controller	Position controller gain for IPOS$^{plus®}$ (positioning mode)
P130 – P133 / P140 – P143 ramp t11 / t21 up/down CW/CCW	Setting in accordance with specified data
P136 / P146 Stop ramp t13 / t23	
P137 / P147 Emergency stop ramp t14 / t24	

Setting of *P820/P821 4-quadrant operation 1/2* is ignored; 4-Q operation is always active.

8.4.11 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 rpm = 150% output current × torque constant.

In *P16x / P17x Fixed setpoints 1 / 2*, the torques have to be entered directly in [% I_N]. The set processing *P11x Analog input AI1* also applies to the torque control if the setpoint selection is made by way of an analog input.

The torque constant (motor-specific value) is defined with: $k_T = M_N / I_{q\_n}$

INFORMATION

• If *P500/P502 Speed monitoring 1/2* is active, the drive is monitored according to the *P500/P502 Speed monitoring 1/2* parameter description.
• If *P500/P502 Speed monitoring 1/2* = OFF, the drive responds as follows if its speed exceeds or drops below *P500/P502 Speed monitoring 1/2*:
  – Motor operation: The available motor torque is reduced to zero with a linear function above n_{max} and below $-n_{max}$. 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 $-n_{min}$ – n – n_{min}.
• The current is always limited to *P303/P313 Current limit 1/2*.
• At a stop ramp, the drive inverter switches to speed control and the drive is decelerated along the relevant stop ramp.

Settings after the startup function	
P303/P313 Current limit 1/2	I_{max} (inverter) = 150% I_{motor}
P302/P312 Maximum speed 1/2	Depends on number of poles and rated motor frequency e. g. 2-pole / 50 Hz -> 3000 rpm e. g. 4-pole / 60 Hz -> 1800 rpm
P301 / P311 Minimum speed 1/2	0 rpm
P500/P502 Speed monitoring 1/2	MOTOR & REGENERATIVE
P501/P503 Delay time 1/2	0.1 s
P100 Setpoint source	UNIPOL./FIX.SETPT
P101 Control signal source	TERMINALS
P730 / P733 Brake function 1 / 2	ON
P731 / P734 Brake release time 1 / 2	Setting in accordance with specified motor data.
P732 / P735 Brake application time 1 / 2	
P323/P333 Premagnetization time 1/2	Setting in accordance with specified motor data

Settings after the startup function of the torque controller	
P200 P-gain n-controller	Setting in accordance with specified data
P201 Time constant n-controller	
P202 Gain acceleration precontrol	
P204 Filter actual speed value	
P115 Filter setpoint	
P203 Filter acceleration precontrol	
P210 P gain hold controller	Position controller gain for the hold control function
P910 Gain X controller	Position controller gain for IPOS$^{plus®}$ (positioning mode)
P130 – P133 / P140 – P143 ramp t11 / t21 up/down CW/CCW	Setting in accordance with specified data
P136 / P146 Stop ramp t13 / t23	
P137 / P147 Emergency stop ramp t14 / t24	

Setting of *P820/P821 4-quadrant operation 1/2* is ignored; 4-Q operation is always active.

8.4.12 CFC & IPOS

CFC & IPOS in parameter set 1 only.

Must be set if IPOSplus® positioning commands are to be processed. Refer to the "IPOSplus® Positioning and Sequence Control System" manual for detailed descriptions of IPOSplus®. This manual can be obtained from SEW-EURODRIVE.

8.4.13 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.

8.4.14 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 MOVITOOLS® MotionStudio 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	
P303/P313 Current limit 1/2	I_{max} (inverter) = Max. motor current at standstill
Torque limit	The value of the motor torque can be limited. The maximum value is determined by the motor type. Do not alter *P303/P313 Current limit 1/2*!
P302/P312 Maximum speed 1/2	Rated motor speed (2000 rpm, 3000 rpm, 4500 rpm)
P301 / P311 Minimum speed 1/2	0 rpm
P500/P502 Speed monitoring 1/2	MOTOR & REGENERATIVE
P501/P503 Delay time 1/2	0.1 s
P100 Setpoint source	UNIPOL./FIX.SETPT
P101 Control signal source	TERMINALS
P730 / P733 Brake function 1 / 2	ON
P731 / P734 Brake release time 1 / 2	Setting in accordance with specified motor data
P732 / P735 Brake application time 1 / 2	

SERVO always requires to startup the speed controller.

Settings after the startup function of the speed controller	
P200 P-gain n-controller	Setting in accordance with specified data
P201 Time constant n-controller	
P202 Gain acceleration precontrol	
P204 Filter actual speed value	
P115 Filter setpoint	
P203 Filter acceleration precontrol	
P210 P gain hold controller	Position controller gain for the hold control function
P910 Gain X controller	Position controller gain for IPOSplus® (positioning mode)
P130 – P133 / P140 – P143 ramp t11 / t21 up/down CW/CCW	Setting in accordance with specified data
P136 / P146 Stop ramp t13 / t23	
P137 / P147 Emergency stop ramp t14 / t24	

Setting of *P820/P821 4-quadrant operation 1/2* is ignored; 4-Q operation is always active.

8.4.15 SERVO & M-control

SERVO & M-control in parameter set 1 only.

This operating mode allows the servomotor to be controlled directly with torque control. The setpoint is standardized on the following torque:

3000 rpm = 150% output current × torque constant

As fixed setpoints, the torque values must be entered directly in the unit [% I_N] (*P16x / P17x Fixed setpoints 1 / 2*). The set processing (*P11x Analog input AI1*) also applies to the torque control if the setpoint selection is made by way of an analog input.

The torque constant (motor-specific value) is defined with: $k_e = M_0 / I_0$

INFORMATION

- If *P500/P502 Speed monitoring 1/2* is active, the drive is monitored according to the *P500/P502 Speed monitoring 1/2* parameter description.
- If *P500/P502 Speed monitoring 1/2* = OFF, the drive responds as follows if its speed exceeds or drops below *P500/P502 Speed monitoring 1/2*:
  – Motor operation: The available motor torque is reduced to zero with a linear function above n_{max} and below $–n_{max}$. 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 $–n_{min}$ – n – n_{min}.
- The current is always limited to *P303/P313 Current limit 1/2*.
- At a stop ramp, the drive inverter switches to speed control and the drive is decelerated along the relevant stop ramp.

8.4.16 SERVO & IPOS

SERVO & IPOS in parameter set 1 only.

Must be set if IPOS$^{plus®}$ positioning commands are to be processed. Refer to the "IPOS$^{plus®}$ Positioning and Sequence Control System" manual for detailed descriptions of IPOS$^{plus®}$. This manual can be obtained from SEW-EURODRIVE.

8.4.17 SERVO & Sync

SERVO & Sync in parameter set 1 only.

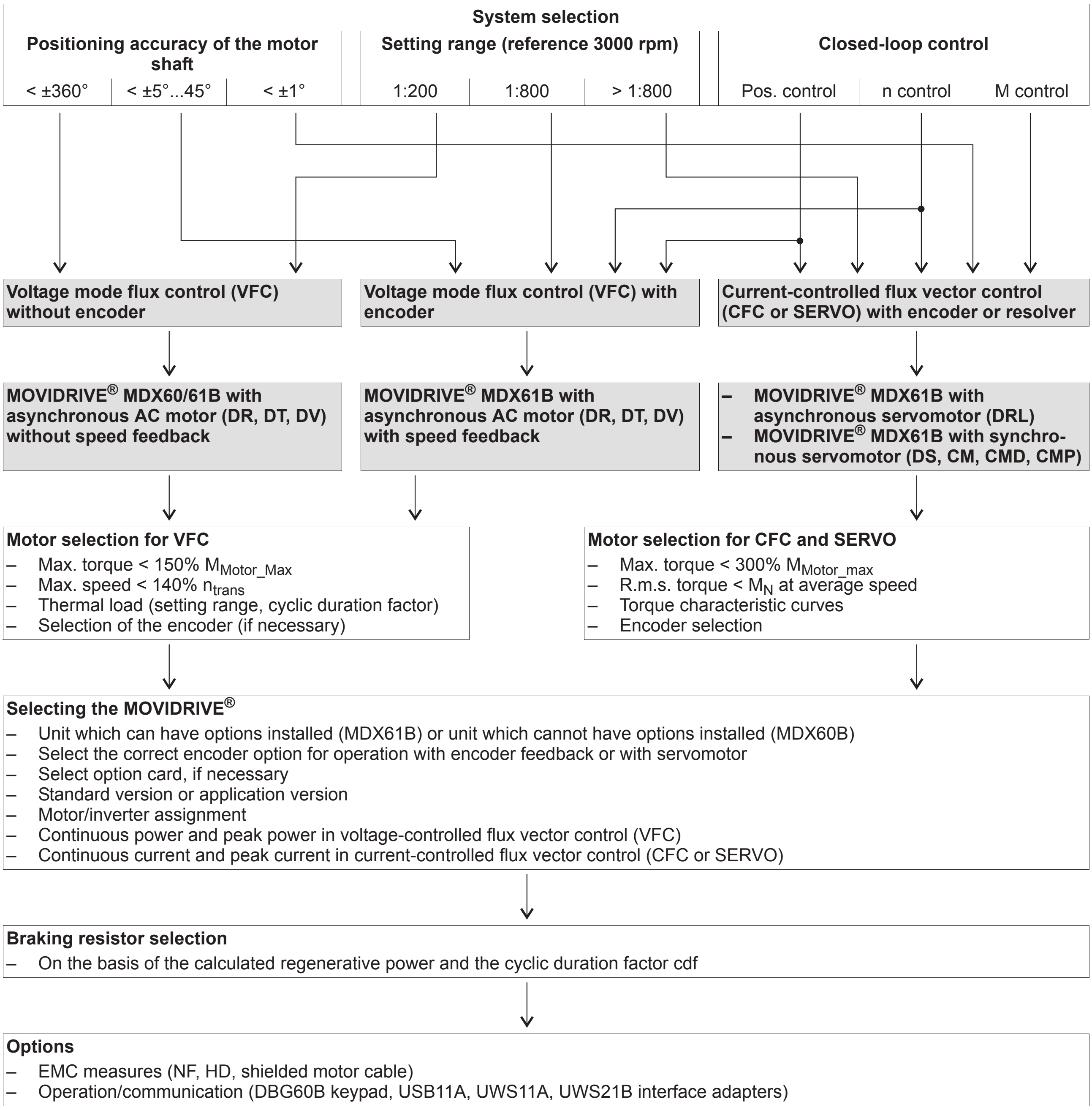
Set on the slave drives if a group of servomotors should be operated at a synchronous angle in relation to one another or with an adjustable proportional ratio. Refer to the "MDX61B - Synchronous Operation Board DRS11B" manual for a detailed description of synchronous operation. This manual is available from SEW-EURODRIVE.

9 Project Planning

9.1 Schematic procedure

9.1.1 Drive properties

The required drive properties are the main factors determining the selection of the inverter. The following figure provides assistance.



Pos. control = Positioning control
n control = Speed control
M control = Torque control

M_N = Rated motor torque
n_{trans} = Rated speed (base speed) of the motor

VFC = Voltage controlled flux vector control (Voltage Mode Flux Control)
CFC = current-controlled flux vector control for asynchronous servomotors (Current Mode Flux Control)
SERVO = current-controlled flux vector control for synchronous servomotors

9.2 *Control characteristics*

9.2.1 Characteristic values

MOVIDRIVE® 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.

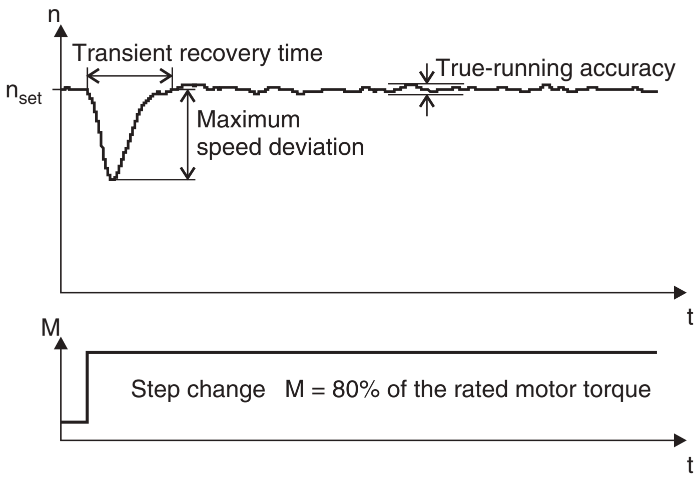


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Figure 1: Features of control characteristics

The following values apply to MOVIDRIVE® inverters in combination with motors of the same power:

MOVIDRIVE® type	Continuous speed range n_{max} = 3000 rpm	Stationary control accuracy[1)] based on n_{max} = 3000 rpm
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 speed mean value to setpoint speed

The defined control characteristics are maintained in the specified speed range.

9.2.2 Control characteristics

INFORMATION

Due to the higher output frequency, the following motors must be operated with a PWM frequency of at least 8 kHz (P864):

- CMP 40 – 63 for speed class 6000 rpm
- CMP 71 – 100 for speed classes 4500 rpm and 6000 rpm

INFORMATION

The following project planning guidelines apply to the operation of CMP71-100 motors:

- The motor load must not exceed a maximum of four times the rated motor current I_0.
- The current of MOVIDRIVE® B must be limited to the following values:
  - For size 0 to 166% I_N
  - For sizes 1 – 6 to 125% I_N
- The following motor selection tables take account of these project planning guidelines.

The following table shows the differences in control characteristics between VFC without encoder, VFC with encoder, and CFC (always with encoder) operating modes.

Specification

- Set speed n_{set} = 1000 rpm
- Step change in load DM = 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 DM = 80%, with reference to n = 3000 rpm	True-running accuracy at M = const. in relation to n = 3000 rpm
VFC without encoder	100%	1.8%	≤ 0.20%
VFC with TTL sensor (1024 inc.)	90%	1.5%	≤ 0.17%
CFC with TTL sensor (1024 inc.)	35%	1.0%	≤ 0.07%
CFC with sin/cos encoder	25%	0.7%	≤ 0.03%

INFORMATION

We recommend that you choose CFC operating mode for position-controlled applications with MOVIDRIVE® B size 7.

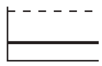
9.3 *Description of the applications*

9.3.1 Description of the applications

Selecting the inverter

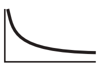
The great number of different drive applications can be divided into five categories. The five categories are listed below together with the recommended SEW inverter. The assignment is based on the required setting range and the resulting control process.

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
     – MOVIDRIVE® MDX61B with in the VFC n-CONTROL operating mode

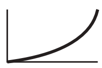


2. Dynamic load, e.g. trolleys; brief high torque demand for acceleration followed by low load.
   - Low requirements on the setting range (motor without encoder)
     – MOVIDRIVE® MDX60/61B without option in VFC operating mode
   - High requirements on the setting range
     – MOVIDRIVE® MDX61B with in the VFC n-CONTROL operating mode
   - High dynamic properties required (asynchronous or synchronous servomotor)
     – Asynchronous or synchronous servomotor with encoder feedback: MOVIDRIVE® MDX61B in CFC or SERVO operating mode

3. Stationary load, e.g. hoists; mainly steady high stationary load with overload peaks.
   - Low requirements on the setting range (motor without encoder)
     – MOVIDRIVE® MDX60/61B in VFC operating mode
   - High requirements on the setting range (motor with encoder)
     – Motor with encoder: MOVIDRIVE® MDX61B in VFC-n-CONTROL, CFC or 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 encoder: MOVIDRIVE® MDX61B in CFC&M-CONTROL or 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).
     – Asynchronous servomotor without encoder: MOVIDRIVE® MDX60/61B in VFC or V/f operating mode.

Project planning for hoists

In practice, hoists are dimensioned by taking account of special thermal and safety-relevant criteria.

Thermal factors

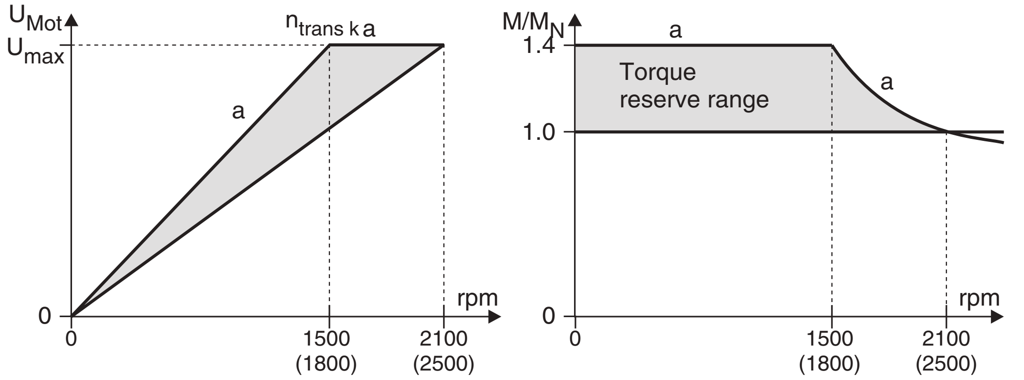
In contrast to trolleys, hoists require approx. 70 to 90% of the rated motor torque assuming constant speed upwards or downwards and the standard configuration.

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 designed for a maximum speed of 2100 rpm (70 Hz) with a transition speed of 1500 rpm (50 Hz) and 2500 rpm (83 Hz) at a transition speed of 1800 rpm (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 rpm (0...50 Hz) or 0...1800 rpm (0...60 Hz). Further advantages are that the speed range is greater and the self-cooling of the motor more powerful.



2102367243

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 (page 307).

Encoder monitoring

MOVIDRIVE® has encoder monitoring for RS422, TTL, sin/cos, and HIPERFACE® encoders.

	INFORMATION
	For speed controlled hoist drives, SEW-EURODRIVE recommends using RS422, TTL, sin/cos, or HIPERFACE® 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. Maximum load occurs at the maximum speed; overload peaks do not occur. This is why the dimensions of MOVIDRIVE® 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 kHz) of MOVIDRIVE®. This means MOVIDRIVE® can operate a motor with the power of the next higher motor type. See also "Motor selection examples" (page 307).

9.4 Basic recommendations for motor selection

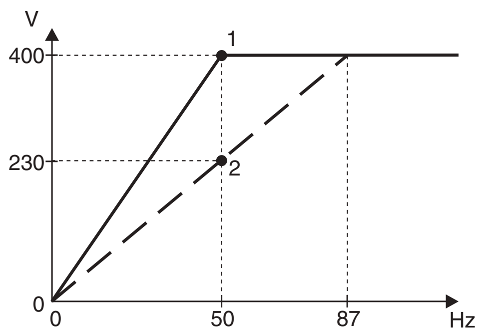
- Only use motors with at least thermal class 155 (F).
- Use TF thermistors or TH winding thermostats. TH should be preferred in the case of group drives on one inverter. The series connection of the TH contacts (normally closed) is not subject to limitation when both monitoring functions are used.
- 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 applies particularly to gearmotors 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® MDX61B with DEH11B Hiperface® encoder card option or with DER11B resolver card option is required for speed control. In this case, the motor must be equipped with an encoder (Hiperface®, sin/cos, or TTL) or resolver.

9.5 *Motor selection for asynchronous AC motors (VFC)*

9.5.1 Voltage/frequency characteristic curve

The VFC operating mode 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 curves of an asynchronous AC motor 230/400 V, 50 Hz.



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1 Star connection: 400 V, 50 Hz

2 Delta connection: 230 V, 50 Hz

The inverter output voltage V_{out} is limited by the connected supply voltage. The "nominal supply voltage" input value in the startup function limits the r.m.s. 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 "nominal supply voltage" input value is less than or equal to the supply voltage of the inverter.

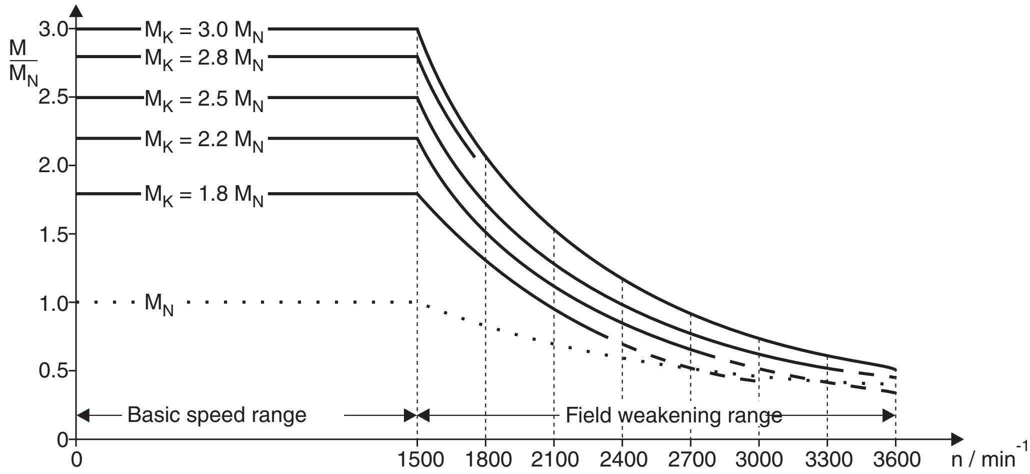
9.5.2 Speed/torque characteristic curve

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 rpmn) 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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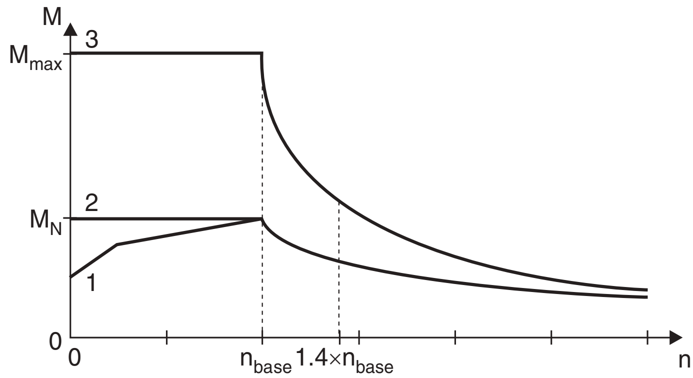
With gearmotors, the maximum motor speed depends on the size and mounting position of the gear unit. The speed should not exceed 3000 rpm due to the resulting noise and oil churning losses.

Typical speed-torque characteristic curve

M_N is determined by the motor. M_{max} and n_{base} depend on the motor/inverter combination. Refer to the motor selection tables for the CFC mode for the values of n_{base}, M_N and M_{max}.



1476913547

[1] With self-cooling
[2] With forced cooling
[3] Maximum torque

9.5.3 Dynamic applications ($P_{inverter} > P_{motor}$)

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 manually set 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.

INFORMATION

Set parameter P324 "Slip compensation" to **max. 130% of the rated slip of the motor** for **stable operation**.

Combinations with $P_{inverter}$ > 4 × 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.

9.5.4 DRS motor selection with delta/star connection type (AC 230/400 V / 50 Hz)

<table>
<tr><th colspan="8">Motors for AC 380 V / 60 Hz can also be allocated on the basis of this selection table.
P_{max} in kW (HP) for operation on MOVIDRIVE® MDX60/61B...-5_3 (AC 400/500 V units)</th></tr>
<tr><td colspan="2">Connection</td><td colspan="4">⅄ / AC 400 V[1]</td><td colspan="2">△ / AC 230 V[2]</td></tr>
<tr><td colspan="2">Cooling</td><td colspan="2">Self-cooling</td><td colspan="2">Forced cooling</td><td>Self-cooling</td><td>Forced cooling</td></tr>
<tr><td colspan="2">f_{min} - f_{max} Hz</td><td colspan="2">10 - 50 / 6 - 60
5 - 70 / 5.5 - 80</td><td colspan="2">≤ 2.5 - 50 / ≤ 3 - 60[3]</td><td>9 - 87</td><td>≤ 2.5 - 87[3]</td></tr>
<tr><td colspan="2">n_{min} - n_{max} rpm</td><td colspan="2">300 - 1500 / 180 - 1800
150 - 2100 / 165 - 2400</td><td colspan="2">≤ 75 - 1500 / ≤ 90 - 1800</td><td>270 - 2610</td><td>≤ 75 - 2610</td></tr>
<tr><td colspan="2">Setting range</td><td colspan="2">1:5 / 1:10 / 1:15</td><td colspan="2">≥ 1:20</td><td>1:10</td><td>≥ 1:20</td></tr>
<tr><td rowspan="2">Motor type</td><td rowspan="2">Rated power P_n
kW (HP)</td><td colspan="2">$P = P_{reduced}$</td><td colspan="2">$P = P_n$</td><td colspan="2">$P = P_{increased}$</td></tr>
<tr><td>kW (HP)</td><td>MDX[4]
60/61B...-5_3</td><td>kW (HP)</td><td>MDX[4]
60/61B...-5_3</td><td>kW (HP)</td><td>MDX[4]
60/61B...-5_3</td></tr>
<tr><td>DRS71S4</td><td>0.37 (0.5)</td><td>0.25 (0.34)</td><td rowspan="3">0005/0015</td><td>0.37 (0.5)</td><td rowspan="2">0005/0015</td><td>0.55 (0.74)</td><td>0005/0015</td></tr>
<tr><td>DRS71M4</td><td>0.55 (0.74)</td><td>0.37 (0.5)</td><td>0.55 (0.74)</td><td>0.75 (1.0)</td><td>0008/0015</td></tr>
<tr><td>DRS80S4</td><td>0.75 (1.0)</td><td>0.55 (0.74)</td><td>0.75 (1.0)</td><td>0008/0015</td><td>1.1 (1.5)</td><td>0011/0015</td></tr>
<tr><td>DRS80M4</td><td>1.1 (1.5)</td><td>0.75 (1.0)</td><td>0008/0015</td><td>1.1 (1.5)</td><td>0011/0015</td><td>1.5 (2.0)</td><td>0014/0015</td></tr>
<tr><td>DRS90M4</td><td>1.5 (2.0)</td><td>1.1 (1.5)</td><td>0011/0015</td><td>1.5 (2.0)</td><td>0014/0015</td><td>2.2 (3.0)</td><td>0022</td></tr>
<tr><td>DRS90L4</td><td>2.2 (3.0)</td><td>1.5 (2.0)</td><td>0014/0015</td><td>2.2 (3.0)</td><td>0022</td><td>3.0 (4.0)</td><td>0030</td></tr>
<tr><td>DRS100M4</td><td>3.0 (4.0)</td><td>2.2 (3.0)</td><td>0022</td><td>3.0 (4.0)</td><td>0030</td><td>4.0 (5.4)</td><td>0040</td></tr>
<tr><td>DRS100LC4</td><td rowspan="2">4.0 (5.4)</td><td rowspan="2">3.0 (4.0)</td><td rowspan="2">0030</td><td rowspan="2">4.0 (5.4)</td><td rowspan="2">0040</td><td rowspan="2">5.5 (7.4)</td><td rowspan="2">0055</td></tr>
<tr><td>DRS112M4</td></tr>
<tr><td>DRS132S4</td><td>5.5 (7.4)</td><td>4.0 (5.4)</td><td>0040</td><td>5.5 (7.4)</td><td>0055</td><td>7.5 (10)</td><td>0075</td></tr>
<tr><td>DRS132M4</td><td>7.5 (10)</td><td>5.5 (7.4)</td><td>0055</td><td>7.5 (10)</td><td>0075</td><td>9.2 (12)</td><td rowspan="3">0110</td></tr>
<tr><td>DRS132MC4</td><td rowspan="2">9.2 (12)</td><td rowspan="2">7.5 (10)</td><td rowspan="2">0075</td><td rowspan="2">9.2 (12)</td><td rowspan="3">0110</td><td rowspan="2">11 (15)</td></tr>
<tr><td>DRS160S4</td></tr>
<tr><td>DRS160M4</td><td>11 (15)</td><td>9.2 (12)</td><td rowspan="3">0110</td><td>11 (15)</td><td>15 (20)</td><td>0150</td></tr>
<tr><td>DRS160MC4</td><td rowspan="2">15 (20)</td><td rowspan="2">11 (15)</td><td rowspan="2">15 (20)</td><td rowspan="2">0150</td><td rowspan="2">18.5 (24.8)</td><td rowspan="3">0220</td></tr>
<tr><td>DRS180S4</td></tr>
<tr><td>DRS180M4</td><td>18.5 (24.8)</td><td>15 (20)</td><td>0150</td><td>18.5 24.8)</td><td rowspan="2">0220</td><td>22 (30)</td></tr>
<tr><td>DRS180L4</td><td>22 (30)</td><td>18.5 (24.8)</td><td rowspan="3">0220</td><td>22 (30)</td><td>30 (40)</td><td>0300</td></tr>
<tr><td>DRS180LC4</td><td rowspan="2">30 (40)</td><td rowspan="2">22 (30)</td><td rowspan="2">30 (40)</td><td rowspan="2">0300</td><td rowspan="2">37 (50)</td><td rowspan="2">0370</td></tr>
<tr><td>DRS200L4</td></tr>
<tr><td>DRS225S4</td><td>37 (50)</td><td>30 (40)</td><td>0300</td><td>37 (50)</td><td>0370</td><td>45 (60)</td><td>0450</td></tr>
<tr><td>DRS225M4</td><td>45 (60)</td><td>37 (50)</td><td>0370</td><td>45 (60)</td><td>0450</td><td>55 (74)</td><td>0550</td></tr>
<tr><td>DRS225MC4</td><td>55 (74)</td><td>45 (60)</td><td>0450</td><td>55 (74)</td><td>0550</td><td>75 (100)</td><td>0750</td></tr>
<tr><td>DRS315K4[5]</td><td>110 (148)</td><td>90 (120)</td><td>0900</td><td>110 (148)</td><td>1100</td><td>132 (177)</td><td>1320</td></tr>
<tr><td>DRS315S4[5]</td><td>132 (177)</td><td>110 (148)</td><td>1100</td><td>132 (177)</td><td>1320</td><td>160 (215)</td><td>1600</td></tr>
<tr><td>DRS315M4[5]</td><td>160 (215)</td><td>132 (177)</td><td>1320</td><td>160 (215)</td><td>1600</td><td>200 (268)</td><td>2000</td></tr>
<tr><td>DRS315L4[5]</td><td>200 (268)</td><td>160 (215)</td><td>1600</td><td>200 (268)</td><td>2000</td><td>-</td><td>-</td></tr>
</table>

1) Also applies to motors with AC 460 V or AC 500 V nominal voltage and for AC 400/690 V motors in △ connection.
2) Also applies to motors with AC 266 V or AC 290 V nominal voltage.
3) Without speed control: f_{min} = 0.5 Hz
4) 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 an increased continuous output power (→ MDX60B/61B catalog, Technical Data chapter). The continuous output current of 125% of the rated unit current is only available at f_{PWM} = 4 kHz.
5) Maximum permitted motor speed n_{max} = 2500 rpm

9.5.5 DRE motor selection with delta/star connection type (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_{max} in kW (HP) for operation on MOVIDRIVE® MDX60/61B...-5_3 (AC 400/500 V units)							
Connection		⅄ / AC 400 V[1]				△ / AC 230 V[2]	
Cooling		Self-cooling		Forced cooling		Self-cooling	Forced cooling
f_{min} - f_{max} Hz		10 - 50 / 6 - 60 5 - 70 / 5.5 - 80		≤ 2.5 - 50 / ≤ 3 - 60[3]		9 - 87	≤ 2.5 - 87[3]
n_{min} - n_{max} rpm		300 - 1500 / 180 - 1800 150 - 2100 / 165 - 2400		≤ 75 - 1500 / ≤ 90 - 1800		270 - 2610	≤ 75 - 2610
Setting range		1:5 / 1:10 / 1:15		≥ 1:20		1:10	≥ 1:20
Motor type	**Rated power P_n kW (HP)**	**$P = P_{reduced}$**		**$P = P_n$**		**$P = P_{increased}$[4]**	
		kW (HP)	**MDX[5] 60/61B...-5_3**	**kW (HP)**	**MDX[4] 60/61B...-5_3**	**kW (HP)**	**MDX[4] 60/61B...-5_3**
DRE80M4	**0.75 (1.0)**	0.55 (0.74)	**0005/0015**	0.75 (1.0)	**0008/0015**	1.1 (1.5)	**0011/0015**
DRE90M4	**1.1 (1.5)**	0.75 (1.0)	**0008/0015**	1.1 (1.5)	**0011/0015**	1.5 (2.0)	**0014/0015**
DRE90L4	**1.5 (2.0)**	1.1 (1.5)	**0011/0015**	1.5 (2.0)	**0014/0015**	2.2 (3.0)	**0022**
DRE100M4	**2.2 (3.0)**	1.5 (2.0)	**0014/0015**	2.2 (3.0)	**0022**	3.0 (4.0)	**0030**
DRE100LC4 **DRE112M4**	**3.0 (4.0)**	2.2 (3.0)	**0022**	3.0 (4.0)	**0030**	4.0 (5.4)	**0040**
DRE132S4	**4.0 (5.4)**	3.0 (4.0)	**0030**	4.0 (5.4)	**0040**	5.5 (7.4)	**0055**
DRE132M4	**5.5 (7.4)**	4.0 (5.4)	**0040**	5.5 (7.4)	**0055**	7.5 (10)	**0075**
DRE132MC4 **DRE160S4**	**7.5 (10)**	5.5 (7.4)	**0055**	7.5 (10)	**0075**	9.2 (12)	**0110**
DRE160M4	**9.2 (12)**	7.5 (10)	**0075**	9.2 (12)	**0110**	11 (15)	
DRE160MC4 **DRE180S4**	**11 (15)**	9.2 (12)	**0110**	11 (15)		15 (20)	**0150**
DRE180M4[5]	**15 (20)**	11 (15)		15 (20)	**0150**	18.5 (24.8)	**0220**
DRE180L4[5]	**18.5 (24.8)**	15 (20)	**0150**	18.5 24.8)	**0220**	22 (30)	
DRE180LC4[5] **DRE200L4**	**22 (30)**	18.5 (24.8)	**0220**	22 (30)		30 (40)	**0300**
DRE225S4	**30 (40)**	22 (30)		30 (40)	**0300**	37 (50)	**0370**
DRE225M4	**37 (50)**	30 (40)	**0300**	37 (50)	**0370**	45 (60)	**0450**
DRE225MC4	**45 (60)**	37 (50)	**0370**	45 (60)	**0450**	55 (74)	**0550**
DRE315K4[6]	**110 (148)**	90 (120)	**0900**	110 (148)	**1100**	132 (177)	**1320**
DRE315S4[6]	**132 (177)**	110 (148)	**1100**	132 (177)	**1320**	160 (215)	**1600**
DRE315M4[6]	**160 (215)**	132 (177)	**1320**	160 (215)	**1600**	200 (268)	**2000**
DRE315L4[6]	**200 (268)**	160 (215)	**1600**	200 (268)	**2000**	-	**-**

1) Also applies to motors with AC 460 V or AC 500 V nominal voltage and for AC 400/690 V motors in △ connection.

2) Also applies to motors with AC 266 V or AC 290 V nominal voltage.

3) Without speed control: f_{min} = 0.5 Hz

4) The motor is operated at the power of the next larger motor (one frame size), rather than with the $\sqrt{3}$-fold power.

5) 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 an increased continuous output power (→ MDX60B/61B catalog, Technical Data chapter). The continuous output current of 125% of the rated unit current is only available at f_{PWM} = 4 kHz.

6) Maximum permitted motor speed n_{max} = 2500 rpm

9.5.6 DRP motor selection with delta/star connection type (AC 230/400 V / 50 Hz)

<table>
<tr><th colspan="8">Motors for AC 380 V / 60 Hz can also be allocated on the basis of this selection table.
P_{max} in kW (HP) for operation on MOVIDRIVE® MDX60/61B...-5_3 (AC 400/500 V units)</th></tr>
<tr><td colspan="2">Connection</td><td colspan="4">⅄ / AC 400 V[1]</td><td colspan="2">△ / AC 230 V[2]</td></tr>
<tr><td colspan="2">Cooling</td><td colspan="2">Self-cooling</td><td colspan="2">Forced cooling</td><td>Self-cooling</td><td>Forced cooling</td></tr>
<tr><td colspan="2">f_{min} - f_{max} Hz</td><td colspan="2">10 - 50 / 6 - 60
5 - 70 / 5.5 - 80</td><td colspan="2">≤ 2.5 - 50 / ≤ 3 - 60[3]</td><td>9 - 87</td><td>≤ 2.5 - 87[3]</td></tr>
<tr><td colspan="2">n_{min} - n_{max} rpm</td><td colspan="2">300 - 1500 / 180 - 1800
150 - 2100 / 165 - 2400</td><td colspan="2">≤ 75 - 1500 / ≤ 90 - 1800</td><td>270 - 2610</td><td>≤ 75 - 2610</td></tr>
<tr><td colspan="2">Setting range</td><td colspan="2">1:5 / 1:10 / 1:15</td><td colspan="2">≥ 1:20</td><td>1:10</td><td>≥ 1:20</td></tr>
<tr><td rowspan="2">Motor type</td><td rowspan="2">Rated power P_n
kW (HP)</td><td colspan="2">$P = P_{reduced}$</td><td colspan="2">$P = P_n$</td><td colspan="2">$P = P_{increased}$[4]</td></tr>
<tr><td>kW (HP)</td><td>MDX[5]
60/61B...-5_3</td><td>kW (HP)</td><td>MDX[4]
60/61B...-5_3</td><td>kW (HP)</td><td>MDX[4]
60/61B...-5_3</td></tr>
<tr><td>DRP90M4</td><td>0.75 (1.0)</td><td>0.55 (0.74)</td><td>0005/0015</td><td>0.75 (1.0)</td><td>0008/0015</td><td>1.1 (1.5)</td><td>0011/0015</td></tr>
<tr><td>DRP90L4</td><td>1.1 (1.5)</td><td>0.75 (1.0)</td><td>0008/0015</td><td>1.1 (1.5)</td><td>0011/0015</td><td>1.5 (2.0)</td><td>0014/0015</td></tr>
<tr><td>DRP100M4</td><td>1.5 (2.0)</td><td>1.1 (1.5)</td><td>0011/0015</td><td>1.5 (2.0)</td><td>0014/0015</td><td>2.2 (3.0)</td><td>0022</td></tr>
<tr><td>DRP100L4</td><td>2.2 (3.0)</td><td>1.5 (2.0)</td><td>0014/0015</td><td>2.2 (3.0)</td><td>0022</td><td>3.0 (4.0)</td><td>0030</td></tr>
<tr><td>DRP112M4</td><td>3.0 (4.0)</td><td>2.2 (3.0)</td><td>0022</td><td>3.0 (4.0)</td><td>0030</td><td>4.0 (5.4)</td><td>0040</td></tr>
<tr><td>DRP132M4</td><td>4.0 (5.4)</td><td>3.0 (4.0)</td><td>0030</td><td>4.0 (5.4)</td><td>0040</td><td>5.5 (7.4)</td><td>0055</td></tr>
<tr><td>DRP132MC4</td><td rowspan="2">5.5 (7.4)</td><td rowspan="2">4.0 (5.4)</td><td rowspan="2">0040</td><td rowspan="2">5.5 (7.4)</td><td rowspan="2">0055</td><td rowspan="2">7.5 (10)</td><td rowspan="2">0075</td></tr>
<tr><td>DRP160S4</td></tr>
<tr><td>DRP160M4</td><td>7.5 (10)</td><td>5.5 (7.4)</td><td>0055</td><td>7.5 (10)</td><td>0075</td><td>9.2 (12)</td><td rowspan="2">0110</td></tr>
<tr><td>DRP160MC4</td><td rowspan="2">9.2 (12)</td><td rowspan="2">7.5 (10)</td><td rowspan="2">0075</td><td rowspan="2">9.2 (12)</td><td rowspan="3">0110</td><td>11 (15)</td></tr>
<tr><td>DRP180S4</td><td rowspan="2">15 (20)</td><td rowspan="2">0150</td></tr>
<tr><td>DRP180M4</td><td>11 (15)</td><td>9.2 (12)</td><td rowspan="2">0110</td><td>11 (15)</td></tr>
<tr><td>DRP180L4</td><td>15 (20)</td><td>11 (15)</td><td>15 (20)</td><td>0150</td><td>18.5 (24.8)</td><td rowspan="3">0220</td></tr>
<tr><td>DRP180LC4</td><td rowspan="2">18.5 (24.8)</td><td rowspan="2">15 (20)</td><td rowspan="2">0150</td><td rowspan="2">18.5 24.8)</td><td rowspan="3">0220</td><td rowspan="2">22 (30)</td></tr>
<tr><td>DRP200L4</td></tr>
<tr><td>DRP225S4</td><td>22 (30)</td><td>18.5 (24.8)</td><td rowspan="2">0220</td><td>22 (30)</td><td>30 (40)</td><td>0300</td></tr>
<tr><td>DRP225M4</td><td>30 (40)</td><td>22 (30)</td><td>30 (40)</td><td>0300</td><td>37 (50)</td><td>0370</td></tr>
<tr><td>DRP225MC4</td><td>37 (50)</td><td>30 (40)</td><td>0300</td><td>37 (50)</td><td>0370</td><td>45 (60)</td><td>0450</td></tr>
<tr><td>DRP315K4[6]</td><td>90 (120)</td><td>75 (100)</td><td>0750</td><td>90 (120)</td><td>0900</td><td>110 (148)</td><td>1100</td></tr>
<tr><td>DRP315S4[6]</td><td>110 (148)</td><td>90 (120)</td><td>0900</td><td>110 (148)</td><td>1100</td><td>-</td><td>-</td></tr>
<tr><td>DRP315M4[6]</td><td>132 (177)</td><td>110 (148)</td><td>1100</td><td>132 (177)</td><td>1320</td><td>-</td><td>-</td></tr>
<tr><td>DRP315L4[6]</td><td>160 (215)</td><td>132 (177)</td><td>1320</td><td>160 (215)</td><td>1600</td><td>-</td><td>-</td></tr>
</table>

1) Also applies to motors with AC 460 V or AC 500 V nominal voltage and for AC 400/690 V motors in △ connection.
2) Also applies to motors with AC 266 V or AC 290 V nominal voltage.
3) Without speed control: f_{min} = 0.5 Hz
4) The motor is operated at the power of the next larger motor (one frame size), rather than with the $\sqrt{3}$-fold power.
5) 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 an increased continuous output power (→ MDX60B/61B catalog, Technical Data chapter). The continuous output current of 125% of the rated unit current is only available at f_{PWM} = 4 kHz.
6) Maximum permitted motor speed n_{max} = 2500 rpm

9.5.7 DR63, DV250, DV280 motor selection with delta/star connection type (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_{max} in kW (HP) for operation on MOVIDRIVE® MDX60/61B...-5_3 (AC 400/500 V units)							
Connection		⅄ / AC 400 V[1)]				△ / AC 230 V[2)]	
Cooling		Self-cooling		Forced cooling		Self-cooling	Forced cool-ing
f_{min} - f_{max} Hz		10 - 50 / 6 - 60 5 - 70 / 5.5 - 80		≤ 2.5 - 50 / ≤ 3 - 60[3)]		9 - 87	≤ 2.5 - 87[3)]
n_{min} - n_{max} rpm		300 - 1500 / 180 - 1800 150 - 2100 / 165 - 2400		≤ 75 - 1500 / ≤ 90 - 1800		270 - 2610	≤ 75 - 2610
Setting range		1:5 / 1:10 / 1:15		≥ 1:20		1:10	≥ 1:20
Motor type[4)]	**Rated power P_n kW (HP)**	**$P = P_{reduced}$**		**$P = P_n$**		**$P = P_{increased}$[5)]**	
		kW (HP)	**MDX[6)] 60/61B...-5_3**	**kW (HP)**	**MDX[4)] 60/61B...-5_3**	**kW (HP)**	**MDX[4)] 60/61B...-5_3**
DR63S4	**0.12 (0.16)**					0.18	
DR63M4	**0.18 (0.24)**			0.18	**0005**	0.25	**0005**
DR63L4	**0.25 (0.34)**	0.18 (0.24)	**0005**	0.25 (0.34)		0.37 (0.5)	
DV250M4	**55 (74)**	45 (60)	**0450**	55 (74)	**0550**	75 (100)	**0750**
DV280S4	**75 (100)**	55 74)	**0550**	75 (100)	**0750**	90 (120)	**0900**
D280M4	**90 (120)**	75 (100)	**0750**	90 (120)	**0900**	110 (148)	**1100**

1) Also applies to motors with AC 460 V or AC 500 V nominal voltage and for AC 400/690 V motors in △ connection.
2) Also applies to motors with AC 266 V or AC 290 V nominal voltage.
3) Without speed control: f_{min} = 0,5 Hz
4) In load type S3 (40% cdf), the motor may be operated at its listed power ($P = P_n$) even without forced cooling. Example: P_{stat} = 2 kW, P_{dyn} = 2.5 kW → selected motor DV100M4 (P_n = 2.2 kW).
5) $P_{increased}$ 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 an increased continuous output power (→ chapter Technical Data). The continuous output current of 125% of the rated unit current is only available at f_{PWM} = 4 kHz.

9.5.8 Examples for motor selection delta/star AC 230/400 V

Trolley drive

- P_{travel} = 1.3 kW
- P_{max} = 13 kW
- n_{min} = 270 rpm, setting range 1:10
- n_{max} = 2610 rpm

In inverter mode with adapted power ($P = P_n$), the motor can output 150% of its listed power during the acceleration phase. This means:

$P_{Mot} = P_{max} : 1.5 = 13\ kW : 1.5 = 8.67\ kW$

A DRS132M4 motor with delta connection (P_n = 9.2 kW) is selected.

The selection table allocates a MOVIDRIVE® MDX61B0055 ($P = P_n$).

Hoist drive

High constant load with short-term overload (acceleration):

- P_{max} = 26 kW
- $P_{const.}$ = 20 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 nominal current during acceleration. Consequently, a MOVIDRIVE® MDX61B0220 is selected.

In view of the duty type (S3, 40% cdf), the selection table allocates motor type DRS180L4 (P_n = 22 kW) in a star connection.

For more information, refer to the "Project planning for hoists" chapter

Fan/pump

Variable torque load with the following power values:

- P_{max} = 4.8 kW
- n_{max} = 1400 rpm, continuous duty with n_{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 DRS132S4 in star connection (P_n = 5.5 kW) is sufficient.

The selection table allocates a MOVIDRIVE® MDX61B0055 ($P = P_n$). 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.

9.5.9 DRS motor selection in delta connection type (AC 230 V / 50 Hz)

P_{max} kW (HP) for operation on MOVIDRIVE® MDX61B...-2_3 (AC 230 V units)					
Connection		△ / AC 230 V			
Cooling		Self-cooling		Forced cooling	
f_{min} - f_{max} Hz		10 - 50 6 - 60 5 - 70 / 5.5 - 80		≤ 2.5 - 50 / ≤ 3 - 60[1)]	
n_{min} - n_{max} rpm		300 - 1500 180 - 1800 150 - 2100 / 165 - 2400		≤ 75 - 1500 / ≤ 90 - 1800	
Setting range		1:5 1:10 1:15		≥ 1:20	
Motor type	**Rated power P_n kW (HP)**	**P = $P_{reduced}$ kW (HP)**	**With MDX61B...-2_3[2)]**	**P = P_n kW (HP)**	**With MDX61B...-2_3**
DRS71S4	**0.37 (0.5)**	0.25 (0.34)	**0015**	0.37 (0.5)	**0015**
DRS71M4	**0.55 (0.74)**	0.37 (0.5)		0.55 (0.74)	
DRS80S4	**0.75 (1.0)**	0.55 (0.74)		0.75 (1.0)	
DRS80M4	**1.1 (1.5)**	0.75 (1.0)		1.1 (1.5)	
DRS90M4	**1.5 (2.0)**	1.1 (1.5)		1.5 (2.0)	
DRS90L4	**2.2 (3.0)**	1.5 (2.0)		2.2 (3.0)	**0022**
DRS100M4	**3.0 (4.0)**	2.2 (3.0)	**0022**	3.0 (4.0)	**0037**
DRS100LC4 **DRS112M4**	**4.0 (5.4)**	3.0 (4.0)	**0037**	4.0 (5.4)	**0055**
DRS132S4	**5.5 (7.4)**	4.0 (5.4)	**0055**	5.5 (7.4)	
DRS132M4	**7.5 (10)**	5.5 (7.4)		7.5 (10)	**0075**
DRS132MC4 **DRS160S4**	**9.2 (12)**	7.5 (10)	**0075**	9.2 (12)	**0110**
DRS160M4	**11 (15)**	9.2 (12)	**0110**	11 (15)	
DRS160MC4 **DRS180S4**	**15 (20)**	11 (15)		15 (20)	**0150**
DRS180M4	**18.5 (24.8)**	15 (20)	**0150**	18.5 (24.8)	**0220**
DRS180L4	**22 (30)**	18.5 (24.8)	**0220**	22 (30)	
DRS180LC4 **DRS200L4**	**30 (40)**	22 (30)		30 (40)	**0300**
DRS225S4	**37 (50)**	30 (40)	**0300**	-	

1) Without speed control: f_{min} = 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 an increased continuous output power (→ MDX60B/61B catalog, Technical Data chapter). The continuous output current of 125% of the rated unit current is only available at f_{PWM} = 4 kHz.

9.5.10 DRE motor selection in delta connection type (AC 230 V / 50 Hz)

P_{max} kW (HP) for operation on MOVIDRIVE® MDX61B...-2_3 (AC 230 V units)					
Connection		△ / AC 230 V			
Cooling		Self-cooling		Forced cooling	
f_{min} - f_{max} Hz		10 - 50 6 - 60 5 - 70 / 5.5 - 80		≤ 2.5 - 50 / ≤ 3 - 60[1)]	
n_{min} - n_{max} rpm		300 - 1500 180 - 1800 150 - 2100 / 165 - 2400		≤ 75 - 1500 / ≤ 90 - 1800	
Setting range		1:5 1:10 1:15		≥ 1:20	
Motor type	**Rated power P_n kW (HP)**	**P = $P_{reduced}$ kW (HP)**	**With MDX61B...-2_3[2)]**	**P = P_n kW (HP)**	**With MDX61B...-2_3[3)]**
DRE80M4	**0.75 (1.0)**	0.55 (0.74)	**0015**	0.75 (1.0)	**0015**
DRE90M4	**1.1 (1.5)**	0.75 (1.0)		1.1 (1.5)	
DRE90L4	**1.5 (2.0)**	1.1 (1.5)		1.5 (2.0)	
DRE100M4	**2.2 (3.0)**	1.5 (2.0)		2.2 (3.0)	**0022**
DRE100LC4 **DRE112M4**	**3.0 (4.0)**	2.2 (3.0)	**0022**	3.0 (4.0)	**0037**
DRE132S4	**4.0 (5.4)**	3.0 (4.0)	**0037**	4.0 (5.4)	**0055**
DRE132M4	**5.5 (7.4)**	4.0 (5.4)	**0055**	5.5 (7.4)	
DRE132MC4 **DRE160S4**	**7.5 (10)**	5.5 (7.4)		7.5 (10)	**0075**
DRE160M4	**9.2 (12)**	7.5 (10)	**0075**	9.2 (12)	**0110**
DRE160MC4 **DRE180S4**	**11 (15)**	9.2 (12)	**0110**	11 (15)	
DRE180M4	**15 (20)**	11 (15)		15 (20)	**0150**
DRE180L4	**18.5 (24.8)**	15 (20)	**0150**	18.5 (24.8)	**0220**
DRE180LC4 **DRE200L4**	**22 (30)**	18.5 (24.8)	**0220**	22 (30)	
DRE225S4	**30 (40)**	22 (30)		30 (40)	**0300**
DRE225M4	**37 (50)**	30 (40)	**0300**	-	

1) Without speed control: f_{min} = 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 an increased continuous output power (→ MDX60B/61B catalog, Technical Data chapter). The continuous output current of 125% of the rated unit current is only available at f_{PWM} = 4 kHz.

9.5.11 DRP motor selection in delta connection type (AC 230 V / 50 Hz)

P_{max} kW (HP) for operation on MOVIDRIVE® MDX61B...-2_3 (AC 230 V units)					
Connection		△ / AC 230 V			
Cooling		Self-cooling		Forced cooling	
f_{min} - f_{max} Hz		10 - 50 6 - 60 5 - 70 / 5.5 - 80		≤ 2.5 - 50 / ≤ 3 - 60[1]	
n_{min} - n_{max} rpm		300 - 1500 180 - 1800 150 - 2100 / 165 - 2400		≤ 75 - 1500 / ≤ 90 - 1800	
Setting range		1:5 1:10 1:15		≥ 1:20	
Motor type	**Rated power P_n kW (HP)**	**$P = P_{reduced}$ kW (HP)**	**With MDX61B...-2_3[2]**	**$P = P_n$ kW (HP)**	**With MDX61B...-2_3[3]**
DRP90M4	**0.75 (1.0)**	0.55 (0.74)	**0015**	0.75 (1.0)	**0015**
DRP90L4	**1.1 (1.5)**	0.75 (1.0)		1.1 (1.5)	
DRP100M4	**1.5 (2.0)**	1.1 (1.5)		1.5 (2.0)	
DRP100L4	**2.2 (3.0)**	1.5 (2.0)		2.2 (3.0)	**0022**
DRP112M4	**3.0 (4.0)**	2.2 (3.0)	**0022**	3.0 (4.0)	**0037**
DRP132M4	**4.0 (5.4)**	3.0 (4.0)	**0037**	4.0 (5.4)	**0055**
DRP132MC4	**5.5 (7.4)**	4.0 (5.4)	**0055**	5.5 (7.4)	
DRP160S4					
DRP160M4	**7.5 (10)**	5.5 (7.4)		7.5 (10)	**0075**
DRP160MC4	**9.2 (12)**	7.5 (10)	**0075**	9.2 (12)	**0110**
DRP180S4					
DRP180M4	**11 (15)**	9.2 (12)	**0110**	11 (15)	
DRP180L4	**15 (20)**	11 (15)		15 (20)	**0150**
DRP180LC4	**18.5 (24.8)**	15 (20)	**0150**	18.5 (24.8)	**0220**
DRP200L4					
DRP225S4	**22 (30)**	18.5 (24.8)	**0220**	22 (30)	
DRP225M4	**30 (40)**	22 (30)		30 (40)	**0300**
DRP225MC4	**37 (50)**	30 (40)	**0300**	-	

1) Without speed control: f_{min} = 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 an increased continuous output power (→ MDX60B/61B catalog, Technical Data chapter). The continuous output current of 125% of the rated unit current is only available at f_{PWM} = 4 kHz.

9.5.12 DRS motor selection in double-star/star connection type (AC 230/460 V / 60 Hz)

P_{max} in kW (HP) for operation on MOVIDRIVE® MDX60/61B...-5_3 (AC 400/500 V units)							
Connection		⅄ / AC 460 V				⅄⅄ / AC 230 V	
Cooling		Self-cooling		Self-cooling	Forced cooling	Self-cooling	Forced cooling
f_{min} - f_{max} Hz		6 - 90		10 - 60	0 - 60[1]	10 - 120	0 - 120[1]
n_{min} - n_{max} rpm		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_n kW (HP)**	**$P = P_{reduced}$**		**$P = P_n$**		**$P = P_{increased}$[2]**	
		kW (HP)	**With MDX60/61B...-5_3[3]**	**kW (HP)**	**With MDX60/61B...-5_3[3]**	**kW (HP)**	**With MDX60/61B...-5_3[3]**
DRS71S4	**0.37 (0.5)**	0.25 (0.34)	**0005/0015**	0.37 (0.5)	**0005/0015**	0.75 (1.0)	**0008/0015**
DRS71M4	**0.55 (0.74)**	0.37 (0.5)		0.55 (0.74)		1.1 (1.5)	**0011/0015**
DRS80S4	**0.75 (1.0)**	0.55 (0.74)		0.75 (1.0)	**0008/0015**	1.5 (2.0)	**0014/0015**
DRS80M4	**1.1 (1.5)**	0.75 (1.0)	**0008/0015**	1.1 (1.5)	**0011/0015**	2.2 (3.0)	**0022**
DRS90M4	**1.5 (2.0)**	1.1 (1.5)	**0011/0015**	1.5 (2.0)	**0014/0015**	3.0 (4.0)	**0030**
DRS90L4	**2.2 (3.0)**	1.5 (2.0)	**0014/0015**	2.2 (3.0)	**0022**	4.0 (5.4)	**0040**
DRS100M4	**3.7 (5.0)**	2.2 (3.0)	**0022**	3.7 (5.0)	**0040**	5.5 (7.4)	**0055**
DRS100L4 **DRS112M4**	**4.0 (5.4)**	3.0 (4.0)	**0030**	4.0 (5.4)		7.5 (10)	**0075**
DRS132S4	**5.5 (7.4)**	4.0 (5.4)	**0040**	5.5 (7.4)	**0055**	9.2 (12)	**0110**
DRS132M4	**7.5 (10)**	5.5 (7.4)	**0055**	7.5 (10)	**0075**	11 (15)	
DRS132MC4 **DRS160S4**	**9.2 (12)**	7.5 (10)	**0075**	9.2 (12)	**0110**	15 (20)	**0150**
DRS160M4	**11 (15)**	9.2 (12)	**0110**	11 (15)		18.5 (24.8)	**0220**
DRS160MC4 **DRS180S4**	**15 (20)**	11 (15)		15 (20)	**0150**	22 (30)	
DRS180M4	**18.5 (24.8)**	15 (20)	**0150**	18.5 (24.8)	**0220**	30 (40)	**0300**
DRS180L4	**22 (30)**	18.5 (24.8)	**0220**	22 (30)	**0300**	37 (50)	**0370**
DRS180LC4 **DRS200L4**	**30 (40)**	22 (30)		30 (40)		45 (60)	**0450**
DRS225S4	**37 (50)**	30 (40)	**0300**	37 (50)	**0370**	55 (74)	**0550**
DRS225M4	**45 (60)**	37 (50)	**0370**	45 (60)	**0450**	75 (100)	**0750**
DRS225MC4	**55 (74)**	45 (60)	**0450**	55 (74)	**0550**	90 (120)	**0900**
DRS315K4[4]	**110 (148)**	90 (120)	**0900**	110 (148)	**1100**	-	**-**
DRS315S4[4]	**132 (177)**	110 (148)	**1100**	132 (177)	**1320**	-	**-**
DRS315M4[4]	**160 (215)**	132 (177)	**1320**	160 (215)	**1600**	-	**-**
DRS315M4[4]	**185 (248)**	160 (215)	**1600**	185 (248)	**2000**	-	**-**
DRS315L4[4]	**200 (268)**	160 (215)	**1600**	200 (268)	**2000**	-	**-**
DRS315L4[4]	**225 (302)**	200 (268)	**2000**	225 (302)	**2500**	-	**-**

1) Without speed control: f_{min} = 0.5 Hz

2) $P_{increased}$ means that the motor is operated with increased power (not always with twice the 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 an increased continuous output power (→ MDX60B/61B catalog, Technical Data chapter). The continuous output current of 125% of the rated unit current is only available at f_{PWM} = 4 kHz.

4) Maximum permitted motor speed n_{max} = 2500 rpm

9.5.13 DRE motor selection in double-star/star connection type (AC 230/460 V / 60 Hz)

<table>
<tr><th colspan="8">P_{max} in kW (HP) for operation on MOVIDRIVE® MDX60/61B...-5_3 (AC 400/500 V units)</th></tr>
<tr><td colspan="2">Connection</td><td colspan="4">⅄ / AC 460 V</td><td colspan="2">⅄⅄ / AC 230 V</td></tr>
<tr><td colspan="2">Cooling</td><td colspan="2">Self-cooling</td><td>Self-cooling</td><td>Forced cooling</td><td>Self-cooling</td><td>Forced cooling</td></tr>
<tr><td colspan="2">f_{min} - f_{max} Hz</td><td colspan="2">6 - 90</td><td>10 - 60</td><td>0 - 60 1)</td><td>10 - 120</td><td>0 - 120 2)</td></tr>
<tr><td colspan="2">n_{min} - n_{max} rpm</td><td colspan="2">180 - 2700</td><td>300 - 1800</td><td>0 - 1800</td><td>300 - 3600</td><td>0 - 3600</td></tr>
<tr><td colspan="2">Setting range</td><td colspan="2">1:15</td><td>1:6</td><td>≥ 1:15</td><td>1:12</td><td>≥ 1:20</td></tr>
<tr><th rowspan="2">Motor type</th><th rowspan="2">Rated power P_n kW (HP)</th><th colspan="2">$P = P_{reduced}$</th><th colspan="2">$P = P_n$</th><th colspan="2">$P = P_{increased}$ 2)</th></tr>
<tr><th>kW (HP)</th><th>With MDX60/61B...-5_3 3)</th><th>kW (HP)</th><th>With MDX60/61B...-5_3 3)</th><th>kW (HP)</th><th>With MDX60/61B...-5_3 3)</th></tr>
<tr><td>DRE80M4</td><td>0.75 (1.0)</td><td>0.55 (0.74)</td><td>0005/0015</td><td>0.75 (1.0)</td><td>0008/0015</td><td>1.5 (2.0)</td><td>0014/0015</td></tr>
<tr><td>DRE90M4</td><td>1.1 (1.5)</td><td>0.75 (1.0)</td><td>0008/0015</td><td>1.1 (1.5)</td><td>0011/0015</td><td>2.2 (3.0)</td><td>0022</td></tr>
<tr><td>DRE90L4</td><td>1.5 (2.0)</td><td>1.1 (1.5)</td><td>0011/0015</td><td>1.5 (2.0)</td><td>0014/0015</td><td>3.0 (4.0)</td><td>0030</td></tr>
<tr><td>DRE100L4</td><td>2.2 (3.0)</td><td>1.5 (2.0)</td><td>0014/0015</td><td>2.2 (3.0)</td><td>0022</td><td>4.0 (5.4)</td><td>0040</td></tr>
<tr><td>DRE100LC4</td><td>3.7 (5.0)</td><td rowspan="2">2.2 (3.0)</td><td rowspan="2">0022</td><td rowspan="2">3.7 (5.0)</td><td rowspan="2">0040</td><td rowspan="2">5.5 (7.4)</td><td rowspan="2">0055</td></tr>
<tr><td>DRE112M4</td><td>3.7 (5.0)</td></tr>
<tr><td>DRE132M4</td><td>5.5 (7.4)</td><td>4.0 (5.4)</td><td>0040</td><td>5.5 (7.4)</td><td>0055</td><td>9.2 (12)</td><td rowspan="3">0110</td></tr>
<tr><td>DRE132MC4</td><td rowspan="2">7.5 (10)</td><td rowspan="2">5.5 (7.4)</td><td rowspan="2">0055</td><td rowspan="2">7.5 (10)</td><td rowspan="2">0075</td><td rowspan="2">11 (15)</td></tr>
<tr><td>DRE160S4</td></tr>
<tr><td>DRE160M4</td><td>9.2 (12)</td><td>7.5 (10)</td><td>0075</td><td>9.2 (12)</td><td rowspan="3">0110</td><td>15 (20)</td><td>0150</td></tr>
<tr><td>DRE160MC4</td><td rowspan="2">11 (15)</td><td rowspan="2">9.2 (12)</td><td rowspan="3">0110</td><td rowspan="2">11 (15)</td><td rowspan="2">18.5 (24.8)</td><td rowspan="3">0220</td></tr>
<tr><td>DRE180S4</td></tr>
<tr><td>DRE180M4</td><td>15 (20)</td><td>11 (15)</td><td>15 (20)</td><td>0150</td><td>22 (30)</td></tr>
<tr><td>DRE180L4</td><td>18.5 (24.8)</td><td>15 (20)</td><td>0150</td><td>18.5 (24.8)</td><td rowspan="2">0220</td><td>30 (40)</td><td>0300</td></tr>
<tr><td>DRE180LC4</td><td>22 (30)</td><td>18.5 (24.8)</td><td rowspan="2">0220</td><td>22 (30)</td><td>37 (50)</td><td>0370</td></tr>
<tr><td>DRE200L4</td><td>30 (40)</td><td>22 (30)</td><td>30 (40)</td><td>0300</td><td>45 (60)</td><td>0450</td></tr>
<tr><td>DRE225S4</td><td>37 (50)</td><td>30 (40)</td><td>0300</td><td>37 (50)</td><td>0370</td><td>55 (74)</td><td>0550</td></tr>
<tr><td>DRE225M4</td><td>45 (60)</td><td>37 (50)</td><td>0370</td><td>45 (60)</td><td>0450</td><td>75 (100)</td><td>0750</td></tr>
<tr><td>DRE315K4 4)</td><td>110 (148)</td><td>90 (120)</td><td>0900</td><td>110 (148)</td><td>1100</td><td>132 (177)</td><td>1320</td></tr>
<tr><td>DRE315S4 4)</td><td>132 (177)</td><td>110 (148)</td><td>1100</td><td>132 (177)</td><td>1320</td><td>160 (215)</td><td>1600</td></tr>
<tr><td>DRE315S4 4)</td><td>150 (201)</td><td>132 (177)</td><td>1320</td><td>150 (201)</td><td>1600</td><td>160 (215)</td><td>1600</td></tr>
<tr><td>DRE315M4 4)</td><td>160 (215)</td><td>132 (177)</td><td>1320</td><td>160 (215)</td><td>1600</td><td>200 (268)</td><td>2000</td></tr>
<tr><td>DRE315M4 4)</td><td>185 (248)</td><td>160 (215)</td><td>1600</td><td>185 (248)</td><td>2000</td><td>200 (268)</td><td>2000</td></tr>
<tr><td>DRE315L4 4)</td><td>200 (268)</td><td>160 (215)</td><td>1600</td><td>200 (268)</td><td>2000</td><td>-</td><td>-</td></tr>
<tr><td>DRE315L4 4)</td><td>225 (302)</td><td>200 (268)</td><td>2000</td><td>225 (302)</td><td>2500</td><td>-</td><td>-</td></tr>
</table>

1) Without speed control: f_{min} = 0.5 Hz

2) $P_{increased}$ means that the motor is operated with increased power (not always with twice the 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 an increased continuous output power (→ MDX60B/61B catalog, Technical Data chapter). The continuous output current of 125% of the rated unit current is only available at f_{PWM} = 4 kHz.

4) Maximum permitted motor speed n_{max} = 2500 rpm

9.5.14 DR63, DV250, DV280 motor selection with double-star/star connection type (AC 230/460 V / 60 Hz)

P_{max} in kW (HP) for operation on MOVIDRIVE® MDX60/61B...-5_3 (AC 400/500 V units)							
Connection		⅄ / AC 460 V				⅄⅄ / AC 230 V	
Cooling		Self-cooling		Self-cooling	Forced cooling	Self-cooling	Forced cooling
f_{min} - f_{max}	**Hz**	6 - 90		10 - 60	0 - 60 1)	10 - 120	0 - 120 1)
n_{min} - n_{max}	**rpm**	180 - 2700		300 - 1800	0 - 1800	300 - 3600	0 - 3600
Setting range		1:15		1:6	≥ 1:15	1:12	≥ 1:20
		$P = P_{reduced}$		**$P = P_n$**		**$P = P_{increased}$ 2)**	
Motor type	**Rated power P_n kW (HP)**	**kW (HP)**	**With MDX60/61B...-5_3 3)**	**kW (HP)**	**With MDX60/61B...-5_3 3)**	**kW (HP)**	**With MDX60/61B...-5_3 3)**
DR63S4	**0.12 (0.16)**					0.18 (0.24)	
DR63M4	**0.18 (0.24)**			0.18 (0.24)	**0005**	0.25 (0.34)	**0005**
DR63L4	**0.25 (0.34)**	0.18 (0.24)	**0005**	0.25 (0.34)		0.37 (0.5)	
DV250M4 4)	**55 (74)**	45 (60)	**0450**	55 (74)	**0550**	90 (120)	**0900**
DV280S4 4)	**75 (100)**	55 (74)	**0550**	75 (100)	**0750**	110 (148)	**1100**
DV280M4 4)	**90 (120)**	75 (100)	**0750**	90 (120)	**0900**	132 (177)	**1320**

1) Without speed control: f_{min} = 0,5 Hz
2) $P_{increased}$ means that the motor is operated at the power of the next larger motor (one frame size), rather than with the √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 an increased continuous output power (→ chapter Technical Data). The continuous output current of 125% of the rated unit current is only available at f_{PWM} = 4 kHz.
4) Maximum permitted motor speed n_{max} = 2600 rpm

9.5.15 DRS motor selection in double-star connection type (AC 230 V / 60 Hz)

P_{max} kW (HP) for operation on MOVIDRIVE® MDX61B...-2_3 (AC 230 V units)					
Connection		⅄⅄ / AC 230 V			
Cooling		Self-cooling		Self-cooling	Forced cooling
f_{min} - f_{max} Hz		6 - 90		10 - 60	0 - 60[1)]
n_{min} - n_{max} rpm		180 - 2700		300 - 1800	0 - 1800
Setting range		1:15		1:6	≥ 1:15
Motor type	**Rated power P_n kW (HP)**	**P = $P_{reduced}$ kW (HP)**	**With MDX61B...-2_3[2)]**	**P = P_n kW (HP)**	**With MDX61B...-2_3[2)]**
DRS71D4	**0.37 (0.5)**	0.25 (0.34)	**0015**	0.37 (0.5)	**0015**
DRS71M4	**0.55 (0.74)**	0.37 (0.5)		0.55 (0.74)	
DRS80S4	**0.75 (1.0)**	0.55 (0.74)		0.75 (1.0)	
DRS80M4	**1.1 (1.5)**	0.75 (1.0)		1.1 (1.5)	
DRS90M4	**1.5 (2.0)**	1.1 (1.5)		1.5 (2.0)	
DRS90L4	**2.2 (3.0)**	1.5 (2.0)		2.2 (3.0)	**0022**
DRS100M4	**3.7 (5.0)**	2.2 (3.0)	**0220**	3.7 (5.0)	**0037**
DRS100L4 **DRS112M4**	**4.0 (5.4)**	3.0 (4.0)	**0037**	4.0 (5.4)	**0055**
DRS132S4	**5.5 (7.4)**	4.0 (5.4)	**0055**	5.5 (7.4)	
DRS132M4	**7.5 (10)**	5.5 (7.4)		7.5 (10)	**0075**
DRS132MC4 **DRS160S4**	**9.2 (12)**	7.5 (10)	**0075**	9.2 (12)	**0110**
DRS160M4	**11 (15)**	9.2 (12)	**0110**	11 (15)	
DRS160MC4 **DRS180S4**	**15 (20)**	11 (15)		15 (20)	**0150**
DRS180M4	**18.5 (24.8)**	15 (20)	**0150**	18.5 (24.8)	**0220**
DRS180L4	**22 (30)**	18.5 (24.8)	**0220**	22 (30)	
DRS180LC4 **DRS200L4**	**30 (40)**	22 (30)		30 (40)	**0300**
DRS225S4	**37 (50)**	30 (40)	**0300**	-	

1) Without speed control: f_{min} = 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 an increased continuous output power (→ MDX60B/61B catalog, Technical Data chapter). The continuous output current of 125% of the rated unit current is only available at f_{PWM} = 4 kHz.

9.5.16 DRE motor selection in double-star connection type (AC 230 V / 60 Hz)

<table>
<tr><th colspan="6">P_{max} kW (HP) for operation on MOVIDRIVE® MDX61B...-2_3 (AC 230 V units)</th></tr>
<tr><td colspan="2">**Connection**</td><td colspan="4">⅄⅄ / AC 230 V</td></tr>
<tr><td colspan="2">**Cooling**</td><td colspan="2">Self-cooling</td><td>Self-cooling</td><td>Forced cooling</td></tr>
<tr><td colspan="2">**f_{min} - f_{max} Hz**</td><td colspan="2">6 - 90</td><td>10 - 60</td><td>0 - 60[1)]</td></tr>
<tr><td colspan="2">**n_{min} - n_{max} rpm**</td><td colspan="2">180 - 2700</td><td>300 - 1800</td><td>0 - 1800</td></tr>
<tr><td colspan="2">**Setting range**</td><td colspan="2">1:15</td><td>1:6</td><td>≥ 1:15</td></tr>
<tr><th rowspan="2">Motor type</th><th rowspan="2">Rated power P_n
kW (HP)</th><th colspan="2">$P = P_{reduced}$</th><th colspan="2">$P = P_n$</th></tr>
<tr><th>kW (HP)</th><th>With MDX61B...-2_3[2)]</th><th>kW (HP)</th><th>With MDX61B...-2_3[2)]</th></tr>
<tr><td>**DRE80M4**</td><td>**0.75 (1.0)**</td><td>0.55 (0.74)</td><td rowspan="4">**0015**</td><td>0.75 (1.0)</td><td rowspan="3">**0015**</td></tr>
<tr><td>**DRE90M4**</td><td>**1.1 (1.5)**</td><td>0.75 (1.0)</td><td>1.1 (1.5)</td></tr>
<tr><td>**DRE90I4**</td><td>**1.5 (2.0)**</td><td>1.1 (1.5)</td><td>1.5 (2.0)</td></tr>
<tr><td>**DRE100L4**</td><td>**2.2 (3.0)**</td><td>1.5 (2.0)</td><td>2.2 (3.0)</td><td>**0022**</td></tr>
<tr><td>**DRE100LC4**</td><td rowspan="2">**3.7 (5.0)**</td><td rowspan="2">2.2 (3.0)</td><td rowspan="2">**0022**</td><td rowspan="2">3.0 (4.0)</td><td rowspan="2">**0037**</td></tr>
<tr><td>**DRE112M4**</td></tr>
<tr><td>**DRE132M4**</td><td>**5.5 (7.4)**</td><td>4.0 (5.4)</td><td rowspan="3">**0055**</td><td>5.5 (7.4)</td><td>**0055**</td></tr>
<tr><td>**DRE132MC4**</td><td rowspan="2">**7.5 (10)**</td><td rowspan="2">5.5 (7.4)</td><td rowspan="2">7.5 (10)</td><td rowspan="2">**0075**</td></tr>
<tr><td>**DRE160S4**</td></tr>
<tr><td>**DRE160M4**</td><td>**9.2 (12)**</td><td>7.5 (10)</td><td>**0075**</td><td>9.2 (12)</td><td rowspan="3">**0110**</td></tr>
<tr><td>**DRE160MC4**</td><td rowspan="2">**11 (15)**</td><td rowspan="2">9.2 (12)</td><td rowspan="3">**0110**</td><td rowspan="2">11 (15)</td></tr>
<tr><td>**DRE180S4**</td></tr>
<tr><td>**DRE180M4**</td><td>**15 (20)**</td><td>11 (15)</td><td>15 (20)</td><td>**0150**</td></tr>
<tr><td>**DRE180L4**</td><td>**18.5 (24.8)**</td><td>15 (20)</td><td>**0150**</td><td>18.5 (24.8)</td><td rowspan="2">**0220**</td></tr>
<tr><td>**DRE180LC4**</td><td>**22 (30)**</td><td>18.5 (24.8)</td><td rowspan="2">**0220**</td><td>22 (30)</td></tr>
<tr><td>**DRE200L4**</td><td>**30 (40)**</td><td>22 (30)</td><td>30 (40)</td><td>**0300**</td></tr>
<tr><td>**DRE225S4**</td><td>**37 (50)**</td><td>30 (40)</td><td>**0300**</td><td colspan="2">-</td></tr>
</table>

1) Without speed control: f_{min} = 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 an increased continuous output power (→ MDX60B/61B catalog, Technical Data chapter). The continuous output current of 125% of the rated unit current is only available at f_{PWM} = 4 kHz.

9.6 Motor selection for asynchronous AC and servomotors (CFC)

	INFORMATION
	The torque limit (M limit) is set automatically by the startup function of the MOVITOOLS® MotionStudio engineering software. Do not increase this automatically set value! SEW-EURODRIVE recommends always using the latest version of MOVITOOLS® MotionStudio for startup. The latest MOVITOOLS® MotionStudio version can be downloaded from our homepage (www.sew-eurodrive.de).

9.6.1 Motor characteristics

Drives in CFC operating modes are characterized by their ability to control torque directly and quickly. This means it achieves a high level of dynamic overload capacity (up to 3 × 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. These characteristics are made possible through field-oriented control. The current components for magnetization (I_d) and torque generation (I_q) are controlled separately. A 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 motor connected to calculate the motor model. These data are made available by the MOVITOOLS® MotionStudio engineering software with the startup function. The CFC operating modes are only possible with the SEW motors listed in the following chapters. They cannot be used with other SEW motors or non-SEW motors. The necessary motor data for the CFC operating modes are stored in MOVIDRIVE® for the 4-pole SEW motors.

9.6.2 Magnetizing current

Dynamic drives that have to accelerate without a 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 ≤ 2 Hz, you must refer to the diagrams in chapter "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.

9.6.3 CFC operation 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.

   $M_{r.m.s.} < M_{N\_mot}$

   The operating point must lie below the characteristic curve for the continuous torque. No forced cooling is required if this operating point lies below the characteristic curve for self-cooling.

2. Maximum torque needed across the speed curve.

   $M_{max} < M_{dyn\_mot}$

   This operating point must lie below the characteristic curve for the maximum torque of the motor/MOVIDRIVE® combination.

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 approx. 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 3000 rpm with delta connection.

   $n_{max} < 1.4 \times n_{base} < 3000$ rpm

9.6.4 Motor cooling

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.

9.6.5 CFC operation with speed control (CFC & M-CONTROL)

This operating mode permits direct torque control of the asynchronous motor in the basic speed range ($n \leq n_{base}$). 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 (→ P11_, parameter description) also remain in effect. The fixed setpoints (P16_, P17_) can be entered either in the unit (rpm) or (%$I_{N\_inverter}$) (→ MOVITOOLS® MotionStudio).

The following relationship exists between the units:

3000 rpm = 150% inverter rated current

The torque on the output shaft of the motor can be calculated for the basic speed range ($n \leq n_{base}$) 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 rpm:

$$M = k_T \times 1.5 \times I_{N\_inverter} \times \frac{\text{setpoint}}{3000\ 1/\text{min}}$$

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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 parameters M_n and I_{q_n}, refer to the motor tables.

In addition to the current I_q for creating the torque, the inverter also needs to supply the magnetizing current I_d.- The actual inverter output current I_{tot} can be calculated using the following formulae:

Specification of a setpoint for the motor torque in % $I_{N\_inverter}$:

$$I_{total} = \sqrt{\left(\text{setpoint} \times I_{N\_inverter}\right)^2 + I_{d\_N}^2}$$

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Specification of a setpoint for the motor torque in rpm:

$$I_{total} = \sqrt{\left(\text{setpoint} \times 1.5 \times I_{N\ \ inverter} \times \frac{1}{3000\ \text{rpm}}\right)^2 + I_{d\ \ N}^2}$$

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I_{q_n}	= Nominal value for the current which generates the torque, according to the motor table
I_{d_n}	= Nominal value of the magnetizing current according to the motor table

9.6.6 Asynchronous DRL servomotors

SEW-EURODRIVE offers DRL series asynchronous servomotors especially for operation with MOVIDRIVE® in CFC operating modes. These motors have the following characteristics:

High power yield

The optimum winding of DRL motors permits a high power yield.

Classification into speed classes

DRL motors are available in four speed classes. This division ensures optimum utilization of torque and speed.

With sin/cos encoder as standard

As standard, DRL motors are equipped with a high-resolution sin/cos encoder (ES7S, EG7S).

With TF or TH motor protection as standard

The winding temperature of the three motor phases is monitored using temperature sensors (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 155 (F) as standard

DRL motors are built using material of thermal classification 155 (F) as standard.

Dynamics packages 1 and 2

DRL motors are available in two dynamics packages. The motors differ in their overload capacity related to the motor torque.

- Dynamics package 1: 190% - 220% nominal motor torque
- Dynamics package 2: 300% - 350% nominal motor torque

DRS, DRE, DRP motors or DRL motors can be used in CFC mode. SEW-EURODRIVE recommends using DRL motors to achieve optimum benefit from the advantages of CFC mode.

<table>
<tr><th></th><th>Advantage</th><th>Disadvantage</th></tr>
<tr><td rowspan="4">CFC mode with DRS, DRE, DRP motor selection</td><td rowspan="4">Standard motor version</td><td>Slower transition speed than the DRL motor.</td></tr>
<tr><td>The power yield of the motor is less than the rated motor power.</td></tr>
<tr><td>In terms of the power yield, the mass inertia is greater than that of the DRL motors.</td></tr>
<tr><td>The maximum torque is limited for some of the inverter/motor combinations due to mechanical rigidity.</td></tr>
<tr><td rowspan="4">CFC mode with DRL motor
Motor selection</td><td>Higher transition speed
than DRS, DRE, DRP motors.</td><td rowspan="2">No IEC standard motor</td></tr>
<tr><td>Usually with a power yield one motor type higher.</td></tr>
<tr><td>Based on the power yield of a lower mass moment of inertia.</td><td rowspan="2">Higher current demand due to higher power yield; therefore a larger inverter has to be assigned.</td></tr>
<tr><td>Motor is designed for dynamic operation.</td></tr>
</table>

9.6.7 DRL motor table

n_N	Motor	P_m	M_N	I_N	I_{q_n}	I_{d_n}	k_T	M_{max} Dyn1	M_{max} Dyn2	J_{mot}	J_{BMot}
rpm		kW	Nm (lb in)	A	A	A	Nm/A (lb in/A)	Nm (lb in)	Nm (lb in)	10^{-4} kgm^2	
1200	DRL71S4	0.37	2.7 (24)	1.18	1.02	0.62	2.66 (23.5)	5 (44)	8.5 (75)	4.9	6.2
	DRL71M4	0.55	4 (35)	1.6	1.36	0.80	2.93 (25.9)	7 (62)	14 (124)	7.1	8.4
	DRL80S4	0.75	6.5 (58)	2.15	1.95	0.88	3.33 (29.5)	10 (89)	25 (221)	14.9	19.4
	DRL80M4	1.1	9.5 (84)	2.9	2.64	1.10	3.60 (31.9)	14 (124)	30 (266)	21.5	26
	DRL90L4	2.2	15 (133)	4.8	4.14	2.21	3.63 (32.1)	25 (221)	46 (407)	43.5	49.5
	DRL100L4	2.2	26 (230)	8.50	8.05	2.68	3.23 (28.6)	40 (354)	85 (752)	68	74
	DRL132S4	5.5	42 (372)	12.6	11.9	4.07	3.52 (31.2)	80 (708)	150 (1328)	190	200
	DRL132MC4	9.2	56 (496)	17.6	15.4	7.50	3.63 (32.1)	130 (1151)	200 (1770)	340	355
	DRL160M4	11	85 (752)	25.5	24.2	8.05	3.51 (31.1)	165 (1460)	280 (2478)	450	500
	DRL160MC4	15	90 (797)	28	25.1	10.9	3.58 (31.7)	185 (1637)	320 (2832)	590	640
	DRL180S4	15	120 (1062)	34.5	33.2	10.8	3.62 (32.0)	210 (1859)	380 (3363)	900	1030
	DRL180M4	18.5	135 (1195)	38	36.1	11.3	3.74 (33.1)	250 (2213)	430 (3806)	1110	1250
	DRL180L4	22	165 (1460)	47	44.9	14.8	3.67 (32.5)	320 (2832)	520 (4602)	1300	1440
	DRL180LC4	30	175 (1549)	52	46.8	17.1	3.74 (33.1)	420 (3717)	600 (5310)	1680	1910
	DRL200L4	30	200 (1770)	58.5	56.0	17.8	3.57 (31.6)	475 (4204)	680 (6019)	2360	2590
	DRL225S4	37	250 (2213)	72	68.1	23.4	3.67 (32.5)	520 (4602)	770 (6815)	2930	3160
	DRL225MC4	55	290 (2567)	89	78.6	29.2	3.69 (32.7)	770 (6815)	1100 (9736)	4330	4560
1700	DRL71S4	0.37	2.7 (24)	1.63	1.40	0.86	1.92 (17.0)	5 (44)	8.5 (75)	4.9	6.2
	DRL71M4	0.55	4 (35)	2.20	1.90	1.11	2.11 (18.7)	7 (62)	14 (124)	7.1	8.4
	DRL80S4	0.75	6.5 (58)	2.96	2.71	1.22	2.40 (21.2)	10 (89)	25 (221)	14.9	19.4
	DRL80M4	1.1	9.5 (84)	4.00	3.65	1.52	2.60 (23.0)	14 (124)	30 (266)	21.5	26
	DRL90L4	2.2	15 (133)	6.60	5.67	3.02	2.65 (23.5)	25 (221)	46 (407)	43.5	49.5
	DRL100L4	2.2	26 (230)	11.40	11.00	3.66	2.36 (20.9)	40 (354)	85 (752)	68	74
	DRL132S4	5.5	42 (372)	17.80	16.9	5.75	2.49 (22.0)	80 (708)	150 (1328)	190	200
	DRL132MC4	9.2	56 (496)	24.90	21.9	10.6	2.56 (22.7)	130 (1151)	200 (1770)	340	355
	DRL160M4	11	85 (752)	35.00	33.5	11.1	2.54 (22.5)	165 (1460)	280 (2478)	450	500
	DRL160MC4	15	90 (797)	36.00	32.3	14.0	2.78 (24.6)	185 (1637)	320 (2832)	590	640
	DRL180S4	15	120 (1062)	47.50	45.6	14.8	2.63 (23.3)	210 (1859)	380 (3363)	900	1030
	DRL180M4	18.5	135 (1195)	52.00	50.1	15.7	2.70 (23.9)	250 (2213)	430 (3806)	1110	1250
	DRL180L4	22	165 (1460)	63.00	61.3	20.2	2.69 (23.8)	320 (2832)	520 (4602)	1300	1440
	DRL180LC4	30	175 (1549)	72.00	65.7	24.1	2.66 (23.5)	420 (3717)	600 (5310)	1680	1910
	DRL200L4	30	200 (1770)	80.60	78.4	25.0	2.55 (22.6)	475 (4204)	680 (6019)	2360	2590
	DRL225S4	37	245 (2168)	97.00	92	32.2	2.66 (23.5)	520 (4602)	770 (6815)	2930	3160
	DRL225MC4	55	280 (2478)	130.00	114	43.9	2.45 (21.7)	770 (6815)	1100 (9736)	4330	4560
2100	DRL71S4	0.37	2.6 (23)	2.00	1.70	1.08	1.53 (13.5)	4.9 (43)	6.2 (55)	4.9	6.2
	DRL71M4	0.55	3.8 (34)	2.70	2.25	1.39	1.69 (15.0)	7.1 (63)	8.4 (74)	7.1	8.4
	DRL80S4	0.75	6.2 (55)	3.59	3.22	1.52	1.92 (17.0)	14.9 (132)	19.4 (172)	14.9	19.4
	DRL80M4	1.1	9.5 (84)	5.00	4.60	1.91	2.07 (18.3)	21.5 (190)	26 (230)	21.5	26
	DRL90L4	2.2	15 (133)	8.40	7.21	3.84	2.08 (18.4)	43.5 (385)	49.5 (438)	43.5	49.5
	DRL100L4	2.2	25 (221)	14.0	13.4	4.63	1.87 (16.6)	68 (602)	74 (655)	68	74
	DRL132S4	5.5	41 (363)	21.4	20.3	7.07	2.02 (17.9)	190 (1682)	200 (1770)	190	200
	DRL132MC4	9.2	52 (460)	28.8	25.0	13.0	2.08 (18.4)	340 (3009)	355 (3142)	340	355
	DRL160M4	11	85 (752)	44.0	42.1	14.0	2.02 (17.9)	450 (3983)	500 (4425)	450	500
	DRL160MC4	15	88 (779)	48.0	42.8	18.9	2.06 (18.2)	590 (5222)	640 (5664)	590	640
	DRL180S4	15	110 (974)	55.3	52.7	18.7	2.09 (18.5)	900 (7966)	1030 (9116)	900	1030
	DRL180M4	18.5	130 (1151)	64.0	60.4	19.6	2.15 (19.0)	1110 (9824)	1250 (11063)	1110	1250
	DRL180L4	22	160 (1416)	78.0	75.8	25.8	2.11 (18.7)	1300 (11506)	1440 (12745)	1300	1440
	DRL180LC4	30	170 (1505)	87.0	79.1	29.8	2.15 (19.0)	1680 (14869)	1910 (16905)	1680	1910
	DRL200L4	30	195 (1726)	99.0	94.6	30.9	2.06 (18.2)	2360 (20888)	2590 (22923)	2360	2590
	DRL225S4	37	235 (2080)	119	111	40.6	2.11 (18.7)	2930 (25933)	3160 (27968)	2930	3160
	DRL225MC4	55	265 (2345)	142	125	50.8	2.12 (18.8)	4330 (38324)	4560 (40359)	4330	4560

n_N	Motor	P_m	M_N	I_N	I_{q_n}	I_{d_n}	k_T	M_{max} Dyn1	M_{max} Dyn2	J_{mot}	J_{BMot}
rpm		kW	Nm (lb in)	A	A	A	Nm/A (lb in/A)	Nm (lb in)	Nm (lb in)	10^{-4} kgm^2	
3000	DRL71S4	0.37	2.5 (22)	2.68	2.26	1.49	1.11 (9.8)	5 (44)	8.5 (75)	4.9	6.2
	DRL71M4	0.55	3.6 (32)	3.55	2.96	1.93	1.21 (10.7)	7 (62)	14 (124)	7.1	8.4
	DRL80S4	0.75	6 (53)	4.82	4.32	2.10	1.39 (12.3)	10 (89)	25 (221)	14.9	19.4
	DRL80M4	1.1	8.8 (78)	6.50	5.86	2.63	1.50 (13.3)	14 (124)	30 (266)	21.5	26
	DRL90L4	2.2	14 (124)	11.0	9.19	5.25	1.52 (13.5)	25 (221)	46 (407)	43.5	49.5
	DRL100L4	2.2	21 (186)	16.6	15.4	6.35	1.36 (12.0)	40 (354)	85 (752)	68	74
	DRL132S4	5.5	35 (310)	25.5	24.4	10.0	1.43 (12.7)	80 (708)	150 (1328)	190	200
	DRL132MC4	9.2	42 (372)	34.8	28.4	18.4	1.48 (13.1)	130 (1151)	200 (1770)	340	355
	DRL160M4	11	79 (699)	57.0	53.9	19.3	1.47 (13.0)	165 (1460)	280 (2478)	450	500
	DRL160MC4	15	83 (735)	59.0	51.8	24.3	1.60 (14.2)	185 (1637)	320 (2832)	590	640
	DRL180S4	15	100 (885)	70.1	65.9	25.7	1.52 (13.5)	210 (1859)	380 (3363)	900	1030
	DRL180M4	18.5	105 (929)	73.0	67.6	27.2	1.55 (13.7)	250 (2213)	430 (3806)	1110	1250
	DRL180L4	22	130 (1151)	90.0	83.8	35.0	1.55 (13.7)	320 (2832)	520 (4602)	1300	1440
	DRL180LC4	30	140 (1239)	105	91	41.8	1.53 (13.5)	420 (3717)	600 (5310)	1680	1910
	DRL200L4	30	165 (1460)	118	112	43.3	1.47 (13.0)	475 (4204)	680 (6019)	2360	2590
	DRL225S4	37	195 (1726)	139	127	56.0	1.53 (13.5)	520 (4602)	770 (6815)	2930	3160
	DRL225MC4	55	220 (1947)	188	156	76	1.41 (12.5)	770 (6815)	1100 (9736)	4330	4560

9.6.8 Combination overview for DRL motors with MOVIDRIVE® B (line voltage 400 V)

Nominal speed n_N = 1200 rpm, dynamics package 1

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)										
		0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
DRL71S4	M_{max} Nm	5				5						
	(lb in)	(44)				(44)						
	n_{base} rpm	834				843						
DRL71M4	M_{max} Nm	7				7						
	(lb in)	(62)				(62)						
	n_{base} rpm	849				849						
DRL80S4	M_{max} Nm	10		10								
	(lb in)	(89)		(89)								
	n_{base} rpm	914		914								
DRL80M4	M_{max} Nm	14	14	14		14						
	(lb in)	(124)	(124)	(124)		(124)						
	n_{base} rpm	890	966	984		984						
DRL90L4	M_{max} Nm				25	19.7	25	25				
	(lb in)				(221)	(174)	(221)	(221)				
	n_{base} rpm				978	996	990	1037				
DRL100L4	M_{max} Nm						25.7	33.1	40			
	(lb in)						(227)	(293)	(354)			
	n_{base} rpm						1166	1084	1043			
DRL132S4	M_{max} Nm								48.2	64.8	80	80
	(lb in)								(427)	(574)	(708)	(708)
	n_{base} rpm								1049	966	903	908
DRL132MC4	M_{max} Nm										80.9	125
	(lb in)										(716)	(1106)
	n_{base} rpm										1059	947
DRL160M4	M_{max} Nm											123
	(lb in)											(1089)
	n_{base} rpm											1032
DRL160MC4	M_{max} Nm											119
	(lb in)											(1053)
	n_{base} rpm											1085
DRL180S4	M_{max} Nm											125
	(lb in)											(1106)
	n_{base} rpm											1125

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
DRL132MC4	M_{max} Nm	130									
	(lb in)	(1151)									
	n_{base} rpm	996									
DRL160M4	M_{max} Nm	165	165								
	(lb in)	(1460)	(1460)								
	n_{base} rpm	931	940								
DRL160MC4	M_{max} Nm	164	185	185							
	(lb in)	(1452)	(1637)	(1637)							
	n_{base} rpm	1006	1032	1032							
DRL180S4	M_{max} Nm	170	210								
	(lb in)	(1505)	(1859))								
	n_{base} rpm	1063	1067								

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**
DRL180M4	M_{max} Nm	174	250	250							
	(lb in)	(1540)	(2213)	(2213)							
	n_{base} rpm	1069	999	1065							
DRL180L4	M_{max} Nm	171	255	320	320						
	(lb in)	(1513)	(2257)	(2832)	(2832)						
	n_{base} rpm	1089	1022	999	1062						
DRL180LC4	M_{max} Nm		243	324	397	420					
	(lb in)		(2151)	(2868)	(3514)	(3717)					
	n_{base} rpm		1065	1009	952	979					
DRL200L4	M_{max} Nm		239	317	388	475					
	(lb in)		(2115)	(2806)	(3434)	(4204)					
	n_{base} rpm		1128	1066	1000	925					
DRL225S4	M_{max} Nm			319	393	484	520				
	(lb in)			(2823)	(3478)	(4284)	(4602)				
	n_{base} rpm			1110	1069	1110	1025				
DRL225MC4	M_{max} Nm					466	558	700	770		
	(lb in)					(4124)	(4939)	(6196)	(6815)		
	n_{base} rpm					1031	996	937	937		

Nominal speed n_N = 1200 rpm, dynamics package 2

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)										
		0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
DRL71S4	M_{max} Nm	8.5				8.5						
	(lb in)	(75)				(75)						
	n_{base} rpm	457				457						
DRL71M4	M_{max} Nm	11.6	14			14						
	(lb in)	(103)	(124)			(124)						
	n_{base} rpm	521	369			369						
DRL80S4	M_{max} Nm	13	15.7	20.4	25	19.7	25					
	(lb in)	(115)	(139)	(181)	(221)	(174)	(221)					
	n_{base} rpm	738	613	386	181	416	181					
DRL80M4	M_{max} Nm	14	17.1	22.4	29.2	21.7	30					
	(lb in)	(124)	(151)	(198)	(258)	(192)	(266)					
	n_{base} rpm	890	808	668	498	691	480					
DRL90L4	M_{max} Nm				27.4	19.7	28.4	36.8	46			
	(lb in)				(243)	(174)	(251)	(326)	(407)			
	n_{base} rpm				896	996	884	773	650			
DRL100L4	M_{max} Nm						25.3	33.1	45.7	60.5	77.8	
	(lb in)						(224)	(293)	(404)	(535)	(689)	
	n_{base} rpm						1166	1084	949	785	609	
DRL132S4	M_{max} Nm								48.2	64.8	83.8	126
	(lb in)								(427)	(574)	(742)	(1115)
	n_{base} rpm								1049	966	874	664
DRL132MC4	M_{max} Nm										80.9	125
	(lb in)										(716)	(1106)
	n_{base} rpm										1059	947
DRL160M4	M_{max} Nm											123
	(lb in)											(1089)
	n_{base} rpm											1032
DRL160MC4	M_{max} Nm											119
	(lb in)											(1053)
	n_{base} rpm											1085
DRL180S4	M_{max} Nm											125
	(lb in)											(1106)
	n_{base} rpm											1125

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
DRL132S4	M_{max} Nm	150									
	(lb in)	(1328)									
	n_{base} rpm	561									
DRL132MC4	M_{max} Nm	169	200								
	(lb in)	(1496)	(1770)								
	n_{base} rpm	835	752								
DRL160M4	M_{max} Nm	167	241	280							
	(lb in)	(1478)	(2133)	(2478)							
	n_{base} rpm	922	747	663							
DRL160MC4	M_{max} Nm	164	240	314	320						
	(lb in)	(1452)	(2124)	(2779)	(2832)						
	n_{base} rpm	1006	870	742	733						
DRL180S4	M_{max} Nm	170	248	326	380						
	(lb in)	(1505)	(2195)	(2885)	(3363)						
	n_{base} rpm	1063	940	821	738						

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**
DRL180M4	M_{max} Nm	174	255	335	409	430					
	(lb in)	(1540)	(2257)	(2965)	(3620)	(3806)					
	n_{base} rpm	1069	979	886	800	777					
DRL180L4	M_{max} Nm	171	255	337	413	505	520				
	(lb in)	(1513)	(2257)	(2983)	(3655)	(4470)	(4602)				
	n_{base} rpm	1089	1022	952	886	806	793				
DRL180LC4	M_{max} Nm		243	324	397	488	578	600			
	(lb in)		(2151)	(2868)	(3514)	(4319)	(5116)	(5310)			
	n_{base} rpm		1065	1009	952	879	810	793			
DRL200L4	M_{max} Nm			239	317	388	475	561	680		
	(lb in)			(2115)	(2806)	(3434)	(4204)	(4965)	(6019)		
	n_{base} rpm			1128	1066	1000	925	847	753		
DRL225S4	M_{max} Nm			319	393	484	574	713	770		
	(lb in)			(2823)	(3478)	(4284)	(5080)	(6311)	(6815)		
	n_{base} rpm			1110	1069	1010	955	864	829		
DRL225MC4	M_{max} Nm					466	558	700	922	1089	1100
	(lb in)					(4124)	(4939)	(6196)	(8160)	(9638)	(9736)
	n_{base} rpm					1031	996	937	843	776	773

Nominal speed n_N = 1700 rpm, dynamics package 1

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)										
		0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
DRL71S4	M_{max} Nm	5				5						
	(lb in)	(44)				(44)						
	n_{base} rpm	1347				1347						
DRL71M4	M_{max} Nm	7				7						
	(lb in)	(62)				(62)						
	n_{base} rpm	1347				1347						
DRL80S4	M_{max} Nm	9.1	10			10						
	(lb in)	(81)	(89)			(89)						
	n_{base} rpm	1429	1447			1500						
DRL80M4	M_{max} Nm			14	14	14	14					
	(lb in)			(124)	(124)	(124)	(124)					
	n_{base} rpm			1441	1564	1412	1564					
DRL90L4	M_{max} Nm						19.8	25	25			
	(lb in)						(175)	(221)	(221)			
	n_{base} rpm						1429	1400	1564			
DRL100L4	M_{max} Nm							23.3	32.8	40	40	
	(lb in)							(206)	(290)	(708)	(708)	
	n_{base} rpm							1669	1558	1517	1529	
DRL132S4	M_{max} Nm									44.6	58.4	80
	(lb in)									(395)	(517)	(708)
	n_{base} rpm									1547	1464	1362
DRL132MC4	M_{max} Nm											86.2
	(lb in)											(763)
	n_{base} rpm											1528
DRL160M4	M_{max} Nm											87.3
	(lb in)											(773)
	n_{base} rpm											1573

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
DRL132MC4	M_{max} Nm	117	130								
	(lb in)	(1036)	(1151)								
	n_{base} rpm	1425	1484								
DRL160M4	M_{max} Nm	119	165								
	(lb in)	(1053)	(1460)								
	n_{base} rpm	1476	1353								
DRL160MC4	M_{max} Nm	124	184	185							
	(lb in)	(1097)	(1629)	(1637)							
	n_{base} rpm	1406	1278	1362							
DRL180S4	M_{max} Nm	121	179	210	210						
	(lb in)	(1071)	(1584)	(1859)	(1859)						
	n_{base} rpm	1586	1485	1498	1529						
DRL180M4	M_{max} Nm		181	240	250	250					
	(lb in)		(1602)	(2124)	(2213)	(2213)					
	n_{base} rpm		1500	1421	1517	1530					
DRL180L4	M_{max} Nm		181	243	299	320	320				
	(lb in)		(1602)	(2151)	(2646)	(2832)	(2832)				
	n_{base} rpm		1497	1441	1381	1464	1507				
DRL180LC4	M_{max} Nm			224	278	344	409	420			
	(lb in)			(1983)	(2461)	(2956)	(3620)	(3717)			
	n_{base} rpm			1534	1487	1427	1361	1441			

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
DRL200L4	M_{max} Nm			221	273	336	399	475			
	(lb in)			(1956)	(2416)	(2974)	(3531)	(4201)			
	n_{base} rpm			1621	1566	1496	1424	1332			
DRL225S4	M_{max} Nm				279	346	412	515	520		
	(lb in)				(2469)	(3062)	(3647)	(4558)	(4602)		
	n_{base} rpm				1576	1529	1476	1391	1467		
DRL225MC4	M_{max} Nm							453	606	719	770
	(lb in)							(4009)	(5364)	(6364)	(6815)
	n_{base} rpm							1576	1494	1429	1447

Nominal speed n_N = 1700 rpm, dynamics package 2

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)										
		0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
DRL71S4	M_{max} Nm	7.6	8.5			8.5						
	(lb in)	(67)	(75)			(75)						
	n_{base} rpm	960	949			849						
DRL71M4	M_{max} Nm	8.2	10	14	14	13	14					
	(lb in)	(73)	(89)	(124)	(124)	(115)	(124)					
	n_{base} rpm	1195	1043	732	849	914	849					
DRL80S4	M_{max} Nm	9.1	11.1	14.6	18.9	14.1	19.5	25				
	(lb in)	(81)	(98)	(129)	(167)	(125)	(173)	(221)				
	n_{base} rpm	1429	1318	1130	896	1154	861	591				
DRL80M4	M_{max} Nm			20.9	20.3	15.4	21.6	27.8	30			
	(lb in)			(185)	(180)	(136)	(191)	(246)	(266)			
	n_{base} rpm			1136	1242	1294	1119	943	955			
DRL90L4	M_{max} Nm						19.8	26.2	36.9	46		
	(lb in)						(175)	(232)	(327)	(407)		
	n_{base} rpm						1429	1335	1236	1037		
DRL100L4	M_{max} Nm							23.3	33.3	43.8	56.5	85
	(lb in)							(206)	(295)	(388)	(500)	(752)
	n_{base} rpm							1669	1564	1412	1248	896
DRL132S4	M_{max} Nm									44.6	58.4	89.2
	(lb in)									(395)	(517)	(789)
	n_{base} rpm									1547	1464	1269
DRL132MC4	M_{max} Nm											86.2
	(lb in)											(763)
	n_{base} rpm											1528
DRL160M4	M_{max} Nm											87.3
	(lb in)											(773)
	n_{base} rpm											1573

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B1600-503 (sizes 3 – 7):

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	1600
DRL132S4	M_{max} Nm	119.4	150									
	(lb in)	(1057)	(1328)									
	n_{base} rpm	1079	903									
DRL132MC4	M_{max} Nm	117	171	200								
	(lb in)	(1036)	(1513)	(1770)								
	n_{base} rpm	1425	1240	1147								
DRL160M4	M_{max} Nm	119	174	227	278	280						
	(lb in)	(1053)	(1540)	(2009)	(2461)	(2478)						
	n_{base} rpm	1476	1305	1138	993	988						

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	1600
DRL160MC4	M_{max} Nm	124	184	243	297	320						
	(lb in)	(1097)	(1629)	(2151)	(2629)	(2832)						
	n_{base} rpm	1406	1278	1151	1037	988						
DRL180S4	M_{max} Nm	121	179	235	288	352	380					
	(lb in)	(1071)	(1584)	(2080)	(2549)	(3115)	(3363)					
	n_{base} rpm	1586	1485	1371	1270	1142	1089					
DRL180M4	M_{max} Nm		181	240	294	360	425	430				
	(lb in)		(1602)	(2124)	(2602)	(3186)	(3762)	(3806)				
	n_{base} rpm		1500	1421	1341	1241	1145	1138				
DRL180L4	M_{max} Nm		181	243	299	368	436	520				
	(lb in)		(1602)	(2151)	(2646)	(3257)	(3859)	(4602)				
	n_{base} rpm		1497	1441	1381	1308	1231	1138				
DRL180LC4	M_{max} Nm			224	278	344	409	509	600			
	(lb in)			(1983)	(2461)	(3045)	(3620)	(4505)	(5310)			
	n_{base} rpm			1534	1487	1427	1361	1258	1165			
DRL200L4	M_{max} Nm			221	273	336	399	495	650	680		
	(lb in)			(1956)	(2416)	(2974)	(3531)	(4381)	(5753)	(6019)		
	n_{base} rpm			1621	1566	1496	1424	1304	1128	1097		
DRL225S4	M_{max} Nm				279	346	412	515	678	770		
	(lb in)				(2469)	(3062)	(3647)	(4558)	(6001)	(6815)		
	n_{base} rpm				1576	1529	1576	1391	1253	1177		
DRL225MC4	M_{max} Nm							453	606	719	904	1089
	(lb in)							(4009)	(5364)	(6364)	(8001)	(9638)
	n_{base} rpm							1576	1494	1429	1318	1210

Nominal speed n_N = 2100 rpm, dynamics package 1

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)**										
		0005	**0008**	**0011**	**0014**	**0015**	**0022**	**0030**	**0040**	**0055**	**0075**	**0110**
DRL71S4	M_{max} Nm	5				5						
	(lb in)	(44)				(44)						
	n_{base} rpm	1804				1804						
DRL71M4	M_{max} Nm		7	7		7						
	(lb in)		(62)	(62)		(62)						
	n_{base} rpm		1763	1787		1787						
DRL80S4	M_{max} Nm			10	10	10	10					
	(lb in)			(89)	(89)	(89)	(89)					
	n_{base} rpm			1957	2033	1927	2033					
DRL80M4	M_{max} Nm				14	11.9	14	14				
	(lb in)				(124)	(105)	(124)	(124)				
	n_{base} rpm				1939	1816	1968	2109				
DRL90L4	M_{max} Nm							19.9	25	25		
	(lb in)							(176)	(221)	(221)		
	n_{base} rpm							1863	1933	2121		
DRL100L4	M_{max} Nm								25.2	34.2	40	40
	(lb in)								(223)	(303)	(354)	(354)
	n_{base} rpm								2127	2003	1998	2044
DRL132S4	M_{max} Nm										46.8	72.2
	(lb in)										(414)	(639)
	n_{base} rpm										1909	1728

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B1600-503 (sizes 3 – 7):

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**	**1600**
DRL132S4	M_{max} Nm	80										
	(lb in)	(708)										
	n_{base} rpm	1713										
DRL132MC4	M_{max} Nm	94.8	130	130								
	(lb in)	(839)	(1151)	(1151)								
	n_{base} rpm	1855	1787	1850								
DRL160M4	M_{max} Nm	93.4	137	165								
	(lb in)	(827)	(1213)	(1460)								
	n_{base} rpm	1968	1810	1735								
DRL160MC4	M_{max} Nm		134	178	185							
	(lb in)		(1186)	(1575)	(1637)							
	n_{base} rpm		1898	1775	1885							
DRL180S4	M_{max} Nm		140	185	210	210						
	(lb in)		(1239)	(1637)	(1859)	(1859)						
	n_{base} rpm		1981	1880	1902	1964						
DRL180M4	M_{max} Nm		142	190	233	250	250					
	(lb in)		(1257)	(1682)	(2062)	(2213)	(2213)					
	n_{base} rpm		1955	1885	1816	1915	1985					
DRL180L4	M_{max} Nm			187	232	287	320	320				
	(lb in)			(1655)	(2053)	(2540)	(2832)	(2832)				
	n_{base} rpm			1912	1866	1799	1829	1955				
DRL180LC4	M_{max} Nm					274	327	409	420			
	(lb in)					(2425)	(2894)	(3620)	(3717)			
	n_{base} rpm					1862	1806	1706	1812			
DRL200L4	M_{max} Nm				217	269	320	399	475			
	(lb in)				(1921)	(2381)	(2832)	(3531)	(4204)			
	n_{base} rpm				2019	1957	1886	1777	1671			

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	1600
DRL225S4	M_{max} Nm (lb in)						322 (2850)	405 (3585)	520 (4602)	520 (4602)		
	n_{base} rpm						1960	1883	1795	1872		
DRL225MC4	M_{max} Nm (lb in)								519 (4594)	618 (5470)	770 (6815)	770 (6815)
	n_{base} rpm								1790	1725	1637	1681

Nominal speed n_N = 2100 rpm, dynamics package 2

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)										
		0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
DRL71S4	M_{max} Nm	6	7.2	8.5		8.5						
	(lb in)	(53)	(64)	(75)		(75)						
	n_{base} rpm	1582	1388	1207		1207						
DRL71M4	M_{max} Nm		7.9	10.3	13.5	10	13.9	14				
	(lb in)		(69.9)	(91.2)	(119)	(88.5)	(123)	(124)				
	n_{base} rpm		1611	1377	1089	1406	1054	1048				
DRL80S4	M_{max} Nm			11.5	15.1	11.2	15.6	19.9	25			
	(lb in)			(102)	(134)	(99)	(138)	(176)	(221)			
	n_{base} rpm			1728	1517	1752	1488	1230	949			
DRL80M4	M_{max} Nm				16.4	11.9	17	21.9	30			
	(lb in)				(145)	(105)	(150)	(194)	(266)			
	n_{base} rpm				1681	1816	1664	1505	1253			
DRL90L4	M_{max} Nm							19.9	28.3	38	46	
	(lb in)							(176)	(250)	(336)	(407)	
	n_{base} rpm							1863	1728	1558	1435	
DRL100L4	M_{max} Nm								25.2	34.2	44.4	67.2
	(lb in)								(223)	(303)	(393)	(595)
	n_{base} rpm								2127	2003	1851	1494
DRL132S4	M_{max} Nm										46.8	72.2
	(lb in)										(414)	(639)
	n_{base} rpm										1909	1728

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B2000-503 (sizes 3 – 7):

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	1600	2000
DRL100L4	M_{max} Nm	85											
	(lb in)	(752)											
	n_{base} rpm	1242											
DRL132S4	M_{max} Nm	97	140	150									
	(lb in)	(859)	(1239)	(1328)									
	n_{base} rpm	1538	1235	1171									
DRL132MC4	M_{max} Nm	94.8	139	183	200								
	(lb in)	(839)	(1230)	(1620)	(1770)								
	n_{base} rpm	1855	1684	1508	1440								
DRL160M4	M_{max} Nm	93.4	137	180	221	270	280						
	(lb in)	(827)	(1213)	(1593)	(1956)	(2390)	(2478)						
	n_{base} rpm	1968	1810	1643	1494	1322	1287						
DRL160MC4	M_{max} Nm		134	178	219	268	317	320					
	(lb in)		(1186)	(1575)	(1938)	(2372)	(2805)	(2832)					
	n_{base} rpm		1898	1775	1661	1524	1393	1388					
DRL180S4	M_{max} Nm		140	185	227	278	329	380					
	(lb in)		(1239)	(1637)	(2009)	(2461)	(2912)	(3363)					
	n_{base} rpm		1981	1880	1784	1661	1538	1423					
DRL180M4	M_{max} Nm		142	190	233	286	339	421	430				
	(lb in)		(1257)	(1681)	(2062)	(2531)	(3000)	(3721)	(3806)				
	n_{base} rpm		1955	1885	1816	1723	1627	1480	1464				
DRL180L4	M_{max} Nm			187	232	287	341	425	520				
	(lb in)			(1655)	(2053)	(2540)	(3018)	(3762)	(4602)				
	n_{base} rpm			1912	1866	1799	1729	1620	1490				
DRL180LC4	M_{max} Nm					274	327	409	539	600			
	(lb in)					(2425)	(2894)	(3620)	(4771)	(5310)			
	n_{base} rpm					1862	1806	1710	1550	1474			

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	1600	2000
DRL200L4	M_{max} Nm				217	269	320	399	524	618	680		
	(lb in)				(1921)	(2381)	(2832)	(3531)	(4638)	(5470)	(6019)		
	n_{base} rpm				2019	1957	1886	1777	1593	1468	1386		
DRL225S4	M_{max} Nm						322	405	535	633	770		
	(lb in)						(2850)	(3585)	(4735)	(5603)	(6815)		
	n_{base} rpm						1960	1883	1752	1652	1511		
DRL225MC4	M_{max} Nm								519	618	780	940	1100
	(lb in)								(4594)	(5470)	(6904)	(8320)	(9736)
	n_{base} rpm								1790	1725	1617	1508	1403

Nominal speed n_N = 3000 rpm, dynamics package 1

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)										
		0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
DRL71S4	M_{max} Nm		5	5		5						
	(lb in)		(44.2)	(44.2)		(44.2)						
	n_{base} rpm		2554	2654		2654						
DRL71M4	M_{max} Nm			7	7	7	7					
	(lb in)			(62)	(62)	(62)	(62)					
	n_{base} rpm			2519	2630	2478	2630					
DRL80S4	M_{max} Nm				10	7.8	10	10				
	(lb in)				(89)	(69)	(89)	(89)				
	n_{base} rpm				2794	2830	2841	3064				
DRL80M4	M_{max} Nm						11.8	14	14			
	(lb in)						(104)	(124)	(124)			
	n_{base} rpm						2595	2424	3140			
DRL90L4	M_{max} Nm								19.8	25	25	
	(lb in)								(175)	(221)	(221)	
	n_{base} rpm								2619	2677	3035	
DRL100L4	M_{max} Nm									24.1	31.8	40
	(lb in)									(213)	(281)	(354)
	n_{base} rpm									2988	2859	2912
DRL132S4	M_{max} Nm											50
	(lb in)											(443)
	n_{base} rpm											2710

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B2500-503 (sizes 3 – 7):

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	1600	2000	2500
DRL100L4	M_{max} Nm	40												
	(lb in)	(354)												
	n_{base} rpm	2912												
DRL132S4	M_{max} Nm	68	80											
	(lb in)	(602)	(708)											
	n_{base} rpm	2543	2558											
DRL132MC4	M_{max} Nm		96.4	128	130									
	(lb in)		(853)	(1133)	(1151)									
	n_{base} rpm		2666	2504	2595									
DRL160M4	M_{max} Nm		97.6	129	159	165								
	(lb in)		(864)	(1142)	(1407)	(1460)								
	n_{base} rpm		2733	2584	2439	2447								
DRL160MC4	M_{max} Nm			136	168	185	185	185						
	(lb in)			(1204)	(1487)	(1637)	(1637)	(1637)						
	n_{base} rpm			2456	2351	2425	2460	2513						
DRL180S4	M_{max} Nm			132	163	200	210							
	(lb in)			(1168)	(1443)	(1770)	(1859)							
	n_{base} rpm			2777	2693	2584	2720							
DRL180M4	M_{max} Nm				165	204	242	250	250					
	(lb in)				(1460)	(1806)	(2142)	(2213)	(2213)					
	n_{base} rpm				2689	2613	2530	2755	2812					
DRL180L4	M_{max} Nm					205	246	308	320					
	(lb in)					(1814)	(2177)	(2726)	(2832)					
	n_{base} rpm					2609	2553	2457	2722					
DRL180LC4	M_{max} Nm						227	287	381	420	420			
	(lb in)						(2009)	(2540)	(3372)	(3717)	(3717)			
	n_{base} rpm						2702	2619	2477	2506	2593			

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	1600	2000	2500
DRL200L4	M_{max} Nm						224	281	372	439	475			
	(lb in)						(1983)	(2487)	(3292)	(3885)	(4204)			
	n_{base} rpm						2835	2738	2570	2437	2375			
DRL225S4	M_{max} Nm							287	383	455	520	520		
	(lb in)							(2540)	(3390)	(4027)	(4602)	(4602)		
	n_{base} rpm							2753	2639	2548	2543	2610		
DRL225MC4	M_{max} Nm										508	618	770	770
	(lb in)										(4496)	(5470)	(6815)	(6815)
	n_{base} rpm										2718	2619	2510	2630

Nominal speed n_N = 3000 rpm, dynamics package 2

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)										
		0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
DRL71S4	M_{max} Nm		5.1	6.7	8.5	6.5	8.5					
	(lb in)		(45)	(59)	(75)	(57)	(75)					
	n_{trans} rpm		2502	2185	1869	2232	1869					
DRL71M4	M_{max} Nm			7.3	9.6	7	9.9	12.7	14			
	(lb in)			(65)	(85)	(62)	(88)	(112)	(124)			
	n_{trans} rpm			2443	2162	2478	2127	1798	1664			
DRL80S4	M_{max} Nm				10.7	7.8	11	14.2	19.5	25		
	(lb in)				(95)	(69)	(97)	(126)	(173)	(221)		
	n_{trans} rpm				2630	2830	2607	2378	2003	1634		
DRL80M4	M_{max} Nm						11.8	15.5	21.6	28.7	30	
	(lb in)						(104)	(137)	(191)	(254)	(266)	
	n_{trans} rpm						2595	2472	2250	1986	1933	
DRL90L4	M_{max} Nm								19.8	27.1	35.5	46
	(lb in)								(175)	(240)	(314)	(407)
	n_{trans} rpm								2619	2478	2314	2121
DRL100L4	M_{max} Nm									24.1	31.8	48.8
	(lb in)									(213)	(281)	(432)
	n_{trans} rpm									2988	2859	2537
DRL132S4	M_{max} Nm											50
	(lb in)											(443)
	n_{trans} rpm											2710

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B2500-503 (sizes 3 – 7):

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	1600	2000	2500
DRL100L4	M_{max} Nm	65.5	85											
	(lb in)	(580)	(752)											
	n_{base} rpm	2209	1851											
DRL132S4	M_{max} Nm	68	98.9	129	150									
	(lb in)	(602)	(875)	(1142)	(1328)									
	n_{base} rpm	2543	2236	1943	1762									
DRL132MC4	M_{max} Nm		96.4	128	157	192	200							
	(lb in)		(853)	(1133)	(1390)	(1922)	(1770)							
	n_{base} rpm		2666	2504	2348	2163	2119							
DRL160M4	M_{max} Nm		97.6	129	159	194	230	280						
	(lb in)		(864)	(1142)	(1407)	(1717)	(2036)	(2478)						
	n_{base} rpm		2733	2584	1439	2254	2078	1850						
DRL160MC4	M_{max} Nm			136	168	207	245	305	320					
	(lb in)			(1204)	(1487)	(1832)	(2168)	(2699)	(2832)					
	n_{base} rpm			2456	2351	2214	2078	1872	1828					
DRL180S4	M_{max} Nm			132	163	200	210	238	296	380				
	(lb in)			(1168)	(1443)	(1770)	(1859)	(2106)	(2620)	(3363)				
	n_{base} rpm			2777	2693	2584	2720	2469	2285	2025				
DRL180M4	M_{max} Nm				165	204	242	302	398	430				
	(lb in)				(1460)	(1806)	(2142)	(2673)	(3523)	(3806)				
	n_{base} rpm				2689	2613	2530	2393	2168	2091				
DRL180L4	M_{max} Nm					205	246	308	407	481	520			
	(lb in)					(1814)	(2177)	(2726)	(3602)	(4257)	(4602)			
	n_{base} rpm					2609	2553	2457	2287	2158	2091			
DRL180LC4	M_{max} Nm						227	287	381	451	567	600		
	(lb in)						(2009)	(2540)	(3372)	(3992)	(5018)	(5310)		
	n_{base} rpm						2702	2619	2477	2364	2174	2118		

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	1600	2000	2500
DRL200L4	M_{max} Nm (lb in)						224 (1983)	281 (2487)	372 (3292)	439 (3885)	551 (4877)	662 (5859)	680 (6019)	
	n_{base} rpm						2835	2738	2570	2437	2218	2015	1984	
DRL225S4	M_{max} Nm (lb in)							287 (2540)	383 (3390)	455 (4027)	574 (5080)	691 (6116)	770 (6815)	
	n_{base} rpm							2753	2639	2548	2387	2223	2115	
DRL225MC4	M_{max} Nm (lb in)										508 (4496)	618 (5470)	791 (7001)	985 (8718)
	n_{base} rpm										2718	2619	2452	2261

9.6.9 Motor table DRS series AC motors (characteristic value with delta/star connection AC 230/400 V / 50 Hz)

Motor	P_m	M_N	Mass moment of inertia J_M		Star ⅄ (AC 400 V)				Delta △ (AC 230 V)			
			without brake	with brake	I_n	I_{q_n} 1)	I_{d_n} 1)	k_T 1)	I_n	I_{q_n} 1)	I_{d_n} 1)	k_T
	kW	Nm (lb in)	10^{-4} kgm²		A	A	A	Nm/A (lb in/A)	A	A	A	Nm/A (lb in/A)
DRS71S4	0.37	2.55 (23)	4.9	6.2	1.14	0.91	0.68	2.79 (24.7)	1.97	1.58	1.18	1.61 (14.2)
DRS71M4	0.55	3.8 (34)	7.1	8.4	1.55	1.23	0.95	3.10 (27.4)	2.68	2.12	1.64	1.79 (15.8)
DRS80S4	0.75	5.1 (45)	14.9	16.4	1.8	1.54	0.93	3.31 (29.3)	3.1	2.67	1.61	1.91 (16.9)
DRS80M4	1.1	7.4 (65)	21.5	26	2.4	2.09	1.19	3.55 (31.4)	4.2	3.6	2.1	2.05 (18.1)
DRS90M4	1.5	10.3 (91)	35.5	40	3.3	3.00	1.39	3.44 (30.4)	5.7	5.2	2.4	1.99 (17.6)
DRS90L4	2.2	15 (133)	43.5	49.5	4.85	4.11	2.57	3.65 (32.3)	8.4	7.1	4.4	2.10 (18.6)
DRS100M4	3	20.5 (181)	56	62	6.4	5.91	2.45	3.47 (30.7)	11.1	10.2	4.2	2.00 (17.7)
DRS100LC4	4	26.5 (235)	90	96	8.4	7.55	3.67	3.51 (31.1)	14.5	13.1	6.4	2.03 (18.0)
DRS112M4	4	26.5 (235)	146	151	8.1	7.71	2.49	3.44 (30.4)	14.0	13.4	4.3	1.98 (17.5)
DRS132S4	5.5	36.5 (323)	190	200	11.1	10.3	4.18	3.55 (31.4)	19.2	17.8	7.2	2.05 (18.1)
DRS132M4	7.5	49.5 (438)	255	265	14.4	13.6	4.64	3.63 (32.1)	24.9	23.6	8.0	2.10 (18.6)
DRS132MC4	9.2	60 (531)	340	355	18.6	16.6	8.29	3.60 (31.9)	32.2	28.8	14.4	2.08 (18.4)
DRS160S4	9.2	60 (531)	370	420	18.9	16.8	8.75	3.58 (31.7)	32.7	29.1	15.2	2.07 (18.3)
DRS160M4	11	72 (637)	450	500	22	20.1	8.94	3.58 (31.7)	38.1	34.8	15.5	2.07 (18.3)
DRS160MC4	15	94 (832)	590	640	30	27.8	11.8	3.38 (29.9)	52.0	48.1	20.5	1.95 (17.3)
DRS180S4	15	98 (867)	900	960	29	26.4	11.7	3.71 (32.8)	50.2	45.7	20.3	2.14 (18.9)
DRS180M4	18.5	121 (1071)	1110	1250	34.5	32.0	12.7	3.78 (33.5)	59.8	55.4	21.9	2.18 (19.3)
DRS180L4	22	143 (1266)	1300	1440	41.5	37.5	17.3	3.81 (33.7)	71.9	64.9	29.9	2.20 (19.5)
DRS180LC4	30	195 (1726)	1680	1910	57	52.6	21.2	3.71 (32.8)	98.7	91.1	36.7	2.14 (18.9)
DRS200L4	30	194 (1717)	2360	2590	57	53.2	20.6	3.64 (32.2)	98.7	92.2	35.7	2.10 (18.6)
DRS225S4	37	240 (2124)	2930	3160	70	64.8	25.2	3.70 (32.7)	121	112	43.7	2.14 (18.9)
DRS225M4	45	290 (2567)	3430	3660	84	76.2	35.1	3.80 (33.6)	145	132	60.8	2.20 (19.5)
DRS225MC4	55	355 (3142)	4330	4560	105	97.6	38.7	3.64 (32.2)	182	169	67.1	2.10 (18.6)
DRS315K4	110	710 (6284)	18400	19500	200	185	75.9	3.84 (34.0)	345	321	131	2.22 (19.6)
DRS315S4	132	850 (7523)	22500	23600	245 2)	212	94.7	4.01 (35.5)	425	367	164	2.32 (20.5)

Motor	P_m	M_N	Mass moment of inertia J_M		Star ⅄ (AC 400 V)				Delta △ (AC 230 V)			
			without brake	with brake	I_n	I_{q_n} 1)	I_{d_n} 1)	k_T 1)	I_n	I_{q_n} 1)	I_{d_n} 1)	k_T
	kW	Nm (lb in)	10^{-4} kgm^2		A	A	A	Nm/A (lb in/A)	A	A	A	Nm/A (lb in/A)
DRS315M4	160	1030 (9116)	27900	29000	280	262	97.4	3.92 (34.7)	485	455	169	2.27 (20.1)
DRS315L4	200	1290 (11417)	31900	33000	350	330	117	3.91 (34.6)	-	-	-	-

1) Applies in the basic speed range up to n_{trans}.

2) Current ratings for 230/400 V winding. Due to the number of turns, the current of the 400/690 V winding is 235 A.

9.6.10 DRS motor selection with delta/star connection type (line AC 400 V / 50 Hz)

AC 230/400 V / 50 Hz motors in star connection or AC 400/690 V / 50 Hz motors in delta connection

Assignment of MOVIDRIVE® MDX61B0005-5A3 ... MDX61B0110-503 (sizes 0 ... 2):

Motor voltage		**MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)**										
AC 400 / 50 Hz		**0005**	**0008**	**0011**	**0014**	**0015**	**0022**	**0030**	**0040**	**0055**	**0075**	**0110**
DRS71S4	M_{max} Nm	10				10						
	(lb in)	(89)				(89)						
	n_{base} rpm	375				375						
DRS71M4	M_{max} Nm	10				10						
	(lb in)	(89)				(89)						
	n_{base} rpm	685				685						
DRS80S4	M_{max} Nm	12.9	14			14						
	(lb in)	(114)	(124)			(124)						
	n_{base} rpm	761	703			704						
DRS80M4	M_{max} Nm	13.6	14	14		14						
	(lb in)	(120)	(124)	(124)		(124)						
	n_{base} rpm	960	1031	1066		1066						
DRS90M4	M_{max} Nm			20.7	27	20	27.9	28				
	(lb in)			(183)	(240)	(177)	(247)	(248)				
	n_{base} rpm			925	791	943	774	767				
DRS90L4	M_{max} Nm				27.6	19.8	28.6	37.1	40			
	(lb in)				(244)	(175)	(253)	(328)	(354)			
	n_{base} rpm				925	1019	914	808	785			
DRS100M4	M_{max} Nm						27.3	35.3	40			
	(lb in)						(242)	(312)	(354)			
	n_{base} rpm						1113	1037	1066			
DRS100LC4	M_{max} Nm							34.4	48.2	55	55	
	(lb in)							(304)	(427)	(487)	(487)	
	n_{base} rpm							1166	1095	1148	1212	
DRS112M4	M_{max} Nm							35.2	48.4	55		
	(lb in)							(312)	(428)	(487)		
	n_{base} rpm							1152	1059	1040		
DRS132S4	M_{max} Nm								48.2	64.6	83.5	110
	(lb in)								(427)	(572)	(739)	(974)
	n_{base} rpm								1093	1025	942	825
DRS132M4	M_{max} Nm									66.1	85.6	110
	(lb in)									(585)	(758)	(974)
	n_{base} rpm									1079	1015	976
DRS132MC4	M_{max} Nm										81.1	126
	(lb in)										(718)	(1115)
	n_{base} rpm										1103	1005
DRS160S4	M_{max} Nm										80.2	125
	(lb in)										(710)	(1106)
	n_{base} rpm										1063	980
DRS160M4	M_{max} Nm											124
	(lb in)											(1097)
	n_{base} rpm											1067
DRS160MC4	M_{max} Nm											119
	(lb in)											(1053)
	n_{base} rpm											1160
DRS180S4	M_{max} Nm											126
	(lb in)											(1115)
	n_{base} rpm											1092

Note:
The data is based on a supply voltage of AC 400 V.

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B0750-503 (size 3 ... 5):

Motor voltage		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)						
AC 400 / 50 Hz		0150	0220	0300	0370	0450	0550	0750
DRS132S4	M_{max} Nm	110						
	(lb in)	(974)						
	n_{base} rpm	825						
DRS132M4	M_{max} Nm	110						
	(lb in)	(974)						
	n_{base} rpm	976						
DRS132MC4	M_{max} Nm	170	200					
	(lb in)	(1505)	(1770)					
	n_{base} rpm	903	844					
DRS160S4	M_{max} Nm	169	200					
	(lb in)	(1496)	(1770)					
	n_{base} rpm	892	852					
DRS160M4	M_{max} Nm	168	200	200				
	(lb in)	(1487)	(1770)	(1770)				
	n_{base} rpm	984	958	958				
DRS160MC4	M_{max} Nm	163	200	200	200			
	(lb in)	(1443)	(1770)	(1770)	(1770)			
	n_{base} rpm	1107	1164	1204	1204			
DRS180S4	M_{max} Nm	172	200	200				
	(lb in)	(1522)	(1770)	(1770)				
	n_{base} rpm	1029	1079	1079				
DRS180M4	M_{max} Nm	174	255	335	400	400		
	(lb in)	(1540)	(2257)	(2965)	(3540)	(3540)		
	n_{base} rpm	1069	979	886	810	810		
DRS180L4	M_{max} Nm	171	255	337	400	400		
	(lb in)	(1513)	(2257)	(2983)	(3540)	(3540)		
	n_{base} rpm	1085	1022	952	909	929		
DRS180LC4	M_{max} Nm		243	324	397	488	578	600
	(lb in)		(2151)	(2868)	(3514)	(4319)	(5116)	(5310)
	n_{base} rpm		1065	1009	949	879	810	793
DRS200L4	M_{max} Nm		241	320	393	482	570	600
	(lb in)		(2133)	(2832)	(3478)	(4266)	(5045)	(5310)
	n_{base} rpm		1081	1022	963	890	820	796
DRS225S4	M_{max} Nm			319	393	484	574	600
	(lb in)			(2823)	(3478)	(4284)	(5080)	(5310)
	n_{base} rpm			1110	1066	1010	962	934
DRS225M4	M_{max} Nm				394	490	584	600
	(lb in)				(3487)	(4337)	(5169)	(5310)
	n_{base} rpm				1092	1054	1013	1092
DRS225MC4	M_{max} Nm					464	555	695
	(lb in)					(4107)	(4912)	(6151)
	n_{base} rpm					1037	996	931

Note:
The data is based on a supply voltage of AC 400 V.

Assignment of MOVIDRIVE® MDX61B0900-503 ... MDX61B2500-503 (sizes 6 ... 7):

Motor voltage		**MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)**					
AC 400 / 50 Hz		**0900**	**1100**	**1320**	**1600**	**2000**	**2500**
DRS225MC4	M_{max} Nm	914	1079	1200			
	(lb in)	(8090)	(9550)	(10621)			
	n_{base} rpm	832	758	709			
DRS315K4	M_{max} Nm	932	1111	1406	1600	1600	1600
	(lb in)	(8249)	(9833)	(12444)	(14161)	(14161)	(14161)
	n_{base} rpm	1053	1041	1015	1046	1198	1221
DRS315S4	M_{max} Nm		1141	1455	1600	1600	1600
	(lb in)		(10099)	(12878)	(14161)	(14161)	(14161)
	n_{base} rpm		1074	1056	1142	1360	1482
DRS315M4	M_{max} Nm			1421	1724	2204	2400
	(lb in)			(12577)	(15259)	(19507)	(21242)
	n_{base} rpm			1010	997	972	1061
DRS315L4	M_{max} Nm	**Note:**			1699	2181	2400
	(lb in)	The data is based on a supply voltage of			(15037)	(19303)	(21242)
	n_{base} rpm	AC 400 V.			1002	985	1081

AC 230/400 V / 50 Hz motors in delta connection

Assignment of MOVIDRIVE® MDX61B0005-5A3 ... MDX61B0110-503 (sizes 0 ... 2):

Motor voltage AC 230 / 50 Hz		**MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)**										
		0005	**0008**	**0011**	**0014**	**0015**	**0022**	**0030**	**0040**	**0055**	**0075**	**0110**
DRS71S4	M_{max} Nm	6.2	7.5	9.8	10	9.4	10					
	(lb in)	(55)	(66)	(87)	(89)	(83)	(89)					
	n_{base} rpm	1669	1494	1201	1171	1242	1171					
DRS71M4	M_{max} Nm		8	10		10						
	(lb in)		(71)	(89)		(89)						
	n_{base} rpm		1687	1564		1546						
DRS80S4	M_{max} Nm			11.4	14	11	14					
	(lb in)			(101)	(124)	(97)	(124)					
	n_{base} rpm			1757	1658	1781	1669					
DRS80M4	M_{max} Nm				14	11.6	14	14				
	(lb in)				(124)	(103)	(124)	(124)				
	n_{base} rpm				2050	1962	2091	2285				
DRS90M4	M_{max} Nm						15.6	20.1	27.7	28		
	(lb in)						(138)	(178)	(245)	(248)		
	n_{base} rpm						1980	1857	1646	1658		
DRS90L4	M_{max} Nm							19.9	28.4	38.2	40	
	(lb in)							(176)	(251)	(338)	(354)	
	n_{base} rpm							1921	1798	1646	1734	
DRS100M4	M_{max} Nm								27.1	36.3	40	40
	(lb in)								(240)	(321)	(354)	(354)
	n_{base} rpm								2080	1968	2103	2191
DRS100LC4	M_{max} Nm									35.5	46.5	55
	(lb in)									(314)	(412)	(487)
	n_{base} rpm									2121	2044	2302
DRS112M4	M_{max} Nm									36.2	46.8	55
	(lb in)									(320)	(412)	(487)
	n_{base} rpm									2094	1987	2016
DRS132S4	M_{max} Nm										46.5	71.7
	(lb in)										(412)	(635)
	n_{base} rpm										1997	1845
DRS132M4	M_{max} Nm											73.4
	(lb in)											(650)
	n_{base} rpm											1923

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B0750-503 (size 3 ... 5):

Motor voltage AC 230 / 50 Hz		**MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)**						
		0150	**0220**	**0300**	**0370**	**0450**	**0550**	**0750**
DRS100LC4	M_{max} Nm	55						
	(lb in)	(487)						
	n_{base} rpm	2361						
DRS132S4	M_{max} Nm	96.4	110					
	(lb in)	(853)	(974)					
	n_{base} rpm	1684	1596					
DRS132M4	M_{max} Nm	98.9	110					
	(lb in)	(875)	(974)					
	n_{base} rpm	1806	1855					

Motor voltage		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)						
AC 230 / 50 Hz		**0150**	**0220**	**0300**	**0370**	**0450**	**0550**	**0750**
DRS132MC4	M_{max} Nm	94.8	139	184	200			
	(lb in)	(839)	(1230)	(1629)	(1770)			
	n_{base} rpm	1943	1806	1655	1616			
DRS160S4	M_{max} Nm	93.9	138	183	200			
	(lb in)	(831)	(1221)	(1620)	(1770)			
	n_{base} rpm	1880	1762	1639	1643			
DRS160M4	M_{max} Nm	93.5	138	182	200			
	(lb in)	(828)	(1221)	(1611)	(1770)			
	n_{base} rpm	2012	1902	1779	1801			
DRS160MC4	M_{max} Nm		132	176	200	200		
	(lb in)		(1168)	(1558)	(1770)	(1770)		
	n_{base} rpm		2056	1977	2043	2232		
DRS180S4	M_{max} Nm		140	187	200	200		
	(lb in)		(1239)	(1655)	(1770)	(1770)		
	n_{base} rpm		1932	1836	1949	2032		
DRS180M4	M_{max} Nm		141	189	232	285	338	400
	(lb in)		(1248)	(1673)	(2053)	(2522)	(2992)	(3540)
	n_{base} rpm		1965	1895	1822	1733	1636	1524
DRS180L4	M_{max} Nm			186	231	286	340	400
	(lb in)			(1646)	(2045)	(2531)	(3009)	(3540)
	n_{base} rpm			1922	1872	1809	1739	1700
DRS180LC4	M_{max} Nm					273	326	407
	(lb in)					(2416)	(2885)	(3602)
	n_{base} rpm					1872	1812	1716
DRS200L4	M_{max} Nm					270	322	403
	(lb in)					(2390)	(2850)	(3567)
	n_{base} rpm					1889	1825	1722
DRS225S4	M_{max} Nm						321	403
	(lb in)						(2841)	(3567)
	n_{base} rpm						1968	1892
DRS225M4	M_{max} Nm							405
	(lb in)							(3585)
	n_{base} rpm							1927

Assignment of MOVIDRIVE® MDX61B0900-503 ... MDX61B2500-503 (sizes 6 ... 7):

Motor voltage		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)					
AC 230 / 50 Hz		**0900**	**1100**	**1320**	**1600**	**2000**	**2500**
DRS180LC4	M_{max} Nm	537	600				
	(lb in)	(4753)	(5310)				
	n_{base} rpm	1557	1480				
DRS200L4	M_{max} Nm	530	600				
	(lb in)	(4691)	(5310)				
	n_{base} rpm	1555	1467				
DRS225S4	M_{max} Nm	533	600				
	(lb in)	(4717)	(5310)				
	n_{base} rpm	1760	1719				
DRS225M4	M_{max} Nm	542	600	600			
	(lb in)	(4797)	(5310)	(5310)			
	n_{base} rpm	1839	1878	1968			
DRS225MC4	M_{max} Nm	514	611	771	936	1192	1200
	(lb in)	(4549)	(5408)	(6824)	(8284)	(10550)	(10621)
	n_{base} rpm	1804	1734	1614	1517	1350	1344

Motor voltage		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)					
AC 230 / 50 Hz		**0900**	**1100**	**1320**	**1600**	**2000**	**2500**
DRS315K4	M_{max} Nm				947	1221	1525
	(lb in)				(8382)	(10807)	(13497)
	n_{base} rpm				1856	1823	1782
DRS315S4	M_{max} Nm					1258	1580
	(lb in)					(11134)	(13984)
	n_{base} rpm					1881	1856
DRS315M4	M_{max} Nm					1228	1544
	(lb in)					(10869)	(13666)
	n_{base} rpm					1792	1772
DRS315L4	M_{max} Nm						1517
	(lb in)						(13427)
	n_{base} rpm						1774

9.6.11 DRS motor selection in delta connection type (line AC 230 V / 50 Hz)

AC 230/400 V / 50 Hz motors in delta connection

Motor voltage		MOVIDRIVE® MDX61B...-2_3 (AC 230 V units) in CFC operating modes (P700)								
AC 230 V / 50 Hz		**0015**	**0022**	**0037**	**0055**	**0075**	**0110**	**0150**	**0220**	**0300**
DRS71M4 0.37 kW	M_{max} Nm	10								
	(lb in)	(89)								
	n_{base} rpm	263								
DRS71M4	M_{max} Nm	10								
	(lb in)	(89)								
	n_{base} rpm	685								
DRS80S4	M_{max} Nm	14								
	(lb in)	(124)								
	n_{base} rpm	703								
DRS80M4	M_{max} Nm	14								
	(lb in)	(124)								
	n_{base} rpm	1066								
DRS90M4	M_{max} Nm	21.1	25	28						
	(lb in)	(187)	(221)	(248)						
	n_{base} rpm	919	832	767						
DRS90L4	M_{max} Nm	21	25.4	40						
	(lb in)	(186)	(225)	(354)						
	n_{base} rpm	1007	955	779						
DRS100M4	M_{max} Nm		24.2	40	40					
	(lb in)		(214)	(354)	(354)					
	n_{base} rpm		1142	1025	1072					
DRS100LC4	M_{max} Nm			41.8	55	55				
	(lb in)			(370)	(487)	(487)				
	n_{base} rpm			1130	1154	1212				
DRS112M4	M_{max} Nm			42.3	55					
	(lb in)			(374)	(487)					
	n_{base} rpm			1103	1040					
DRS132S4	M_{max} Nm			41.7	65.4	87.2	110			
	(lb in)			(369)	(579)	(772)	(974)			
	n_{base} rpm			1118	1020	927	825			
DRS132M4	M_{max} Nm				66.9	89.4	110			
	(lb in)				(592)	(791)	(974)			
	n_{base} rpm				1074	1001	976			
DRS132MC4	M_{max} Nm					85	127	165	200	
	(lb in)					(752)	(1124)	(1460)	(1770)	
	n_{base} rpm					1093	1001	918	844	
DRS160S4	M_{max} Nm					84.1	126	164	200	
	(lb in)					(744)	(1115)	(1452)	(1770)	
	n_{base} rpm					1054	980	905	852	
DRS160M4	M_{max} Nm					83.6	125	163	200	
	(lb in)					(740)	(1106)	(1443)	(1770)	
	n_{base} rpm					1138	1067	993	958	
DRS160MC4	M_{max} Nm						120	158	200	200
	(lb in)						(1062)	(1398)	(1770)	(1770)
	n_{base} rpm						1160	1111	1164	1204
DRS180S4	M_{max} Nm						127	167	200	
	(lb in)						(1124)	(1478)	(1770)	
	n_{base} rpm						1092	1035	1079	
DRS180M4	M_{max} Nm							169	255	305
	(lb in)							(1496)	(2257)	(2699)
	n_{base} rpm							1075	979	923

Note:
The data is based on a supply voltage of AC 230 V.

Motor voltage AC 230 V / 50 Hz		MOVIDRIVE® MDX61B...-2_3 (AC 230 V units) in CFC operating modes (P700)								
		0015	0022	0037	0055	0075	0110	0150	0220	0300
DRS180L4	M_{max} Nm (lb in)								255 (2257)	306 (2708)
	n_{base} rpm								1022	979
DRS180LC4	M_{max} Nm (lb in)								243 (2151)	293 (2593)
	n_{base} rpm								1065	1029
DRS200L4	M_{max} Nm (lb in)								241 (2133)	290 (2567)
	n_{base} rpm								1081	1045
DRS225S4	M_{max} Nm (lb in)									288 (2549)
	n_{base} rpm									1127

Note:
The data is based on a supply voltage of AC 230 V.

9.6.12 Motor table DRE series AC motors (characteristic value with delta/star connection AC 230/400 V / 50 Hz)

Motor	P_m	M_N	Mass moment of inertia J_M		Star ⅄ (AC 400 V)				Delta △ (AC 230 V)			
			without brake	with brake	I_n	I_{q_n}[1]	I_{d_n}[1]	k_T[1]	I_n	I_{q_n}[1]	I_{d_n}[1]	k_T[1]
	kW	Nm (lb in)	10^{-4} kgm^2		A	A	A	Nm/A (lb in/A)	A	A	A	Nm/A (lb in/A)
DRE80M4	0.75	5 (44)	21.5	23	1.68	1.37	0.98	3.66 (32.4)	2.91	2.37	1.69	2.11 (18.7)
DRE90M4	1.1	7.4 (65)	35.5	40	2.45	2.15	1.18	3.45 (30.5)	4.24	3.72	2.04	1.99 (17.6)
DRE90L4	1.5	10 (89)	43.5	48.5	3.35	2.64	2.06	3.78 (33.5)	5.80	4.58	3.56	2.18 (19.3)
DRE100M4	2.2	14.7 (130)	56	62	4.6	4.16	1.96	3.53 (31.2)	8.0	7.21	3.40	2.04 (18.1)
DRE100LC4	3	19.7 (174)	90	96	6.2	5.52	2.81	3.57 (31.6)	10.7	9.57	4.87	2.06 (18.2)
DRE112M4	3	19.7 (174)	146	151	6	5.51	2.38	3.58 (31.7)	10.4	9.54	4.12	2.07 (18.3)
DRE132S4	4	26 (230)	190	195	8	7.35	3.17	3.54 (31.3)	13.9	12.7	5.5	2.04 (18.1)
DRE132M4	5.5	36 (319)	255	265	10.5	9.91	3.48	3.63 (32.1)	18.2	17.2	6.0	2.10 (18.6)
DRE132MC4	7.5	48.5 (429)	340	355	14.8	13.4	6.31	3.62 (32.0)	25.6	23.2	10.9	2.09 (18.5)
DRE160S4	7.5	49 (434)	370	390	14.7	13.3	6.29	3.68 (32.6)	25.5	23.0	10.9	2.13 (18.9)
DRE160M4	9.2	60 (531)	450	500	18.3	16.2	8.41	3.70 (32.7)	31.7	28.1	14.6	2.13 (18.9)
DRE160MC4	11	71 (628)	590	640	21.5	20.1	8.10	3.53 (31.2)	37	34.9	14.0	2.04 (18.1)
DRE180S4	11	71 (628)	895	955	21	18.7	9.26	3.79 (33.5)	36	32.5	16.0	2.19 (19.4)
DRE180M4	15	97 (859)	1110	1170	28	25.9	10.4	3.75 (33.2)	48	44.8	18.1	2.17 (19.2)
DRE180L4	18.5	120 (1062)	1300	1440	34	31.2	14.1	3.85 (34.1)	59	54.0	24.4	2.22 (19.6)
DRE180LC4	22	142 (1257)	1680	1815	42	36.3	20.8	3.91 (34.6)	73	62.8	36.0	2.26 (20.0)
DRE200L4	30	194 (1717)	2360	2500	57	53.6	19.4	3.62 (32.0)	99	92.8	33.6	2.09 (18.5)
DRE225S4	37	240 (2124)	2930	3160	70	65.1	25.7	3.69 (32.7)	121	113	44.5	2.13 (18.9)
DRE225M4	45	290 (2567)	3430	3660	84	78.3	30.5	3.70 (32.7)	145	136	52.9	2.14 (18.9)
DRE315K4	110	708 (6266)	18400	19500	196	183	69.6	3.86 (34.2)	340	317	121	2.23 (19.7)
DRE315S4	132	850 (7523)	22500	23600	230[1]	208	95.6	4.08 (36.1)	425	360	166	2.36 (20.9)
DRE315M4	160	1030 (9116)	27900	29000	275	260	88.8	3.96 (35.0)	480	451	154	2.28 (20.2)
DRE315L4	200	1289 (11409)	31900	33000	345	328	106	3.93 (34.8)	-	-	-	-

1) Applies in the basic speed range up to n_{base}.

9.6.13 DRE motor selection with delta/star connection type (line AC 400 V / 50 Hz)

AC 230/400 V / 50 Hz motors in star connection or AC 400/690 V / 50 Hz motors in delta connection

Assignment of MOVIDRIVE® MDX61B0005-5A3 ... MDX61B0110-503 (sizes 0 ... 2):

Motor voltage		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)										
AC 400 / 50 Hz		**0005**	**0008**	**0011**	**0014**	**0015**	**0022**	**0030**	**0040**	**0055**	**0075**	**0110**
DRE80M4	M_{max} Nm	14	14			14						
	(lb in)	(124)	(124)			(124)						
	n_{base} rpm	849	884			890						
DRE90M4	M_{max} Nm	13.2	14	14		14						
	(lb in)	(117)	(124)	(124)		(124)						
	n_{base} rpm	990	1037	1084		1084						
DRE90L4	M_{max} Nm			22.2	28	21.4	28	28				
	(lb in)			(196)	(248)	(189)	(248)	(248)				
	n_{base} rpm			902	837	914	843	867				
DRE100M4	M_{max} Nm				27.5	20.1	28.4	36.6	40			
	(lb in)				(243)	(178)	(251)	(324)	(354)			
	n_{base} rpm				1048	1125	1037	943	931			
DRE100LC4	M_{max} Nm						27.6	36.1	40	40		
	(lb in)						(244)	(320)	(354)	(354)		
	n_{base} rpm						1113	1060	1166	1212		
DRE112M4	M_{max} Nm						28.2	36.6	40			
	(lb in)						(250)	(324)	(354)			
	n_{base} rpm						1084	1020	1074			
DRE132S4	M_{max} Nm							35.7	49.5	55	55	
	(lb in)							(316)	(438)	(487)	(487)	
	n_{base} rpm							1113	1044	1103	1123	
DRE132M4	M_{max} Nm								50.4	67.1	86.5	110
	(lb in)								(446)	(593)	(766)	(974)
	n_{base} rpm								1079	1015	932	830
DRE132MC4	M_{max} Nm									64.3	84.3	110
	(lb in)									(569)	(746)	(974)
	n_{base} rpm									1103	1059	1079
DRE160S4	M_{max} Nm									64.9	8501	110
	(lb in)									(574)	(75240)	(974)
	n_{base} rpm									1098	1050	1072
DRE160M4	M_{max} Nm										82.7	128
	(lb in)										(731)	(1133)
	n_{base} rpm										1103	1019
DRE160MC4	M_{max} Nm											124
	(lb in)											(1097)
	n_{base} rpm											1129
DRE180S4	M_{max} Nm											132
	(lb in)											(1168)
	n_{base} rpm											1026
DRE180M4	M_{max} Nm											129
	(lb in)											(1142)
	n_{base} rpm											1092

Note:
The data is based on a supply voltage of AC 400 V.

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B0750-503 (size 3 ... 5):

Motor voltage		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)						
AC 400 / 50 Hz		**0150**	**0220**	**0300**	**0370**	**0450**	**0550**	**0750**
DRE160M4	M_{max} Nm	174	200					
	(lb in)	(1540)	(1770)					
	n_{base} rpm	931	900					
DRE160MC4	M_{max} Nm	167	200					
	(lb in)	(1478)	(1770)					
	n_{base} rpm	1059	1072					
DRE180S4	M_{max} Nm	179	200					
	(lb in)	(1584)	(1770)					
	n_{base} rpm	946	946					
DRE180M4	M_{max} Nm	176	200					
	(lb in)	(1558)	(1770)					
	n_{base} rpm	1035	1115					
DRE180L4	M_{max} Nm	176	260	342	400			
	(lb in)	(1558)	(2301)	(3027)	(3540)			
	n_{base} rpm	1035	962	883	830			
DRE180LC4	M_{max} Nm		257	342	400			
	(lb in)		(2275)	(3027)	(3540)			
	n_{base} rpm		959	899	873			
DRE200L4	M_{max} Nm		240	318	390	478	565	600
	(lb in)		(2124)	(2815)	(3452)	(4231)	(5001)	(5310)
	n_{base} rpm		1086	1025	966	893	823	796
DRE225S4	M_{max} Nm			317	391	481	571	600
	(lb in)			(2806)	(3461)	(4257)	(5054)	(5310)
	n_{base} rpm			1104	1060	1004	949	928
DRE225M4	M_{max} Nm				390	482	574	600
	(lb in)				(3452)	(4266)	(5080)	(5310)
	n_{base} rpm				1122	1081	1037	1092

Note:
The data is based on a supply voltage of AC 400 V.

Assignment of MOVIDRIVE® MDX61B0900-503 ... MDX61B2500-503 (sizes 6 ... 7):

Motor voltage		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)					
AC 400 / 50 Hz		**0900**	**1100**	**1320**	**1600**	**2000**	**2500**
DRE315K4	M_{max} Nm	948	1128	1424	1600	1600	1600
	(lb in)	(8391)	(9984)	(12603)	(14161)	(14161)	(14161)
	n_{base} rpm	1068	1056	1030	1068	1216	1234
DRE315S4	M_{max} Nm		1158	1477	1600	1600	1600
	(lb in)		(10249)	(13073)	(14161)	(14161)	(14161)
	n_{base} rpm		1071	1053	1155	1373	1487
DRE315M4	M_{max} Nm			1441	1745	2227	2400
	(lb in)			(12754)	(15445)	(19711)	(21242)
	n_{base} rpm			1043	1028	1000	1096
DRE315L4	M_{max} Nm				1717	2199	2400
	(lb in)				(15197)	(19463)	(21242)
	n_{base} rpm				1035	1018	1122

Note:
The data is based on a supply voltage of AC 400 V.

AC 230/400 V / 50Hz motors in delta connection

Assignment of MOVIDRIVE® MDX61B0008-5A3 ... MDX61B0110-503 (sizes 0 ... 2):

Motor voltage		**MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)**										
AC 230 / 50 Hz		**0005**	**0008**	**0011**	**0014**	**0015**	**0022**	**0030**	**0040**	**0055**	**0075**	**0110**
DRE80M4	M_{max} Nm		9.4	12.1	14	12.1	14	14				
	(lb in)		(83)	(107)	(124)	(107)	(124)	(124)				
	n_{base} rpm		1898	1787	1875	1804	1898	1957				
DRE90M4	M_{max} Nm				14	11.2	14	14				
	(lb in)				(124)	(99.1)	(124)	(124)				
	n_{base} rpm				1980	1951	2015	2179				
DRE90L4	M_{max} Nm						16.2	21.5	28	28		
	(lb in)						(143)	(190)	(248)	(248)		
	n_{base} rpm						1839	1757	1716	1834		
DRE100M4	M_{max} Nm							20.2	28.2	37.6	40	
	(lb in)							(179)	(250)	(333)	(354)	
	n_{base} rpm							2074	1962	1828	1904	
DRE100LC4	M_{max} Nm								27.4	37.1	40	40
	(lb in)								(243)	(328)	(354)	(354)
	n_{base} rpm								2033	1957	2185	2384
DRE112M4	M_{max} Nm								28	37.6	40	40
	(lb in)								(248)	(333)	(354)	(354)
	n_{base} rpm								1967	1870	2026	2070
DRE132S4	M_{max} Nm									36.7	47.8	55
	(lb in)									(325)	(423)	(487)
	n_{base} rpm									2002	1923	2109
DRE132M4	M_{max} Nm										48.7	74.4
	(lb in)										(431)	(658)
	n_{base} rpm										1967	1816
DRE132MC4	M_{max} Nm											71.7
	(lb in)											(635)
	n_{base} rpm											1958
DRE160S4	M_{max} Nm											72.4
	(lb in)											(641)
	n_{base} rpm											1955

Note:
The data is based on a supply voltage of AC 400 V.

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B0750-503 (size 3 ... 5):

Motor voltage		**MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)**						
AC 230 / 50 Hz		**0150**	**0220**	**0300**	**0370**	**0450**	**0550**	**0750**
DRE132M4	M_{max} Nm	99.8	110					
	(lb in)	(883)	(974)					
	n_{base} rpm	1655	1591					
DRE132MC4	M_{max} Nm	97.8	110					
	(lb in)	(866)	(974)					
	n_{base} rpm	1875	2073					
DRE160S4	M_{max} Nm	98.7	110					
	(lb in)	(874)	(974)					
	n_{base} rpm	1863	2065					
DRE160M4	M_{max} Nm	96.8	142	188	200			
	(lb in)	(857)	(1257)	1664	(1770)			
	n_{base} rpm	1938	1814	1683	1700			
DRE160MC4	M_{max} Nm	93.3	137	180	200	200		
	(lb in)	(826)	(1213)	(1593)	(1770)	(1770)		
	n_{base} rpm	2100	2003	1898	1938	1990		
DRE180S4	M_{max} Nm	99.1	147	194	200			
	(lb in)	(877)	(1301)	(1717)	(1770)			
	n_{base} rpm	1922	1816	1696	1759			

Note:
The data is based on a supply voltage of AC 400 V.

Motor voltage AC 230 / 50 Hz		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)						
		0150	0220	0300	0370	0450	0550	0750
DRE180M4	M_{max} Nm		144	191	200	200		
	(lb in)		(1275)	(1690)	(1770)	(1770)		
	n_{base} rpm		1925	1839	1995	2058		
DRE180L4	M_{max} Nm		143	192	236	290	344	400
	(lb in)		(1266)	(1699)	(2088)	(2567)	(2956)	(3540)
	n_{base} rpm		1889	1836	1779	1703	1623	1570
DRE180LC4	M_{max} Nm			185	232	289	344	400
	(lb in)			(1637)	(2053)	(2558)	(2956)	(3540)
	n_{base} rpm			1793	1749	1690	1623	1617
DRE200L4	M_{max} Nm					269	320	400
	(lb in)					(2381)	(2832)	(3540)
	n_{base} rpm					1895	1834	1728
DRE225S4	M_{max} Nm						319	401
	(lb in)						(2823)	(3549)
	n_{base} rpm						1957	1883
DRE225M4	M_{max} Nm							400
	(lb in)							(3540)
	n_{base} rpm							1980

Note:
The data is based on a supply voltage of AC 400 V.

Assignment of MOVIDRIVE® MDX61B0900-503 ... MDX61B2500-503 (sizes 6 ... 7):

Motor voltage AC 230 / 50 Hz		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)					
		0900	1100	1320	1600	2000	2500
DRE180LC4	M_{max} Nm	400					
	(lb in)	(3540)					
	n_{base} rpm	1670					
DRE200L4	M_{max} Nm	526	600				
	(lb in)	(4655)	(5310)				
	n_{base} rpm	1561	1464				
DRE225S4	M_{max} Nm	530	600				
	(lb in)	(4691)	(5310)				
	n_{base} rpm	1754	1708				
DRE225M4	M_{max} Nm	532	600	600			
	(lb in)	(4709)	(5310)	(5310)			
	n_{base} rpm	1886	1883	1980			
DRE315K4	M_{max} Nm				963	1238	1543
	(lb in)				(8523)	(10957)	(13657)
	n_{base} rpm				1884	1851	1807
DRE315S4	M_{max} Nm					1277	1600
	(lb in)					(11302)	(14161)
	n_{base} rpm					1876	1856
DRE315M4	M_{max} Nm					1248	1564
	(lb in)					(11046)	(13843)
	n_{base} rpm					1848	1828
DRE315L4	M_{max} Nm						1536
	(lb in)						(13595)
	n_{base} rpm						1836

Note:
The data is based on a supply voltage of AC 400 V.

9.6.14 DRE motor selection in delta connection type (line AC 230 V / 50 Hz)

AC 230/400 V / 50 Hz motors in delta connection

Motor voltage			MOVIDRIVE® MDX61B...-2_3 (AC 230 V units) in CFC operating modes (P700)								
AC 230 V / 50 Hz			**0015**	**0022**	**0037**	**0055**	**0075**	**0110**	**0150**	**0220**	**0300**
	M_{max}	Nm	14								
DRE80M4		(lb in)	(120)								
	n_{base}	rpm	890								
	M_{max}	Nm	14								
DRE90M4		(lb in)	(120)								
	n_{base}	rpm	1084								
	M_{max}	Nm	22.5	27	28						
DRE90L4		(lb in)	(896)	(240)	(250)						
	n_{base}	rpm	896	832	867						
	M_{max}	Nm	21.2	25.3	40						
DRE100M4		(lb in)	(188)	(224)	(350)						
	n_{base}	rpm	1113	1072	925						
	M_{max}	Nm		24.5	40	40					
DRE100LC4		(lb in)		(217)	(350)	(350)					
	n_{base}	rpm		1136	1089	1212					
	M_{max}	Nm		25.1	40	40					
DRE112M4		(lb in)		(222)	(350)	(350)					
	n_{base}	rpm		1103	1040	1074					
	M_{max}	Nm			43.1	55					
DRE132S4		(lb in)			(381)	(490)					
	n_{base}	rpm			1079	1108					
	M_{max}	Nm			43.8	68	90.3	110			
DRE132M4		(lb in)			(388)	(600)	(799)	(974)			
	n_{base}	rpm			1108	1010	913	830			
	M_{max}	Nm				65.1	88.1	110			
DRE132MC4		(lb in)				(5576)	(780)	(974)			
	n_{base}	rpm				1103	1049	1084			
	M_{max}	Nm				65.8	88.9	110			
DRE160S4		(lb in)				(582)	(787)	(974)			
	n_{base}	rpm				1098	1041	1072			
	M_{max}	Nm					86.7	129	168	200	
DRE160M4		(lb in)					(767)	(1142)	(1487)	(1770)	
	n_{base}	rpm					1094	1015	940	900	
	M_{max}	Nm					83.7	124	162	200	
DRE160MC4		(lb in)					(741)	(1097)	(1434)	(1770)	
	n_{base}	rpm					1190	1129	1067	1072	
	M_{max}	Nm					88.6	133	174	200	
DRE180S4		(lb in)					(784)	(1177)	(1540)	(1770)	
	n_{base}	rpm					1089	1022	956	946	
	M_{max}	Nm						130	171	200	
DRE180M4		(lb in)						(1151)	(1513)	(1770)	
	n_{base}	rpm						1092	1042	1115	
	M_{max}	Nm							171	260	311
DRE180L4		(lb in)							(1513)	(2301)	(2753)
	n_{base}	rpm							1039	962	913
	M_{max}	Nm								257	310
DRE180LC4		(lb in)								(2275)	(2744)
	n_{base}	rpm								959	923
	M_{max}	Nm								240	288
DRE200L4		(lb in)								(2124)	(2549)
	n_{base}	rpm								1086	1048

Note:
The data is based on a supply voltage of AC 230 V.

Motor voltage			MOVIDRIVE® MDX61B...-2_3 (AC 230 V units) in CFC operating modes (P700)								
AC 230 V / 50 Hz			0015	0022	0037	0055	0075	0110	0150	0220	0300
DRE225S4	M_{max}	Nm (lb in)									285 (2522)
	n_{base}	rpm									1122

9.6.15 Motor table DRP AC motors (characteristic value with delta/star connection AC 230/400 V)

Motor	P_m	M_N	Mass moment of inertia J_M		Star ⅄ (AC 400 V)				Delta △ (AC 230 V)			
			without brake	with brake	I_n	I_{q_n} 1)	I_{d_n} 1)	k_T 1)	I_n	I_{q_n} 1)	I_{d_n} 1)	k_T
	kW	Nm (lb in)	10^{-4} kgm²		A	A	A	Nm/A (lb in/A)	A	A	A	Nm/A (lb in/A)
DRP90M4	0.75	5 (44)	35.5	40	1.81	1.38	1.17	3.58 (31.7)	3.14	2.39	2.02	2.07 (18.3)
DRP90L4	1.1	7.3 (65)	43.5	48.5	2.4	1.86	1.52	3.93 (34.8)	4.16	3.22	2.63	2.27 (20.1)
DRP100M4	1.5	9.9 (88)	56	62	3.2	2.82	1.51	3.51 (31.1)	5.54	4.88	2.62	2.03 (18.0)
DRP100L4	2.2	14.6 (129)	90	96	4.75	3.92	2.68	3.72 (32.9)	8.23	6.79	4.65	2.15 (19.0)
DRP112M4	3	19.7 (174)	146	151	6	5.53	2.34	3.57 (31.6)	10.4	9.6	4.1	2.06 (18.2)
DRP132M4	4	26 (230)	255	265	7.7	7.15	2.85	3.64 (32.2)	13.3	12.4	4.9	2.10 (18.6)
DRP132MC4	5.5	35.5 (314)	340	355	11	9.93	4.69	3.57 (31.6)	19	17.2	8.1	2.06 (18.2)
DRP160S4	5.5	35.5 (314)	370	390	10.9	9.39	5.53	3.78 (33.5)	19	16.3	9.6	2.18 (19.3)
DRP160M4	7.5	48.5 (429)	450	500	14.5	13.4	6.06	3.62 (32.0)	25	23.2	10.5	2.09 (18.5)
DRP160MC4	9.2	59 (522)	590	640	17.8	16.6	5.42	3.55 (31.4)	31	28.8	9.4	2.05 (18.1)
DRP180S4	9.2	60 (531)	895	955	18	15.2	8.63	3.94 (34.9)	31	26.4	15.0	2.28 (20.2)
DRP180M4	11	71 (628)	1110	1170	21	18.6	8.46	3.83 (33.9)	36	32.1	14.7	2.21 (19.6)
DRP180L4	15	97 (859)	1300	1440	28	24.4	12.8	3.97 (35.1)	48	42.3	22.2	2.29 (20.3)
DRP180LC4	18.5	119 (1053)	1790	1930	35	31.1	15.8	3.82 (33.8)	61	53.9	27.4	2.21 (19.6)
DRP200L4	22	142 (1257)	2360	2500	41	37.6	16.3	3.77 (33.4)	71	65.2	28.2	2.18 (19.3)
DRP225S4	30	193 (1708)	2930	3160	55	49.4	23.4	3.91 (34.6)	95	85.5	40.5	2.26 (20.0)
DRP225M4	37	240 (2124)	3430	3660	69	63.8	26.4	3.76 (33.3)	120	110	45.7	2.17 (19.2)
DRP315K4	90	580 (5133)	18400	19500	159	149	54.8	3.89 (34.4)	340	259	94.9	2.24 (19.8)
DRP315S4	110	710 (6284)	22500	23600	192	176	76.2	4.03 (35.7)	-	-	-	-
DRP315M4	132	850 (7523)	27900	29000	230	212	89.2	4.01 (35.5)	-	-	-	-
DRP315L4	160	1030 (9116)	31900	33000	275	252	110	4.09 (36.2)	-	-	-	-

1) Applies in the basic speed range up to n_{base}.

9.6.16 DRP motor selection with delta/star connection type (line AC 400 V / 50 Hz)

AC 230/400 V / 50 Hz motors in star connection or AC 400/690 V / 50 Hz in delta connection

Assignment of MOVIDRIVE® MDX61B0005-5A3 ... MDX61B0110-503 (sizes 0 ... 2):

Motor voltage		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)										
AC 400 / 50 Hz		**0005**	**0008**	**0011**	**0014**	**0015**	**0022**	**0030**	**0040**	**0055**	**0075**	**0110**
DRP90M4	M_{max} Nm	13.7	14			14						
	(lb in)	(121)	(124)			(124)						
	n_{base} rpm	890	943			955						
DRP90L4	M_{max} Nm	14	14	14		14						
	(lb in)	(124)	(124)	(124)		(124)						
	n_{base} rpm	914	1037	1101		1101						
DRP100M4	M_{max} Nm			21.2	27.7	20.5	28	28				
	(lb in)			(188)	(245)	(181)	(248)	(248)				
	n_{base} rpm			984	896	996	896	925				
DRP100L4	M_{max} Nm				28	20	29	37.8	40			
	(lb in)				(248)	(177)	(257)	(335)	(354)			
	n_{base} rpm				1002	1066	990	919	972			
DRP112M4	M_{max} Nm						28.2	36.5	40			
	(lb in)						(250)	(323)	(354)			
	n_{base} rpm						1088	1025	1079			
DRP132M4	M_{max} Nm							36.8	50.9	55		
	(lb in)							(326)	(451)	(487)		
	n_{base} rpm							1186	1113	1196		
DRP132MC4	M_{max} Nm								48.2	65.1	84.4	110
	(lb in)								(427)	(576)	(747)	(974)
	n_{base} rpm								1044	1001	947	908
DRP160S4	M_{max} Nm								49.8	67.9	88.5	110
	(lb in)								(441)	(601)	(783)	(974)
	n_{base} rpm								1006	966	918	936
DRP160M4	M_{max} Nm									64.6	84.5	110
	(lb in)									(572)	(748)	(974)
	n_{base} rpm									1147	1103	1133
DRP160MC4	M_{max} Nm										83.7	127
	(lb in)										(741)	(1124)
	n_{base} rpm										1204	1111
DRP180S4	M_{max} Nm										87.6	136
	(lb in)										(775)	(1204)
	n_{base} rpm										1055	976
DRP180M4	M_{max} Nm										86.2	134
	(lb in)										(763)	(1186)
	n_{base} rpm										1082	1019
DRP180L4	M_{max} Nm											133
	(lb in)											(1177)
	n_{base} rpm											1026

Note:
The data is based on a supply voltage of AC 400 V.

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B0750-503 (size 3 ... 5):

Motor voltage		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)						
AC 400 / 50 Hz		0150	0220	0300	0370	0450	0550	0750
DRP160MC4	M_{max} Nm	170	200					
	(lb in)	(1505)	(1770)					
	n_{base} rpm	1015	953					
DRP180S4	M_{max} Nm	184	200					
	(lb in)	(1629)	(1770)					
	n_{base} rpm	893	889		**Note:** The data is based on a supply voltage of AC 400 V.			
DRP180M4	M_{max} Nm	181	200					
	(lb in)	(1602)	(1770)					
	n_{base} rpm	946	952					
DRP180L4	M_{max} Nm	183	200					
	(lb in)	(1620)	(1770)					
	n_{base} rpm	979	1128					
DRP180LC4	M_{max} Nm	173	257	339	400			
	(lb in)	(1531)	(2275)	(3000)	(3540)			
	n_{base} rpm	1062	999	926	886			
DRP200L4	M_{max} Nm	170	252	333	400			
	(lb in)	(1505)	(2230)	(2947)	(3540)			
	n_{base} rpm	1092	1025	952	896			
DRP225S4	M_{max} Nm		254	340	419	515	600	
	(lb in)		(2248)	(3009)	(3708)	(4558)	(5310)	
	n_{base} rpm		969	925	881	826	788	
DRP225M4	M_{max} Nm			321	397	489	580	600
	(lb in)			(2841)	(3514)	(4328)	(5133)	(5310)
	n_{base} rpm			1125	1086	1040	990	1010
DRP315K4	M_{max} Nm							726
	(lb in)							(6426)
	n_{base} rpm							1028

Assignment of MOVIDRIVE® MDX61B0900-503 ... MDX61B2500-503 (sizes 6 ... 7):

Motor voltage		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)					
AC 400 / 50 Hz		0900	1100	1320	1600	2000	2500
DRP315K4	M_{max} Nm	966	1144	1439	1600	1600	
	(lb in)	(8550)	(10125)	(12736)	(14161)	(14161)	
	n_{base} rpm	1008	990	957	987	1079	
DRP315S4	M_{max} Nm	976	1164	1472	1600	1600	1600
	(lb in)	(8638)	(10302)	(13028)	(14161)	(14161)	(14161)
	n_{base} rpm	982	972	952	1028	1188	1234
DRP315M4	M_{max} Nm		1144	1455	1762	2249	2400
	(lb in)		(10125)	(12878)	(15595)	(19905)	(21242)
	n_{base} rpm		1053	1041	1025	997	1102
DRP315L4	M_{max} Nm	**Note:** The data is based on a supply voltage of AC 400 V.		1460	1777	2278	2400
	(lb in)			(12922)	(15728)	(20162)	(21242)
	n_{base} rpm			1035	1025	1005	1142

AC 230/400 V / 50 Hz motors in delta connection

Assignment of MOVIDRIVE® MDX61B0005-5A3 ... MDX61B0110-503 (sizes 0 ... 2):

Motor voltage		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)								
AC 230 / 50 Hz		**0011**	**0014**	**0015**	**0022**	**0030**	**0040**	**0055**	**0075**	**0110**
DRP90M4	M_{max} Nm	12	14	11.6	14	14				
	(lb in)	(106)	(124)	(103)	(124)	(124)				
	n_{base} rpm	1769	1839	1781	1869	1945				
DRP90L4	M_{max} Nm		14	12.2	14	14				
	(lb in)		(124)	(108)	(124)	(124)				
	n_{base} rpm		1951	1716	1992	2232				
DRP100M4	M_{max} Nm				15.9	20.6	28	28		
	(lb in)				(141)	(182)	(248)	(248)		
	n_{base} rpm				1951	1869	1746	1863		
DRP100L4	M_{max} Nm					20.1	28.8	38.9	40	
	(lb in)					(178)	(255)	(344)	(354)	
	n_{base} rpm					1945	1857	1752	1945	
DRP112M4	M_{max} Nm						28	37.5	40	
	(lb in)						(248)	(332)	(354)	
	n_{base} rpm						1982	1884	2036	
DRP132M4	M_{max} Nm							37.9	49.2	55
	(lb in)							(335)	(435)	(487)
	n_{base} rpm							2119	2036	2236
DRP132MC4	M_{max} Nm								46.5	72.3
	(lb in)								(412)	(640)
	n_{base} rpm								1879	1787
DRP160S4	M_{max} Nm								47.9	75.6
	(lb in)								(424)	(669)
	n_{base} rpm								1806	1722
DRP160M4	M_{max} Nm									72
	(lb in)									(637)
	n_{base} rpm									2025
DRP160MC4	M_{max} Nm									71.5
	(lb in)									(633)
	n_{base} rpm									2188
DRP180S4	M_{max} Nm									73.6
	(lb in)									(651)
	n_{base} rpm									1909

Note:
The data is based on a supply voltage of AC 400 V.

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B0750-503 (size 3 ... 5):

Motor voltage		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)						
AC 230 / 50 Hz		0150	0220	0300	0370	0450	0550	0750
DRP132MC4	M_{max} Nm	97.5	110					
	(lb in)	(863)	(974)					
	n_{base} rpm	1679	1743					
DRP160S4	M_{max} Nm	102	110					
	(lb in)	(903)	(974)					
	n_{base} rpm	1634	1788					
DRP160M4	M_{max} Nm	98	110					
	(lb in)	(867)	(974)					
	n_{base} rpm	1942	2157					
DRP160MC4	M_{max} Nm	96.9	140	184	200			
	(lb in)	(858)	(1239)	(1629)	(1770)			
	n_{base} rpm	2113	1973	1823	1779			
DRP180S4	M_{max} Nm	102	151	199	200			
	(lb in)	(903)	(1336)	(1761)	(1770)			
	n_{base} rpm	1852	1733	1607	1656			
DRP180M4	M_{max} Nm	100	148	195	200			
	(lb in)	(885)	(1310)	(1726)	(1770)			
	n_{base} rpm	1895	1796	1683	1779			
DRP180L4	M_{max} Nm		149	199	200	200		
	(lb in)		(1319)	(1761)	(1770)	(1770)		
	n_{base} rpm		1806	1743	1982	2091		
DRP180LC4	M_{max} Nm		189	233	288	342	400	
	(lb in)		(1673)	(2062)	(2549)	(3027)	(3540)	
	n_{base} rpm		1872	1819	1749	1680	1633	
DRP200L4	M_{max} Nm			185	229	282	335	400
	(lb in)			(1637)	(2027)	(2496)	(2965)	(3540)
	n_{base} rpm			1913	1860	1787	1713	1634
DRP225S4	M_{max} Nm				229	286	343	429
	(lb in)				(2027)	(2531)	(3036)	(3797)
	n_{base} rpm				1740	1699	1658	1585
DRP225M4	M_{max} Nm						324	407
	(lb in)						(2868)	(3602)
	n_{base} rpm						1986	1921

Note:
The data is based on a supply voltage of AC 400 V.

Assignment of MOVIDRIVE® MDX61B0900-503 ... MDX61B2500-503 (sizes 6 ... 7):

Motor voltage AC 230 / 50 Hz		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700) 0900	1100	1320	1600	2000	2500
DRP225S4	M_{max} Nm	567	600	600			
	(lb in)	(5018)	(5310)	(5310)			
	n_{base} rpm	1461	1456	1456			
DRP225M4	M_{max} Nm	539	600	600			
	(lb in)	(4771)	(5310)	(5310)			
	n_{base} rpm	1813	1801	1819			
DRP315K4	M_{max} Nm			809	981	1253	1558
	(lb in)			(7160)	(8683)	(11089)	(13789)
	n_{base} rpm			1800	1777	1736	1683

Note:
The data is based on a supply voltage of AC 400 V.

9.6.17 DRP motor selection in delta connection type (line AC 230 V / 50 Hz)

AC 230/400 V / 50 Hz motors in delta connection

Assignment of MOVIDRIVE® MDX61B0015-2A3 ... MDX61B0300-203 (sizes 1 ... 3):

Motor voltage AC 230 / 60 Hz		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700) 0015	0022	0037	0055	0075	0110	0150	0220	0300
DRP90M4	M_{max} Nm	14								
	(lb in)	(124)								
	n_{base} rpm	953								
DRP90L4	M_{max} Nm	14								
	(lb in)	(124)								
	n_{base} rpm	1101								
DRP100M4	M_{max} Nm	21.6	25.6	40						
	(lb in)	(191)	(227)	(354)						
	n_{base} rpm	978	925	925						
DRP100L4	M_{max} Nm	21.2	25.7	40	40					
	(lb in)	(188)	(227)	(354)	(354)					
	n_{base} rpm	1054	1019	949	972					
DRP112M4	M_{max} Nm		25.1	40	40					
	(lb in)		(222)	(354)	(354)					
	n_{base} rpm		1113	1044	1079					
DRP132M4	M_{max} Nm			44.4	55	55				
	(lb in)			(393)	(487)	(487)				
	n_{base} rpm			1147	1196	1206				
DRP132MC4	M_{max} Nm				65.9	88.1	110			
	(lb in)				(583)	(780)	(974)			
	n_{base} rpm				1001	937	908			
DRP160S4	M_{max} Nm				68.8	92.5	110			
	(lb in)				(609)	(819)	(974)			
	n_{base} rpm				966	909	936			
DRP160M4	M_{max} Nm				65.4	88.3	110	110		
	(lb in)				(579)	(782)	(974)	(974)		
	n_{base} rpm				1147	1094	1138	1177		
DRP160MC4	M_{max} Nm					87.4	128	165	200	
	(lb in)					(774)	(1133)	(1460)	(1770)	
	n_{base} rpm					1195	1111	1028	953	
DRP180S4	M_{max} Nm					91.9	137	179	200	
	(lb in)					(813)	(1213)	(1584)	(1770)	
	n_{base} rpm					1049	976	903	889	
DRP180M4	M_{max} Nm					90.3	135	175	200	
	(lb in)					(799)	(1195)	(1549)	(1770)	
	n_{base} rpm					1079	1016	956	952	

Note:
The data is based on a supply voltage of AC 230 V.

Motor voltage AC 230 / 60 Hz		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)								
		0015	0022	0037	0055	0075	0110	0150	0220	0300
DRP180L4	M_{max} Nm (lb in)						134 (1186)	177 (1567)	200 (1770)	
	n_{base} rpm						1026	986	1128	
DRP180LC4	M_{max} Nm (lb in)							168 (1487)	257 (2275)	308 (2726)
	n_{base} rpm							1065	999	956
DRP200L4	M_{max} Nm (lb in)							164 (1452)	252 (2230)	302 (2673)
	n_{base} rpm							1095	1025	981
DRP225S4	M_{max} Nm (lb in)								254 (2248)	307 (2717)
	n_{base} rpm								969	943
DRP225M4	M_{max} Nm (lb in)									290 (2567)
	n_{base} rpm									1139

Note:
The data is based on a supply voltage of AC 230 V.

9.6.18 Motor table DV series AC motors (characteristic value with delta/star connection AC 230/400 V / 50 Hz)

Motor	P_m	M_N	Mass moment of inertia J_M		Star ⅄ (AC 400 V)				Delta △ (AC 230 V)			
			without brake	with brake	I_n	I_{q_n} 1)	I_{d_n} 1)	k_T 1)	I_n	I_{q_n} 1)	I_{d_n} 1)	k_T
	kW	Nm (lb in)	10^{-4} kgm²		A	A	A	Nm/A (lb in/A)	A	A	A	Nm/A (lb in/A)
DV250M4	55	356 (3151)	6300	6600/6730 2)	102	91.7	44.7	3.88 (34.3)	177	159	77.4	2.24 (19.8)
DV280S4	75	484 (4284)	8925	9225/9355 2)	138	120.4	67.5	4.02 (35.6)	239	209	117	2.32 (20.5)
DV280M4	90	581 (5142)	8925	9225/9355 2)	170	149	81.9	3.9 (34.5)	295	258	142	2.25 (19.9)

1) Applies in the basic speed range up to n_{base}.

2) Double disk brake

9.6.19 DV motor selection with delta/star connection type (line 400 V / 50 Hz)

AC 230/400 V / 50 Hz motors in star connection or AC 400/690 V / 50 Hz motors in delta connection

Motor voltage 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
DV250M4	M_{max} Nm (lb in)						586.5 (5191)	641 (5670)	641 (5670)		
	n_{base} rpm						1018	1133	1357		
DV280S4	M_{max} Nm (lb in)	**Note:** The maximum torque M_{max} is limited to 180% of the rated motor torque M_N. The data is based on a supply voltage of AC 400 V.						735.4 (6509)	871 (7710)	871 (7710)	
	n_{base} rpm							1082	1184	1344	
DV280M4	M_{max} Nm (lb in)								941 (8330)	1000 (8851)	1000 (8851)
	n_{base} rpm								1139	1254	1478

AC 230/400 V / 50 Hz motors in delta connection

Motor voltage AC 230 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
DV250M4	M_{max} Nm (lb in)	**Note:** The maximum torque M_{max} is limited to 180% of the rated motor torque M_N. The data is based on a supply voltage of AC 400 V.							542 (4800)	641 (5670)	641 (5670)
	n_{base} rpm								1843	1837	2227
DV280S4	M_{max} Nm (lb in)									638.2 (5649)	823.2 (7286)
	n_{base} rpm									1946	1920

9.6.20 Motor table DRS series AC motors (characteristic value with double-star/star connection AC 230/460 V / 60 Hz)

Motor	P_m	M_N	Mass moment of inertia J_M		Star ⅄ (AC 460 V)				Double-star ⅄⅄ (AC 230 V)			
			without brake	with brake	I_n	I_{q_n} 1)	I_{d_n} 1)	k_T 1)	I_n	I_{q_n} 1)	I_{d_n} 1)	k_T 1)
	kW	Nm (lb in)	10^{-4} kgm²		A	A	A	Nm/A (lb in/A)	A	A	A	Nm/A (lb in/A)
DRS71S4	0.37	2.1 (18.6)	4.9	6.2	0.92	0.92	0.58	2.93 (25.9)	1.84	1.43	1.16	1.47 (13.0)
DRS71M4	0.55	3.1 (27.4)	7.1	8.4	1.25	1.25	0.75	3.09 (27.3)	2.50	2.00	1.49	1.55 (13.7)
DRS80S4	0.75	4.2 (37.2)	14.9	16.4	1.66	1.66	1.12	3.43 (30.4)	3.32	2.45	2.24	1.71 (15.1)
DRS80M4	1.1	6.1 (54.0)	21.5	26	2.14	2.14	1.23	3.48 (30.8)	4.28	3.50	2.46	1.74 (15.4)
DRS90M4	1.5	8.4 (74.3)	35.5	40	2.87	2.87	1.38	3.34 (29.6)	5.74	5.03	2.76	1.67 (14.8)
DRS90L4	2.2	12.2 (108)	43.5	49.5	4.1	4.1	2.37	3.66 (32.4)	8.20	6.66	4.75	1.83 (16.2)
DRS100M4	3	16.7 (148)	56	62	5.5	5.5	2.45	3.39 (30.0)	11.0	9.85	4.90	1.70 (15.0)
DRS100M4	3.7	21 (186)	56	62	6.65	6.65	2.42	3.39 (30.0)	13.3	12.4	4.84	1.70 (15.0)
DRS100L4	4	22.5 (199)	68.3	74.3	7.3	7.3	3.78	3.60 (31.9)	14.6	12.5	7.56	1.80 (15.9)
DRS112M4	4	22 (195)	146	151	6.8	6.8	2.26	3.43 (30.4)	13.6	12.8	4.52	1.71 (15.1)
DRS132S4	5.5	30 (266)	190	200	9.4	9.4	3.36	3.42 (30.3)	18.8	17.6	6.72	1.71 (15.1)
DRS132M4	7.5	41 (363)	255	265	12.4	12.4	4.01	3.50 (31.0)	24.8	23.5	8.02	1.75 (15.5)
DRS132MC4	9.2	50 (443)	342	355	16	16	6.33	3.40 (30.1)	32.0	29.4	12.7	1.70 (15.0)
DRS160S4	9.2	50 (443)	370	420	15.9	15.9	7.2	3.53 (31.2)	31.8	28.4	14.4	1.76 (15.6)
DRS160M4	11	60 (531)	450	500	18.8	18.8	6.99	3.44 (30.4)	37.6	34.9	14.0	1.72 (15.2)
DRS160MC4	15	81 (717)	590	640	26.5	26.5	9.57	3.28 (29.0)	53.0	49.4	19.1	1.64 (14.5)
DRS180S4	15	81 (717)	895	955	25.5	25.5	9.68	3.43 (30.4)	51.0	47.2	19.4	1.72 (15.2)
DRS180M4	18.5	100 (885)	1110	1250	30.5	30.5	14.1	3.70 (32.7)	61.0	54.1	28.2	1.85 (16.4)
DRS180L4	22	119 (1053)	1300	1440	35.9	35.9	16.0	3.70 (32.7)	71.8	64.2	32.0	1.85 (16.4)
DRS180LC4	30	161 (1425)	1680	1910	48.5	48.5	16.9	3.54 (31.3)	97.0	90.9	33.8	1.77 (15.7)
DRS200L4	30	161 (1425)	2360	2590	51	51	17.6	3.36 (29.7)	102	95.8	35.1	1.68 (14.9)
DRS225S4	37	198 (1752)	2930	3160	61	61	22.6	3.50 (31.0)	122	113	45.3	1.75 (15.5)
DRS225M4	45	240 (2124)	3430	3660	72	72	21.7	3.50 (31.0)	144	137	43.4	1.75 (15.5)

Motor	P_m	M_N	Mass moment of inertia J_M		Star ⅄ (AC 460 V)				Double-star ⅄⅄ (AC 230 V)			
			without brake	with brake	I_n	I_{q_n} 1)	I_{d_n} 1)	k_T 1)	I_n	I_{q_n} 1)	I_{d_n} 1)	k_T 1)
	kW	Nm (lb in)	10^{-4} kgm^2		A	A	A	Nm/A (lb in/A)	A	A	A	Nm/A (lb in/A)
DRS225MC4	55	295 (2611)	4330	4560	87.9	87.9	24.2	3.49 (30.9)	176	169	48.4	1.75 (15.5)
DRS315K4	110	589 (5213)	18400	19500	172	172	47.4	3.56 (31.5)	-	-	-	-
DRS315S4	132	707 (6257)	22500	23600	205	205	43.4	3.49 (30.9)	-	-	-	-
DRS315S4	150	802 (7098)	22500	23600	230	230	60.7	3.62 (32.0)	-	-	-	-
DRS315M4	160	856 (7576)	27900	29000	245	245	60.3	3.60 (31.9)	-	-	-	-
DRS315M4	185	991 (8771)	27900	29000	280	280	59.9	3.62 (32.0)	-	-	-	-
DRS315L4	200	1072 (9488)	31900	33000	304	304	73.4	3.63 (32.1)	-	-	-	-
DRS315L4	225	1205 (10665)	31900	33000	335	335	72.8	3.67 (32.5)	-	-	-	-

1) Applies in the basic speed range up to n_{base}.

9.6.21 DRS motor selection with double-star/star connection type (line AC 460 / 60 Hz)

AC 230/460 V / 60 Hz motors in star connection

Assignment of MOVIDRIVE® MDX61B0005-5A3 ... MDX61B0110-503 (sizes 0 ... 2):

Motor voltage		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)										
AC 460 / 60 Hz		0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
DRS71S4	M_{max} Nm	10				10						
	(lb in)	(89)				(89)						
	n_{base} rpm	439				439						
DRS71M4	M_{max} Nm	10				10						
	(lb in)	(89)				(89)						
	n_{base} rpm	820				820						
DRS80S4	M_{max} Nm	13	14			14						
	(lb in)	(114)	(124)			(124)						
	n_{base} rpm	978	955			960						
DRS80M4	M_{max} Nm	13.2	14	14		14						
	(lb in)	(117)	(124)	(124)		(124)						
	n_{base} rpm	1130	1195	1259		1259						
DRS90M4	M_{max} Nm		15.3	20.1	26.2	19.4	27.1	28				
	(lb in)		(135)	(178)	(232)	(172)	(240)	(248)				
	n_{base} rpm		1136	1025	878	1037	855	837				
DRS90L4	M_{max} Nm				28.1	20.3	29.1	37.6	40			
	(lb in)				(249)	(180)	(258)	(333)	(354)			
	n_{base} rpm				1025	1130	1013	896	873			
DRS100M4 3 kW	M_{max} Nm						26.6	34.5	40			
	(lb in)						(235)	(305)	(354)			
	n_{base} rpm						1241	1158	1171			
DRS100M4 3.7 kW	M_{max} Nm						26.5	23.4	40			
	(lb in)						(234)	(207)	(354)			
	n_{base} rpm						1394	1318	1353			
DRS100L4	M_{max} Nm							34.9	40	40		
	(lb in)							(309)	(354)	(354)		
	n_{base} rpm							1171	1289	1377		
DRS112M4	M_{max} Nm						27.1	35	48	55		
	(lb in)						(240)	(310)	(425)	(486)		
	n_{base} rpm						1406	1342	1220	1181		
DRS132S4	M_{max} Nm								47.3	63.1	81.2	110
	(lb in)								(419)	(558)	(719)	(974)
	n_{base} rpm								1280	1190	1081	915
DRS132M4	M_{max} Nm								47.7	63.9	82.5	110
	(lb in)								(422)	(566)	(730)	(974)
	n_{base} rpm								1395	1331	1248	1139
DRS132MC4	M_{max} Nm									59.8	78.4	120
	(lb in)									(529)	(694)	(1062)
	n_{base} rpm									1401	1350	1228
DRS160S4	M_{max} Nm									60.8	80.4	123
	(lb in)									(538)	(712)	(1089)
	n_{base} rpm									1212	1173	1076
DRS160M4	M_{max} Nm										78.5	120
	(lb in)										(695)	(1062)
	n_{base} rpm										1357	1256
DRS160MC4	M_{max} Nm											113
	(lb in)											(1000)
	n_{base} rpm											1410

Note:
The data is based on a supply voltage of AC 460 V.

Motor voltage AC 460 / 60 Hz		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700) 0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
DRS180S4	M_{max} Nm											119
	(lb in)											(1053)
	n_{base} rpm											1261
DRS180M4	M_{max} Nm											121
	(lb in)											(1071)
	n_{base} rpm											1231

Note:
The data is based on a supply voltage of AC 460 V.

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B0750-503 (size 3 ... 5):

Motor voltage AC 460 / 60 Hz		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700) 0150	0220	0300	0370	0450	0550	0750
DRS132MC4	M_{max} Nm	161	200					
	(lb in)	(1424)	(1770)					
	n_{base} rpm	1100	985					
DRS160S4	M_{max} Nm	166	200					
	(lb in)	(1469)	(1770)					
	n_{base} rpm	971	892					
DRS160M4	M_{max} Nm	162	200					
	(lb in)	(1434)	(1770)					
	n_{base} rpm	1147	1054					
DRS160MC4	M_{max} Nm	154	200					
	(lb in)	(1363)	(1770)					
	n_{base} rpm	1340	1331					
DRS180S4	M_{max} Nm	162	200					
	(lb in)	(1434)	(1770)					
	n_{base} rpm	1182	1145					
DRS180M4	M_{max} Nm	168	248	327	399	400		
	(lb in)	(1487)	(2195)	(2894)	(3531)	(3540)		
	n_{base} rpm	1185	1092	997	906	903		
DRS180L4	M_{max} Nm	167	248	327	400			
	(lb in)	(1478)	(2195)	(2894)	(3540)			
	n_{base} rpm	1255	1185	1105	1029			
DRS180LC4	M_{max} Nm		238	314	385	471	557	600
	(lb in)		(2106)	(2779)	(3407)	(4169)	(4930)	(5310)
	n_{base} rpm		1268	1198	1125	1039	952	909
DRS200L4	M_{max} Nm		224	297	364	445	526	600
	(lb in)		(1983)	(2629)	(3222)	(3939)	(4655)	(5310)
	n_{base} rpm		1303	1227	1151	1097	966	890
DRS225S4	M_{max} Nm		228	305	375	461	546	600
	(lb in)		(2018)	(2699)	(3319)	(4080)	(4833)	(5310)
	n_{base} rpm		1377	1321	1262	1189	1116	1069
DRS225M4	M_{max} Nm			308	378	464	550	600
	(lb in)			(2726)	(3346)	(4107)	(4868)	(5310)
	n_{base} rpm			1315	1265	1201	1133	1095
DRS225MC4	M_{max} Nm				374	460	547	680
	(lb in)				(3310)	(4071)	(4841)	(6019)
	n_{base} rpm				1356	1303	1248	1157
DRS315K4	M_{max} Nm							673
	(lb in)							(5957)
	n_{base} rpm							1423

Note:
The data is based on a supply voltage of AC 460 V.

Assignment of MOVIDRIVE® MDX61B0900-503 ... MDX61B2500-503 (sizes 6 ... 7):

Motor voltage			**MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)**					
AC 460 / 60 Hz			**0900**	**1100**	**1320**	**1600**	**2000**	**2500**
DRS225MC4	M_{max}	Nm	892	1051	1200			
		(lb in)	(7895)	(9302)	(10621)			
	n_{base}	rpm	1019	922	840			
DRS315K4	M_{max}	Nm	892	1054	1324	1592	1600	
		(lb in)	(7895)	(9328)	(11718)	(14090)	(14161)	
	n_{base}	rpm	1364	1318	1237	1154	1152	
DRS315S4 132 kW	M_{max}	Nm	876	1036	1299	1563	1600	
		(lb in)	(7753)	(9169)	(11497)	(13833)	(14161)	
	n_{base}	rpm	1401	1359	1286	1210	1213	
DRS315S4 150 kW	M_{max}	Nm	895	1062	1337	1600	1600	
		(lb in)	(7921)	(9399)	(11833)	(14161)	(14161)	
	n_{base}	rpm	1433	1403	1352	1301	1396	
DRS315M4 160 kW	M_{max}	Nm		1059	1334	1607	2043	2400
		(lb in)		(9373)	(11806)	(14223)	(18082)	(21242)
	n_{base}	rpm		1428	1381	1333	1247	1186
DRS315M4 185 kW	M_{max}	Nm			1339	1613	2051	2400
		(lb in)			(11851)	(14276)	(18153)	(21242)
	n_{base}	rpm			1394	1347	1264	1203
DRS315L4 200 kW	M_{max}	Nm			1336	1613	2054	2400
		(lb in)			(21242)	(14276)	(18179)	(21242)
	n_{base}	rpm	**Note:** The data is based on a supply voltage of AC 460 V.		1438	1406	1347	1335
DRS315L4 225 kW	M_{max}	Nm			1351	1631	2076	2400
		(lb in)			(11957)	(14436)	(18374)	(21242)
	n_{base}	rpm			1447	1416	1357	1357

AC 230/460 V / 60 Hz motors in double-star connection

Assignment of MOVIDRIVE® MDX61B0005-5A3 ... MDX61B0110-503 (sizes 0 ... 2):

Motor voltage		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)										
AC 230 V / 60 Hz		0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
DRS71S4	M_{max} Nm	5.6	6.8	8.8	10	8.5	10					
	(lb in)	(49.6)	(60.2)	(77.9)	(89)	(75.2)	(89)					
	n_{base} rpm	2343	2138	1804	1617	1851	1617					
DRS71M4	M_{max} Nm		7.1	9.3	10	9	10					
	(lb in)		(63)	(82.3)	(89)	(79.7)	(89)					
	n_{base} rpm		2443	2197	2144	2233	2144					
DRS80S4	M_{max} Nm			9.8	13	9.4	13.4	14				
	(lb in)			(86.7)	(115)	(83)	(119)	(124)				
	n_{base} rpm			2554	2384	2572	2361	2548				
DRS80M4	M_{max} Nm				13.2	9.5	13.7	14	14			
	(lb in)				(117)	(84.1)	(121)	(124)	(124)			
	n_{base} rpm				2560	2689	2543	2941	3117			
DRS90M4	M_{max} Nm						12.9	16.9	23.3	28		
	(lb in)						(114)	(150)	(206)	(248)		
	n_{base} rpm						2601	2472	2255	2103		
DRS90L4	M_{max} Nm							17.2	24.7	33.4	40	40
	(lb in)							(152)	(219)	(296)	(354)	(354)
	n_{base} rpm							2525	2396	2238	2185	2244
DRS100M4 3 kW	M_{max} Nm								22.6	30.6	39.7	40
	(lb in)								(200)	(271)	(351)	(354)
	n_{base} rpm								2718	2607	2472	2777
DRS100M4 3.7 kW	M_{max} Nm									30.5	39.6	40
	(lb in)									(270)	(350)	(354)
	n_{base} rpm									2923	2789	3210
DRS100L4	M_{max} Nm									30.6	40	40
	(lb in)									(271)	(354)	(354)
	n_{base} rpm									2566	2513	3193
DRS112M4	M_{max} Nm									31.1	40.2	55
	(lb in)									(275)	(356)	(487)
	n_{base} rpm									2880	2749	2592
DRS132S4	M_{max} Nm										39.4	60.5
	(lb in)										(349)	(535)
	n_{base} rpm										2749	2563
DRS132M4	M_{max} Nm											61.2
	(lb in)											(542)
	n_{base} rpm											2797

Note:
The data is based on a supply voltage of AC 460 V.

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B0750-503 (size 3 ... 5):

Motor voltage		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
DRS132S4	M_{max} Nm	81.2	110					
	(lb in)	(719)	(974)					
	n_{base} rpm	2358	2075					
DRS132M4	M_{max} Nm	82.5	110					
	(lb in)	(730)	(974)					
	n_{base} rpm	2646	2485					
DRS132MC4	M_{max} Nm	78.4	114	150	184	200		
	(lb in)	(694)	(1009)	(1327)	(1629)	(1770)		
	n_{base} rpm	2807	2636	2446	2270	2187		
DRS160S4	M_{max} Nm	80.4	118	156	190	200		
	(lb in)	(712)	(1044)	(1381)	(1682)	(1770)		
	n_{base} rpm	2443	2311	2162	2025	2017		

Note:
The data is based on a supply voltage of AC 460 V.

Motor voltage AC 230 V / 60 Hz		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700) 0150	0220	0300	0370	0450	0550	0750
DRS160M4	M_{max} Nm	78.5	115	152	185	200		
	(lb in)	(695)	(1018)	(1345)	(1637)	(1770)		
	n_{base} rpm	2799	2654	2496	2346	2293		
DRS160MC4	M_{max} Nm		108	144	176	200	200	
	(lb in)		(956)	(1275)	(1558)	(1770)	(1770)	
	n_{base} rpm		2913	2821	2724	2772	2948	
DRS180S4	M_{max} Nm		114	151	185	200		
	(lb in)		(1009)	(1336)	(1637)	(1770)		
	n_{base} rpm		2629	2516	2400	2453		
DRS180M4	M_{max} Nm			157	194	240	285	355
	(lb in)			(1390)	(1717)	(2124)	(2522)	(3142)
	n_{base} rpm			2463	2393	2304	2211	2058
DRS180L4	M_{max} Nm			155	193	239	284	355
	(lb in)			(1372)	(1708)	(2115)	(2514)	(3142)
	n_{base} rpm			2589	2540	2470	2397	2274
DRS180LC4	M_{max} Nm				185	229	273	341
	(lb in)				(1637)	(2027)	(2416)	(3018)
	n_{base} rpm				2686	2623	2553	2433
DRS200L4	M_{max} Nm					217	258	323
	(lb in)					(1921)	(2283)	(2859)
	n_{base} rpm					2680	2601	2472
DRS225S4	M_{max} Nm						263	331
	(lb in)						(2328)	(2930)
	n_{base} rpm						2751	2654
DRS225M4	M_{max} Nm							335
	(lb in)							(2965)
	n_{base} rpm							2645
DRS225MC4	M_{max} Nm							330
	(lb in)							(2921)
	n_{base} rpm							2800

Note:
The data is based on a supply voltage of AC 460 V.

Assignment of MOVIDRIVE® MDX61B0900-503 ... MDX61B2500-503 (sizes 6 ... 7):

Motor voltage AC 230 V / 60 Hz		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700) 0900	1100	1320	1600	2000	2500
DRS180LC4	M_{max} Nm	450	530	600			
	(lb in)	(3983)	(4691)	(5310)			
	n_{base} rpm	2237	2088	1965			
DRS200L4	M_{max} Nm	425	501	600			
	(lb in)	(3761)	(4434)	(5310)			
	n_{base} rpm	2255	2094	1901			
DRS225S4	M_{max} Nm	439	519	600			
	(lb in)	(3885)	(4594)	(5310)			
	n_{base} rpm	2490	2361	2229			
DRS225M4	M_{max} Nm	443	523	600			
	(lb in)	(3921)	(4629)	(5310)			
	n_{base} rpm	2502	2387	2279			
DRS225MC4	M_{max} Nm	439	520	654	786	998	1200
	(lb in)	(3885)	(4602)	(5788)	(6957)	(8833)	(10621)
	n_{base} rpm	2683	2586	2419	2252	2001	1787

Note:
The data is based on a supply voltage of AC 460 V.

9.6.22 DRS motor selection in double-star connection (line AC 230 V / 60 Hz)

AC 230/460 V / 60 Hz motors in double-star connection

Assignment of MOVIDRIVE® MDX61B0015-2A3 ... MDX61B0300-203 (sizes 1 ... 4):

Motor voltage AC 230 V / 60 Hz		MOVIDRIVE® MDX61B...-5_3 (AC 230 V units) in CFC operating modes (P700) 0015	0022	0037	0055	0075	0110	0150	0220	0300
DRS71S4	M_{max} Nm	10								
	(lb in)	(89)								
	n_{base} rpm	439								
DRS71M4	M_{max} Nm	10								
	(lb in)	(89)								
	n_{base} rpm	820								
DRS80S4	M_{max} Nm	14								
	(lb in)	(124)								
	n_{base} rpm	960								
DRS80M4	M_{max} Nm	14								
	(lb in)	(124)								
	n_{base} rpm	1248								
DRS90M4	M_{max} Nm	17.6	21	28						
	(lb in)	(156)	(186)	(248)						
	n_{base} rpm	1084	1002	837						
DRS90L4	M_{max} Nm	18.1	22.1	39	40					
	(lb in)	(160)	(196)	(345)	(354)					
	n_{base} rpm	1160	1107	878	873					
DRS100M4 3 kW	M_{max} Nm		20.2	35.8	40					
	(lb in)		(179)	(317)	(354)					
	n_{base} rpm		1300	1148	1177					
DRS100M4 3.7 kW	M_{max} Nm			35.7	40					
	(lb in)			(316)	(354)					
	n_{base} rpm			1300	1371					
DRS100L4	M_{max} Nm			36.4	40					
	(lb in)			(322)	(354)					
	n_{base} rpm			1166	1359					
DRS112M4	M_{max} Nm			36.3	55					
	(lb in)			(320)	(487)					
	n_{base} rpm			1328	1162					

Note:
The data is based on a supply voltage of AC 230 V.

Motor voltage AC 230 V / 60 Hz		MOVIDRIVE® MDX61B...-5_3 (AC 230 V units) in CFC operating modes (P700)								
		0015	**0022**	**0037**	**0055**	**0075**	**0110**	**0150**	**0220**	**0300**
DRS132S4	M_{max} Nm			35.4	55.2	73.5	107	110		
	(lb in)			(313)	(489)	(651)	(947)	(974)		
	n_{base} rpm			1342	1235	1127	932	918		
DRS132M4	M_{max} Nm				55.8	74.6	109	110		
	(lb in)				(494)	(660)	(965)	(974)		
	n_{base} rpm				1362	1284	1132	1142		
DRS132MC4	M_{max} Nm					70.5	104	135	200	
	(lb in)					(624)	(920)	(1195)	(1770)	
	n_{base} rpm					1372	1279	1181	986	
DRS160S4	M_{max} Nm					72.1	107	139	200	
	(lb in)					(638)	(947)	(1230)	(1770)	
	n_{base} rpm					1190	1111	1037	892	
DRS160M4	M_{max} Nm					70.4	105	136	200	
	(lb in)					(623)	(929)	(1204)	(1770)	
	n_{base} rpm					1375	1296	1217	1054	
DRS160MC4	M_{max} Nm						98.3	128	194	200
	(lb in)						(870)	(1133)	(1717)	(1770)
	n_{base} rpm						1432	1384	1270	1344
DRS180S4	M_{max} Nm						103	135	200	200
	(lb in)						(912)	(1195)	(1770)	(1770)
	n_{base} rpm						1291	1235	1118	1145
DRS180M4	M_{max} Nm							139	214	257
	(lb in)							(1230)	(1894)	(2275)
	n_{base} rpm							1215	1132	1082
DRS180L4	M_{max} Nm								213	256
	(lb in)								(1885)	(2266)
	n_{base} rpm								1215	1175
DRS180LC4	M_{max} Nm								205	246
	(lb in)								(1814)	(2177)
	n_{base} rpm								1298	1261
DRS200L4	M_{max} Nm								193	232
	(lb in)								(1708)	(2053)
	n_{base} rpm								1335	1297
DRS225S4	M_{max} Nm									236
	(lb in)									(2088)
	n_{base} rpm									1371

Note:
The data is based on a supply voltage of AC 230 V.

9.6.23 Motor table DRE series AC motors (characteristic value with double-star/star connection AC 230/460 V / 60 Hz)

Motor	P_m	M_N	Mass moment of inertia J_M		Star ⅄ (AC 460 V)				Double-star ⅄⅄ (AC 230 V)			
			without brake	with brake	I_n	I_{q_n} 1)	I_{d_n} 1)	k_T 1)	I_n	I_{q_n} 1)	I_{d_n} 1)	k_T 1)
	kW	Nm (lb in)	10^{-4} kgm²		A	A	A	Nm/A (lb in/A)	A	A	A	Nm/A (lb in/A)
DRE80M4	0.75	4.1 (36.3)	21.5	23	1.44	1.15	0.86	3.56 (31.5)	2.88	2.31	1.73	1.78 (15.8)
DRE90M4	1.1	6 (53.1)	35.5	40	2.30	1.83	1.39	3.27 (28.9)	4.60	3.67	2.77	1.63 (14.4)
DRE90L4	1.5	8.2 (72.6)	43.5	48.5	2.80	2.14	1.80	3.83 (33.9)	5.60	4.28	3.61	1.91 (16.9)
DRE100L4	2.2	12.1 (107)	68	74	4.00	3.39	2.12	3.57 (31.6)	8.0	6.8	4.25	1.78 (15.8)
DRE100LC4	3	16.3 (144)	89.8	95.8	5.40	5.14	2.58	3.17 (28.1)	10.8	10.3	5.16	1.59 (14.1)
DRE100LC4	3.7	20 (177)	89.8	95.8	6.40	5.85	2.60	3.42 (30.3)	12.8	11.7	5.20	1.71 (15.1)
DRE112M4	3.7	20 (177)	146	151	6.30	5.96	2.04	3.35 (29.7)	12.6	11.9	4.07	1.68 (14.9)
DRE132S4	4	21.6 (191)	190	195	7.90	6.36	2.79	3.39 (30)	15.8	12.7	5.59	1.70 (15.0)
DRE132M4	5.5	30 (266)	255	265	9.00	8.57	2.74	3.50 (31.0)	18.0	17.1	5.49	1.75 (15.5)
DRE132MC 4	7.5	40.5 (359)	340	355	12.9	11.5	5.93	3.54 (31.3)	25.8	22.9	11.9	1.77 (15.7)
DRE160S4	7.5	40.5 (358)	370	390	12.7	11.4	5.66	3.56 (31.5)	25.4	22.7	11.3	1.78 (15.8)
DRE160M4	9.2	49.5 (438)	450	500	15.4	14.0	6.52	3.55 (31.4)	30.8	27.9	13.0	1.77 (15.7)
DRE160MC 4	11	59 (522)	590	640	18.3	16.8	7.28	3.51 (31.1)	36.6	33.6	14.6	1.76 (15.6)
DRE180S4	11	59 (522)	900	960	17.9	16.3	7.36	3.62 (32.0)	35.8	32.6	14.7	1.81 (16.0)
DRE180M4	15	81 (717)	1110	1170	24.0	22.1	8.86	3.67 (32.5)	48.0	44.2	17.7	1.83 (16.2)
DRE180L4	18.5	100 (885)	1300	1440	30.0	27.0	12.7	3.71 (32.8)	60.0	54.0	25.3	1.85 (16.4)
DRE180LC4	22	118 (1044)	1790	1930	35.5	33.2	12.6	3.56 (31.5)	71.0	66.4	25.2	1.78 (15.8)
DRE200L4	30	161 (1425)	2360	2500	49.5	45.4	19.0	3.54 (31.3)	99.0	90.9	38.0	1.77 (15.7)
DRE225S4	37	199 (1761)	2930	3160	59.0	57.2	15.1	3.48 (30.8)	118	114	30.3	1.74 (15.4)
DRE225M4	45	240 (2124	3430	3660	71.0	66.5	24.4	3.61 (32.0)	142	133	48.7	1.80 (15.9)
DRE315K4	110	590 (5222)	18400	19500	169	157	63.2	3.76 (33.3)	338	314	126	1.88 (16.6)
DRE315S4	132	707 (6257)	22500	23600	205	202	43.4	3.49 (30.9)	410	405	87	1.75 (15.5)
DRE315S4	150	900 (7966)	22500	23600	225	218	61.2	4.14 (36.6)	450	435	122	2.07 (18.3)

Motor	P_m	M_N	Mass moment of inertia J_M		Star (AC 460 V)				Double-star (AC 230 V)			
			without brake	with brake	I_n	I_{q_n} 1)	I_{d_n} 1)	k_T 1)	I_n	I_{q_n} 1)	I_{d_n} 1)	k_T 1)
	kW	Nm (lb in)	10^{-4} kgm^2		A	A	A	Nm/A (lb in/A)	A	A	A	Nm/A (lb in/A)
DRE315M4	160	856 (7576)	27900	29000	240	232	60.7	3.69 (33.0)	480	464	121	1.84 (16.3)
DRE315M4	185	990 (8762)	27900	29000	275	264	81.0	3.75 (33.2)	550	528	162	1.87 (16.6)
DRE315L4	200	1070 (9470)	31900	33000	295	287	74	3.73 (33.0)	-	-	-	-
DRE315L4	225	1205 (10665)	31900	33000	335	325	73	3.71 (32.8)	-	-	-	-

1) Applies in the basic speed range up to n_{trans}.

9.6.24 DRE motor selection in double-star/star connection type (line AC 460 V / 60 Hz)

AC 230/460 V / 60 Hz motors in star connection

Assignment of MOVIDRIVE® MDX61B0005-5A3 ... MDX61B0110-503 (sizes 0 ... 2):

Motor voltage			MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)										
AC 460 / 60 Hz			0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
DRE80M4 0.75 kW	M_{max}	Nm	13.9	14			14						
		(lb in)	(123)	(124)			(124)						
	n_{base}	rpm	949	978			978						
DRE90M4 1.1 kW	M_{max}	Nm	12.3	14	14		14	**Note:**					
		(lb in)	(109)	(124)	(124)		(124)	The data is based on a supply voltage of AC 460 V.					
	n_{base}	rpm	1195	1212	1324		1318						
DRE90L4 1.5 kW	M_{max}	Nm		17.1	22.8	28	22	28					
		(lb in)		(151)	(202)	(248)	(195)	(248)					
	n_{base}	rpm		1119	1031	972	1043	978					
DRE100L4 2.2 kW	M_{max}	Nm				27.6	20	28.5	36.7	40			
		(lb in)				(244)	(177)	(252)	(325)	(354)			
	n_{base}	rpm				1095	1177	1084	990	972			
DRE100LC4 3.0 kW	M_{max}	Nm						24.8	32.2	40	40		
		(lb in)						(219)	(285)	(354)	(354)		
	n_{base}	rpm						1371	1306	1318	1441		
DRE100LC4 3.7 kW	M_{max}	Nm						27	35.1	40	40		
		(lb in)						(239)	(310)	(354)	(354)		
	n_{base}	rpm						1353	1289	1394	1470		
DRE112M4 3.7 kW	M_{max}	Nm						27.1	34.9	40			
		(lb in)						(240)	(309)	(354)			
	n_{base}	rpm						1503	1425	1464			
DRE112M4 4.5 kW	M_{max}	Nm							34	40	40		
		(lb in)							(301)	(354)	(354)		
	n_{base}	rpm							1347	1406	1469		
DRE132S4	M_{max}	Nm							34.6	47.9	55	55	
		(lb in)							(306)	(424)	(487)	(487)	
	n_{base}	rpm							1435	1357	1406	1450	
DRE132M4 5.5 kW	M_{max}	Nm							35.4	48.8	64.8	83.2	110
		(lb in)							(313)	(432)	(574)	(736)	(974)
	n_{base}	rpm							1538	1455	1352	1225	1044
DRE132M4 7.5 kW	M_{max}	Nm								47.8	63.8	82.2	110
		(lb in)								(423)	(565)	(728)	(974)
	n_{base}	rpm								1552	1474	1372	1215
DRE132MC4 7.5 kW	M_{max}	Nm									62.7	81.9	110
		(lb in)									(555)	(725)	(974)
	n_{base}	rpm									1313	1259	1250
DRE132MC4 9.2 kW	M_{max}	Nm									61.3	80.6	110
		(lb in)									(543)	(713)	(974)
	n_{base}	rpm									1381	1333	1342
DRE160S4 7.5 kW	M_{max}	Nm									63.6	83	110
		(lb in)									(563)	(735)	(974)
	n_{base}	rpm									1217	1168	1168
DRE160S4 9.2 kW	M_{max}	Nm									61.2	80	110
		(lb in)									(542)	(708)	(974)
	n_{base}	rpm									1305	1261	1252
DRE160M4 9.2 kW	M_{max}	Nm									62.5	82.2	126
		(lb in)									(553)	(728)	(1115)
	n_{base}	rpm									1296	1252	1147
DRE160M4 11 kW	M_{max}	Nm										79.9	123
		(lb in)										(707)	(1089)
	n_{base}	rpm										1344	1243

Motor voltage AC 460 / 60 Hz			MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700) 0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
DRE160MC4 11 kW	M_{max}	Nm										80.4	123
		(lb in)										(712)	(1089)
	n_{base}	rpm										1362	1283
DRE160MC4 15 kW	M_{max}	Nm											117
		(lb in)											(1036)
	n_{base}	rpm											1388
DRE180S4 11 kW	M_{max}	Nm										83.1	128
		(lb in)										(735)	(1133)
	n_{base}	rpm										1321	1221
DRE180S4 15 kW	M_{max}	Nm											124
		(lb in)											(1097)
	n_{base}	rpm											1265
DRE180M4 15 kW	M_{max}	Nm											127
		(lb in)											(1124)
	n_{base}	rpm											1265
DRE180M4 18.5 kW	M_{max}	Nm											124
		(lb in)											(1097)
	n_{base}	rpm											1421
DRE180L4 18.5 kW	M_{max}	Nm											124
		(lb in)											(1097)
	n_{base}	rpm											1324

Note:
The data is based on a supply voltage of AC 460 V.

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B0750-503 (size 3 ... 5):

Motor voltage AC 460 / 60 Hz		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700) 0150	0220	0300	0370	0450	0550	0750
DRE132MC4 9.2 kW	M_{max} Nm	110						
	(lb in)	(974)						
	n_{base} rpm	1425						
DRE160S4 7.5 kW	M_{max} Nm	110						
	(lb in)	(974)						
	n_{base} rpm	1204						
DRE160S4 9.2 kW	M_{max} Nm	110						
	(lb in)	(974)						
	n_{base} rpm	1314						
DRE160M4 9.2 kW	M_{max} Nm	169	200					
	(lb in)	(1496)	(1770)					
	n_{base} rpm	1028	949					
DRE160M4 11 kW	M_{max} Nm	165	200					
	(lb in)	(1460)	(1770)					
	n_{base} rpm	1138	1054					
DRE160MC4 11 kW	M_{max} Nm	166	200					
	(lb in)	(1469)	(1770)					
	n_{base} rpm	1199	1164					
DRE160MC4 15 kW	M_{max} Nm	159	200	200				
	(lb in)	(1407)	(1770)	(1770)				
	n_{base} rpm	1322	1349	1388				
DRE180S4 11 kW	M_{max} Nm	172	200					
	(lb in)	(1522)	(1770)					
	n_{base} rpm	1115	1052					
DRE180S4 15 kW	M_{max} Nm	169	200					
	(lb in)	(1496)	(1770)					
	n_{base} rpm	1182	1165					
DRE180M4 15 kW	M_{max} Nm	172	200					
	(lb in)	(1522)	(1770)					
	n_{base} rpm	1192	1211					
DRE180M4 18.5 kW	M_{max} Nm	169	200					
	(lb in)	(1496)	(1770)					
	n_{base} rpm	1354	1427					
DRE180L4 18.5 kW	M_{max} Nm	170	250	328	400			
	(lb in)	(1505)	(2213)	(2903)	(3540)			
	n_{base} rpm	1275	1178	1079	982			
DRE180L4 22 kW	M_{max} Nm	169	248	326	397	400		
	(lb in)	(1496)	(2195)	(2885)	(3514)	(3540)		
	n_{base} rpm	1301	1205	1102	1009	1006		
DRE180LC4 22 kW	M_{max} Nm	164	241	316	386	400		
	(lb in)	(1452)	(2133)	(2797)	(3416)	(3540)		
	n_{base} rpm	1311	1221	1125	1035	1016		
DRE180LC4 30 kW	M_{max} Nm		238	314	384	400		
	(lb in)		(2106)	(2779)	(3399)	(3540)		
	n_{base} rpm		1308	1231	1155	1168		
DRE200L4	M_{max} Nm		234	311	381	468	552	600
	(lb in)		(2071)	(2753)	(3372)	(4142)	(4886)	(5310)
	n_{base} rpm		1259	1186	1113	1025	940	896
DRE225S4	M_{max} Nm		234	308	377	460	544	600
	(lb in)		(2071)	(2726)	(3337)	(4071)	(4815)	(5310)
	n_{base} rpm		1438	1353	1268	1166	1069	1007
DRE225M4	M_{max} Nm			314	387	476	564	600
	(lb in)			(2779)	(3425)	(4213)	(4992)	(5310)
	n_{base} rpm			1242	1198	1142	1081	1084

Note:
The data is based on a supply voltage of AC 460 V.

Motor voltage AC 460 / 60 Hz		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700) 0150	0220	0300	0370	0450	0550	0750
DRE315K4	M_{max} Nm	**Note:** The data is based on a supply voltage of AC 460 V.						692
	(lb in)							(6125)
	n_{base} rpm							1294

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B0750-503 (size 6 ... 7):

Motor voltage AC 460 V / 60 Hz		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700) 0900	1100	1320	1600	2000	2500
DRE315K4	M_{max} Nm	926	1100	1386	1600	1600	
	(lb in)	(8196)	(9736)	(12267)	(14161)	(14161)	
	n_{base} rpm	1272	1254	1223	1236	1399	
DRE315S4 132 kW	M_{max} Nm	876	1036	1299	1563	1600	
	(lb in)	(7753)	(9169)	(11497)	(13834)	(14161)	
	n_{base} rpm	1401	1359	1286	1210	1213	
DRE315S4 150 kW	M_{max} Nm		1106	1407	1600	1600	1600
	(lb in)		(9798)	(12453)	(14161)	(14161)	(14161)
	n_{base} rpm		1259	1241	1297	1548	1696
DRE315M4 160 kW	M_{max} Nm		1083	1364	1643	2089	2400
	(lb in)		(9585)	(12072)	(14542)	(18489)	(21242)
	n_{base} rpm		1420	1374	1325	1242	1191
DRE315M4 185 kW	M_{max} Nm			1373	1660	2116	2400
	(lb in)			(12152)	(14692)	(18728)	(21242)
	n_{base} rpm			1241	1223	1190	1246
DRE315L4 200 kW	M_{max} Nm			1372	1657	2109	2400
	(lb in)			(12143)	(14666)	(18666)	(21242)
	n_{base} rpm			1430	1398	1342	1357
DRE315L4 225 kW	M_{max} Nm			1365	1648	2098	2400
	(lb in)			(12081)	(14586)	(18569)	(21242)
	n_{base} rpm			1440	1408	1352	1362

AC 230/460 V / 60 Hz motors in double-star connection
Assignment of MOVIDRIVE® MDX61B0005-5A3 ... MDX61B0110-503 (sizes 0 ... 2):

Motor voltage AC 230 / 60 Hz		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700) 0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
DRE80M4 0.75 kW	M_{max} Nm		8	10.6	13.9	10.3	14	14				
	(lb in)		(71)	(94)	(123)	(91)	(124)	(124)				
	n_{base} rpm		2554	2437	2279	2455	2308	2507				
DRE90M4 1.1 kW	M_{max} Nm				12.3	8.8	12.8	14	14			
	(lb in)				(109)	(78)	(113)	(124)	(124)			
	n_{base} rpm				2595	2707	2578	2847	3093			
DRE90L4 1.5 kW	M_{max} Nm						14.3	18.9	26.5	28		
	(lb in)						(127)	(167)	(235)	(248)		
	n_{base} rpm						2484	2396	2238	2425		
DRE100L4 2.2 kW	M_{max} Nm							17.2	24.3	32.6	40	40
	(lb in)							(152)	(215)	(289)	(354)	(354)
	n_{base} rpm							2548	2443	2314	2244	2320
DRE100LC4 3.7 kW	M_{max} Nm									31.1	40	40
	(lb in)									(275)	(354)	(354)
	n_{base} rpm									2794	2724	3275
DRE112M4 3.7 kW	M_{max} Nm								23.1	31	40	40
	(lb in)								(204)	(274)	(354)	(354)
	n_{base} rpm								3193	3071	2915	3173

Motor voltage AC 230 / 60 Hz		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700) 0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110
DRE112M4 4.5 kW	M_{max} Nm									30.1	39.1	40
	(lb in)									(275)	(346)	(354)
	n_{base} rpm									2880	2763	3183
DRE132S4	M_{max} Nm										40	55
	(lb in)										(354)	(487)
	n_{base} rpm										2924	2944
DRE132M4 5.5 kW	M_{max} Nm										40.8	62.1
	(lb in)										(361)	(550)
	n_{base} rpm										3115	2885
DRE132M4 7.5 kW	M_{max} Nm											61.1
	(lb in)											(541)
	n_{base} rpm											3097
DRE132MC4 7.5 kW	M_{max} Nm											59.9
	(lb in)											(530)
	n_{base} rpm											2719
DRE132MC4 9.2 kW	M_{max} Nm											58.5
	(lb in)											(518)
	n_{base} rpm											2854
DRE160S4 7.5 kW	M_{max} Nm	**Note:** The data is based on a supply voltage of AC 460 V.										60.8
	(lb in)											(538)
	n_{base} rpm											2531
DRE160S4 9.2 kW	M_{max} Nm											58.5
	(lb in)											(518)
	n_{base} rpm											2707
DRE160M4 9.2 kW	M_{max} Nm											59.7
	(lb in)											(528)
	n_{base} rpm											2671

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B0750-503 (size 3 ... 5):

Motor voltage		**MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)**						
AC 230 / 60 Hz		**0150**	**0220**	**0300**	**0370**	**0450**	**0550**	**0750**
DRE132S4	M_{max} Nm	55						
	(lb in)	(487)						
	n_{base} rpm	3115						
DRE132M4 5.5 kW	M_{max} Nm	83.2	110					
	(lb in)	(736)	(974)					
	n_{base} rpm	2631	2314					
DRE132M4 7.5 kW	M_{max} Nm	82.2	110					
	(lb in)	(728)	(974)					
	n_{base} rpm	2905	2668					
DRE132MC4 7.5 kW	M_{max} Nm	81.9	110	110				
	(lb in)	(725)	(974)	(974)				
	n_{base} rpm	2622	2617	2788				
DRE132MC4 9.2 kW	M_{max} Nm	80.6	110	110				
	(lb in)	(713)	(974)	(974)				
	n_{base} rpm	2771	2771	3052				
DRE160S4 7.5 kW	M_{max} Nm	83	110	110				
	(lb in)	(735)	(974)	(974)				
	n_{base} rpm	2443	2460	2614				
DRE160S4 9.2 kW	M_{max} Nm	80	110	110				
	(lb in)	(708)	(974)	(974)				
	n_{base} rpm	2627	2601	2882				
DRE160M4 9.2 kW	M_{max} Nm	82.2	120	158	193	200		
	(lb in)	(728)	(1062)	(1398)	(1708)	(1770)		
	n_{base} rpm	2597	2439	2267	2109	2074		
DRE160M4 11 kW	M_{max} Nm	79.9	117	155	189	200		
	(lb in)	(707)	(1036)	(1372)	(1673)	(1770)		
	n_{base} rpm	2768	2632	2474	2324	2489		
DRE160MC4 11 kW	M_{max} Nm	80.4	118	156	190	200		
	(lb in)	(712)	(1044)	(1381)	(1682)	(1770)		
	n_{base} rpm	2794	2685	2562	2434	2526		
DRE160MC4 15 kW	M_{max} Nm		112	149	483	200	200	
	(lb in)		(991)	(1319)	(4275)	(1770)	(1770)	
	n_{base} rpm		2874	2781	2689	2821	2957	
DRE180S4 11 kW	M_{max} Nm	83.1	122	161	197	200		
	(lb in)	(735)	(1080)	(1425)	(1744)	(1770)		
	n_{base} rpm	2716	2573	2410	2257	2257		
DRE180S4 15 kW	M_{max} Nm		119	158	193	200		
	(lb in)		(1053)	(1398)	(1708)	(1770)		
	n_{base} rpm		2629	2513	2397	2533		
DRE180M4 15 kW	M_{max} Nm		121	161	197	200		
	(lb in)		(1071)	(1425)	(1744)	(1770)		
	n_{base} rpm		2616	2510	2400	2560		
DRE180M4 18.5 kW	M_{max} Nm		118	157	193	200	200	
	(lb in)		(1044)	(1390)	(1708)	(1770)	(1770)	
	n_{base} rpm		2915	2822	2722	2955	2985	
DRE180L4 18.5 kW	M_{max} Nm		118	159	196	241	286	356
	(lb in)		(1044)	(1407)	(1735)	(2133)	(2531)	(3151)
	n_{base} rpm		2712	2646	2573	2477	2374	2211
DRE180L4 22 kW	M_{max} Nm			158	195	240	284	353
	(lb in)			(1398)	(1726)	(2124)	(2514)	(3124)
	n_{base} rpm			2692	2623	2530	2430	2267
DRE180LC4 22 kW	M_{max} Nm			153	189	233	276	343
	(lb in)			(1354)	(1673)	(2062)	(2443)	(3036)
	n_{base} rpm			2699	2629	2536	2433	2274

Note:
The data is based on a supply voltage of AC 460 V.

Motor voltage AC 230 / 60 Hz		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)						
		0150	0220	0300	0370	0450	0550	0750
DRE180LC4 30 kW	M_{max} Nm				185	230	273	341
	(lb in)				(1637)	(2062)	(2416)	(3018)
	n_{base} rpm				2769	2696	2619	2493
DRE200L4	M_{max} Nm					226	270	338
	(lb in)					(2000)	(2390)	(2992)
	n_{base} rpm					2583	2513	2386
DRE225S4	M_{max} Nm					226	270	337
	(lb in)					(2000)	(2390)	(2983)
	n_{base} rpm					2765	2698	2584
DRE225M4	M_{max} Nm							342
	(lb in)							(3027)
	n_{base} rpm							2502

Note:
The data is based on a supply voltage of AC 460 V.

Assignment of MOVIDRIVE® MDX61B0150-503 ... MDX61B0750-503 (size 6 ... 7):

Motor voltage AC 230 V / 60 Hz		MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in CFC operating modes (P700)					
		0900	1100	1320	1600	2000	2500
DRE180L4 18.5 kW	M_{max} Nm	400					
	(lb in)	(3540)					
	n_{base} rpm	2108					
DRE180L4 22 kW	M_{max} Nm	400					
	(lb in)	(3540)					
	n_{base} rpm	2168					
DRE180LC4 22 kW	M_{max} Nm	400					
	(lb in)	(3540)					
	n_{base} rpm	2138					
DRE180LC4 30 kW	M_{max} Nm	400					
	(lb in)	(3540)					
	n_{base} rpm	2450					
DRE200L4	M_{max} Nm	446	526	600			
	(lb in)	(3947)	(4655)	(5310)			
	n_{base} rpm	2185	2033	1901			
DRE225S4	M_{max} Nm	444	523	600			
	(lb in)	(3930)	(4629)	(5310)			
	n_{base} rpm	2387	2241	2103			
DRE225M4	M_{max} Nm	454	537	600			
	(lb in)	(4018)	(4753)	(5310)			
	n_{base} rpm	2376	2276	2264			
DRE315K4	M_{max} Nm				810	1042	1300
	(lb in)				(7169)	(9222)	(11506)
	n_{base} rpm				2600	2559	2511
DRE315S4	M_{max} Nm					1045	1317
	(lb in)					(9249)	(11656)
	n_{base} rpm					2554	2526
DRE315M4	M_{max} Nm						1286
	(lb in)						(11382)
	n_{base} rpm						2518

Note:
The data is based on a supply voltage of AC 460 V.

9.6.25 DRE motor selection in double-star connection (line AC 230 V / 60 Hz)

AC 230/460 V / 60 Hz motors in double-star connection

Motor voltage		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
DRE80S4	M_{max} Nm	14								
	(lb in)	(124)								
	n_{base} rpm	855								
DRE80M4 0.75 kW	M_{max} Nm	14								
	(lb in)	(124)								
	n_{base} rpm	978								
DRE80M4 1.1 kW	M_{max} Nm	14								
	(lb in)	(124)								
	n_{base} rpm	1277								
DRE90M4 1.1 kW	M_{max} Nm	14								
	(lb in)	(124)								
	n_{base} rpm	1289								
DRE90M4 1.5 kW	M_{max} Nm	14								
	(lb in)	(124)								
	n_{base} rpm	1365								
DRE90L4 1.5 kW	M_{max} Nm	19.9	23.8	28						
	(lb in)	(176)	(211)	(248)						
	n_{base} rpm	1078	1013	990						
DRE90L4 2.2 kW	M_{max} Nm	17.9	21.6	28						
	(lb in)	(158)	(191)	(248)						
	n_{base} rpm	1212	1154	1142						
DRE100M4	M_{max} Nm		20.5	35.9	40					
	(lb in)		(181)	(318)	(354)					
	n_{base} rpm		1400	1218	1236					
DRE100L4 2.2 kW	M_{max} Nm	18	21.8	38.1	40					
	(lb in)	(159)	(193)	(337)	(354)					
	n_{base} rpm	1201	1160	972	972					
DRE100L4 3.7 kW	M_{max} Nm			35.7	40					
	(lb in)			(316)	(354)					
	n_{base} rpm			1418	1564					
DRE100LC4 3.7 kW	M_{max} Nm			36.5	40					
	(lb in)			(323)	(354)					
	n_{base} rpm			1283	1464					
DRE112M4 3.7 kW	M_{max} Nm			36.2	40					
	(lb in)			(320)	(354)					
	n_{base} rpm			1411	1469					
DRE112M4 4.5 kW	M_{max} Nm			35.2	40					
	(lb in)			(312)	(354)					
	n_{base} rpm			1337	1465					
DRE132S4	M_{max} Nm			36	55	55				
	(lb in)			(319)	(487)	(487)				
	n_{base} rpm			1430	1323	1450				
DRE132M4 5.5 kW	M_{max} Nm			36.7	56.8	75.3	109	110		
	(lb in)			(325)	(503)	(666)	(965)	(974)		
	n_{base} rpm			1533	1406	1279	1049	1044		
DRE132M4 7.5 kW	M_{max} Nm				55.8	74.3	108	110		
	(lb in)				(494)	(658)	(956)	(974)		
	n_{base} rpm				1513	1416	1225	1215		
DRE132MC4 7.5 kW	M_{max} Nm				54.2	73.7	109	110		
	(lb in)				(480)	(652)	(965)	(974)		
	n_{base} rpm				1333	1279	1176	1279		

Note:
The data is based on a supply voltage of AC 230 V.

Motor voltage AC 230 V / 60 Hz		MOVIDRIVE® MDX61B...-2_3 (AC 230 V units) in CFC operating modes (P700)								
		0015	0022	0037	0055	0075	0110	0150	0220	0300
DRE132MC4 9.2 kW	M_{max} Nm					72.4	107	110		
	(lb in)					(641)	(947)	(974)		
	n_{base} rpm					1357	1259	1401		
DRE160S4 7.5 kW	M_{max} Nm				55.2	74.8	110	110		
	(lb in)				(489)	(662)	(974)	(974)		
	n_{base} rpm				1239	1186	1094	1190		
DRE160S4 9.2 kW	M_{max} Nm					72	106	110	110	
	(lb in)					(637)	(938)	(974)	(974)	
	n_{base} rpm					1283	1190	1309	1314	
DRE160M4 9.2 kW	M_{max} Nm					73.8	109	142	200	
	(lb in)					(653)	(965)	(1257)	(1770)	
	n_{base} rpm					1274	1186	1103	949	
DRE160M4 11 kW	M_{max} Nm					71.7	107	139	200	
	(lb in)					(635)	(947)	(1230)	(1770)	
	n_{base} rpm					1362	1283	1204	1054	
DRE160MC4 11 kW	M_{max} Nm					72	107	140	200	
	(lb in)					(637)	(947)	(1239)	(1770)	
	n_{base} rpm					1379	1314	1252	1147	
DRE160MC4 15 kW	M_{max} Nm						101	133	200	200
	(lb in)						(894)	(1177)	(1770)	(1770)
	n_{base} rpm						1410	1366	1261	1362
DRE180S4 11 kW	M_{max} Nm					74.4	111	144	200	
	(lb in)					(658)	(982)	(1275)	(1770)	
	n_{base} rpm					1338	1261	1182	1052	
DRE180S4 15 kW	M_{max} Nm						107	141	200	
	(lb in)						(947)	(1248)	(1770)	
	n_{base} rpm						1291	1235	1152	
DRE180M4 15 kW	M_{max} Nm						111	145	200	
	(lb in)						(982)	(1283)	(1770)	
	n_{base} rpm						1251	1202	1155	
DRE180M4 18.5 kW	M_{max} Nm							142	200	200
	(lb in)							(1257)	(1770)	(1770)
	n_{base} rpm							1334	1308	1404
DRE180L4 18.5 kW	M_{max} Nm							143	220	264
	(lb in)							(1266)	(1947)	(2337)
	n_{base} rpm							1231	1155	1109
DRE180L4 22 kW	M_{max} Nm							141	217	260
	(lb in)							(1248)	(1921)	(2301)
	n_{base} rpm							1245	1172	1125
DRE180LC4 22 kW	M_{max} Nm								213	256
	(lb in)								(1885)	(2266)
	n_{base} rpm								1205	1162
DRE180LC4 30 kW	M_{max} Nm								207	249
	(lb in)								(1832)	(2204)
	n_{base} rpm								1258	1225
DRE200L4	M_{max} Nm								201	243
	(lb in)								(1779)	(2151)
	n_{base} rpm								1289	1251
DRE225S4	M_{max} Nm									243
	(lb in)									(2151)
	n_{base} rpm									1338

Note:
The data is based on a supply voltage of AC 230 V.

9.6.26 Motor tables DV series AC motors (characteristic value with double-star/star connection AC 230/460 V / 60 Hz)

Motor	P_m	M_N	Mass moment of inertia J_M without brake	Mass moment of inertia J_M with brake	Star ⅄ (AC 460 V) I_n	I_{q_n} 1)	I_{d_n} 1)	k_T 1)	Double-star ⅄⅄ (AC 230 V) I_n	I_{q_n} 1)	I_{d_n} 1)	k_T 1)
	kW	Nm (lb in)	10^{-4} kgm²		A	A	A	Nm/A (lb in/A)	A	A	A	Nm/A (lb in/A)
DV250M4	55	296 (2620)	6300	6600/6730 2)	87	78.5	37.6	3.77 (33.4)	174	157	75.2	1.89 (16.7)
DV280S4	75	402 (3558)	8925	9225/9355 2)	118	107	50.8	3.77 (33.4)	236	213	102	1.89 (16.7)
DV280M4	90	580 (5133)	14500	3)	162	153	51.7	3.79 (33.5)	324	306	103	1.89 (16.7)

1) Applies in the basic speed range up to n_{base}.
2) Double disk brake
3) On request

9.6.27 DV motor selection in double-star/star connection type (line AC 460 V / 60 Hz)

AC 230/460 V / 60 Hz motors in star connection

Motor voltage AC 460 V / 60 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
DV250M4	M_{max} Nm (lb in)						576 (5100)	641 (5670)			
	n_{base} rpm						1261	1370			
DV280S4	M_{max} Nm (lb in)	**Note:** The maximum torque M_{max} is limited to 180% of the rated motor torque M_N. The data is based on a supply voltage of AC 460 V.						711 (6290)	871 (7710)	871 (7710)	
	n_{base} rpm							1421	1478	1664	
D280M4	M_{max} Nm (lb in)							712 (6300)	946 (8370)	1045 (9249)	
	n_{base} rpm							1338	1318	1382	

AC 230/460 V / 60 Hz motors in double-star connection

Motor voltage AC 230 V / 60 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
DV250M4	M_{max} Nm (lb in)	**Note:** The maximum torque M_{max} is limited to 180% of the rated motor torque M_N. The data is based on a supply voltage of AC 460 V.							459 (4062)	547 (4841)	641 (5673)
	n_{base} rpm								2656	2630	2771
DV280S4	M_{max} Nm (lb in)									533 (4717)	681 (6027)
	n_{base} rpm									2963	2925

9.7 *Motor selection for synchronous servomotors (SERVO)*

INFORMATION

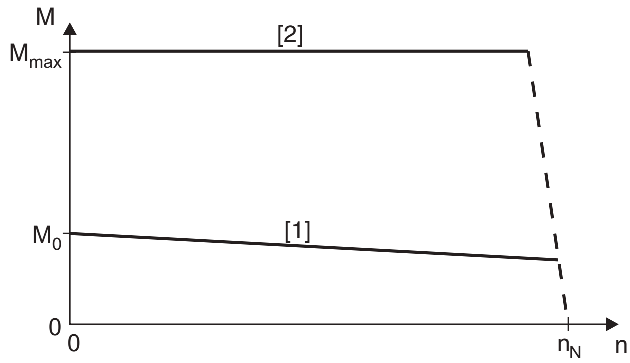
The torque limit (M limit) is set automatically by the startup function of the MOVITOOLS® MotionStudio engineering software. Do not increase this automatically set value!

We recommend always using the latest version of MOVITOOLS® MotionStudio for startup. The latest MOVITOOLS® MotionStudio version can be downloaded from our homepage (www.sew-eurodrive.de).

9.7.1 Motor characteristics

The demands made on a servo drive include speed dynamics, stable speed, and positioning accuracy. DS/CM/CMD/CMP motors with MOVIDRIVE® meet these requirements.

Technically speaking, these are synchronous motors with permanent magnets on the rotor and a mounted resolver. The required characteristics, namely a constant torque over a wide speed range (up to 6000 rpm), a high speed and control range and a high overload capacity, are achieved using control with MOVIDRIVE®. 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. The following figures shows the speed/torque characteristic curve of DS/CM/CMD/CMP servomotors.



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[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 selection tables (DS/CM/CMD/CMP) the values for M_0.

Refer to the motor selection tables (DS/CM/CMD/CMP) for the values for M_{max}.

9.7.2 Basic recommendations

For SEW motors, the motor data required for the SERVO operating modes is stored in MOVIDRIVE®.

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.

   $M_{eff} < M_0$

   The point must lie below the characteristic curve for the continuous torque (figure 37, 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.

   $M_{max} < M_{dyn\_mot}$

   This operating point must lie below the characteristic curve for the maximum torque of the motor/MOVIDRIVE® combination (figure 37, 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 rpm as a result of the high input speed.

   $n_{max} \leq n_N$

SERVO mode with torque control (SERVO & M-CTRL.)

This operating mode allows 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 either in the unit (rpm) or (% $I_{N\_inverter}$) (→ MOVITOOLS® MotionStudio).

The following relationship exists between the units:

3000 rpm ≙ 150% nominal inverter current

The torque at the output shaft of the servomotor can be calculated using the following formula:

$$M = \frac{M_0}{I_0} \times \frac{150\% \times I_{N\_inverter} \times n_{setpoint}}{3000\ 1/min}$$

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M_0	Continuous static torque according to the motor tables DS/CM/CMD/CMP
I_0	Continuous static torque according to the motor tables DS/CM/CMD/CMP

9.7.3 Motor table DS/CM

Characteristic values at V_{max} = AC 230 V / AC 400 V

		Without forced cooling fan			With forced cooling fan VR					Mass moment of inertia J_M	
n_N rpm	Motor	M_0 Nm (lb in)	I_0 1) A	I_0 2) A	M_{0_VR} Nm (lb in)	I_{0_VR} 1) A	I_{0_VR} 2) A	I_{max} 1) A	I_{max} 2) A	without brake 10^{-4} kgm²	with brake 10^{-4} kgm²
2000	**CM71S**	5.0 (44)	2.2	3.95	7.3 (65)	3.2	5.7	8.8	15.8	4.85	6.89
	CM71M	6.5 (58)	3.0	5.3	9.4 (83)	4.2	7.7	12.0	21.0	6.27	8.31
	CM71L	9.5 (84)	4.2	7.4	13.8 (122)	6.1	10.7	16.8	29.5	9.1	11.1
	CM90S	11.0 (97.4)	4.9	8.7	16.0 (142)	7.1	12.6	19.6	35.0	14.3	19.8
	CM90M	14.5 (128)	6.9	12.1	21.0 (186)	10.0	17.5	28.0	48.5	18.6	24.1
	CM90L	21.0 (186)	9.9	17.1	30.5 (270)	14.4	25.0	40.0	68.0	27.1	32.6
	CM112S	23.5 (208)	10.0	18.0	34.0 (301)	14.5	26.0	40.0	72	67.4	87.5
	CM112M	31.0 (274)	13.5	24.5	45.0 (398)	19.6	35.5	54.0	98	87.4	108
	CM112L	45.0 (398)	20.0	35.5	65.0 (575)	29.0	51.0	80.0	142	128	148
	CM112H	68.0 (602)	30.5	52.0	95.0 (841)	42.5	73.0	122	208	189	209
3000	**DS56M**	1.0 (8.9)	1.65	1.65	-	-	-	6.6	6.6	0.47	0.85
	DS56L	2.0 (18)	2.4	2.4	-	-	-	9.6	9.6	0.82	1.2
	DS56H	4.0 (36)	2.8	4.7	-	-	-	11.2	19	1.53	1.88
	CM71S	5.0 (44)	3.3	5.9	7.3 (65)	4.8	8.6	13.2	23.5	4.85	6.89
	CM71M	6.5 (58)	4.3	7.6	9.4 (83)	6.2	11.0	17.2	30.5	6.27	8.31
	CM71L	9.5 (84)	6.2	11.1	13.8 (122)	9.0	16.1	25.0	44.5	9.1	11.1
	CM90S	11.0 (97.4)	7.3	12.7	16.0 (142)	10.6	18.4	30.0	51	14.3	19.8
	CM90M	14.5 (128)	10.1	17.4	21.0 (186)	14.6	25.0	40.0	70	18.6	24.1
	CM90L	21.0 (186)	14.4	25.5	30.5 (270)	21.0	37.0	58.0	102	27.1	32.6
	CM112S	23.5 (208)	15.0	27.0	34.0 (301)	22.0	39.0	60.0	108	67.4	87.5
	CM112M	31.0 (274)	20.5	35.0	45.0 (398)	30.0	51.0	82.0	140	87.4	108
	CM112L	45.0 (398)	30.0	48.0	65.0 (575)	44.0	70.0	120	192	128	148
	CM112H	68.0 (602)	43.0	73.0	95.0 (841)	60.0	102	172	292	189	209
4500	**DS56M**	1.0 (8.9)	1.65	1.65	-	-	-	6.6	6.6	0.47	0.85
	DS56L	2.0 (18)	2.4	-	-	-	-	9.6	-	0.82	1.2
	DS56H	4.0 (36)	4.0	-	-	-	-	16.0	-	1.53	1.88
	CM71S	5.0 (44)	4.9	8.5	7.3 (65)	7.2	12.3	20.0	34	4.85	6.89
	CM71M	6.5 (58)	6.6	11.3	9.4 (83)	9.6	16.4	26.0	45	6.27	8.31
	CM71L	9.5 (84)	9.6	17.1	13.8 (122)	14.0	25.0	38.0	68	9.1	11.1
	CM90S	11.0 (97.4)	11.1	18.9	16.0 (142)	16.2	27.5	44.0	76	14.3	19.8
	CM90M	14.5 (128)	14.7	26.0	21.0 (186)	21.5	37.5	59.0	104	18.6	24.1
	CM90L	21.0 (186)	21.6	39.0	30.5 (270)	31.5	57	86.0	156	27.1	32.6
	CM112S	23.5 (208)	22.5	38.5	34.0 (301)	32.5	56	90.0	154	67.4	87.5
	CM112M	31.0 (274)	30.0	54.0	45.0 (398)	44.0	78	120	216	87.4	108
	CM112L	45.0 (398)	46.0	78.0	65.0 (575)	67.0	113	184	312	128	148
	CM112H	68.0 (602)	66.0	-	95.0 (841)	92.0	-	264	-	189	209
6000	**DS56M**	1.0 (8.9)	1.65	-	-	-	-	6.6	-	0.47	0.85
	DS56L	2.0 (18)	2.75	-	-	-	-	11.0	-	0.82	1.2
	DS56H	4.0 (36)	5.3	-	-	-	-	21.0	-	1.53	1.88
	CM71S	5.0 (44)	6.5	11.6	7.3 (65)	7.2	16.8	26.0	46.5	4.85	6.89
	CM71M	6.5 (58)	8.6	14.1	9.4 (83)	9.6	20.5	34.0	56	6.27	8.31
	CM71L	9.5 (84)	12.5	21.5	13.8 (122)	14.0	31.0	50.0	86	9.1	11.1
	CM90S	11.0 (97.4)	14.5	23.5	16.0 (142)	16.2	34.0	58.0	94	14.3	19.8
	CM90M	14.5 (128)	19.8	37.0	21.0 (186)	21.5	54	79.0	148	18.6	24.1
	CM90L	21.0 (186)	29.5	51.0	30.5 (270)	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

INFORMATION

For additional project planning notes and information about the type DS/CM synchronous servomotors, refer to the "Servo Gearmotors" catalog, which you can order from SEWEURODRIVE.

9.7.4 DS/CM motor selection (line AC 400 V / 50 Hz)

1. Nominal speed n_N = 2000 rpm:

Motor			MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in the 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									
		(lb in)	(79)	(93)	(116)	(138)	(112)	(141)	(146)									
CM71M	M_{max}	Nm	8.6	10.3	13.1	16.2	12.7	16.7	19.8	21.5								
		(lb in)	(76)	(91)	(116)	(143)	(112)	(148)	(175)	(190)								
CM71L	M_{max}	Nm		10.8	13.9	17.7	13.5	18.2	22.5	28.4	31.4							
		(lb in)		(96)	(123)	(157)	(119)	(161)	(199)	(251)	(278)							
CM90S	M_{max}	Nm			13.9	17.8	13.4	18.4	23.2	30.6	38.2	39.4						
		(lb in)			(123)	(158)	(119)	(163)	(205)	(271)	(338)	(349)						
CM90M	M_{max}	Nm				16.8	12.6	17.3	21.9	29.5	38.0	46.9	52.5					
		(lb in)				(149)	(112)	(153)	(194)	(261)	(336)	(415)	(465)					
CM90L	M_{max}	Nm						17.5	22.2	30.1	39.3	49.6	70.3	75.8				
		(lb in)						(155)	(196)	(266)	(348)	(439)	(622)	(671)				
CM112S	M_{max}	Nm						19.3	24.6	33.4	43.6	54.8	76.2	81.9				
		(lb in)						(171)	(218)	(296)	(386)	(485)	(674)	(725)				
CM112M	M_{max}	Nm							23.9	32.6	42.9	54.7	79.3	99.6	108.0			
		(lb in)							(212)	(289)	(380)	(484)	(702)	(882)	(956)			
CM112L	M_{max}	Nm									42.0	53.9	80.3	104.9	141.5	156.8		
		(lb in)									(372)	(477)	(711)	(928	(1252)	(1388)		
CM112H	M_{max}	Nm										53.2	80.1	106.5	150.3	189.2	220.1	237.0
		(lb in)										(471)	(709)	(943)	(1330)	(1675)	(1948)	(2100)

2. Nominal speed n_N = 3000 rpm:

Motor			MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in the SERVO operating modes (P700)								
			0005	**0008**	**0011**	**0014**	**0015**	**0022**	**0030**	**0040**	**0055**
DS56M	M_{max}	Nm (lb in)	2.4 (21)	2.8 (25)	3.6 (32)	3.8 (34)	3.5 (31)	3.8 (34)			
DS56L	M_{max}	Nm (lb in)	3.3 (29)	4.0 (35)	5.1 (45)	6.4 (57)	4.9 (43)	6.6 (58)	7.6 (67)		
DS56H	M_{max}	Nm (lb in)	5.7 (50)	6.8 (60)	8.8 (78)	11.2 (99)	8.5 (75)	11.5 (102)	14.3 (127)	15.0 (133)	
CM71S	M_{max}	Nm (lb in)	6.0 (53)	7.2 (64)	9.2 (81)	11.6 (103)	8.9 (79)	11.9 (105)	14.3 (127)	16.5 (146)	
CM71M	M_{max}	Nm (lb in)		7.2 (64)	9.3 (82)	11.9 (105)	9.0 (80)	12.2 (108)	15.1 (134	19.1 (169)	21.5 (190)
CM71L	M_{max}	Nm (lb in)			9.5 (84)	12.2 (108)	9.2 (81)	12.6 (112)	15.9 (141)	21.0 (186)	26.2 (232)
CM90S	M_{max}	Nm (lb in)				12.0 (106)	9.0 (80)	12.4 (110)	15.7 (139)	21.2 (188)	27.4 (243)
CM90M	M_{max}	Nm (lb in)						11.8 (104)	15.0 (133)	20.4 (181)	26.6 (235)
CM90L	M_{max}	Nm (lb in)								20.7 (183)	27.3 (242)
CM112S	M_{max}	Nm (lb in)								22.2 (196)	29.3 (259)
CM112M	M_{max}	Nm (lb in)									28.2 (250

Motor			MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in the SERVO operating modes (P700)								
			0075	**0110**	**0150**	**0220**	**0300**	**0370**	**0450**	**0550**	**0750**
CM71L	M_{max}	Nm (lb in)	30.8 (273)	31.5 (279)							
CM90S	M_{max}	Nm (lb in)	34.0 (301)	39.2 (347)							
CM90M	M_{max}	Nm (lb in)	33.7 (298)	47.8 (423)	51.6 (457)						
CM90L	M_{max}	Nm (lb in)	34.7 (307)	51.1 (452)	65.6 (581)	75.6 (669)					
CM112S	M_{max}	Nm (lb in)	37.4 (331)	54.8 (485)	69.8 (618)	81.9 (725)					
CM112M	M_{max}	Nm (lb in)	36.2 (320)	54.0 (478)	70.7 (626)	95.7 (847)	108.0 (956)				
CM112L	M_{max}	Nm (lb in)	35.8 (317)	53.9 (477)	71.6 (634)	101.0 (894)	126.9 (1123)	147.4 (1305)	156.8 (1388)		
CM112H	M_{max}	Nm (lb in)		56.6 (501)	75.7 (670)	108.6 (961)	139.9 (1238)	167.0 (1478)	197.1 (1744)	223.2 (1975)	237.0 (2098)

3. Nominal speed n_N = 4500 rpm:

Motor			MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in the 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		
		(lb in)	(21)	(25)	(32)	(34)	(31)	(34)		
DS56L	M_{max}	Nm	3.3	4.0	5.1	6.4	4.9	6.6	7.6	
		(lb in)	(29)	(35)	(45)	(57)	(43)	(58)	(67)	
DS56H	M_{max}	Nm	4.0	4.8	6.2	7.9	6.0	8.2	10.3	13.7
		(lb in)	(35)	(42)	(55)	(70	(53)	(73)	(91)	(121)
CM71S	M_{max}	Nm			6.3	8.1	6.1	8.3	10.4	13.4
		(lb in)			(56)	(72)	(54)	(73)	(92)	(119)
CM71M	M_{max}	Nm				7.9	5.9	8.1	10.2	13.6
		(lb in)				(70)	(52)	(72)	(90)	(120)
CM71L	M_{max}	Nm						8.2	10.4	14.0
		(lb in)						(73)	(92)	(124)
CM90S	M_{max}	Nm							10.4	14.1
		(lb in)							(92)	(125)
CM90M	M_{max}	Nm								14.0
		(lb in)								(124)

Motor			MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in the SERVO operating modes (P700)											
			0055	0075	0110	0150	0220	0300	0370	0450	0550	0750	0900	1100
DS56H	M_{max}	Nm	15.2											
		(lb in)	(135)											
CM71S	M_{max}	Nm	16.1	16.5										
		(lb in)	(142)	(146)										
CM71M	M_{max}	Nm	17.1	20.3	21.3									
		(lb in)	(151)	(180)	(189)									
CM71L	M_{max}	Nm	18.1	22.5	30.3	31.2								
		(lb in)	(160)	(199)	(268)	(276)								
CM90S	M_{max}	Nm	18.4	23.4	33.6	39.2								
		(lb in)	(163)	(207)	(297)	(347)								
CM90M	M_{max}	Nm	18.4	23.5	34.6	44.5	52.1							
		(lb in)	(163)	(208)	(306)	(394)	(461)							
CM90L	M_{max}	Nm	18.2	23.3	34.7	45.8	63.4	75.0						
		(lb in)	(161)	(206)	(307)	(405)	(561)	(664)						
CM112S	M_{max}	Nm	19.5	25.0	37.4	49.2	67.5	81.9						
		(lb in)	(173)	(221)	(331)	(435)	(597)	(725)						
CM112M	M_{max}	Nm		24.6	37.1	49.4	69.6	87.4	101.5	108.0				
		(lb in)		(218)	(328)	(437)	(616)	(774)	(898)	(956)				
CM112L	M_{max}	Nm			35	46.8	67.2	86.9	104.1	123.5	140.7	156.8		
		(lb in)			(310)	(414)	(595)	(769)	(921)	(1093)	(1245)	(1388)		
CM112H	M_{max}	Nm					70.9	92.5	112.1	135.5	157.7	189.4	231.6	237.0
		(lb in)					(628)	(819)	(992)	(1199)	(1396)	(1676)	(2050)	(2098)

4. Nominal speed n_N = 6000 rpm:

Motor			MOVIDRIVE® MDX61B...-5_3 (AC 400/500 V units) in the 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										
		(lb in)	(21)	(25	(32)	(34)	(31)	(34)										
DS56L	M_{max}	Nm	2.9	3.5	4.5	5.7	4.3	5.8	7.3	7.6								
		(lb in)	(26)	(31)	(40)	(50)	(38)	(51)	(65)	(67)								
DS56H	M_{max}	Nm			4.7	6.0	4.5	6.2	7.9	10.5	13.6	15.1						
		(lb in)			(42)	(53)	(40)	(55)	(70)	(93)	(120)	(134)						
CM71S	M_{max}	Nm				6.1	4.6	6.3	8.0	10.6	13.3	15.8	16.5					
		(lb in)				(54)	(41)	(56)	(71)	(94)	(118)	(140)	(146)					
CM71M	M_{max}	Nm						6.2	7.9	10.6	13.7	16.8	21.3					
		(lb in)						(55)	(70)	(94)	(121)	(149)	(189)					
CM71L	M_{max}	Nm							8.0	10.8	14.1	17.9	25.2	30.7	31.4			
		(lb in)							(71)	(96)	(125)	(158)	(223)	(272)	(278)			
CM90S	M_{max}	Nm								10.8	14.2	18.1	26.6	34.2	39.4			
		(lb in)								(96)	(126)	(160)	(235)	(303)	(349)			
CM90M	M_{max}	Nm									13.7	17.5	26.1	34.3	46.9	51.9		
		(lb in)									(121)	(155)	(231)	(304)	(415)	(459)		
CM90L	M_{max}	Nm										17.1	25.6	33.9	48.0	60.9	71.3	75.2
		(lb in)										(151)	(227)	(300)	(425)	(539)	(631)	(666)

9.7.5 DS/CM motor selection (line AC 230 V)

Nominal speed n_N = 2000 rpm:

Motor			MOVIDRIVE® MDX61B...-2_3 (AC 230 V units) in the SERVO operating modes (P700)								
			0015	0022	0037	0055	0075	0110	0150	0220	0300
CM71S	M_{max}	Nm	12.9	14.6	16.5						
		(lb in)	(114)	(129)	(146)						
CM71M	M_{max}	Nm	13.1	15.1	21.4						
		(lb in)	(116)	(134)	(189)						
CM71L	M_{max}	Nm	14.0	16.3	25.6	31.3					
		(lb in)	(124)	(144)	(227)	(277)					
CM90S	M_{max}	Nm	13.8	16.2	26.8	38.0	39.6				
		(lb in)	(122)	(143)	(237)	(336)	(350)				
CM90M	M_{max}	Nm	13.1	15.4	25.8	38.2	48.1	52.0			
		(lb in)	(116)	(136)	(228)	(338)	(426)	(460)			
CM90L	M_{max}	Nm		15.8	26.6	40.0	51.9	70.9	74.9		
		(lb in)		(140)	(235)	(354)	(459)	(628)	(663)		
CM112S	M_{max}	Nm			28.3	42.7	55.1	74.7	81.9		
		(lb in)			(250)	(378)	(488)	(661)	(725)		
CM112M	M_{max}	Nm			27.4	41.6	54.6	76.8	94.4	108.0	
		(lb in)			(243)	(368)	(483)	(680)	(836)	(956)	
CM112L	M_{max}	Nm				41.7	55.0	79.2	100.2	139.3	156.8
		(lb in)				(369)	(487)	(701)	(887)	(1233)	(1388)
CM112H	M_{max}	Nm					56.6	82.2	105.5	153	177.9
		(lb in)					(501)	(728)	(934)	(1350)	(1575)

Nominal speed n_N = 3000 rpm:

Motor			MOVIDRIVE® MDX61B...-2_3 (AC 230 V units) in the SERVO operating modes (P700)								
			0015	0022	0037	0055	0075	0110	0150	0220	0300
DS56M	M_{max}	Nm	3.8								
		(lb in)	(34)								
DS56L	M_{max}	Nm	7.6								
		(lb in)	(67)								
DS56H	M_{max}	Nm	9.2	10.7	15.3						
		(lb in)	(81)	(95)	(135)						
CM71S	M_{max}	Nm	9.1	10.6	15.8	16.5					
		(lb in)	(81)	(94)	(140)	(146)					
CM71M	M_{max}	Nm	9.3	10.9	17.2	21.5					
		(lb in)	(82)	(97)	(152)	(190)					
CM71L	M_{max}	Nm	9.4	11.0	18.2	25.8	31.0	31.4			
		(lb in)	(83)	(97)	(161)	(228)	(274)	(278)			
CM90S	M_{max}	Nm	9.5	11.2	18.7	27.7	35.1	39.5			
		(lb in)	(84)	(99)	(166)	(245)	(311)	(350)			
CM90M	M_{max}	Nm			18.1	27.2	35.3	48.4	52.2		
		(lb in)			(160)	(241)	(312)	(428)	(462)		
CM90L	M_{max}	Nm			17.9	27.1	35.5	50.5	63.1	75.2	
		(lb in)			(158)	(240)	(314)	(447)	(558)	(666)	
CM112S	M_{max}	Nm			18.8	28.7	37.7	53.4	66.3	81.9	
		(lb in)			(166)	(254)	(334)	(473)	(587)	(725)	
CM112M	M_{max}	Nm				29.1	38.4	55.3	69.9	97.0	108.0
		(lb in)				(258)	(340)	(489)	(619)	(859)	(956)
CM112L	M_{max}	Nm					40.6	58.9	75.4	108.8	125.9
		(lb in)					(359)	(521)	(667)	(963)	(1114)
CM112H	M_{max}	Nm						58.4	75.3	111.1	131.1
		(lb in)						(517)	(666)	(983)	(1160)

Nominal speed n_N = 4500 rpm:

Motor			MOVIDRIVE® MDX61B...-2_3 (AC 230 V units) in the SERVO operating modes (P700)								
			0015	0022	0037	0055	0075	0110	0150	0220	0300
DS56M	M_{max}	Nm	3.8								
		(lb in)	(34)								
CM71S	M_{max}	Nm	6.4	7.5	12.1	16.3	16.5				
		(lb in)	(57)	(66)	(107)	(144)	(146)				
CM71M	M_{max}	Nm	6.3	7.4	12.2	17.4	21.0	21.4			
		(lb in)	(56)	(65)	(108)	(154)	(186)	(189)			
CM71L	M_{max}	Nm		7.2	12.1	17.9	22.8	29.9	31.3		
		(lb in)		(64)	(107)	(158)	(202)	(265)	(277)		
CM90S	M_{max}	Nm			12.6	19.0	24.8	34.4	39.6		
		(lb in)			(112)	(168)	(219)	(304)	(350)		
CM90M	M_{max}	Nm			12.1	18.3	24.1	34.3	42.8	52.0	
		(lb in)			(107)	(162)	(213)	(304)	(379)	(460)	
CM90L	M_{max}	Nm				17.7	23.4	33.7	42.9	61.4	70.5
		(lb in)				(157)	(207)	(298)	(380)	(543)	(624)
CM112S	M_{max}	Nm				20.0	26.5	38.2	48.6	68.3	77.7
		(lb in)				(177)	(235)	(338)	(430)	(605)	(688)
CM112M	M_{max}	Nm					24.8	36.1	46.3	67.4	78.5
		(lb in)					(219)	(320)	(410)	(597)	(695)

Nominal speed n_N = 6000 rpm:

Motor			MOVIDRIVE® MDX61B...-2_3 (AC 230 V units) in the 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			
		(lb in)	(42)	(50)	(81)	(117)	(141)	(147)			
CM71M	M_{max}	Nm	5.0	5.9	9.9	14.6	18.2	21.4			
		(lb in)	(44)	(52)	(88)	(129)	(161)	(189)			
CM71L	M_{max}	Nm			9.6	14.5	18.7	25.6	30.3	31.4	
		(lb in)			(85)	(128)	(166)	(227)	(268)	(278)	
CM90S	M_{max}	Nm			10.2	15.4	20.1	28.5	35.3	39.4	
		(lb in)			(90)	(136)	(178)	(252)	(312)	(349)	
CM90M	M_{max}	Nm				12.9	17.0	24.5	31.2	44.3	50.6
		(lb in)				(114)	(150)	(217)	(276)	(392)	(448)
CM90L	M_{max}	Nm					17.9	25.9	33.1	48.3	56.5
		(lb in)					(158)	(229)	(293)	(427)	(500)

9.7.6 Motor table CMD

Characteristic values at V_{max} = AC 400 V

n_N rpm	Motor	M_0 Nm (lb in)	I_0 A	I_{max} A	Mass moment of inertia J_M 10^{-4} kgm^2
1200	**CMD93S**	2.4 (21)	1.55	8.1	1.23
	CMD93M	4.2 (37)	2.5	16.2	2.31
	CMD93L	6.0 (50)	3.5	22.9	3.38
	CMD138S	6.7 (59	3.9	13.2	6.4
	CMD138M	12.1 (107)	5.5	25.5	11.4
	CMD138L	16.5 (146)	8	40.2	16.5
2000	**CMD138S**	6.7 (59)	7.4	25.0	6.5
	CMD138M	12.1 (107)	11.4	53.0	11.4
	CMD138L	16.5 (146)	15.1	76.0	16.5
3000	**CMD70S**	0.7 (6)	1.04	5.8	0.261
	CMD70M	1.1 (9.7)	1.36	7.9	0.45
	CMD70L	1.9 (17)	1.96	17.7	0.83
	CMD93S	2.4 (21)	2.32	12.2	1.23
	CMD93M	4.2 (37)	3.6	23.2	2.31
	CMD93L	6.0 (53)	6	39.7	3.38
4500	**CMD55S**	0.25 (2.2)	0.7	4.1	0.087
	CMD55M	0.45 (4)	0.95	6.1	0.15
	CMD55L	0.9 (8)	1.5	12.2	0.267

9.7.7 CMD motor selection (line AC 400 V)

1. Nominal speed n_N = 1200 rpm:

Motor			MOVIDRIVE® MDX61B...-5_3 (AC 400 V units) in the SERVO operating modes (P700)											
			0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110	0150
CMD93S	M_{max}	Nm (lb in)	5.8 (51)	6.7 (59)	8.1 (72)	10 (89)	7.9 (70)	10 (89)						
CMD93M	M_{max}	Nm (lb in)		8.2 (73)	10.5 (93)	13.3 (118)	10.2 (90)	13.6 (120)	16.6 (147)	20.6 (182)	22 (190)			
CMD93L	M_{max}	Nm (lb in)			10.5 (93)	13.5 (119)	10.1 (89)	14.0 (124)	17.6 (156)	23.1 (204)	28.6 (253)	33 (290)		
CMD138S	M_{max}	Nm (lb in)				12.5 (111)	9.8 (87)	12.8 (113)	15.2 (135)	17 (150)				
CMD138M	M_{max}	Nm (lb in)							21.9 (194)	27.9 (247)	33.3 (295)	37.8 (335)	39 (350)	
CMD138L	M_{max}	Nm (lb in)									36.8 (326)	45.0 (398)	59 (520)	62 (550)

2. Nominal speed n_N = 2000 rpm:

Motor			MOVIDRIVE® MDX61B...-5_3 (AC 400 V units) in the SERVO operating modes (P700)						
			0040	0055	0075	0110	0150	0220	0300
CMD138S	M_{max}	Nm (lb in)	11.9 (105)	14.7 (130)	17 (150)				
CMD138M	M_{max}	Nm (lb in)			23.7 (210)	31.8 (281)	37.2 (329)	38.8 (343)	
CMD138L	M_{max}	Nm (lb in)				37.4 (331)	47.1 (417)	59.6 (528)	62 (550)

3. Nominal speed n_N = 3000 rpm:

Motor			MOVIDRIVE® MDX61B...-5_3 (AC 400 V units) in the 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									
		(lb in)	(19)	(22)	(27)									
CMD70M	M_{max}	Nm	3.2	3.7	4.5	5.2	4.4	5						
		(lb in)	(28)	(33)	(40)	(46)	(39)	(44)						
CMD70L	M_{max}	Nm	3.8	4.5	5.8	7.4	5.7	7.6	9.1	10.6	11			
		(lb in)	(34)	(40)	(51)	(65)	(50)	(67)	(81)	(94)	(97)			
CMD93S	M_{max}	Nm		4.8	6.0	7.3	5.8	7.5	8.8	10				
		(lb in)		(42)	(53)	(65)	(51)	(66)	(78)	(86)				
CMD93M	M_{max}	Nm				9.5	7.2	9.8	12.3	15.9	19.5	22		
		(lb in)				(84)	(64)	(87)	(109)	(141)	(173)	(190)		
CMD93L	M_{max}	Nm								13.9	18.1	22.5	30.7	33
		(lb in)								(123)	(160)	(199)	(272)	(290)

4. Nominal speed n_N = 4500 rpm:

Motor			MOVIDRIVE® MDX61B...-5_3 (AC 400 V units) in the SERVO operating modes (P700)							
			0005	0008	0011	0014	0015	0022	0030	0040
CMD55S	M_{max}	Nm	1.2							
		(lb in)	(11)							
CMD55M	M_{max}	Nm	1.8	2	2.3					
		(lb in)	(16)	(18)	(20)					
CMD55L	M_{max}	Nm	2.5	2.9	3.7	4.5	3.6	4.6	5.4	6
		(lb in)	(22)	(26)	(33)	(40)	(32)	(41)	(48)	(53)

9.7.8 CMP motor table

Characteristic values at V_{max} = AC 230 V / AC 400 V

n_N	Motor	Without forced cooling fan			With forced cooling fan VR			I_{max} 1)	I_{max} 2)	Mass moment of inertia J_M	
		M_0	I_0 1)	I_0 2)	M_{0_VR}	I_{0_VR} 1)	I_{0_VR} 2)			without brake	with brake
rpm		Nm (lb in)	A	A	Nm (lb in)	A	A	A	A	10^{-4} kgm^2	
2000	**CMP71S**	6.4 (57)	3.4	-	8.7 (77)	4.6	-	17	-	3.01	3.45
	CMP71M	9.4 (83)	5	-	13.7 (121)	7.3	-	26	-	4.06	4.5
	CMP71L	13.1 (116)	6.3	-	21 (186)	10.1	-	39	-	6.16	6.6
	CMP80S	13.4 (119)	6.9	-	18.5 (164)	9.5	-	33	-	8.39	9.79
	CMP80M	18.7 (166)	9.3	-	27 (239)	13.4		48		11.5	12.9
	CMP80L	27.5 (243)	12.4	-	44 (389)	20	-	72	-	17.7	19.1
	CMP100S	25.5 (225)	13.3	-	36 (319)	18.8	-	49	-	19.3	22.2
	CMP100M	31 (274)	14.9	-	47 (416)	22.3	-	69	-	26.3	29.1
	CMP100L	47 (416)	21.8	-	70 (620)	32.5	-	113	-	40	42.8
3000	**CMP40S**	0.5 (4)	1.2	1.2	-	-		6.1	6.1	0.104	0.132
	CMP40M	0.8 (7)	0.95	1.1	-	-	-	6.0	6.9	0.148	0.176
	CMP50S	1.3 (12)	0.96	1.64	1.7 (15)	1.25	-	5.1	9.8	0.415	0.481
	CMP50M	2.4 (21)	1.68	2.84	3.5 (31)	2.45		9.6	17.1	0.667	0.733
	CMP50L	3.3 (29)	2.2	3.84	4.8 (42)	3.2	-	13.6	23.1	0.919	0.985
	CMP63S	2.9 (26)	2.15	3.61	4 (35)	3	-	12.9	21.7	1.15	1.49
	CMP63M	5.3 (47)	3.6	6.35	7.5 (66)	5.1		21.6	38.1	1.92	2.26
	CMP63L	7.1 (63)	4.95	8.76	10.3 (91)	7.2	-	29.7	52.6	2.69	3.03
	CMP71S	6.4 (57)	4.9	8.7	8.7 (77)	6.7	11.8	25	44	3.01	3.45
	CMP71M	9.4 (83)	7.5	13.1	13.7 (121)	10.9	19.1	39	68	4.06	4.5
	CMP71L	13.1 (116)	9.4	16.8	21 (186)	15.1	27	58	103	6.16	6.6
	CMP80S	13.4 (119)	10	17.7	18.5 (164)	13.8	24.5	47	83	8.39	9.79
	CMP80M	18.7 (166)	13.4	23.5	27 (239)	19.3	34	69	121	11.5	12.9
	CMP80L	27.5 (243)	18.7	32.5	44 (389)	30	52	107	186	17.7	19.1
	CMP100S	25.5 (225)	19.6	34.2	36 (319)	27.5	-	73	127	19.3	22.2
	CMP100M	31 (274)	21.8	40	47 (416)	33	-	102	187	26.3	29.1
	CMP100L	47 (416)	32.3	58.1	70 (620)	48		167		40	42.8
4500	**CMP40S**	0.5 (4)	1.2	1.2	-	-	-	6.1	6.1	0.104	0.132
	CMP40M	0.8 (7)	0.95	1.5	-	-	-	6	9	0.148	0.176
	CMP50S	1.3 (12)	1.32	2.29	1.7 (15)	1.7		7	13.8	0.415	0.481
	CMP50M	2.4 (21)	2.3	4.025	3.5 (31)	3.35	-	13.1	24.2	0.667	0.733
	CMP50L	3.3 (29)	3.15	5.53	4.8 (42)	4.6	-	19.5	33.2	0.919	0.985
	CMP63S	2.9 (26)	3.05	5.25	4 (35)	4.2		18.3	31.5	1.15	1.49
	CMP63M	5.3 (47)	5.4	9.78	7.5 (66)	7.6	-	32.4	58.7	1.92	2.26
	CMP63L	7.1 (63)	6.9	12.0	10.3 (91)	10	-	41.4	72.1	2.69	3.03
	CMP71S 3)	6.4 (57)	7.3	12.8	8.7 (77)	9.9	17.4	38	67	3.01	3.45
	CMP71M 3)	9.4 (83)	10.9	19.2	13.7 (121)	15.9	28	57	101	4.06	4.5
	CMP71L 3)	13.1 (116)	14.1	25.6	21 (186)	22.5	-	87	-	6.16	6.6
	CMP80S 3)	13.4 (119)	15.3	27	18.5 (164)	21	37	73	129	8.39	9.79
	CMP80M 3)	18.7 (166)	20.1	35	27 (239)	29	51	103	180	11.5	12.9
	CMP80L 3)	27.5 (243)	27.8	49.9	44 (389)	44.5	-	159	-	17.7	19.1
	CMP100S 3)	25.5 (225)	29.9	54.5	36 (319)	42.5	-	111	200	19.3	22.2
	CMP100M 3)	31 (274)	33.1	60	47 (416)	50	-	154	-	26.3	29.1
	CMP100L 3)	47 (416)	48.4		70 (620)	72	-	251	-	40	42.8

n_N	Motor	Without forced cooling fan			With forced cooling fan VR			I_{max} 1)	I_{max} 2)	Mass moment of inertia J_M	
		M_0	I_0 1)	I_0 2)	M_{0_VR}	I_{0_VR} 1)	I_{0_VR} 2)			without brake	with brake
rpm		Nm (lb in)	A	A	Nm (lb in)	A	A	A	A	10^{-4} kgm^2	
6000	**CMP40S** 3)	0.5 (4)	1.2	1.36	-	-	-	6.1	6.8	0.104	0.132
	CMP40M 3)	0.8 (7)	1.1	1.91	-	-	-	6.9	11.5	0.148	0.176
	CMP50S 3)	1.3 (12)	1.7	3.07	1.7 (15)	2.2	-	9	18.5	0.415	0.481
	CMP50M 3)	2.4 (21)	3	5.25	3.5 (31)	4.4	-	17.1	31.5	0.667	0.733
	CMP50L 3)	3.3 (29)	4.2	7.6	4.8 (42)	6.1	-	26	45.4	0.919	0.985
	CMP63S 3)	2.9 (26)	3.9	6.78	4 (35)	5.4	-	23.4	40.7	1.15	1.49
	CMP63M 3)	5.3 (47)	6.9	12.06	7.5 (66)	9.8	-	41.4	72.4	1.92	2.26
	CMP63L 3)	7.1 (63)	9.3		10.3 (91)	13.5	-	55.8	-	2.69	3.03
	CMP71S 3)	6.4 (57)	9.6	17	8.7 (77)	13.1	23	50	89	3.01	3.45
	CMP71M 3)	9.4 (83)	14.7	26.3	13.7 (121)	21.5	-	76	-	4.06	4.5
	CMP71L 3)	13.1 (116)	18.8		21 (186)	30	-	115	-	6.16	6.6
	CMP80S 3)	13.4 (119)	20	35.5	18.5 (164)	27.5	48.5	95	168	8.39	9.79
	CMP80M 3)	18.7 (166)	26.4	46.9	27 (239)	38	-	135		11.5	12.9
	CMP80L 3)	27.5 (243)	37.6	68	44 (389)	60	-	215	-	17.7	19.1

1) For synchronous servomotors with AC 400 V system voltage

2) For synchronous servomotors with AC 230 V system voltage

3) Due to the high output frequency, the following motors must be operated with a PWM frequency of at least 8 kHz (P864):

9.7.9 CMP motor selection (line AC 400 V)

Nominal speed n_N = 2000 rpm:

Assignment of MOVIDRIVE® MDX61B0005-5_3 - MDX61B0110-5_3 (sizes 0 - 2):

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
CMP71S	M_{max}	Nm	6.5	7.6	9.6	11.8	9.3	12.1	14.4	17.1	18.0		
		(lb in)	(58)	(67)	(85)	(104)	(82)	(107)	(127)	(151)	(159)		
CMP71M	M_{max}	Nm			9.6	12.3	9.4	12.7	15.7	20.1	24.2	27.4	
		(lb in)			(85)	(109)	(83)	(112)	(139)	(178)	(214)	(243)	
CMP71L	M_{max}	Nm				13.6	10.2	14.1	17.8	23.7	30.0	36.1	41.1
		(lb in)				(120)	(90)	(125)	(158)	(210)	(266)	(320)	(364)
CMP80S	M_{max}	Nm				12.7	9.5	13.2	16.9	22.7	28.7	34.0	39.3
		(lb in)				(112)	(84)	(116)	(149)	(201)	(254)	(301)	(348)
CMP80M	M_{max}	Nm						13.9	17.7	23.8	30.8	38.2	51.1
		(lb in)						(123)	(157)	(211)	(273)	(337)	(452)
CMP80L	M_{max}	Nm							19.3	26.1	34.0	43.0	61.7
		(lb in)							(171)	(231)	(301)	(381)	(546)
CMP100S	M_{max}	Nm							17.0	23.0	30.0	37.6	52.2
		(lb in)							(150)	(204)	(266)	(333)	(462)
CMP100M	M_{max}	Nm								24.7	32.5	41.5	60.7
		(lb in)								(219)	(288)	(367)	(537)
CMP100L	M_{max}	Nm									34.0	43.5	64.8
		(lb in)									(301)	(385)	(574)

Assignment of MOVIDRIVE® MDX61B0150-5_3 - MDX61B1320-5_3 (sizes 3 - 6):

Motor			MOVIDRIVE® MDX61B...-5_3 (AC 400 V units) in SERVO operating modes (P700)									
			0150	0220	0300	0370	0450	0550	0750	0900	1100	1320
CMP80M	M_{max}	Nm	57.0									
		(lb in)	(504)									
CMP80L	M_{max}	Nm	77.5	89.4								
		(lb in)	(686)	(791)								
CMP100S	M_{max}	Nm	62.2	68.1								
		(lb in)	(551)	(603)								
CMP100M	M_{max}	Nm	77.2	98.1	100.0							
		(lb in)	(683)	(868)	(885)							
CMP100L	M_{max}	Nm	85.1	116.6	142.0	155.9						
		(lb in)	(753)	(1032)	(1257)	(1380)						

Nominal speed n_N = 3000 rpm:

Assignment of MOVIDRIVE® MDX61B0005-5_3 - MDX61B0110-5_3 (sizes 0 - 2):

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	1.9			1.9						
		(lb in)	(13)	(17)			(17)						
CMP40M	M_{max}	Nm	3.0	3.4	3.8		3.8						
		(lb in)	(27)	(30)	(34)		(3.4)						
CMP50S	M_{max}	Nm	4.5	5.0	5.2		5.2						
		(lb in)	(40)	(44)	(46)		(46)						
CMP50M	M_{max}	Nm	5.4	6.3	7.7	9.3	7.6	9.4	10.3				
		(lb in)	(48)	(56)	(68)	(82)	(67)	(83)	(91)				
CMP50L	M_{max}	Nm	5.9	7.0	8.8	10.8	8.5	11.1	13.2	15.4			
		(lb in)	(52)	(62)	(78)	(95)	(75)	(98)	(117)	(136)			
CMP63S	M_{max}	Nm	5.2	6.0	7.2	8.6	7.1	8.8	10.1	11.1			
		(lb in)	(46)	(53)	(64)	(76)	(63)	(78)	(89)	(98)			
CMP63M	M_{max}	Nm	6.1	7.1	9.0	11.1	8.7	11.4	13.8	17.0	20.0	21.4	
		(lb in)	(54)	(63)	(80)	(98)	(77)	(101)	(122)	(150)	(177)	(189)	
CMP63L	M_{max}	Nm			9.0	11.4	8.7	11.7	14.5	18.7	23.0	27.1	30.4
		(lb in)			(80)	(101	(77)	(103)	(127)	(166)	(204)	(240)	(269)
CMP71S	M_{max}	Nm			6.9	8.6	6.7	8.9	10.9	13.8	16.3	18.0	
		(lb in)			(61)	(76)	(59)	(79)	(96)	(122)	(144)	(159)	
CMP71M	M_{max}	Nm				8.4	6.4	8.7	10.9	14.5	18.3	22	27.5
		(lb in)				(74)	(57)	(77)	(96)	(128)	(162)	(195)	(243)
CMP71L	M_{max}	Nm						9.5	12.1	16.3	21.2	26.5	36.3
		(lb in)						(84)	(107)	(144)	(187)	(235)	(321)
CMP80S	M_{max}	Nm						8.9	11.5	15.7	20.6	25.8	34.6
		(lb in)						(79)	(102)	(139)	(182)	(228)	(306)
CMP80M	M_{max}	Nm							12.3	16.6	21.8	27.6	39.4
		(lb in)							(109)	(148)	(193)	(244)	(349)
CMP80L	M_{max}	Nm								17.3	22.7	28.9	42.6
		(lb in)								(153)	(201)	(256)	(377)
CMP100S	M_{max}	Nm									20.5	26.2	38.2
		(lb in)									(181)	(232)	(338)
CMP100M	M_{max}	Nm									22.2	28.5	42.5
		(lb in)									(196)	(252)	(377)
CMP100L	M_{max}	Nm											44.0
		(lb in)											(389)

Assignment of MOVIDRIVE® MDX61B0150-5_3 - MDX61B1320-5_3 (sizes 3 - 6):

Motor			MOVIDRIVE® MDX61B...-5_3 (AC 400 V units) in SERVO operating modes (P700)									
			0150	0220	0300	0370	0450	0550	0750	0900	1100	1320
CMP71L	M_{max}	Nm (lb in)	41.1 (364)									
CMP80S	M_{max}	Nm (lb in)	39.3 (348)									
CMP80M	M_{max}	Nm (lb in)	48.8 (432)	57.0 (504)								
CMP80L	M_{max}	Nm (lb in)	55.4 (490)	74.6 (660)	89.3 (790)							
CMP100S	M_{max}	Nm (lb in)	48.5 (429)	61.4 (543)	68.3 (605)							
CMP100M	M_{max}	Nm (lb in)	56.0 (496)	76.3 (675)	92.0 (814)	100.2 (887)						
CMP100L	M_{max}	Nm (lb in)	58.5 (518)	82.7 (732)	104.9 (928)	123.1 (1090)	142.1 (1257)	155.9 (1380)				

Nominal speed n_N = 4500 rpm:

Assignment of MOVIDRIVE® MDX61B0005-5_3 - MDX61B0110-5_3 (sizes 0 - 2):

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 (lb in)	1.5 (13)	1.7 (15)	1.9 (17)		1.9 (17)	1.9 (17)					
CMP40M	M_{max} Nm (lb in)	3.0 (27)	3.4 (30)	3.8 (34)		3.8 (34)						
CMP50S	M_{max} Nm (lb in)	3.5 (31)	4.1 (36)	4.8 (42)	5.2 (46)	4.7 (42)	5.2 (46)					
CMP50M	M_{max} Nm (lb in)	4.2 (36)	4.8 (42)	6.1 (53)	7.4 (65)	5.9 (52)	7.6 (67)	9.0 (80)	10.3 (91)			
CMP50L	M_{max} Nm (lb in)	4.2 (37)	5.0 (44)	6.3 (56)	7.9 (70)	6.1 (54)	8.2 (73)	10.0 (89)	12.7 (112)	15.1 (134)	15.4 (136)	
CMP63S	M_{max} Nm (lb in)	3.8 (34)	4.5 (40)	5.6 (50)	6.8 (60)	5.4 (48)	6.9 (61)	8.2 (73)	9.9 (88)	11.1 (98)		
CMP63M	M_{max} Nm (lb in)			6.3 (56)	7.9 (70)	6.1 (54)	8.1 (72)	10.0 (89)	12.8 (113)	15.7 (139)	18.3 (162)	21.4 (189)
CMP63L	M_{max} Nm (lb in)				8.3 (73)	6.3 (56)	8.6 (76)	10.7 (95)	14.0 (124)	17.7 (157)	21.5 (190)	28.2 (250)
CMP71S[1)]	M_{max} Nm (lb in)				6.0 (53)	4.6 (41)	6.2 (55)	7.7 (68)	10.1 (89)	12.5 (111)	14.9 (132)	17.9 (158)
CMP71M[1)]	M_{max} Nm (lb in)						6.0 (53)	7.6 (67)	10.2 (90)	13.1 (116)	16.4 (145)	22.4 (198)
CMP71L[1)]	M_{max} Nm (lb in)								10.9 (96)	14.4 (127)	18.3 (162)	26.5 (235)
CMP80S[1)]	M_{max} Nm (lb in)								10.1 (89)	13.4 (119)	17.3 (153)	25.3 (224)
CMP80M[1)]	M_{max} Nm (lb in)									14.6 (129)	18.6 (165)	27.6 (244)
CMP80L[1)]	M_{max} Nm (lb in)										19.6 (173)	29.2 (258)
CMP100S[1)]	M_{max} Nm (lb in)										17.2 (152)	25.7 (227)
CMP100M[1)]	M_{max} Nm (lb in)											28.2 (250)

1) Due to the high output frequency, the following motors must be operated with a PWM frequency of at least 8 kHz (P864).

Assignment of MOVIDRIVE® MDX61B0150-5_3 - MDX61B1320-5_3 (sizes 3 - 6):

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400 V units) in SERVO operating modes (P700)									
		0150	0220	0300	0370	0450	0550	0750	0900	1100	1320
CMP63L	M_{max} Nm (lb in)	30.4 (269)									
CMP71S[1)]	M_{max} Nm (lb in)										
CMP71M[1)]	M_{max} Nm (lb in)	26.4 (234)	27.4 (243)								
CMP71L[1)]	M_{max} Nm (lb in)	33.3 (295)	41.1 (364)								
CMP80S[1)]	M_{max} Nm (lb in)	31.7 (281)	38.3 (339)	39.2 (347)							
CMP80M[1)]	M_{max} Nm (lb in)	35.7 (316)	47.3 (419)	55.2 (489)	56.9 (504)						
CMP80L[1)]	M_{max} Nm (lb in)	38.5 (341)	53.8 (476)	67.4 (597)	78.3 (693)	89.3 (790)					
CMP100S[1)]	M_{max} Nm (lb in)	33.8 (299)	46.3 (410)	56.1 (497)	62.6 (554)	68.3 (605)					

Motor		MOVIDRIVE® MDX61B...-5_3 (AC 400 V units) in SERVO operating modes (P700)									
		0150	0220	0300	0370	0450	0550	0750	0900	1100	1320
CMP100M[1)]	M_{max} Nm (lb in)	37.6 (333)	53.3 (472)	67.5 (597)	79.0 (699)	90.7 (803)	99.8 (883)	100.2 (887)			
CMP100L[1)]	M_{max} Nm (lb in)	39.1 (346)	56.1 (497)	72.6 (643)	87.1 (771)	103.9 (920)	119.2 (1055)	139.6 (1236)	155.8 (1379)		

1) Due to the high output frequency, the following motors must be operated with a PWM frequency of at least 8 kHz (P864).

Nominal speed n_N = 6000 rpm:

Assignment of MOVIDRIVE® MDX61B0005-5_3 - MDX61B0110-5_3 (sizes 0 - 2):

Motor[1)]		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 (lb in)	1.5 (13	1.7 (15)	1.9 (17)		1.9 (17)	1.9 (17)					
CMP40M	M_{max} Nm (lb in)	2.6 (23)	3.0 (27)	3.6 (32)	3.8 (34)	3.5 (31)	3.8 (34)					
CMP50S	M_{max} Nm (lb in)	2.9 (26)	3.3 (29)	4.1 (36)	4.8 (42)	4.0 (35)	4.9 (43)	5.2 (46)				
CMP50M	M_{max} Nm (lb in)	3.2 (28)	3.8 (34)	4.8 (42)	6.0 (54)	4.6 (41)	6.1 (54)	7.4 (65)	9.2 (81)	10.3 (91)		
CMP50L	M_{max} Nm (lb in)		3.8 (34)	4.8 (42)	6.1 (54)	4.7 (42)	6.3 (56)	7.8 (69)	10.2 (90)	12.5 (111)	14.7 (130)	15.4 (136)
CMP63S	M_{max} Nm (lb in)	3.1 (27)	3.6 (32)	4.5 (40)	5.6 (50)	4.4 (39)	5.8 (51)	6.9 (61)	8.6 (76)	10.0 (89)	11.1 (98)	
CMP63M	M_{max} Nm (lb in)				6.3 (56)	4.8 (42)	6.5 (58)	8.0 (71)	10.4 (92)	13.0 (115)	15.6 (138)	20.0 (177)
CMP63L	M_{max} [Nm (lb in)						6.5 (58)	8.1 (72)	10.8 (96)	13.8 (122)	17.0 (150)	23.3 (206)
CMP71S	M_{max} Nm (lb in)						4.8 (42)	6.0 (53)	8.0 (71)	10.1 (89)	12.3 (109)	16.1 (143)
CMP71M	M_{max} Nm (lb in)								7.7 (68)	10.0 (89)	12.6 (112)	18.0 (159)
CMP71L	M_{max} Nm (lb in)								8.2 (73)	10.8 (96)	13.8 (122)	20.4 (181)
CMP80S	M_{max} Nm (lb in)									10.2 (90)	13.2 (117)	19.8 (175)
CMP80M	M_{max} Nm (lb in)										14.2 (126)	21.3 (189)
CMP80L	M_{max} Nm (lb in)											21.8 (193)

1) At a nominal speed of n_N= 6000 rpm, the motors must be operated with a minimum PWM frequency of 8 kHz due to the high output frequency.

Assignment of MOVIDRIVE® MDX61B0150-5_3 - MDX61B1320-5_3 (sizes 3 - 6):

Motor[1)]		MOVIDRIVE® MDX61B...-5_3 (AC 400 V units) in SERVO operating modes (P700)									
		0150	0220	0300	0370	0450	0550	0750	0900	1100	1320
CMP63M	M_{max} Nm (lb in)	21.4 (189)									
CMP63L	M_{max} Nm (lb in)	28.1 (249)	30.4 (269)								
CMP71S	M_{max} Nm (lb in)	18.0 (159)									
CMP71M	M_{max} Nm (lb in)	22.3 (196)	27.3 (242)	27.5 (243)							
CMP71L	M_{max} Nm (lb in)	26.5 (235)	35.3 (312)	41.2 (365)	41.2 (365)						

Motor[1)]		MOVIDRIVE® MDX61B...-5_3 (AC 400 V units) in SERVO operating modes (P700)									
		0150	0220	0300	0370	0450	0550	0750	0900	1100	1320
CMP80S	M_{max} Nm (lb in)	25.8 (228)	33.7 (298)	38.3 (339)	39.2 (347)						
CMP80M	M_{max} Nm (lb in)	28.9 (256)	38.5 (341)	47.1 (417)	53.1 (470)	57.0 (504)					
CMP80L	M_{max} Nm (lb in)	28.9 (256)	41.0 (363)	52.3 (463)	62.0 (549)	72.8 (644)	61.9 (548)	82.1 (727)	89.5 (792)		

1) At a nominal speed of n_N= 6000 rpm, the motors must be operated with a minimum PWM frequency of 8 kHz due to the high output frequency.

9.7.10 CMP motor selection (line AC 230 V)

Nominal speed n_N = 3000 rpm:

Motor			MOVIDRIVE® MDX61B...-2_3 (AC 230 V units) in the SERVO operating modes (P700)								
			0015	0022	0037	0055	0075	0110	0150	0220	0300
CMP40S	M_{max}	Nm	1.9								
		(lb in)	(16.8)								
CMP40M	M_{max}	Nm	3.8								
		(lb in)	(33.7)								
CMP50S	M_{max}	Nm	5.2								
		(lb in)	(46.1)								
CMP50M	M_{max}	Nm	8.0	9.0	10.3						
		(lb in)	(71.1)	(79.8)	(91.2)						
CMP50L	M_{max}	Nm	8.8	10.1	14.6	15.4					
		(lb in)	(77.7)	(89.5)	(129)	(136)					
CMP63S	M_{max}	Nm	7.5	8.4	11.1						
		(lb in)	(66.8)	(74.7)	(98.3)						
CMP63M	M_{max}	Nm	9.0	10.3	15.5	20.0	21.4				
		(lb in)	(79.7)	(91.2)	(137)	(177)	(190)				
CMP63L	M_{max}	Nm	8.9	10.4	16.4	22.8	27.4	30.3	30.4		
		(lb in)	(78.9)	(92.1)	(145)	(202)	(243)	(268)	(269)		
CMP71S	M_{max}	Nm	6.9	8.0	12.3	16.2	18.0				
		(lb in)	(61.2)	(71.0)	(109)	(143)	(159)				
CMP71M	M_{max}	Nm	6.6	7.8	12.8	18.4	22.5	27.5			
		(lb in)	(58.4)	(68.6)	(113)	(163)	(199)	(243)			
CMP71L	M_{max}	Nm		8.3	14.0	21.0	26.9	35.9	41.3		
		(lb in)		(73.5)	(124)	(186)	(238)	(316)	(366)		
CMP80S	M_{max}	Nm			13.5	20.5	26.3	34.4	38.6	39.2	
		(lb in)			(119)	(181)	(233)	(305)	(342)	(347)	
CMP80M	M_{max}	Nm			14.5	21.9	28.5	39.4	47.5	57.0	
		(lb in)			(128)	(194)	(252)	(349)	(421)	(505)	
CMP80L	M_{max}	Nm				23.0	30.1	42.9	53.9	74.6	84.3
		(lb in)				(204)	(266)	(380)	(477)	(660)	(746)

Nominal speed n_N = 4500 rpm:

Motor			MOVIDRIVE® MDX61B...-2_3 (AC 230 V units) in the SERVO operating modes (P700)								
			0015	**0022**	**0037**	**0055**	**0075**	**0110**	**0150**	**0220**	**0300**
CMP40S	M_{max}	Nm	1.9								
		(lb in)	(16.8)								
CMP40M	M_{max}	Nm	3.8								
		(lb in)	(33.6)								
CMP50S	M_{max}	Nm	4.9	5.3	5.2						
		(lb in)	(43.4)	(46.9)	(46.0)						
CMP50M	M_{max}	Nm	6.1	7.0	10.0	10.3					
		(lb in)	(54.0)	(62.0)	(88.5)	(91.2)					
CMP50L	M_{max}	Nm	6.3	7.4	11.4	15.1	15.4				
		(lb in)	(55.8)	(65.5)	(100.9)	(133.6)	(136.3)				
CMP63S	M_{max}	Nm	5.7	6.5	9.2	11.1					
		(lb in)	(50.4)	(57.5)	(81.4)	(98.2)					
CMP63M	M_{max}	Nm	6.1	7.1	11.2	15.4	18.4	21.4			
		(lb in)	(54.0)	(62.8)	(99.1)	(136.3)	(162.9)	(189.4)			
CMP63L	M_{max}	Nm	6.6	7.7	12.5	17.9	22.2	28.3	30.4		
		(lb in)	(58.4)	(68.2)	(110.6)	(158.4)	(196.5)	(250.5)	(269.1)		
CMP71S[1)]	M_{max}	Nm	4.7	5.5	8.9	12.5	15.2	17.9			
		(lb in)	(41.6)	(48.7)	(78.8)	(110.6)	(134.5)	(158.4)			
CMP71M[1)]	M_{max}	Nm			8.9	13.1	16.7	22.3	25.8	27.4	
		(lb in)			(78.8)	(115.9)	(147.8)	(197.4)	(228.3)	(242.5)	
CMP80S[1)]	M_{max}	Nm			8.7	13.4	17.7	25.1	30.7	38.1	39.2
		(lb in)			(77.0)	(118.6)	(156.7)	(222.2)	(271.7)	(337.2)	(346.9)
CMP80M[1)]	M_{max}	Nm				14.7	19.3	27.6	34.6	47.1	52.4
		(lb in)				(130.1)	(170.8)	(244.3)	(306.2)	(416.9)	(463.8)

1) Due to the high output frequency, the following motors must be operated with a PWM frequency of at least 8 kHz (P864).

Nominal speed n_N = 6000 rpm:

Motor[1)]			MOVIDRIVE® MDX61B...-2_3 (AC 230 V units) in the SERVO operating modes (P700)								
			0015	**0022**	**0037**	**0055**	**0075**	**0110**	**0150**	**0220**	**0300**
CMP40S	M_{max}	Nm	1.9								
		(lb in)	(16.8)								
CMP40M	M_{max}	Nm	3.6	3.8							
		(lb in)	(31.9)	(33.6)							
CMP50S	M_{max}	Nm	4.0	4.5	5.2						
		(lb in)	(35.4)	(39.8)	(46.0)						
CMP50M	M_{max}	Nm	4.8	5.6	8.5	10.3					
		(lb in)	(42.5)	(49.6)	(75.2)	(91.2)					
CMP50L	M_{max}	Nm	4.7	5.5	8.8	12.3	14.8	15.4			
		(lb in)	(41.6)	(48.7)	(77.9)	(108.9)	(131.0)	(136.3)			
CMP63S	M_{max}	Nm	4.6	5.3	7.8	10.1	11.1				
		(lb in)	(40.7)	(46.9)	(69.0)	(89.4)	(98.2)				
CMP63M	M_{max}	Nm	5.0	5.9	9.4	13.1	16.1	20.1	21.4		
		(lb in)	(44.3)	(52.2)	(83.2)	(115.9)	(142.5)	(177.9)	(189.4)		
CMP71S	M_{max}	Nm		4.3	7.0	10.1	12.5	16.0	17.9	18.0	
		(lb in)		(38.1)	(62.0)	(89.4)	(110.6)	(141.6)	(158.4)	(159.3)	
CMP80S	M_{max}	Nm				10.1	13.5	19.6	24.7	33.4	36.6
		(lb in)				(89.4)	(119.5)	(173.5)	(218.6)	(295.6)	(323.9)

1) At a nominal speed of n_N= 6000 rpm, the motors must be operated with a minimum PWM frequency of 8 kHz due to the high output frequency.

9.8 SL2 synchronous linear motors

INFORMATION

For detailed information on SL2 synchronous linear motors, refer to the operating instructions and the catalog "SL2 Synchronous Linear Motors". The documents are available for download from the homepage of SEW-EURODRIVE.

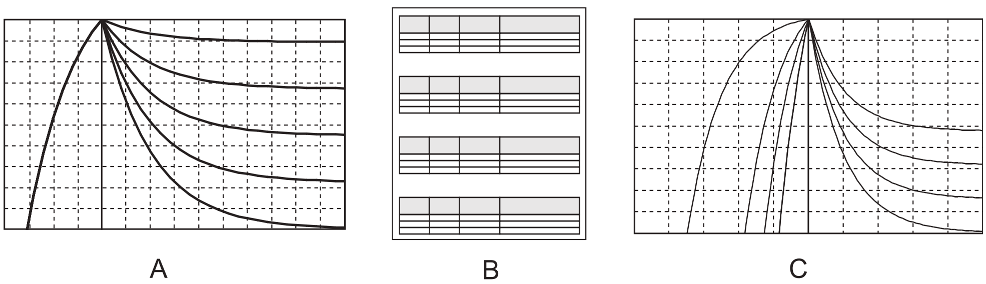
9.9 Overload capacity of the inverter

MOVIDRIVE® inverters permanently calculate the load on the inverter output stage (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 (see section "Heat sink time constant")

9.9.1 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. Determining the overload capacity in the characterized time range (→ following figure):
   - Minutes: Overload diagrams (A) → (page 410)
   - Seconds: Tables and formulas (B) → (page 426)
   - Fraction of a second: Overload diagrams (C) → (page 429)



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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	7
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	1.2 min = 72 s

9.9.2 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 the overload time t_1, the value is just below the critical heat sink temperature.
- 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.

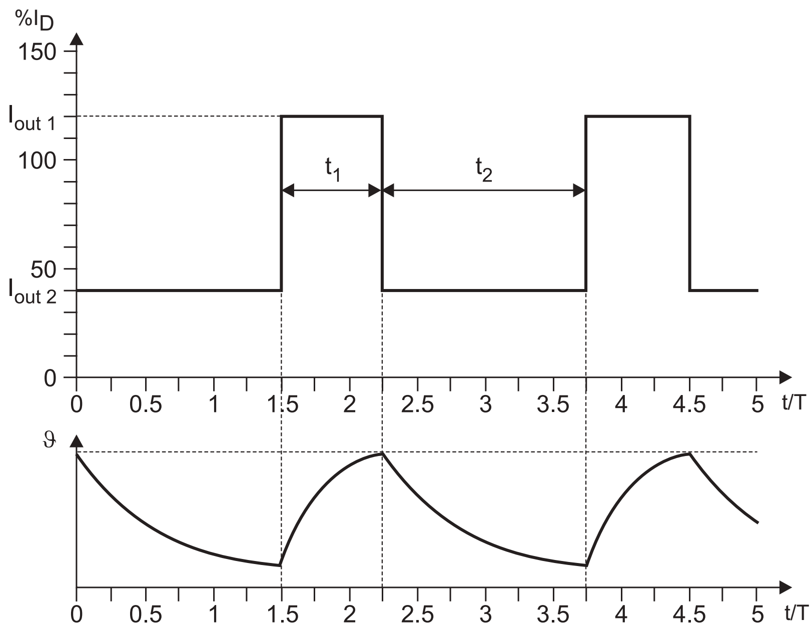
The following figure gives an example of such a load cycle. The temperature profiles of the heat sink for the overload time t_1 and the low-load time t_2 are shown under the load cycle. If you arrange the temperature profiles as shown in the following figure, you can check whether the overload limit is being 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 × T
- Low-load time t_2 = 1.5 × T

The following figure gives an example of a load cycle.



2930855051

9.9.3 Continuous output current

The thermal model of MOVIDRIVE® 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 ϑ_{amb} and the output frequency f_A.

It is particularly important to take output frequencies f_A < 2 Hz into account for:

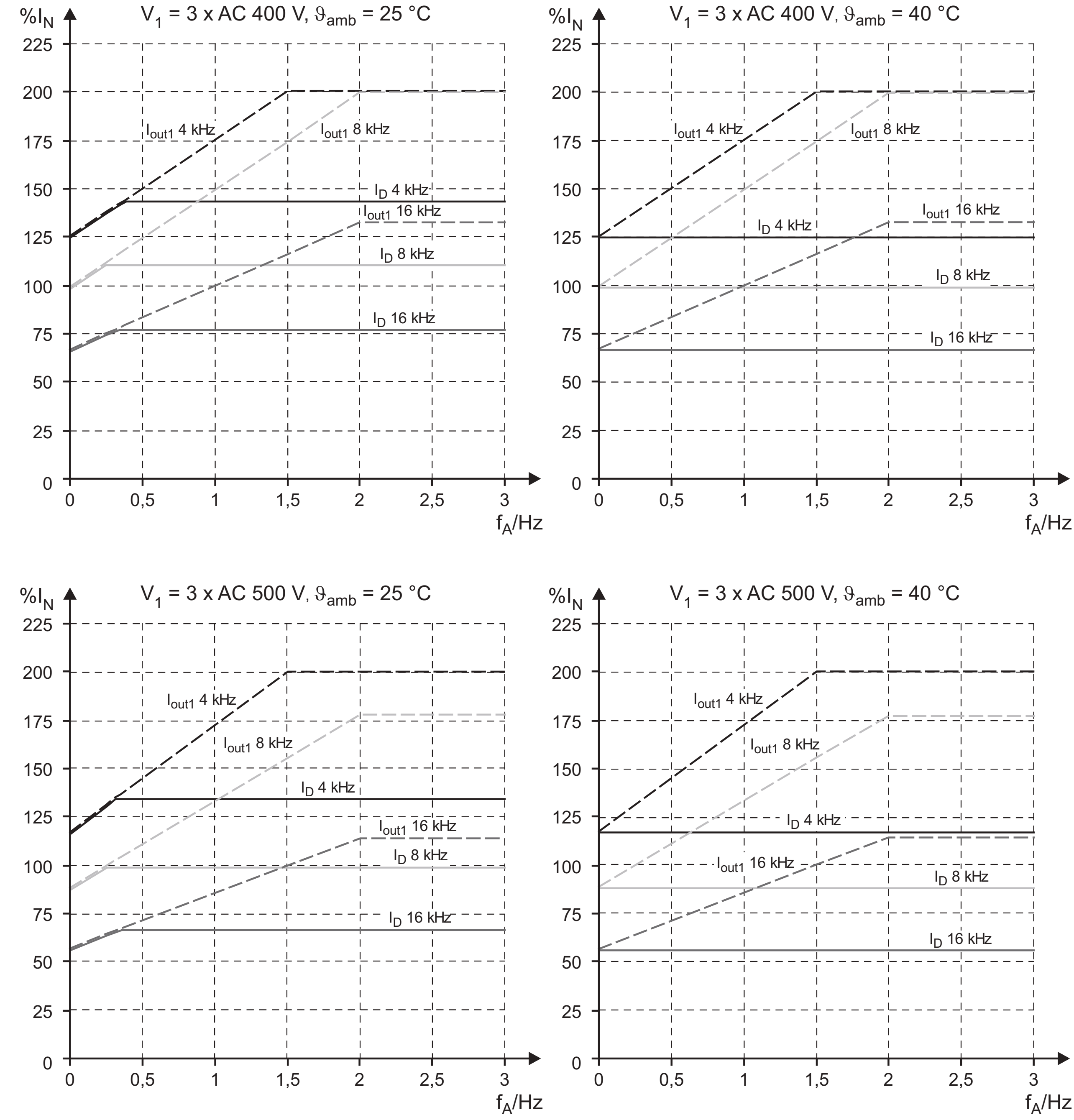
- Electrically stopping hoists.
- Torque control at low speeds or at a standstill

INFORMATION

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.

MDX60B / 61B, size 0: Guaranteed continuous output currents I_D depending on the output frequency f_A

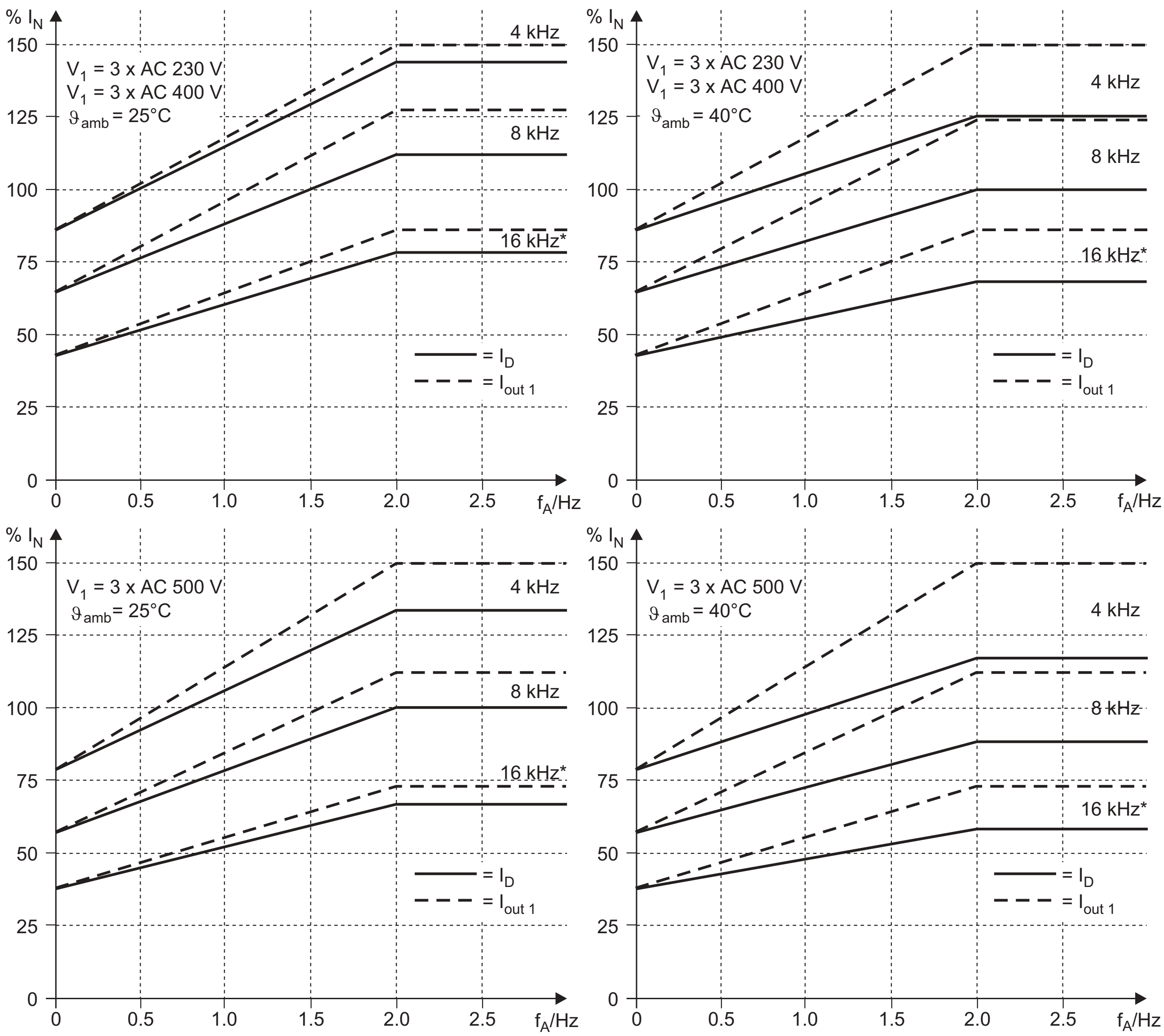
Continuous output currents I_D for MOVIDRIVE® MDX60B / 61B, size 0



2932189963

ϑ_{amb}	= Ambient temperature	I_D	= Continuous inverter output current
V_1	= Line voltage	$I_{out\ 1}$	= Limited overload current of the inverter
f_o	= Inverter output frequency	I_N	= Rated output current of inverter according to technical data

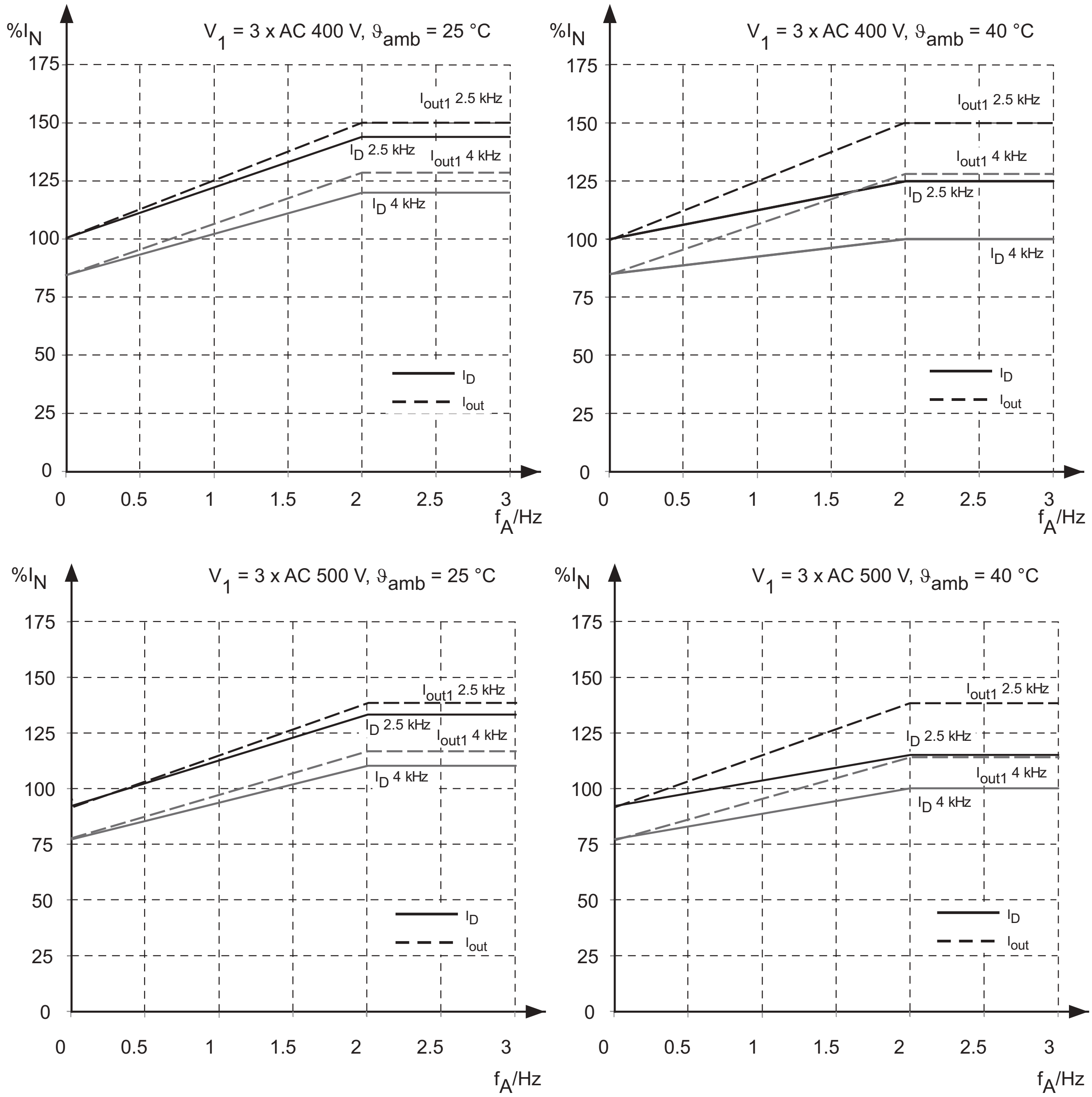
MDX61B, sizes 1 - 6: Guaranteed continuous output currents I_D depending on the output frequency f_A



Continuous output currents I_D for MOVIDRIVE® MDX61B, sizes 1 - 6 (* f_{PWM} = 16 kHz only for sizes 1 - 5)

ϑ_{amb}	= Ambient temperature	I_D	= Continuous inverter output current
V_1	= Line voltage	$I_{out\ 1}$	= Limited overload current of the inverter
f_o	= Inverter output frequency	I_N	= Rated output current of inverter according to technical data
f_{PWM}	= PWM frequency (P860, P861)		

MDX61B size 7: Guaranteed continuous output currents I_D depending on the output frequency f_A



2643041931

ϑ_{amb}	= Ambient temperature	I_D	= Continuous inverter output current
V_1	= Line voltage	$I_{out\ 1}$	= Limited overload current of the inverter
f_o	= Inverter output frequency	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 F/f modes and "P862/P863 PWM fix 1/2" is set to 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. The inverter reacts to a higher than permitted load with the "F44 Unit utilization" fault message and an immediate switch-off.

Temperature-controlled fan

The fans of the power section heat sink are subject to temperature-control. The fan is not switched on until above a heat sink temperature of ϑ = 45 °C.

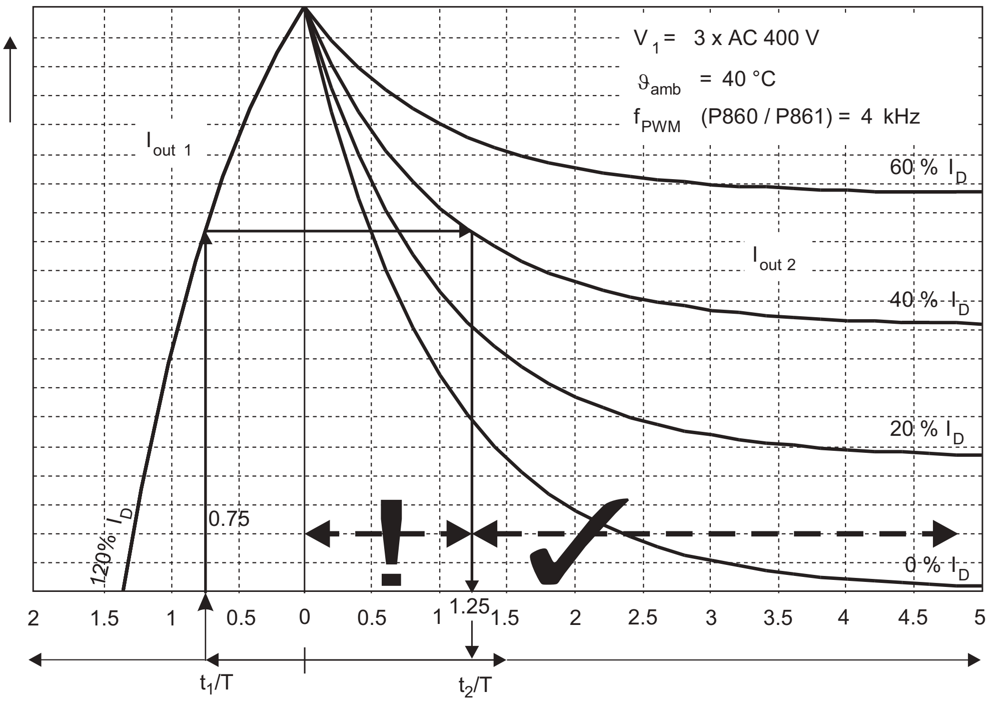
9.9.4 Overload capacity in the minute range

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 $t_1 \geq 0.25 \times T$:



2932198411

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_{out1} 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, the overload capacity (see figure) is determined as follows:

- When overload time $t_1 = 0.75 \times T$ vertically upwards until the intersection with $I_{out\ 1}$.
- Horizontally to the right up to the 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_{out2} are permitted (√); all times t_2 to the left are not permitted (!).

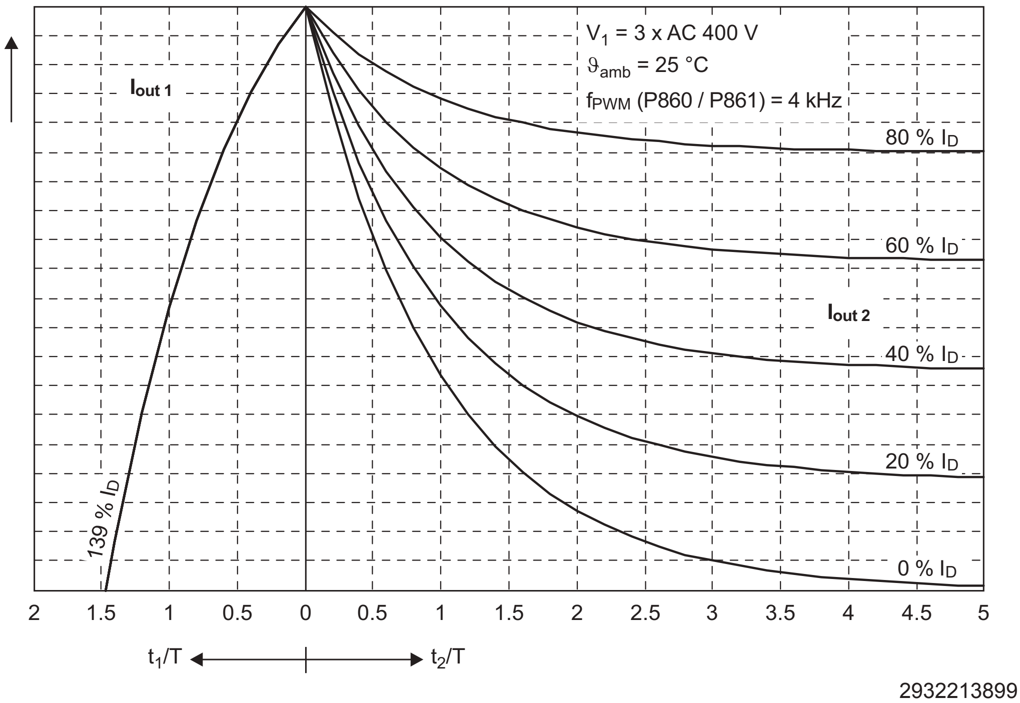
In the load cycle from $t_2 = 1.5 \times T$, which means the overload capacity is given.

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 × T** use the following diagrams to ascertain the overload capacity. Note the dependencies of I_D on I_N.

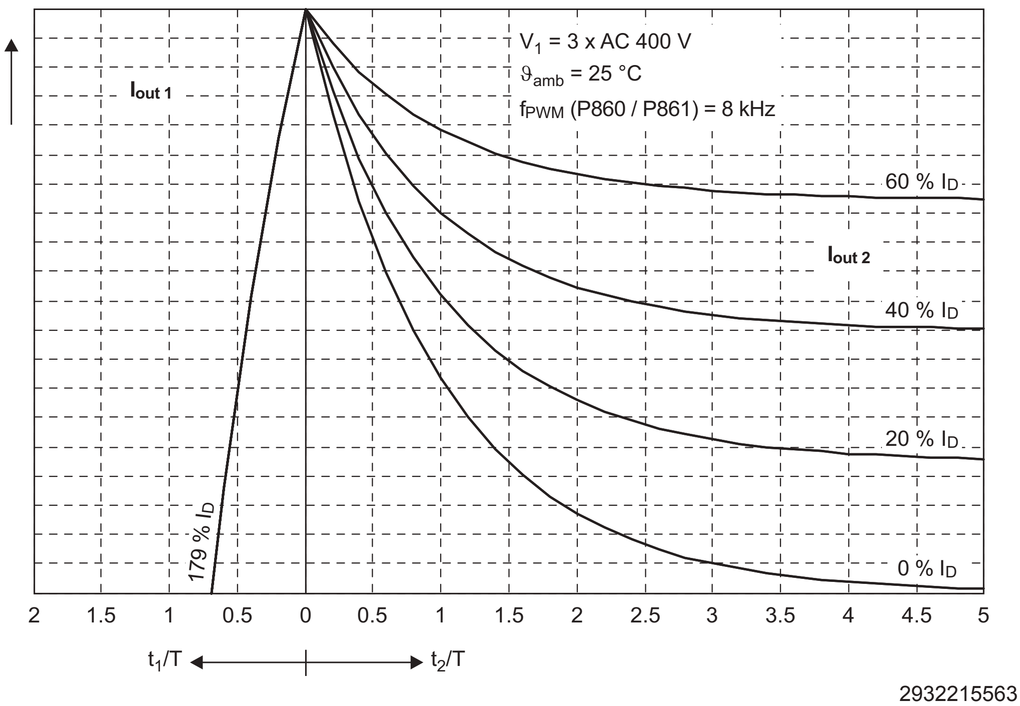
MDX60B/61B, BG0 overload capacity at 400 V / 25 °C

Cycle frequency f_{PWM} = 4 kHz:



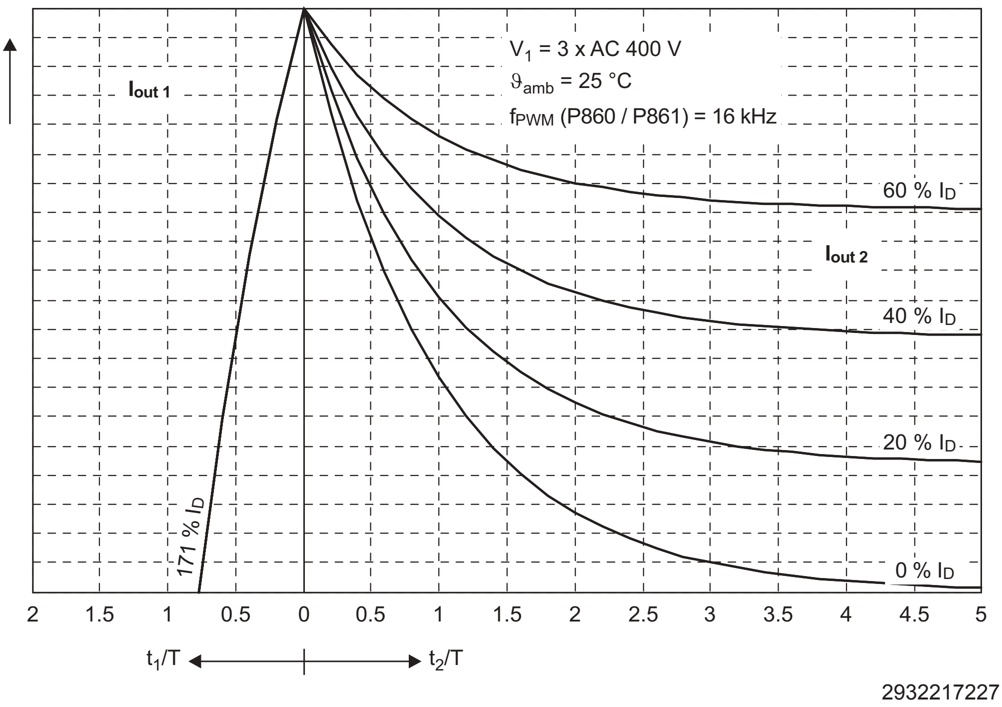
Overload capacity at f_{PWM} = 4 kHz (400 V / 25 °C)

Cycle frequency f_{PWM} = 8 kHz:



Overload capacity at f_{PWM} = 8 kHz (400 V / 25 °C)

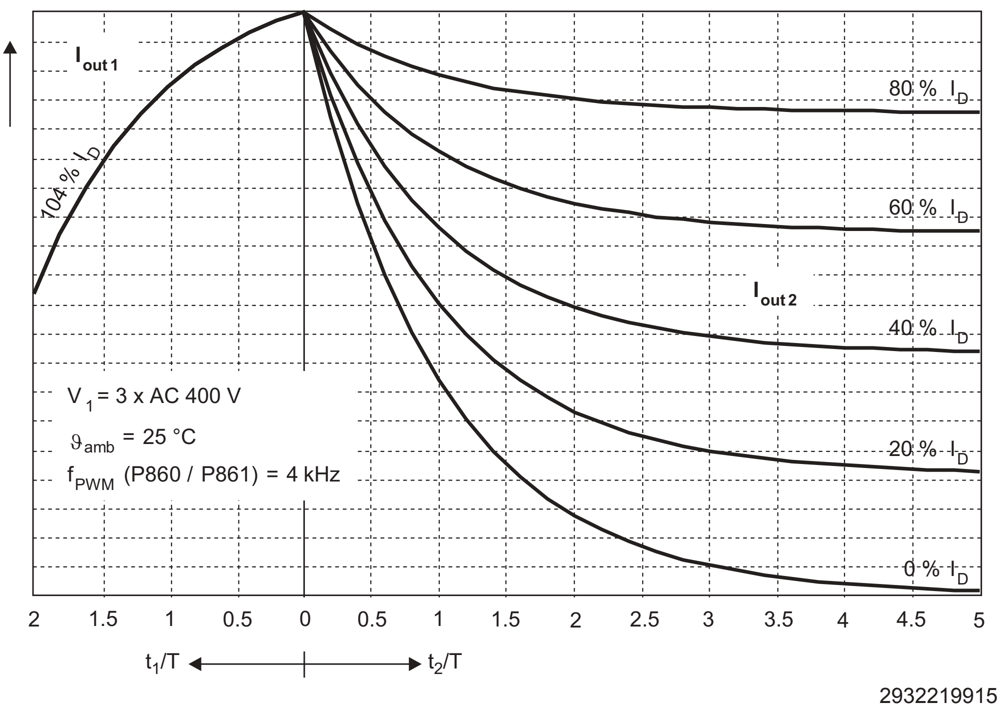
Cycle frequency f_{PWM} = 16 kHz:



Overload capacity at f_{PWM} = 16 kHz (400 V / 25 °C)

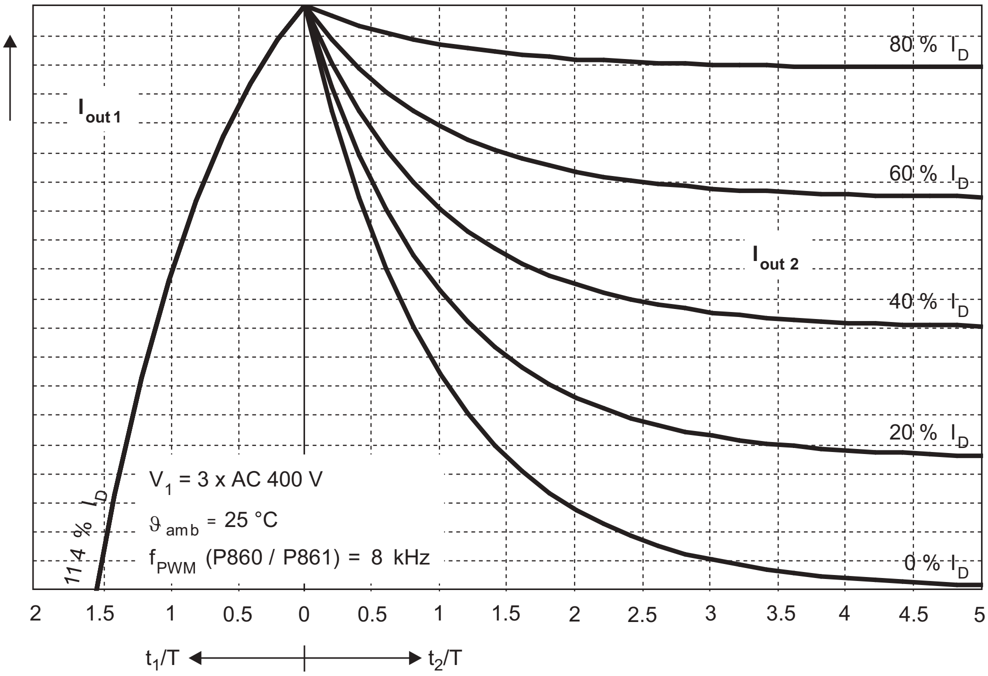
MDX61B, BG 1-6 overload capacity at 400 V / 25 °C

Cycle frequency f_{PWM} = 4 kHz:



Overload capacity at f_{PWM} = 4 kHz (400 V / 25 °C)

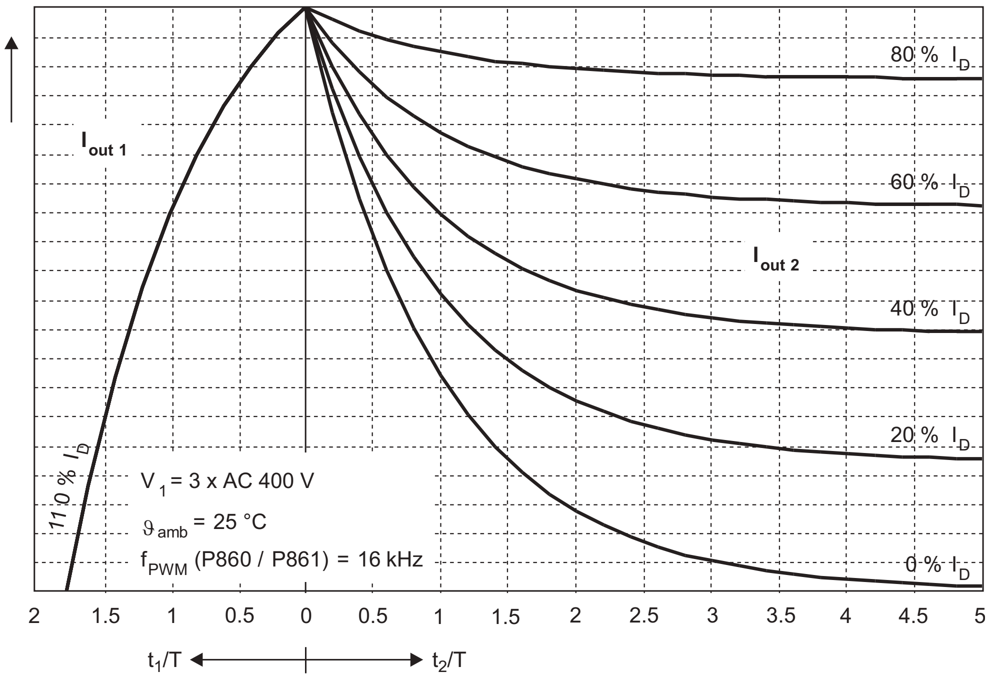
Cycle frequency f_{PWM} = 8 kHz:



2932221579

Overload capacity at f_{PWM} = 8 kHz (400 V / 25 °C)

Cycle frequency f_{PWM} = 16 kHz:

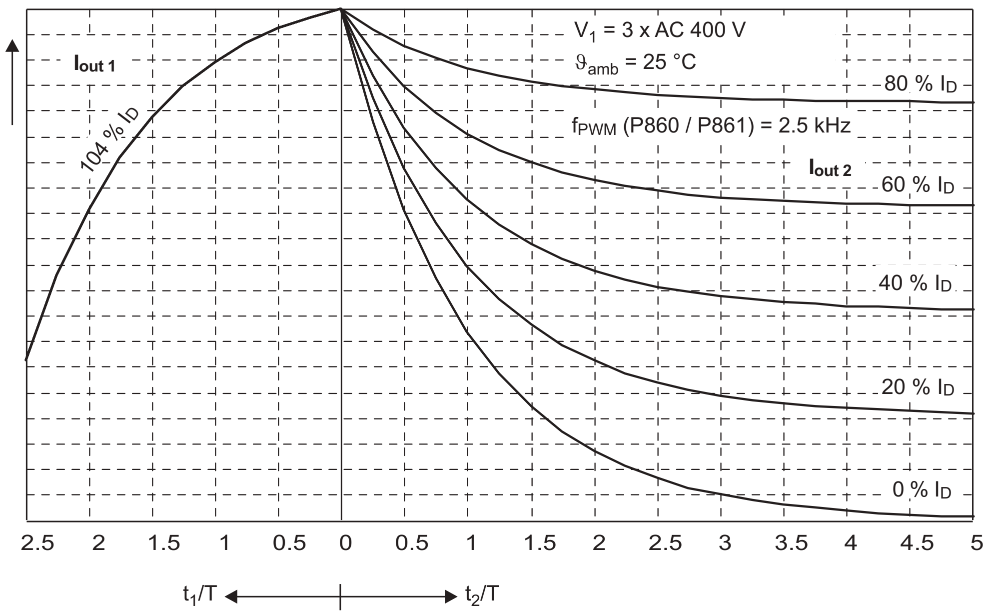


2932223243

Overload capacity at f_{PWM} = 16 kHz (400 V / 25 °C)

MDX61B, BG 7 overload capacity at 400 V / 25 °C

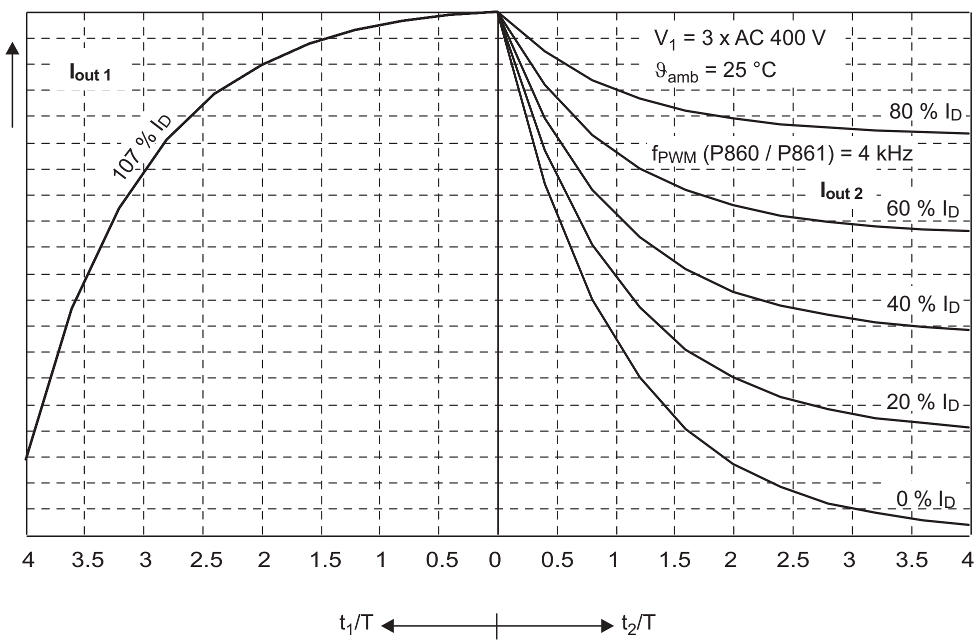
Cycle frequency f_{PWM} = 2,5 kHz:



3171324171

Overload capacity at f_{PWM} = 2.5 kHz (400 V / 25 °C)

Cycle frequency f_{PWM} = 4 kHz:

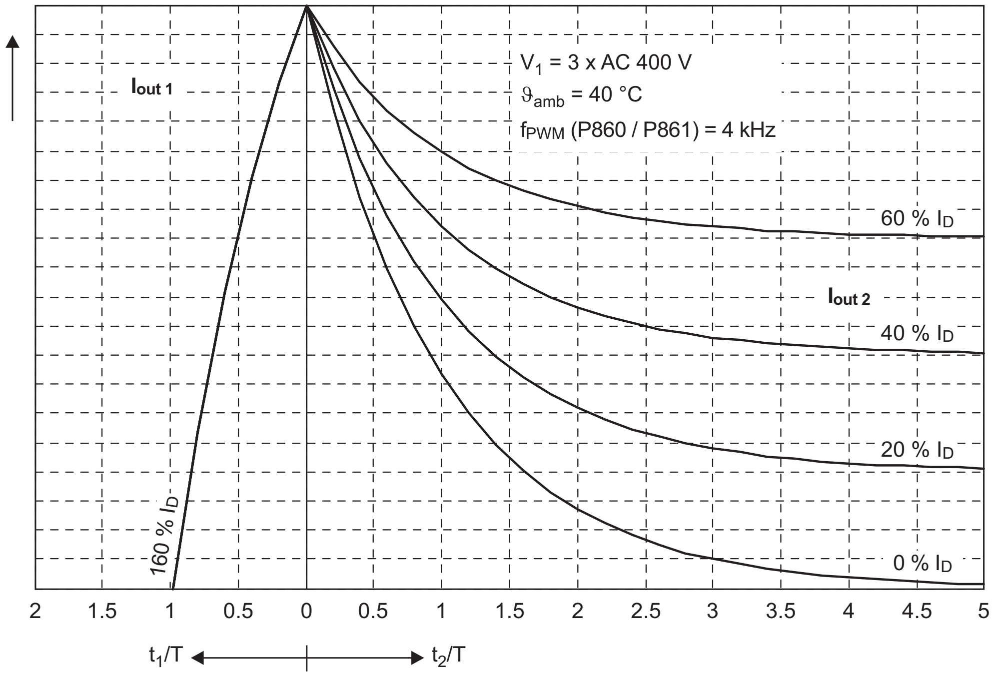


3171403403

Overload capacity at f_{PWM} = 4 kHz (400 V / 25 °C)

MDX60B/61B, BG0 overload capacity at 400 V / 40 °C

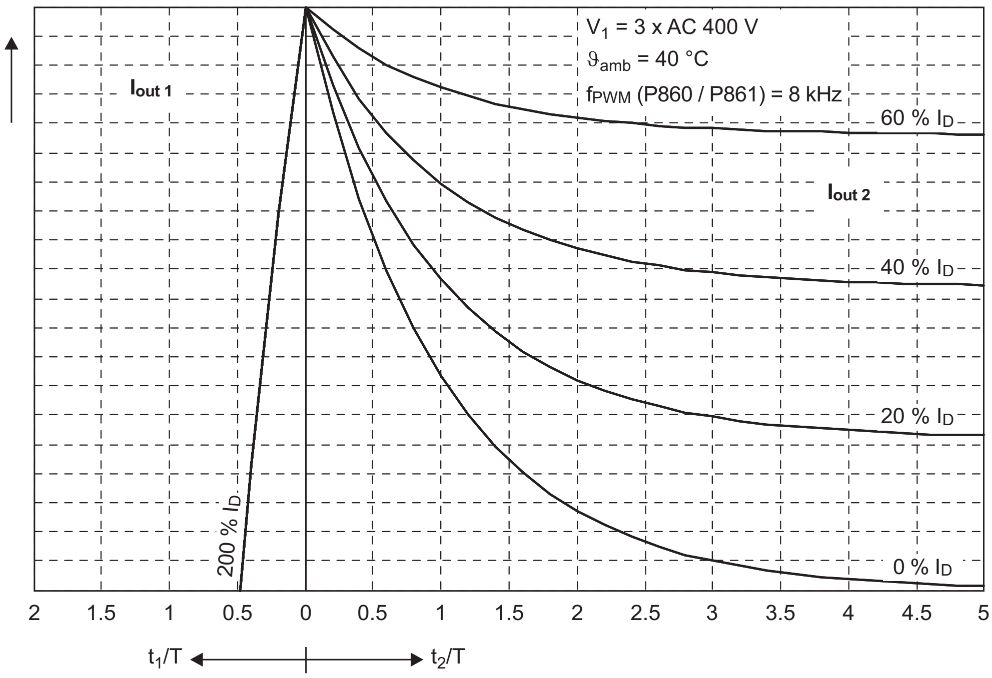
Cycle frequency f_{PWM} = 4 kHz:



2932225931

Overload capacity at f_{PWM} = 4 kHz (400 V / 40 °C)

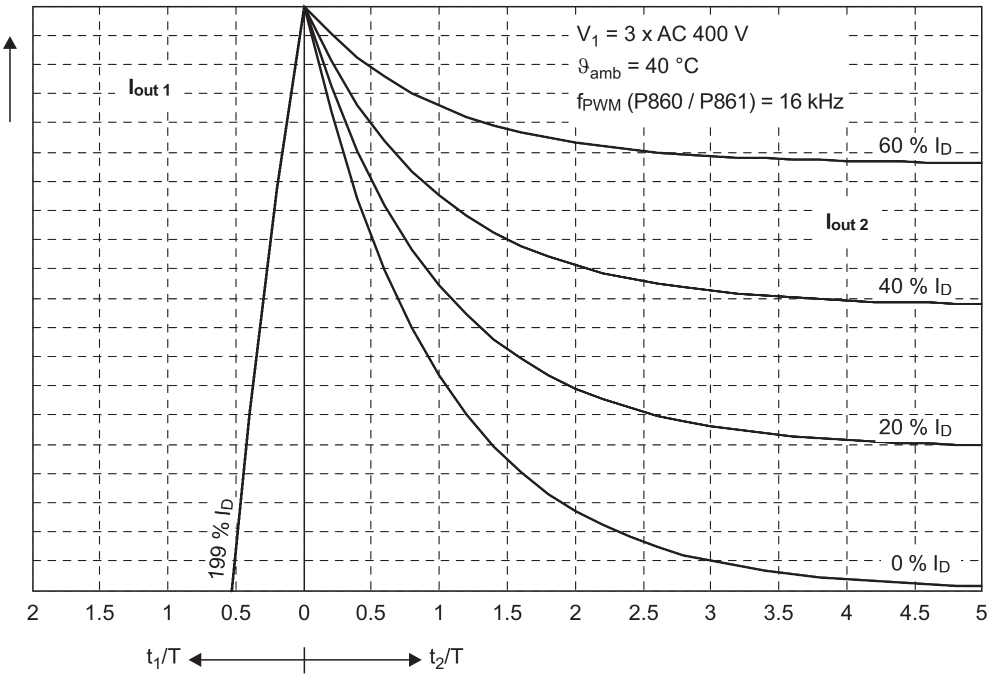
Cycle frequency f_{PWM} = 8 kHz:



2932227595

Overload capacity at f_{PWM} = 8 kHz (400 V / 40 °C)

Cycle frequency f_{PWM} = 16 kHz:

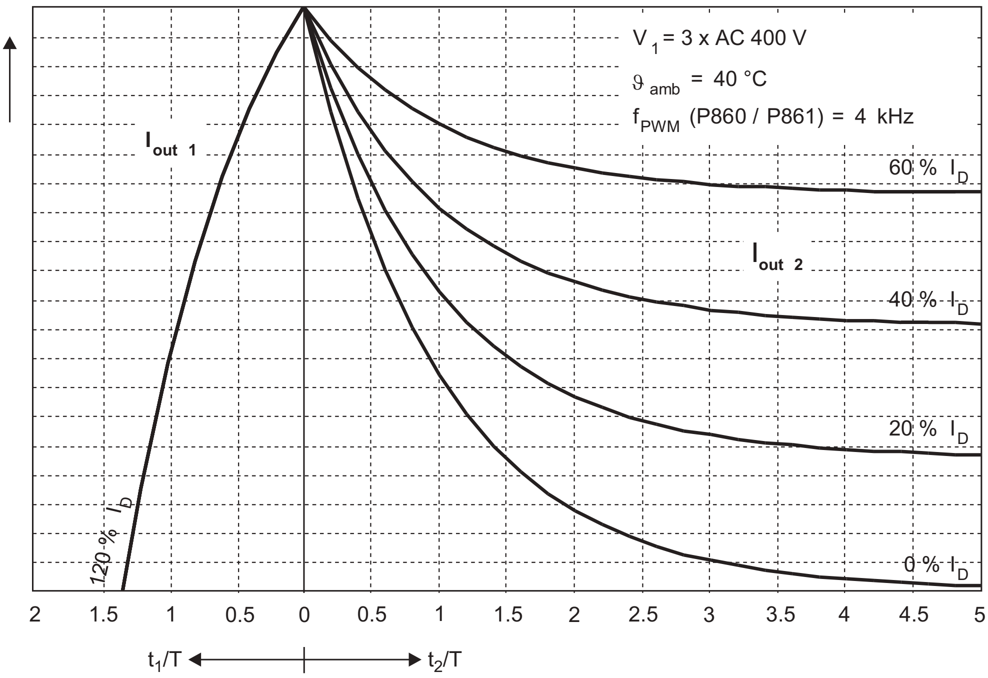


2932229259

Overload capacity at f_{PWM} = 16 kHz (400 V / 40 °C)

MDX61B,BG1-6 overload capacity at 400 V / 40 °C

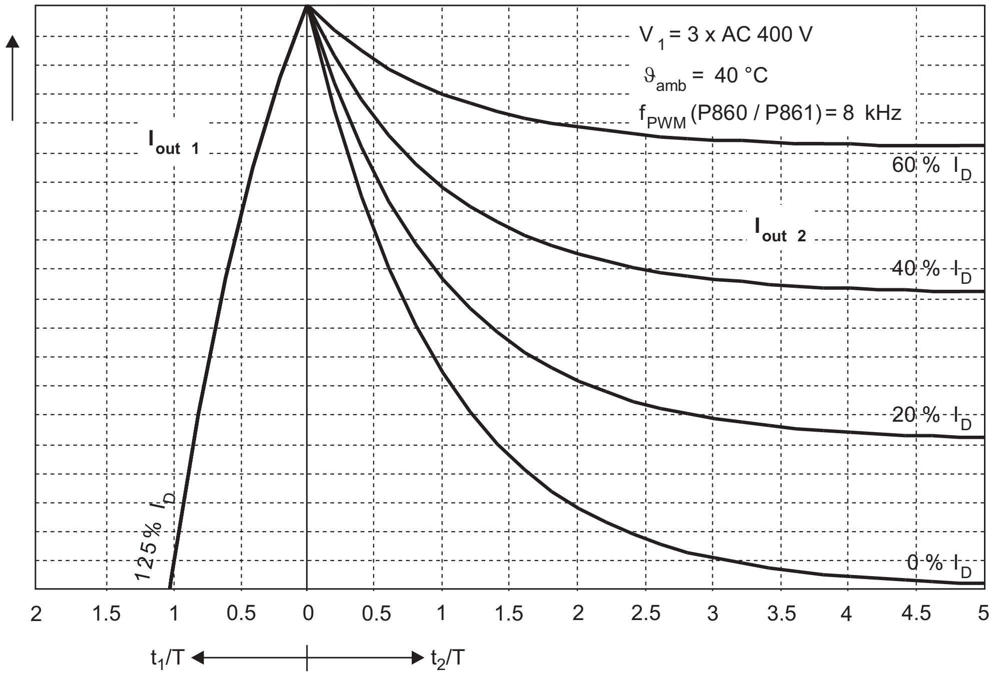
Cycle frequency f_{PWM} = 4 kHz:



2932231947

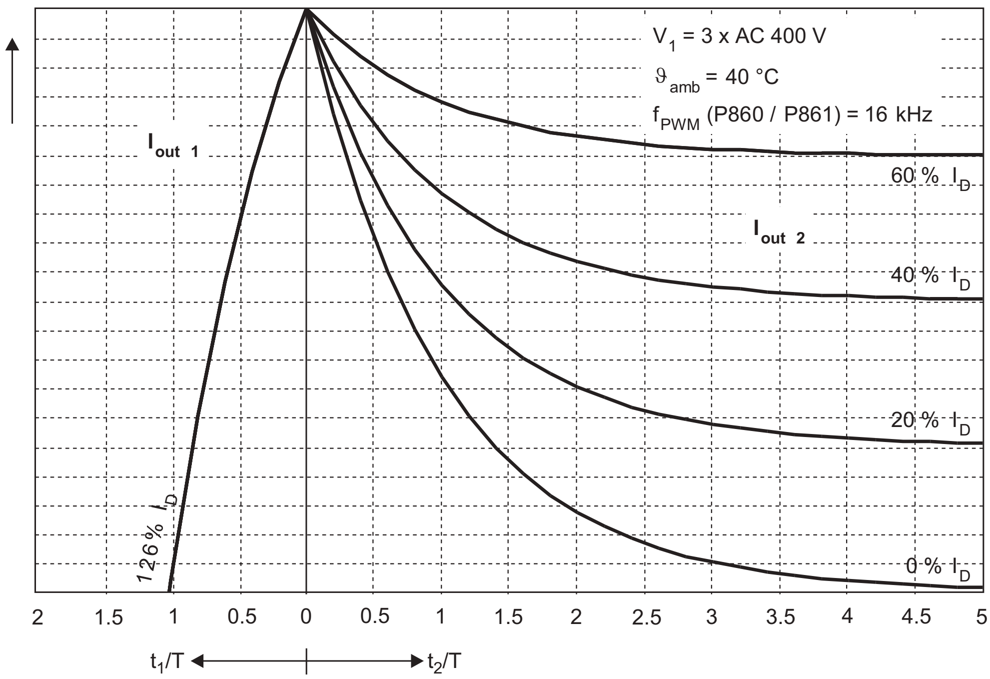
Overload capacity at f_{PWM} = 4 kHz (400 V / 40 °C)

Cycle frequency f_{PWM} = 8 kHz:



Overload capacity at f_{PWM} = 8 kHz (400 V / 40 °C)

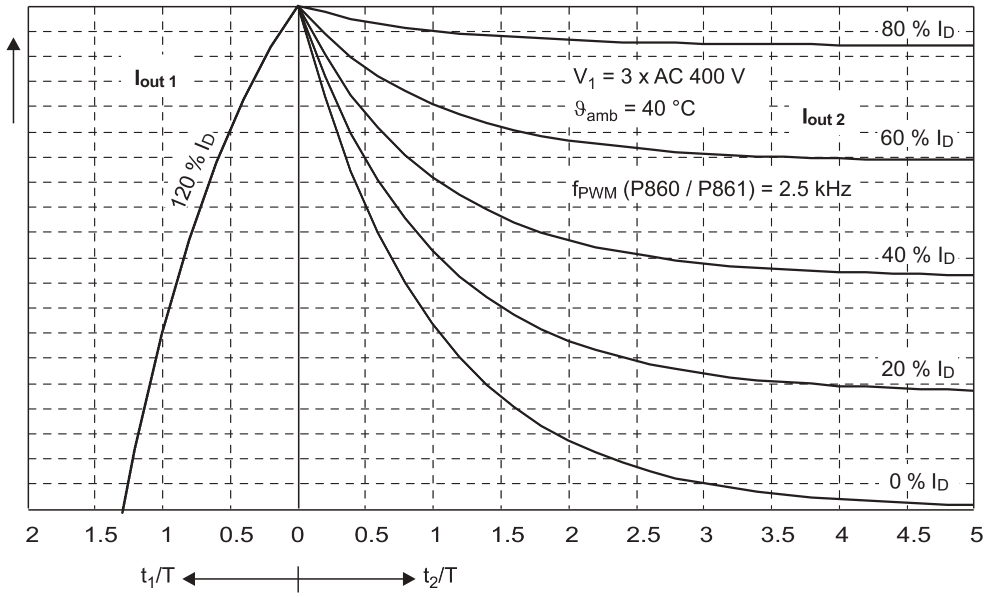
Cycle frequency f_{PWM} = 16 kHz:



Overload capacity at f_{PWM} = 16 kHz (400 V / 40 °C)

MDX61B, BG 7 overload capacity at 400 V / 40 °C

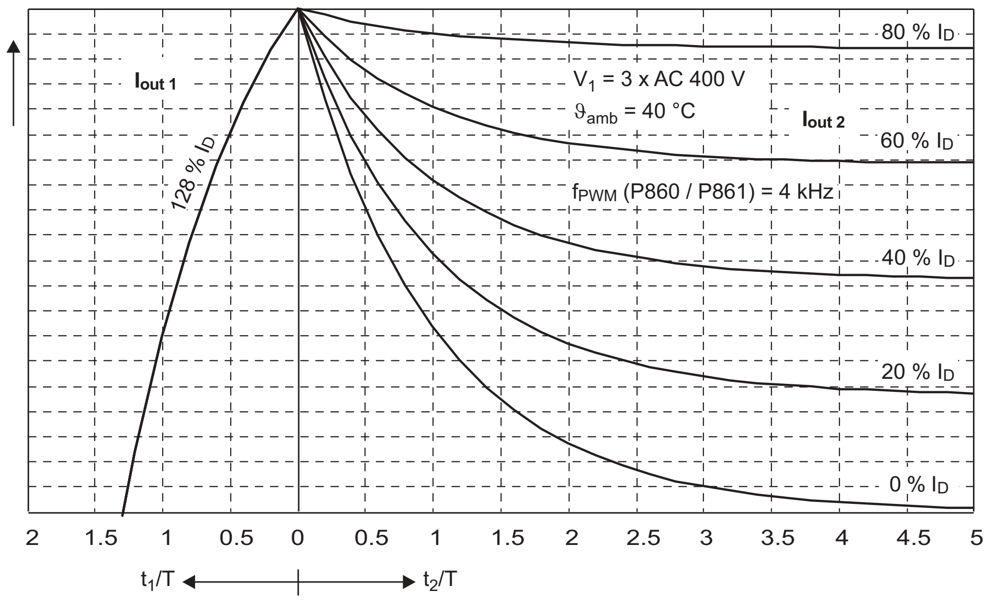
Cycle frequency f_{PWM} = 2.5 kHz:



3171408267

Overload capacity at f_{PWM} = 2.5 kHz (400 V / 40 °C)

Cycle frequency f_{PWM} = 4 kHz:

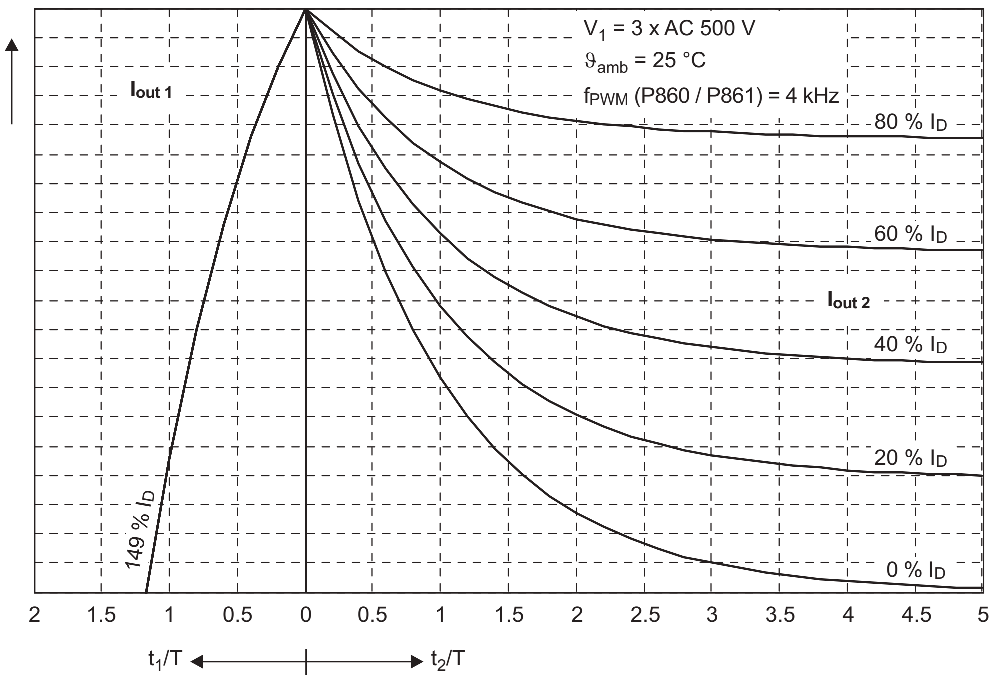


3171410187

Overload capacity at f_{PWM} = 4 kHz (400 V / 40 °C)

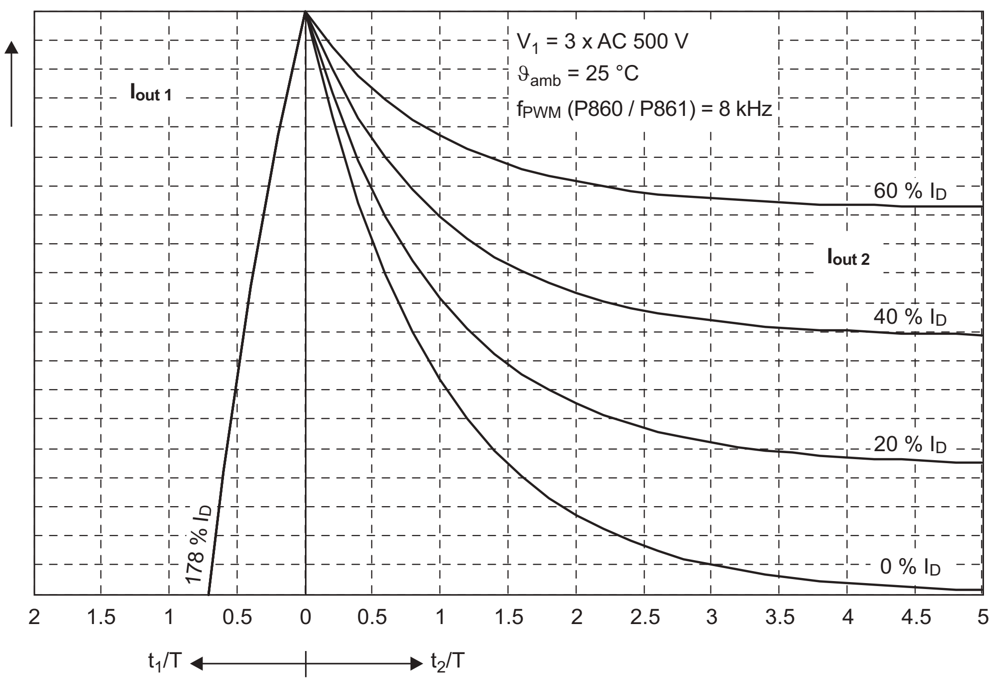
MDX60B/61B, BG0 overload capacity at 500 V / 25 °C

Cycle frequency f_{PWM} = 4 kHz:



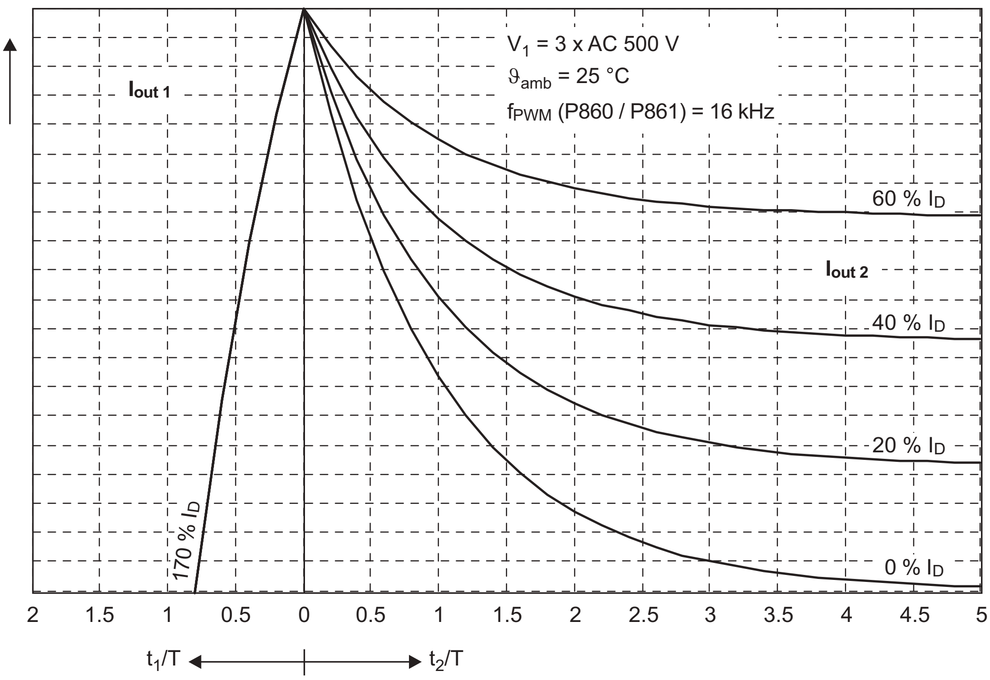
Overload capacity at f_{PWM} = 4 kHz (500 V / 25 °C)

Cycle frequency f_{PWM} = 8 kHz:



Overload capacity at f_{PWM} = 8 kHz (500 V / 25 °C)

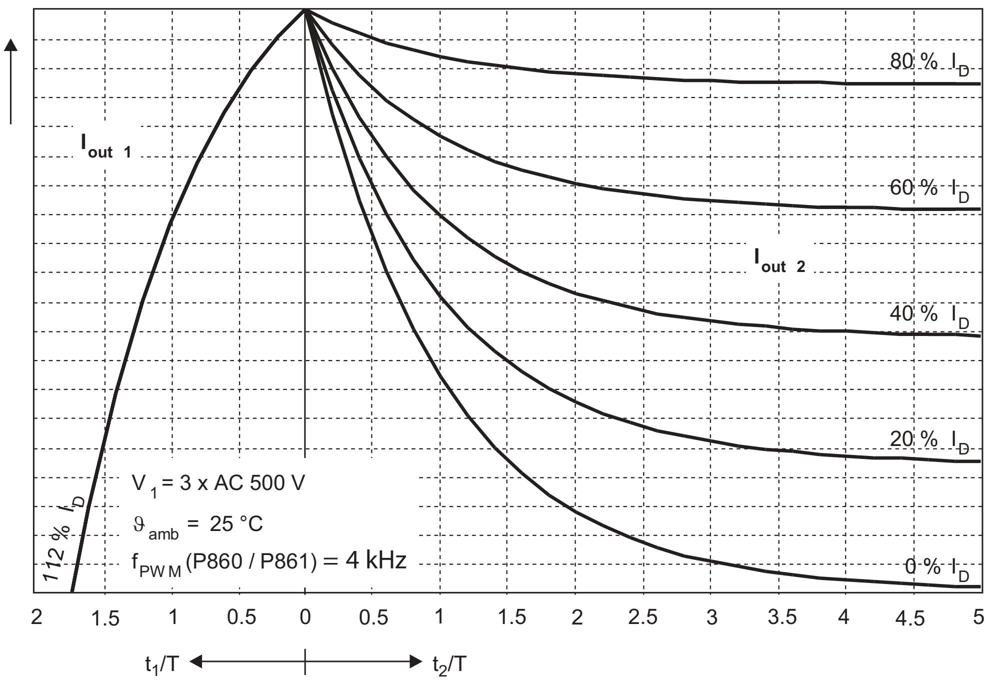
Cycle frequency f_{PWM} = 16 kHz:



Overload capacity at f_{PWM} = 16 kHz (500 V / 25 °C)

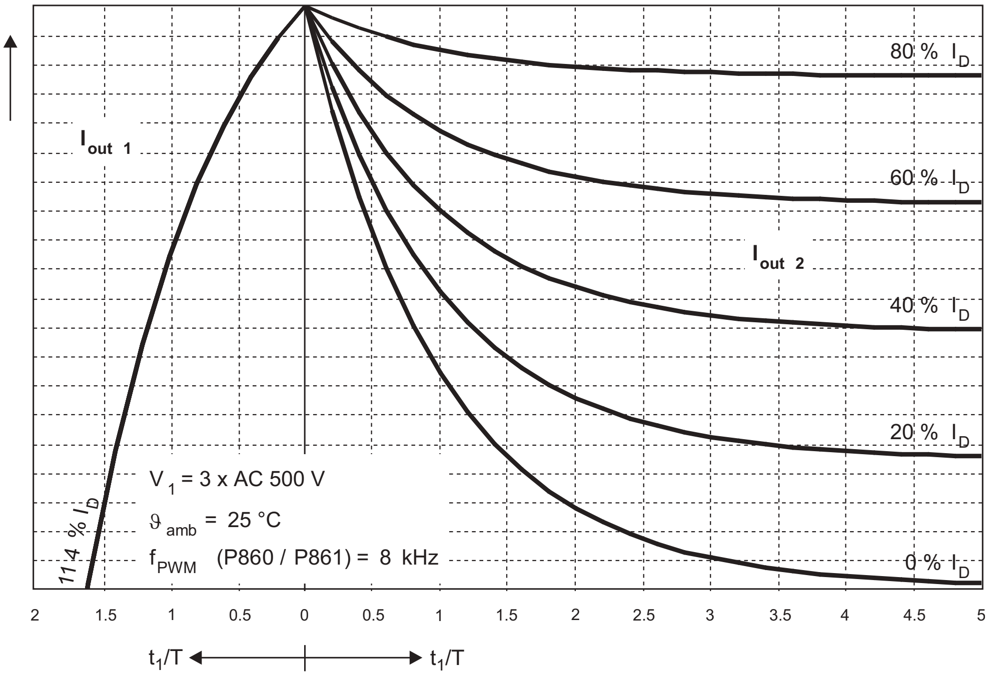
MDX61B, BG 1-6 overload capacity at 500 V / 25 °C

Cycle frequency f_{PWM} = 4 kHz:



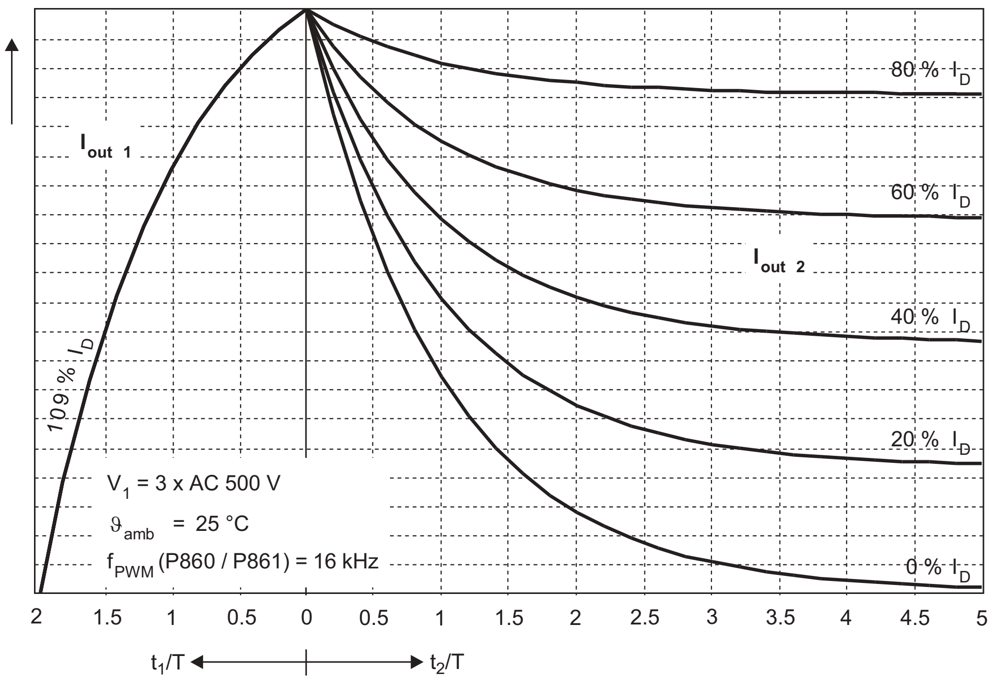
Overload capacity at f_{PWM} = 4 kHz (500 V / 25 °C)

Cycle frequency f_{PWM} = 8 kHz:



Overload capacity at f_{PWM} = 8 kHz (500 V / 25 °C)

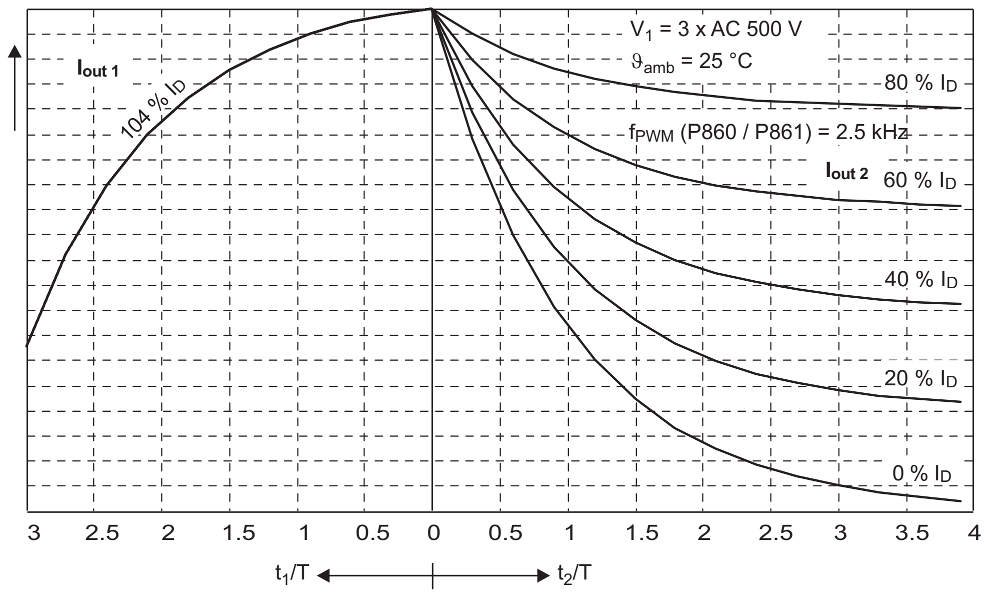
Cycle frequency f_{PWM} = 16 kHz:



Overload capacity at f_{PWM} = 16 kHz (500 V / 25 °C)

MDX61B, BG 7 overload capacity at 500 V / 25 °C

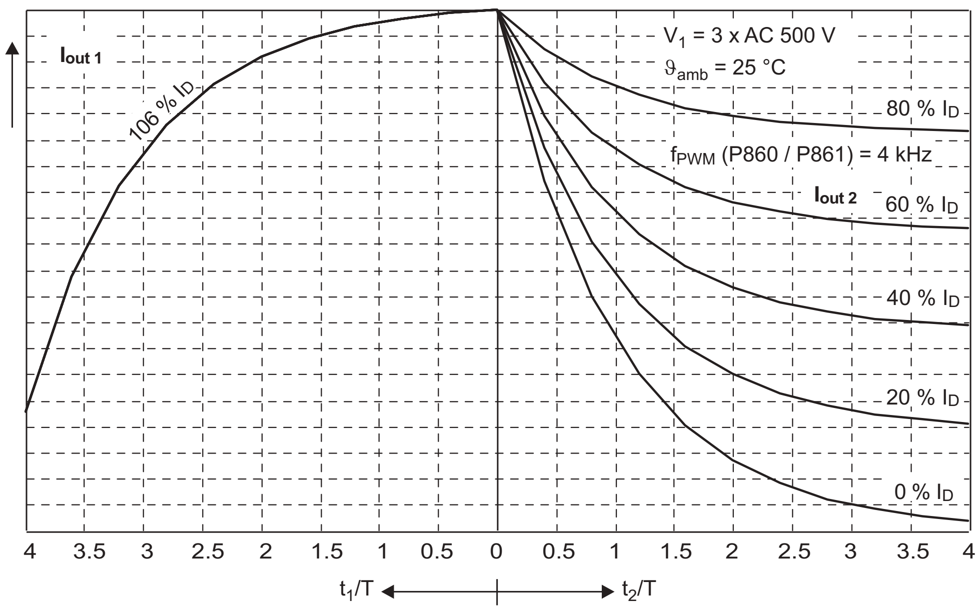
Cycle frequency f_{PWM} = 2.5 kHz:



3171415179

Overload capacity at f_{PWM} = 2.5 kHz (500 V / 25 °C)

Cycle frequency f_{PWM} = 4 kHz:

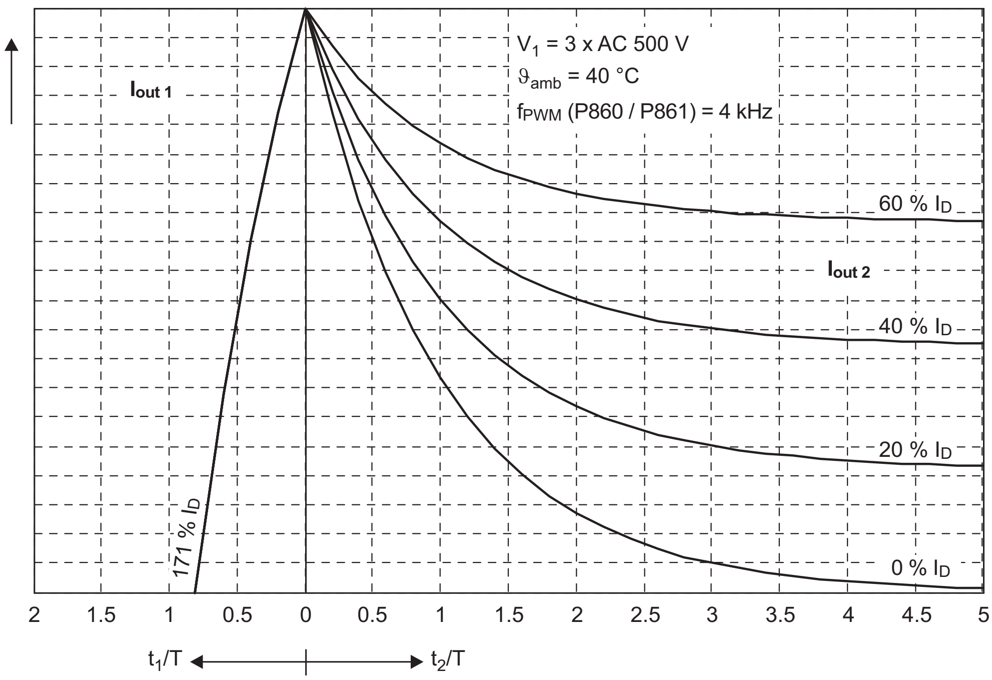


3171417099

Overload capacity at f_{PWM} = 4 kHz (500 V / 25 °C)

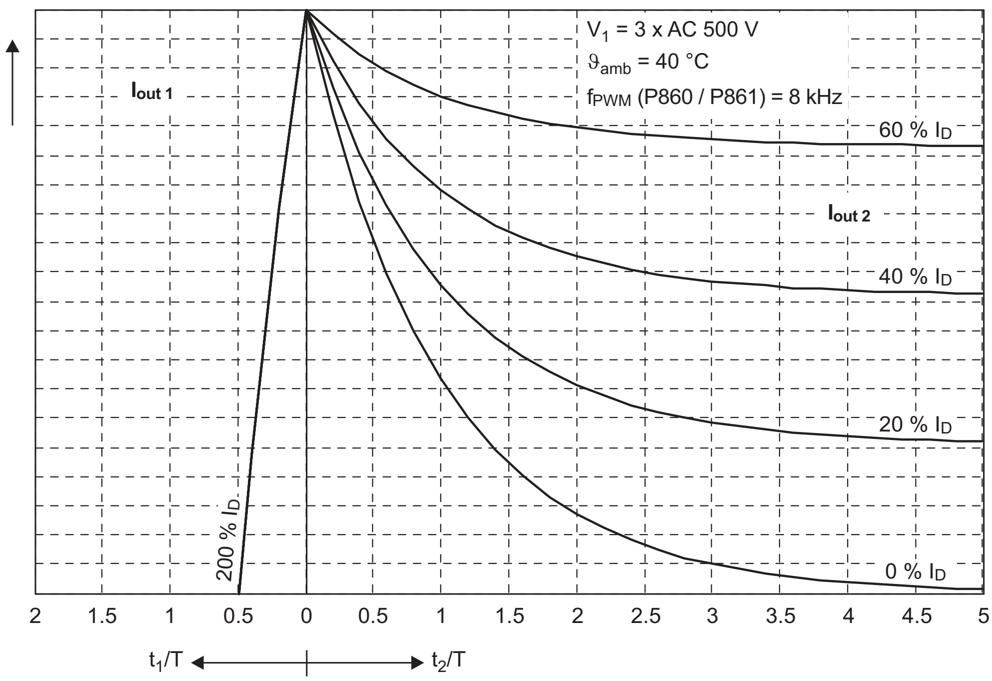
MDX60B/61B, BG0 overload capacity at 500 V / 40 °C

Cycle frequency f_{PWM} = 4 kHz:



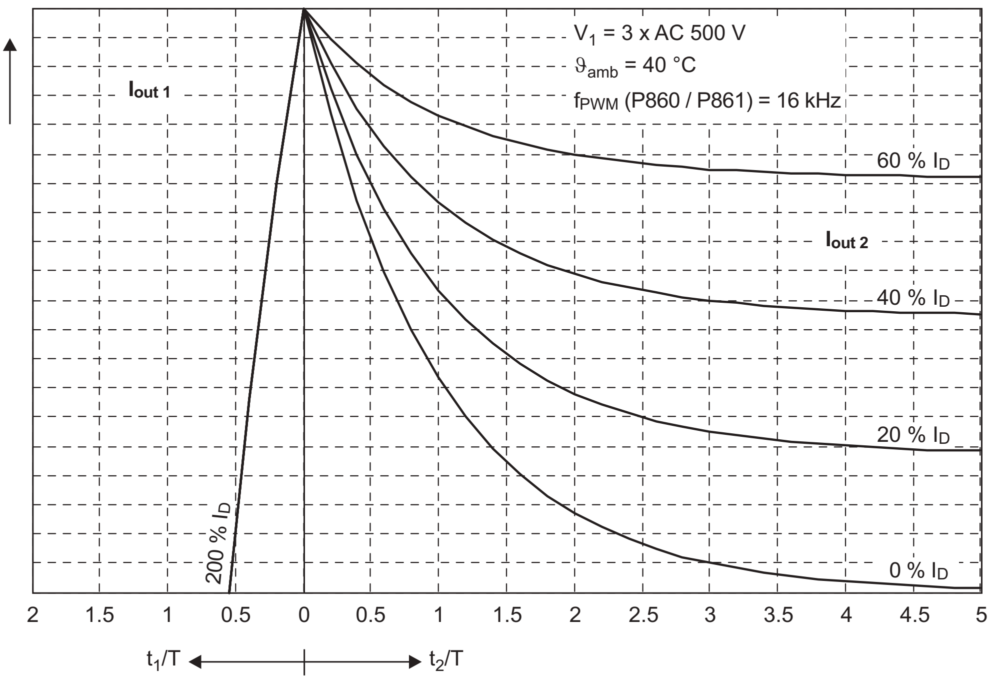
Overload capacity at f_{PWM} = 4 kHz (500 V / 40 °C)

Cycle frequency f_{PWM} = 8 kHz:



Overload capacity at f_{PWM} = 8 kHz (500 V / 40 °C)

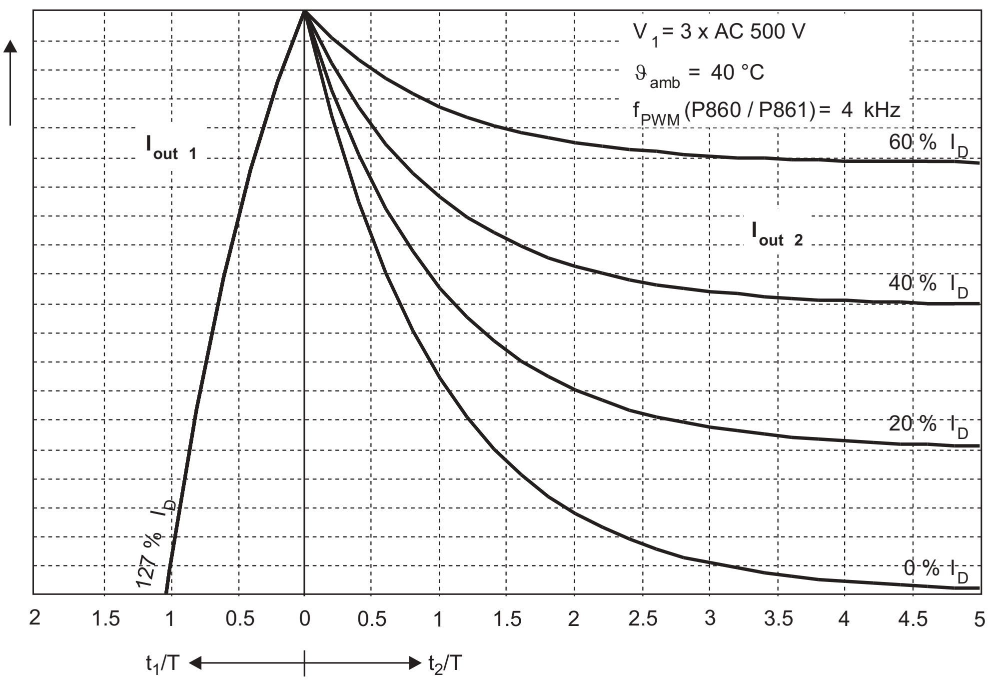
Cycle frequency f_{PWM} = 16 kHz:



Overload capacity at f_{PWM} = 16 kHz (500 V / 40 °C)

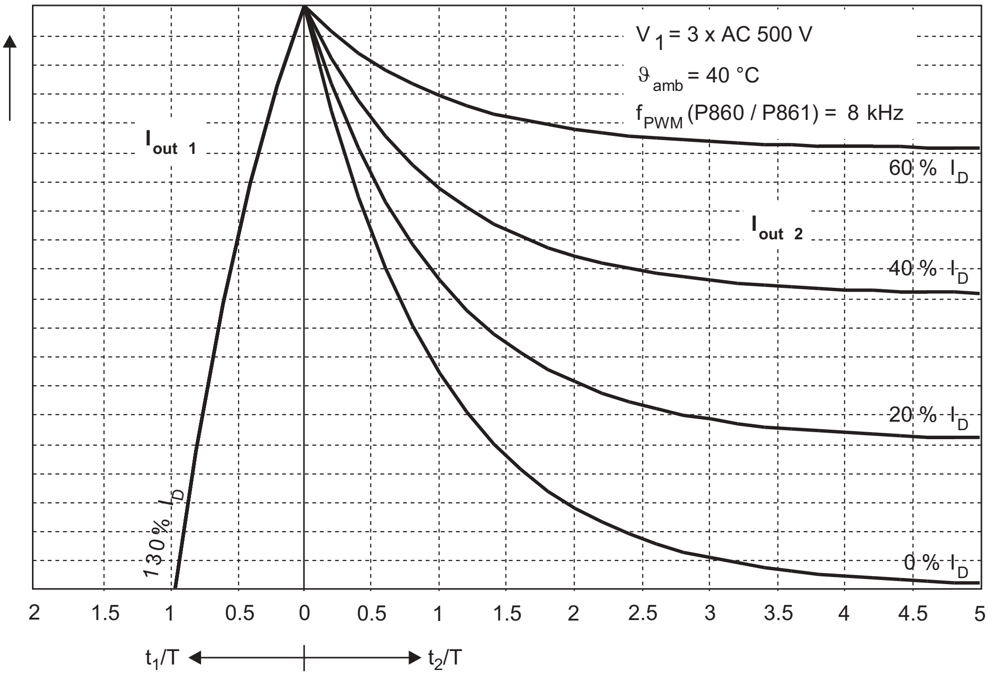
MDX61B, BG 1-6 overload capacity at 500 V / 40 °C

Cycle frequency f_{PWM} = 4 kHz:



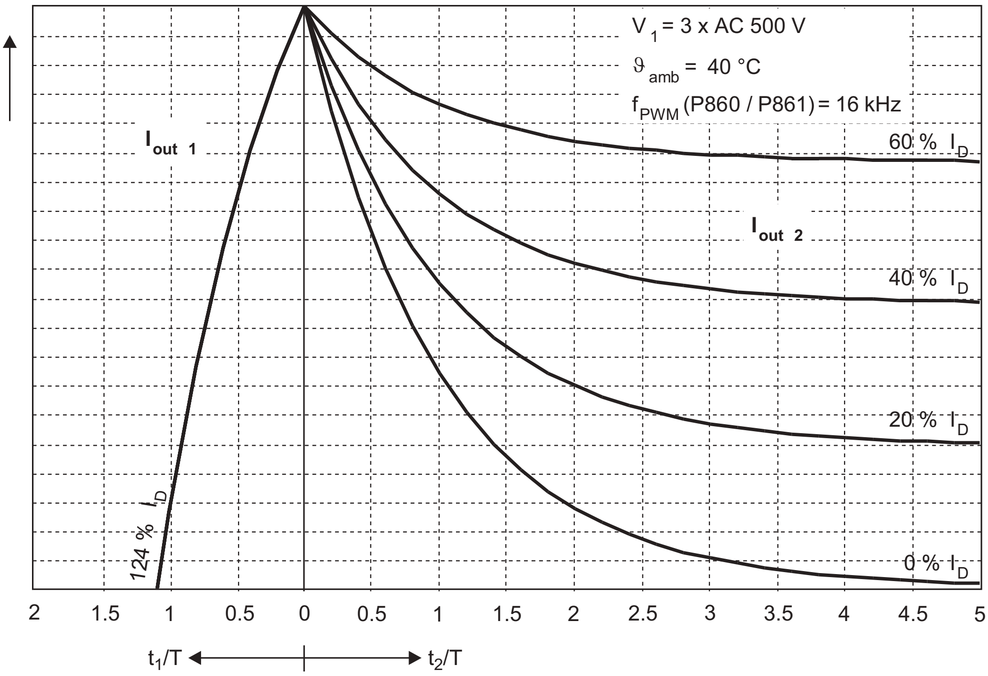
Overload capacity at f_{PWM} = 4 kHz (500 V / 40 °C)

Cycle frequency f_{PWM} = 8 kHz:



Overload capacity at f_{PWM} = 8 kHz (500 V / 40 °C)

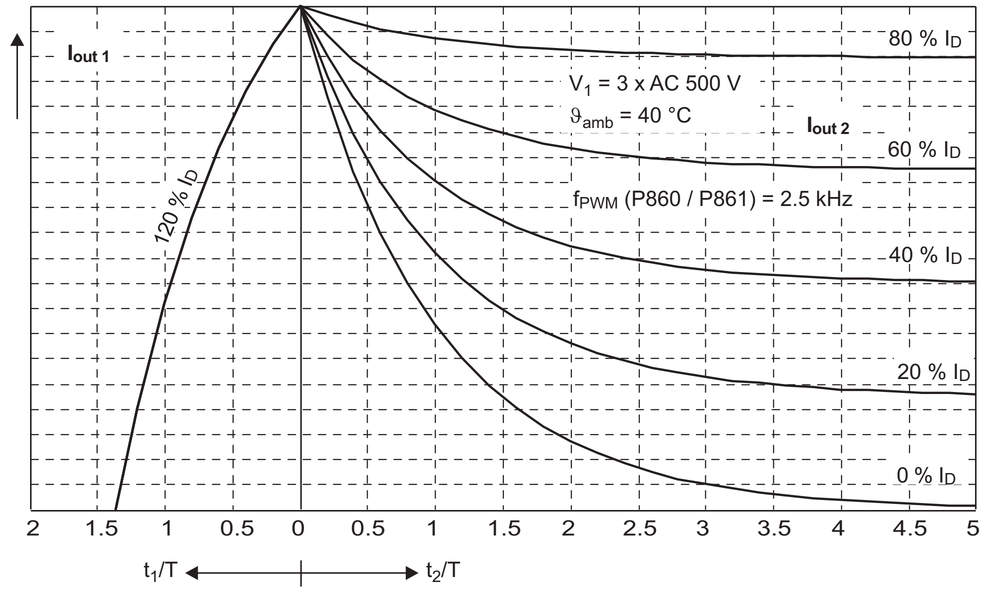
Cycle frequency f_{PWM} = 16 kHz:



Overload capacity at f_{PWM} = 16 kHz (500 V / 40 °C)

MDX61B, BG 7 overload capacity at 500 V / 40 °C

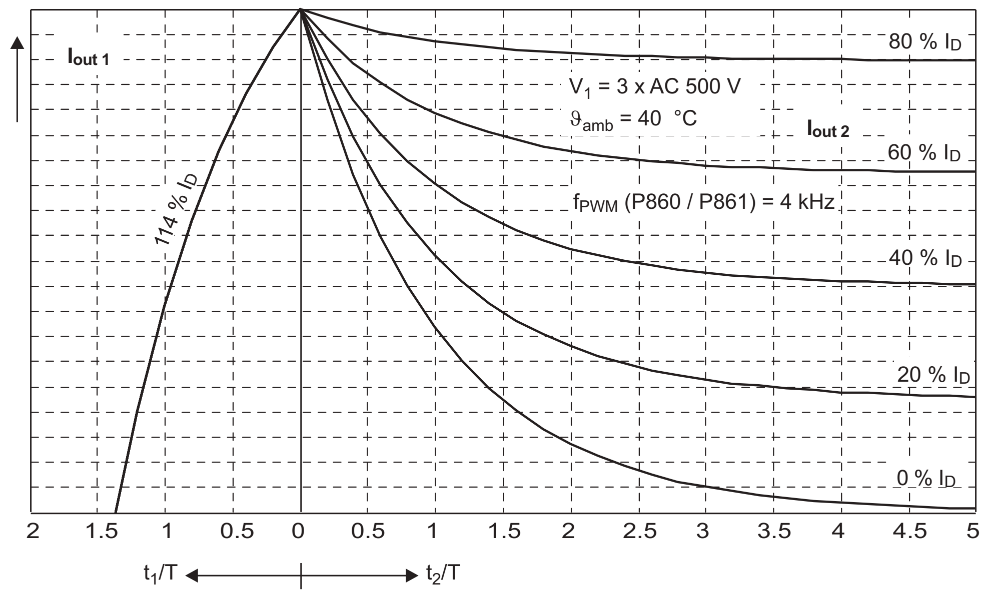
Cycle frequency f_{PWM} = 2.5 kHz:



3171420555

Overload capacity at f_{PWM} = 2.5 kHz (500 V / 40 °C)

Cycle frequency f_{PWM} = 4 kHz:



3171422475

Overload capacity at f_{PWM} = 4 kHz (500 V / 40 °C)

9.9.5 Overload capacity in the second range

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:

$t_2 > k \times t_1$ k = Overload factor

Example

The values for overload factors k are given in the following tables, depending on the supply voltage V_1, ambient temperature ϑ and cycle frequency f_{PWM}.

Example with MOVIDRIVE® MDX61B0055 (size 2):

- Operation with supply voltage $V_1 = 3 \times$ AC 400 V, ambient temperature ϑ = 40 °C and cycle frequency f_{PWM} = 4 kHz.
- Rated unit current I_N = AC 12.5 A and continuous output current $I_D = 125\% \times I_N$ = AC 15.6 A
- Overload time $t_1 = 30\ s = 0.1 \times T$
- 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 Hz)	Overload current $I_{out\ 1}$ (at f_A > 2 Hz)	Overload factor k at low-load current $I_{out\ 2}$ =			
			0	0.2 × I_D	0.4 × I_D	0.6 × 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 $t_2 > k \times t_1 > 0.778 \times 30\ s > 23.34\ s$.

For **overload times t_1 < 0.25 × 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 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 Hz)	Overload current $I_{out\ 1}$ (at f_A > 2 Hz)	Overload factor k at low-load current $I_{out\ 2}$ =				
			0	0.2 × I_D	0.4 × I_D	0.6 × I_D	0.8 × 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 Hz)	Overload current $I_{out\ 1}$ (at f_A > 2 Hz)	Overload factor k at low-load current $I_{out\ 2}$ =				
			0	0.2 × I_D	0.4 × I_D	0.6 × I_D	0.8 × 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

MDX61B, BG7 overload capacity at 400 V / 25 °C

Cycle frequency f_{PWM}	Continuous output current I_D (f_A > 2 Hz)	Overload current $I_{out\ 1}$ (at f_A > 2 Hz)	Overload factor k at low-load current $I_{out\ 2}$ =				
			0	0.2 × I_D	0.4 × I_D	0.6 × I_D	0.8 × I_D
2.5 kHz	144% I_N	104% I_D (= 150% I_N)	0.068	0.096	0.123	0.192	0.411
4 kHz	120% I_N	107% I_D (= 128% I_N)	0.018	0.024	0.029	0.047	0.082

MDX60B/61B, BG0 overload capacity at 400 V / 40 °C

Cycle frequency f_{PWM}	Continuous output current I_D (f_A > 2 Hz)	Overload current $I_{out\ 1}$ (at f_A > 2 Hz)	Overload factor k at low-load current $I_{out\ 2}$ =			
			0	0.2 × I_D	0.4 × I_D	0.6 × I_D
4 kHz	125% I_N	160% I_D (= 200% I_N)	0.727	0.909	1.212	1.818
8 kHz	100% I_N	200% I_D (= 200% I_N)	1.931	2.690	4.069	9.448
16 kHz	67% I_N	199% I_D (= 133% I_N)	0.737	0.912	1.211	1.825

MDX61B, BG 1-6 overload capacity at 400 V / 40 °C

Cycle frequency f_{PWM}	Continuous output current I_D (f_A > 2 Hz)	Overload current $I_{out\ 1}$ (at f_A > 2 Hz)	Overload factor k at low-load current $I_{out\ 2}$ =			
			0	0.2 × I_D	0.4 × I_D	0.6 × I_D
4 kHz	125% I_N	120% I_D (= 150% I_N)	0.411	0.538	0.778	1.407
8 kHz	100% I_N	125% I_D (= 125% I_N)	0.678	0.928	1.473	3.639
16 kHz	68% I_N	126% I_D (= 86% I_N)	0.676	0.922	1.448	3.438

MDX61B, BG7 overload capacity at 400 V / 40 °C

Cycle frequency f_{PWM}	Continuous output current I_D (f_A > 2 Hz)	Overload current $I_{out\ 1}$ (at f_A > 2 Hz)	Overload factor k at low-load current $I_{out\ 2}$ =				
			0	0.2 × I_D	0.4 × I_D	0.6 × I_D	0.8 × I_D
2.5 kHz	125% I_N	120% I_D (= 150% I_N)	0.458	0.625	0.833	1.458	5.833
4 kHz	100% I_N	128% I_D (= 128% I_N)	0.297	0.378	0.486	0.757	1.514

MDX60B/61B, BG0 overload capacity at 500 V / 25 °C

Cycle frequency f_{PWM}	Continuous output current I_D (f_A > 2 Hz)	Overload current $I_{out\ 1}$ (at f_A > 2 Hz)	Overload factor k at low-load current $I_{out\ 2}$ =				
			0	0.2 × I_D	0.4 × I_D	0.6 × I_D	0.8 × I_D
4 kHz	134% I_N	149% I_D (= 200% I_N)	0.558	0.674	0.907	1.326	2.674
8 kHz	100% I_N	178% I_D (= 178% I_N)	1.154	1.538	2.077	3.462	11.615
16 kHz	67% I_N	170% I_D (= 114% I_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_{PWM}	Continuous output current I_D (f_A > 2 Hz)	Overload current $I_{out\ 1}$ (at f_A > 2 Hz)	Overload factor k at low-load current $I_{out\ 2}$ =				
			0	0.2 × I_D	0.4 × I_D	0.6 × I_D	0.8 × I_D
4 kHz	134% I_N	112% I_D (= 150% I_N)	0.245	0.316	0.443	0.741	2.287
8 kHz	100% I_N	114% I_D (= 114% I_N)	0.286	0.369	0.522	0.888	3.040
16 kHz	67% I_N	109% I_D (= 73% I_N)	0.182	0.232	0.321	0.521	1.385

MDX61B, BG7 overload capacity at 500 V / 25 °C

Cycle frequency f_{PWM}	Continuous output current I_D (f_A > 2 Hz)	Overload current $I_{out\ 1}$ (at f_A > 2 Hz)	Overload factor k at low-load current $I_{out\ 2}$ =				
			0	0.2 × I_D	0.4 × I_D	0.6 × I_D	0.8 × I_D
2.5 kHz	133% I_N	104% I_D (= 138% I_N)	0.040	0.053	0.067	0.107	0.220
4 kHz	110% I_N	106% I_D (= 117% I_N)	0.016	0.024	0.032	0.040	0.072

MDX60B/61B, BG0 overload capacity at 500 V / 40 °C

Cycle frequency f_{PWM}	Continuous output current I_D (f_A > 2 Hz)	Overload current $I_{out\ 1}$ (at f_A > 2 Hz)	Overload factor k at low-load current $I_{out\ 2}$ =			
			0	0.2 × I_D	0.4 × I_D	0.6 × I_D
4 kHz	117% I_N	171% I_D (= 200% I_N)	1.000	1.268	1.805	3.049
8 kHz	89% I_N	200% I_D (= 178% I_N)	1.882	2.529	3.824	8.412
16 kHz	57% I_N	200% I_D (= 114% I_N)	1.667	2.208	3.167	5.792

MDX61B, BG 1-6 overload capacity at 500 V / 40 °C

Cycle frequency f_{PWM}	Continuous output current I_D (f_A > 2 Hz)	Overload current $I_{out\ 1}$ (at f_A > 2 Hz)	Overload factor k at low-load current $I_{out\ 2}$ =			
			0	0.2 × I_D	0.4 × I_D	0.6 × I_D
4 kHz	117% I_N	128% I_D (= 150% I_N)	0.662	0.897	1.395	3.176
8 kHz	89% I_N	126% I_D (= 112% I_N)	0.745	1.022	1.627	4.103
16 kHz	59% I_N	123% I_D (= 73% I_N)	0.595	0.803	1.234	2.695

MDX61B, BG7 overload capacity at 500 V / 40 °C

Cycle frequency f_{PWM}	Continuous output current I_D (f_A > 2 Hz)	Overload current $I_{out\ 1}$ (at f_A > 2 Hz)	Overload factor k at low-load current $I_{out\ 2}$ =				
			0	0.2 × I_D	0.4 × I_D	0.6 × I_D	0.8 × I_D
2.5 kHz	115% I_N	120% I_D (= 138% I_N)	0.385	0.538	0.769	1.308	3.846
4 kHz	100% I_N	114% I_D (= 114% I_N)	0.314	0.400	0.571	0.914	2.657

9.9.6 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 8kHz and 12k Hz; 133% at PWM frequency 16 kHz).

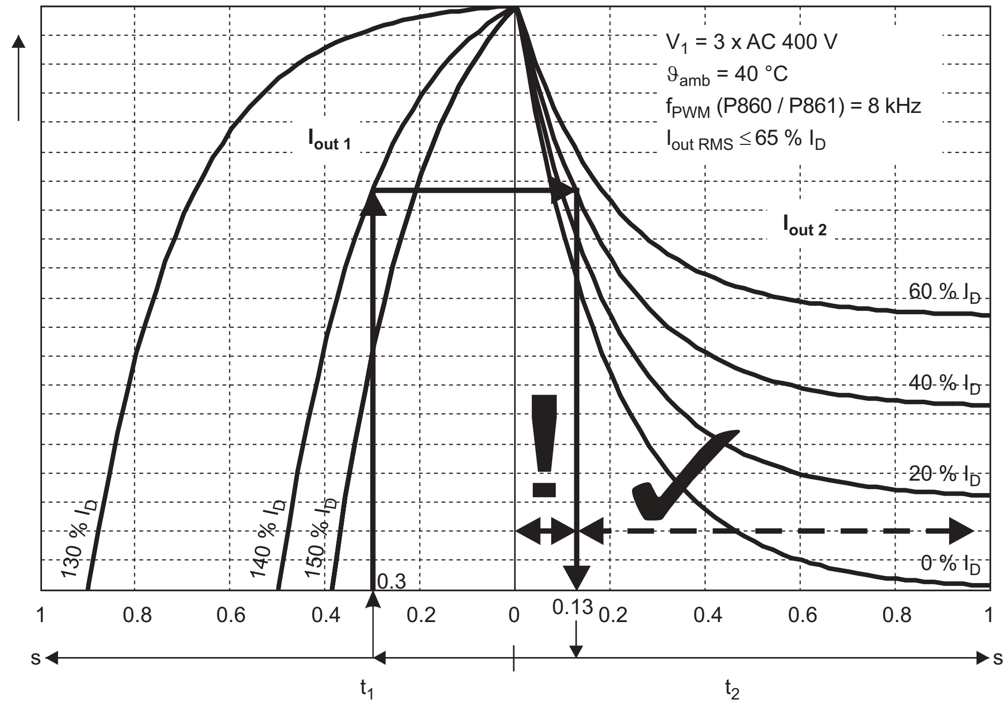
The overload time t_1 **must be less than 1 s** for this high overload capacity to be achieved.

Determining the overload capacity

The overload capacity for the short overload time (t_1 < 1 s) is determined as follows:

- Für MDX61B sizes 1 - 6 using the diagrams (→ following figure)
- For MDX60B/61B sizes 0 and 7 according to the chapter "Overload capacity in the second range" (page 426) .

The mean inverter output current $I_{out\ RMS}$ during the load cycle must not exceed a certain value.



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 for various overload currents $I_{out\ 1}$ are shown in a series of curves above t_1. The temperature profiles for 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 × I_D.

- 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 permitted (√); all times t_2 to the left are not permitted (!).

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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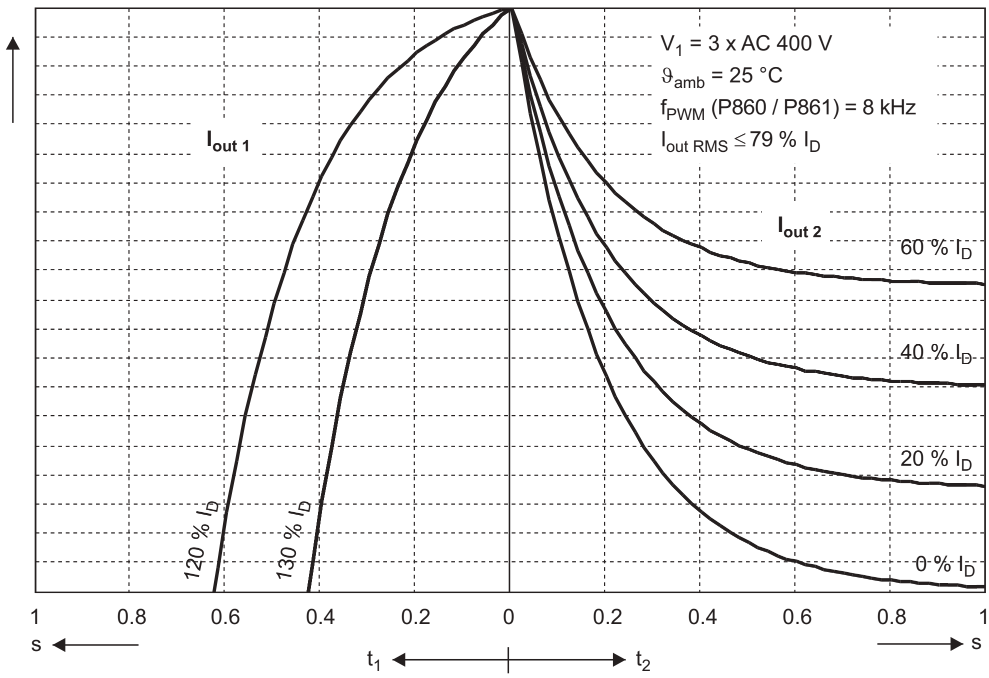
The permitted mean inverter output current is $I_{out\ RMS} \leq 65\%\ I_D$. In the specified load cycle, $I_{out\ RMS} = 63.08\%\ I_D$. Therefore, the load cycle is permitted.

MDX61B, BG 1-6 overload capacity at 400 V / 25 °C

Cycle frequency f_{PWM} = 8 kHz:

The permitted mean inverter output current is $I_{out\ RMS} \leq 79\%\ I_D$.

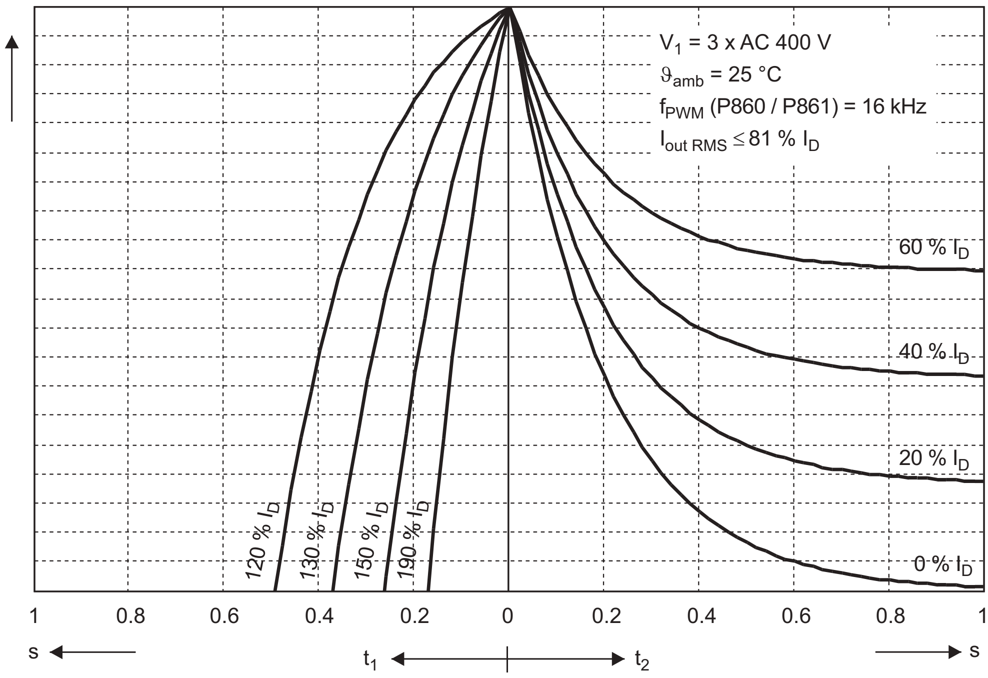


2932288139

Brief overload capacity at f_{PWM} = 8 kHz (400 V / 25 °C)

Cycle frequency f_{PWM} = 16 kHz:

The permitted mean inverter output current is $I_{out\ RMS} \leq 81\%\ I_D$.



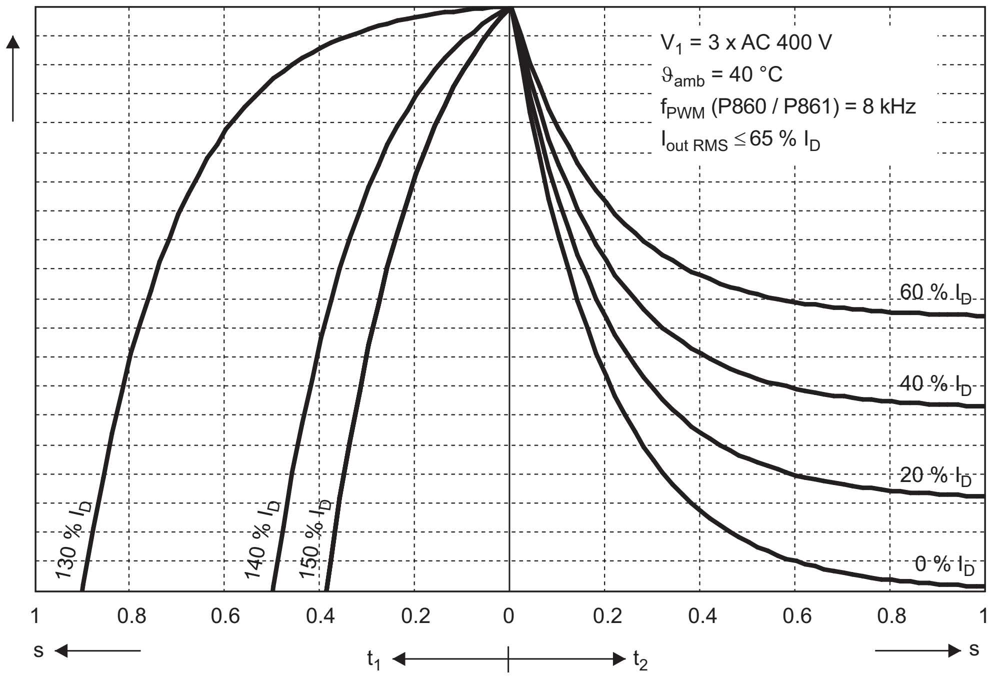
2932288139

Brief overload capacity at f_{PWM} = 16 kHz (400 V / 25 °C)

MDX61B, BG 1-6 overload capacity at 400 V / 40 °C

Cycle frequency f_{PWM} = 8 kHz:

The permitted mean inverter output current is $I_{out\ RMS} \leq 65\%\ I_D$.

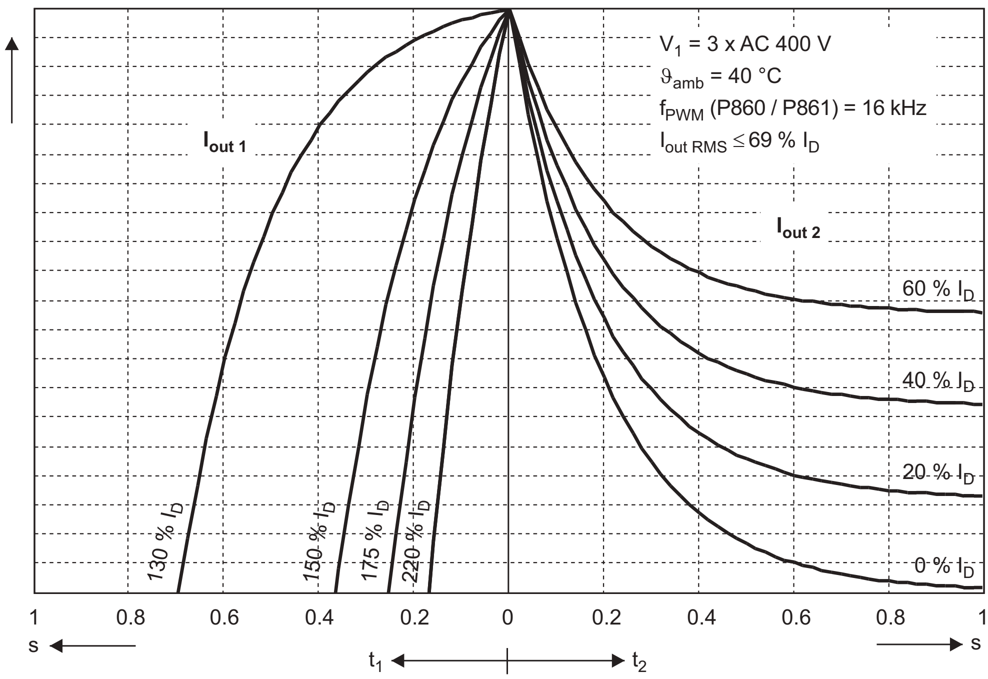


2932290827

Brief overload capacity at f_{PWM} = 8 kHz (400 V / 40 °C)

Cycle frequency f_{PWM} = 16 kHz:

The permitted mean inverter output current is $I_{out\ RMS} \leq 69\%\ I_D$.



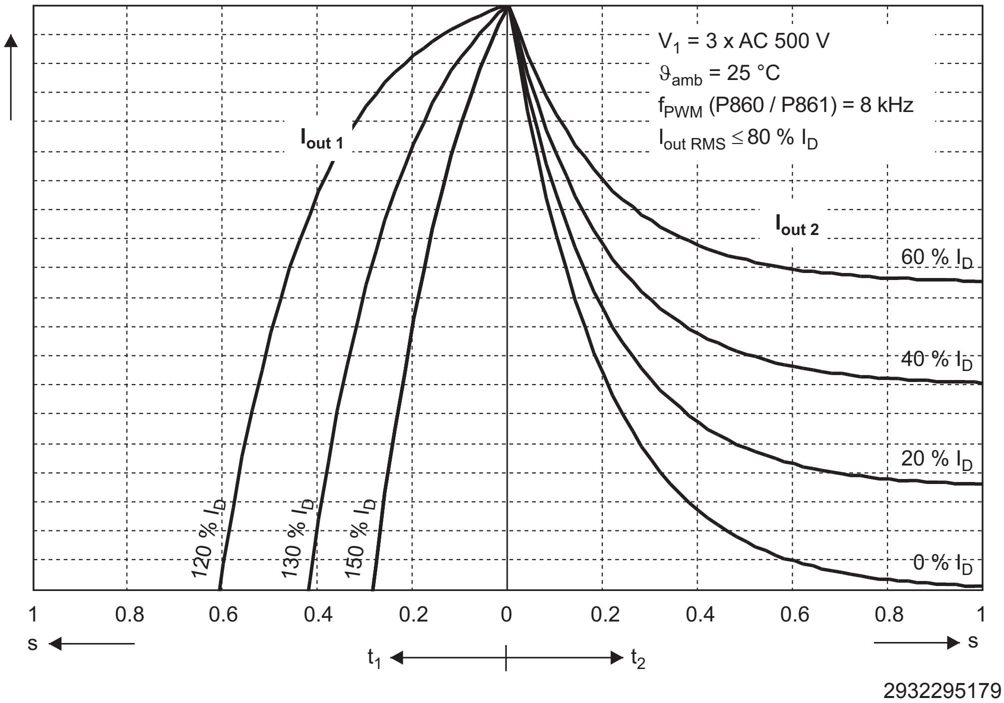
2932292491

Brief overload capacity at f_{PWM} = 16 kHz (400 V / 40 °C)

MDX61B, BG 1-6 overload capacity at 500 V / 25 °C

Cycle frequency f_{PWM} = 8 kHz:

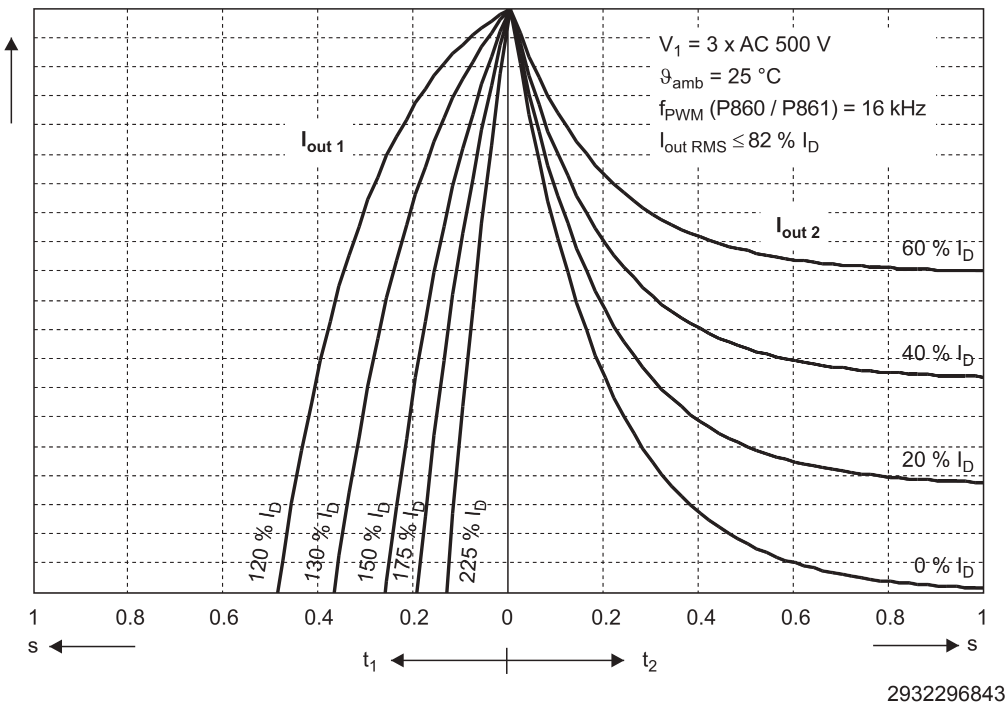
The permitted mean inverter output current is $I_{out\ RMS} \leq 80\%\ I_D$.



Brief overload capacity at f_{PWM} = 8 kHz (500 V / 25 °C)

Cycle frequency f_{PWM} = 16 kHz:

The permitted mean inverter output current is $I_{out\ RMS} \leq 82\%\ I_D$.

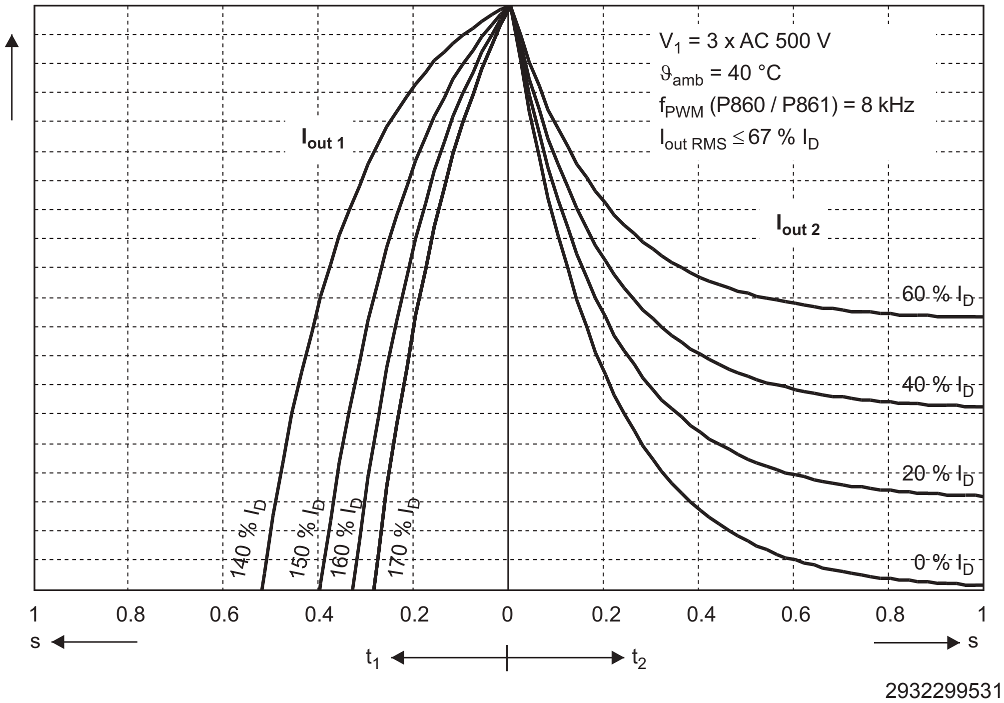


Brief overload capacity at f_{PWM} = 16 kHz (500 V / 25 °C)

MDX61B, BG 1-6 overload capacity at 500 V / 40 °C

Cycle frequency f_{PWM} = 8 kHz:

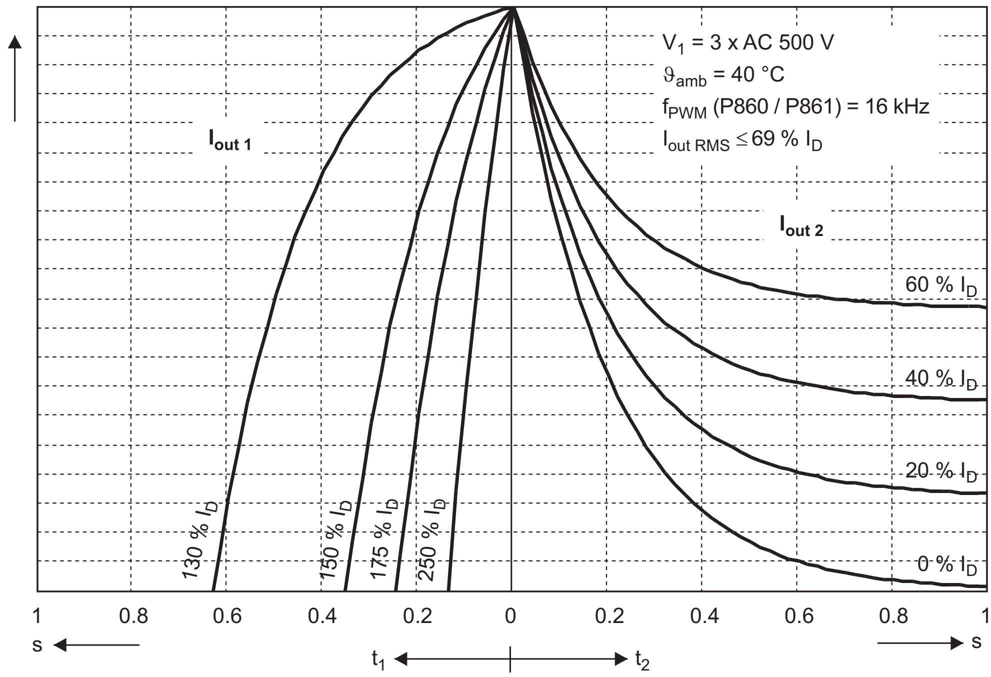
The permitted mean inverter output current is $I_{out\ RMS} \leq 67\%\ I_D$.



Brief overload capacity at f_{PWM} = 8 kHz (500 V / 40 °C)

Cycle frequency f_{PWM} = 16 kHz:

The permitted mean inverter output current is $I_{out\ RMS} \leq 69\%\ I_D$.



2932301195

Brief overload capacity at f_{PWM} = 16 kHz (500 V / 40 °C)

9.10 Braking resistor selection

DANGER

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

Severe or fatal injuries from electric shock.

- The braking resistor cables must be suitable for this high DC voltage.
- Install the braking resistor cables according to the regulations.

WARNING

The surfaces of the braking resistors get very hot when the braking resistors are loaded with P_N.

Risk of burns and fire.

- Choose a suitable installation location. Braking resistors are usually mounted on top of the control cabinet.
- Do not touch the braking resistors.

INFORMATION

- The data applies to BW..., BW...-T and BW...-P braking resistors.
- For BW..., BW...-T and BW...-P braking resistors, plan for a load derating of 4% per 10 K from an ambient temperature of 40 °C (113 °F) Do not exceed a maximum ambient temperature of 80 °C.
- The overload factor of the BW..-T and BW...-P braking resistors is limited by using an integrated temperature relay:
  - BW...-T up to overload factor 12
  - BW...-P up to overload factor 40
- The **maximum permitted line length** between **MOVIDRIVE®** and the braking resistor is **100 m**.

9.10.1 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.

9.10.2 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:

$$P_{\max} = \frac{U^2{}_{DC}}{R}$$

V_{DC} is the maximum permitted DC link voltage. Its value is

– for MOVIDRIVE® MDX60/61B...-5_3 (400/500 V units) V_{DC} = DC 970 V and

– for MOVIDRIVE® MDX61B...-2_3 (AC 230 V units) V_{DC} = DC 485 V.

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
2.5 Ω	376 kW	94.0 kW
1.4 Ω	670 kW	168 kW

Technical data of BW...-T / BW...-P braking resistors

BW...-T / BW...-P	
Connection cross section for signal contact/tightening torque	1 x 2.5 mm²/ 1 Nm
Switching capability of the thermostat's signal contact	• DC 2 A / DC 24 V (DC11) • AC 2 A / AC 230V (AC11)
Switch contact (NC)	according to EN 61800-5-1

9.10.3 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			**BW100-006-T**			**BW168-T**	**BW268-T**
Part number			1820 419 8			1820 133 4	1820 417 1
Continuous 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[1]	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 the **regenerative power limit** 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	2.4 A	0.6 A	1 A	3.4 A	4.2 A
Design	PTC	Flat-design	Wire resistor on ceramic core	Flat-design		Wire resistor on ceramic core	
Connections / Tightening torque	Cable	Cable	Ceramic terminals 2.5 mm^2 (AWG13) 0.5 Nm	Cable		Ceramic terminals 2.5 mm^2 (AWG13) 0.5 Nm	
Degree of protection	IP20	IP54	IP20 (when installed)	IP54		IP20 (when installed)	
Ambient temperature ϑ_U	-20 ... +40 °C						
Type of cooling	KS = self-cooling						
For MOVIDRIVE® (recommended)	0005 ... 0014	0005 ... 0022	0015 ... 0040	0005 ... 0014		0005 ... 0040	0015 ... 0040

1) cdf = Cyclic duration factor of the braking resistor in relation to 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	1820 134 2	1820 084 2	1820 135 0	1820 136 9	1820 415 5	1820 137 7
Continuous 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[1]	2.2 kW	3.6 kW	7.2 kW	2.1 kW	4.7 kW	8.5 kW
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[2]	7.2 kW	15.6 kW	24.0 kW
6% cdf	11 kW	19 kW	20 kW	11.4 kW	24.0 kW	24.0 kW
	Observe the **regenerative power limit** 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	6.5 A	9.2 A	5.5 A	8.1 A	11.3 A
Design	Wire resistor on ceramic core					Grid resistor
Connections / Tightening torque	Ceramic terminals 2.5 mm^2 (AWG13) / 0.5 Nm BW347-T: Ceramic terminals 10 mm^2 (AWG18) / 1.6 Nm					M8 stud / 6 Nm
Degree of protection	IP20 (when installed)					
Ambient temperature ϑ_U	-20 ... +40 °C					
Type of cooling	KS = self-cooling					
For MOVIDRIVE® (recommended)	0055/0075			0110		

1) cdf = Cyclic duration factor of the braking resistor in relation to 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
Continuous braking power (= 100% cdf)	1.5 kW	3.5 kW	7.5 kW	16 kW
Load capacity 50% cdf[1]	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
6% cdf	11.4 kW	26.6 kW	52.2 kW[2]	62.7 kW
	Observe the **regenerative power limit** 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	13.9 A	20.4 A	32.6 A
Design	Wire resistor on ceramic core	Grid resistor		
Connections / Tightening torque	BW018-015: Ceramic terminals 2.5 mm² (AWG13) / 0.5 Nm BW018-015-P: Terminal 2.5 mm² (AWG13) / 1 Nm	Bolt M8 / 6 Nm		
Degree of protection	IP20 (when installed)			
Ambient temperature ϑ_U	-20 ... +40 °C			
Type of cooling	KS = self-cooling			
For MOVIDRIVE® (recommended)	0150/0220 and 2 × parallel with 0370/0450[3]			0220

1) cdf = Cyclic duration factor of the braking resistor in relation to 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**
Part number	1820 414 7	1820 140 7	1820 141 5
Continuous braking power (= 100% cdf)	2.5 kW	5.0 kW	10 kW
Load capacity 50% cdf[1]	4.2 kW	8.5 kW	17 kW
At 25% cdf	7.5 kW	15.0 kW	30 kW
12% cdf	11.2 kW	22.5 kW	45 kW
6% cdf	19.0 kW	38.0 kW	76 kW
	Observe the **regenerative power limit** of the inverter! (= 150% of the recommended motor power → technical data)		
Resistance value R_{BW}	12 Ω ±10%		
Trip current (of F16) I_F	14.4 A	20.4 A	28.8 A
Design	Grid resistor		
Connections / Tightening torque	Bolt M8 / 6 Nm		
Degree of protection	IP20 (when installed)		
Ambient temperature ϑ_U	-20 ... +40 °C		
Type of cooling	KS = self-cooling		
For MOVIDRIVE® (recommended)	0300		

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

Braking resistor type BW...-T/-P	BW106-T	BW206-T	BW1.4-170	BW003-420-T
Part number	1820 083 4	1820 412 0	1330 152 7	1330 124 5
Continuous braking power (= 100% cdf) Load capacity At 50% cdf[1)] 25% cdf 12% cdf 6% cdf	13.5 kW 23 kW 40 kW 61 kW 102 kW	18 kW 30.6 kW 54 kW 81 kW 136.8 kW	17 kW 30.6 kW 51 kW 85 kW 270 kW	42kW 75.6 kW 126 kW 210 kW 360 kW
Resistance value R_{BW}	6 Ω ±10%		1.4 Ω ±10%	2.5 Ω ±10%
Trip current (of F16) I_F	47.4 A	54.7 A	110 A	129 A
Design	Grid resistor			
Connections / Tightening torque	Bolt M8 / 6 Nm		Bolt M12 / 15.5 Nm	
Degree of protection	IP20 (when installed)			
Ambient temperature ϑ_U	-20 ... +40 °C			
Type of cooling	KS = self-cooling			
For MOVIDRIVE® (recommended)	0370...0750 and 2 × parallel with 0900/1100/ 1320[2)]		1600/2000/2500	

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

2) When connected in parallel, the load capacity and trip current are doubled.

9.10.4 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-P	BW018-035-T
Part number			1820 136 9	1820 415 5			1820 416 3	1820 138 5
Continuous 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 50% cdf[1]	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	1.9 kW	3.8 kW	4.5 kW	10.5 kW
12% cdf	1.8 kW	3.6 kW	6.0 kW[2]	6.0 kW	3.6 kW	7.2 kW	6.7 kW	13.0 kW
6% cdf	2.8 kW	5.7 kW	6.0 kW	6.0 kW	5.7 kW	8.7 kW	11.4 kW	13.0 kW
	Observe the **regenerative power limit** 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	3.9 A	5.5 A	8.1 A	4.7 A	6.6 A	9.1 A	13.9 A
Design	Wire resistor						Grid resistor	
Connections / Tightening torque	Ceramic terminals 2.5 mm^2 (AWG12) / 0.5 Nm							M8 stud / 6 Nm
Degree of protection	IP20 (when installed)							
Ambient temperature ϑ_U	-20 ... +40 °C							
Type of cooling	KS = self-cooling							
For MOVIDRIVE® (recommended)	0015/0022				0015...0037		2 × parallel with 0110[3]	

1) cdf = Cyclic duration factor of the braking resistor in relation to a cycle duration of $T_D \leq 120$ 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/-P	BW018-075-T	BW915-T	BW012-025-P	BW012-050-T	BW012-100-T	BW106-T	BW206-T
Part number	1820 139 3	1820 413 9	1820 414 7	1820 140 7	1820141 5	1820 083 4	1820 412 0
Continuous braking power (= 100 cdf)	7.5 kW	15.6 kW	2.5 kW	5.0 kW	10 kW	13.5 kW	18 kW
Load capacity At 50% cdf[1]	12.7 kW	15.6 kW	4.2 kW	8.5 kW	17 kW	23 kW	30.6 kW
25% cdf	13.0 kW	15.6 kW	7.5 kW	15.0 kW	19.6 kW	39.2 kW	39.2 kW
12% cdf	13.0 kW[2]	15.6 kW	11.2 kW	19.6 kW	19.6 kW	39.2 kW	39.2 kW
6% cdf	13.0 kW	15.6 kW	19.0 kW	19.6 kW	19.6 kW	39.2 kW	39.2 kW
	Observe the **regenerative power limit** 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	32.6 A	14.4 A	20.4 A	28.8 A	47.4 A	54.7 A
Design	Grid resistor						
Connections / Tightening torque	M8 stud / 6 Nm						
Degree of protection	IP20 (when installed)						
Ambient temperature ϑ_U	-20 ... +40 °C						
Type of cooling	KS = self-cooling						
For MOVIDRIVE® (recommended)	2 × parallel with 0110		0055/0075			0150 and 2 × parallel with 0220/0300[3]	

1) cdf = Cyclic duration factor of the braking resistor in relation to 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.

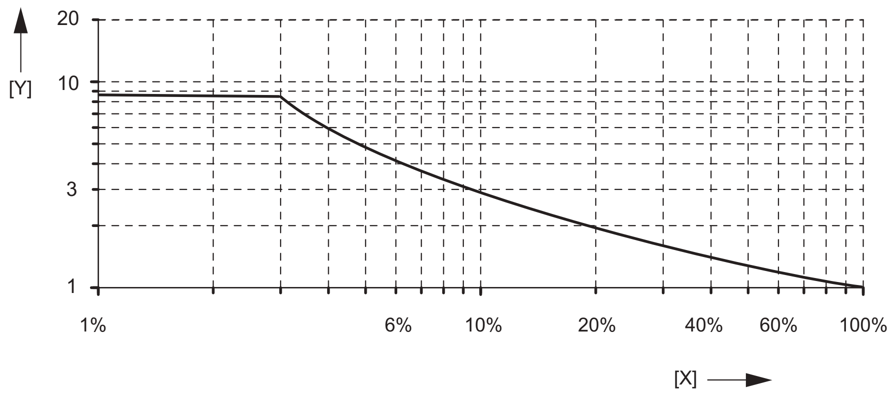
9.10.5 Overload capacity for braking resistors

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 (see following diagrams). Observe the conditional peak braking power due to the DC link voltage when determining the load capacity.

The cdf braking power is calculated using the following formula:

CDF braking power = continuous braking power × overload factor

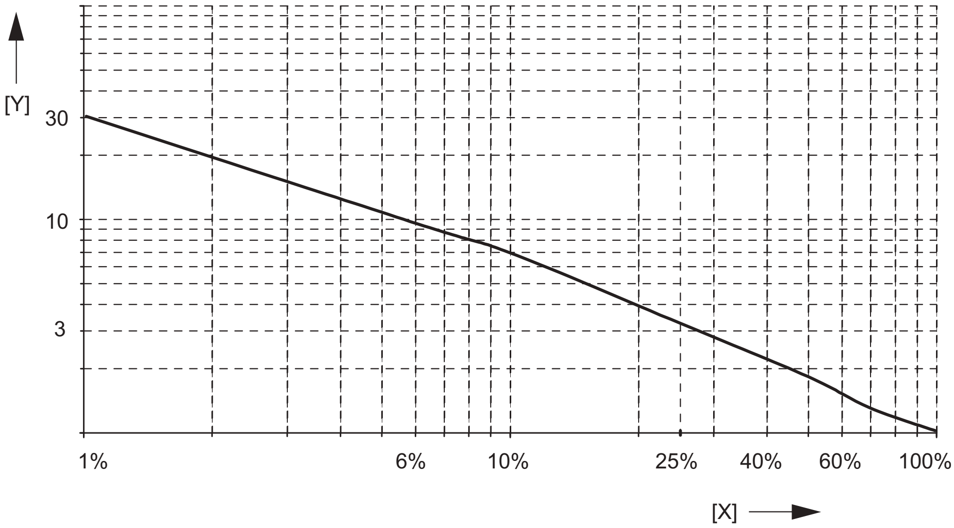
Overload capacity for flat-type braking resistors



Overload factor depending on the cyclic duration factor for flat-type braking resistors

[X] Cyclic duration factor (cdf)	1%	3%	6%	15%	25%	40%	60%	80%	100%
[Y] Overload factor	8.7	8.6	4	2.6	1.83	1.5	1.2	1.12	1

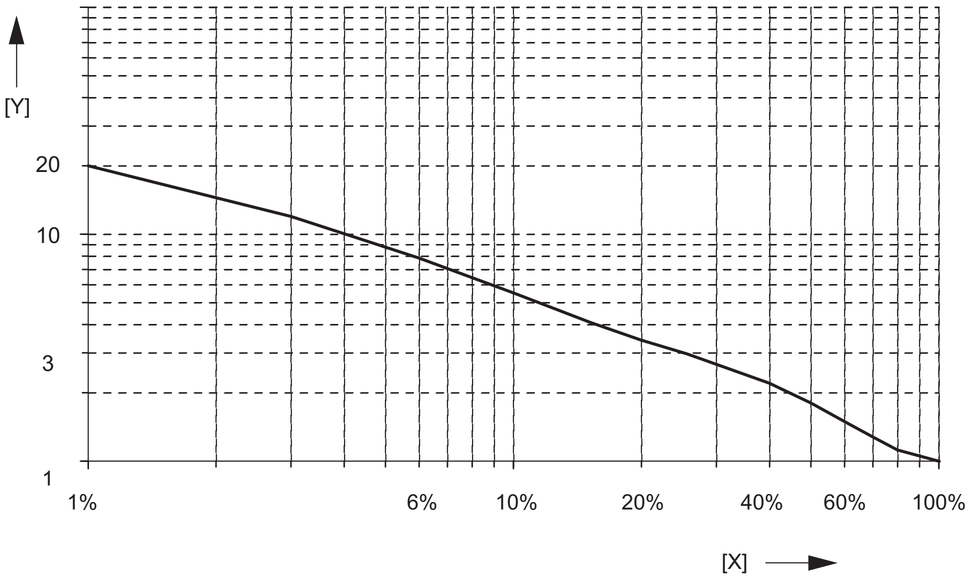
Overload factor for wire resistors on ceramic core



Overload factor depending on the cyclic duration factor for wire resistors

[X] Cyclic duration factor (cdf)	1%	3%	6%	15%	25%	40%	60%	80%	100%
[Y] Overload factor	30	15	9.5	5	3.2	2.2	1.5	1.12	1

Overload factor for grid resistors



Overload factor depending on the cyclic duration factor for grid resistors

[X] Cyclic duration factor (cdf)	1%	3%	6%	15%	25%	40%	60%	80%	100%
[Y] Overload factor	20	12	7.6	4	3	2.2	1.5	1.12	1

Calculation example

Given:

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

Required:

- BW.. braking resistor

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 .**

   The **maximum braking resistance value is 72 Ω** for a peak braking power of 13 kW when using a **MDX60B/61B...-5_3 (AC 400/500 V unit)** (→ Peak braking power table).

   The **maximum braking resistance value is 18 Ω** for a peak braking power of 13 kW when using a **MDX60B/61B...-2_3 (AC 230/500 V unit)** (→ Peak braking power table).

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)

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

INFORMATION

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

9.11.1 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 circuits (faster cut-off)

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

- All hoist applications
- The CFC and SERVO operating modes

9.11.2 Brake control

Always activate the brake via binary output DOØ2 "/Brake". Do not use the PLC!

The binary output DOØ2 "/Brake" is configured as an output for operating a relay with free-wheeling diode and a control voltage of DC +24 V / max. 150 mA / 3.6 W. A power contactor can be controlled directly with a DC 24 V coil voltage or the BMK brake rectifier. This power contactor is used to switch the brake.

The startup function in the DBG60B keypad and in the MOVITOOLS® MotionStudio engineering software sets the brake parameters for the 2 and 4-pole motors from SEW-EURODRIVE. The brake parameters (P73_) must be set manually when using SEW-EURODRIVE motors with a higher number of poles and non-SEW motors.

9.11.3 Brake parameters

INFORMATION

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, then for example hoists might sag.

9.12 *Permitted voltage systems for MOVIDRIVE® B*

INFORMATION

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

The line voltage tolerance (short-term overvoltage or undervoltage) must not exceed 10%.

9.13 *Line contactors and line fuses*

9.13.1 Line contactor

- Only use line contactors of utilization category AC-3 (EN 60947-4-1).

NOTICE

- Do not use the **line contactor K11** (→ MOVIDRIVE® MDX60B/61B operating instructions, chapter "Wiring diagram for basic unit") for jog mode but **only to switch the inverter on and off**. For jog mode, use the the commands "Enable/stop", "CW/stop" or "CCW/stop".
- Observe a minimum switch-off time of 10 s for the supply system contactor K11.

9.13.2 Line fuse types

Sizes 0 – 6

Line protection types in operation classes gL, gG:

- Nominal fusing voltage ≥ nominal line voltage
- Nominal fusing current must be designed for 100% or 125% of the nominal inverter current depending on the inverter utilization.

Power circuit breaker with characteristics B, C:

- Nominal circuit breaker voltage ≥ nominal line voltage
- The nominal voltage of the line protection circuit breaker must be 10% above the nominal inverter current.

Size 7

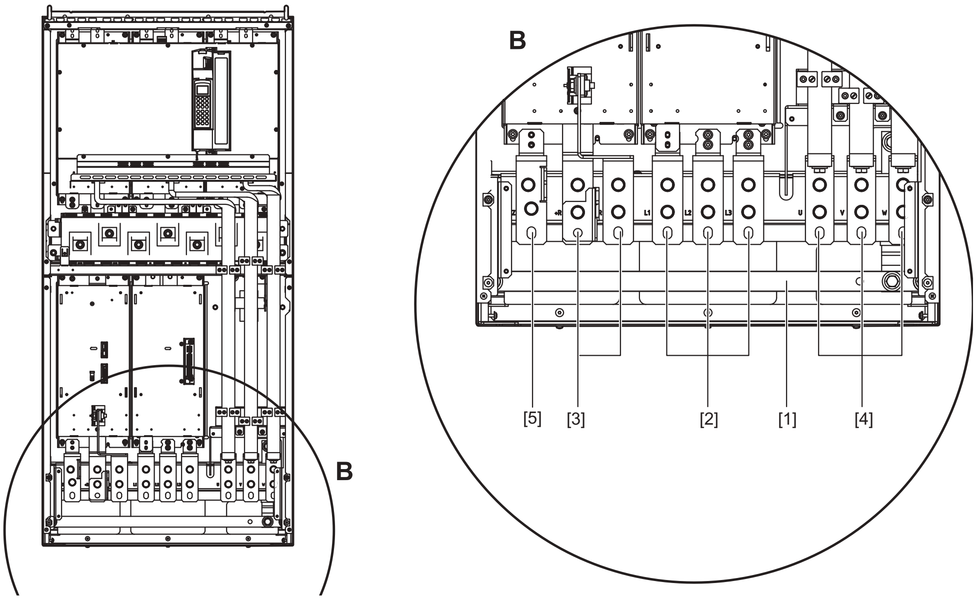
Line fuses type gRL are recommended for protecting the unit. This is a combination of semiconductor and line protection fuse and is required for protecting the input rectifier.

9.14 Power connection for size 7

9.14.1 Power connections

Size 7 MOVIDRIVE® B has other connections than sizes 0 to 6. All power connections are made from underneath via M12 cable lugs.

PE is connected with specific shield clamps on the PE busbar. This is where also the motor shields can be applied.



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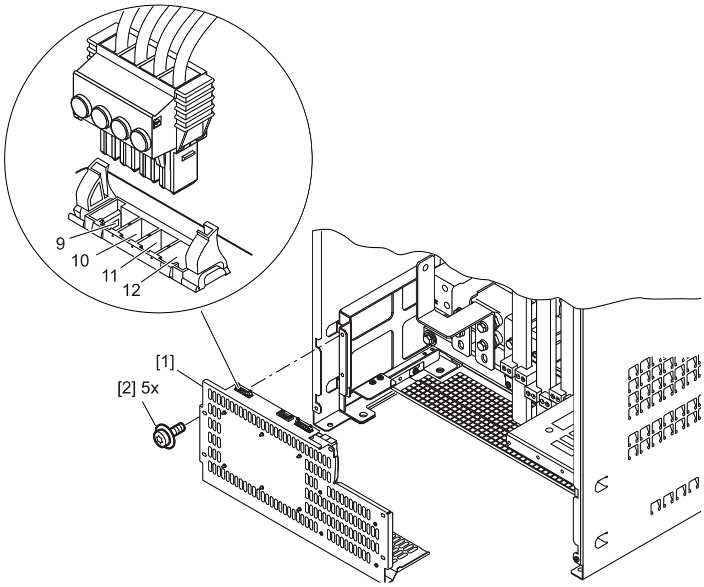
[1] PE connection rail (thickness = 10 mm)
[2] X1: Power supply connection 1/L1, 2/L2, 3/L3
[3] X3: Braking resistor connection 8/+R, 9/–R
[4] X2: Motor connection 4/U, 5/V, 6/W
[5] -U_Z: Only with DC link adapter DLZ12B or DLZ14B accessory:

9.14.2 Auxiliary supply

Unlike sizes 0 to 6, size 7 has a switched-mode power supply unit that is not supplied from the DC link but requires its own AC 3 × 400 V supply. This voltage can be derived from the mains or (even better) from an auxiliary supply in the control circuit. The unit cannot be taken into operation without connecting this power supply unit.



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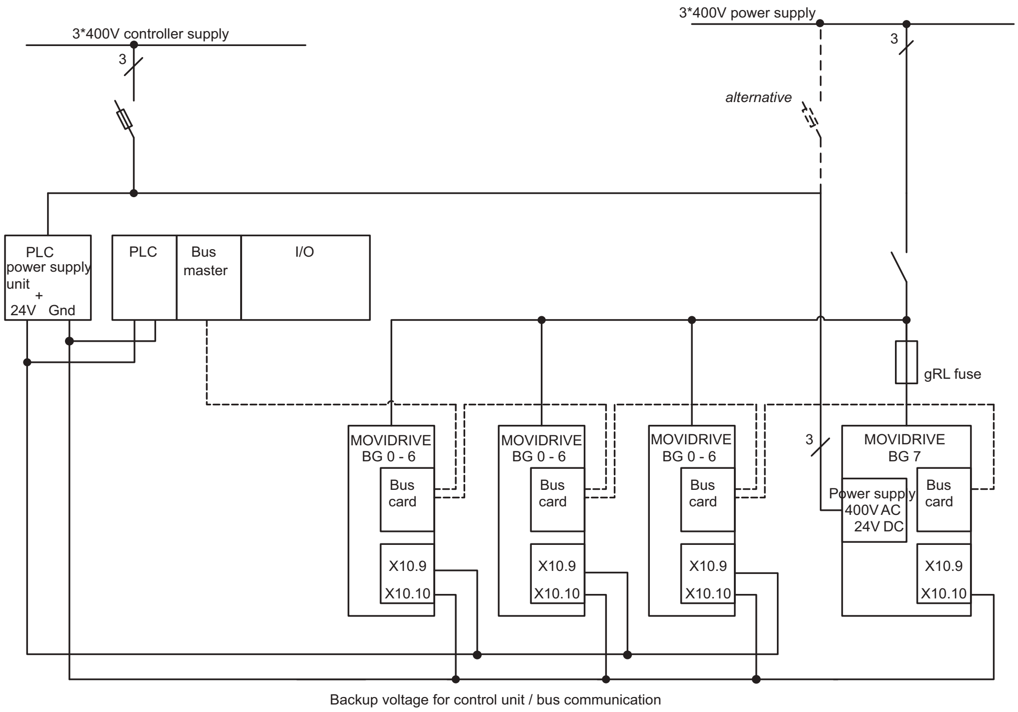
[1] DC power supply unit
[2] Screw

	INFORMATION
	Do not apply external 24 V to X10.9.



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Auxiliary supply X10.9/10 on the control unit only supplies the control unit, not the power electronics and internal unit communication of MOVIDRIVE® B size 7. This is why the unit must be supplied as shown in the figure.

For connecting the binary inputs and outputs, refer to the wiring diagram of the signal terminals.

	INFORMATION
	• The power supply unit has a rated current of 2.4 A. • The starting current is up to a max. of 30 A (slow-blow fuses are required)

9.15 *Line and motor cables*

9.15.1 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").

9.15.2 Cable cross sections and fusing

If single-core copper cables with PVC insulation routed in cable ducts are used, SEW-EURODRIVE suggests the following cable cross-sections and fuses for an ambient temperature of 25 °C and rated line currents of 100% of the rated inverter current:

9.15.3 AC 400/500 V units SI units, V_{line} = 3 × 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			
Supply system cable L1/L2/ L3	1.5 mm²				1.5 mm²			
PE conductor	2 × 1.5 mm² or 1 × 10 mm²				2 × 1.5 mm² or 1 × 10 mm²			
Motor cable U/V/W	1.5 mm²				1.5 mm²			
Unit terminal cross section of the power section	Separable terminal strip 4 mm² conductor end sleeve DIN 46228				Separable terminal strip 4 mm² 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
Supply system cable L1/L2/ L3	2.5 mm²		4 mm²	6 mm²	10 mm²	16 mm²
PE conductor	2 × 4 mm² or 1 × 10 mm²			2 × 6 mm² or 1 × 10 mm²	1 × 10 mm²	1 × 16 mm²
Motor cable U/V/W	2.5 mm²		4 mm²	6 mm²	10 mm²	16 mm² 1)
Unit terminal cross section of the power section	Terminal blocks 4 mm² conductor end sleeves DIN 46228		M4 screw and washer assembly with terminal clip 4 mm² conductor end sleeve DIN 46228 6 mm² crimp cable lug DIN 46234	M6 screw and washer assembly with washer max. 25 mm² Crimp cable lug DIN 46234		
Tightening torque	1.5 Nm			3.5 Nm		

1) With synchronous servo drives: Use motor with terminal box!

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
Supply system cable L1/L2/L3	25 mm²	35 mm²		50 mm²	70 mm²	95 mm²	150 mm²
PE conductor	1 × 16 mm²			25 mm²	35 mm²	50 mm²	70 mm²
Motor cable U/V/W	25 mm² 1)	35 mm²		50 mm²	70 mm²	95 mm²	150 mm²
Unit terminal cross section of the power section	M10 bolt with nut max. 70 mm² Press cable lug DIN 46235				M12 bolt with nut max. 185 mm² Press cable lug DIN 46235		
Tightening torque	14 Nm				20 Nm		

1) With synchronous servo drives: Use motor with terminal box!

Size 7 The fuse value depends on the application and must be adjusted when the unit is operated in 125% mode.

MDX61B...-503	1600	2000	2500	2500 in 125% mode
Size	7			
Fuses	315A gRL	400A gRL	500A gRL	630A gRL
Supply system cable L1/L2/L3	150 mm² / 2 × 50 mm²	240 mm² / 2 × 70 mm²	2 × 95 mm²	2 × 150 mm²
PE conductor	70 mm² / 2 × 25 mm²	120 mm² / 2 × 35 mm²	150 mm² / 2 × 50 mm²	150 mm²/ 2 × 70 mm²
Motor cable U/V/W	150 mm² / 2 × 50 mm²	240 mm² / 2×70 mm²	2 × 95 mm²	2 × 150 mm²
Unit terminal cross section of the power section	Connection bar with bore for M12 max. 2 × 240 mm² Press cable lug DIN 46235			
Tightening torque	70 Nm			

9.15.4 AC 230 V units SI units, V_{line} = 3 × 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
Supply system cable L1/L2/L3	1.5 mm²		4 mm²	4 mm²	6 mm²
PE conductor	2 × 1.5 mm² 1 × 10 mm²		2 × 4 mm² 1 × 10 mm²	2 × 4 mm² 1 × 10 mm²	2 × 6 mm² 1 × 10 mm²
Motor cable U/V/W	1.5 mm²		4 mm²	4 mm²	6 mm²
Unit terminal cross section of the power section	Separable terminal strip 4 mm² conductor end sleeve DIN 46228			M4 screw and washer assembly with terminal clip 4 mm² conductor end sleeve DIN 46228 6 mm² 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
Supply system cable L1/L2/L3	10 mm²	16 mm²	25 mm²	35 mm²
PE conductor	1 × 10 mm²	1 × 16 mm²	1 × 16 mm²	1 × 16 mm²
Motor cable U/V/W	10 mm²	16 mm²	25 mm²	35 mm²
Unit terminal cross section of the power section	M6 screw and washer assembly with washer max. 25 mm² Crimp cable lug DIN 46234		M10 bolt with nut max. 70 mm² Press cable lug DIN 46235	
Tightening torque	3.5 Nm		14 Nm	

9.15.5 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 in mm^2	Smallest wire bending space in 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
240	305	305	380

9.15.6 AC 400/500 V units according to USA NEC, V_{line} = 3 × 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
Supply system cable L1/L2/L3	AWG14				AWG14			
PE conductor	AWG14				AWG14			
Motor cable 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
Supply system cable L1/L2/L3	AWG12		AWG10	AWG8	AWG6	AWG4
PE conductor	AWG12		AWG10	AWG10		AWG8
Motor cable U/V/W	AWG12		AWG10	AWG8	AWG6 1)	AWG4 1)
Unit terminal cross section of the power section	Terminal blocks 4 mm^2 conductor end sleeves 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 motor with terminal box!

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
Supply system cable L1/L2/L3	AWG4	AWG3	AWG1	AWG2/0	AWG2/0	AWG3/0	AWG4/0
PE conductor	AWG8	AWG6	AWG6		AWG6	AWG6	AWG4
Motor cable U/V/W	AWG4 1)	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 motor with terminal box!

MDX61B...-503	1600	2000	2500
Size	7		
Fuses	315 A	400 A	500 A
Supply system cable L1/L2/L3	400 kcmil 2 × AWG2/0	2 × AWG3/0	2 × 250 Kcmil
PE conductor	AWG3	AWG3	AWG2
Motor cable U/V/W	400 kcmil 2 × AWG2/0	2 × AWG3/0	2 × 250 Kcmil
Unit terminal cross section of the power section	Connection rail with bore for M12 max. 2 × 450 Kcmil Crimp cable lug		
Tightening torque	70 Nm		

9.15.7 AC 230 V units according to USA NEC, V_{line} = 3 × 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
Supply system cable L1/L2/ L3	AWG14		AWG12	AWG10	
PE conductor	AWG14		AWG12	AWG10	
Motor cable 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
Supply system cable L1/L2/ L3	AWG6	AWG4	AWG4	AWG3
PE conductor	AWG10	AWG8	AWG8	AWG6
Motor cable U/V/W	AWG6	AWG4	AWG4	AWG3
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	

9.15.8 Permitted motor cable lengths

The **maximum motor cable 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 limiting values, but exclusively by the voltage drop along the motor cable.
- For encoder connection (VFC-n, CFC, SERVO): Maximum cable length for the encoder connection is 100 m at a capacitance per unit length ≤ 120 nF/km (exception: 200 m for HTL encoders with interface adapter DWE12B)

The following data applies as an approximation:

MOVIDRIVE® MDX60/61B...-5_3:

MDX60/61B...-5_3 at V_{line} = 3 × AC 400 V		0005...0014	0015	0022	0030	0040	0055	0075...1320	1600...2500
		Recommended maximum motor cable length in m							
		Shielded line							
PWM frequency (P860/P861)	2.5kHz	–	–	–	–	–	–	–	400
	4 kHz	120	120	200	250	300	300	400	300
	8 kHz	80	80	120	150	250	250	300	–
	12 kHz	50	50	80	120	200	200	250[1)]	–
	16 kHz	40	40	60	100	150	150	200[1)]	–
		Unshielded line							
PWM frequency (P860/P861)	2.5 kHz	–	–	–	–	–	–	–	1200
	4 kHz	360	360	600	750	900	900	1200	900
	8 kHz	240	240	360	450	750	750	900	–
	12 kHz	150	150	240	360	600	600	750[1)]	–
	16 kHz	120	120	180	300	450	450	600[1)]	–

1) Not valid for size 6

MOVIDRIVE® MDX61B...-2_3:

MDX61B...-2_3 at V_{supply} = 3 × AC 230 V		0015	0022	0037	0055	0075	0110 ... 0300
		Recommended maximum motor cable length in m					
		Shielded line					
PWM frequency (P860/P861)	4 kHz	120	200	250	300	300	400
	8 kHz	80	120	150	250	250	300
	12 kHz	50	80	120	200	200	250
	16 kHz	40	60	100	150	150	200
		Unshielded line					
PWM frequency (P860/P861)	4 kHz	360	600	750	900	900	1200
	8 kHz	240	360	450	750	750	900
	12 kHz	150	240	360	600	600	750
	16 kHz	120	180	300	450	450	600

INFORMATION

SEW-EURODRIVE recommends not to use a ground fault circuit interrupter with long motor cables. The earth-leakage currents caused by cable capacitance may cause mis-tripping.

9.15.9 Voltage drop

The cable cross section of the motor cable 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 in A =**																				
	4	**6**	**8**	**10**	**13**	**16**	**20**	**25**	**30**	**40**	**50**	**63**	**80**	**100**	**125**	**150**	**200**	**250**	**300**	**350**	**400**
Copper	Voltage drop ΔV in V with length = 100 m and ϑ = 70 °C																				
1.5 mm²	5.3	8	10.6	13.3	17.3	21.3	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
2.5 mm²	3.2	4.8	6.4	8.1	10.4	12.8	16	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
4 mm²	1.9	2.8	3.8	4.7	6.5	8.0	10	12.5	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
6 mm²					4.4	5.3	6.4	8.3	9.9	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
10 mm²						3.2	4.0	5.0	6.0	8.2	10.2	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
16 mm²								3.3	3.9	5.2	6.5	7.9	10.0	1)	1)	1)	1)	1)	1)	1)	1)
25 mm²									2.5	3.3	4.1	5.1	6.4	8.0	1)	1)	1)	1)	1)	1)	1)
35 mm²											2.9	3.6	4.6	5.7	7.2	8.6	1)	1)	1)	1)	1)
50 mm²														4.0	5.0	6.0	1)	1)	1)	1)	1)
70 mm²																	5.8	1)	1)	1)	1)
95 mm²																	4.2	5.3	1)	1)	1)
150 mm²																		3.3	4.0	1)	1)
185 mm²																			3.2	3.8	1)
240 mm²																			2.5	2.9	3.3

1) Load not permitted according to IEC 60364-5-52.

Line cross section	**Load with I in A =**																				
	4	**6**	**8**	**10**	**13**	**16**	**20**	**25**	**30**	**40**	**50**	**63**	**80**	**100**	**125**	**150**	**200**	**250**	**300**	**350**	**350**
Copper	Voltage drop ΔV in V with length = 100 m and ϑ = 70 °C																				
AWG16	7.0	10.5	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	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)	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)	1)	1)
AWG10					5.6	6.9	8.7	10.8	13.0	1)	1)	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)	1)	1)
AWG6								4.3	5.1	6.9	8.6	10.8	13.7	1)	1)	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)	1)	1)
AWG3									2.6	3.4	4.3	5.1	6.9	8.6	10.7	12.8	13.7	1)	1)	1)	1)
AWG2											3.4	4.2	5.4	6.8	8.5	10.2	10.9	13.6	1)	1)	1)
AWG1												3.4	4.3	5.4	6.8	8.1	8.6	10.8	13.5	1)	1)
AWG1/0												2.6	3.4	4.3	5.4	6.4	6.7	8.6	10.7	13.2	1)
AWG2/0													2.7	3.4	4.3	5.1	5.4	6.8	8.5	10.5	12.0
AWG3/0														2.6	3.3	4.0	4.1	5.2	6.5	8.3	9.5
AWG4/0															3.1	3.8	4.0	5.0	6.2	6.6	7.5
Kcmil 250																3.0	3.2	4.0	5.0	5.6	6.4
Kcmil 300																	2.6	3.3	4.0	4.6	5.3
Kcmil 350																		2.8	3.4	4.0	4.5
Kcmil 400																			3.0	3.5	4.0
Kcmil 450																				3.1	3.5

1) More than 3% voltage drop in relation to V_{line} = AC 460 V. Observe the applicable guidelines regarding the load of the cables.

9.16 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.

	INFORMATION
	The parameter settings apply to all connected motors.

9.16.1 Motor currents

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

9.16.2 Motor cables 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 cables connected in parallel is determined as follows:

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

l_{ges} = Total length of the motor line connected in parallel

l_{max} = Recommended maximum motor cable length (see page 455)

n = Number of motors connected in parallel

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

9.16.3 Motor size

The motors in a group must not be more than three motor types apart.

9.16.4 Output filter

An HF... output filter is required if the maximum motor cable length (l_{max}) given in the table "Permitted motor cable lengths" is exceeded. This may be the case in large groups (n) or when there are long motor cable lengths connected in parallel (l_{ges}). In this case, the maximum motor cable length is not limited by the limit value given in the table but by the voltage drop on the motor cable. The total value of the rated motor currents must not exceed the rated throughput current of the output filter.

9.17 Connecting explosion-proof AC motors

Observe the following instructions when connecting explosion-proof AC motors to MOVIDRIVE® B inverters:

- The inverter must be installed outside the potentially explosive area.
- Observe industry-specific and country-specific regulations.
- Observe the regulations and information of the motor manufacturer with regard to operation on a frequency inverter, e.g. mandatory sine filter.
- 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 MOVIDRIVE® B 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® B.

INFORMATION

For more information on the operation of explosion-proof AC motors, refer to the Explosion-Proof AC Motors, Asynchronous Servomotors operating instructions. You can order the operating instructions from SEW-EURODRIVE.

9.18 *EMC-compliant installation in accordance with EN 61800-3*

The designated use of drive systems with MOVIDRIVE® is 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, 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 2004/108/EC.

MOVIDRIVE® MDX60/61B inverters of size 0, 1 and 2 are equipped with a line filter as standard. The line filter on the supply system end complies with limit class C2 to EN 61800-3 without further measures.

9.18.1 Interference immunity

With regard to interference immunity, MOVIDRIVE® meets **all** the requirements stipulated in EN 61000-6-2 and EN 61800-3.

9.18.2 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 (grid) and the system configuration.

Class C3 limit

EMC-compliant installation according to EN 61800-3, **Class C3 limit**, is achieved as follows for **size 7**:

Class C3 limit	Motor end Size 7	Line end Size 7
1st option	Output choke HD005	No measure required
2nd option	Shielded motor cable	No measure required

Class C2 limit

Three options are available for EMC-compliant installation of sizes 0 to 6 in accordance with EN 61800-3, **class C2 limit**, depending on the machine configuration:

Class C2 limit	Motor end	Line end	
	Sizes 0 to 6	Sizes 0 to 2	Sizes 3 to 6
1st option	HD... output choke	No measure required	NF...-... line filter
2nd option	Shielded motor cable	No measure required	NF...-... line filter
3rd option	HF... output filter	No measure required	NF...-... line filter

EMC-compliant installation according to EN 61800-3, **Class C2 limit**, is achieved as follows for **size 7**:

Class C2 limit	Motor end Size 7	Line end Size 7
	Output choke HD005	NF600-503 line filter

Class C1 limit

Three options are available for EMC-compliant installation in accordance with EN 61800-3, **class C1 limit**, depending on the machine configuration:

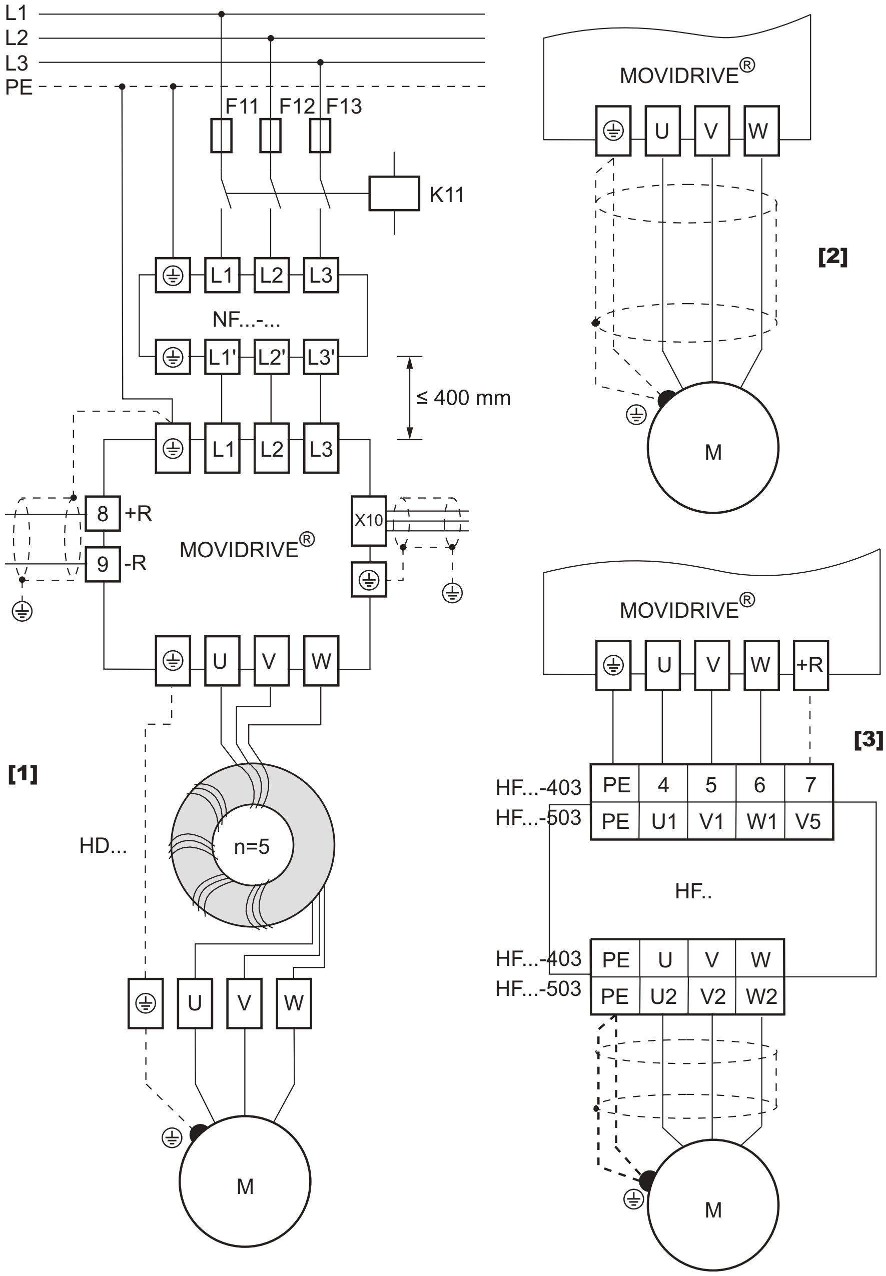
Class C1 limit	Motor end Sizes 0 to 5	Line end Sizes 0 to 5
1st option	HD... output choke	NF...-... line filter
2nd option	Shielded motor cable	NF...-... line filter
3rd option	HF... output filter	NF...-... line filter

9.18.3 IT systems

INFORMATION

No EMC limits are specified for interference emission in voltage supply systems without a grounded star point (IT systems).

9.18.4 Block diagram of class C1 limit



EMC-compliant installation according to class C1 limit

(1) = 1. Possible solution with HD... output choke

(2) = 2. Possible solution with shielded motor line

(3) = 3. Possible solution with HF... output filter (see chapter "HF output filter")

For more information, refer to the publication entitled Drive Engineering – Practical Implementation, Electromagnetic Compatibility. You can order the publication from SEW-EURODRIVE.

9.19 *HF… output filter type*

9.19.1 Important information

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 the voltage drop in the output filter into account and the reduced motor torque that results. This applies particularly to AC 230 V units with output filters.
- Flying start function is not possible with HF.. output filter

Installation, connection and operation

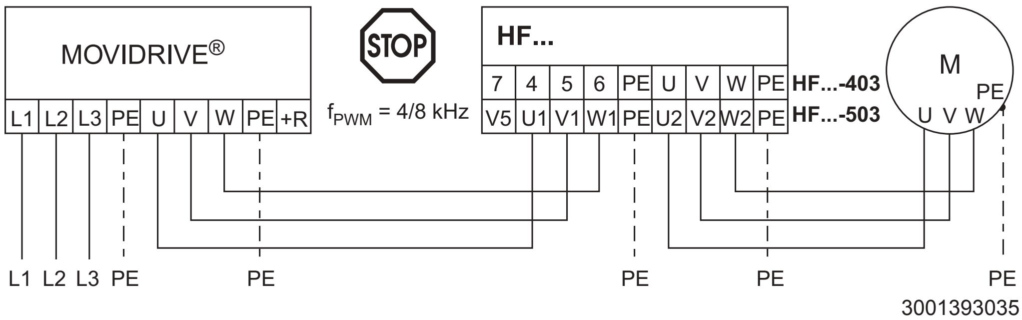
INFORMATION

- 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 inverter and output filter to the absolutely necessary length. 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 (= continous output current).
- Several motors can be connected together 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 to 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).
- For HF450-503, please note that an I_N reduction always has to be considered depending on the PWM frequency.

$V_{DC\ link}$ connection

Operation without $V_{DC\ link}$ connection:

- Approved only for PWM frequency 4 kHz or 8 kHz.



HF...-... output filter connection without $V_{DC\ link}$ connection

INFORMATION

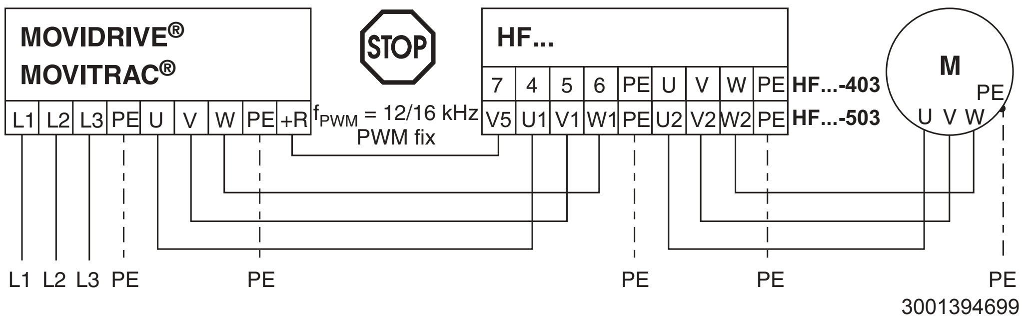
Operation with $V_{DC\ link}$ connection

(Connection of inverter terminal + R with HF…-503 terminal V5 or HF…-403 terminal 7):

- Only approved for PWM frequency 12 kHz or 16 kHz. Note that increased losses (= power reduction) occur in the inverter when operating with 12 kHz or 16 kHz.
- Optimized grounded filter effect.
- Improved filter effect in the low-frequency range (≤ 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 is only permitted if V_{line} ≤ AC 400 V, not if V_{line} = AC 500 V.
- The $V_{DC\ link}$ 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.
- HF180 and HF325 output filters can only be operated without $V_{DC\ link}$ connection.

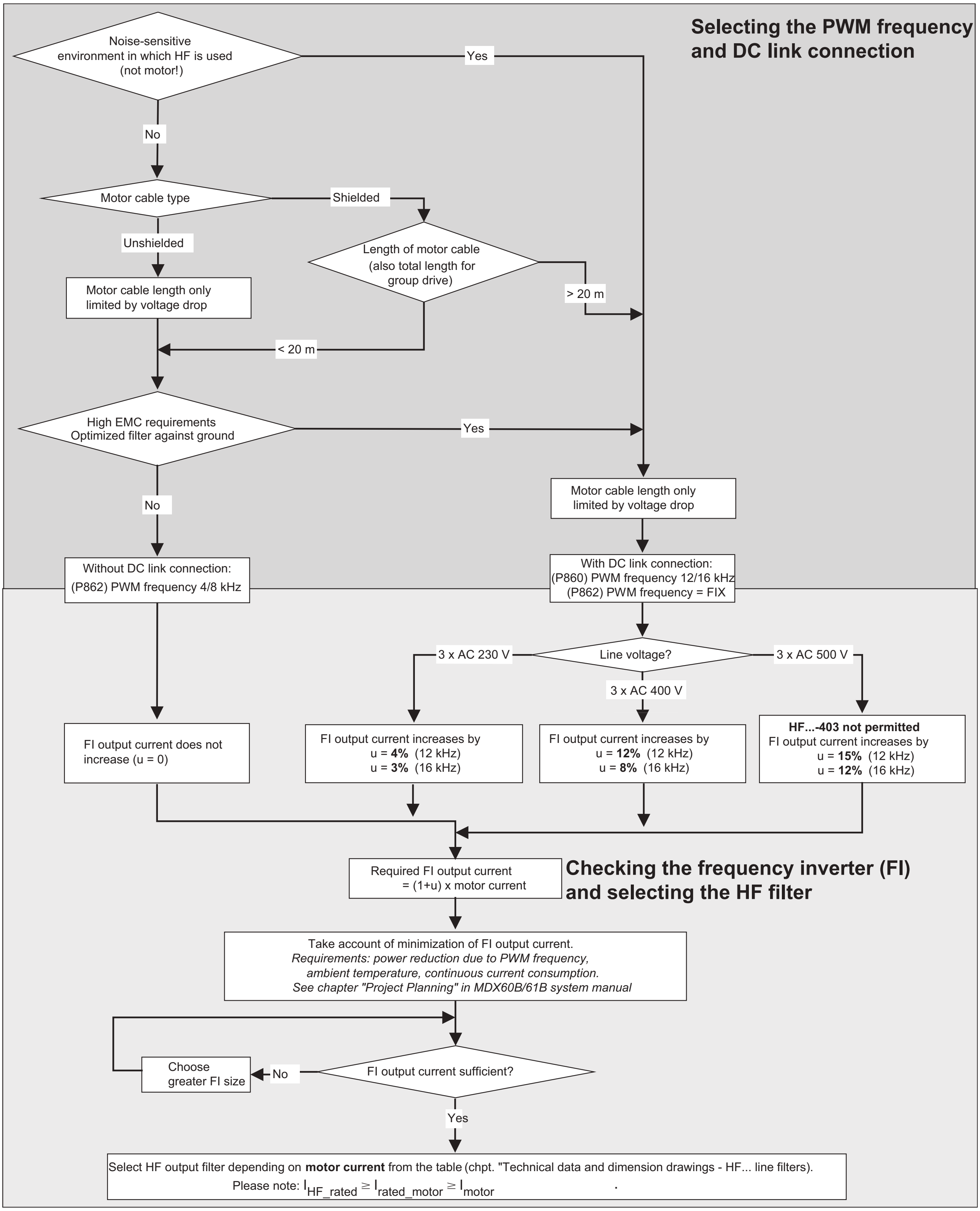
f_{PWM}	V_{line} = 3 × AC 230 V	V_{line} = 3 × AC 400 V	V_{line} = 3 × AC 500 V
12 kHz	4%	12%	15%
16 kHz	3%	8%	12%

The increased 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.



HF...-... output filter connection with $V_{DC\ link}$ connection

The procedure for selecting the PWM frequency and checking the inverter is summarized in the following figure.



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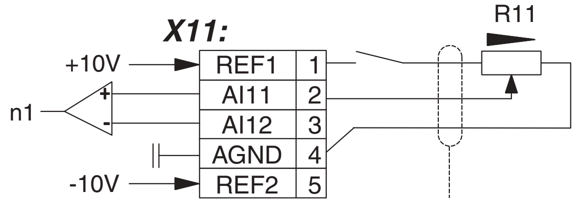
9.20 *Electronics cables and signal generation*

- The electronics terminals of the basic unit are suitable for the following cross sections:
  - Single core 0.20...2.5 mm^2 (AWG24...12)
  - Double core 0.20...1 mm^2 (AWG24...17)

  Route electronics cables separately from power cables, contactor control cables or braking resistor cables. If you use shielded electronics cables, earth 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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Switch potentiometer setpoint

- Never connect 0 V cables (AGND, DGND, DCOM) for generating signals. The 0 V 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 control cabinet compartments rather than distributing them.
  - Lay the 0 V cables with 1.5 mm^2 (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 electronics 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" throughout the self-test.
- DC 24 V voltage supply VI24:

  To EN 61131-2, V_N = +24 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.

9.21 External voltage supply DC 24 V

9.21.1 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 line contactor.**

The following tables show the power demand of the MOVIDRIVE® 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.

The 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 (approx. 4 W with SEW encoder).

9.21.2 Power demand

The power values of the options are basic values **without** load on the inputs and outputs.

INFORMATION

- The load of the outputs depends on the connected consumer.
- 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.
- The 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 the MOVIDRIVE® B unit. You have to take the additional power into account when the MOVIDRIVE® B is to provide the voltage supply for these options. Note that MOVIDRIVE® B delivers a maximum total current of DC 400 mA for the DC 24 V outputs.

- DC 24 V power demand of MOVIDRIVE® MDX60/61B **without option**:

Size MDX60B/61B	DC 24 V power demand without option	Power consumption X17:4
0	17.6 W	3 W
1		5 W
2, 2S		6 W
3	23.6 W	7.5 W
4	25.6 W	8 W
5		10 W
6		6 W
7	–	6 W

- Additional DC 24 V power demand of MOVIDRIVE® MDX60/61B **with option** (size 0: only available with option-capable MDX61B units):

Additional DC 24 V power demand with installed option									
DEH11B, DEH21B	**DER11B**	**Fieldbus options**[1)]	**DIO11B**	**DRS11B DIP11B**	**DHP11B**	**OST11B**	**DHE41B**	**DHF41B**	**DHR41B**
5 W	6 W	3 W	6 W	2.5 W	4.5 W	1.5 W	6.5 W	8 W	9.5 W

1) Fieldbus options are: DFP21B, DFI11B, DFI21B, DFE11B, DFE12B, DFE13B, DFE32B, DFE33B, DFE24B , DFD11B, DFC11B, DFS..B

- The safety monitor options DCS21B/31B always require external DC 24 V voltage supply.

Example 1

MOVIDRIVE® MDX61B0022-5A3-4-00 (size 1) with 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 x 0.2 W = 0.8 W
  – Power demand of the brake coil on DB00; 24 V x 0.1 A = 2.4 W

  The total power demand is 23.8 W. No external DC 24 V voltage supply is required in this case.

Example 2

MOVIDRIVE® MDX61B0110-5A3-4-00 (size 2) with the options Hiperface® 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 24V. Additionally, six outputs of the DIO11B option are subject to a load of DC 25 mA.

- 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 x 0.2 W = 1.6 W
  – Power demand of the brake coil on DB00; 24 V x 0.1 A = 2.4 W
  – Power demand of the binary outputs: 6 x 24 V x 0.025 A = 3.6 W

  The total power demand is 39.2 W. External DC 24 V voltage supply is required in this case.

9.22 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. A binary input must be programmed to the "PARAM. SWITCHOVER" function (→ P60_/P61_) for this purpose. You can then change from parameter set 1 to 2 and vice versa in INHIBITED inverter status.

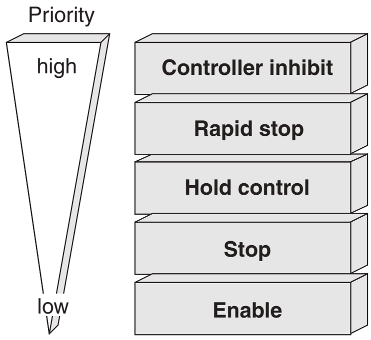
Function	Effect when	
	"0" signal	"1" signal
PARAM. SELECT	Parameter set 1 active	Parameter set 2 active

INFORMATION

- In operation with encoder feedback, switching between the parameter sets must not be faster than every 2 seconds. The reason is to ensure that the encoders can be initialized.
- A changeover contactor should be provided for each of the two motor leads 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!
- Parameter set 2 allows for VFC operating modes without speed control only. Speed control or CFC and SERVO operating modes are not possible.

9.23 *Priority of operating states and interrelation between control signals*

9.23.1 Priority of the operating states



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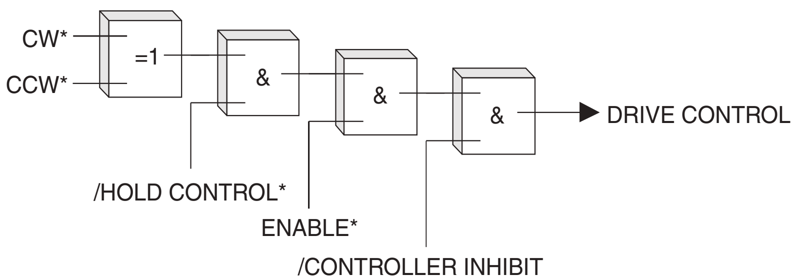
Priority of the operating states

9.23.2 Interrelation between control signals

The following table shows the interrelation of 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 state
	Enable/ Stop	/Hold control	CW/stop	CCW/stop	
"0"	1)	1)	1)	1)	Inhibited
"1"	"0"	2)	2)	2)	Inhibited
"1"	"1"	"0"	3)	3)	Inhibited
"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/stop" = "0"
3) Not relevant if "/Hold control" = "0"



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Interrelation between control signals
* If a binary input is programmed to this function.

9.24 *Limit switches*

9.24.1 Limit switch processing

The limit switch processing provides for the travel range of a drive not to be exceeded. To do this, it is possible to program the binary inputs to the functions "/LS CW" (limit switch right) and "/LS CCW" (limit switch left). 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.

9.24.2 Limit switch contacted (“0” signal)

- The drive is stopped at the emergency ramp t14/t24.
- When the brake function is activated, the brake is applied.
- In IPOS$^{\text{plus®}}$ operating modes, contacting a limit switch generates an error message. A reset is then required to move clear of the limit switch (→ IPOS$^{\text{plus®}}$ manual).

9.24.3 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.
- With activated setpoint stop function: Setpoint > start setpoint

9.24.4 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.

9.24.5 Limit switch monitoring

- 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 F280
- If this is the case, the inverter triggers an emergency stop and displays fault F27 “Limit switches missing.”

10 General Information

10.1 How to use the operating instructions

The operating instructions are an integral part of the product and contain important information for operation and service. The operating instructions are written for all employees who assemble, install, startup, and service this product.

The operating instructions must be legible and accessible at all times. Make sure that staff responsible for the plant and its operation, as well as persons who work independently on the unit, have read 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, contact SEW-EURODRIVE.

10.2 Structure of the safety notes

The safety notes in these operating instructions are designed as follows:

Pictogram	SIGNAL WORD
	Type and source of danger. Possible consequence(s) if disregarded. • Measure(s) to prevent the danger.

Pictogram	Signal word	Meaning	Consequences if disregarded
Example: General danger Specific danger, e.g. electric shock	DANGER	Imminent danger	Severe or fatal injuries
	WARNING	Possible dangerous situation	Severe or fatal injuries
	CAUTION	Possible dangerous situation	Minor injuries
	NOTICE	Possible damage to property	Damage to the drive system or its environment
	INFORMATION	Useful information or tip. Simplifies the handling of the drive system.	

10.3 Rights to claim under limited warranty

A requirement of fault-free operation and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the operating instructions. Therefore, read the operating instructions before you start working with the unit.

10.4 Exclusion of liability

You must comply with the information contained in these operating instructions to ensure safe operation of the MOVIDRIVE® MDX60B/61B inverters and to achieve the specified product characteristics and performance requirements. SEW-EURODRIVE does not assume 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.

10.5 Copyright notice

10.6 Product names and trademarks

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

11 Safety Notes

The following basic safety notes must be read carefully to prevent injury to persons and damage to property. The operator must ensure that the basic safety notes are read and 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, please contact SEW-EURODRIVE.

11.1 General information

Never install or start up damaged products. 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 degree of protection.

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

Refer to the documentation for additional information.

11.2 Target group

Only qualified electricians are authorized to install, startup or service the units or correct unit faults (observing 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.

Any activities regarding transportation, storage, operation, and disposal must be carried out by persons who have been instructed appropriately.

11.3 Designated use

Drive inverters are components intended for installation in electrical systems or machines.

In case of installation in machines, startup of the inverters (meaning the start of designated use) is prohibited until it is determined that the machine meets the requirements stipulated in the Machinery Directive 2006/42/EC; EN 60204 must be observed.

Startup (i.e. the start of designated use) is only permitted under observance of the EMC (2004/108/EC) directive.

The drive inverters meet the requirements stipulated in low voltage guideline 2006/95/ EC. The harmonized standards of the EN 61800-5-1/DIN VDE T105 series in connection with EN 60439-1/VDE 0660 part 500 and EN 60146/VDE 0558 are applied to these drive inverters.

You must observe the technical data and information on the connection requirements as provided on the nameplate and in the documentation.

11.3.1 Safety functions

MOVIDRIVE® MDX60/61B 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, observe the specifications in the "MOVIDRIVE® MDX60B/61B Functional Safety" manual.

11.4 Transportation, storage

Observe the notes on transportation, storage and proper handling. Observe the climatic conditions as stated in the section "General technical data".

11.5 Installation

The units must be installed and cooled according to the regulations and specifications in the corresponding documentation.

Protect the drive inverters from excessive strain. Ensure that components are not deformed and/or insulation spaces are maintained, particularly during transportation. 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 the unit is explicitly designed for such use:

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

11.6 Electrical connection

Observe the applicable national accident prevention guidelines when working on live drive inverters (for example, BGV A3).

Electrical installation is to be carried out in compliance with pertinent regulations (e.g. cable 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 EMC legislation.

Protective measures and protection devices must comply with the regulations in force (e.g. EN 60204 or EN 61800-5-1).

Required preventive measure: Grounding the unit.

MOVIDRIVE® B, size 7 has an additional display LED under the lower front cover. The lit display LED indicates a DC link voltage. Do not touch power connections. Check that there is no voltage present before touching power connections even if the LED display indicates that there is no voltage.

11.7 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.

11.8 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 legislation governing technical equipment, accident prevention regulations, etc. The operating software may be used to make changes to the drive inverter.

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 (such as the display LED on size 7 units) are no longer illuminated does not indicate that the unit has been disconnected from the power supply and no longer carries any voltage.

Check that there is no voltage present before touching power connections even if the LED display indicates that there is no voltage.

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

12 Unit Structure

12.1 *Type designation, nameplates and scope of delivery*

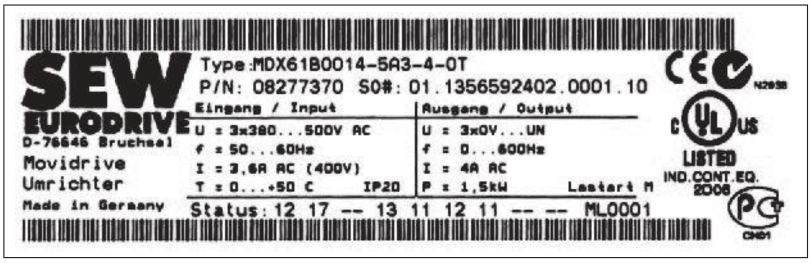
12.1.1 Example: Unit designation

MDX60 B 0011 - 5 A 3 - 4 00

00	**Type**	00 = Standard 0T = Application XX = Special unit XX/L = Coated pcbs
4	**Quadrants**	4 = 4Q (with brake chopper) 2 = 2Q
3	**Connection type**	3 = 3-phase
A	**Radio interference suppression on the line side**	B = Radio interference suppression C1 A = Radio interference suppression C2 0 = No radio interference suppression
5	**Supply voltage**	5 = AC 380 ... 500 V 2 = AC 200 ... 230 V
0011	**Recommended motor power**	0011 = 1.1 kW
B	**Version B**	
MDX60	**Series**	60 = No options can be installed 61 = Options can be installed

12.1.2 Example: System nameplate size 0

The **system nameplate** for MDX60B/61B.. size 0 is attached to the side of the unit.



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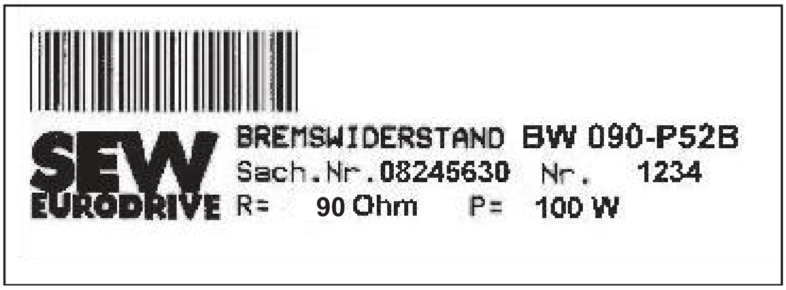
12.1.3 Example: Nameplate for BW090-P52B braking resistor

The braking resistor BW090-P52B is only available for MDX60B/61B size 0.



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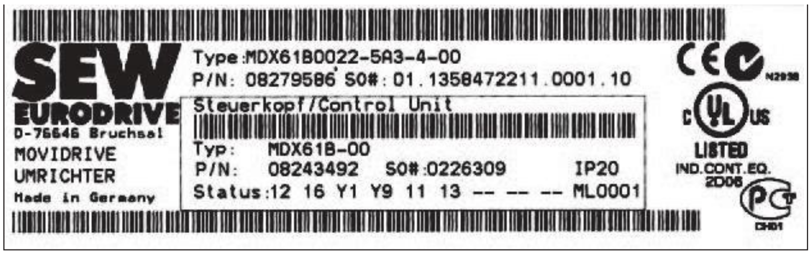
12.1.4 Example: System nameplate for sizes 1 - 7

The **system nameplate** is attached to MDX61B.. as follows:

- On the side of the units of size 1- 6
- On the upper front cover of size 7



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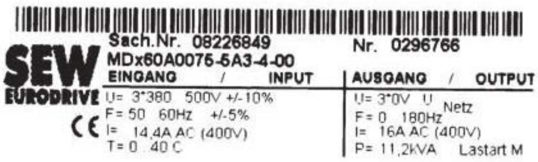
12.1.5 Example: Nameplate for power section sizes 1 - 7

The **power section nameplate** is attached to MDX61B.. as follows:

- On the side of the units of size 1- 6
- Top left inside the size 7 unit



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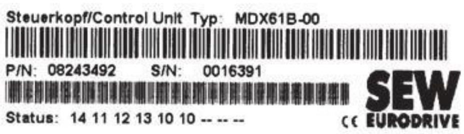
12.1.6 Example: Nameplate for control unit sizes 1 - 7

The **control unit nameplate** is attached to the front of MDX61B.. size 1 - 7.



1799762059

12.1.7 Example: Option card nameplate

Sachnr:18205631 Sernr:0139860 Baust:121110

1799765131

12.2 *Scope of delivery*

12.2.1 Sizes 0 – 7

- Connector housing for all signal terminals (X10 ... X17), connected
- Connector housing for the power terminals (X1 ... X4), connected
- Pluggable memory card, connected

12.2.2 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

12.2.3 Sizes 1 - 7

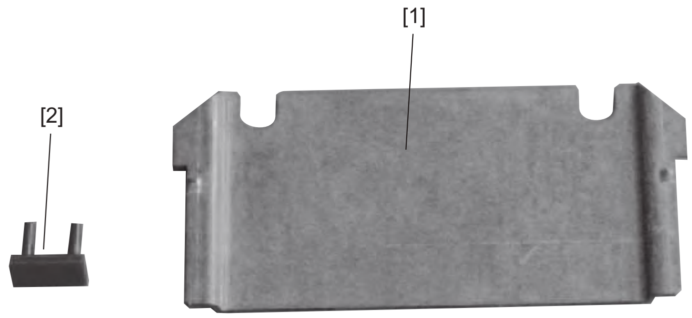
- 1 set of shield clamps for signal cable, not installed. The set of shield clamps comprises:
  - 1 shield clamp for signal cable (1 contact clip)
  - 2 contact clips
  - 2 screws for attaching the contact clips
  - 1 screw for attaching the shield clamp to the unit
- Only for size 6: Carrying bar and 2 split pins
- For size 7, you can order the connection set DLA11B (part no. 18223125) with connection screws and 3 PE terminals.

12.2.4 Size 2S

- Accessories set, not installed. The accessories set (→ following figure) 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).

  Degree of protection IP20 is achieved as soon as one of the following conditions is fulfilled:
  – Touch guard [2] mounted to X3/X4 (→ section "Touch guard")
  – An adequately prefabricated cable is connected to X3/X4

    If neither of the two conditions is fulfilled, the degree of protection is IP10.



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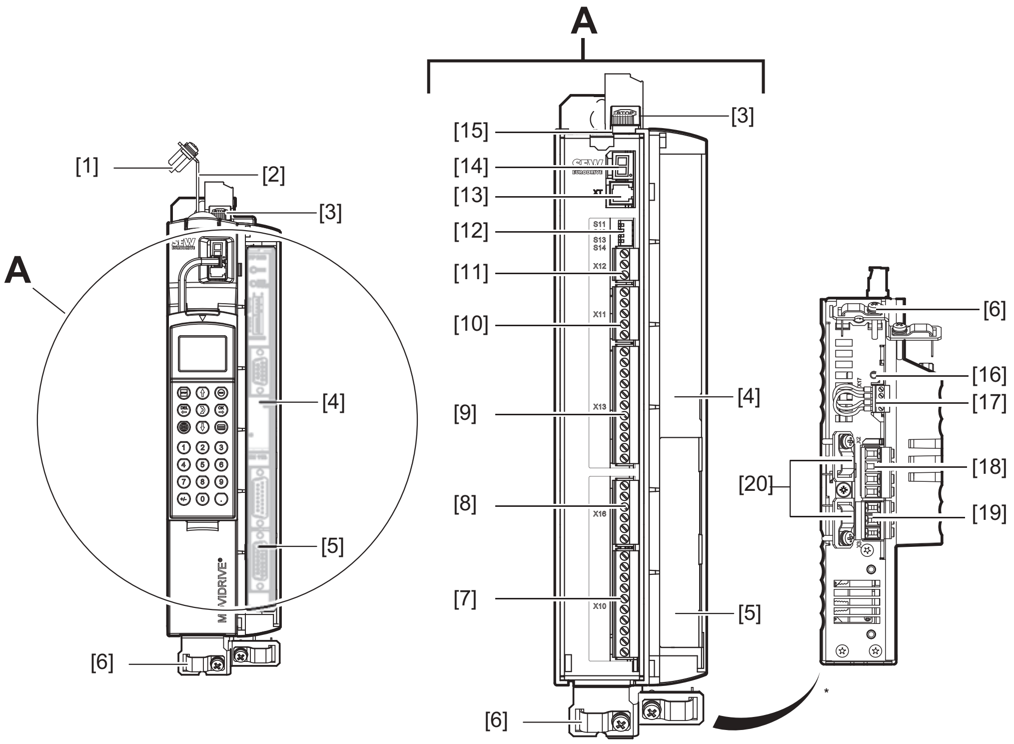
12.3 Size 0

MDX60/61B-5A3 (AC 400/500 V units): 0005 / 0008 / 0011 / 0014



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* View of the underside of the unit

[1] Power shield clamp for supply system connection and 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 port

[5] Only with MDX61B: Encoder slot

[6] Shield clamp for signal cables MDX61B size 0

[7] X10: Signal terminal strip for binary outputs and TF/TH input

[8] X16: Signal terminal strip binary inputs and outputs

[9] X13: Signal terminal strip terminal strip for binary inputs and RS485 interface

[10] X11: Signal terminal strip for setpoint input AI1 and 10 V reference voltage

[11] X12: Signal terminal strip 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] Grounding screw M4 × 14

[17] X17: Signal terminal strip for safety contacts for safe stop

[18] X2: Motor connection U, V, W and PE connection, separable

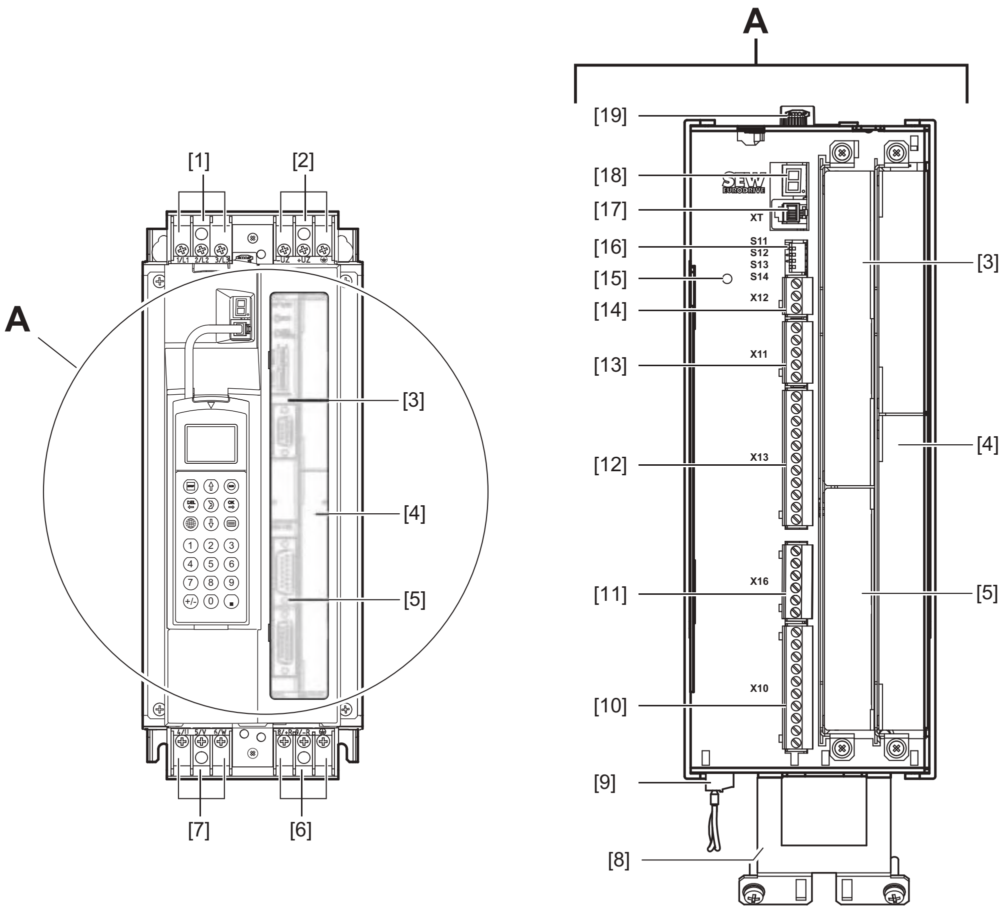
[19] X3: Braking resistor connection +R / –R and PE connection, separable

[20] Power shield clamp for motor connection and braking resistor connection

12.4 Size 1

MDX61B-5A3 (AC 400/500 V units): 0015 / 0022 / 0030 / 0040

MDX61B-2A3 (AC 230 V units): 0015 / 0022 / 0037

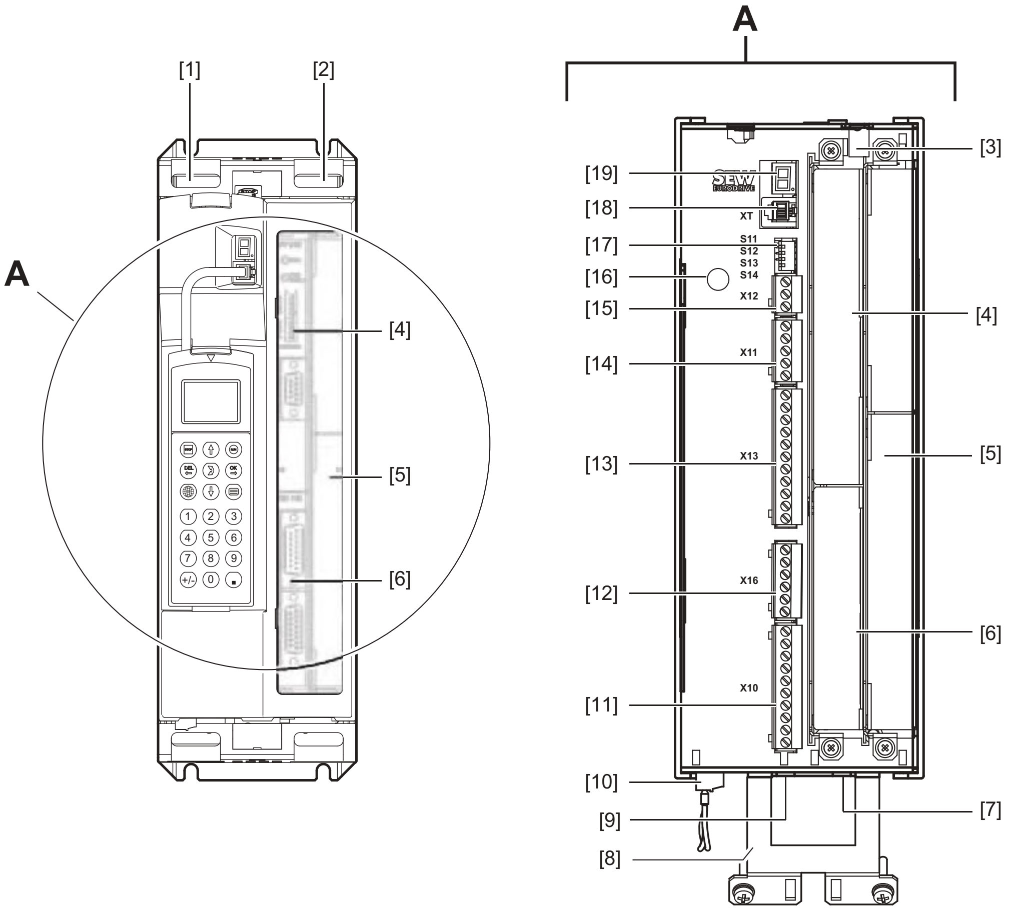


2205808267

[1] X1: Power supply connection 1/L1, 2/L2, 3/L3, separable
[2] X4: Connection for DC link coupling $-U_Z$ $+U_Z$, separable
[3] Fieldbus slot
[4] Expansion slot
[5] Encoder slot
[6] X3: Braking resistor connection 8/+R, 9/–R and PE connection, separable
[7] X2: Motor connection 4/U, 5/V, 6/W and PE connection, separable
[8] Shield clamp for signal cables and PE connection
[9] X17: Signal terminal strip for safety contacts for safe stop
[10] X10: Signal terminal strip for binary outputs and TF/TH input
[11] X16: Signal terminal strip binary inputs and outputs
[12] X13: Signal terminal strip terminal strip for binary inputs and RS485 interface
[13] X11: Signal terminal strip for setpoint input AI1 and 10 V reference voltage
[14] X12: Signal terminal strip system bus (SBus)
[15] Grounding screw M4 × 14
[16] DIP switches S11 ... S14
[17] XT: Slot for DBG60B keypad or UWS21B serial interface
[18] 7-segment display
[19] Memory card

12.5 Size 2S

MDX61B-5A3 (AC 400/500 V units): 0055 / 0075



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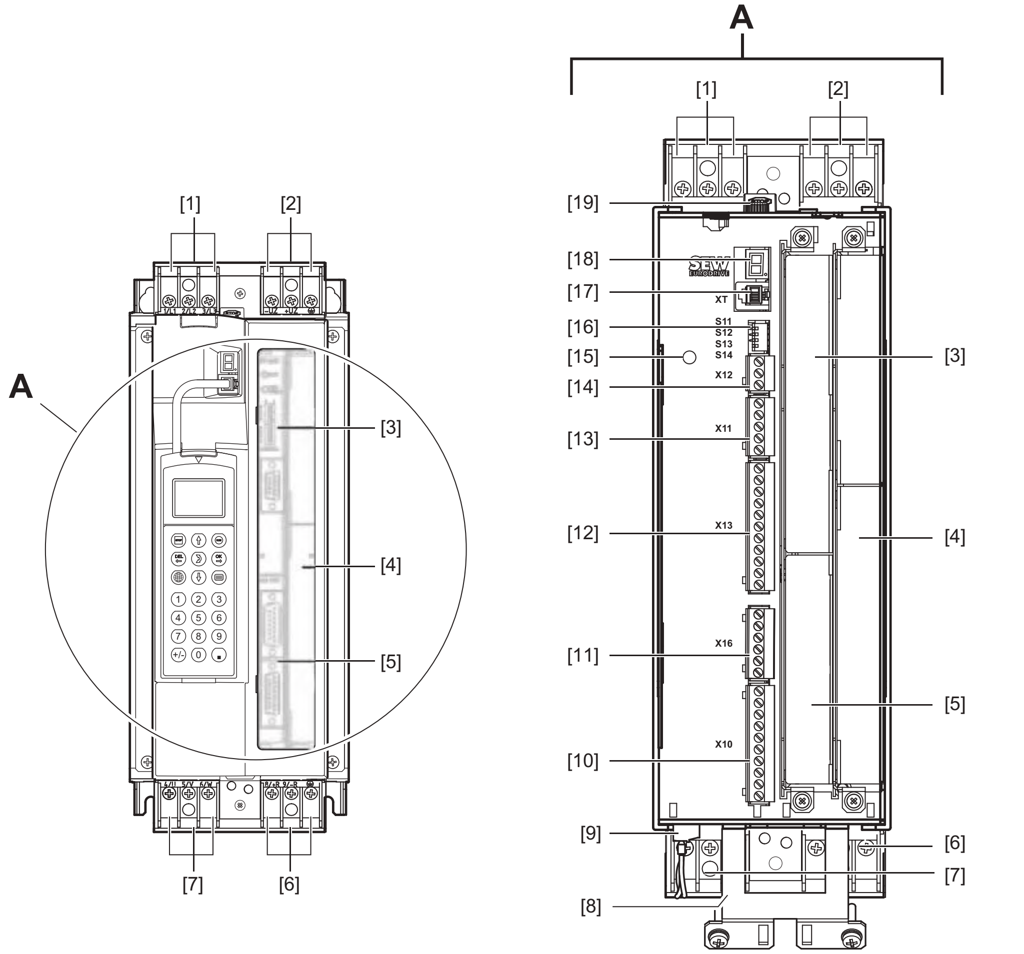
[1] X1: Power supply connection 1/L1, 2/L2, 3/L3
[2] X4: Connection for DC link coupling $-U_Z$ $+U_Z$ and PE connection
[3] Memory card
[4] Fieldbus slot
[5] Expansion slot
[6] Encoder slot
[7] X3: Braking resistor connection 8/+R, 9/–R and PE connection
[8] Shield clamp for signal cables and PE connection
[9] X2: Motor connection 4/U, 5/V, 6/W
[10] X17: Signal terminal strip for safety contacts for safe stop
[11] X10: Signal terminal strip for binary outputs and TF/TH input
[12] X16: Signal terminal strip binary inputs and outputs
[13] X13: Signal terminal strip terminal strip for binary inputs and RS485 interface
[14] X11: Signal terminal strip for setpoint input AI1 and 10 V reference voltage
[15] X12: Signal terminal strip system bus (SBus)
[16] Grounding screw M4 × 14
[17] DIP switches S11 ... S14
[18] XT: Slot for DBG60B keypad or UWS21B serial interface
[19] 7-segment display

12.6 Size 2

MDX61B-5A3 (AC 400/500 V units): 0110

MDX61B-2A3 (AC 230 V units): 0055 / 0075



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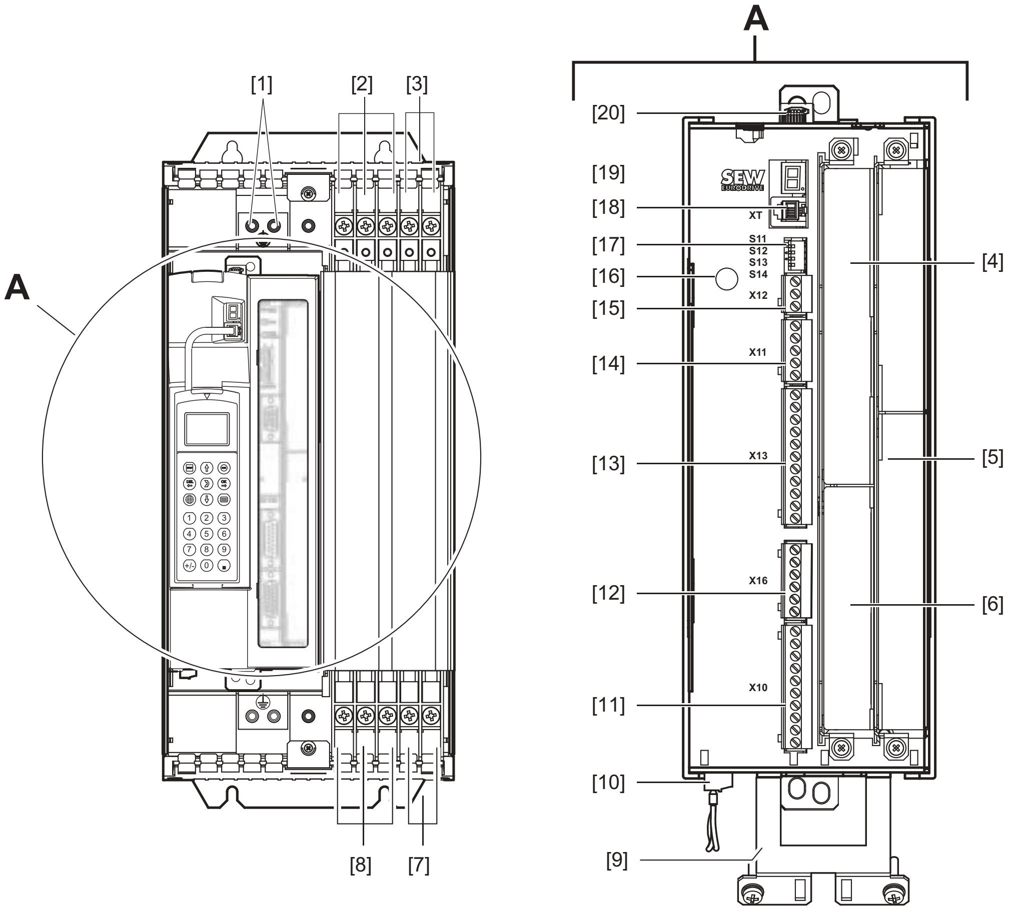
[1] X1: Power supply connection 1/L1, 2/L2, 3/L3
[2] X4: Connection for DC link coupling $–U_Z$ $+U_Z$ and PE connection
[3] Fieldbus slot
[4] Expansion slot
[5] Encoder slot
[6] X3: Braking resistor connection 8/+R, 9/–R and PE connection
[7] X2: Motor connection 4/U, 5/V, 6/W
[8] Shield clamp for signal cables and PE connection
[9] X17: Signal terminal strip for safety contacts for safe stop
[10] X10: Signal terminal strip for binary outputs and TF/TH input
[11] X16: Signal terminal strip binary inputs and outputs
[12] X13: Signal terminal strip terminal strip for binary inputs and RS485 interface
[13] X11: Signal terminal strip for setpoint input AI1 and 10 V reference voltage
[14] X12: Signal terminal strip system bus (SBus)
[15] Grounding screw M4 × 14
[16] DIP switches S11 ... S14
[17] XT: Slot for DBG60B keypad or UWS21B serial interface
[18] 7-segment display
[19] Memory card

12.7 Size 3

MDX61B-503 (AC 400/500 V units): 0150 / 0220 / 0300

MDX61B-203 (AC 230 V units): 0110 / 0150



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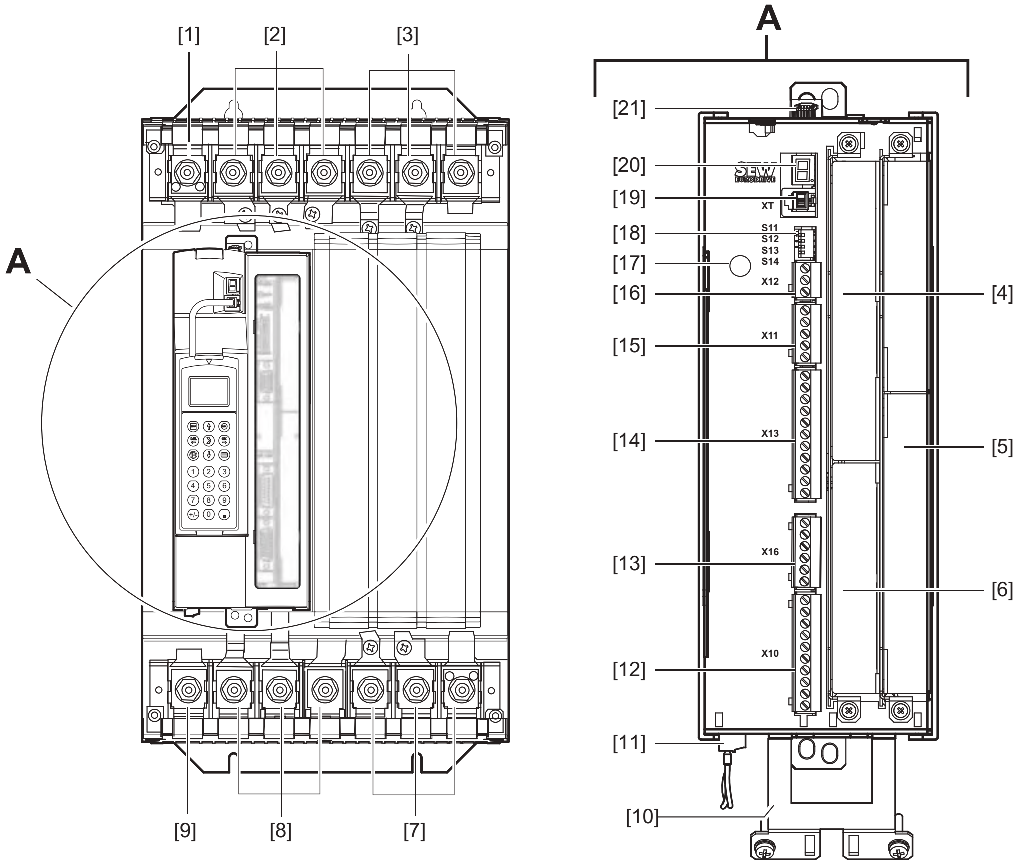
[1] PE connection
[2] X1: Power supply connection 1/L1, 2/L2, 3/L3
[3] X4: Connection for DC link coupling $-U_Z$ $+U_Z$
[4] Fieldbus slot
[5] Expansion slot
[6] Encoder slot
[7] X3: Braking resistor connection 8/+R, 9/–R
[8] X2: Motor connection 4/U, 5/V, 6/W
[9] Shield clamp for signal cables and PE connection
[10] X17: Signal terminal strip for safety contacts for safe stop
[11] X10: Signal terminal strip for binary outputs and TF/TH input
[12] X16: Signal terminal strip binary inputs and outputs
[13] X13: Signal terminal strip terminal strip for binary inputs and RS485 interface
[14] X11: Signal terminal strip for setpoint input AI1 and 10 V reference voltage
[15] X12: Signal terminal strip system bus (SBus)
[16] Grounding screw M4 × 14
[17] DIP switches S11 ... S14
[18] XT: Slot for DBG60B keypad or UWS21B serial interface
[19] 7-segment display
[20] Memory card

12.8 Size 4

MDX61B-503 (AC 400/500 V units): 0370 / 0450

MDX61B-203 (AC 230 V units): 0220 / 0300



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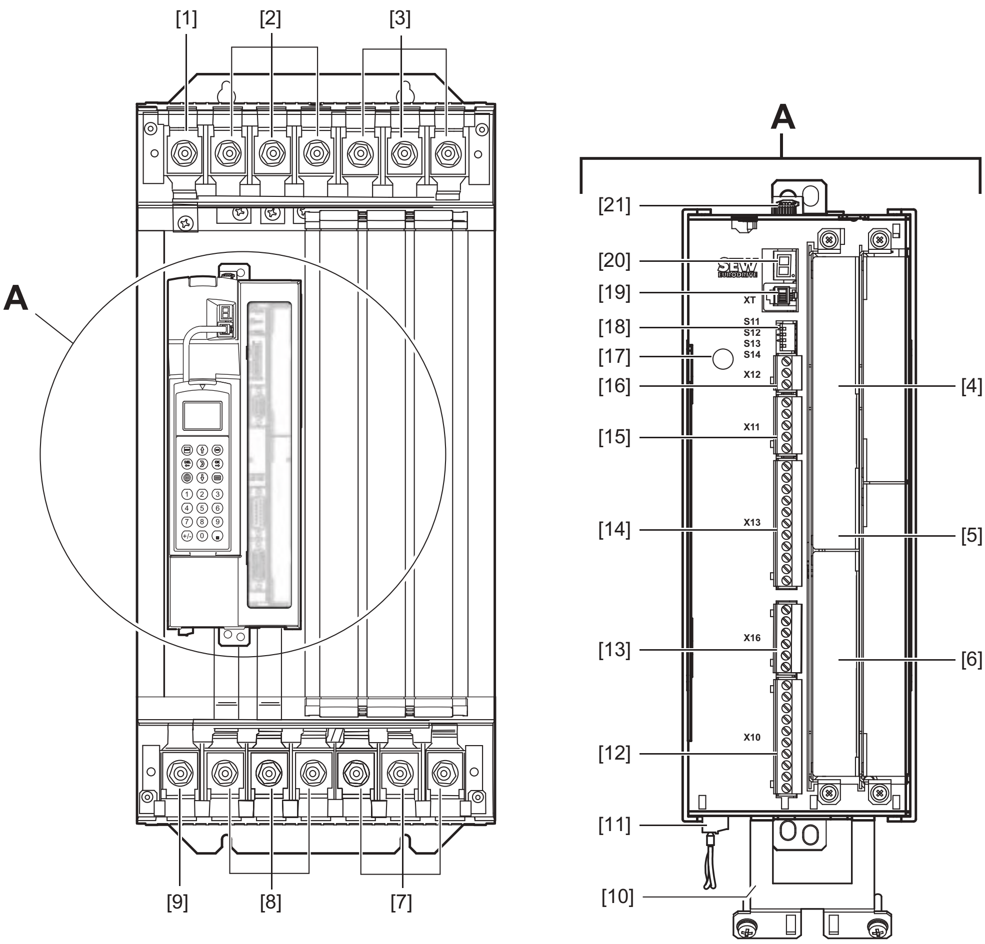
[1] PE connection
[2] X1: Power supply connection 1/L1, 2/L2, 3/L3
[3] X4: Connection for DC link coupling $-U_Z$ $+U_Z$ and PE connection
[4] Fieldbus slot
[5] Expansion slot
[6] Encoder slot
[7] X3: Braking resistor connection 8/+R, 9/–R and PE connection
[8] X2: Motor connection 4/U, 5/V, 6/W
[9] PE connection
[10] Shield clamp for signal cables
[11] X17: Signal terminal strip for safety contacts for safe stop
[12] X10: Signal terminal strip for binary outputs and TF/TH input
[13] X16: Signal terminal strip binary inputs and outputs
[14] X13: Signal terminal strip terminal strip for binary inputs and RS485 interface
[15] X11: Signal terminal strip for setpoint input AI1 and 10 V reference voltage
[16] X12: Signal terminal strip system bus (SBus)
[17] Grounding screw M4 × 14
[18] DIP switches S11 ... S14
[19] XT: Slot for DBG60B keypad or UWS21B serial interface
[20] 7-segment display
[21] Memory card

12.9 Size 5

MDX61B-503 (AC 400/500 V units): 0550 / 0750



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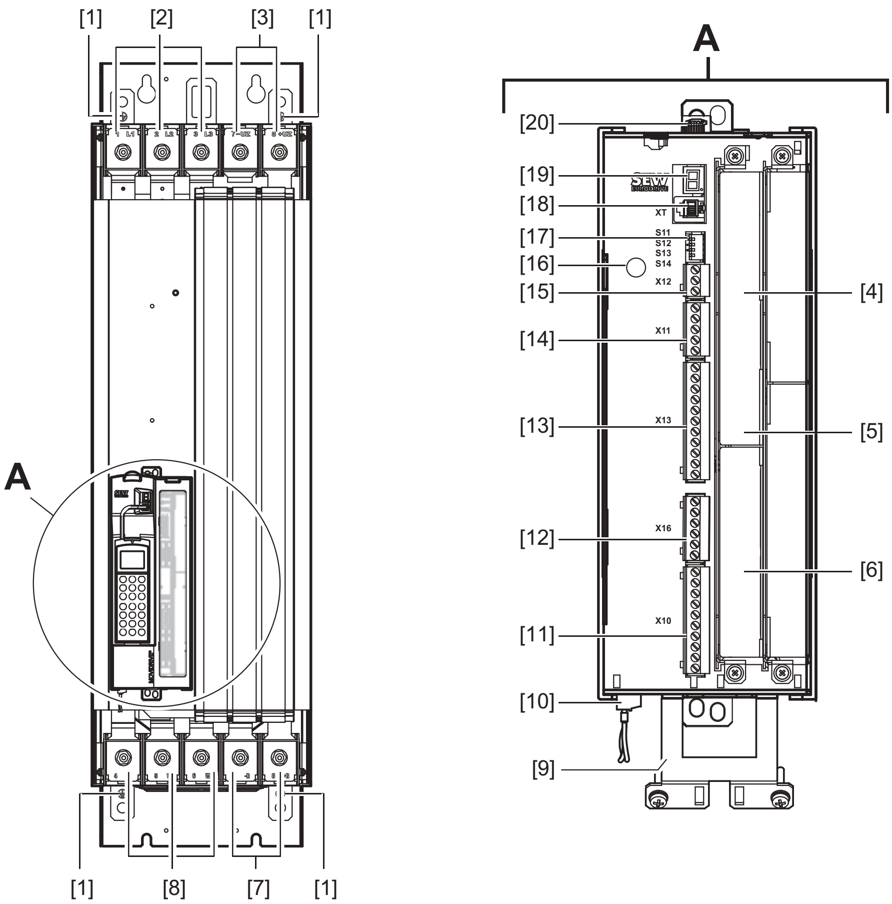
[1] PE connection
[2] X1: Power supply connection 1/L1, 2/L2, 3/L3
[3] X4: Connection for DC link coupling $-U_Z$ $+U_Z$ and PE connection
[4] Fieldbus slot
[5] Expansion slot
[6] Encoder slot
[7] X3: Braking resistor connection 8/+R, 9/–R and PE connection
[8] X2: Motor connection 4/U, 5/V, 6/W
[9] PE connection
[10] Shield clamp for signal cables
[11] X17: Signal terminal strip for safety contacts for safe stop
[12] X10: Signal terminal strip for binary outputs and TF/TH input
[13] X16: Signal terminal strip binary inputs and outputs
[14] X13: Signal terminal strip terminal strip for binary inputs and RS485 interface
[15] X11: Signal terminal strip for setpoint input AI1 and 10 V reference voltage
[16] X12: Signal terminal strip system bus (SBus)
[17] Grounding screw M4 × 14
[18] DIP switches S11 ... S14
[19] XT: Slot for DBG60B keypad or UWS21B serial interface
[20] 7-segment display
[21] Memory card

12.10 Size 6

MDX61B-503 (AC 400/500 V units): 0900 / 1100 / 1320



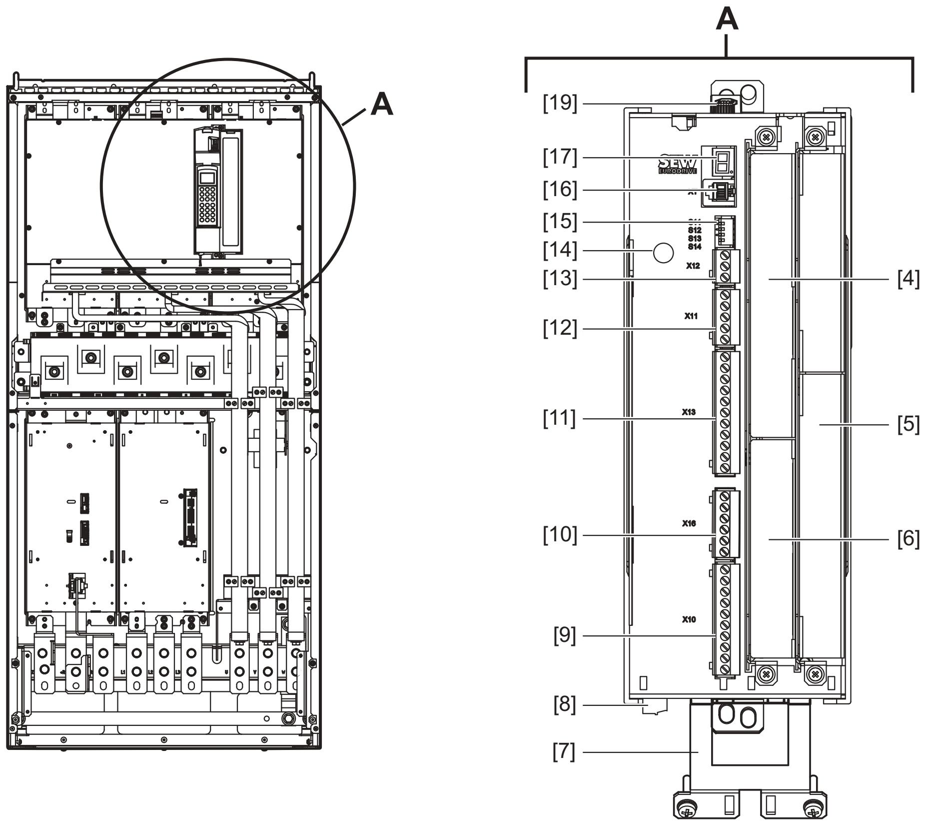
2205804427

[1] PE connection
[2] X1: Power supply connection 1/L1, 2/L2, 3/L3
[3] X4: Connection for DC link coupling $–U_Z$ $+U_Z$
[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 and PE connection
[9] Shield clamp for signal cables
[10] X17: Signal terminal strip for safety contacts for safe stop
[11] X10: Signal terminal strip for binary outputs and TF/TH input
[12] X16: Signal terminal strip binary inputs and outputs
[13] X13: Signal terminal strip terminal strip for binary inputs and RS485 interface
[14] X11: Signal terminal strip for setpoint input AI1 and 10 V reference voltage
[15] X12: Signal terminal strip system bus (SBus)
[16] Threaded hole for grounding screw M4 × 8 or M4 × 10
[17] DIP switches S11 ... S14
[18] XT: Slot for DBG60B keypad or UWS21B serial interface
[19] 7-segment display
[20] Memory card

12.11 Size 7

12.11.1 Control unit

MDX61B-503 (AC 400/500 V units): 1600 / 2000 / 2500



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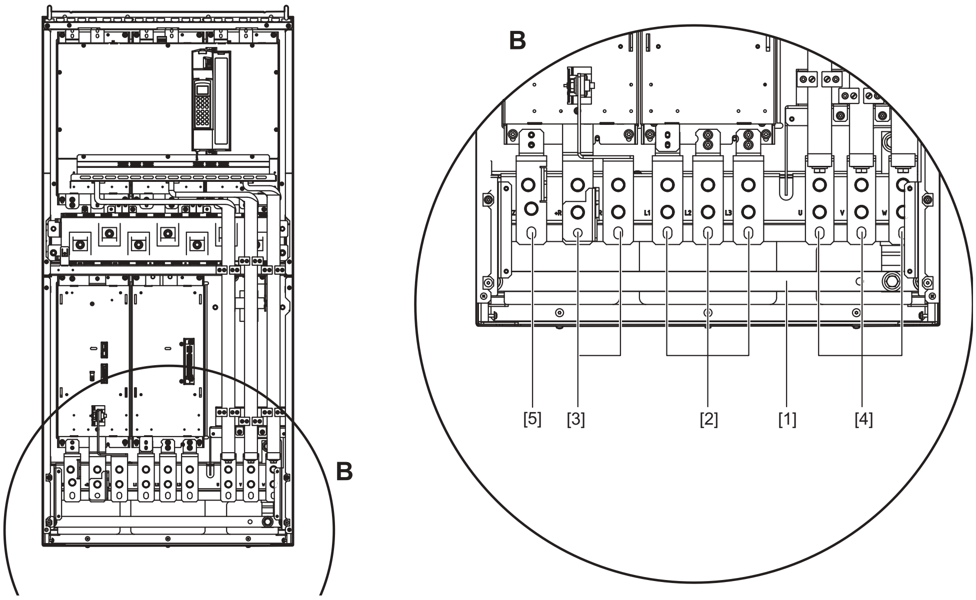
[4] Fieldbus slot
[5] Expansion slot
[6] Encoder slot
[7] Shield clamp for signal cables
[8] X17: Signal terminal strip for safety contacts for safe stop
[9] X10: Signal terminal strip for binary outputs and TF/TH input
[10] X16: Signal terminal strip binary inputs and outputs
[11] X13: Signal terminal strip terminal strip for binary inputs and RS485 interface
[12] X11: Signal terminal strip for setpoint input AI1 and 10 V reference voltage
[13] X12: Signal terminal strip system bus (SBus)
[14] Grounding screw M4 × 14
[15] DIP switches S11 ... S14
[16] XT: Slot for DBG60B keypad or UWS21B serial interface
[17] 7-segment display
[19] Memory card

12.11.2 Power section

MDX61B-503 (AC 400/500 V units): 1600 / 2000 / 2500



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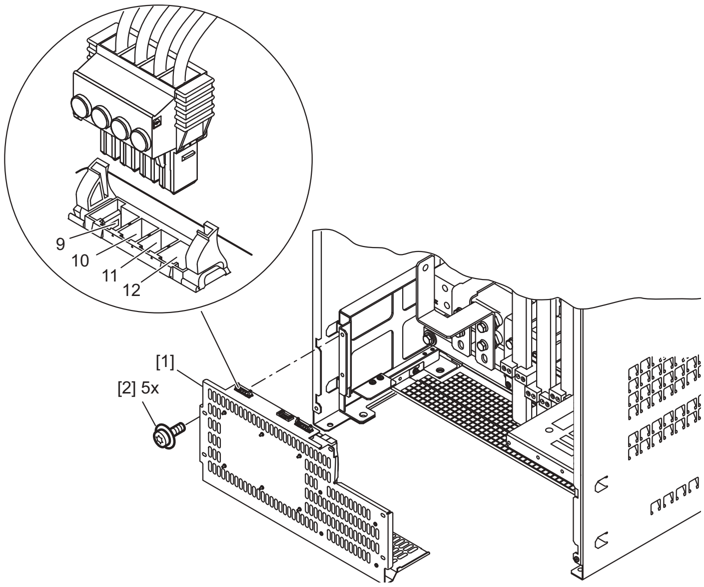
[1] PE connection rail (thickness = 10 mm)
[2] X1: Power supply connection 1/L1, 2/L2, 3/L3
[3] X3: Braking resistor connection 8/+R, 9/–R
[4] X2: Motor connection 4/U, 5/V, 6/W
[5] $-U_Z$: Only with DC link adapter accessory

12.11.3 DC power supply unit

MDX61B-503 (AC 400/500 V units): 1600 / 2000 / 2500



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[1] DC power supply unit
[2] Screw

13 Installation

13.1 *Installation instructions for the basic unit*

13.1.1 Tightening torques

Tightening torques of power terminals

Only use **original connection elements**. Note the **permitted tightening torques** for MOVIDRIVE® power terminals.

Size	Tightening torque	
	Nm	lb in
0, 1 and 2S	0.6	5
2	1.5	13
3	3.5	31
4 and 5	14.0	124
6	20.0	177
7	70.0	620

- The **permitted tightening torque** for the **signal terminals** is 0.6 Nm (5 lb in).

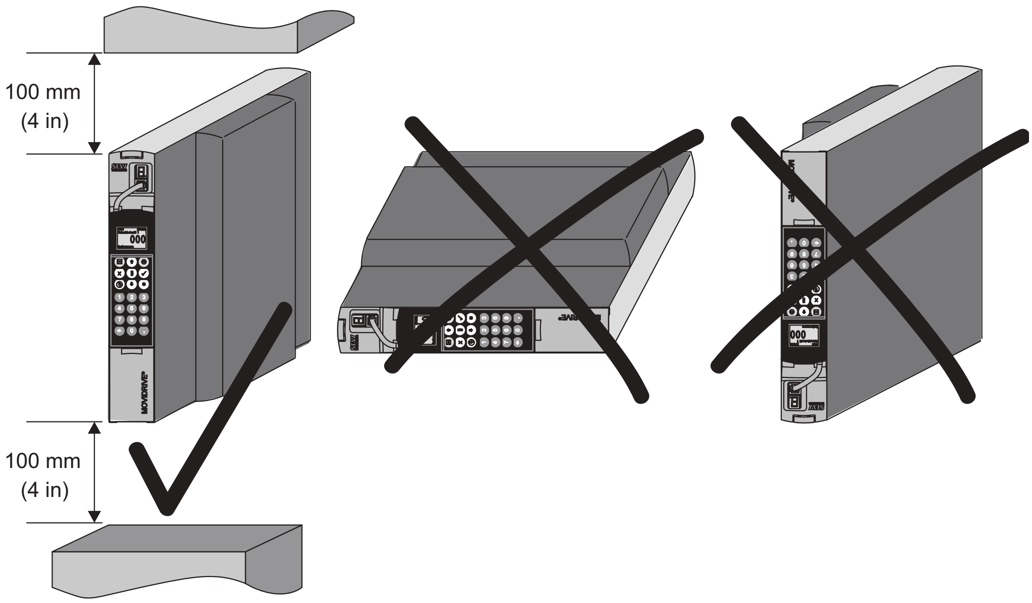
General tightening torques

Note the permitted tightening torques:

Component	Screws	Tightening torque	
		Nm	lb in
Screw cover	M5 x 25	1.4 - 1.7	12 - 15
Screws with integral disk	M4	1.7	15
	M5	3.4	30
	M6	5.7	50
Current rail screws	M10	20	180
Insulating spacer	M10 (SW32)	30	270

13.1.2 Minimum clearance and mounting position

- Leave at least **100 mm (4 in) 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 which are sensitive to high temperatures within 300 mm (12 in) of the top of the unit.
- Ensure unobstructed cooling air supply and make sure that the units are not subjected to heated air from nearby components.
- There is no need for clearance at the sides of the unit. You may line up the units directly next to each other.
- Only install the units **vertically**. Do not install them horizontally, tilted or upside down (→ following figure, applies to all sizes).



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13.1.3 Separate cable ducts

- Route **power cables** and **signal cables** in **separate cable ducts**.

13.1.4 Fuses and earth-leakage circuit breakers

- Install the **input 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 but take alternative measures. Please refer to the section "PE connection". If you want to use an earth-leakage circuit breaker (RCD) nonetheless, **note the following according to EN 61800-5-1**:

WARNING

MOVIDRIVE® can cause a DC current in the PE conductor, which might result in a malfunction of the earth leakage circuit breaker.

The use of an incorrect earth-leakage circuit breaker type can cause death or severe injuries.

- Either take alternative measures instead of earth-leakage circuit breakers according to the relevant standards (e.g. 61800-5-1, EN 60204-1) – see section "PE connection" –
- or use earth-leakage circuit breakers of type B.

13.1.5 Line and brake contactors

- Only use **contactors in utilization category AC-3** (IEC 60947-4-1) as mains and brake contactors.

INFORMATION

- Only use the **input contactor K11** (→ Sec. "Wiring diagram for basic unit") to **switch the inverter on and off**. Do not use it for jog mode. For jog mode, use the the commands "Enable/stop", "CW/stop" or "CCW/stop".
- Observe a minimum switch-off time of 10 s for the supply system contactor K11.

13.1.6 PE connection (→ EN 61800-5-1)

Earth-leakage currents ≥ 3.5 mA can occur during normal operation. To meet the requirements of EN 61800-5-1 observe the following:

- **Supply system lead < 10 mm^2**:

  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^2**.

- **Supply system cable 10 mm^2 ... 16 mm^2**:

  Route a **copper protective earth conductor with the cross section of the supply system lead**.

- **Supply system cable 16 mm^2 ... 35 mm^2**:

  Route a **copper protective earth conductor with a cable cross section of 16 mm^2**.

- **Supply system cable < 35 mm^2**:

  Route a **copper protective earth conductor with the cross section of the supply system lead**.

13.1.7 IT systems

- MOVIDRIVE® B is designed for operation on TN and TT systems with a directly grounded star point. Operation on voltage supply systems with a non-grounded star point is permitted In this case, 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).
- Size 7 can be converted for IT networks. Note the information in the "MOVIDRIVE® MDX60B / 61B – Inspection and Maintenance of Size 7" manual.

13.1.8 Cable cross sections

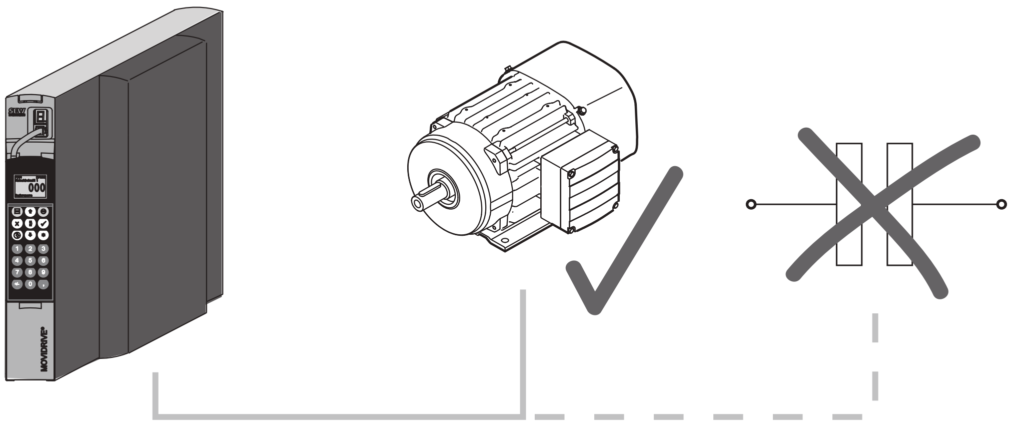
- Supply system cable: **Cable cross section according to rated input current** I_{mains} at rated load.
- Motor cable: **Cable cross section according to rated output current** I_{rated}.
- Signal cables of basic unit (terminals X10, X11, X12, X13, X16):
  – One core per terminal 0.20 ... 2.5 mm² (AWG 24 to 13)
  – Two cores per terminal 0.25 ... 1 mm² (AWG 23 to 17)
- Signal cables of terminal X17 and DIO11B terminal expansion board (terminals X20, X21, X22):
  – One core per terminal 0.08 ... 1.5 mm² (AWG 28 to 16)
  – Two cores per terminal 0.25 ... 1 mm² (AWG 23 to 17)

13.1.9 Unit output

NOTICE

MOVIDRIVE® B can suffer irreparable damage if you connect capacitive loads.

- **Only connect ohmic/inductive loads (motors).**
- Never connect capacitive loads.



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13.1.10 Installing braking resistors BW.../ BW..-T / BW...-P

- Mounting permitted:
  - 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

13.1.11 Connection of braking resistors

- Use **two tightly twisted leads or a 2-core shielded power cable**. Cable cross section according to trip current I_F of F16. The rated voltage of the cable must amount to at least V_0/V = 300 V / 500 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**.

13.1.12 Operating braking resistors

- The connection leads to the braking resistors carry a **high pulsed DC voltage** during rated operation.

WARNING

The surfaces of the braking resistors get very hot when the braking resistors are loaded with P_{rated}.

Risk of burns and fire.

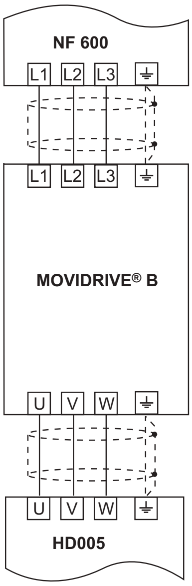
- Choose a suitable installation location. Braking resistors are usually mounted on top of the control cabinet.
- Do not touch the braking resistors.

13.1.13 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.

13.1.14 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.



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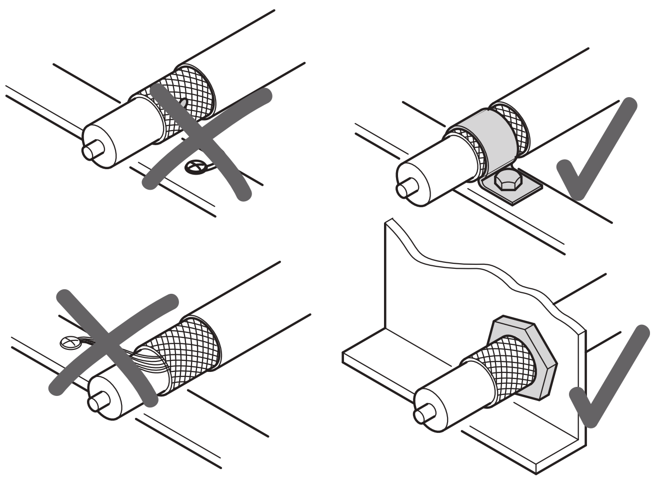
Shielded cables

- 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 using an interference 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 at the other end.



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Correct shield connection using metal clamp (shield clamp) or cable gland

- You can also use **earthed sheet-metal ducts or metal pipes** to **shield the cables**. **Route** the **power and signal 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).

INFORMATION

- MOVIDRIVE® B is a product with restricted availability in accordance with EN 61800-3. It may cause EMC interference. In this case, it is recommended for the operator to take suitable 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 C1 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 unshielded cables for the supply system connection as well.
- SEW-EURODRIVE recommends taking one of the following **EMC measures on the motor side to maintain class C1 and C2 limits**:
  - Shielded motor cable
  - HD... output choke option
  - HF.. output filter option (in operating modes VFC and V/f)

Interference emission category

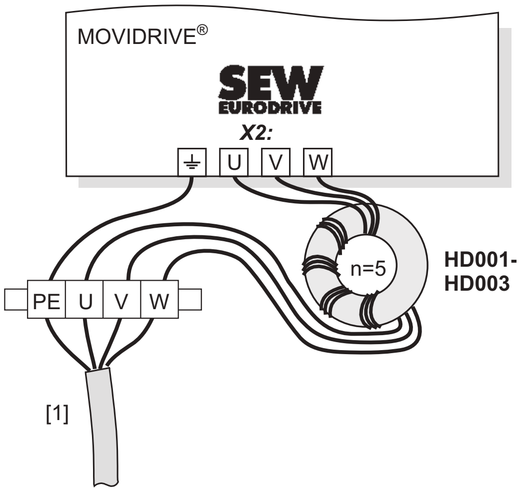
Compliance with category C2 according to EN 61800-3 has been tested in a CE typical drive system. SEW-EURODRIVE can provide detailed information on request.

WARNING

This product can cause high-frequency interferences in residential areas which can require measures for interference suppression.

HD... output choke

- Install the **output choke close to the inverter** but outside the minimum clearance for cooling.
- For HD001 ... HD003: Route **all three phases (U, V, W) 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**.



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Connection of output choke HD001 – HD003

[1] Motor cable

13.1.15 Installation notes for size 6

The MOVIDRIVE® units of size 6 (0900 ... 1320) are equipped with a factory mounted lifting lug [1]. Use a crane and the lifting eye [1] to install the unit.

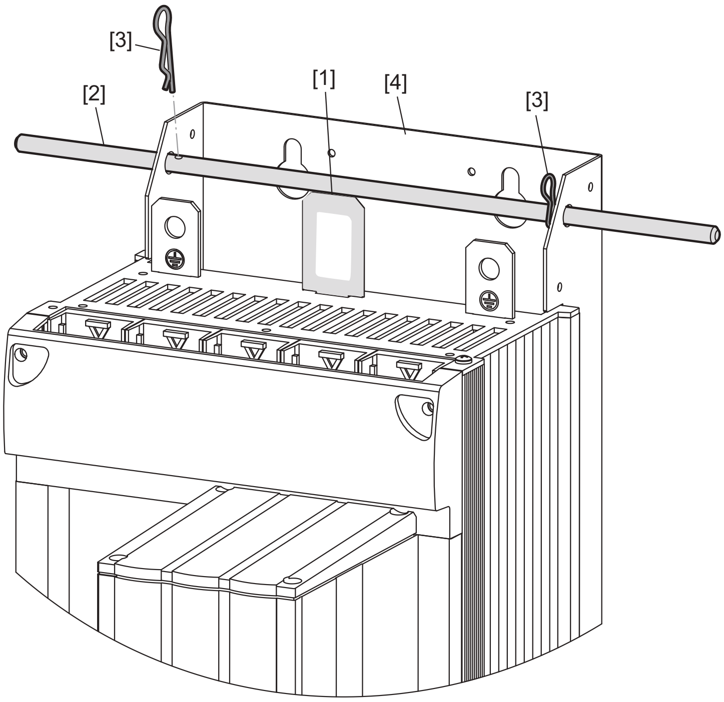
⚠ DANGER

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 pins [3] (see figure below).



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[1] Fixed lifting eye
[2] Carrying bar (included in the delivery of size 6)
[3] 2 split pins (included in the delivery of size 6)
[4] Rear panel

13.1.16 Installation notes for size 7

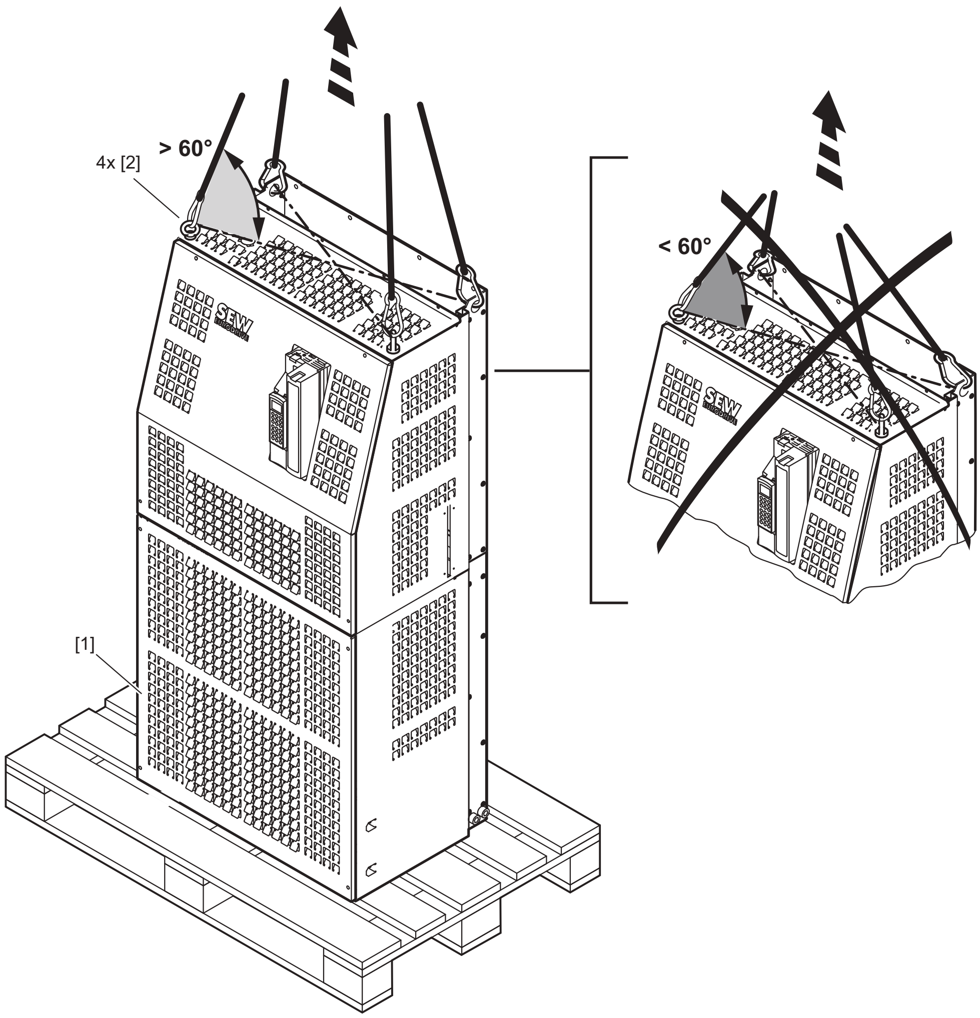
MOVIDRIVE® units size 7 (1600 - 2500) have 4 fixed lifting eyes [2] for transport. Use only these four lifting eyes [2] for installation.

DANGER

Suspended load.

Danger of fatal injury if the load falls.

- Do not stand under the suspended load.
- Secure the danger zone.
- Always use all 4 lifting eyes.
- Align the lifting eyes with the direction of tension



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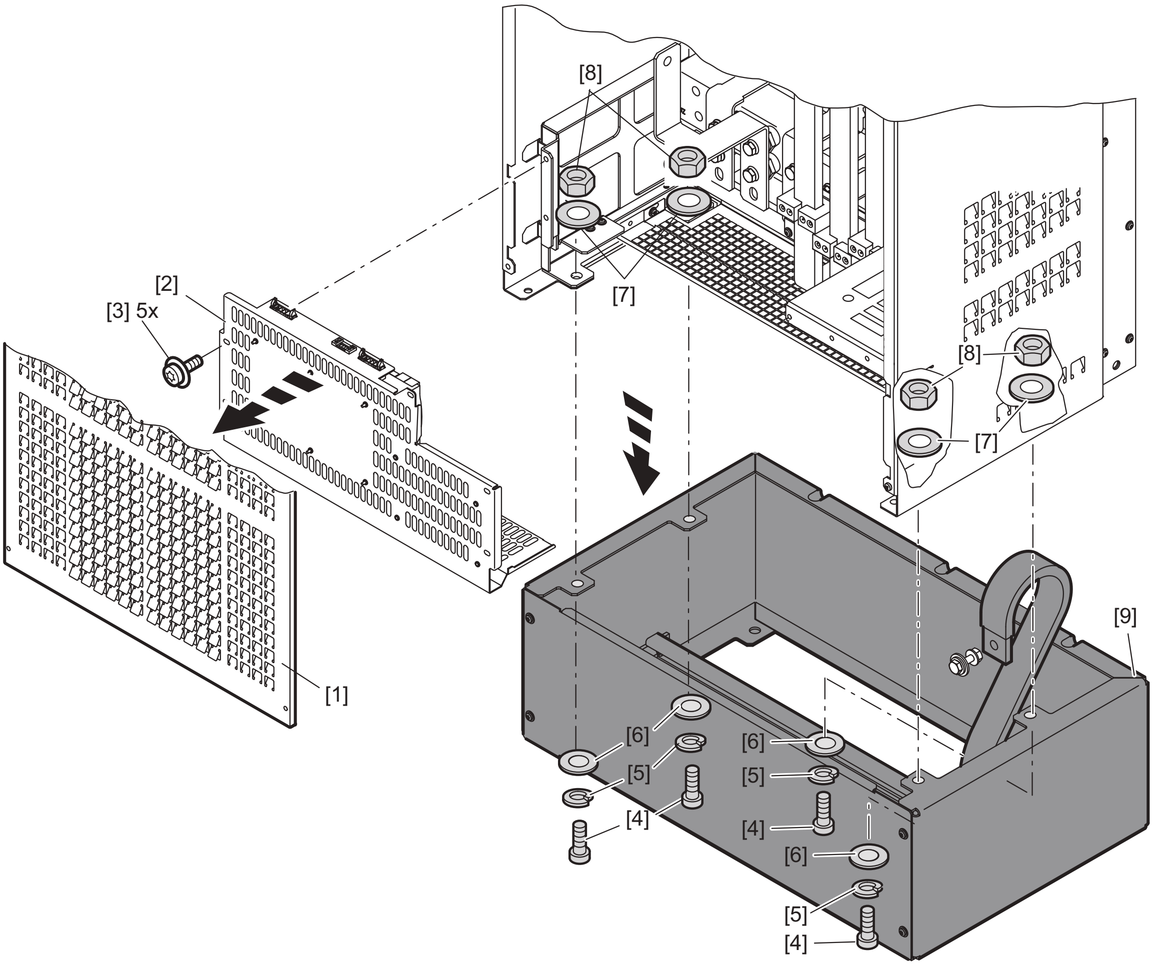
[1] Installed front cover
[2] 4 lifting eyes

13.1.17 Optional scope of delivery for size 7

Mounting base

The **mounting base DLS11B** with mounting material [9] (part no.: 1 822 602 7) is used to **install MOVIDRIVE® B, size 7 on the floor of the control cabinet**. MOVIDRIVE® B size 7 must be screwed onto the mounting base immediately after installation (see following figure). Do not take MOVIDRIVE® B size 7 into operation until the mounting base has been completely mounted.



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The mounting material (pos. 3 - 8) is enclosed in a plastic bag.

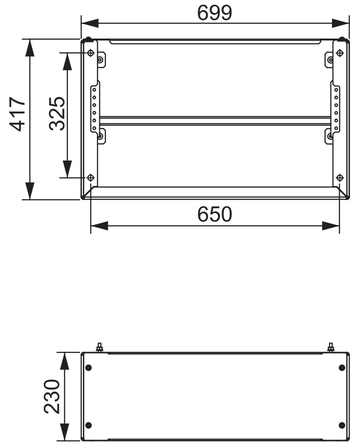
[1] Front cover
[2] Insert (for external power supply)
[3] Retaining screws for insert
[4] Machine screw M8 × 30 hexagon socket
[5] Lock washer
[6] Washer
[7] Washer
[8] M8 nut

Do the following to install the mounting base [9] to MOVIDRIVE® B size 7:

1. Loosen (not unscrew!) the 4 retaining screws of the front cover [1] until you can lift it off. Remove the front cover [1].
2. Remove the insert [2]. Loosen the 5 retaining screws [5] to do so.
3. The following steps apply to each of the 4 mounting holes.
   - Position the washer [7] centrically between inverter and mounting base [9].
   - Place the lock washer [5] and the washer [6] onto the socket head screw [4] M8×30.
   - Insert the preassembled socket head screw through the mounting hole.
   - Screw the M8 nut [8] onto the socket head screw. Tightening torque 20 Nm. Apply thread locking compound.
4. Replace the insert [2] into the unit and fasten it using the 5 retaining screws.
5. Replace the front cover [1] onto the unit and fasten it using the 4 retaining screws.

Dimension drawing of mounting base

The following figure shows the dimensions of the mounting base.



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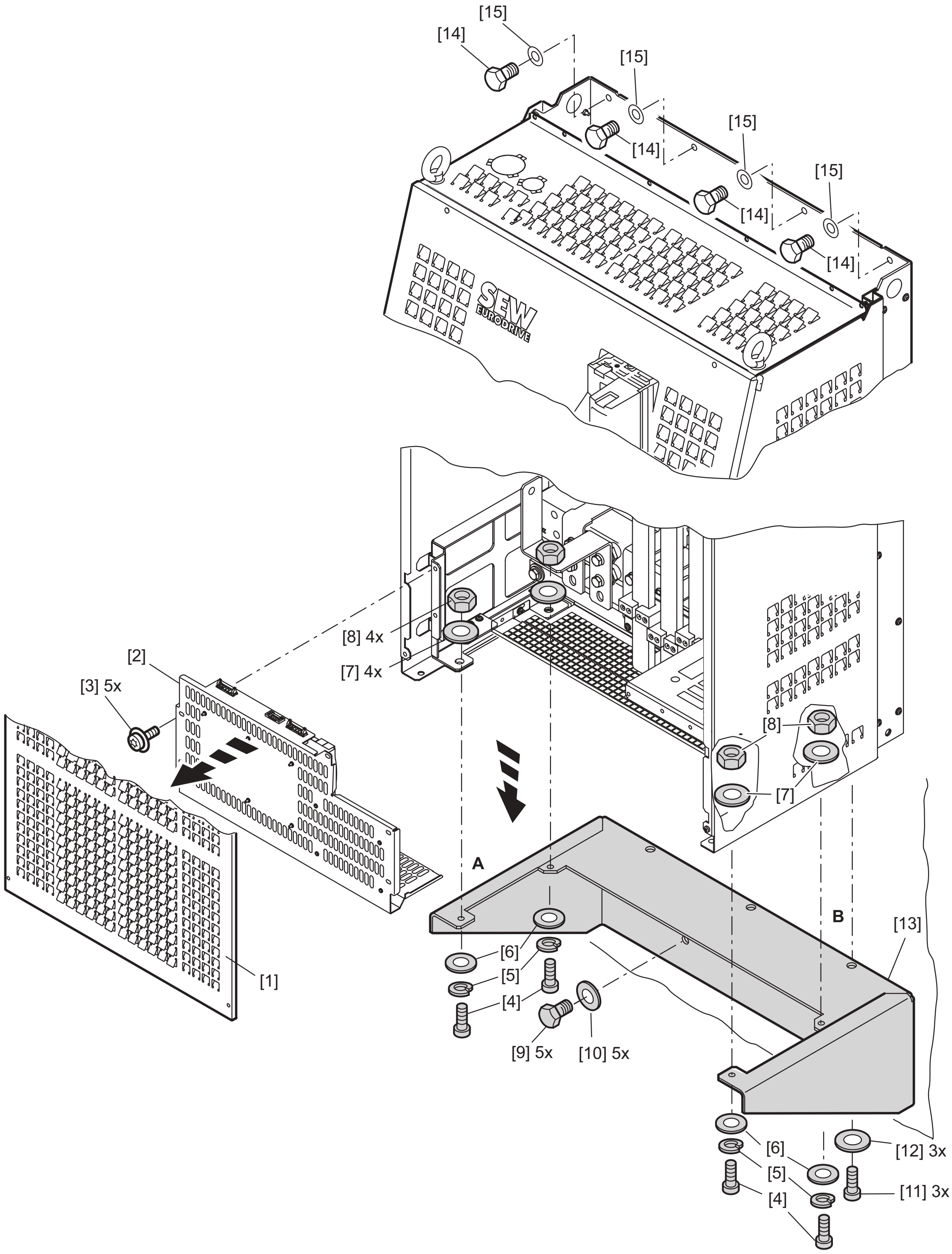
Wall bracket

The **wall bracket DLH11B** [13] (part no: 1 822 610 8) is used to **attach MOVIDRIVE® B size 7 to the wall** (see following figure). Do not take MOVIDRIVE® B size 7 into operation until the installation of the unit is complete.



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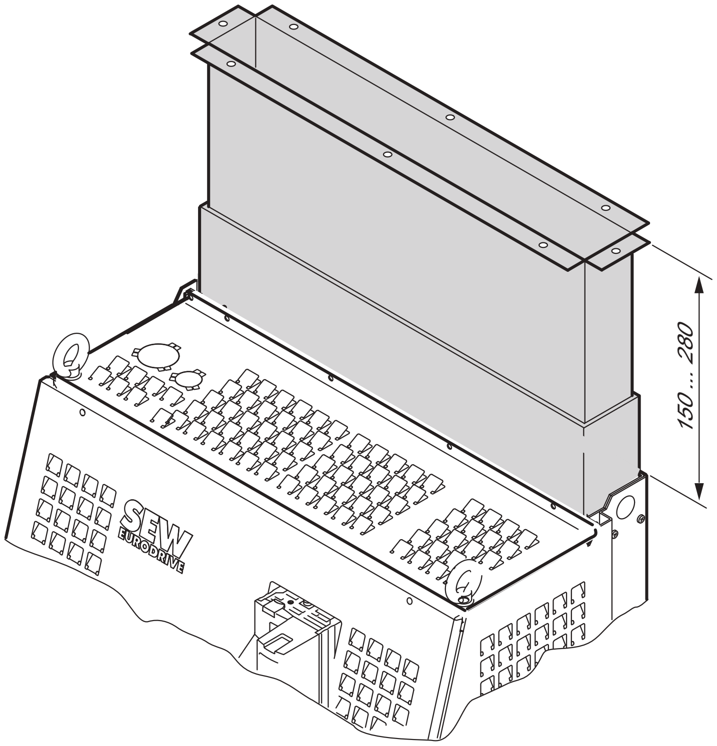
The installation material for wall mounting is not included in the scope of delivery of SEW-EURODRIVE.

Proceed as follows to fasten the wall bracket [13] to MOVIDRIVE® B size 7:

1. Loosen (not unscrew!) the 4 retaining screws of the front cover [1] until you can lift it off. Remove the front cover [1].
2. Remove the insert [2]. Loosen the 5 retaining screws [5] to do so.
3. The wall bracket [13] is screwed onto MOVIDRIVE® B at 5 points [A, B] (see above figure).
   - Position the a washer [7] at each point centrically between inverter and wall bracket [13].
   - Place the lock washer [5] and the washer [6] onto the socket head screw [4] M8×30.
   - Insert the preassembled socket head screw through the two mounting holes [A].
   - Screw the M8 nut [8] onto the socket head screw. Tightening torque 20 Nm. Apply thread locking compound.
   - Screw the wall bracket to MOVIDRIVE® B at the 3 mounting bores [B] using the retaining screws [11] and washers [12].
4. Replace the insert [2] into the unit and fasten it using the 5 retaining screws.
5. Replace the front cover [1] onto the unit and fasten it using the 4 retaining screws.
6. To mount MOVIDRIVE® B size 7 to a wall (material not included in the scope of delivery), use
   - 4 retaining screws [14] and washers [15] for the 4 mounting holes at the top of the unit and
   - 5 retaining screws [9] and washers [10] for the 5 mounting holes on the wall bracket [13].

Heat dissipation through air duct

A **DLK11B air duct** (part no.: 1 822 603 5) is available as an option to dissipate heat of MOVIDRIVE® B size 7. Install the air duct in such a way that it points vertically upwards (see below figure).



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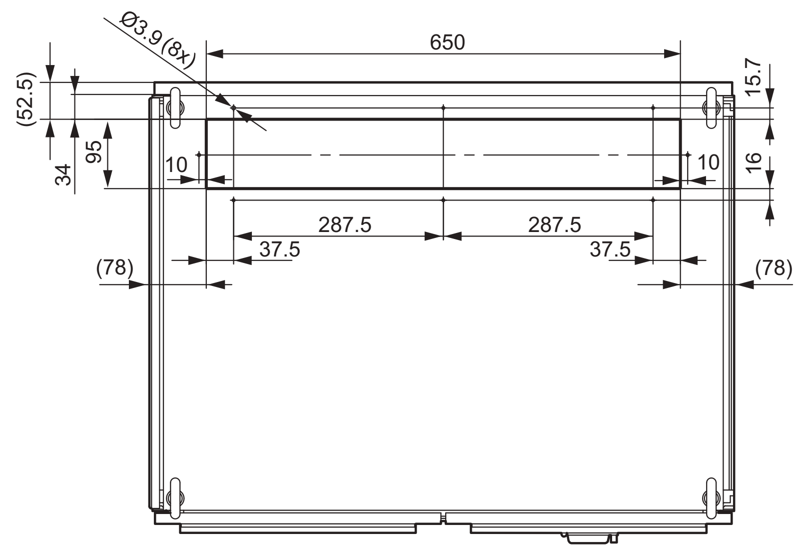
Roof cut-out for DLK11B air duct

The following figure shows the cut-out of the control cabinet roof for the DLK11B air duct.



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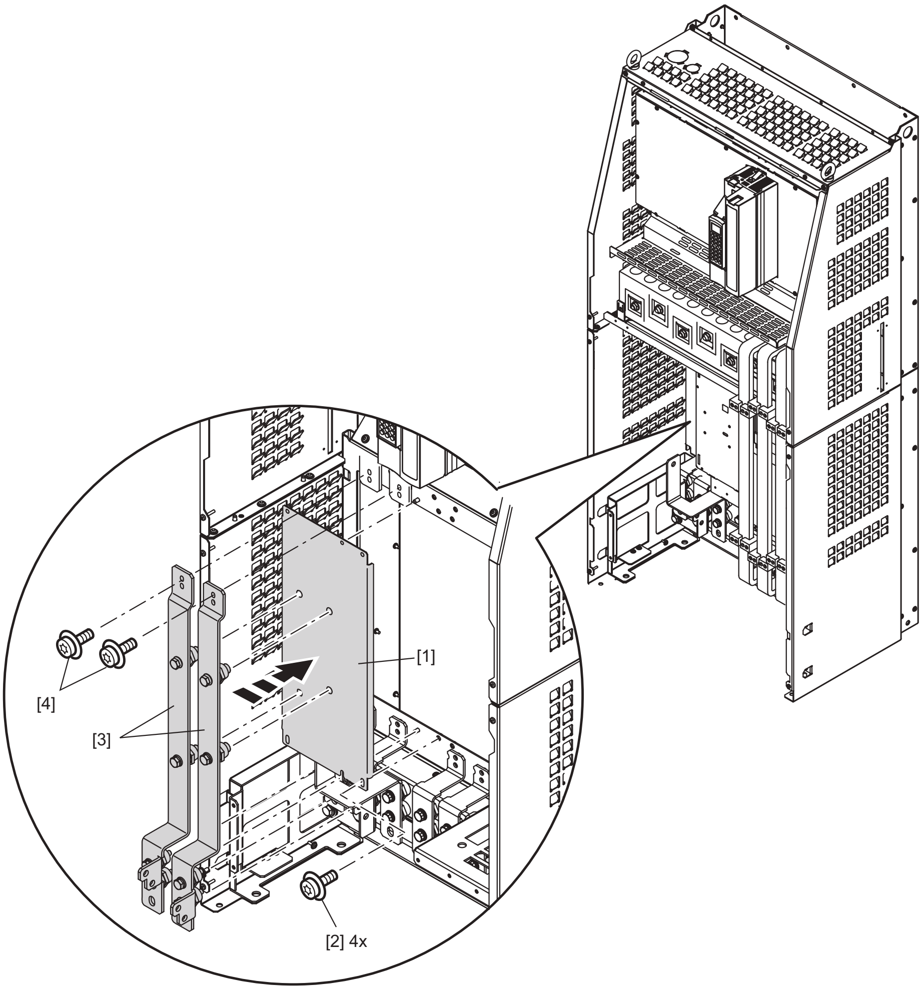
DC link adapter 2Q The **DC link adapter 2Q DLZ12B** (part no.: 1 822 729 5) can be used to provide a DC link connection at the bottom of the unit:



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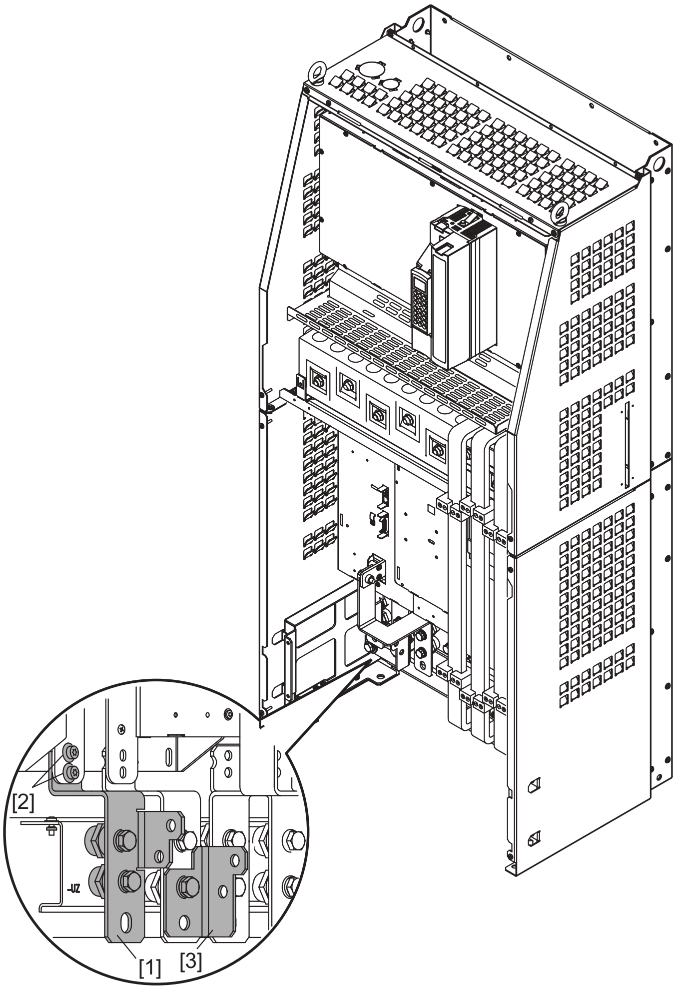
1. Loosen the 4 screws of both the upper and lower cover and remove them.
2. Loosen the 5 screws of the insert and remove it.
3. Place the cover panel on the fastening pin of the slot for the brake chopper module.
4. Position the 2 upper retaining screws [2] of the cover panel [1] in the frame. Position the 2 lower retaining screws of the cover panel in the frame.
5. Screw the insulating spacers tightly to the cover panel [1].
6. Screw the insulating spacers tightly to the frame (bottom).
7. Position the 2 screws of the fixing strap -U_Z at the DC link (top left).
8. Position the 2 screws of the fixing strap +U_Z at the DC link (top right).
9. Position the 4 screws of the fixing straps -U_Z and +U_Z on the insulating spacer.
10. Tighten all screws of the fixing straps -U_Z and +U_Z.
11. Replace the covers.

DC link adapter 4Q The **DC link adapter 4Q DLZ14B** (part no.: 1 822 728 7) can be used to provide a DC link connection at the bottom of the unit:



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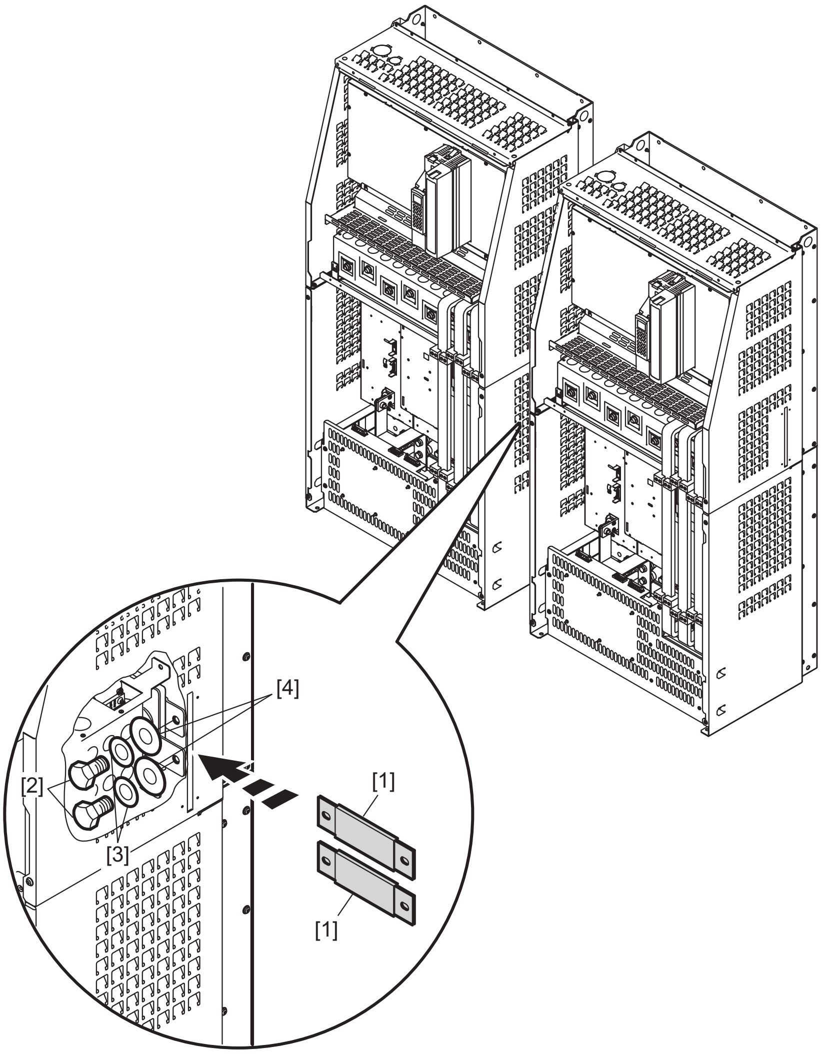
1. Loosen the 4 screws of the upper cover and remove it.
2. Loosen the 4 screws of the lower cover and remove it.
3. Position the 2 screws of the conductor rail [1] -U_Z on the brake chopper module (bottom left) on the insulating spacer.
4. Position the 2 screws of the conductor rail [1] -U_Z on the insulating spacer.
5. Tighten all screws of the fixing strap -U_Z.
6. Screw on the angle bracket [3].
7. Replace the covers.

DC link coupling

To connect 2 inverters that are installed next to each other, you can use the **DLZ11B DC link coupling** (part no.: 1 823 193 4):



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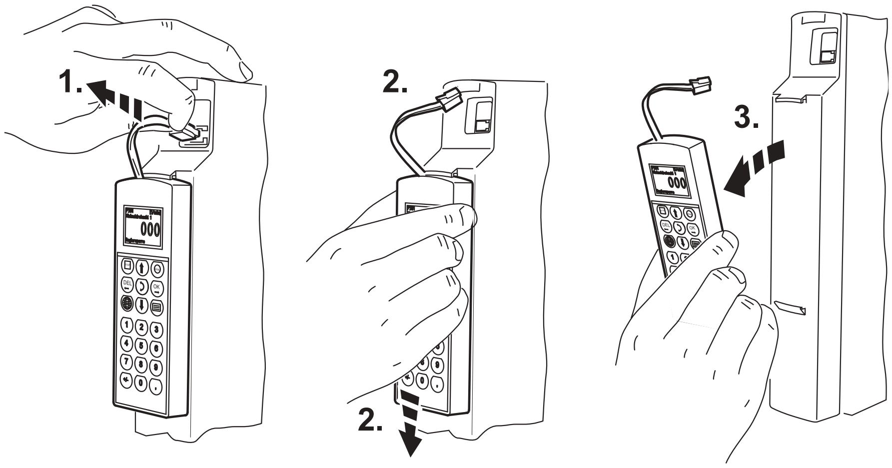
1. The units that you want to connect must be installed at ground level and 100 mm apart from each other.
2. Loosen the 4 screws of the upper cover and remove it.
3. Loosen the 4 screws of the lower cover and remove it.
4. Insert the 2 DC link couplings [1] into the units.
5. Screw the DC link coupling [1] to one unit first, before attaching it to the other units.
6. Tighten the screws [2].
7. Replace the covers.

13.2 Removing/installing the keypad

13.2.1 Removing the keypad

Proceed as follows:



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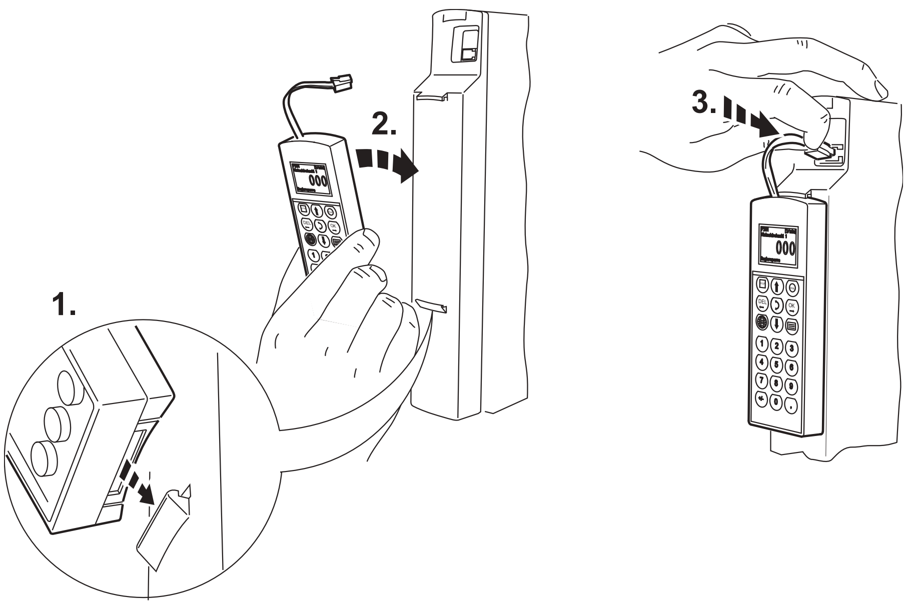
1. Unplug the connection cable from the XT slot.
2. Carefully push the keypad downward until it comes off the upper fixture on the front cover.
3. Remove the keypad **forward** (not to the side!).

13.2.2 Installing the keypad

Proceed as follows:



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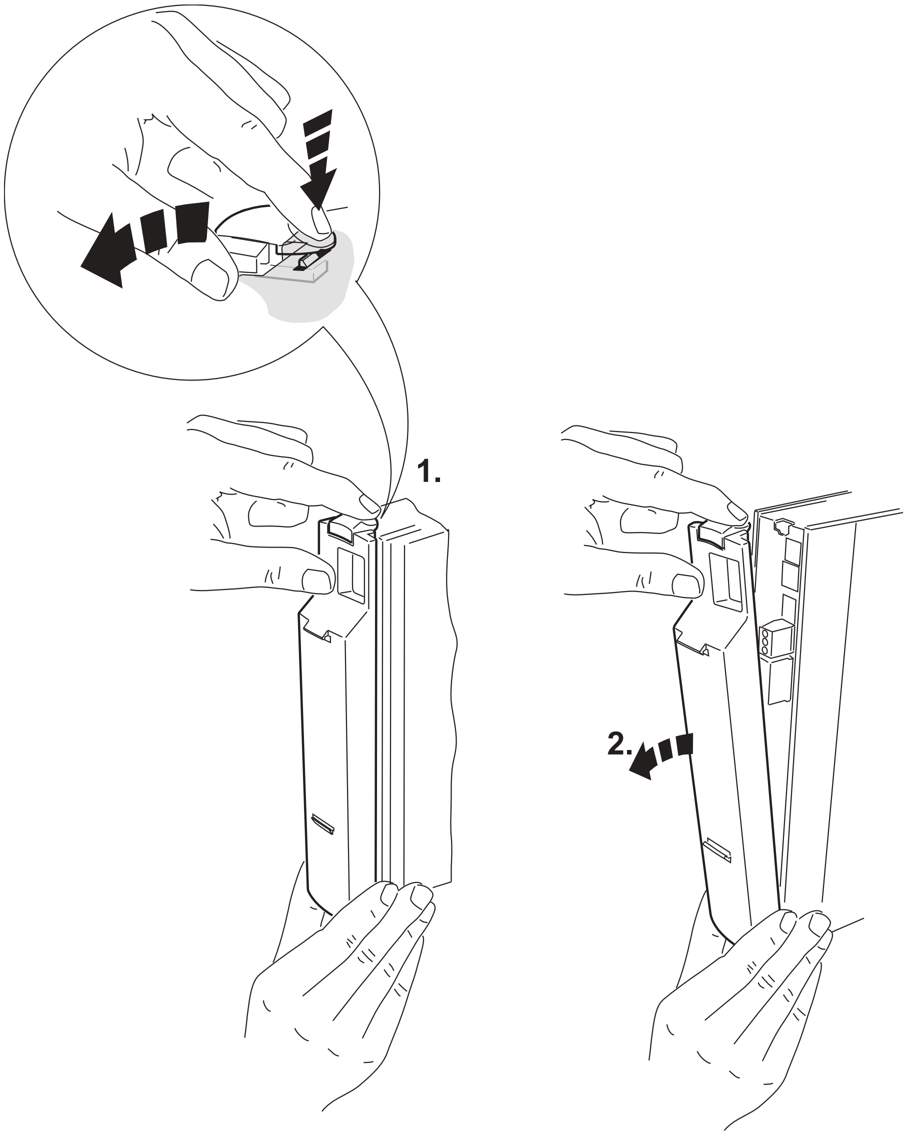
1. Place the underside of the keypad onto the lower fixture of the front cover.
2. Push the keypad into the upper fixture of the front cover.
3. Plug the connecting cable into the XT slot.

13.3 *Removing/installing the front cover*

13.3.1 Removing the front cover

Proceed as follows to remove the front cover:



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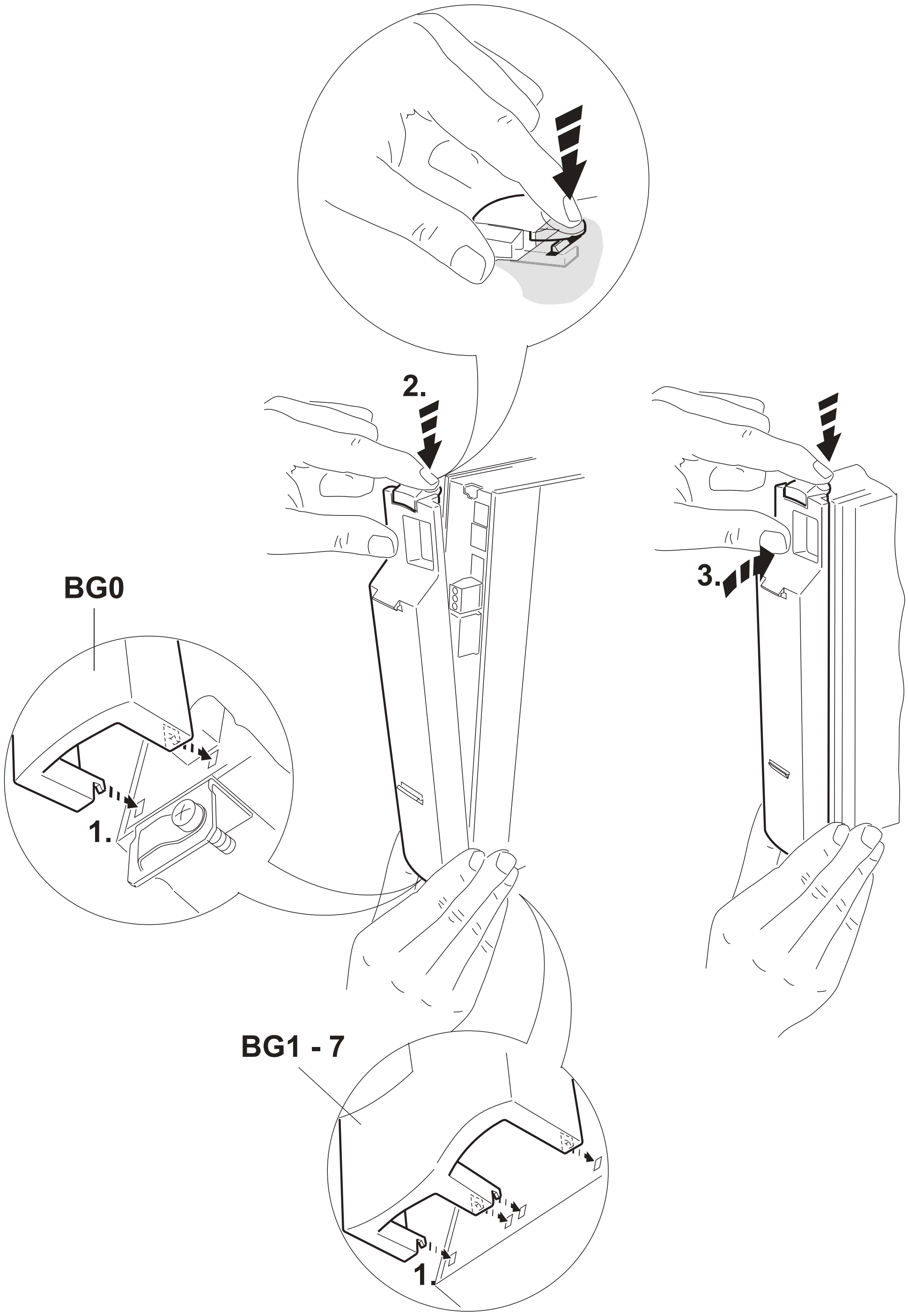
1. If a keypad (page 510) is installed, remove it first.
2. Press the grooved clip on top of the front cover.
3. Keep the clip pressed down to remove the front cover.

13.3.2 Installing the front cover

Proceed as follows to install the front cover:



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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.

13.4 *Information regarding UL*

13.4.1 Field wiring power terminals

- MOVIDRIVE® MDX60B/61B 0003 – 0300: Only use copper lines with a rated thermal value of 60/75 °C.

  MOVIDRIVE® MDX60B/61B 0370 – 2500: Use only 75 °C copper wire
- Tighten terminals to in-lbs (Nm) as follows:

Series	Size	in-lbs	Nm
MOVIDRIVE® B	0XS, 0S, 0L	5	0.6
	1, 2S	5	0.6
	2	13	1.5
	3	31	3.5
	4, 5	120	14
	6	180	20
	7	620	70

13.4.2 Short circuit current rating

- Suitable for use on a circuit capable of delivering not more than 200000 A symmetrical amperes:
  - MOVIDRIVE® MDX60B/61B 0005 – 2500 (only 400 V units).

    Max. voltage is limited to 500 V.
  - MOVIDRIVE® MDX60B/61B 0015 – 0300 (only 230 V units).

    Max. voltage is limited to 240 V.

13.4.3 Branch circuit protection

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

For maximum fuse rating see tables below.

AC 400/500 V units

MOVIDRIVE® MDX60B/61B...5_3	Max. supply short circuit current	Max. line voltage	Max. fuse rating
0005/0008/0011/0014	AC 200000 A	AC 500 V	AC 15 A / 600 V
0015/0022/0030/0040	AC 200000 A	AC 500 V	AC 35 A / 600 V
0055/0075	AC 200000 A	AC 500 V	AC 60 A / 600 V
0110	AC 200000 A	AC 500 V	AC 110 A / 600 V
0150/0220	AC 200000 A	AC 500 V	AC 175 A / 600 V
0300	AC 200000 A	AC 500 V	AC 225 A / 600 V
0370/0450	AC 200000 A	AC 500 V	AC 350 A / 600 V
0550/0750	AC 200000 A	AC 500 V	AC 500 A / 600 V
0900	AC 200000 A	AC 500 V	AC 250 A / 600 V
1100	AC 200000 A	AC 500 V	AC 300 A / 600 V
1320	AC 200000 A	AC 500 V	AC 400 A / 600 V
1600	AC 200000 A	AC 500 V	AC 400 A / 600 V
2000	AC 200000 A	AC 500 V	AC 500 A / 600 V
2500	AC 200000 A	AC 500 V	AC 600 A / 600 V

AC 230 V units

MOVIDRIVE® MDX61B...2_3	Max. supply short circuit current	Max. line voltage	Max. fuse rating
0015/0022/0037	AC 200000 A	AC 240 V	AC 30 A / 250 V
0055/0075	AC 200000 A	AC 240 V	AC 110 A / 250 V
0110	AC 200000 A	AC 240 V	AC 175 A / 250 V
0150	AC 200000 A	AC 240 V	AC 225 A / 250 V
0220/0300	AC 200000 A	AC 240 V	AC 350 A / 250 V

13.4.4 Motor overload protection

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

13.4.5 Ambient temperature

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

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

INFORMATION

- Use only tested units with a **limited output voltage** (V_{max} = DC 30 V) and **limited output current** (I_{max} = 8 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).**

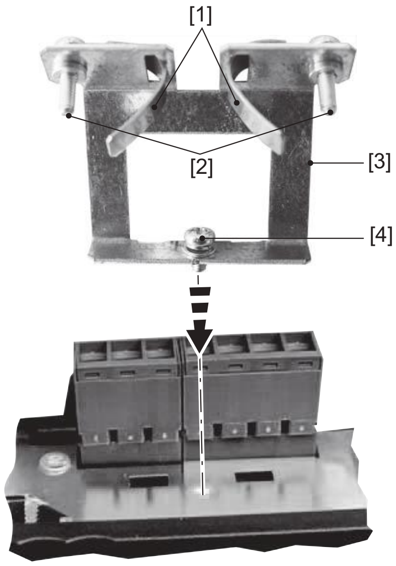
13.5 *Shield clamps*

13.5.1 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.



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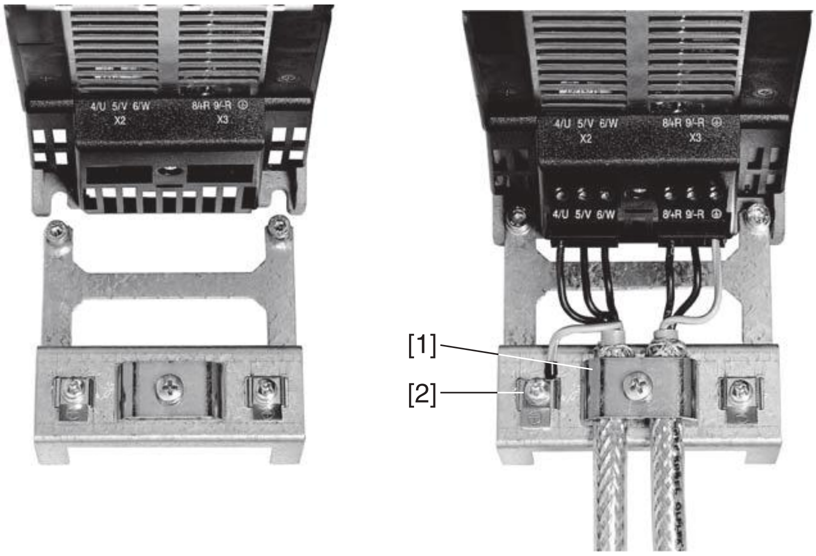
[1] Contact clips
[2] Retaining screws for contact clip
[3] Shield plate
[4] Retaining screw for shield clamp

13.5.2 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.



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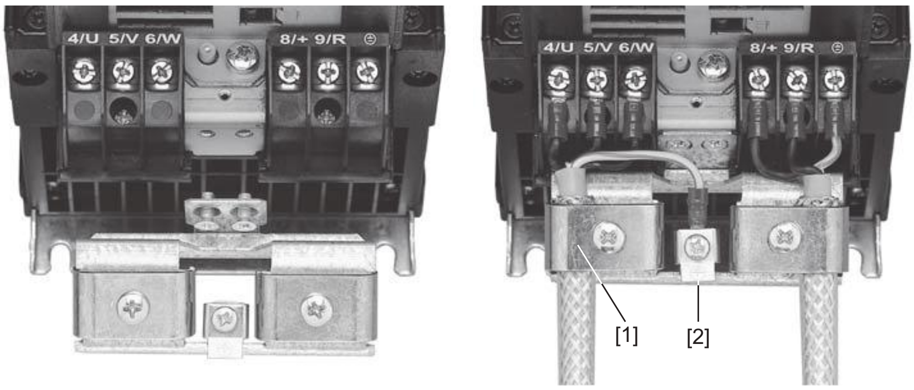
[1] Power section shield clamp [2] PE connection

13.5.3 Shield clamp for power section, sizes 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 this shield clamp using the two retaining screws.



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[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 below.

13.5.4 Shield clamp for power section, sizes 3 to 7

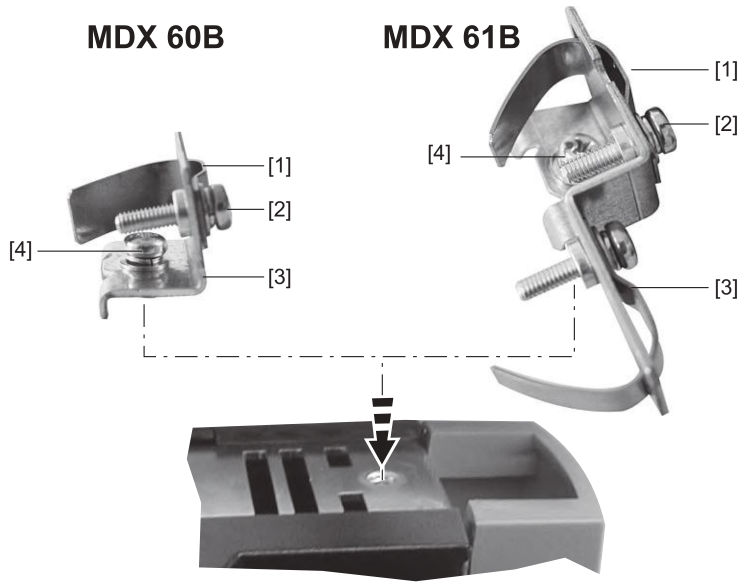
No shield clamps for the power section are supplied with MOVIDRIVE® MDX61B sizes 3 to 7. Use commercially available shield clamps for installing the shielding of motor and brake cables. Apply the shield as closely as possible to the inverter.

13.5.5 Shield clamp for signal cables

Install the shield clamp for the signal cable as follows:

- If installed, remove the keypad and the front cover.
- Size 0: Attach the shield clamp on the bottom of the control unit.
- Sizes 1 to 7: Attach the shield clamp on the bottom of the control unit.

Size 0



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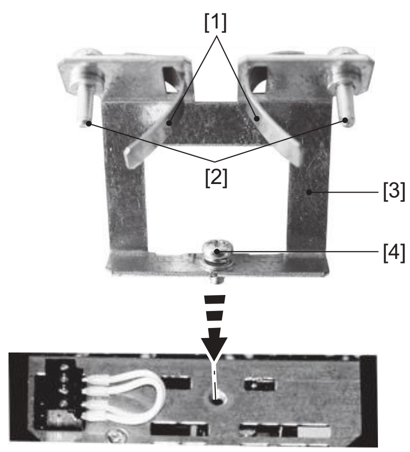
Sizes 1 to 7



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[1] Contact clip(s)
[2] Retaining screw(s) for contact clips
[3] Shield plate
[4] Retaining screw for shield clamp

13.6 *Touch guard for power terminals*

DANGER

Uncovered power connections.

Severe or fatal injuries from electric shock.

- Install the touch guard according to the regulations.
- Never start the unit if the touch guard is not installed.

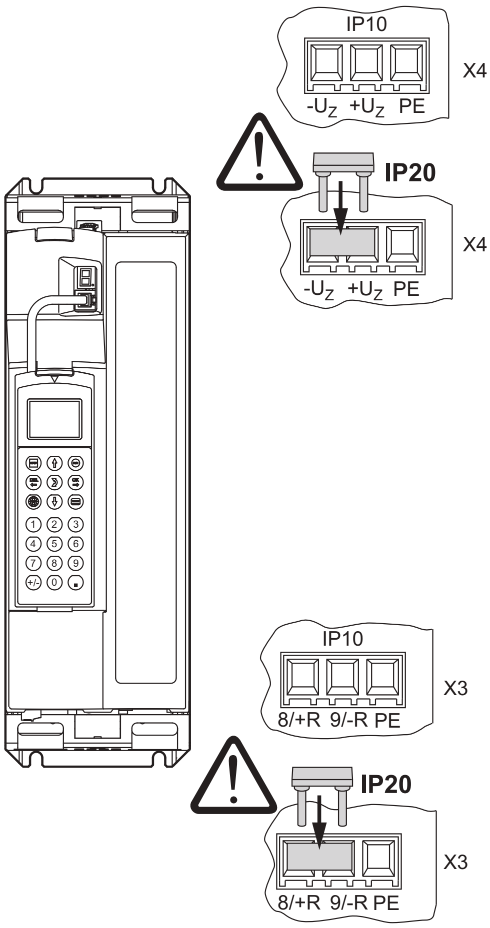
13.6.1 Size 2S

IP20 is achieved for MOVIDRIVE® MDX61B size 2S if one of the following conditions is fulfilled:

- Touch guard is installed on X3 / X4.
- An adequate cable is connected to X3 / X4

If neither of the two conditions is fulfilled, the degree of protection is IP10.

The following figure shows the touch guard for MOVIDRIVE® MDX61B size 2S.



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13.6.2 Sizes 4 and 5

IP20 is achieved for MOVIDRIVE® MDX61B sizes 4 and 5 (AC 500 V units: MDX61B0370/0450/0550/0750; AC 230 V units: MDX61B0220/0300), as soon as one of the following conditions is fulfilled:

- Cables with shrink tubing and a cable cross section of ≥ 35 mm^2 (AWG2) are connected to X1, X2, X3, X4. The additional DLB11B touch guard need not be installed.
- Cables with shrink tubing and a cable cross section of < 35 mm^2 (AWG2) are connected to X1, X2, X3, X4. The DLB11B touch guard must be installed properly (see section "Installing the DLB11B touch guard").
- The DLB11B must be connected to power terminals that are not connected. The DLB11B does not have to be connected to the PE terminals.

If neither of the conditions is fulfilled, the degree of protection is IP10. The **DLB11B touch guard (12 pieces included in the scope of delivery)** is available via the **part number 0823 111 7**.

Installing the DLB11B touch guard

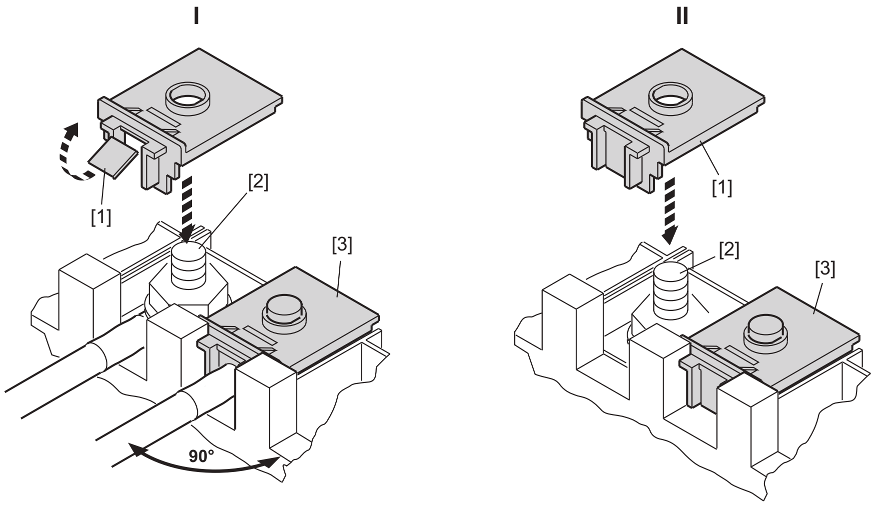
Proceed as follows to install the **DLB11B touch guard**:

- Figure I: Power terminal with connected power cable with a cable cross section of < 35 mm^2 (AWG2):

  Remove the plastic saddle [1] and push the DLB11B touch guard [3] on the respective stud [2] of the power terminal. Make sure that the cable output is straight. Install the cover for the power terminals.

- Figure II: Power terminal without connected power cable:

  Push the DLB11B touch guard [1] on the respective stud [2]. Install the cover for the power terminals.



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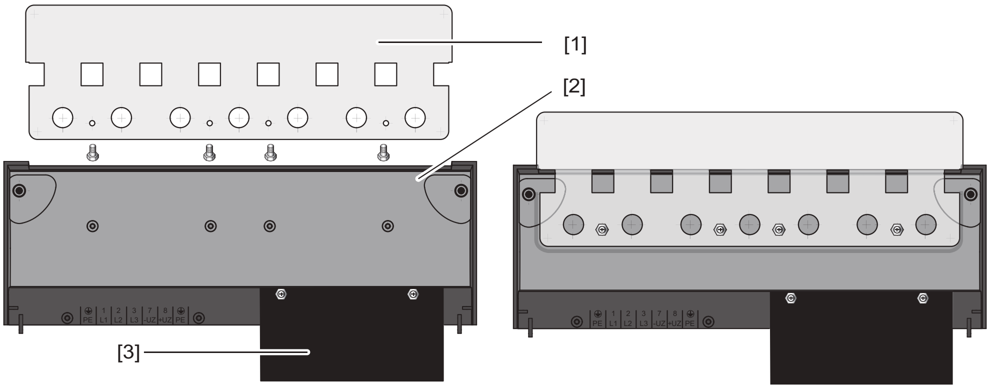
[1] Plastic saddle	[1] Touch guard
[2] Terminal stud	[2] Terminal stud
[3] Correctly mounted touch guard	[3] Correctly mounted touch guard

For additional information on the X1, X2, X3 and X4 power terminals, refer to the "Technical Data" section.

13.6.3 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 (2) touch guards with eight (8) retaining screws are supplied as standard. Install the touch guard on both covers of the power terminals.

The following figure shows the touch guard for MOVIDRIVE® MDX61B sizes 4, 5 and 6.



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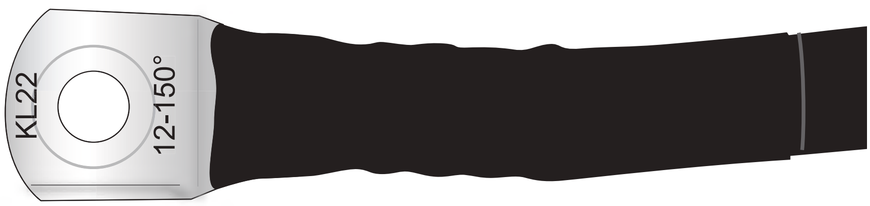
The touch guard comprises the following parts:

[1] Cover plate
[2] Connection plate
[3] Screen (only for size 5)

IP10 degree of protection is only achieved for the MOVIDRIVE® MDX61B units sizes 4, 5 and 6 when the following conditions are fulfilled:

- Touch guard is fully installed
- Shrink tubing is installed on the power cables of all power terminals (X1, X2, X3, X4) (see following picture)



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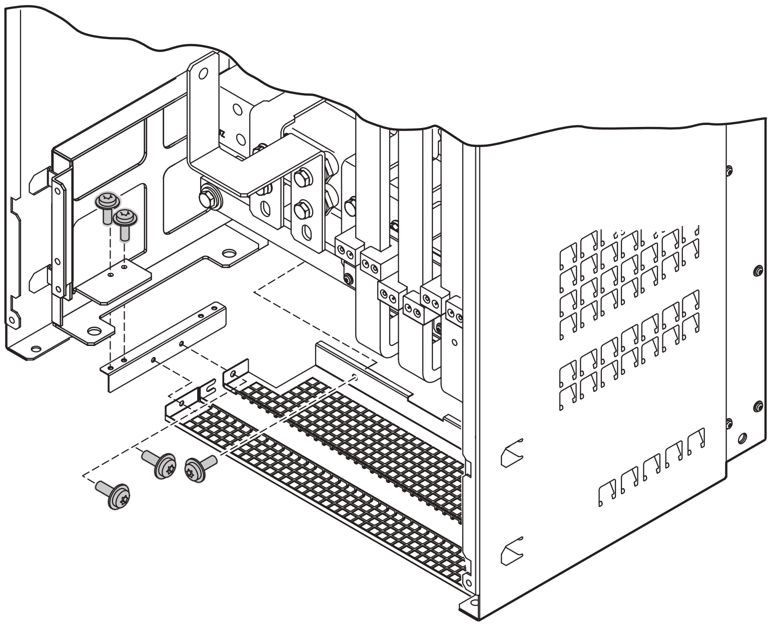
	INFORMATION
	If the above conditions are not met, MOVIDRIVE® units sizes 4, 5 and 6 have degree of protection IP00.

13.6.4 Size 7

Installation of touch guard DLB21B

Degree of protection IP20 is achieved for MOVIDRIVE® MDX61B size 7 when the touch guard DLB21B (part no 1 822 608 6) is trimmed to size by the customer and mounted in front and behind the power connections.



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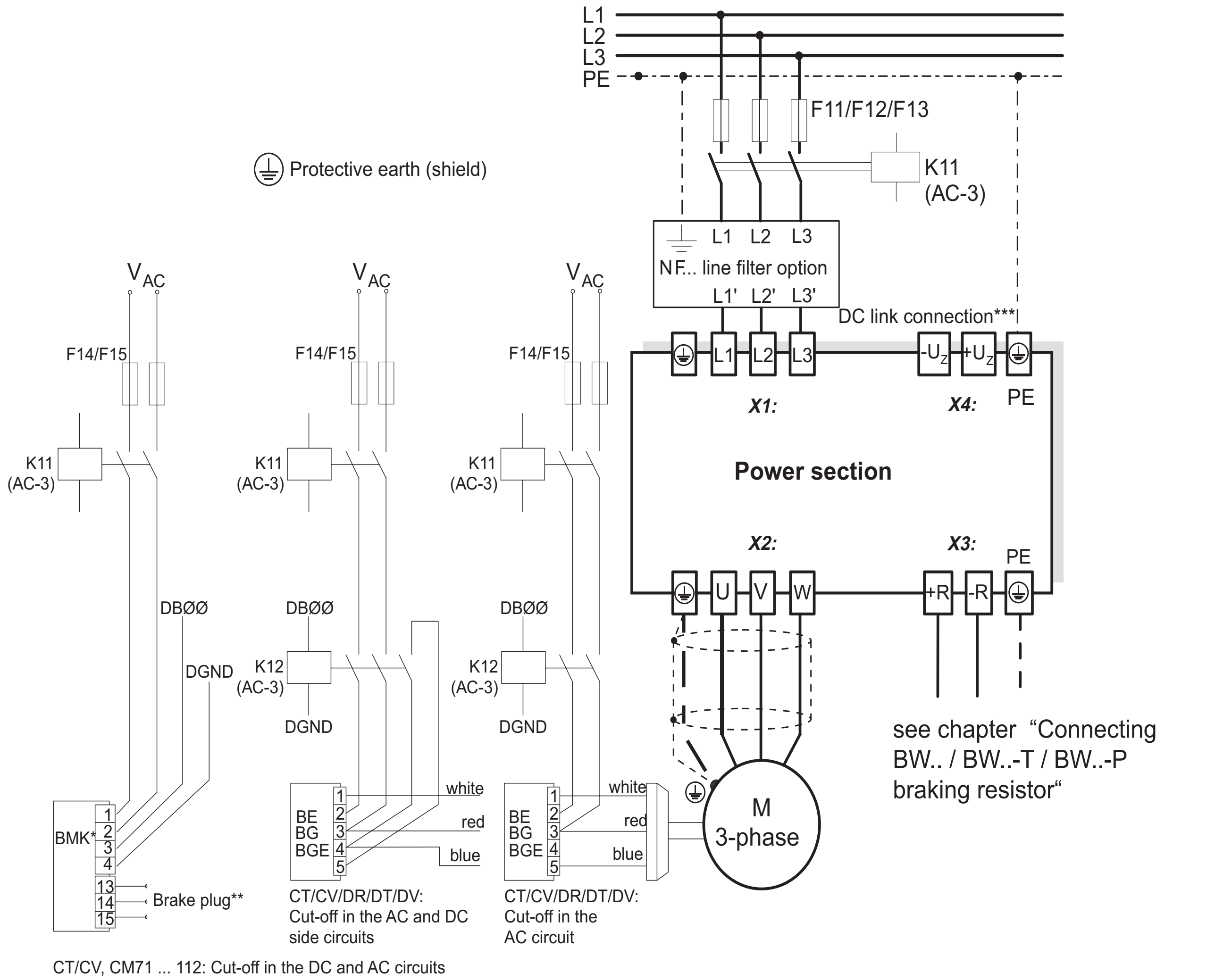
	INFORMATION
i	If the above conditions are not met, MOVIDRIVE® units size 7 have degree of protection IP00.

13.7 *Wiring diagram for basic unit*

13.7.1 Power section (sizes 0 – 6) and brake



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* K12 is not required when K11 is used

** **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.

*** 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).

INFORMATION

- Connect the brake rectifier using a separate supply system lead.
- **Supply via the motor voltage is not permitted!**

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

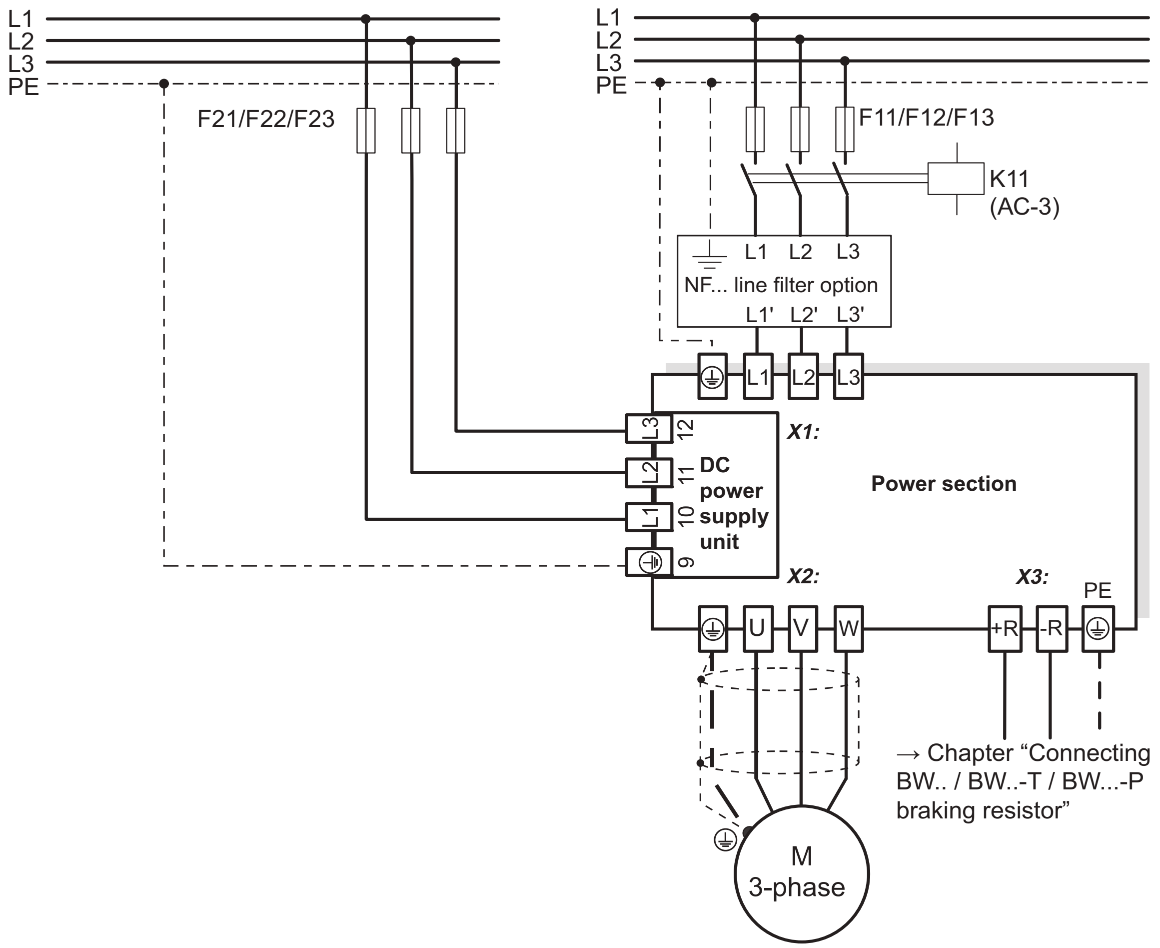
– all hoist applications,

– Drives that require a rapid brake response time

– CFC and SERVO operating modes

13.7.2 Power section and DC power supply unit (size7)

For connecting the brake, refer to the wiring diagram of size 1-6.



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Technical data of DC power supply unit:

- Rated current: AC 2.4 A
- Inrush current AC 30 A / AC 380 - 500 V

INFORMATION

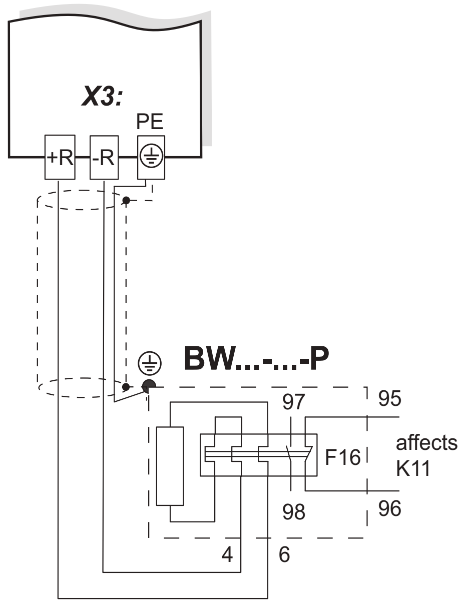
Note that the connection of external +24 V power supply units to the X10:9 control terminal is not permitted in backup mode via power supply unit. Incorrect connection prompts an error message.

13.7.3 Brake rectifier in the 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.

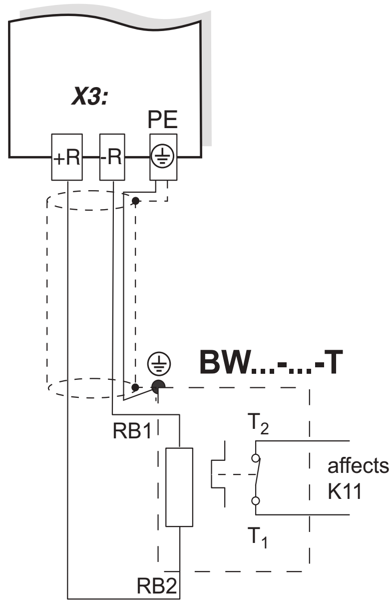
13.7.4 Braking resistor BW... / BW...-...-T /BW...-...-P

Power section



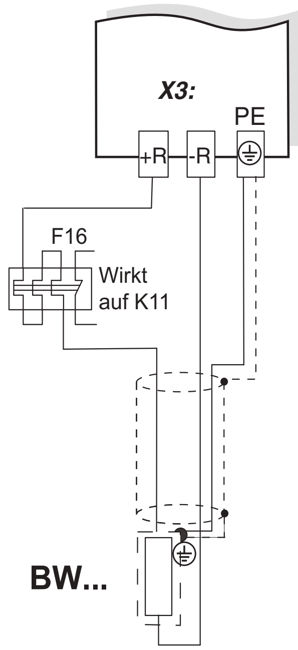
When the signal contact F16 trips, K11 must be opened and DIØØ"/Controller inhibit" must receive a "0" signal. The resistor circuit must not be interrupted!

Power section



When the internal temperature switch trips, K11 must be opened and DIØØ"/Controller inhibit" must receive a "0" signal. The resistor circuit must not be interrupted!

Power section



When the external bimetal relay (F16) trips, K11 must be opened and DIØØ "/Controller inhibit" must receive a "0" signal . The resistor circuit must not be interrupted!

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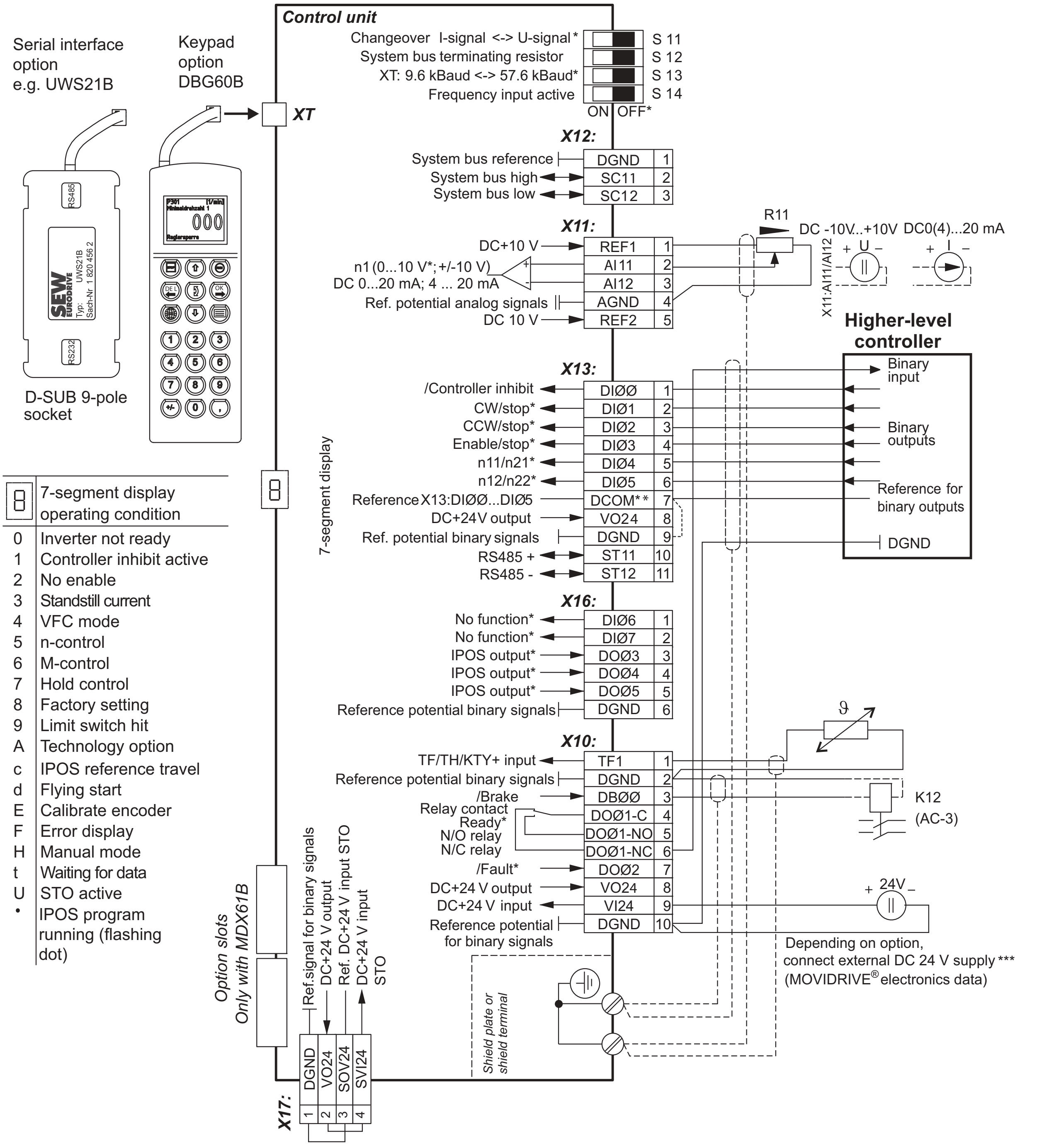
Braking resistor type	Overload protection		
	Design specified	Internal temperature switch (..T)	External bimetallic relay (F16)
BW...	-	-	Required
BW...-...-T	-	One of the two options (internal temperature switch/external bimetallic relay) is required.	
BW...-003 / BW...-005	Adequate	-	Permitted
BW090-P52B	Adequate	-	-

13.7.5 Signal terminals



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*	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®.
	DGND (X10, X12, X13, X16, X17) is connected with PE as standard (threaded hole, see section "Unit structure"). You can establish galvanic isolation by removing the M4 x 14 grounding screw.
***	External voltage supply via X:10 only for size 0-6. With size 7, the 24 V backup voltage must be connected via the DC power supply unit.

13.7.6 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)** **$+U_Z/-U_Z$ (PE)**	Power supply Motor connection Braking resistor connection DC link connection	
9,10,11,12	**L1/L2/L3/PE**	Connection of switched-mode power supply (only for size 7)	
S11: **S12:** **S13:** **S14:**		Change I-signal DC(0(4)...20 am) ↔ 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 XT. Either 9.6 or 57.6 baud, factory setting: 75.6 baud. 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 am) 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, with fixed assignment "/Controller inhibit" Binary input 2, factory setting "CW/stop" Binary input 3, factory setting "CCW/stop" Binary input 4, factory setting "Enable/stop" Binary input 5, factory setting "n11/n21" Binary input 6, factory setting "n12/n22"	• The binary inputs are electrically isolated by optocouplers. • Selection options for binary inputs 2 to 6 (DIØ1 ... DIØ5) → Parameter menu P60_
X13:7	**DCOM**	Reference for binary inputs X13:1 to X13:6 (DIØØ to DIØ5) and X16:1/X16:2 (DIØ6 to DIØ7) • Switching binary inputs with DC+24 V external voltage: Connection X13:7 (DCOM) must be connected to the reference potential of the external voltage. – Without jumper X13:7-X13:9 (DCOM-DGND) → Isolated binary inputs – With jumper X13:7-X13:9 (DCOM-DGND) → Non-isolated binary inputs • 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).	
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+ (baud rate has a fixed setting of 9.6 kBaud) RS485-	
X16:1 **X16:2** **X16:3** **X16:4** **X16:5** **X16:6**	**DIØ6** **DIØ7** **DOØ3** **DOØ4** **DOØ5** **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" **Do not connect external voltage to binary outputs X16:3 (DOØ3) and X16:5 (DOØ5)!** Reference potential for binary signals	• The binary inputs are electrically isolated by optocouplers. • Selection options for binary inputs 7 to 8 (DIØ6/ DIØ7) → Parameter menu P60_ • Selection options for binary outputs 3 to 5 (DOØ3...DOØ5) → Parameter menu P62_

Terminal		Function
X10:1	**TF1**	KTY+/TF-/TH connection (connect to X10:2 via TF/TH), factory set to "No response" (→ P835)
X10:2	**DGND**	Reference potential for binary signals / KTY–
X10:3	**DBØØ**	Binary output DBØØ with fixed assignment "/Brake", load capacity max DC 150 mA (short-circuit proof, protected against external voltage to DC 30 V)
X10:4	**DOØ1-C**	Shared contact binary output 1, factory setting "Ready"
X10:5	**DOØ1-NO**	Normally open contact binary output 1, max. load of relay contacts DC 30 V and DC 0.8 A
X10:6	**DOØ1-NC**	NC contact binary output 1
X10:7	**DOØ2**	Binary output DBØ2, factory set to "/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 (DOØ1 and DOØ2) → Parameter menu P62_. Do not apply external voltage to binary outputs X10:3 (DBØØ) and X10:7 (DOØ2).
X10:8	**VO24**	Auxiliary supply output DC+24 V (max. load X13:8 **and** X10:8 = 400 mA) for external command switches
X10:9	**VI24**	Input DC+24 V voltage supply (backup voltage depending on options, unit diagnosis when supply system off)
X10:10	**DGND**	Reference potential for binary signals
		Note for X:10.9: Only connect external backup voltage DC +24 V to sizes 0-6. With size 7, the DC power supply unit must be connected to the supply system. Refer to section "Power section and DC power supply unit (size 7)" (page 525).
X17:1	**DGND**	Reference potential for X17:2
X17:2	**VO24**	Auxiliary supply voltage DC+24 V, **only to supply X17:4 on the same unit**
X17:3	**SOV24**	Reference potential for DC +24 V "STO" input (safety contact)
X17:4	**SVI24**	DC+24 V "STO" input (safety contact)
XT		Only service interface. Option slot: DBG60B / UWS21B / USB11A

13.8 *Assignment of braking resistors, chokes and filters*

13.8.1 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[1]	-	824 563 0					
BW072-003	I_F = 0.8 A	826 058 3					
BW072-005	I_F = 1.2 A	826 060 5					
BW168/BW168-T	I_F = 3.6 A	820 604 X	1820 133 4				
BW100-006 BW100-006-T	I_F = 2.4 A	821 701 7	1820 419 8				
Line chokes		Part number					
ND020-013	ΣI_{line} = AC 20 A	826 012 5					
Line filter		Part number					
NF009-503	U_{max} = AC 550 V	827 412 6					
Output chokes	Inner diameter	Part number					
HD001	d = 50 mm (2 in)	813 325 5		for cable cross sections 1.5 to 16 mm² (AWG 16 to 6)			
HD002	d = 23 mm (0.91 in)	813 557 6		For cable cross sections ≤ 1.5 mm² (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%)

13.8.2 AC 400/500 V units, sizes 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 = 1.0 A	826 269 1								
BW100-006/ BW100-006-T	I_F = 2.4 A	821 701 7	1820 419 8							
BW168/BW168-T	I_F = 3.6 A	820 604 X	1820 133 4							
BW268/BW268-T	I_F = 4.2 A	820 715 1	1820 417 1							
BW147/BW147-T	I_F = 5.1 A	820 713 5	1820 134 2							
BW247/BW247-T	I_F = 6.5 A	820 714 3	1820 084 2							
BW347/BW347-T	I_F = 9.2 A	820 798 4	1820 135 0							
BW039-012/ BW039-012-T	I_F = 5.5 A	821 689 4	1820 136 9							
BW039-026-T	I_F = 8.2 A		1820 415 5							
BW039-050-T	I_F = 11.3 A		1820 137 7							
Line chokes		Part number								
ND020-013	ΣI_{line} = AC 20 A	826 012 5								
ND045-013	ΣI_{line} = AC 45 A	826 013 3								
Line filter		Part number								
NF009-503	V_{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								
Output chokes	Inner diameter	Part number								
HD001	d = 50 mm (2 in)	813 325 5		For cable cross sections 1.5 – 16 mm² (AWG 16 – 26)						
HD002	d = 23 mm (0.91 in)	813 557 6		For cable cross sections ≤ 1.5 mm² (AWG 16)						
HD003	d = 88 mm (3.5 in)	813 558 4		for cable cross sections > 16 mm² (AWG 6)						
Output filter (only in VFC operating mode)		Part number								
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%)

13.8.3 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	821 684 3		1 820 416 3				C	C
BW018-035-T	I_F = 13.9 A		1820 138 5					C	C
BW018-075-T	I_F = 20.4 A		1820 139 3					C	C
BW915-T	I_F = 32.7 A		1820 413 9						
BW012-025/ BW012-025-P	I_F = 14.4A	821 680 0		1 820 414 7					
BW012-050-T	I_F = 20.4 A		1820 140 7						
BW012-100-T	I_F = 28.9 A		1820 141 5						
BW106-T	I_F = 47.4 A		1820 083 4						
BW206-T	I_F = 54.8 A		1820 412 0						
Line chokes		**Part number**							
ND045-013	Σ I_{line} = AC 45 A	826 013 3				A			
ND085-013	Σ I_{line} = AC 85 A	826 014 1				B			A
ND150-013	Σ I_{line} = AC 150 A	825 548 2							B
ND300-0053	Σ I_{line} = AC 300 A	827 721 4							
Line filter		**Part number**							
NF035-503		827 128 3			A				
NF048-503		827 117 8			B	A			
NF063-503	V_{max} = AC 550 V	827 414 2				B	A		
NF085-503		827 415 0					B		A
NF115-503		827 416 9							B
Output chokes	**Inner diameter**	**Part number**							
HD001	d = 50 mm	813 325 5	For cable cross sections 1.5 – 16 mm^2 (AWG 16 – 6)						
HD003	d = 88 mm	813 558 4	for cable cross sections > 16 mm^2 (AWG 6)						
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

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 × I_F)
D Connect three braking resistors in parallel and set three times the trip current on F16 (3 × I_F)
E Connect four braking resistors in parallel and set four times the trip current on F16 (4 × I_F)

13.8.4 AC 400/500 V units, sizes 5 to 7

MOVIDRIVE® MDX61B...-503			0550	0750	0900	1100	1320	1600	2000	2500
Size			5		6			7		
Braking resistors BW...-...-T	**Trip current**	**Part number** BW...-...-T								
BW106-T	I_F = 47.4 A	1820 083 4			C	C	C	D	E	F
BW206-T	I_F = 54.8 A	1820 412 0			C	C	C	D	E	F
BW1.4-170	I_F = 110 A	1330 152 7								
BW003-420-T	I_F = 129 A	1330 234 5						C	C	C
Line filter		**Part number**								
NF115-503	V_{max} = AC 550 V	827 416 9	A							
NF150-503		827 417 7	B							
NF210-503		827 418 5				A				
NF300-503		827 419 3				B				
NF600-503		1 796 338 9						B	B	B
Output chokes	**Inner diameter**	**Part number**								
HD001	d = 50 mm	813 325 5	For cable cross sections 1.5 – 16 mm² (AWG 16 – 6)							
HD003	d = 88 mm	813 558 4	for cable cross sections > 16 mm² (AWG 6)							
HD004	Connection with M12 bolt	816 885 7								
HD005	Connection With M12 cable lug, M10 PE connection	1 796 336 2						B	B	B
Output filter (only in V/f and VFC operating mode)		**Part number**								
HF450-503		826 948 3	H	H						
HF180-403		829 909 9								
HF325-403		829 948 3								

- 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 × I_F)
- D Connect three braking resistors in parallel and set three times the trip current on F16 (3 × I_F)
- E Connect four braking resistors in parallel and set four times the trip current on F16 (4 × I_F)
- F Connect five braking resistors in parallel and set five times the trip current on F16 (5 × I_F)
- H Two filter in parallel

13.8.5 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 BW...-...-P	Trip current	Part number BW...	Part number BW...-...-T									
BW039-003	I_F = 2.7 A	821 687 8										
BW039-006	I_F = 3.9 A	821 688 6										
BW039-012 BW039-012-T	I_F = 5.5 A	821 689 4	1 820 136 9									
BW039-026-T	I_F = 8.1 A		1 820 415 5									
BW027-006	I_F = 4.7 A	822 422 6										
BW027-012	I_F = 6.6 A	822 423 4										
BW018-015-T	I_F = 9.1 A		1 820 416 3						C	C	C	C
BW018-035-T	I_F = 13.9 A		1 820 138 5						C	C	C	C
BW018-075-T	I_F = 20.4 A		1 820 139 3						C	C	C	C
BW915-T	I_F = 32.6 A		1 820 413 9						C	C	C	C
BW012-025-P	I_F = 14.4 A		1 820 414 7									
BW012-050-T	I_F = 20.4 A		1 820 140 7									
BW012-100-T	I_F = 28.8 A		1 820 141 5									
BW106-T	I_F = 47.4 A		1 820 083 4								C	C
BW206-T	I_F = 54.7 A		1 820 412 0								C	C
Line chokes		Part number										
ND020-013	S I_{line} = AC 20 A	826 012 5					A					
ND045-013	S I_{line} = AC 45 A	826 013 3					B		A			
ND085-013	S I_{line} = AC 85 A	826 014 1							B		A	
ND150-013	S I_{line} = AC 150 A	825 548 2									B	
Line filter		Part number										
NF009-503	V_{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	
Output chokes	Inner diameter	Part number										
HD001	d = 50 mm (2 in)	813 325 5	for cable cross sections 1.5 to 16 mm^2 (AWG 16 to 6)									
HD002	d = 23 mm (0.91 in)	813 557 6	For cable cross sections ≤ 1.5 mm^2 (AWG 16)									
HD003	d = 88 mm (3.5 in)	813 558 4	for cable cross sections > 16 mm^2 (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 × I_F)

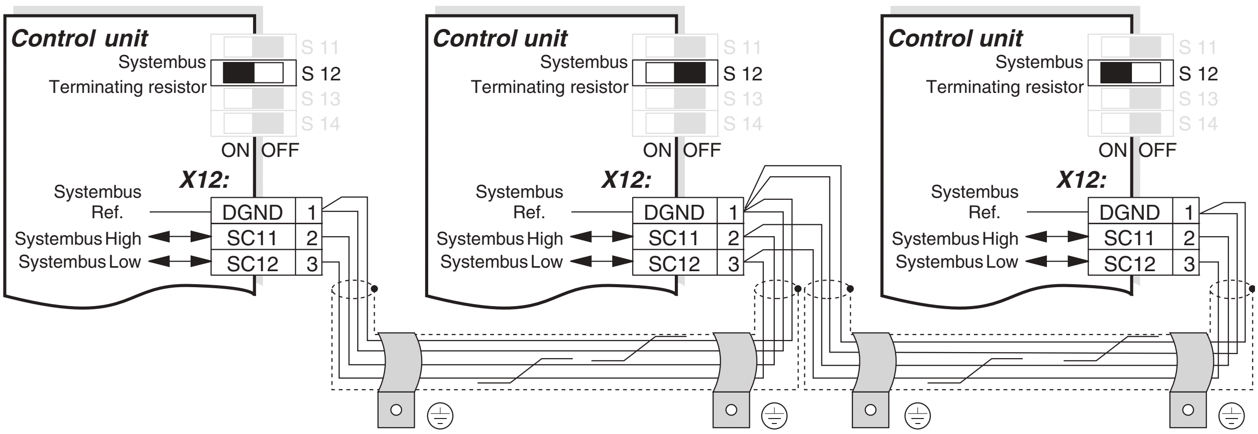
13.9 *Connecting the system bus (SBus 1)*

	INFORMATION
	Only when P884 "SBus baud rate" = 1000 kBaud:
	MOVIDRIVE® *compact* MCH4_A units are not allowed to be combined with other MOVIDRIVE® units in the same system bus combination.
	The units are allowed to be mixed when baud rates ≠ 1000 kBaud.

Max. 64 CAN bus stations can be addressed via system bus (SBus). Use a repeater after 20 or 30 nodes, 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. You can order the manual from SEW-EURODRIVE.

13.9.1 SBus wiring diagram



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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:
  - Cable cross section 0.25 ... 0.75 mm^2 (AWG 23 to AWG 19)
  - Cable resistance 120 Ω at 1 MHz
  - Capacitance per unit length ≤ 40 pF/m at 1 kHz

  Suitable cables include CAN bus or DeviceNet cables.

Connecting the shield

- 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 → 500 m (1640 ft)
  - 250 kBaud → 250 m (820 ft)
  - **500 kBaud → 100 m (328 ft)**
  - 1000 kBaud → 25 m (82 ft)

Terminating resistor

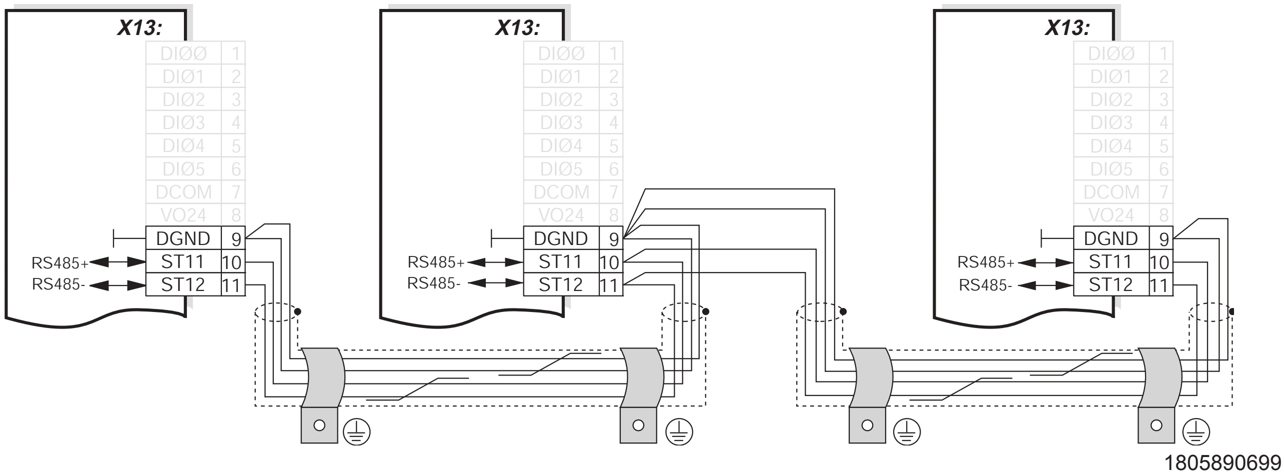
- Switch on the system bus terminating resistor (S12 = ON) at the start and end of the system bus connection. Switch off the terminating resistor on the other units (S12 = OFF).

NOTICE
There must not be any potential displacement between the units connected with the SBus. This may affect the functionality of the units. Take suitable measures to avoid potential displacement, such as connecting the unit ground connectors using a separate cable.

13.10 Connecting the RS485 interface

The RS485 interface (X13:ST11, ST12) 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). The baud rate is set to 9.6 baud by default.

13.10.1 Wiring diagram of the RS485 interface (X13)



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:
  – Cable cross section 0.25 ... 0.75 mm^2 (AWG 23 to AWG 19)
  – Cable resistance 100 ... 150 Ω at 1 MHz
  – Capacitance per unit length ≤ 40 pF/m at 1 kHz

Connecting the shield

- 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 (656 ft).

Terminating resistor

- Dynamic terminating resistors are installed. **Do not connect any external terminating resistors.**

NOTICE

There must not be any potential displacement between the units connected via the RS485. This may affect the functionality of the units.

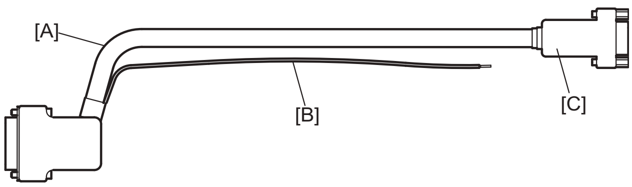
Take suitable measures to avoid potential displacement, such as connecting the unit ground connectors using a separate cable.

13.11 Connecting the interface adapter option type DWE11B/12B

13.11.1 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 theDEH11B/DEH21B option**. 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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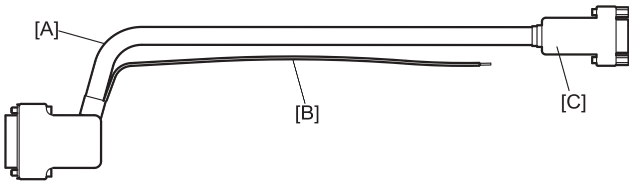
[A] 5 x 2 x 0.25 mm^2 (AWG 23) / length 1000 mm (39.37 in) / max. cable length inverter - encoder: 100 m (328 ft)
[B] DC 24 V connection for HTL encoder; 1 x 0.5 mm^2 (AWG 20) / length 250 mm (9.84 in)

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 single-ended HTL encoders to theDEH11B/DEH21B option**. In addition to the A, B and C track, you will also have to connect the negated tracks ($\overline{A}$, $\overline{B}$, $\overline{C}$). SEW-EURODRIVE recommends using this interface adapter for any new system.



1805896331

[A] 4 x 2 x 0.25 mm^2 (AWG 23) / length 1000 mm (39.37 in) / max. cable length inverter - encoder: 200 m (656 ft)

[B] DC 24 V connection for HTL encoder; 1 x 0.5 mm^2 (AWG 20) / length 250 mm (9.84 in)

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

13.12 Connection of interface adapter option UWS21B (RS232)

13.12.1 Part number

Interface adapter UWS21B: 1 820 456 2

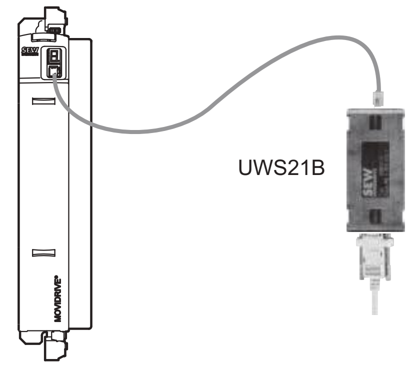
13.12.2 Scope of delivery

The scope of delivery for the UWS21B option includes:

- UWS21B
- CD-ROM with MOVITOOLS® MotionStudio
- 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®.

13.12.3 MOVIDRIVE® – UWS21B connection

- Use the connection cable supplied to connect the UWS21B option to the MOVIDRIVE® unit.
- Plug the connection cable into the XT terminal socket of the MOVIDRIVE® unit.
- Note that the DBG60B keypad and the UWS21B serial interface cannot be connected to the MOVIDRIVE® at the same time.
- The following figure shows the connection cable between MOVIDRIVE® and UWS21B.



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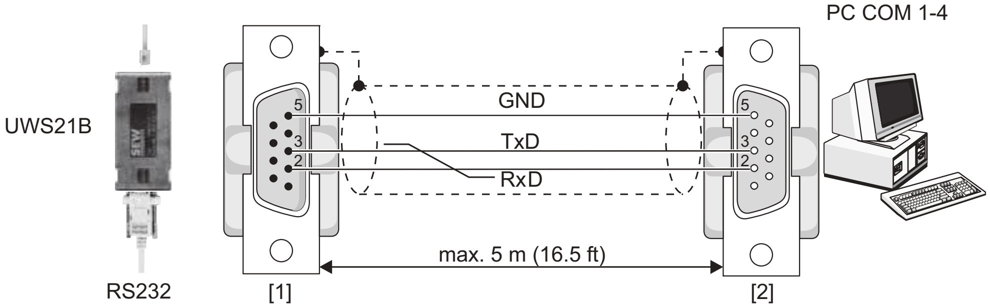
13.12.4 Connecting UWS21B to PC

- Use the connection cable supplied (shielded RS232 standard interface cable) to connect the UWS21B option to the PC.
- The following figure shows the connection cable between UWS21B and PC (1:1 connection).



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[1] 9-pin D-sub connector
[2] 9-pin D-sub socket

13.13 Connecting the interface adapter option USB11A

13.13.1 Part number

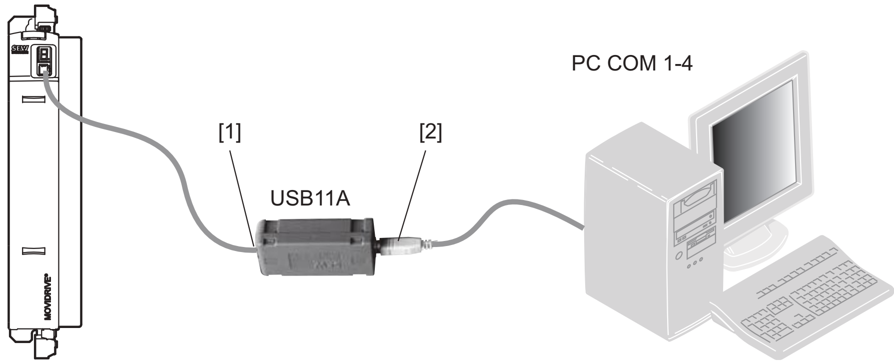
Interface adapter USB11A: 824 831 1

13.13.2 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® MotionStudio
- The USB11A interface adapter supports USB 1.1 and USB 2.0.

13.13.3 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 terminal slot of the 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 MOVIDRIVE® at the same time.
- Use the supplied USB connection cable [2] (type USB A-B) to connect the USB11A to the PC.
- The following figure shows the connection cable between MOVIDRIVE MDX60B/61B and USB11A.



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13.13.4 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.

13.13.5 Operation with MOVITOOLS® MotionStudio

- After installation, the PC recognizes the USB11A interface adapter after approximately 5 to 10 s.
- Start MOVITOOLS® MotionStudio.

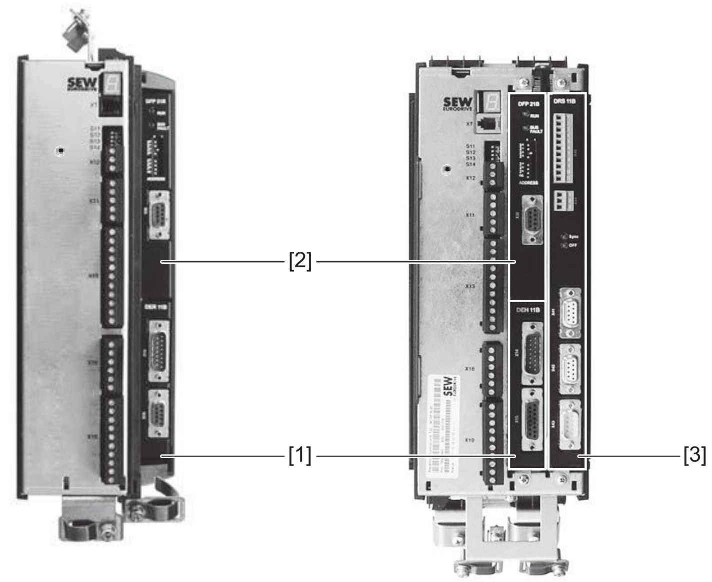
INFORMATION

If the connection between the PC and USB11A is interrupted, you will have to restart MOVITOOLS® MotionStudio.

13.14 Option combinations for MDX61B

13.14.1 Arrangement of the option slots

Size 0 (0005 ... 0014)   Size 1 ... 6 (0015 ... 1320)



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

13.14.2 Option card combinations for MDX61B

The option cards are different sizes and can only be installed in the matching option slots. Fieldbus interfaces including DHx cannot be combined with one another. The following list shows the possible combinations of option cards for MOVIDRIVE® MDX61B.

Option card	Designation	MOVIDRIVE® MDX61B		
		Encoder slot Size 0 - size 7	Fieldbus slot Sizes 0 - 7	Expansion slot Sizes 1 - 7
DEH11B	Encoder input incr. / Hiperface®	X		
DEH21B	Encoder input absolute encoder	X		
DEU21B	Encoder input absolute encoder	X		
DER11B	Encoder input resolver / Hiperface®	X		
DFP21B	PROFIBUS fieldbus interface		X	
DFI11B	Interbus fieldbus interface		X	
DFI21B	Interbus LWL fieldbus interface		X	
DFD11B	DeviceNet fieldbus interface		X	
DFC11B	CAN/CANopen fieldbus interface		X	
DFE11B DFE12B DFE13B	Ethernet fieldbus interface		X	
DFE32B	PROFINET IO fieldbus interface		X	
DFE33B	EtherNet/IP fieldbus interface		X	
DFE24B	EtherCAT fieldbus interface		X	
DFS11B	PROFIBUS fieldbus interface with PROFIsafe (STO)		X	
DFS12B	PROFIBUS fieldbus interface with PROFIsafe		X	
DFS21B	PROFINET IO fieldbus interface with PROFIsafe (STO)		X	
DCS21B/ 31B	Safety monitor			X
DIO11B	I/O expansion		X	X[1)]
DRS11B	Phase-synchronous operation			X
DIP11B	SSI encoder interface			X
DHP11B	User-programmable MOVI-PLC® *basic* controller		X	X[1)]
DHE41B	User-programmable MOVI-PLC® *advanced* controller		X	X[1)]
DHF41B	User-programmable MOVI-PLC® *advanced* controller			X
DHR41B	User-programmable MOVI-PLC® *advanced* controller			X
DHP11B + OST11B	DHP11B + OST11B (RS485 interface, only in combination with DHP11B)	OST11B	DHP11B	DHP11B + OST11B[2)]

1) When fieldbus slot is not available

2) When encoder slot is not available

13.15 Installing and removing option cards

	INFORMATION
	• For MOVIDRIVE® **MDX61B size 0**, **only SEW-EURODRIVE** is authorized to install or remove option cards. • For MOVIDRIVE® MDX61B sizes 1 to 7, you can install or remove the option cards yourself.

13.15.1 Before you start

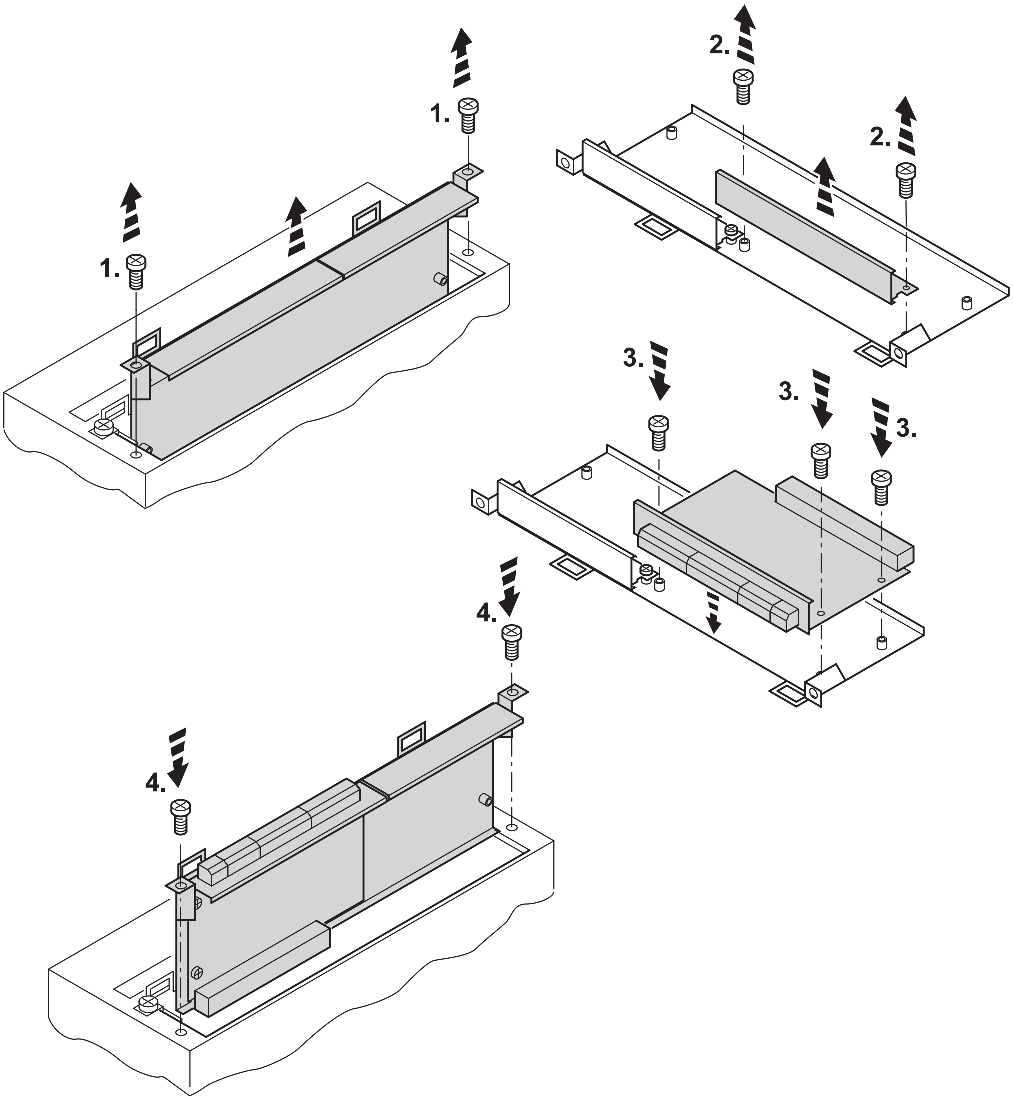
Observe the following notes before installing or removing an option card:

	NOTICE
	Electrostatic charge. Damage to electronic components. • Disconnect the inverter from the power. Switch off the DC 24 V and the supply system voltage. • Take appropriate measures to protect the option card from electrostatic charge (use discharge strap, conductive shoes, etc.) before touching it.

- **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 of the components.

13.15.2 Basic procedure for installing/removing an option card

The following figure shows the basic procedure for installing an option card in MOVIDRIVE® MDX61B size 1 - 7



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 the 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.

13.16 Connecting encoders and resolvers

INFORMATION

- The wiring diagrams do not show the view onto the cable end but the connection to the motor or MOVIDRIVE®.
- The conductor colors specified in the wiring diagrams are in accordance with IEC 757 and correspond to the conductor colors used in the pre-fabricated cables from SEW.

13.16.1 General installation notes

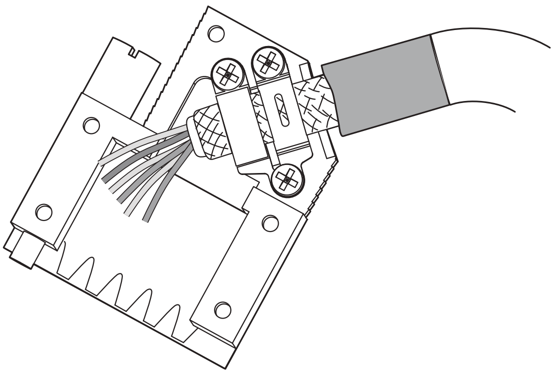
- The D-sub connectors shown in the wiring diagrams have a 4/40 UNC thread.
- Max. line length inverter – encoder/resolver: 100 m (328 ft) with a capacitance per unit length ≤ 120 nF/km.
- Cable cross section: 0.20 – 0.5 mm^2 (AWG 24 ... 20)
- If you cut a core of the encoder/resolver cable, insulate 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 D-sub plug
- Route the encoder/resolver cable separately from the power cables.

13.16.2 Connecting the shield

Connect the shield of the encoder/resolver cable over a large area.

On the inverter

Connect the shield on the inverter end in the housing of the sub D connector (→ following figure).



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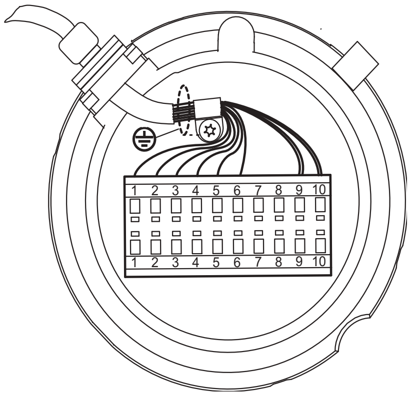
On the encoder/resolver

Connect the shield on the encoder/resolver side at the respective grounding clamps (→ following figure). 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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13.16.3 Prefabricated cables

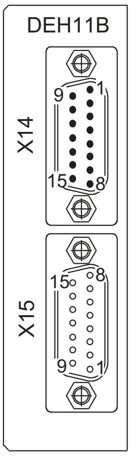
SEW-EURODRIVE offers pre-fabricated cables for connecting encoders/resolvers. We recommend using these prefabricated cables.

13.17 Connection and terminal description of the DEH11B (Hiperface®) option

13.17.1 Part number

Option Hiperface® encoder card type DEH11B: 824 310 7

	INFORMATION
	• The "Hiperface® encoder card type DEH11B" option is only possible in conjunction with MOVIDRIVE® MDX61B, not with MDX60B. • The DEH11B option must be plugged into the encoder slot.

Front view of DEH11B	Description	Terminal	Function
 1806062475	**X14: Input for external encoder or output for incremental encoder simulation**	**X14:1**	(COS+) signal track A (K1)
		X14:2	(SIN+) signal track B (K2)
		X14:3	Signal track C (K0)
		X14:4	DATA+
		X14:5/6	Reserved
		X14:7	Changeover
	Pulse count of the incremental encoder simulation:	**X14:8**	Reference potential DGND
	• 1024 pulses/revolution with HIPERFACE® encoder on X15	**X14:9**	(COS–) Signal track $\overline{A}$ ($\overline{K1}$)
	• As at X15: Motor encoder input with sin/cos encoder or TTL sensor on X15	**X14:10**	(SIN–) Signal track $\overline{B}$ ($\overline{K2}$)
		X14:11	Signal track $\overline{C}$ ($\overline{K0}$)
		X14:12	DATA-
		X14:13/14	Reserved
		X14:15	DC+12 V (tolerance range DC 10.5 – 13 V) (max. load X14:15 **and** X15:15 = DC 650 mA)
	X15: Motor encoder input	**X15:1**	(COS+) signal track A (K1)
		X15:2	(SIN+) signal track B (K2)
		X15:3	Signal track C (K0)
		X15:4	DATA+
		X15:5	Reserved
		X15:6	Reference potential TF/TH/KTY–
		X15:7	Reserved
		X15:8	Reference potential DGND
		X15:9	(COS–) Signal track $\overline{A}$ ($\overline{K1}$)
		X15:10	(SIN–) Signal track $\overline{B}$ ($\overline{K2}$)
		X15:11	Signal track $\overline{C}$ ($\overline{K0}$)
		X15:12	DATA-
		X15:13	Reserved
		X15:14	TF/TH/KTY+ connection
		X15:15	DC+12 V (tolerance range DC 10.5 – 13 V) (max. load X14:15 **and** X15:15 = DC 650 mA)

	INFORMATION
i	• If X14 is used as an incremental encoder simulation output, the switchover (X14:7) must be jumpered with DGND (X14:8). • 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.

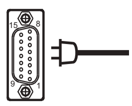
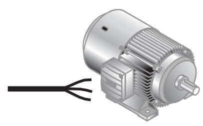
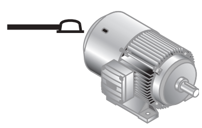
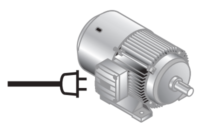
	NOTICE
⚠	Do not connect HTL encoders E..C to X15 of option DEH11B. Doing so can destroy the X15 (motor encoder input) on the DEH11B option. Only connect HTL encoders E..C to option DEH11B/12B using the interface adapter DWE11B/12B (→ Sec. "Connecting the interface adapter type DWE11B/12B").

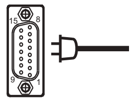
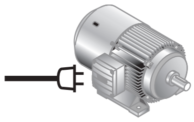
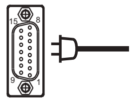
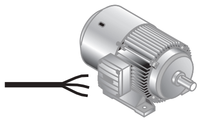
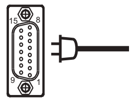
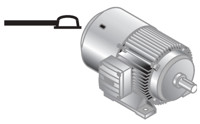
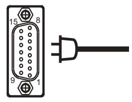
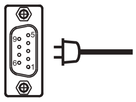
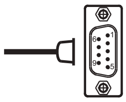
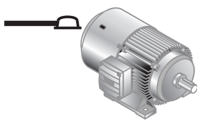
13.17.2 Permissible encoders at X:14

Refer to section "Connecting external encoders to X:14" (page 559).

13.17.3 Permissible encoders at X:15

The following SEW encoders can be connected to the option HIPERFACE® encoder card type DEH11B:

Encoder on DR series AC motors – MOVIDRIVE®					
Motor type	Encoder	MOVIDRIVE® inverter	Motor	Cable	Details
DR71 – DR132	ES7S ES7R AS7W	X15 		1362 2021 1362 2048	(page 560)
DR160 – DR225	EG7S EG7R AG7W				
DR71 – DR132	ES7S ES7R AS7W			1361 7621 1361 7648	
DR160 – DR225	EG7S EG7R AG7W				
DR315	EH7S			1360 2659 1362 3206	

Encoders on DT../DV.. and CM series motors – MOVIDRIVE®					
Motor type	**Encoder**	**MOVIDRIVE® inverter**	**Motor**	**Cable**	**Details**
DT../DV.., DS56 CT../CV.., CM71 – 112 CMP	AS1H ES1H AK0H EK0H AV1H AF1H EG7C			1332 453 5 1332 455 1	(page 560)
CM71 – 112	AS1H ES1H AV1H AF1H EG7C			1332 457 8 1332 454 3	
DT../DV.., CT../CV..,	EH1S ES1S ES2S EV1S ES1R ES2R EV1R: EH1R			1332 459 4 1332 458 6	
DT../DV..,	ES1T ES2T EV1T EH1T	X15:  DWI11A X2: 	DWI11A X1:  	198 829 8 198 828 X 817 957 3	

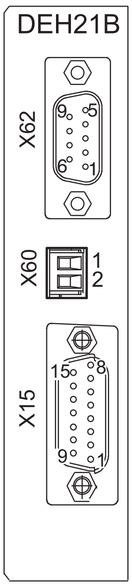
13.18 Connection and terminal description of the DEH21B option

13.18.1 Part number

Encoder card option DEH21B: 1820 818 5

INFORMATION

- For detailed information on the DEH21B option, refer to the "MOVIDRIVE® MDX61B DIP11B/DEH21B absolute encoder cards".
- The DEH21B option card can be installed in MOVIDRIVE® MDX61B sizes 0 to 7. Only SEW-EURODRIVE staff may install or remove the DEH21B option for MOVIDRIVE® MDX61B size 0.
- The DEH21B option card must be plugged into the encoder slot.
- The DC 24 V power supply of an encoder connected to X62 is ensured when X60 is supplied with DC 24 V. Observe the "Project planning" chapter in the MOVIDRIVE® MDX60B/61B system manual.

Front view of DEH21B	Description	Terminal	Function
 1806096139	**X62: Absolute encoder connection**	**X62:1**	Data +
		X62:2	Reserved
		X62:3	Cycle +
		X62:4	Reserved
		X62:5	DGND
		X62:6	Data –
		X62:7	Reserved
		X62:8	Pulse –
		X62:9	DC 24 V output
	X60: Voltage supply	**X60:1**	24VIN
		X60:2	DGND
	X15: Motor encoder input	**X15:1**	(COS+) signal track A (K1)
		X15:2	(SIN+) signal track B (K2)
		X15:3	Signal track C (K0)
		X15:4	DATA+
		X15:5	Reserved
		X15:6	Reference potential TF/TH/KTY–
		X15:7	Reserved
		X15:8	Reference potential DGND
		X15:9	(COS–) Signal track $\overline{A}$ ($\overline{K1}$)
		X15:10	(SIN–) Signal track $\overline{B}$ ($\overline{K2}$)
		X15:11	Signal track $\overline{C}$ ($\overline{K0}$)
		X15:12	DATA-
		X15:13	Reserved
		X15:14	TF/TH/KTY+ connection
		X15:15	DC+12 V (tolerance range DC 10.5 – 13 V) (max. load X15:15 = DC 650 mA)

	INFORMATION
	The DC 12 V supply voltage from 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.

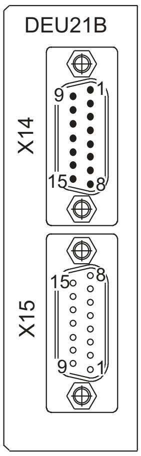
	NOTICE
	Do not connect HTL encoders E..C to X15 of the DEH21B option. Doing so can destroy the X15 (motor encoder input) of the DEH21B option. Only connect HTL encoders E..C to option DEH21B using the interface adapter DWE11B/12B (→ Sec. "Connecting the interface adapter type DWE11B/12B").

13.19 Connection and terminal description of the DEU21B option

13.19.1 Part number

Multi-encoder card option type DEU21B: 18221696

	INFORMATION
i	• For detailed information on the DEU21B option, refer to the "MOVIDRIVE® MDX61B multi-encoder card DEU21B" manual. • The DEU21B option card can be installed in MOVIDRIVE® MDX61B sizes 0 to 7. Only SEW-EURODRIVE staff may install or remove the DEU21B option for MOVIDRIVE® MDX61B size 0. • The DEU21B option card must be plugged into the encoder slot. • The DC 24 V power supply of an encoder connected to X62 is ensured when X60 is supplied with DC 24 V. Observe the "Project planning" chapter in the MOVIDRIVE® MDX60B/61B system manual.

Front view of DEU21B	Description	Terminal	Function
	**X14: Input for external encoder or output for incremental encoder simulation**	**X14:1**	(COS+) signal track A (K1)
		X14:2	(SIN+) signal track B (K2)
		X14:3	Signal track C (K0) / pulse +
		X14:4	DATA+ CANHigh
		X14:5/6	Reserved
	Output for incremental encoder simulation: • **Signal level to RS422** • **The number of pulses is the same as on X15 motor encoder input**	**X14:7**	Changeover
		X14:8	Reference potential DGND
		X14:9	(COS–) Signal track $\overline{A}$ ($\overline{K1}$)
		X14:10	(SIN–) Signal track $\overline{B}$ ($\overline{K2}$)
		X14:11	Signal track $\overline{C}$ ($\overline{K0}$) / pulse –
		X14:12	DATA- CANLow
		X14:13	DC 24 V encoder supply[1)]
		X14:14	Reserved[1)]
		X14:15	DC 12 V encoder supply[1)]
	X15: Motor encoder input	**X15:1**	(COS+) signal track A (K1)
		X15:2	(SIN+) signal track B (K2)
		X15:3	Signal track C (K0) / pulse +
		X15:4	DATA+
		X15:5	Reserved
		X15:6	Reference potential TF/TH/KTY–
		X15:7	Reserved
		X15:8	Reference potential DGND
		X15:9	(COS–) Signal track $\overline{A}$ ($\overline{K1}$)
		X15:10	(SIN–) Signal track $\overline{B}$ ($\overline{K2}$)
		X15:11	Signal track $\overline{C}$ ($\overline{K0}$) / pulse –
		X15:12	DATA-
		X15:13	DC 24 V encoder supply[1)]
		X15:14	TF/TH/KTY+ connection
		X15:15	DC 24 V (tolerance range DC 10.5 - 13 V)[1)]

1) The maximum load on X14:13 and X15:13 is DC 650 mA in total. It the overall unit load on the 24 V level exceeds 400 mA, you must connect an external DC 24 V to X10:9/X10:10. Observe the "Project planning" chapter in the "MOVIDRIVE® MDX60B/61B" system manual.

	NOTICE
	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. De-energize the inverter before plugging or removing the encoder connections. Switch off the supply voltage and the DC 24 V (X10:9).

	INFORMATION
	• If X14 is used as an incremental encoder simulation output, the switchover (X14:7) must be jumpered with DGND (X14:8). • The 24 V encoders from SEW (except HTL and Hiperface®) have a wide voltage range (DC 10 V – 30 V) and can be supplied alternatively with DC 24 V (PIN13) or DC 12 V (PIN15).

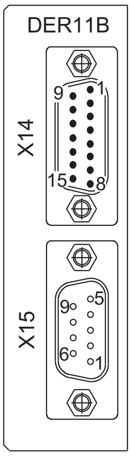
13.20 *Connection and terminal description of the DER11B (resolver) option*

13.20.1 Part number

Resolver card option type DER11B: 824 307 7

INFORMATION

- The "Resolver card type DER11B" option can only be used with MOVIDRIVE® MDX61B, not with MDX60B.
- The DER11B option must be plugged into the encoder slot.

Front view of DER11B	Description	Terminal	Function
 1806100363	**X14: Input for external encoder or output for incremental encoder simulation** **The pulse count of the incremental encoder simulation is always 1024 pulses per revolution**	**X14:1**	(cos) signal track A (K1)
		X14:2	(sin) signal track B (K2)
		X14:3	Signal track C (K0)
		X14:4	DATA+
		X14:5/6	Reserved
		X14:7	Switchover
		X14:8	Reference potential DGND
		X14:9	(cos–) signal track $\overline{A}$ ($\overline{K1}$)
		X14:10	(sin–) signal track $\overline{B}$ ($\overline{K2}$)
		X14:11	Signal track $\overline{C}$ ($\overline{K0}$)
		X14:12	DATA-
		X14:13/14	Reserved
		X14:15	DC+12 V (tolerance range DC 10.5 – 13 V) (max. load DC 650 mA)
	X15: Resolver input	**X15:1**	sin+ (S2)
		X15:2	cos+ (S1)
		X15:3	Ref.+ (R1)
		X15:4	N.C.
		X15:5	Reference potential TF/TH/KTY–
		X15:6	sin– (S4)
		X15:7	cos– (S3)
		X15:8	Ref.– (R2)
		X15:9	TF/TH/KTY+ connection

INFORMATION

- If X14 is used as an incremental encoder simulation output, the switchover (X14:7) must be jumpered with DGND (X14:8).
- 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.

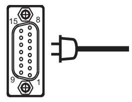
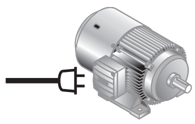
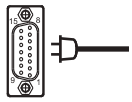
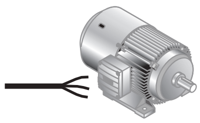
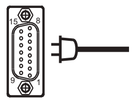
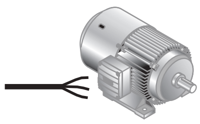
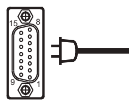
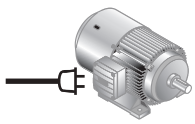
13.20.2 Permissible encoders at X:14

Refer to section "Connecting external encoders to X:14" (page 559).

13.20.3 Resolver at X:15

2-pole resolvers, AC 7 V, 7 kHz, can be connected at X15 (resolver input). The gear ratio of the resolver amplitudes must be approximately 0.5 ± 10%. The control dynamics decrease if the value is lower; the evaluation may be unstable if the value is higher.

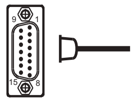
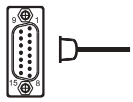
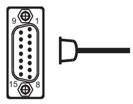
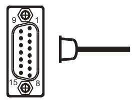
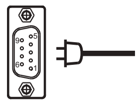
SEW-EURODRIVE offers the following prefabricated cables for connecting resolvers to DER11B:

Encoders on DT../DV.. and CM series motors – MOVIDRIVE®					
Motor type	**Encoder**	**MOVIDRIVE® inverter**	**Motor**	**Cable**	**Details**
DS56 CM71..112	Resolver			199 487 5 199 319 4	(page 563)
CM71 – 112	Resolver			199 589 8 199 590 1	
DS56	Resolver			1332 817 4 1332 844 1	
CMP	Resolver			0199 487 5 0199 319 4	

13.21 Connecting external encoders to X:14

13.21.1 External encoder at DEH11B and DER11B (X:14)

The following external encoders can be connected to connector X14 of the DEH11B option and the DER11B option.

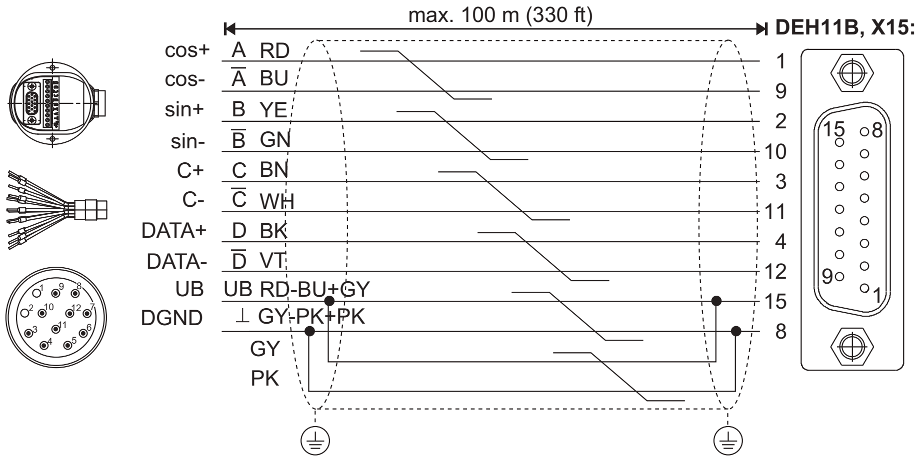
External encoder at DEH11B and DER11B - MOVIDRIVE® (X:14)			
Encoder	**MOVIDRIVE® inverter**	**Cable**	**Details**
AS1H ES1H AV1H		818 015 6 818 165 9	(page 564)
AS1H ES1H AV1H		1810 695 1 1810 697 8	
EH1S ES1S ES2S EV1S ES1R ES2R EV1R: EH1R		819 869 1 818 168 3	
ES1T ES2T EV1T EH1T	 DWI11A X2: 	198 829 8 198 828 X 818 164 03	

13.22 Connection of encoder options

13.22.1 Connection of DEH11B option

Encoder connection at X:15 Depending on the motor type and motor configuration, the encoder is connected via plug connector or terminal box.

DR71...315 Connect the encoder to the option DEH11B as follows:



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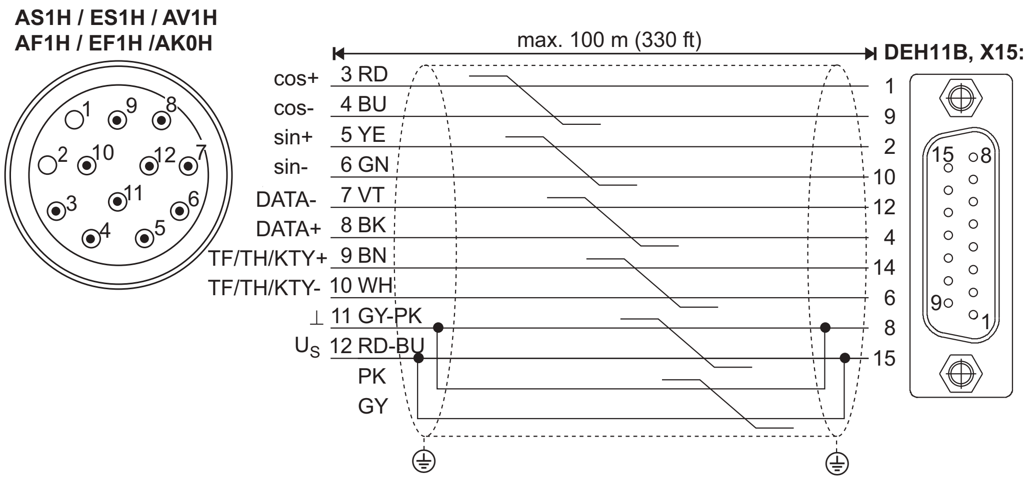
DT../DV.., DS56, CT../CV.., CM71...112/CMP with plug connector Connect the HIPERFACE® encoder to the DEH11B option as follows:



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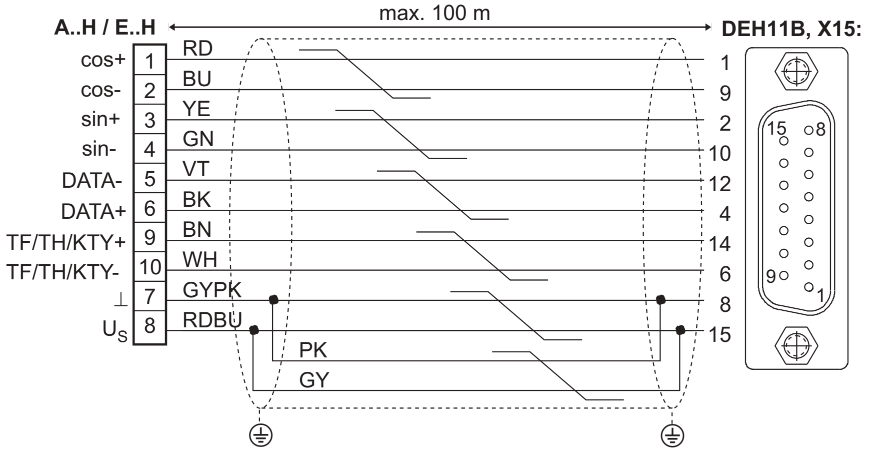
	INFORMATION
	Important for DT/DV or CT/CV motors: TF or TH is **not** connected with the encoder cable but must be connected using an additional 2-core shielded cable.

CM71...112 with terminal box

Connect the HIPERFACE® encoder to the DEH11B option as follows:



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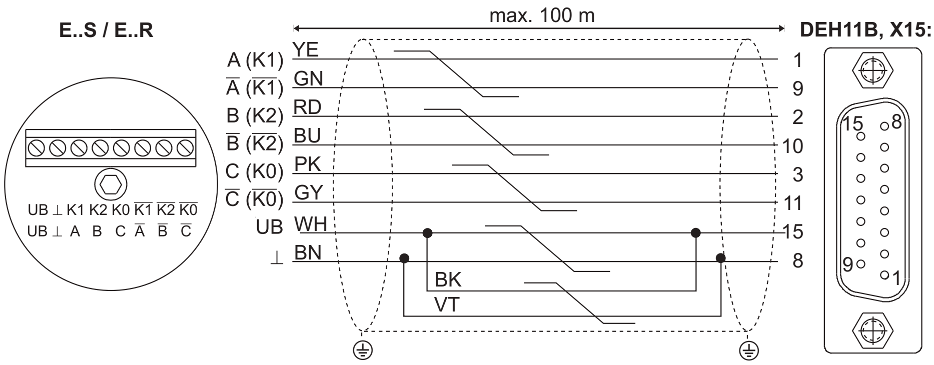
Connecting sin/cos and TTL encoders (DC 24 V) to DT../ DV.., CT../CV.. motors

The high resolution sin/cos encoders and TTL encoders with DC 24 V supply can also be connected to DEH11B. Proceed as follows to connect sin/cos encoders and TTL encoders with DC 24 V supply to the DEH11B option:



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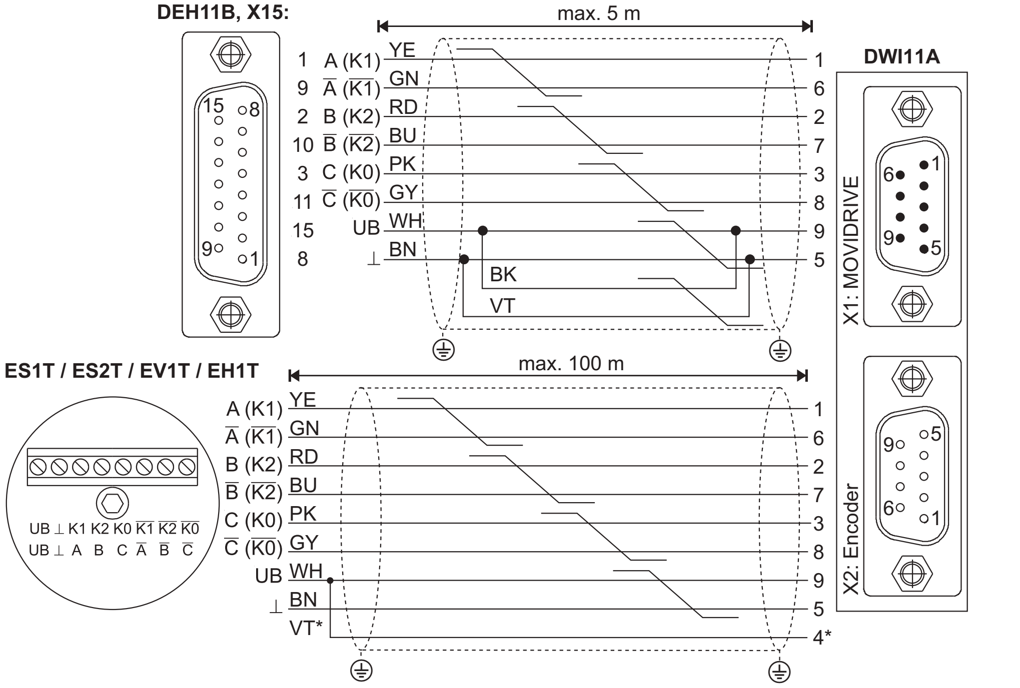
Connecting TTL encoders (DC 5 V) to DT../DV.. motors

Connect the TTL encoders with a DC 5 V voltage supply 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:



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* Connect the sensor cable (VT) on the encoder to UB, do not jumper on the DWI11A!

13.22.2 Connection of DER11B (resolver) option to X:15

Terminal/pin assignment

CM motors: The resolver connections are accommodated in a plug connector or on the 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.

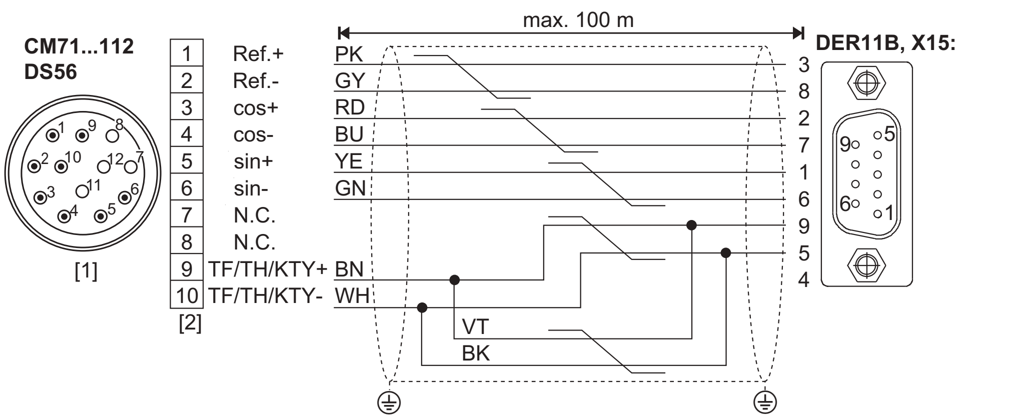
CM plug connector DS56: Intercontec, type ASTA021NN00 10 000 5 000

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 signal	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.

Connection

Connect the resolver as follows:



1806120331

[1] Plug connector
[2] Terminal strip

13.22.3 Connection of external encoders to the DEH11B and DER11B options

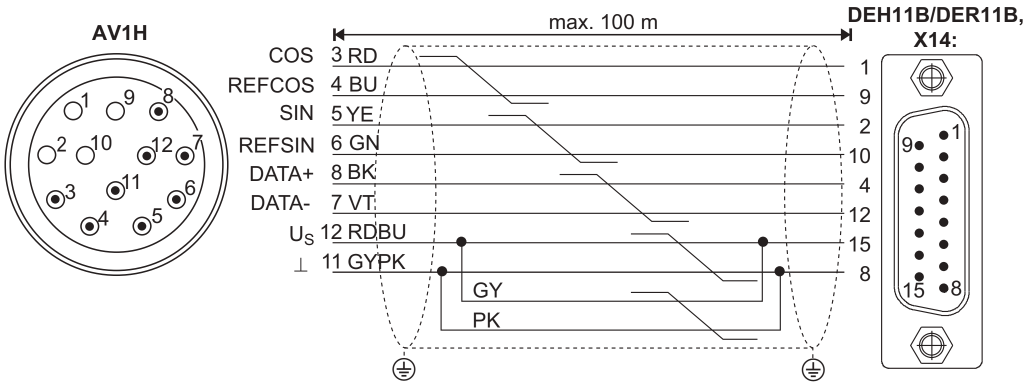
Voltage supply

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).

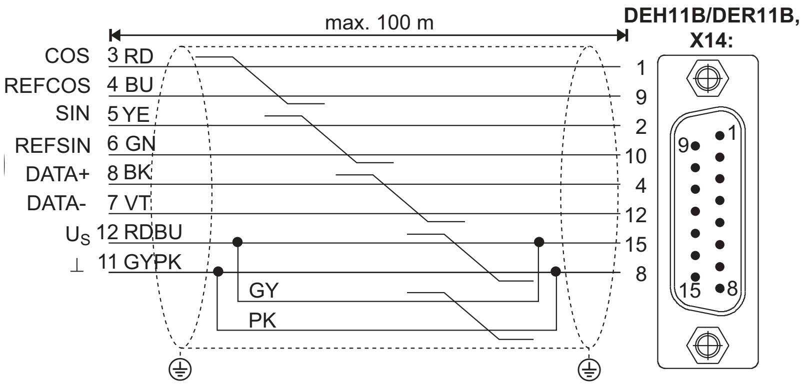
Hiperface® encoder connection

Connect the HIPERFACE® encoder AV1H as follows:



1806128523

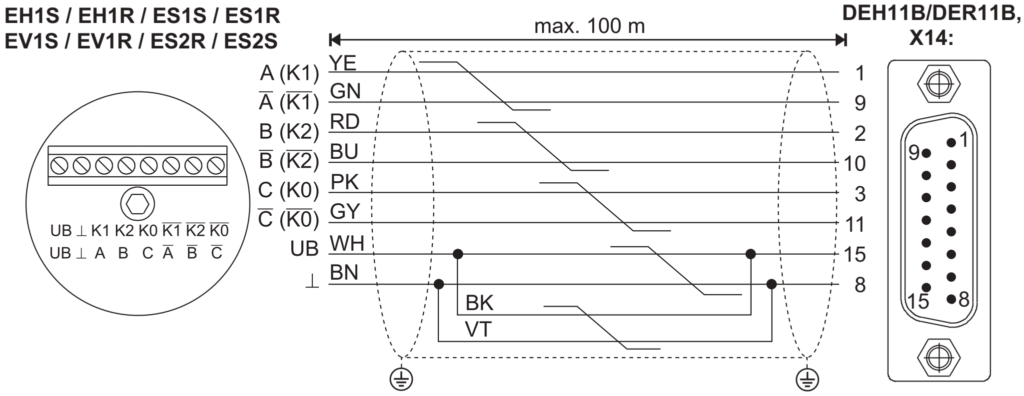
You can still connect HIPERFACE® encoders via a prefabricated cable with conductor end sleeves.



1806128523

Connection of sin/cos and TTL encoders (DC 24 V)

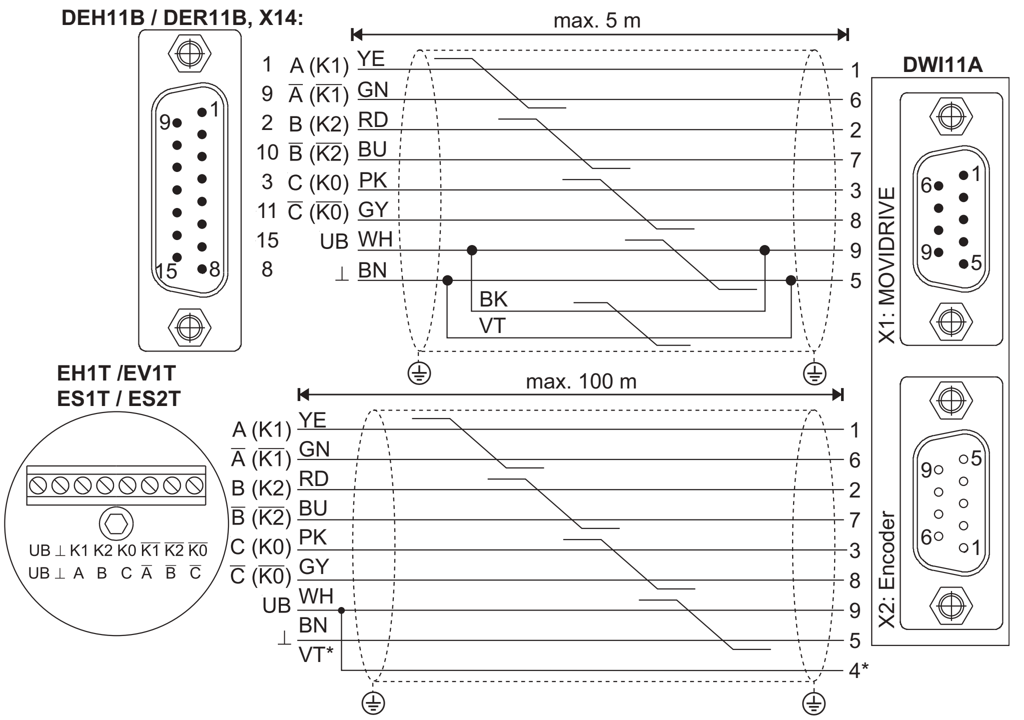
Proceed as follows to connect sin/cos encoders and TTL encoders with DC 24 V supply:



1806336395

Connection of TTL encoder (DC 5 V)

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:



1806339467

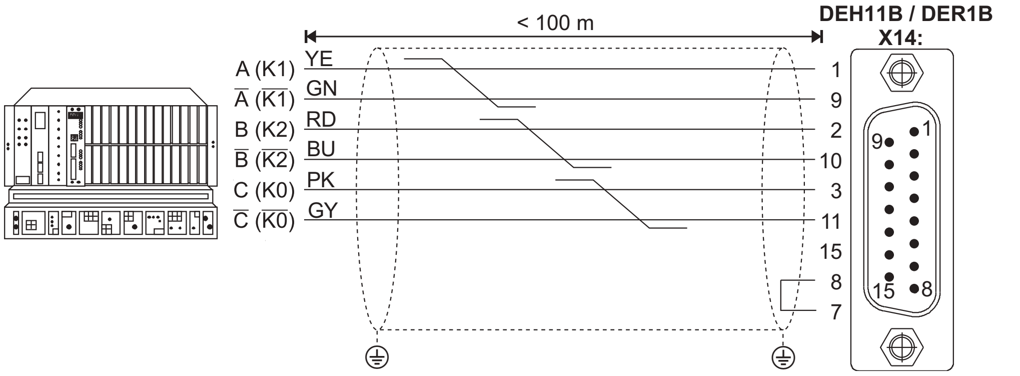
* Connect the sensor cable (VT) on the encoder to UB, do not jumper with DWI11A!

13.23 Connection of incremental encoder simulation

13.23.1 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



1806349707

Part number of the prefabricated cable:

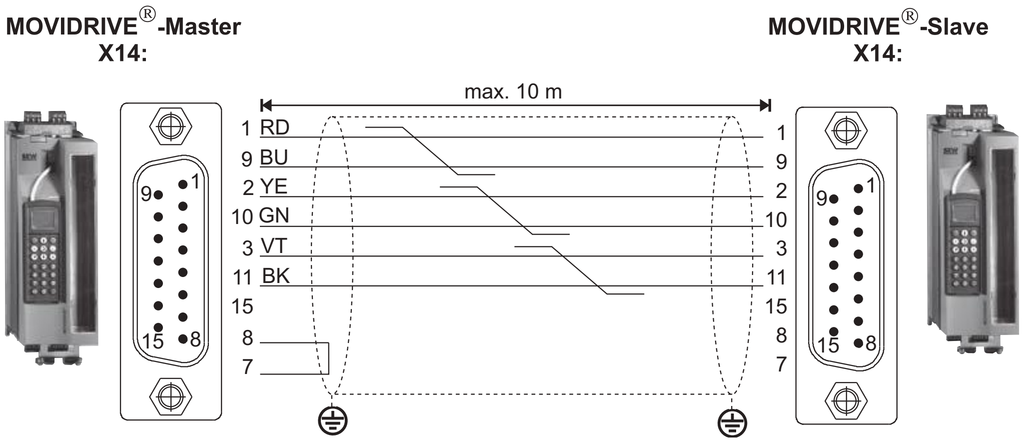
- Option type DEH/DER11B X14: → Incremental encoder simulation
  - For fixed installation: 819 768 7

13.24 Master/slave connection

13.24.1 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.



1806354443

Part number of the prefabricated cable:

- For fixed installation: 817 958 1

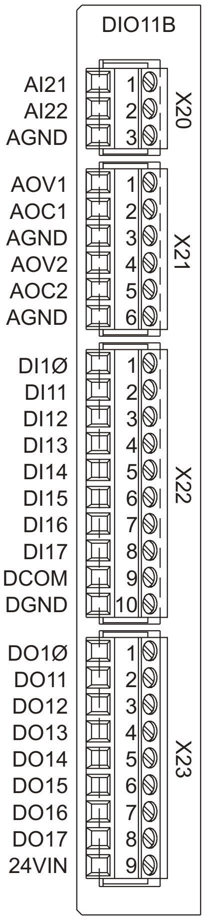
	INFORMATION
	• A **maximum of 3 slaves can be connected to the MOVIDRIVE® master**. • Important: **Do not connect X14:7** when connecting the individual **MOVIDRIVE® slaves together**. Only jumper the connections **X14:7 and X14:8 on the MOVIDRIVE® master.**

13.25 Connection and terminal description of the DIO11B option

13.25.1 Part number

Input/output card type DIO11B: 824 308 5

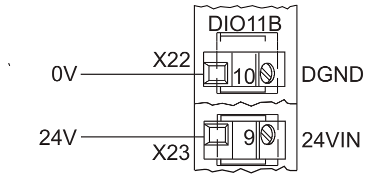
	INFORMATION
	• The "input/output card type DIO11B" option is only possible in conjunction with MOVIDRIVE® MDX61B, not with MDX60B. • The DIO11B option must be plugged into the fieldbus slot. If the fieldbus slot is not available, you can plug the DIO11B input/output card in the expansion slot. • The **extended handle end** of the plug connectors (terminals X20, X21, X22, X23) must **only** be used for **removing the plug connectors** (not for plugging them in!).

Front view of DIO11B	Terminal	Function
 1806361739	**X20:1/2 AI21/22** **X20:3 AGND**	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, A.., AO..)
	X21:1 AOV1 **X21:4 AOV2** **X21:2 AOC1** **X21:5 AOC2** **X21:3/6 AGND**	Analog voltage output V1, factory setting: "actual speed" Analog voltage output V2, factory set to "output current" Load capacity of the analog voltage outputs: I_{max} = DC 10 mA Analog current output C1, factory setting: actual speed Analog current output C2, 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 / max output voltage: DC 15 V Reference potential for analog signals (REF1, REF2, AI.., AO..)
	X22:1...8 DI1Ø...17 **X22:9 DCOM** **X22:10 DGND**	Binary inputs 1 – 8, 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
	X23:1...8 DO1Ø...17 **X23:9 24VIN**	Binary outputs 1 – 8, 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) **Do not apply external voltage to the binary outputs.** Supply voltage DC +24 V for binary outputs D01Ø - D017, non-isolated (reference potential DGND)

13.25.2 Voltage input 24 VIN

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).

The following figure shows voltage input 24VIN (X23:9) and reference potential DGND (X22:10).



1806364811

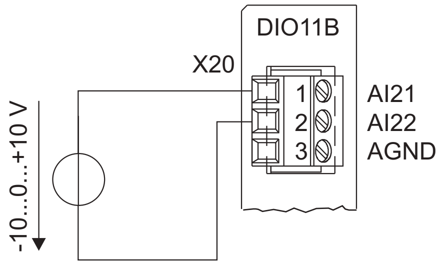
13.25.3 Voltage input n2

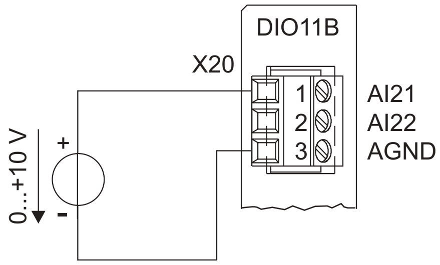
The analog setpoint input n2 (AI21/22) can be used as a differential input or as an input with AGND reference potential.

The following figure shows the n2 setpoint input.

Differential input

Input with AGND reference potential





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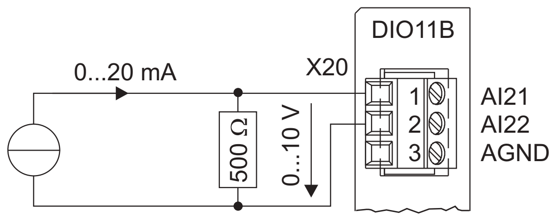
13.25.4 Current input n2

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 Ω → DC 0 – 20 mA = DC 0 – 10 V

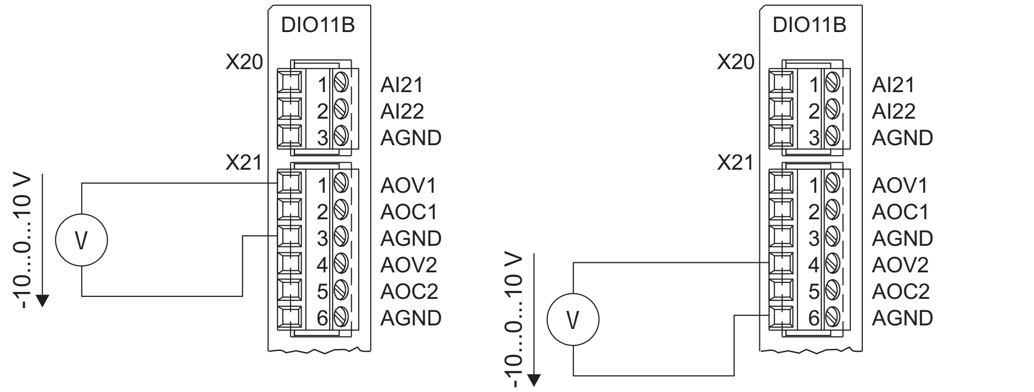
The following figure shows the current input with external load.



1806370955

13.25.5 Voltage outputs AOV1 and AOV2

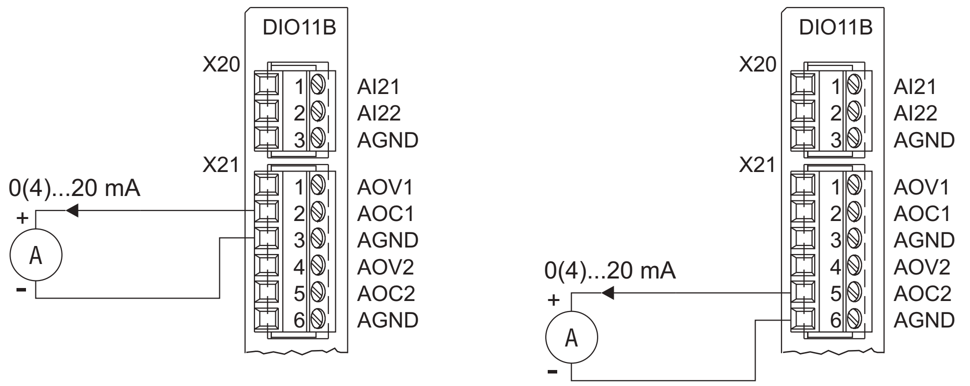
Assign the analog voltage outputs AOV1 and AOV2 in accordance with the following figure:



1806376075

13.25.6 Current outputs AOC1 and AOC2

Assign the analog current outputs AOC1 and AOC2 in accordance with the following figure:



1806377995

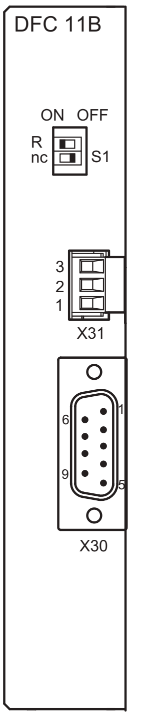
13.26 *Connection and terminal description of the DFC11B option*

13.26.1 Part number

CAN-Bus interface option type DFC11B: 824 317 4

INFORMATION

- The "CAN bus interface type DFC11B" option can only be used with MOVIDRIVE® MDX61B, not with MDX60B.
- The DFC11B option must be plugged into the fieldbus slot.
- The DFC11B option is powered via MOVIDRIVE® MDX61B. A separate voltage supply is not required.

Front view of DFC11B	Description	DIP switch Terminal	Function
 1806384907	**DIP switch block S1: Sets the terminating resistor**	**R** **nc**	Terminating resistor for the CAN-Bus cable Reserved
	X31: CAN bus connection	**X31:3** **X31:2** **X31:1**	CAN Low (jumpered with X30:2) CAN High (jumpered with X30:7) DGND CAN[1)]
	X30: CAN bus connection **(Sub D9 to CiA standard)**	**X30:1** **X30:2** **X30:3** **X30:4** **X30:5** **X30:6** **X30:7** **X30:8** **X30:9**	Reserved CAN Low (jumpered with X31:3) DGND CAN[1)] Reserved Reserved DGND CAN[1)] CAN High (jumpered with X31:2) Reserved Reserved

1) DGND of the CAN bus interface is independent from DGND of the basic unit

13.26.2 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.

14 Startup

14.1 General startup instructions

	DANGER
	Uncovered power connections. Severe or fatal injuries from electric shock. • Install the touch guard according to the regulations. • Never start the unit if the touch guard is not installed.

14.1.1 Requirements

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.

14.1.2 Parameters of non-SEW motors

The database stores parameters of SEW motors and non-SEW motors. We do not warrant that the parameter data of the non-SEW motors is correct and up to date.

14.1.3 VFC operating modes without speed control

MOVIDRIVE® MDX60/61B inverters are factory set 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 Sec. "Starting the motor" (page 589).

	INFORMATION
	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.

14.1.4 Inverter/motor combinations

The following tables indicate which inverter/motor combinations this applies to.

400/500 V units

MOVIDRIVE® MDX60/61B in VFC operating 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
1600-503-4	DRS315M4
2000-503-4	DRS315L4
2500-503-4	DRS315L4

230 V units

MOVIDRIVE® MDX60/61B in VFC operating 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

14.1.5 Hoist applications

	DANGER
	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.

14.2 Preliminary work and resources

- Check the installation.

	DANGER
	Risk of crushing if the motor starts up unintentionally. Severe or fatal injuries. • Ensure that the motor cannot start inadvertently, for example, by removing the electronics terminal block X13. • Additional safety precautions must be taken depending on the application to avoid injury to people and damage to machinery.

- Performing **startup with the DBG60B keypad**:

  Plug the connector of the DBG60B keypad into the XT slot.
- For **startup with PC and MOVITOOLS® MotionStudio:**

  Plug an interface adapter (e.g. USB11A) into the XT slot and connect it to the PC with an interface cable (RS232). Install and start MOVITOOLS® MotionStudio 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 set terminal assignment (→ P60_ / P61_).

	INFORMATION
	A group of **parameter values is changed automatically** at startup. The parameter description P700 "Operating modes" explains which parameters are affected by this step. For the **parameter description**, refer to the MOVIDRIVE® MDX60/61B system manual, section "Parameters".

14.3 *Startup with DBG60B keypad*

14.3.1 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® Motion-Studio operating 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, rated factor cos φ, and rated speed.
- Rated line voltage

The following data is also needed for startup with a speed controller:

- Encoder type and encoder resolution:

SEW encoder type	Startup parameters	
	Encoder type	PPR count
AK0H	HIPERFACE®	128
AS1H, ES1H, AV1H, AF1H	HIPERFACE®	1024
ES1S, ES2S, EV1S, EH1S, EF1H	SINE ENCODER	1024
ES1R, ES2R, EV1R, EH1R ES1T[1], ES2T[1], EV1T[1], EH1T[1]	INCREM. ENCODER	1024

1) DC 5 V TTL encoders ES1T, ES2T, EV1T and EH1T must be connected via the DWI11A option (see Installation section).

- 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

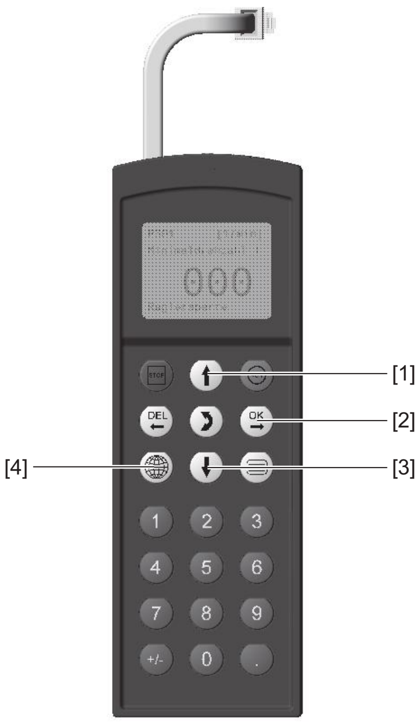
  Recommended setting range: 0.90 – 1 – 1.10 (factory setting = 1)
- Converted mass moment of inertia of the load (gear unit + driven machine) on the motor shaft
- Time required for the shortest ramp

INFORMATION

- Activate encoder monitoring (P504 = "ON") after completing the startup. The function and voltage supply of the encoder will then be monitored.
- If a Hiperface® encoder is connected, it is always monitored regardless of the setting of parameter P504. Encoder monitoring is not a safety function!

14.3.2 Selecting a language

The figure below shows the keys for selecting the language.



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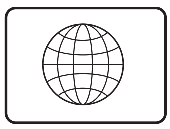
[1]	Key	↑	Move up to the next menu item
[2]	Key	OK	Confirm entry
[3]	Key	↓	Move down to the next menu item
[4]	Key	🌐	A list of languages is displayed

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.



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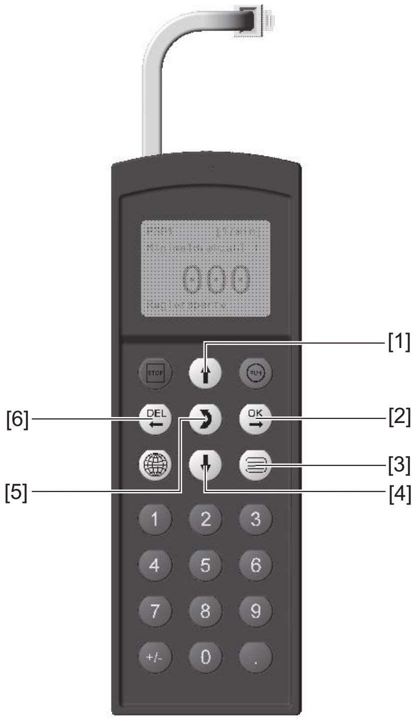
Proceed as follows to select the language:

- 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 OK key. The basic display is now shown in your chosen language.

14.3.3 Startup

The figure below shows the keys required for startup.



1810058891

[1]	Key	↑	Move up to the next menu item
[2]	Key	OK	Confirm entry
[3]	Key	☰	Activate the context menu
[4]	Key	↓	Move down to the next menu item
[5]	Key	⤸	Change the menu, display mode ↔ edit mode
[6]	Key	DEL	Cancel or abort startup

14.3.4 Startup procedure

1. "0" signal at terminal X13:1 (DIØØ "/CONTROL.INHIBIT"), e.g. by disconnecting the electronics terminal block X13.

0.00rpm 0.000Amp CONTROLLER INHIBIT

2. Activate the context menu by pressing the ☰ key.

BASIC VIEW PARAMETER MODE VARIABLE MODE

3. Press the ↓ key to scroll down to the "STARTUP" menu item.

MANUAL MODE **STARTUP** COPY TO DBG COPY TO MDX

4. Press the [OK] 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.
   - Press the [↻] key to change to edit mode. The flashing cursor disappears.
   - Press the [↑] key or [↓] key to select "PARAMETER SET 1" or "PARAMETER SET 2".
   - Confirm the setting by pressing the [OK] key.
   - Press the [↻] key to return to display mode. The flashing cursor appears again.
   - Press the [↑] key to select the next parameter.

STARTUP
PREPARE FOR
STARTUP

C00*STARTUP
PARAMETER SET 1
PARAMETER SET 2

5. Select either stand-alone motor or group drive. Press the [↑] key to select the next parameter.

C22*MOTORS
SINGLE MOTOR
IDENT. MOTORS

6. Select the operating mode you require. Press the [↑] key to select the next parameter.

C26*OPER. MODE 1
STANDARD V/F
VFC

7. Select whether an encoder is to be evaluated. Press the [↑] key to select the next parameter.

C29*encoder
NO
YES

8. Select the operating mode you require. Press the [↑] key to select the next parameter.

C36*OPER.MODE
SPEED CONTROL
HOIST

9. 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.
   Press the [↑] key to select the next parameter.

C02*MOTOR TYPE 1
DT71D2
DT71D4
DT80K2

C02*MOTOR TYPE 1
NON-SEW MOTOR
DT63K4/DR63S4

10. Enter the rated motor voltage for the selected connection type according to the value specified on the nameplate.

    Example: Nameplate 230△ / 400⅄50 Hz
    ⅄ connection → enter "400 V".
    △ connection/transition point at 50 Hz → enter "230 V".
    △ connection, transition point at 87 Hz → Also enter 230 V. However, set parameter P302 "MAXIMUM SPEED 1" to the value for 87 Hz after startup first and then start the drive.

    Example: Nameplate 400△/690⅄ 50 Hz
    Only △ connection possible → enter "400 V".
    ⅄ connection is not possible.

    Press the [↑] key to select the next parameter.

    C03* V
    MOT. RATED VOLT 1
    400.000

11. Enter the rated frequency specified on the motor nameplate.
    Example: 230△/400⅄ 50 Hz
    Enter "50 Hz" in ⅄ and △ connection.

    Press the [↑] key to select the next parameter.

    C04* Hz
    MOT. RATED FREQ. 1
    50.000

FOR SEW MOTORS

12. The motor values are stored for SEW 2 and 4-pole motors and need not be entered.

FOR NON-SEW MOTORS

12. Enter the following motor nameplate data:
    - C10* rated motor current, observe connection type (⅄ or △).
    - C11* rated motor power
    - C12* power factor cos φ
    - C13* rated motor speed

13. Enter the rated power supply voltage (C05* for SEW motor, C14* for non-SEW motor).

    C05* V
    RATED MAINS VLTG
    400.000

14. If no TF/TH is connected to X10:1/2 or X15 → Set "NO RESPONSE". If a TF/TH is connected, set the required error response. To select the sensor, you must set *P530 sensor type 1* after startup.

    835* RESP. TF-SIG.

    NO RESPONSE
    DISPLAY ERROR

15. Start the calculation for the startup data by choosing "YES". The process lasts a few seconds.

    C06*CALCULATION

    NO
    YES

FOR SEW MOTORS

16. The calculation is performed. After calculation, the next menu item appears automatically.

C06*SAVE
NO
YES

FOR NON-SEW MOTORS

16. 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.

17. Set "SAVE" to "YES" The data (motor parameters) are copied to the non-volatile memory of MOVIDRIVE®.

STARTUP
DATA IS
BEING COPIED...

18. The startup procedure is now complete. Press the DEL key to return to the context menu.

MANUAL MODE
STARTUP
COPY TO DBG
COPY TO MDX

19. Press the ↓ key to scroll down to the "QUIT" menu item.

SIGNATURE
QUIT
BASIC VIEW

20. Confirm the setting by pressing the OK key. The basic display appears.

0.00rpm
0.000Amp
CONTROLLER INHIBIT

14.3.5 Starting up the speed controller

Startup is performed without the speed controller first (→ Section "Startup procedure, steps 1 through 17").

Important: Set encoder evaluation to "YES".

C29*encoder
NO
YES

1. Initiate the startup of the speed controller with "YES".

C09*n-CONTROL?
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
RESERVED

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 – <u>1</u> – 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* 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 – <u>1</u> – 1.10	C18* STIFFNESS 1.000
7. Enter the moment of inertia of the brake and fan.	D00* 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^2 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®.	STARTUP DATA IS BEING COPIED...
13. The startup procedure is now complete. Press the [DEL] key to return to the context menu.	MANUAL MODE **STARTUP** COPY TO DBG COPY TO MDX
14. Press the [↓] key to scroll down to the "QUIT" menu item.	SIGNATURE **QUIT** BASIC VIEW
15. Confirm the setting by pressing the [OK] 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 by pressing the OK 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 OK 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®.

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 any parameter settings which differ from the factory settings in the parameter list (→ page 106).
- In the case of non-SEW motors, set the correct brake application time (P732 / P735).
- Observe the notes for starting the motor in the section "Starting the Motor" (→ page 102).
- In case of △ 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**.

14.3.6 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 with the [OK] key. The flashing cursor under the parameter number indicates that the keypad is in parameter mode.
- Press the ⤸ key to change to edit mode. The flashing cursor disappears.
- You can use the ↑ key or ↓ key to select or set the correct parameter value.
- Confirm the setting by pressing the [OK] key.
- Press the ⤸ key to return to the parameter mode. The flashing cursor appears again.
- Press the ↑ key to select the next parameter.

14.4 Operation of MOVITOOLS® MotionStudio

14.4.1 Via MOVITOOLS® MotionStudio

Tasks

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

- Establishing communication with units
- Executing functions with the units

Establishing communication with other units

The SEW Communication Server is integrated into the MOVITOOLS® MotionStudio software package for establishing communication with the units.

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

MOVITOOLS® MotionStudio supports the following types of communication channels:

- Serial (RS-485) via interface adapters
- System bus (SBus) via interface adapters
- Ethernet
- EtherCAT®
- Fieldbus (PROFIBUS DP/DP-V1)
- Tool Calling Interface

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

Executing functions with the units

The software package offers uniformity in executing the following functions:

- Parameterization (for example in the parameter tree of the unit)
- Startup
- Visualization and diagnostics
- Programming

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

- MotionStudio
- MOVITOOLS®

All functions communicate using **tools**. MOVITOOLS® MotionStudio provides the right tools for every unit type.

Technical support

SEW-EURODRIVE offers you a 24-hour service hotline.

Simply dial **(+49) 0 18 05** and then enter the letters **SEWHELP** via the telephone keypad. Of course, you can also dial **(+49) 0 18 05 - 7 39 43 57**.

Online help

After installation, the following types of help are available to you:

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

  If the help window does not appear at the start, deactivate the "Display" control field, in the menu under [Settings] / [Options] / [Help].

  If the help window appears again, activate the "Display" control field, in the menu under [Settings] / [Options] / [Help].
- Context-sensitive help is available for the fields which require you to enter values. For example, you can use the <F1> key to display the ranges of values for the unit parameters.

14.4.2 First steps

Starting the software and creating a project

Proceed as follows to start MOVITOOLS® MotionStudio and create a project:

1. Start the MOVITOOLS® MotionStudio from the Windows start menu via:

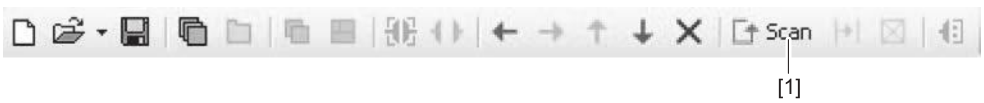
   [Start]/[Programs]/[SEW]/[MOVITOOLS-MotionStudio]/[MOVITOOLS-MotionStudio]
2. Create a project with name and storage location.

Establishing communication and scanning the network

Proceed as follows to establish a communication with MOVITOOLS® MotionStudio and scan your network:

1. Set up a communication channel to communicate with your units.

   For detailed information on how to configure a communication channel, see the section regarding the relevant communication type.
2. Scan your network (unit scan). Press the [Start network scan] button [1] in the toolbar.



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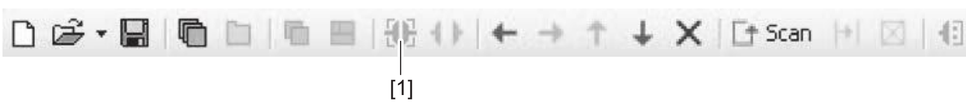
3. Select the unit you want to configure.
4. Right-click to open the context menu.

   As a result you will see a number of unit-specific tools to execute various functions with the units.

Starting up the units (online)

Proceed as follows to start up the units (online):

1. Switch to the network view.
2. Click on "Switch to online mode" [1] in the toolbar.



1184030219

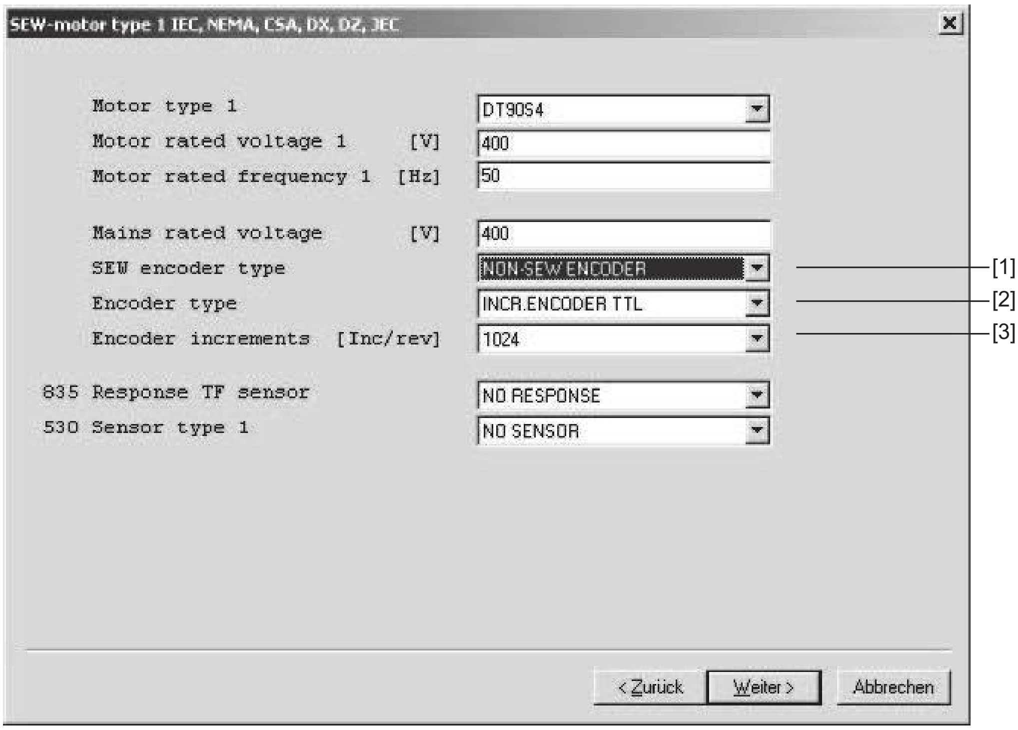
[1] "Switch to online mode" symbol

3. Select the unit you want to startup.
4. Open the context menu and select the command [Startup] / [Startup].

   The Startup wizard opens.
5. Follow the instructions of the startup wizard and then load the startup data onto your unit.

Startup for HTL motor encoders

Observe the following safety notes when starting up an HTL motor encoder to MOVIDRIVE® MDX61B:



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[1] "SEW encoder type" selection list
[2] "Encoder type" selection list
[3] "PPR count" selection list

- Select "Non-SEW encoder" from the "SEW encoder type" list [1].
- Select "INCREM. ENC. TTL" from the "Encoder type" list [2].
- In the dropdown menu "PPR count" [3] select the PPR count (1024 for SEW HTL encoders) printed on the HTL motor encoder.

14.5 Starting the motor

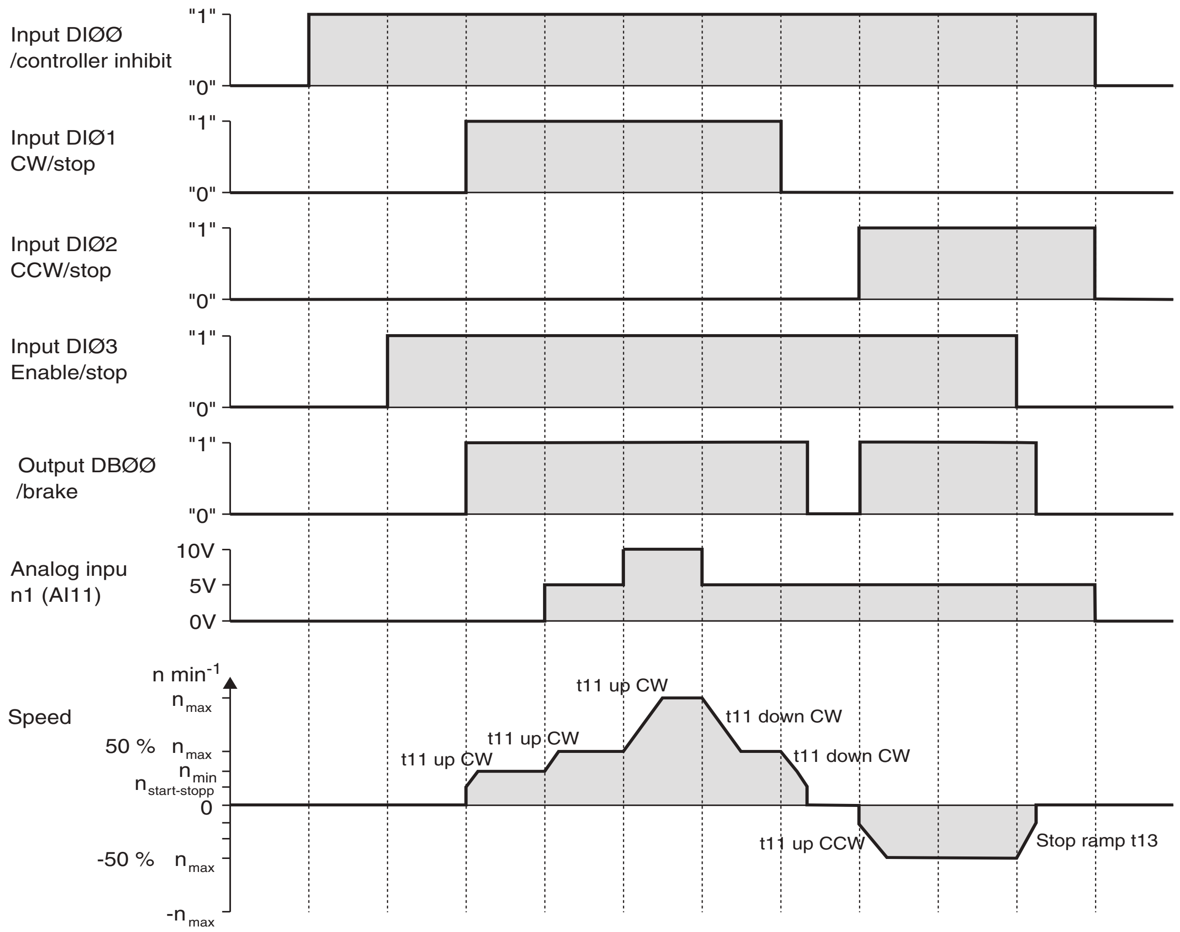
14.5.1 Analog setpoint selection

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 entry.

Function	X11:2 (AI11) Analog input n1	X13:1 (DIØØ) /Controller 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"
Counterclockwise with 50% n_{max}	5 V	"1"	"0"	"1"	"1"	"0"	"0"
Counterclockwise with n_{max}	10 V	"1"	"0"	"1"	"1"	"0"	"0"

14.5.2 Travel diagram

The following travel diagram shows by way of example how the motor is started with the wiring of terminals X13:1 – X13:4 and analog setpoints. Binary output X10:3 (DBØØ "/Brake") is used for switching brake contactor K12.



1810131851

INFORMATION

The motor is not energized in the event of a controller inhibit (DIØØ = "0"). A motor without brake will coast to standstill.

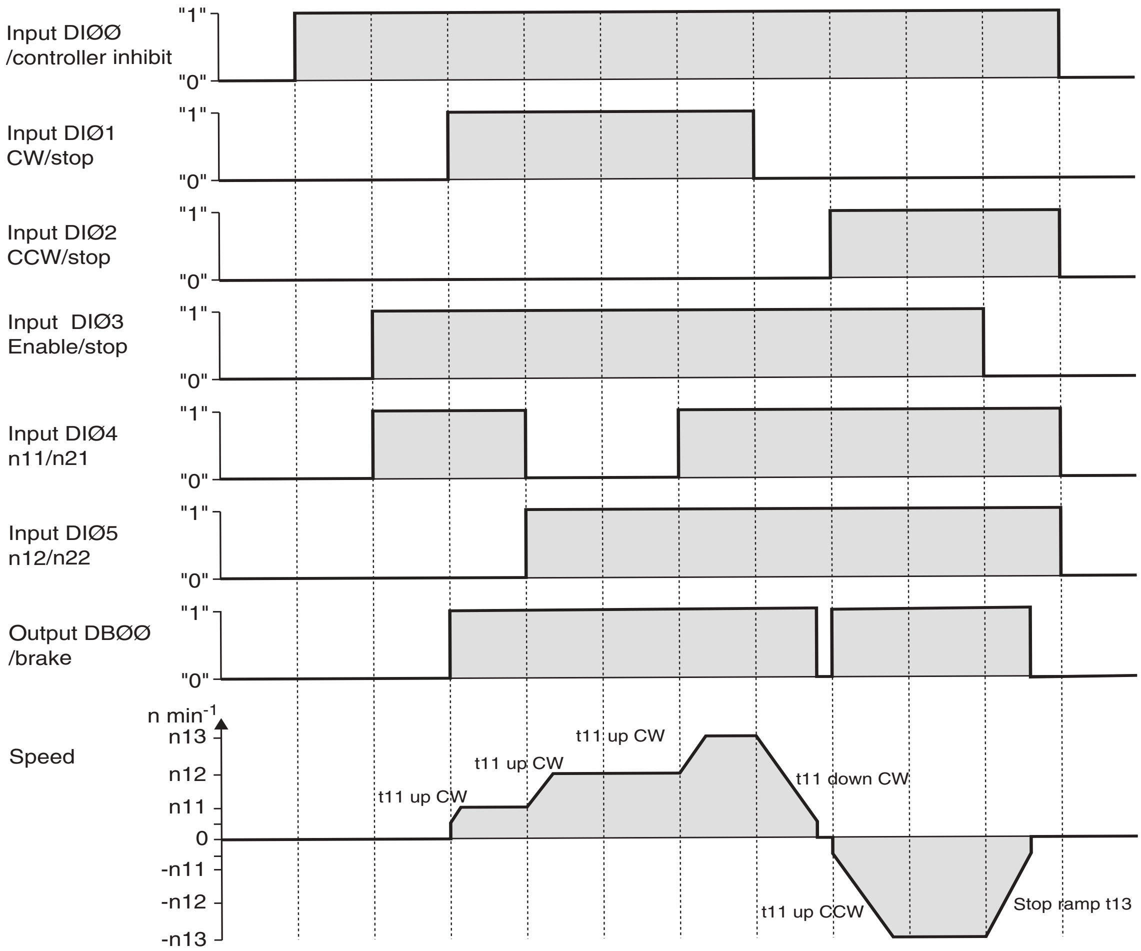
14.5.3 Fixed setpoints

The following table shows the signals that must be present on terminals X13:1 – X13:6 (DIØØ – DIØ5) when the "UNIPOL/FIX.SETPT" setpoint is selected (P100) to operate the drive with the fixed setpoints.

Function	X13:1 (DIØØ) /Controller 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 operation with n11	"1"	"1"	"0"	"1"	"1"	"0"
CW operation with n12	"1"	"1"	"0"	"1"	"0"	"1"
CW operation with n13	"1"	"1"	"0"	"1"	"1"	"1"
CCW operation with n11	"1"	"0"	"1"	"1"	"1"	"0"

14.5.4 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.



1810136203

INFORMATION

The motor is not energized in the event of a controller inhibit (DIØØ = "0"). A motor without brake will coast to standstill.

14.5.5 Manual operation

The inverter can be controlled using the DBG60B keypad in manual operation (context menu → manual operation). The 7-segment display on the unit shows "H" during manual operation.

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 get a "1" signal to enable the drive to be started in manual operation. The drive can also be stopped in manual operation by 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 (+ ≙ CW / – ≙ 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 ↑ and ↓ keys.

INFORMATION

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.

DANGER

Risk of crushing if the motor starts up unintentionally.

Severe or fatal injuries.

- Ensure that the motor cannot start inadvertently, for example, by removing the signal terminal block X13.
- Additional safety precautions must be taken depending on the application to avoid injury to people and damage to machinery.

14.5.6 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.

INFORMATION

Due to exact motor data, the proper function of the flying start function has only been tested with SEW motors. SEW-EURODRIVE does not guarantee a proper function of the flying start function for non-SEW motors.

Note the following when performing **startup for an SEW motor** with DBG60B or MOVITOOLS® MotionStudio:

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® MotionStudio:

Measure the stator resistance *(P322 IxR compensation 1)* at startup. To do so, proceed as follows:

1. Start up the motor in "VFC" operation mode.
2. Enable the **motor in standstill**.
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.

14.6 Complete parameter list

14.6.1 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
DISPLAY VALUES		
00_	**Process values**	
000	Speed	-6100 – 0 – 6100 rpm
\001	User display	"Text"
002	Frequency	0 – 600 Hz
003	Actual position	0 – 2^{31}-1 inc
004	Output current	0 – 250% I_N
005	Active current	-250 – 0 – 250% I_N
\006	Motor utilization 1	0 – 200%
007	Motor utilization 2	0 – 200%
008	DC link voltage	0 – 1000 V
009	Output current	A
01_	**Status displays**	
010	Inverter state	
011	Operating state	
012	Error status	
013	Current parameter set	1/2
014	Heat sink temperature	-20 – 0 – 100 °C
015	Operating hours	h
016	Enable hours	h
017	Work	kWh
018	KTY utilization 1	0 – 200%
019	KTY utilization 2	0 – 200%
02_	**Analog setpoints**	
020	Analog input AI1	-10 – 0 – 10 V
021	Analog input AI2	-10 – 0 – 10 V
022	External current limit	0 – 100%
03_	**Binary inputs of basic unit**	
030	Binary input DIØØ	/CONTR. INHIBIT
031	Binary input DIØ1	Not in DBG60B
032	Binary input DIØ2	
033	Binary input DIØ3	
034	Binary input DIØ4	
035	Binary input DIØ5	
036	Binary input DIØ6	
037	Binary input DIØ7	
\039	Status of binary inputs DIØØ – DIØ7	

Par.	Name	Value range
04_	**Binary input options**	
040	Binary input DI1Ø	Not in DBG60B
041	Binary input DI11	
042	Binary input DI12	
043	Binary input DI13	
044	Binary input DI14	
045	Binary input DI15	
046	Binary input DI16	
047	Binary input DI17	
\048	Status of binary inputs DI1Ø - DI17	
05_	**Binary outputs of basic unit**	
050	Binary output DBØØ	/BRAKE
051	Binary output DOØ1	Not in DBG60B
052	Binary output DOØ2	
053	Binary output DOØ3	
054	Binary output DOØ4	
055	Binary output DOØ5	
\059	Status of binary outputs DBØØ, DOØ1 – DOØ5	
06_	**Binary outputs option**	
060	Binary output DO1Ø	Not in DBG60B
061	Binary output DO11	
062	Binary output DO12	
063	Binary output DO13	
064	Binary output DO14	
065	Binary output DO15	
066	Binary output DO16	
067	Binary output DO17	
\068	Status of binary outputs DO1Ø - DO17	
07_	**Unit data**	
070	Unit type	
071	Rated output current	
072	Option 1 encoder slot	
073	Option 2 fieldbus slot	
074	Option 3 expansion slot	
076	Basic unit firmware	
077	DBG firmware	Only in DBG60B
078	Technology function	
079	Device variant	Standard Technology

08_	**Error memory**	
\080	Error t-0	
081	Error t-1	
082	Error t-2	
083	Error t-3	
084	Error t-4	
09_	**Bus diagnostics**	
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	

Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
1__	**SETPOINTS / RAMP GENERATORS**		
10_	**Setpoint selection**		
\100	Setpoint source	UNIPOL./FIX.SETPT. BIPOL./FIX.SETPT UNIPOL./FIX.SETPT. RS485 Fieldbus Motor potentiometer Motor pot.+analog 1 Fix.setpt.+analog 1 Master SBus1 Master-RS485 SBus 1 Frequency input SBus 2 IPOS setpoint	
101	Control signal source	**Terminals**	
102	Frequency scaling	0.1 – **10 –** 65 kHz	
105	Fault response to wire breakage AI1	**No response** Immediate stop/malfunction Rapid stop/malfunction Rapid stop/warning	
11_	**Analog input AI1**		
110	AI1 scaling	-10 – -0.1 / 0.1 – **1 –** 10	
111	AI1 Offset	-500 – **0 –** 500 mV	
112	AI1 operating mode	Ref. N-MAX Ref. 3000 rpm U-Off., N-MAX N-Off., N-MAX N-MAX, 0-20 mA N-MAX, 4-20 mA	
113	AI1 voltage offset	-10 – **0** – 10 V	
114	AI1 speed offset	-6000 – **0 –** 6000 rpm	
115	Filter speed setpoint	0 – **5** – 100 ms 0 = Filter off	
12_	**Analog inputs (optional)**		
120	AI2 operating mode	No function 0 – 10 V + setpt.1 0 – 10 V I-limit: Actual value PID controller	
13_	**Speed ramps 1**		

Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
\130	Ramp t11 up CW	0 – **2** – 2000 s	
\131	Ramp t11 down CW	0 – **2** – 2000 s	
\132	Ramp t11 up CCW	0 – **2** – 2000 s	
\133	Ramp t11 down CCW	0 – **2** – 2000 s	
\134	Ramp t12 UP=DOWN	0 – **10** – 2000 s	
135	S pattern t12	**0 –** 3	
\136	Stop ramp t13	0 – **2** – 20 s	
\137	Emergency stop ramp t14	0 – **2** – 20 s	
138	Ramp limit VFC	**Yes** No	
139	Ramp monitoring 1	Yes **No**	
14_	**Speed ramps 2**		
140	Ramp t21 up CW	0 – **2** – 2000 s	
141	Ramp t21 down CW	0 – **2** – 2000 s	
142	Ramp t21 up CCW	0 – **2** – 2000 s	
143	Ramp t21 down CCW	0 – **2** – 2000 s	
144	Ramp t22 UP=DOWN	0 – **10** – 2000 s	
145	S pattern t22	**0 –** 3	
146	Stop ramp t23	0 – **2** – 20 s	
147	Emergency stop ramp t24	0 – **2** – 20 s	
149	Ramp monitoring 2	**No** Yes	
15_	**Motor potentiometer (parameter sets 1 and 2)**		
150	Ramp t3 up	0.2 – **20 –** 50 s	
151	Ramp t3 down	0.2 – **20 –** 50 s	
152	Save last setpoint	**OFF** ON	
16_	**Fixed setpoints 1**		
\160	Internal setpoint n11	-6000 – **150** – 6000 rpm (% I_N)	
\161	Internal setpoint n12	-6000 ... **750** ... 6000 rpm (% I_N)	
\162	Internal setpoint n13	-6000 ... **1500** ... 6000 rpm (% I_N)	
17_	**Fixed setpoints 2**		
170	Internal setpoint n21	-6000 – **150** – 6000 rpm (% I_N)	
171	Internal setpoint n22	-6000 – **750** – 6000 rpm (% I_N)	
172	Internal setpoint n23	-6000 – **1500** – 6000 rpm (% I_N)	
2__	**CONTROLLER PARAMETERS**		
20_	**Speed control (only parameter set 1)**		
200	P-gain n-controller	0.01 – **2** – 32	
201	Time constant n-controller	0 – **10** – 300 ms	
202	Gain Accel. prectrl.	**0** – 65	
203	Filter acceleration precontrol	**0** – 100 ms	
204	Filter actual speed value	**0 –** 32 ms	
205	Load precontrol CFC	**– 150% –** 0 – 150%	

Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
206	Sampling time n-controller	**1 ms** 0.5 ms	
207	Load precontrol VFC	**– 150%** – 0 – 150%	
21_	**Hold controller**		
210	P gain hold controller	0.1 – **0.5** – 32	
22_	**Synchronous operation control (only parameter set 1)**		
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	Precontrol filter (DRS)	**0 –** 100 ms	Only with MOVITOOLS® MotionStudio. Not visible on the DBG60B keypad.
23_	**Synchr. oper. with distance encoder**		
230	Distance encoder	**Off** Equal-ranked Chain	
231	Factor slave encoder	**1** – 1000	
232	Factor slave distance encoder	**1 –** 1000	
233	Distance encoder resolution	128 / 256 / 512 / **1024** / 2048	
234	Master encoder resolution	128 / 256 / 512 / **1024** / 2048	
24_	**Synchronous operation with catch up**		
240	Synchronous speed	-6000 – **1500 –** 6000 rpm	
241	Synchronous ramp	0 – **2 –** 50 s	
26_	**Process controller parameters**		
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_p	0 – **1** – 32,767	
264	Integrative time T_n	**0** – 10 – 65535 ms	
265	Derivative time T_V	**0** – 1 – 30 ms	
266	Precontrol	–32767 – **0** – 32767	
27_	**Process controller input values**		
270	Setpoint source	**Parameters** / IPOS variable / Analog 1 / Analog 2	
271	Setpoint	–32767 – **0** – 32767	
272	IPOS setpoint address	**0** – 1023	
273	Time constant	**0** – 0.01 – 2000 s	
274	Scaling setpoints	–32,767 – **1** – 32,767	

Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
275	Actual value source	**Analog 1** / Analog 2 / IPOS Variable	
276	IPOS actual value address	**0** – 1023	
277	Actual value scaling factor	–32.767 – **1** – 32.767	
278	Actual offset value	–32767 – **0** – 32767	
279	Time constant actual value	**0** – 500 ms	
28_	**Process controller limits**		
280	Minimum offset + actual value	–32767 – **0** – 32767	
281	Maximum offset + actual value	–32767 – **10000** – 32767	
282	Minimum output PID controller	–32767 – **-1000** – 32767	
283	Maximum output PID controller	–32767 – **10000** – 32767	
284	Minimum output process controller	–32767 – **0** – 32767	
285	Maximum output process controller	–32767 – **7500** – 32767	
3__	**MOTOR PARAMETERS**		
30_ / 31_	**Limits 1 / 2**		
\300 / 310	Start/stop speed 1 / 2	0 – 150 rpm	
\301 / 311	Minimum speed 1 / 2	0 – **15** – 6100 rpm	
\302 / 312	Maximum speed 1 / 2	0 – **1500 –** 6100 rpm	
\303 / 313	Current limit 1 / 2	0 – 150% (BG0: 0 – 200% I_N)	
304	Torque limit	**0 –** 150% (BG0: 0 – 200%)	
32_ / 33_	**Motor compensation 1 / 2 (asynchronous)**		
\320 / 330	Automatic adjustment 1/2	Off **On**	
321 / 331	Boost 1/2	**0 –** 100%	
322 / 332	IxR adjustment 1	0 – 100%	
323 / 333	Premagnetizing time 1 / 2	0 – 2 s	
324 / 334	Slip compensation 1 / 2	0 – 500 rpm	
34_	**Motor protection**		
340 / 342	Motor protection 1/2	**Off** On (asynchronous) On (synchronous)	
341 / 343	Type of cooling 1/2	**Fan cooled** Forced cooling	
344	Interval for motor protection	0.1 – **4 –** 20 s	
345 / 346	I_N/U_L monitoring 1 / 2	0.1 – 500 A	
35_	**Direction of rotation of the motor**		
350 / 351	Direction of rotation reversal 1 / 2	**Off** On	
36_	**Startup (only available in DBG60B)**		
360	Startup	Yes/**No**	Only available in DBG60B, not in MOVITOOLS® MotionStudio/SHELL.
4__	**REFERENCE SIGNALS**		
40_	**Speed reference signal**		
400	Speed reference value	0 – **1500** – 6000 rpm	
401	Hysteresis	0 – **100** – 500 rpm	
402	Delay time	0 – **1** – 9 s	

Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
403	Signal = "1" if:	**$n < n_{ref}$** $n > n_{ref}$	
41_	**Speed window signal**		
410	Window center	0 – **1500 –** 6000 rpm	
411	Range width	**0 –** 6000 rpm	
412	Delay time	0 – **1** – 9 s	
413	Signal = "1" if:	**Inner** Outside	
42_	**Speed setpoint/actual value comparison**		
420	Hysteresis	0 – **100** – 300 rpm	
421	Delay time	0 – **1** – 9 s	
422	Signal = "1" if:	$n \neq n_{setp}$ **$n = n_{setp}$**	
43_	**Current reference signal**		
430	Current reference value	0 – **100** – 200% I_N	
431	Hysteresis	0 – **5 –** 30% I_N	
432	Delay time	0 – **1** – 9 s	
433	Signal = "1" if:	**$I < I_{ref}$** $I > I_{ref}$	
44_	**Imax signal**		
440	Hysteresis	0 – **5** – 50% I_N	
441	Delay time	0 – **1** – 9 s	
442	Signal = "1" if:	$I = I_{max}$ / **$I < I_{max}$**	
5__	**MONITORING FUNCTIONS**		
50_	**Speed monitoring**		
500 / 502	Speed monitoring 1/2	Off Motor Regenerative **Mot. & regener.**	
501 / 503	Delay time 1/2	0 – **1** – 10 s	
504	Encoder monitoring motor	**No** Yes	
505	Distance encoder monitoring	**No** Yes	
51_	**Synchronous operation monitoring**		
510	Slave position tolerance	10 – **25** – 32 768 Inc	
511	Lag error prewarning	**50 –** 99 999 999 Inc	
512	Lag error limit	100 – **4000 –** 99 999 999 Inc	
513	Deceler. Lag error signal	0 – **1** – 99 s	
514	Counter LED display	10 – **100 –** 32 768 Inc	
515	Position signal delay time	5 – **10** – 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**	

Par.	Name **Selectable par.** **Parameter set 1/2**	Setting range Factory setting	Comment
52_	**Mains OFF monitoring**		
520	Mains OFF response time	**0 –** 5 s	
521	Mains OFF response	**Controller inhibit** Emergency stop	
522	Phase failure monitoring	**On** Off	
53_	**Motor temperature protection**		
530	Sensor type 1	**No sensor** TF/TH/KTY (KTY: only for DS/CM motors)	
531	Sensor type 2	**No sensor** TF/TH/KTY (KTY: only for DS/CM motors)	
532	Source of motor temperature 1	X10/**X15**	
533	Source of motor temperature 2	X10/**X15**	
54_	**Gear unit/motor monitoring**		
540	Response to drive vibration/warning	**Display error**	**The following fault responses can be programmed:** No response • display error • imm. stop/fault • emerg.st./fault • rapid stop/fault • rapid stop/warng. • emerg.st./warng. • rapid stop/warng.
541	Response to drive vibration/fault	**Rapid stop/warning**	
542	Response to oil aging/warning	**Display error**	
543	Response to oil aging/error	**Display error**	
544	Response to oil aging/overtemperature	**Display error**	
545	Response to oil aging/ready	**Display error**	
549	Response to brake wear	**Display error**	
55_	**DCS safety monitor**		
550	DCS safety monitor status	Display value that cannot be changed	
551	Binary inputs DCS 1 – 8		
552	Binary outputs DCS DO0_P – DO2_M		
553	Serial number DCS		
554	CRC DCS		
555	Fault response DCS	**Immediate stop** Malfunction	**The following fault responses can be programmed:** No response • display error
556	DCS alarm response		
557	Actual position source DCS	**Motor encoder (X15)** Ext. encoder (X14) Absolute encoder (X62)	
56_	**Ex-e motor current limitation**		
560	Ex-e motor current limit	On **Off**	
561	Frequency A	0 – **5** – 60 Hz	
562	Current limit A	0 – **50** – 150%	
563	Frequency B	0 – **10** – 104 Hz	
564	Current limit B	0 – **80** – 200%	
565	Frequency C	0 – **25** – 104 Hz	
566	Current limit C	0 – **100** – 200%	

Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
6__	**TERMINAL ASSIGNMENT**		
60_	**Binary inputs of basic unit**		
-	Binary input DIØØ	Fixed assignment with: **/CONTR. INHIBIT**	
600	Binary input DIØ1	**CW/stop**	**The following functions can be programmed:** No function • enable/stop • CW/stop • CCW/stop • n11/n21 • n12/n22 • fix. setpt. sw.over • param. sw.over • ramp sw.over • Motor potentiometer up • motor potentiometer down • /Ext. error • error reset • /hold control • /CW limit switch • /CCW limit switch • IPOS input • reference cam • ref. trav. start • slave free run • setpoint hold • mains on • set DRS zero point • DRS slave start • DRS teach in • DRS master stopped • oscillation/warning • break wear • oil aging/warning • oil aging/error • oil aging overtemp. • 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**	
61_	**Binary inputs option**		
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**	
62_	**Binary outputs of basic unit**		
-	Binary output DBØØ	Fixed assignment with: **/Brake**	
620	Binary output DOØ1	**Ready**	**The following signals can be programmed:** No function • /malfunction • ready • output stage on • rotating field on • brake rel • brake engaged • motor standstill • parameter set • speed reference • speed window • nom./act.val.comp. • curr. reference • Imax signal • /motor utilization 1 • /motor utiliz. 2 • /DRS PREWARN. • /DRS lag error • DRS slave in pos. • IPOS in position • IPOS reference • IPOS output • /IPOS malfunction • reserved • Ex-e current limit • LSM commutation • S pattern • STO
621	Binary output DOØ2	**/Fault**	
622	Binary output DOØ3	**IPOS output**	
623	Binary output DOØ4	**IPOS output**	
624	Binary output DOØ5	**IPOS output**	
63_	**Binary outputs option**		
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**	
64_	**Optional analog outputs**		
640	Analog output AO1	**Actual speed**	**The following functions can be programmed:** No function • ramp input • setpoint speed • actual speed • actual frequency • output current • active current • unit utilization • IPOS output • relative torque • IPOS output 2
641	Scaling AO1	-10 – 0 – **1** – 10	
642	Operating mode AO1	OFF / **-10 – +10 V** / 0 – 20 mA / 4 – 20 mA	
643	Analog output AO2	**Output current**	
644	Scaling AO2	-10 – 0 – **1** – 10	
645	Operating mode AO2	OFF / **-10 – +10 V** / 0 – 20 mA / 4 – 20 mA	

Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
7__	**CONTROL FUNCTIONS**		
70_	**Operating modes**		
700	Operating mode 1	**VFC 1** 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	**VFC 2** VFC 2 & GROUP VFC 2 & HOIST VFC 2 & DC BRAK. VFC 2 & FLYSTART	
702	Motor category	**Rotational** Linear	
71_	**Standstill current**		
710 / 711	Standstill current 1 / 2	**0 –** 50% I_{Mot}	
72_	**Setpoint stop function**		
720 / 723	Setpoint stop function 1 / 2	**Off** On	
721 / 724	Stop setpoint 1 / 2	0 – **30** – 500 rpm	
722 / 725	Start offset 1 / 2	0 – **30** – 500 rpm	
73_	**Brake function**		
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	
74_	**Speed skip function**		
740 / 742	Skip window center 1 / 2	0 – **1500** – 6000 rpm	
741 / 743	Skip width 1/2	**0 –** 300 rpm	
75_	**Master-slave function**		
750	Slave setpoint	**Master/slave off** Speed (RS485) Speed (SBus) speed (485+SBus) Torque (RS485) Torque (SBus) Torque (485+SBus) Load share (RS485) Load share (SBus) Load share (485+SBus)	

Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
751	Scaling slave setpoint	– 10 – 0 – **1** – 10	
76_	**Manual operation**		
760	Lockout run/stop keys	**No** Yes	
77_	**Energy-saving function**		
770	Energy-saving function	**Off** On	
78_	**Ethernet configuration**		
780	IP address	000.000.000.000 – **192.168.10.x** – 223.255.255.255	
781	Subnet mask	000.000.000.000 – **255.255.255.000** – 223.255.255.255	
782	Standard gateway	**000.000.000.000** – 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	**DHCP** Saved IP parameters	
8__	**UNIT FUNCTIONS**		
80_	**Setup**		
800	User menu	**On** / off (only in DBG60B)	
801	Language	Dependent on DBG60B version	
\802	Factory setting	**No** Default Delivery state	
\803	Parameter lock	**Off** On	
804	Reset statistics data	**No** Error memory kWh counter Operating hours	
806	Copy DBG60B → MDX	Yes/**No**	Only in DBG60B
807	Copy MDX → DBG60B	Yes/**No**	Only in DBG60B
81_	**Serial communication**		
810	RS485 address	**0 –** 99	
811	RS485 group address	**100 –** 199	
812	RS485 timeout interval	**0 –** 650 s	
819	Fieldbus timeout interval	0 – **0.5** – 650 s	
82_	**Brake operation**		
\820 / 821	4-quadrant operation 1/2	Off **On**	
83_	**Error responses**		
830	Response EXT. ERROR	**EMERG. ST/FAULT**	**The following fault responses can be programmed:** No response • display error • imm. stop/fault • emerg.st./fault • rapid stop/fault • rapid stop/warng. • emerg.st./warng. • rapid stop/warng.
831	Response FIELDBUS TIMEOUT	**Rapid stop/warning**	
832	Response MOTOR OVERLOAD	**EMERG. ST/FAULT**	
833	Response RS485 TIMEOUT	**Rapid stop/warning**	
834	LAG ERROR response	**EMERG. ST/FAULT**	
\835	TF SIGNAL response	**No response**	
836 / 837	Response SBus TIMEOUT 1 / 2	**EMERG. ST/FAULT**	
838	Response SW limit switch	**EMERG. ST/FAULT**	

Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
839	Response to positioning interruption	**No response**	
84_	**Reset behavior**		
\840	Manual reset	**No** Yes	
841	Auto reset	**Off** On	
842	Restart time	1 – **3** – 30 s	
85_	**Scaling actual speed value**		
850	Scaling factor numerator	**1 –** 65535	Can only be set using MOVITOOLS® MotionStudio.
851	Scaling factor denominator	**1 –** 65535	
852	User-defined unit	**rpm**	
86_	**Modulation**		
860 / 861	PWM frequency 1 / 2 VFC	2.5 kHz **4 kHz** 8 kHz 12 kHz 16 kHz	Factory setting of MOVIDRIVE® MDX61B size 7 (AC 500 V units: MDX61B1600/2000/2500) = **2.5 kHz**
862 / 863	PWM fix 1 / 2	**Off** On	
864	PWM frequency CFC	2.5 kHz **4 kHz** 8 kHz 16 kHz	Factory setting of MOVIDRIVE® MDX61B size 7 (AC 500 V units: MDX61B1600/2000/2500) = **2.5 kHz**
87_	**Process data description**		
870	Setpoint description PO1	**Control word 1**	**The following PO assignment can be set:** No function • speed current • position LO • max. Speed • Max. current • slip • ramp • control word 1 • control word 2 • Speed [%] • IPOS PO DATA
871	Setpoint description PO2	**Speed**	
872	Setpoint description PO3	**No function**	
873	Actual value description PI1	**Status word 1**	**The following PI assignment can be set:** No function • speed • output current • active current • position LO • position HI • status word 1 • status word 2 • speed [%] • IPOS PI DATA • reserved • status word 3
874	Actual value description PI2	**Speed**	
875	Actual value description PI3	**Output current**	
876	PO data enable	Off **On**	
88_ / 89_	**Serial communication SBus 1 / 2**		
880 / 890	Protocol SBus 1 / 2	**SBus MOVILINK®** CANopen	
881 / 891	SBus address 1 / 2	**0** – 63	
882 / 892	SBus group address 1 / 2	**0** – 63	
883 / 893	SBus timeout interval 1 / 2	**0** – 650 s	
884 / 894	Baud rate SBus 1 / 2	125 kBd 250 kBd **500 kBd** 1000 kBd	
885 / 895	Synchronization ID SBus 1 / 2	**0** – 2047	

Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
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**	
9__	**IPOS PARAMETERS**		
90_	**IPOS reference travel**		
900	Reference offset	– $(2^{31}-1)$ – **0** – $2^{31}-1$ Inc	
901	Reference speed 1	0 – **200 –** 6000 rpm	
902	Reference speed 2	0 – **50** – 6000 rpm	
903	Reference travel type	**0 –** 8	
904	Reference travel to zero pulse	**Yes** No	
905	HIPERFACE® Offset (X15)	– $(2^{31}-1)$ – **0** – $2^{31}-1$ Inc	
906	Cam distance	– $(2^{31}-1)$ – **0** – $2^{31}-1$ Inc	
910	Gain X controller	0.1 – **0.5 –** 32	
911	Positioning ramp 1	0.01 – **1 –** 20 s	
912	Positioning ramp 2	0.01 – **1** – 20 s	
913	Travel speed CW	0 – **1500** – 6000 rpm	
914	Travel speed CCW	0 – **1500** – 6000 rpm	
915	Velocity precontrol	-199.99 – 0 – **100** – 199.99%	
916	Ramp type	**Linear** Sine Square Bus ramp Jerk-limited Electronic cam Synchronous operation Cross cutter	
917	Ramp mode	**Mode 1** Mode 2	
918	Bus setpoint source	H0 – **H499** – H1023	

Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
92_	**IPOS Monitoring**		
920	SW limit switch RIGHT	$-(2^{31}-1)$ ... **0** ... $2^{31}-1$ Inc	
921	SW limit switch LEFT	$-(2^{31}-1)$ ... **0** ...$2^{31}-1$ Inc	
922	Position window	0 ... **50** ... 32767 inc	
923	Lag error window	0 ... **5000** ... 2^{31}-1 inc	
924	'Position monitoring' detection	On/**off**	
93_	**IPOS Special functions**		
930	Override	On/**off**	
931	IPOS CTRL.W Task 1	**Stop** / Start / Stop	Only available in DBG60B, not in MOVITOOLS® MotionStudio/SHELL.
932	IPOS CTRL.W Task 2	Start / **Stop**	Only available in DBG60B, not in MOVITOOLS® MotionStudio/SHELL.
933	Jerk time	**0.005** ... 2 s	
938	IPOS speed task 1	**0** ... 9 additional commands/ms	
939	IPOS speed task 2	**0** ... 9 additional commands/ms	
94_	**IPOS Variables/encoder**		
940	IPOS variables edit	On/**off**	This parameter is only available on the DBG60B keypad, not in MOVITOOLS® MotionStudio!
941	Actual position source	**Motor encoder (X15)** Ext. encoder (X14) Absolute encoder (X62)	
942	Encoder factor numerator	**1** ... 32767	
943	Encoder factor denominator	**1** ... 32767	
944	Encoder scaling ext. encoder	**x1** / x2 / x4 / x8 / x16 / x32 / x64	Only with MOVITOOLS® MotionStudio. Not visible on the DBG60B keypad.
945	Distance encoder type (X14)	**TTL** SIN/COS HIPERFACE®	
946	Distance encoder counting direction (X14)	**Normal** Inverted	
947	HIPERFACE® offset (X14)	$-(2^{31}-1)$ ... **0** ...$2^{31}-1$ Inc	
948	Automatic encoder replacement detection	**On**/off	
95_	**Absolute encoder**		
950	Encoder type	**No encoder**	
951	Counting direction	**Normal** Inverted	
952	Cycle frequency	**1** ... 200%	
953	Position offset	$-(2^{31}-1)$ ... **0** ...$2^{31}-1$ Inc	
954	Zero point offset	$-(2^{31}-1)$ ... **0** ...$2^{31}-1$ Inc	
955	Encoder scaling	**x1** / x2 / x4 / x8 / x16 / x32 / x64	
956	CAN encoder baud rate		
96_	**IPOS Modulo function**		
960	Modulo function	**Off** Short CW: CCW	
961	Modulo numerator	0 ... **1** ... $2^{31}-1$	

Par.	Name Selectable par. Parameter set 1/2	Setting range Factory setting	Comment
962	Modulo denominator	0 ... **1** ... 2^{31} – 1	
963	Modulo encoder resolution	0 ... **4096** ... 20000	
97_	**IPOS synchronization**		
970	DRAM synchronization	**No** / yes	
971	Synchronization phase	–2 ... **0**...2 ms	

15 Operation

15.1 Operating Displays

15.1.1 7-segment display

The 7-segment display shows the operating condition of MOVIDRIVE® and, in the event of an error, an error 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
6	**6**	M-control
7	**7**	Hold control
8	**8**	Factory setting
9	**9**	Limit switch contacted
A	**10**	Technology option
c	**12**	IPOS$^{plus®}$ reference travel
d	**13**	Flying start
E	**14**	Calibrate encoder
F	**Error number**	Error indicator (flashing)
H	**Status display**	Manual mode
t	**16**	Inverter is waiting for data
U	**17**	"STO" active
^{2} (blinking dot)	-	IPOS$^{plus®}$ program is running
Flashing display	-	STOP via DBG60B
ꟻ1 ...ꟻ9	-	RAM defective

WARNING

Incorrect interpretation of display U = "STO" active.

Severe or fatal injuries.

The display U = "STO" is not safety-related and must not be used as a safety function.

15.1.2 DC link voltage display of size 7

	INFORMATION
	The DC link voltage display goes out about 20 seconds after the power off.

15.1.3 DBG60B keypad

Basic displays:

0.00rpm 0.000Amp CONTROLLER INHIBIT	Display when X13:1 (DIØØ "/CONTROL.INHIBIT") = "0".
0.00rpm 0.000Amp NO ENABLE	Display when X13:1 (DIØØ "/CONTROL.INHIBIT") = "1" and inverter is not enabled ("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	Error display

15.2 Information messages

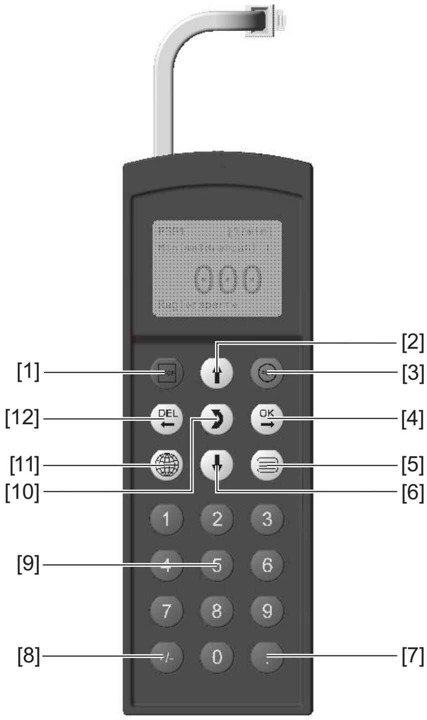
Information messages on the DBG60B (ca. 2 s in duration) or in MOVITOOLS® Motion-Studio/SHELL (message that can be acknowledged):

No.	Text DBG60B/SHELL	Description
1	ILLEGAL INDEX	Index addressed via interface not available.
2	NOT IMPLEMENT.	• Attempt to execute a non-implemented function. • An incorrect communication service has been selected. • Manual operation selected via invalid interface (e.g. fieldbus).
3	READ ONLY VALUE	Attempt to edit a read-only value.
4	PARAM. INHIBITED	Parameter lock P 803 = "ON", parameter cannot be altered.
5	SETUP ACTIVE	You tried to change parameters during setup.
6	VALUE TOO HIGH	You tried to enter a value that is too high.
7	VALUE TOO LOW	You tried 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 completed using X13:ST11/ST12 (RS 485).
11	ONLY TERMINAL	Manual mode must be exited via TERMINAL (DBG60B or UWS21B).
12	NO ACCESS	Access to selected parameter denied.
13	CTRL. INHIBIT MISS-ING	Set terminal DIØØ "/Controller inhibit" = "0" for the selected function.
14	INVALID VALUE	You tried to enter an invalid value.

No.	Text DBG60B/SHELL	Description
16	PARAM. NOT SAVED	Overflow of EEPROM buffer, e.g., due to cyclic write access. Parameter not stored in non-volatile EEPROM.
17	INVERTER ENABLED	• Parameter to be changed can only be set in the state "CONTROLLER INHIBIT". • Attempt to change to manual mode during enabled operation.

15.3 *Functions of the DBG60B keypad*

15.3.1 Key assignment for DBG60B



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[1]	Key	STOP	Stop
[2]	Key	↑	Up arrow, moves up to the next menu item
[3]	Key	RUN	Start
[4]	Key	OK	OK, confirms the entry
[5]	Key	☰	Activate the context menu
[6]	Key	↓	Down arrow, moves down to the next menu item
[7]	Key	·	Decimal point
[8]	Key	+/-	Sign reversal
[9]	Key	0 – 9	Digits 0... 9
[10]	Key	⤸	Change menu
[11]	Key	🌐	Select language
[12]	Key	DEL	Delete previous entry

15.3.2 Copy function of the DBG60B

The DBG60B keypad can be used for copying complete parameter sets from one MOVIDRIVE® unit to other MOVIDRIVE® units. Proceed as follows:

- In the context menu, select the menu item "COPY TO DBG". Confirm the setting by pressing the OK key.
- After the copying process has finished, plug the keypad in the other inverter.
- In the context menu, select the menu item "COPY TO MDX". Confirm the setting by pressing the OK key.

15.3.3 Parameter mode

Proceed as follows to set the parameters in parameter mode:

1. Activate the context menu by pressing the ☰ key.	BASIC VIEW **PARAMETER MODE** VARIABLE MODE WAKE UP PARAMETER
2. Press the OK key to start the PARAMETER MODE. The first display parameter P000 "SPEED" appears. Press the ↑ key or ↓ key to select the main parameter groups 0 to 9.	P 000 upm SPEED 0.0 CONTROLLER INHIBIT
3. Press the ↑ key or ↓ key to select the required main parameter group. The flashing cursor is positioned under the number of the main parameter group.	P 1.. SETPOINTS/ RAMP GENERATORS CONTROLLER INHIBIT
4. Activate parameter subgroup selection in the main parameter group by pressing the OK key. The flashing cursor moves one position to the right.	P 1.. SETPOINTS/ RAMP GENERATORS CONTROLLER INHIBIT
5. Press the ↑ key or ↓ key to select the required parameter subgroup. The flashing cursor is positioned under the number of the parameter subgroup.	\ 13. SPEED RAMPS 1 CONTROLLER INHIBIT
6. Activate parameter selection in the required parameter subgroup by pressing the OK key. The flashing cursor moves one position to the right.	\ 13. SPEED RAMPS 1 CONTROLLER INHIBIT
7. Press the ↑ key or ↓ key to select the desired parameter. The flashing cursor is positioned under the third digit of the parameter number.	\ 132 s T11 UP CCW 0.13 CONTROLLER INHIBIT
8. Press the OK key to activate the setting mode for the selected parameter. The cursor is positioned under the parameter value.	\ 132 s T11 UP CCW 0.13_ CONTROLLER INHIBIT
9. Press the ↑ key or ↓ key to select the desired parameter value.	\ 132 s T11 UP CCW 0.20_ CONTROLLER INHIBIT
10. Confirm the setting by pressing the OK key. Exit the setting mode by pressing the ⤸ key. The flashing cursor is positioned under the third digit of the parameter number again.	\ 132 s T11 UP CCW 0.20 CONTROLLER INHIBIT

11. Press the [↑] key or [↓] key to select another parameter or go back to the parameter subgroup menu using the [DEL] key.

\ 13. SPEED
RAMPS 1
CONTROLLER INHIBIT

12. Press the [↑] key or [↓] key to select another parameter subgroup or go back to the main parameter group menu using the [DEL] key.

P 1.. SETPOINTS/
RAMP GENERATORS
CONTROLLER INHIBIT

13. Press the [☰] key to return to the context menu.

BASIC VIEW
PARAMETER MODE
VARIABLE MODE
WAKE UP PARAMETER

15.3.4 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 confirm with the [OK] key. The variable mode display appears.
- You can use the [↻] key to edit the variables.

15.3.5 User menu

The DBG60B keypad has a standard user menu containing the parameters that are used most often. The parameters in the user menu are displayed with a "\" before the parameter number (→ 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 menu item "USER MENU" and press the OK key to confirm. The user menu with the most frequently used parameters appears.

Adding parameters to the user menu

Proceed in this order to add parameters to the user menu:

- 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 OK key.
- Press the ☰ key to return to the context menu. In the context menu, select the menu item "ADD Pxxx". "xxx" is the parameter you selected previously. Confirm the setting by pressing the OK key. The selected parameter is stored in the user menu.

Deleting parameters from the user menu

Proceed in this order to delete parameters from the user menu:

- Use the ☰ key to call up the context menu. Select the menu item "USER MENU".
- Select the parameter that is to be deleted. Confirm the setting by pressing the OK key.
- Press the ☰ key to return to the context menu. In the context menu, select the menu item "DELETE Pxxx". "xxx" is the parameter you selected previously. Confirm the setting by pressing the OK key. The selected parameter is deleted from the user menu.

15.3.6 Wake-up parameter

The wake-up parameter is the parameter that is displayed when the DBG60B is switched on. The factory setting for the wake up parameter is the basic display. You can select which parameter should be the wake-up parameter. The following options can be used as the wake-up parameter:

- Parameter (→ parameter mode)
- Parameter from the user menu (→ user menu)
- H variable (→ variable mode)
- Basic display

Proceed as follows to save a wake-up parameter:

- First select the required parameter in parameter mode.
- In the context menu, select the menu item "XXXX INITIAL PARAM.". "XXXX" is the selected initial parameter. Confirm the setting by pressing the OK key.

15.3.7 IPOS$^{plus®}$

MOVITOOLS® MotionStudio is required for programming IPOS$^{plus®}$. You can only use the DBG60B keypad to edit or change IPOS$^{plus®}$ variables (H__).

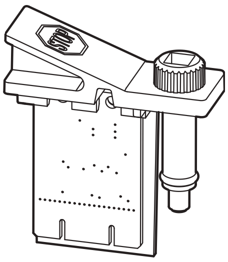
The IPOS$^{plus®}$ program is also stored in the DBG60B keypad when it is saved and is consequently also transferred when the parameter set is copied to another MOVIDRIVE® unit.

Parameter P931 can be used for starting and stopping the IPOS$^{plus®}$ program from the DBG60B keypad.

15.4 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 plant can be started up again quickly without PC and data backup by simply re-plugging the memory card. You can install as many option cards as required.

The following figure shows the MDX60B/61B memory card.



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15.4.1 Notes for replacing the memory card

- Only plug in the memory card when the MOVIDRIVE® 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® MDX60B/61B...	New inverter MOVIDRIVE® 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) is displayed. You can remedy the error by calling up the "DELIVERY CONDITION" menu item from the context menu (P802 factory setting). This resets the unit to its initial delivery condition. You must then restart the unit.
- The counter status of the DRS11B option and the data of the DH..1B and DCS..B options are not stored on the memory card. When you replace the memory card, you have to install the DRS11B, DH..1B and DCS..B 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.
- When replacing an absolute encoder, you have to reference it again.

16 Service

16.1 Error information

16.1.1 Error memory

The fault memory (P080) stores the last five error messages (errors t-0...t-4). The error message of longest standing is deleted whenever more than five error messages have occurred. The following information is stored when a malfunction occurs:

Error that has 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.

16.1.2 Switch-off responses

There are three switch-off responses depending on the fault; the inverter remains inhibited in fault status:

Immediate disconnection

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. Once the stop speed is reached, the brake is applied (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. Once the stop speed is reached, the brake is applied (DBØØ "/Brake" = "0"). The output stage goes to high resistance after the brake reaction time has elapsed (P732 / P735).

16.1.3 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.

DANGER

Risk of crushing if the motor starts up automatically after an auto reset.

Severe or fatal injuries.

- Do not use auto reset with drives where an automatic restart represents a danger to people or units.
- Perform a manual reset.

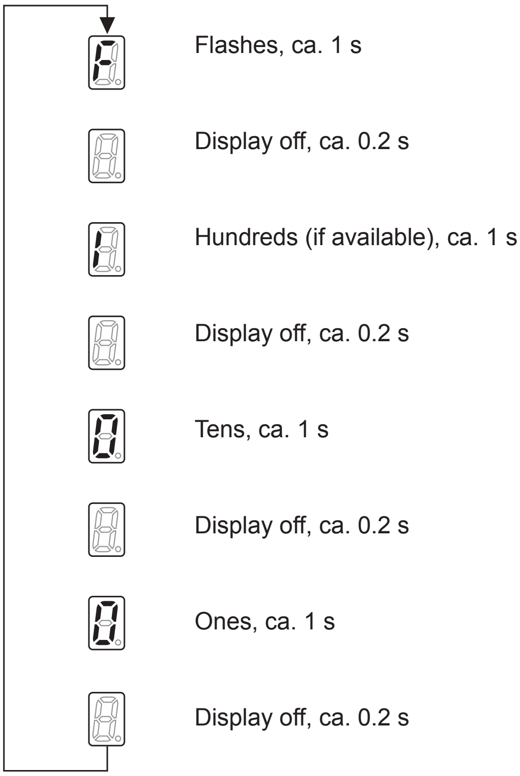
16.1.4 Inverter is waiting for data

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.

16.2 Error messages and list of errors

16.2.1 Error message via 7-segment display

The fault code is shown in a 7-segment display. The following display sequence is used (e.g. fault code 100):



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Following a reset or if the error code resumes the value "0", the display switches to the operating display.

16.2.2 Suberror code – display

The suberror code is displayed in MOVITOOLS® MotionStudio (as of version 4.50) or in the DBG60B keypad.

16.2.3 Error list

The factory set error response is listed in the "Response P" column. (P) indicates that the response is programmable (via *P83_error response* or with IPOS$^{plus®}$). In the event of error 108, (P) indicates that the response can be programmed via *P555 DCS error response* In the event of error 109, (P) indicates that the response can be programmed via *P556 DCS alarm response*

Error			Suberror			
Code	**Designation**	**Response (P)**	**Code**	**Designation**	**Possible cause**	**Measure**
00	No error					
01	Overcurrent	Immediate disconnection	0	Output stage	• Short circuit at output • Motor too large • Defective output stage • External power supply Current converter • Ramp limit is deactivated and set ramp time is too short • Defective phase module • Supply voltage 24 V or 24V generated from it is instable • Interruption or short circuit on the signal lines from the phase modules	• Rectify the short circuit • Connect a smaller motor • Contact SEW Service for advice if the output stage is defective. • Activate P138 and/or increase ramp time
			1	V_{CE} monitoring or undervoltage monitoring of the gate driver		
			5	Inverter remains in hardware current limit		
			6	V_{CE} monitoring or undervoltage monitoring of the gate driver or overcurrent of the current converter. ..Phase U		
			7	..Phase V		
			8	..Phase W		
			9	..Phases U and V		
			10	..Phases U and W		
			11	..Phases V and W		
			12	..Phases U and V and W		
			13	Voltage supply Current converter in mains operation		
			14	MFE signal lines		
03	Ground fault	Immediate disconnection	0	Ground fault	Ground fault • in the motor lead • in the inverter • in the motor	• Eliminate ground fault • Consult SEW Service
04	Brake chopper	Immediate disconnection	0	DC link voltage too high in 4Q operation	• Too much regenerative power • Braking resistor circuit interrupted • Short circuit in the braking resistor circuit • Brake resistance too high • Brake chopper is defective	• Extend deceleration ramps • Check supply cable to braking resistor • Check technical data of braking resistor • Replace MOVIDRIVE® if the brake chopper is defective
			1			
06	Line phase failure	Immediate disconnection	0	DC link voltage periodically too low	• Phase failure • Inadequate line voltage quality	• Check the line cable • Check configuration of the supply system. • Check supply (fuses, contactor)
			3	Line frequency fault		
			4	-		
07	DC link overvoltage	Immediate disconnection	0	DC link voltage too high in 2Q operation	DC link voltage too high	• Extend deceleration ramps • Check supply cable to the braking resistor • Check technical data of braking resistor
			1			
			2	DC link voltage too high in 4Q operation .. .. Phase U		
			3	.. Phase V		
			4	.. Phase W		

Error			Suberror			
Code	**Designation**	**Response (P)**	**Code**	**Designation**	**Possible cause**	**Measure**
08	Speed monitoring	Immediate disconnection (P)	0	Inverter in current limit or in slip limit	• 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. • Encoder not connected correctly or incorrect direction of rotation. • n_{max} is exceeded during torque control. • In operating mode VFC: Output frequency ≥ 150 Hz • In operating mode V/f: Output frequency ≥ 600 Hz	• Reduce load • Increase deceleration time (P501 or P503). • Check encoder connection, swap A/A and B/B pairs if necessary • Check encoder voltage supply • Check current limitation • Extend ramps if necessary • Check motor cable and motor • Check line phases
			3	"Actual speed" system limit exceeded. Speed difference between ramp setpoint and actual value for 2×ramp time higher than expected slip.		
			4	Maximum rotating field speed exceeded. Maximum rotating field frequency (with VFC max. 150 Hz and V/f max 600 Hz) exceeded.		
09	Startup	Immediate disconnection	0	Startup missing	Inverter has not been started up for the selected operating mode.	Perform startup for the required operating mode.
			1	Wrong operating mode selected		
			2	Wrong encoder type or defective encoder card		
10	IPOS-ILLOP	Emergency stop	0	Invalid IPOS command	• Incorrect command detected during IPOS$^{plus®}$ program execution. • Incorrect conditions during command execution.	• Check the content of the program memory and, if necessary, correct. • Load the correct program into the program memory. • Check program sequence (→ IPOS$^{plus®}$ manual)
11	Over-temperature	Emergency stop (P)	0	Heat sink temperature too high or temperature sensor defective	• Thermal overload of inverter • Temperature sensor of a phase module faulty. (size 7)	• Reduce load and/or ensure adequate cooling. • Check fan. • If F-11 is issued even though the temperatures is obviously not too high, this indicates a faulty temperature sensor of the phase module. Replace the phase module (Size 7)
			3	Overtemperature switched-mode power supply		
			6	Heat sink temperature too high or temperature sensor defective. ..Phase U (size 7)		
			7	..Phase V (size 7)		
			8	..Phase W (size 7)		
13	Control signal source	Immediate disconnection	0	Control signal source not available, e.g. control signal source fieldbus without fieldbus card	Control signal source not defined or defined incorrectly.	Set correct control signal source (P101).

Error			Suberror			
Code	**Designation**	**Response (P)**	**Code**	**Designation**	**Possible cause**	**Measure**
14	Encoder	Immediate disconnection	0	Encoder not connected, defective encoder, defective encoder cable	• Encoder cable or shield not connected correctly • Short circuit/broken encoder wire • Encoder defective	Check encoder cable and shield for correct connection, short circuit and broken wire.
			25	Encoder error X15 – Speed range exceeded. Encoder at X15 turns faster than 6542 rpm.		
			26	Encoder error X15 – Card is defective. Error in the quadrant evaluation.		
			27	Encoder error – encoder connection or encoder is defective		
			28	Encoder error X15 – Communication error RS485 channel.		
			29	Encoder error X14 – Communication error RS485 channel.		
			30	Unknown encoder type at X14/X15		
			31	Plausibility check error Hiperface® X14/X15 Increments have been lost.		
			32	Encoder error Hiperface® X15 Hiperface® encoder at X15 signals error		
			33	Encoder error Hiperface® X14 Hiperface® encoder at X14 signals error		
			34	Encoder error X15 resolver. Encoder connection or encoder is defective.		
17	System malfunction	Immediate disconnection	0	"Stack overflow" error	Inverter electronics disrupted, possibly due to effect of EMC.	• Check grounding and shielding and improve, if necessary. • Consult SEW Service if the error reoccurs.
18			0	"Stack underflow" error		
19			0	"External NMI" error		
20			0	"Undefined opcode" error		
21			0	"Protection fault" error		
22			0	"Illegal word operand access" error		
23			0	"Illegal instruction access" error		
24			0	"Illegal external bus access" error		
25	EEPROM	Rapid stop	0	Read or write error on EEPROM power section	Access to the EEPROM of the memory card has failed	• Activate factory settings, perform reset and reset parameters. • Contact SEW service if the error occurs again. • Replace memory card.
			11	NV memory read error NV-RAM inside the unit		
			13	NV memory chip card System module defective		
			14	NV memory chip card Memory card defective		
			16	NV memory initialization error		

Error			Suberror			
Code	**Designation**	**Response (P)**	**Code**	**Designation**	**Possible cause**	**Measure**
26	External terminal	Emergency stop (P)	0	External terminal	Read in external error signal via programmable input.	Eliminate respective cause; reprogram terminal if necessary.
27	No limit switches	Emergency stop	0	Both limit switches missing or open circuit	• Open circuit/both limit switches missing. • Limit switches are swapped over in relation to direction of rotation of motor	• Check wiring of limit switches. • Swap over limit switch connections. • Reprogram terminals
			2	Limit switch reversed		
			3	Both limit switches are active simultaneously		
28	Fieldbus Timeout	Rapid stop (P)	0	"Fieldbus timeout" error	No communication between master and slave within the projected response monitoring.	• Check communications routine of the master • Extend fieldbus timeout time (P819) or deactivate monitoring
			2	Fieldbus card does not boot		
29	Limit switch contacted	Emergency stop	0	Hardware limit switch approached	A limit switch was reached in IPOS$^{plus®}$ operating mode.	• Check travel range. • Correct user program.
30	Emergency stop Timeout	Immediate disconnection	0	Time violation stop emergency stop rate	• Drive overloaded • Emergency stop ramp too short.	• Check configuration • Extend emergency stop ramp
31	TF/TH sensor tripped	No response (P)	0	Thermal motor protection error	• Motor too hot, TF/TH has triggered • TF/TH of the motor not connected or connected incorrectly • MOVIDRIVE® connection and TF/TH connection on motor interrupted	• Let motor cool off and reset error • Check connections/link between MOVIDRIVE® and TF/TH. • If a TF/TH is not connected: Jumper X10:1 with X10:2. • Set P835 to "No response".
32	IPOS index overflow	Emergency stop	0	IPOS program defective	Programming principles violated leading to system internal stack overflow	Check and correct the IPOS$^{plus®}$ user program (see IPOS$^{plus®}$ manual).
33	Setpoint source	Immediate disconnection	0	Setpoint source not available, e.g. control signal source fieldbus without fieldbus card	Setpoint source not defined or defined incorrectly.	Set correct setpoint source (P100).
34	Ramp Timeout	Immediate disconnection	0	Time violation rapid stop ramp	Time of downward ramps exceeded, e.g. due to overload.	• Extend the downwards ramps • Eliminate overload
35	Operating mode	Immediate disconnection	0	Operating mode not available	• Operating mode not defined or defined incorrectly • P916 was used to set a ramp function that is needed by a MOVIDRIVE® unit in technology version. • P916 was used to set a ramp type that does not match the selected technology function. • P916 was used to set a ramp type that does not match the selected synchronization time (P888).	• Use P700 or P701 to set correct operating mode. • Use MOVIDRIVE® in technology version (..OT). • From the "Startup → Select technology function..." menu, select the technology function that matches P916. • Check the settings of P916 and P888
			1	Wrong assignment operating mode - hardware		
			2	Wrong assignment operating mode - technology function		
36	Option missing	Immediate disconnection	0	Hardware is missing or not permitted.	• Type of option card not allowed • Setpoint source, control signal source or operating mode not permitted for this option card • Incorrect encoder type set for DIP11B.	• Use correct option card • Set correct setpoint source (P100) • Set correct control signal source (P101) • Set correct operating mode (P700 or P701) • Set the correct encoder type
			2	Encoder slot error.		
			3	Fieldbus slot error.		
			4	Expansion slot error.		
37	System watchdog	Immediate disconnection	0	Error "watchdog overflow system"	Error while executing system software	Consult SEW Service.

Error			Suberror			
Code	Designation	Response (P)	Code	Designation	Possible cause	Measure
38	System software	Immediate disconnection	0	"System software" error	System malfunction	Consult SEW Service.
39	Reference travel	Immediate disconnection (P)	0	"Reference travel" error	• The reference cam is missing or does not switch • Limit switches are connected incorrectly • Reference travel type was changed during reference travel	• Check reference cam • Check limit switch connection • Check reference travel type setting and required parameters.
40	Boot synchronization	Immediate disconnection	0	Timeout at boot synchronization with option.	• Error during boot synchronization between inverter and option. • Synchronization ID not/ incorrectly transmitted	Install a new option card if this error reoccurs.
41	Watchdog option	Immediate disconnection	0	Error – Watchdog timer from/to option.	• Error in communication between system software and option software • Watchdog in the IPOS$^{plus®}$ program • An application module without the application version has been loaded in a MOVIDRIVE® B unit • The wrong technology function has been set if an application module is used	• Consult SEW Service. • Check IPOS program • Check whether the unit has been activated for the application version (P079) • Check the selected technology function (P078)
			17	Watchdog IPOS error		
42	Lag error	Immediate disconnection (P)	0	Positioning lag error	• Encoder connected incorrectly • Acceleration ramps too short • P component of positioning controller too small • Incorrectly set speed controller parameters • Value of lag error tolerance too small	• Check encoder connection • Extend ramps • Set P component to higher value • Reset speed controller parameters • Increase lag error tolerance • Check wiring of encoder, motor and line phase. • Check whether mechanical system components can move freely or if they are blocked
43	RS485 timeout	Rapid stop (P)	0	Communication timeout at RS485 interface	Error during communication via interface RS485	Check RS485 connection (e.g. inverter - PC, inverter - DBG60B). If necessary, contact SEW Service.
44	Unit utilization	Immediate disconnection	0	Unit utilization error	• Unit utilization (IxT value) > 125%	• Decrease power output • Extend ramps • If suggested actions not possible, use larger inverter. • Reduce load
			8	UL monitoring error		
45	Initialization	Immediate disconnection	0	General error during initialization	• No parameters set for EEPROM in power section, or parameters set incorrectly. • Option card not in contact with backplane bus.	• Restore factory settings Consult SEW Service if the error still cannot be reset. • Insert the option card correctly.
			3	Data bus error during RAM check		
			6	CPU clock error.		
			7	Error in the current evaluation.		
			10	Error when setting flash protection		
			11	Data bus error during RAM check		
			12	Parameter setting error synchronous operation (internal synchronous operation)		

Error			Suberror			
Code	**Designation**	**Response (P)**	**Code**	**Designation**	**Possible cause**	**Measure**
46	System bus 2 timeout	Rapid stop (P)	0	Timeout system bus CAN2	Error during communication via system bus 2.	Check system bus connection.
47	System bus 1 timeout	Rapid stop (P)	0	Timeout system bus CAN1	Error during communication via system bus 1.	Check system bus connection.
48	Hardware DRS	Immediate disconnection	0	Hardware synchronous operation	**Only with DRS11B:** • Encoder signal from master/ synchronous encoder faulty. • Hardware required for synchronous operation is faulty.	• Check encoder signals of master/synchronous encoder. • Check encoder wiring. • Replace synchronous operation card.
57	"TTL encoder"	Immediate disconnection	512	X15: Error in amplitude control	• Encoder cable or shield not connected correctly • Short circuit/broken encoder wire • Encoder defective • EMC interference	• Check encoder cable and shield for correct connection, short circuit and broken wire. • Replace the encoder • Providing for EMC measures
			16896	X14: Error in amplitude control		
			514	X15: Incorrectly set numerator/denominator values	Incorrect numerator/denominator values	Correct the numerator/denominator values
			16898	X14: Incorrectly set numerator/denominator values		
58	"Sin/cos encoder"	Immediate disconnection	512	X15: Error in amplitude control	• Encoder cable or shield not connected correctly • Short circuit/broken encoder wire • Encoder defective • EMC interference	• Check encoder cable and shield for correct connection, short circuit and broken wire. • Replace the encoder • Providing for EMC measures
			514	X15: Track signal error		
			16896	X14: Error in amplitude control		
			16897	X14: Initialization		
			16898	X14: Track signal error		
			513	X15: Initialization	Encoder defective	Replace the encoder
			515	X15: Incorrectly set numerator/denominator values	Incorrect numerator/denominator values	Correct the numerator/denominator values
			16899	X:14 Incorrect numerator/ denominator values		
59	"Encoder communication"	Rapid stop	1	X15: Track signal error	• Encoder cable or shield not connected correctly • Short circuit/broken encoder wire • Encoder defective • EMC interference	• Check encoder cable and shield for correct connection, short circuit and broken wire. • Replace the encoder • Providing for EMC measures
			16	X15: Data line fault		
			64 – 576	X15: RS485 communication		
			1088 – 1388	X15: EnDat communication		
			16385	X14: Track signal error		
			16400	X14: Data line fault		
			16448 – 16832	X14: RS485 communication		
			17472 – 17772	X14: EnDat communication		
			2	X15: Incorrect calibration of encoder	Incorrect encoder calibration or mechanical offset to motor	Delivery condition + new startup
			16386	X15: Incorrect calibration of encoder		
			1024	X15: Clocking and/or data line not connected	Clocking and/or data line not connected	Connect clocking and/or data line
			17408	X14: Clocking and/or data line not connected		
77	IPOS control word	No response (P)	0	Invalid control word IPOS	**Only in IPOS$^{plus®}$ operating mode:** • An attempt was made to set an invalid automatic mode (via external controller). • P916 = BUS RAMP is set.	• Check serial connection to external control. • Check write values of external control. • Set correct value for P916.

Error			Suberror			
Code	**Designation**	**Response (P)**	**Code**	**Designation**	**Possible cause**	**Measure**
78	IPOS SW limit switch	No response (P)	0	Software limit switch reached	**Only in IPOS$^{plus®}$ operating mode:** Programmed target position is outside travel range delimited by software limit switches.	• Check the user program • Check position of the software limit switches
79	Hardware configuration	Immediate disconnection	0	Deviating hardware configuration when replacing the memory card	The following items do not match anymore after having replaced the memory card: • Power rating • Nominal voltage • Variant identification • Unit series • Application or standard version • Option cards	Ensure identical hardware or restore factory setting (parameter = factory setting).
80	RAM test	Immediate disconnection	0	"RAM test" error	Internal unit fault, RAM defective.	Consult SEW Service.
81	Start condition	Immediate disconnection	0	Start condition error with VFC hoist	**Only in "VFC hoist" operating mode:** The motor could not be supplied with the correct amount of current during the pre-magnetizing time: • Rated motor power too small in relation to rated inverter power. • Motor cable cross section too small. **Only for operation with a linear motor (as of firmware 18):** • The drive has been set to "Enable" although the commutation offset between linear motor and linear encoder is not known. This means that the inverter cannot set the current indicator correctly.	• Check startup data and perform new startup, if necessary. • Check connection between inverter and motor. • Check cross section of motor cable and increase if necessary. • Perform commutation travel in the "No enable" state and then switch to "Enable" once the inverter has acknowledged in status word bit 25 that commutation was successful.
82	Open output	Immediate disconnection	0	Output open with VFC hoist	**Only in "VFC hoist" operating mode:** • Two or all output phases interrupted. • Rated motor power too small in relation to rated inverter power.	• Check connection between inverter and motor. • Check startup data and perform new startup, if necessary.
84	Motor protection	Emergency stop (P)	0	"Motor temperature simulation" error	• Motor utilization too high. • I_N-U_L monitoring 1 triggered • P530 set later to "KTY"	• Reduce load. • Extend ramps. • Observe longer pause times. • Check P345/346 • Select a larger motor
			2	Wire breakage Temperature sensor		
			3	No thermal motor model available		
			4	UL monitoring error		
			11	Temperature sensor short circuit		
86	Memory module	Immediate disconnection	0	Error in connection with memory module	• No memory card • Memory card defective	• Tighten knurled screw • Insert and secure memory card • Replace memory card • Load delivery status and parameter set
			2	Hardware card detection wrong memory card		
87	Technology function	Immediate disconnection	0	Technology function selected with standard unit	A technology function was activated in a standard version.	Disable technology function

Error			Suberror			
Code	**Designation**	**Response (P)**	**Code**	**Designation**	**Possible cause**	**Measure**
88	Flying start	Immediate disconnection	0	"Flying start" error	**Only in VFC n-CTRL operating mode:** Actual speed > 6000 rpm with the inverter enabled.	Inverter not enabled before actual speed is ≤ 6000 rpm.
92	DIP encoder problem	Error display (P)	1	Stahl WCS3 dirt problem	Encoder signals a fault	Possible cause: Encoder is dirty → clean encoder
93	DIP encoder error	Emergency stop (P)	0	Fault "Absolute encoder"	The encoder signals an error, e.g. power failure. • Connection cable between the encoder and DIP11B does not meet the requirements (twisted pair, shielded). • Cycle frequency for cable length too high. • Permitted max. speed/acceleration of encoder exceeded. • Encoder defective.	• Check absolute encoder connection. • Check connection cables. • Set correct cycle frequency. • Reduce maximum traveling velocity or ramp. • Replace the absolute encoder.
94	EEPROM checksum	Immediate shut-off	0	Power section parameters	Inverter electronics disrupted, possibly due to effect of EMC or a defect.	Send unit in for repair.
			5	Control unit data		
			6	Power section data		
			7	Invalid version of the configuration data set		
95	DIP plausibility error	Emergency stop (P)	0	Validity check of absolute position	No plausible position could be determined. • Incorrect encoder type set. • IPOS$^{plus®}$ travel parameter set incorrectly. • Numerator/denominator factor set incorrectly. • Zero adjustment performed. • Encoder defective.	• Set the correct encoder type. • Check IPOS$^{plus®}$ travel parameters. • Check traveling velocity. • Correct numerator/denominator factor. • After zero adjustment reset. • Replace the absolute encoder.
97	Copy error	Immediate disconnection	0	Parameter set upload is/was faulty	• Memory card cannot be written or read. • Error during data transmission	• Repeat copying process • Restore default setting (P802) and repeat copying process
			1	Download of parameter set to unit cancelled.		
			2	Not possible to adopt parameters. Not possible to adopt parameters from memory card.		
98	CRC error	Immediate disconnection	0	"CRC via internal flash" error	Internal unit error Flash memory defective	Send unit in for repair.
99	IPOS ramp calculation	Immediate disconnection	0	"Ramp calculation" error	**Only in IPOS$^{plus®}$ operating mode:** Positioning ramp is sinusoidal or square and an attempt is made to change ramp times and traveling velocities with enabled inverter.	Rewrite the IPOS$^{plus®}$ program so that ramp times and traveling velocities can only be altered when the inverter is inhibited.
100	Vibration warning	Display error (P)	0	Vibrations diagnostics warning	Vibration sensor warning (→ "DUV10A" operating instructions).	Determine cause of vibrations. Continue operation until F101 occurs.
101	Vibration error	Rapid stop (P)	0	Vibration diagnostics error	Vibration sensor reports error.	SEW-EURODRIVE recommends that you remedy the cause of the vibrations immediately
102	Oil aging warning	Display error (P)	0	Oil aging warning	Error message from the oil aging sensor	Schedule oil change.
103	Oil aging error	Display error (P)	0	Oil aging error	Error message from the oil aging sensor	SEW-EURODRIVE recommends that you change the gear unit oil immediately.

Error			Suberror			
Code	**Designation**	**Response (P)**	**Code**	**Designation**	**Possible cause**	**Measure**
104	Oil aging over-temperature	Display error (P)	0	Oil aging overtemperature	Overtemperature signal from the oil aging sensor	• Let oil cool down • Check if the gear unit cools properly
105	Oil aging ready signal	Display error (P)	0	Oil aging ready signal	Oil aging sensor is not ready for operation	• Check voltage supply of oil aging sensor • Check and, if necessary, replace the oil aging sensor
106	Brake wear	Display error (P)	0	Brake wear error	Brake lining worn	Replace brake lining (→ "Motors" operating instructions).
107	Line components	Immediate disconnection	1	For regeneration only: No feedback signal from main contactor.	Defective main contactor	• Check main contactor • Check control cables.
108	DCS error	Immediate stop/malfunction (P)	0	DCS error		
			1	Error during transfer of configuration data to the monitoring unit.	Interruption in connection during program download	Send the configuration files again
			2	Configuration data for software version of the subassembly is invalid.	Subassembly configured with incorrect software version of the programming interface.	Configure subassembly with permitted version of the programming interface. Then switch subassembly off and on again.
			3	Unit was programmed with incorrect programming interface.	Program or configuration data was loaded into the unit with an incorrect programming interface.	Check the design of the subassembly. Configure again with a valid programming interface. Then switch the unit off and on again.
			4	Faulty reference voltage.	• Supply voltage of the subassembly is defective. • Faulty component in the subassembly	• Check supply voltage • Switch unit off and on again
			5			
			6	Faulty system voltage.		
			7			
			8	Faulty test voltage		
			9			
			10	Faulty DC 24 V voltage supply		
			11	Ambient temperature of the unit is not in the defined range.	Temperature at the place of operation is not in the permitted range.	Check the ambient temperature.
			12	Plausibility error for position changeover	For the position changeover, ZSC, JSS or DMC is permanently activated.	• Check ZSC activation • Check JSS activation • Check DMC activation (only for monitoring via position)
			13	Faulty switching of the LOSIDE driver DO02_P / DO02_M	Short circuit of the output.	Check wiring at the output.
			14	Faulty switching of the HISIDE driver DO02_P / DO02_M		
			15	Faulty switching of the LOSIDE driver DO0_M		
			16	Faulty switching of the HISIDE driver DO0_P		
			17	Faulty switching of the LOSIDE driver DO01_M		
			18	Faulty switching of the HISIDE driver DO01_P		

Error			Suberror			
Code	**Designation**	**Response (P)**	**Code**	**Designation**	**Possible cause**	**Measure**
109	DCS alarm	Rapid stop/ warning (P)	0	DCS alarm		
			1	Communication error at the CAN interface of the inverter	The DCS21B/31B option does not receive any valid data from the inverter.	• Check hardware connection to the inverter • Check version of the inverter
			2	Plausibility error digital input at pulse P1	No pulse1 voltage present at binary input DI1	• Check configuration of the DI1 digital input according to configuration and wiring diagram • Check wiring
			3			
			4	Plausibility error digital input at pulse P2		• Check configuration of the DI2 binary input according to configuration and wiring diagram • Check wiring
			5			
			6	Pulse 1 plausibility error at binary input DI3		• Check configuration of the DI3 binary input according to configuration and wiring diagram • Check wiring
			7			
			8	Pulse 1 plausibility error at binary input DI4		• Check configuration of the DI4 binary input according to configuration and wiring diagram • Check wiring
			9			
			10	Pulse 1 plausibility error at binary input DI5		• Check configuration of the DI5 binary input according to configuration and wiring diagram • Check wiring
			11			
			12	Pulse 1 plausibility error at binary input DI6		• Check configuration of the DI6 binary input according to configuration and wiring diagram • Check wiring
			13			
			14	Pulse 1 plausibility error at binary input DI7		• Check configuration of the DI7 binary input according to configuration and wiring diagram • Check wiring
			15			
			16	Pulse 1 plausibility error at binary input DI8		• Check configuration of the DI8 binary input according to configuration and wiring diagram • Check wiring
			17			

Error			Suberror			
Code	Designation	Response (P)	Code	Designation	Possible cause	Measure
109	DCS alarm	Rapid stop/ warning (P)	18 19	Pulse 2 plausibility error at binary input DI1	No pulse 2 voltage present at binary input DI1.	• Check configuration of the DI1 digital input according to configuration and wiring diagram • Check wiring
			20 21	Pulse 2 plausibility error at binary input DI2		• Check configuration of the DI2 binary input according to configuration and wiring diagram • Check wiring
			22 23	Pulse 2 plausibility error at binary input DI3		• Check configuration of the DI3 binary input according to configuration and wiring diagram • Check wiring
			24 25	Pulse 2 plausibility error at binary input DI4		• Check configuration of the DI4 binary input according to configuration and wiring diagram • Check wiring
			26 27	Pulse 2 plausibility error at binary input DI5		• Check configuration of the DI5 binary input according to configuration and wiring diagram • Check wiring
			28 29	Pulse 2 plausibility error at binary input DI6		• Check configuration of the DI6 binary input according to configuration and wiring diagram • Check wiring
			30 31	Pulse 2 plausibility error at binary input DI7		• Check configuration of the DI7 binary input according to configuration and wiring diagram • Check wiring
			32 33	Pulse 2 plausibility error at binary input DI8		• Check configuration of the DI8 binary input according to configuration and wiring diagram • Check wiring
			34 35	Plausibility error in the speed recording	The difference between the two speed sensors is higher than the configured speed cut-off thresh-old.	• Check track again with the data of the encoder config-uration. • Check the velocity sensor • Use the SCOPE function to set speed signals so that they are congruent
			36 37	Plausibility error in the position acquisition	The difference between the two position sensors is higher than the configured value.	• Check track with the con-figured data of the encoder setting • Check position signal • Are all signals connected correctly to the 9-pin encoder connector? • Check the encoder con-nector for correct wiring. Is the jumper between pin 1 and pin 2 on the 9-pin encoder connector closed (SSI absolute encoder)? • Use the SCOPE function to set positions signals so that they are congruent

Error			Suberror			
Code	**Designation**	**Response (P)**	**Code**	**Designation**	**Possible cause**	**Measure**
109	DCS alarm	Rapid stop/ warning (P)	38 39	Plausibility error incorrect position range	The current position is outside the configured range.	• Check track with the configured data of the encoder setting • Check position signal, correct offset if necessary • Use the SCOPE function to read off the position and set in ratio to the configured values
			40 41	Plausibility error incorrect speed.	The current speed exceeds the configured maximum speed.	• The drive moves outside the permitted and configured speed range • Check configuration (max. velocity set) • Analyze the speed development using the SCOPE function
			42 43	Configuration error: Acceleration	The current acceleration is outside the configured acceleration range.	• Check encoder type and configuration (SSI/incremental) • Check the encoder connection/wiring • Check polarity of the encoder data • Check function of the encoder
			44 45	Plausibility error in encoder interface (A3401 = encoder 1 and A3402 = encoder 2).	The wiring of the encoder does not correspond to the configured data.	• Check encoder type and configuration (SSI/incremental) • Check the encoder connection/wiring • Check polarity of the encoder data • Check function of the encoder
			46 47	Encoder supply voltage error (A3403 = encoder 1 and A3404 = encoder 2)	Encoder voltage supply is outside the defined range (min. DC 20 V / max. DC 29 V).	• Overload in the supply voltage of the encoder; internal fuse has triggered • Check supply voltage of the DCS21B/31B option
			48 49	Reference voltage error	The reference voltage input of the encoder system is outside the defined range.	Check reference voltage input of the encoder system.
			50 51	Difference level RS485 driver 1 (error INC_B or SSI_CLK) faulty	No encoder connection, incorrect encoder type.	Check the encoder connection.
			52 53	Difference level RS485 driver 2 (error INC_A or SSI_DATA) faulty.		
			54 55	Incremental counter deviation		
			56 57	Plausibility error in encoder interface (A3401 = encoder 1 and A3402 = encoder 2)	The wiring of the encoder does not correspond to the configured data.	• Check encoder type and configuration (SSI/incremental) • Check the encoder connection/wiring • Check polarity of the encoder data • Check function of the encoder

Error			Suberror			
Code	**Designation**	**Response (P)**	**Code**	**Designation**	**Possible cause**	**Measure**
109	DCS alarm	Rapid stop/ warning (P)	58 59	Plausibility error SIN/COS encoder connection.	Incorrect encoder type connected.	• Check encoder connection • Check the encoder connection (jumper between pin 1 and pin2)
			60 61	Plausibility error SSI encoder connection		
			62 63		Phase error of the incremental or sin/cos encoder.	• Check encoder connection • Replace the defective encoder
			64 65	Plausibility error - SSI encoder connection.	Connected encoder type does not correspond to the configuration.	• Check encoder connection • Check connected encoder
			66 67	Plausibility error - SSI listener encoder connection		
			68	Faulty switching of the LOSIDE driver DO2_M	DC 0 V short circuit at the output.	Check wiring at the output.
			69	Faulty switching of the HISIDE driver DO2_P		
			70	Faulty switching of the LOSIDE driver DO0_M		
			71	Faulty switching of the HISIDE driver DO0_P		
			72	Faulty switching of the LOSIDE driver DO1_M		
			73	Faulty switching of the HISIDE driver DO1_P		
			74	Undervoltage test watchdog for LOSIDE driver	DC 0 V short circuit at on of the DC 0 V outputs.	Check wiring at the outputs.
			75	Undervoltage test watchdog for HISIDE driver	DC 24 V short circuit at on of the DC 24 V outputs.	
			76 77	CCW and CW monitoring (in DMC module) activated simultaneously	Multiple activation.	Only one direction of rotation can be activated in the DMC module.
			78 79	CCW and CW monitoring range of the OLC activated simultaneously		
			80 81	CCW and CW monitoring (in JSS module) was activated simultaneously		
			82	Timeout error MET.	Input element with time monitoring is faulty.	• Check wiring of input element • Input element faulty
			83	Time monitoring start signal for confirmation button.		
			84	Timeout error MEZ.	Two-hand operation with time monitoring is faulty.	
			85	Time monitoring for two-hand button.		
			86 87	EMU1 monitoring error	Faulty monitoring of the external disconnection channel	• Check hardware connections • Pick-up or release time too short • Check switching contacts
			88 89	EMU2 monitoring error		
110	"Ex-e protection" error	Emergency stop	0	Duration of operation below 5 Hz exceeded	Duration of operation below 5 Hz exceeded	• Check configuration • Shorten duration of operation below 5 Hz
113	Analog input open circuit	No response (P)	0	AI1 analog input open circuit	AI1 analog input open circuit	Check wiring
116	"Timeout MOVI-PLC" error	Rapid stop/ warning	0	MOVI-PLC® communication timeout		• Check startup • Check wiring

<table>
<tr><th colspan="3">Error</th><th colspan="2">Suberror</th><th rowspan="2">Possible cause</th><th rowspan="2">Measure</th></tr>
<tr><th>Code</th><th>Designation</th><th>Response (P)</th><th>Code</th><th>Designation</th></tr>
<tr><td rowspan="38">122</td><td rowspan="38">"Absolute encoder option"</td><td rowspan="38">Immediate disconnection</td><td>2</td><td>X15: Unknown encoder type</td><td rowspan="2">Connected encoder type unknown</td><td rowspan="2">Replace the encoder</td></tr>
<tr><td>16386</td><td>X14: Unknown encoder type</td></tr>
<tr><td>1</td><td>X15: Plausibility check</td><td rowspan="26">• Encoder cable or shield not connected correctly
• Short circuit/broken encoder wire
• Encoder defective
• EMC interference</td><td rowspan="26">• Check encoder cable and shield for correct connection, short circuit and broken wire.
• Replace the encoder
• Providing for EMC measures</td></tr>
<tr><td>33</td><td>X15: Analog voltages not within tolerance</td></tr>
<tr><td>41 – 45</td><td>X15: RS485 communication</td></tr>
<tr><td>60</td><td>X15: Analog voltages not within tolerance</td></tr>
<tr><td>63</td><td>X15: Position error, excessive speed, unable to generate position</td></tr>
<tr><td>256</td><td>X15: Voltage dip</td></tr>
<tr><td>257</td><td>X15: Clocking or data line interrupted</td></tr>
<tr><td>258</td><td>X15: Change of position</td></tr>
<tr><td>261</td><td>X15: No high level present</td></tr>
<tr><td>513</td><td>X15: Plausibility check</td></tr>
<tr><td>768</td><td>X15: PDO timeout</td></tr>
<tr><td>770</td><td>X15: Change of position</td></tr>
<tr><td>16385</td><td>X14: Plausibility check.</td></tr>
<tr><td>16417</td><td>X14: Analog voltages not within tolerance</td></tr>
<tr><td>16444</td><td>X14: Analog voltages not within tolerance</td></tr>
<tr><td>16447</td><td>X14: Position error, excessive speed, unable to generate position</td></tr>
<tr><td>16425 – 16429</td><td>X14: RS485 communication</td></tr>
<tr><td>16640</td><td>X14: Voltage dip</td></tr>
<tr><td>16641</td><td>X14: Clocking or data line interrupted</td></tr>
<tr><td>16642</td><td>X14: Change of position</td></tr>
<tr><td>16645</td><td>X14: No high level present</td></tr>
<tr><td>16897</td><td>X14: Plausibility check</td></tr>
<tr><td>17152</td><td>X14: PDO timeout</td></tr>
<tr><td>17154</td><td>X14: Change of position</td></tr>
<tr><td>34 – 40</td><td>X15: Internal encoder error</td><td rowspan="10">Internal encoder error</td><td rowspan="10">Replace the encoder</td></tr>
<tr><td>46 – 50</td><td>X15: Internal encoder error</td></tr>
<tr><td>64 – 67</td><td>X15: Internal encoder error</td></tr>
<tr><td>514 – 544</td><td>X15: Internal encoder error</td></tr>
<tr><td>772 – 774</td><td>X15: Internal encoder error</td></tr>
<tr><td>16418 – 16424</td><td>X14: Internal encoder error</td></tr>
<tr><td>16430 – 16434</td><td>X14: Internal encoder error</td></tr>
<tr><td>16448 – 16451</td><td>X14: Internal encoder error</td></tr>
<tr><td>16898 – 16928</td><td>X14: Internal encoder error</td></tr>
<tr><td>17156 – 17158</td><td>X14:Internal encoder error</td></tr>
</table>

Error			Suberror			
Code	**Designation**	**Response (P)**	**Code**	**Designation**	**Possible cause**	**Measure**
122	"Absolute encoder option"	Immediate disconnection	61	X15: Critical transmitter current	Soiled, transmitter broken	Replace the encoder
			16445	X14: Critical transmitter current		
			62	X15: Critical encoder temperature	Encoder temperature too high	Reduce motor and ambient temperature
			16446	X14: Critical encoder temperature		
			259	X15: Insufficient clock frequency	Incorrect encoder parameterization	Check encoder parameterization
			260	X15: Encoder signals programmable error		
			576	X15: Internal encoder warning		
			769	X15: Encoder signals programmable error		
			16643	X14: Insufficient clock frequency		
			16644	X14: Encoder signals programmable error		
			16960	X14: Internal encoder warning		
			17153	X14: Encoder signals programmable error		
			771	X15: Emergency signal		
			17155	X14: Emergency signal		
123	Positioning interruption	Emergency stop (P)	0	Error "Positioning/Positioning interruption"	Target monitoring when interrupted positioning process is resumed. Target would be overrun.	Perform positioning process without interruption until it is complete.
124	Ambient conditions	Emergency stop (P)	1	Permitted ambient temperature exceeded	Ambient temperature > 60°C	• Improve ventilation and cooling conditions • Improve air supply to the control cabinet; check filter mats.

Error			Suberror			
Code	**Designation**	**Response (P)**	**Code**	**Designation**	**Possible cause**	**Measure**
196	Power section	Immediate disconnection	1	Discharge resistor	Discharge resistor overload	Observe waiting time for power on/off
			2	Hardware ID precharge/ discharge control	Incorrect precharge/discharge control variant	• Consult SEW Service • Replace precharge/discharge control
			3	Inverter coupling PLD Live	Defective inverter coupling	• Consult SEW Service • Replace inverter coupling
			4	Inverter coupling reference voltage	Defective inverter coupling	• Consult SEW Service • Replace inverter coupling
			5	Power section configuration	Different phase modules installed in the unit	• Inform SEW service. • Check and replace phase modules
			6	Control unit configuration	Control unit line inverter or motor inverter incorrect	Replace or correctly assign the control unit of line and motor inverter.
			7	Communication power section control unit	No communication	Check control unit installation.
			8	Communication precharge/discharge control inverter coupling	No communication	• Check wiring • Consult SEW Service
			10	Communication power section control unit	The inverter coupling does not support protocol	Replace inverter coupling
			11	Communication power section control unit	Faulty communication with inverter coupling at power-up (CRC error).	Replace inverter coupling
			12	Communication power section control unit	Inverter coupling uses protocol that does not match control unit	Replace inverter coupling
			13	Communication power section control unit	Faulty communication with inverter coupling during operation: More than once per second a CRC error.	Replace inverter coupling
			14	Control unit configuration	Missing PLD functionality for EEPROM data set size 7.	Replace control unit
			15	Inverter coupling error	Inverter coupling processor has signaled internal error.	• Consult SEW service if the error reoccurs • Replace inverter coupling
			16	Inverter coupling error: PLD version incompatible		Replace inverter coupling
			17	Precharge/discharge control error	Precharge/discharge control processor has signaled internal error	• Consult SEW service if the error reoccurs • Replace precharge/discharge control

Error			Suberror			
Code	**Designation**	**Response (P)**	**Code**	**Designation**	**Possible cause**	**Measure**
			18	Defective DC link fan	The DC link fan is faulty.	• Consult SEW Service • Check whether DC link choke fan is connected or faulty
			19	Communication power section control unit	Faulty communication with inverter coupling during operation: More than once per second an internal error.	• Consult SEW Service if the error reoccurs. • Replace inverter coupling
			20	Communication power section control unit	The control unit has not sent any messages to the inverter coupling for a while.	• Consult SEW Service if the error reoccurs. • Replace inverter coupling
			21	Uz measurement implausible phase R	Defective phase module	Consult SEW service if the error reoccurs
			22	Uz measurement implausible phase S		
			23	Uz measurement implausible phase T		
197	Power supply	Immediate disconnection	1	Line overvoltage (motor inverter only at start of precharging process)	Inadequate line voltage quality.	• Check supply (fuses, contactor) • Check configuration of the supply system
			2	Line undervoltage (only with line inverter)		
199	DC link charging	Immediate disconnection	4	Precharging was aborted	Unable to charge DC link.	• Precontrol overload • Connected DC link capacity too high • Short circuit in the DC link; check DC link connection in case of several units.

16.3 SEW Electronics Service

16.3.1 Send in for repair

Please contact the **SEW-EURODRIVE electronics service if an error 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.

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, connection ⅄ or △)
- Nature of the fault
- Accompanying circumstances
- Your own presumptions as to what has happened
- Any unusual events preceding the problem, etc.

16.4 Extended storage

If the unit is stored for a long time, connect it to the supply system 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 de-energized. 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 line voltage slowly up to the maximum voltage. This can be done, for example, by using a variable transformer for which the output voltage has been set according to the following overview.

The following stages are recommended:

AC 400/500 V units:

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

16.5 Disposal

Please follow the current instructions. Dispose in accordance with the material structure and the regulations in force for instance as:

- Electronics scrap (circuit boards)
- Plastic (housing)
- Sheet metal
- copper

17 Address Directory

Germany			
Headquarters **Production** **Sales**	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal P.O. Box Postfach 3023 • D-76642 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-1970 http://www.sew-eurodrive.de sew@sew-eurodrive.de
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Germany			
	Dresden	SEW-EURODRIVE GmbH & Co KG Hauptstraße 32 D-01445 Radebeul	Tel. +49 351 26338-0 Fax +49 351 26338-38 tb-dresden@sew-eurodrive.de
	Erfurt	SEW-EURODRIVE GmbH & Co KG Dubliner Straße 12 D-99091 Erfurt	Tel. +49 361 21709-70 Fax +49 361 21709-79 tb-erfurt@sew-eurodrive.de
	Güstrow	SEW-EURODRIVE GmbH & Co KG Am Gewerbegrund 3 D-18273 Güstrow P.O. Box Postfach 1216 • D-18262 Güstrow	Tel. +49 3843 8557-80 Fax +49 3843 8557-88 tb-guestrow@sew-eurodrive.de
	Hamburg	SEW-EURODRIVE GmbH & Co KG Bramfelder Straße 119 D-22305 Hamburg	Tel. +49 40 298109-60 Fax +49 40 298109-70 tb-hamburg@sew-eurodrive.de
	Hannover/Garb-sen	SEW-EURODRIVE GmbH & Co KG Alte Ricklinger Str.40-42 D-30823 Garbsen P.O. Box Postfach 1104 53 • D-30804 Garbsen	Tel. +49 5137 8798-10 Fax +49 5137 8798-50 tb-hannover@sew-eurodrive.de
	Heilbronn	SEW-EURODRIVE GmbH & Co KG Zeppelinstraße 7 D-74357 Bönnigheim	Tel. +49 7143 8738-0 Fax +49 7143 8738-25 tb-heilbronn@sew-eurodrive.de
	Herford	SEW-EURODRIVE GmbH & Co KG Radewiger Straße 21 D-32052 Herford P.O. Box Postfach 4108 • D-32025 Herford	Tel. +49 5221 9141-0 Fax +49 5221 9141-20 tb-herford@sew-eurodrive.de
	Karlsruhe	SEW-EURODRIVE GmbH & Co KG Ettlinger Weg 2 D-76467 Bietigheim P.O. Box Postfach 43 • D-76463 Bietigheim	Tel. +49 7245 9190-10 Fax +49 7245 9190-20 tb-karlsruhe@sew-eurodrive.de
	Kassel	SEW-EURODRIVE GmbH & Co KG Lange Straße 14 D-34253 Lohfelden	Tel. +49 561 95144-80 Fax +49 561 95144-90 tb-kassel@sew-eurodrive.de
	Koblenz	SEW-EURODRIVE GmbH & Co KG Bahnstraße 17a D-56743 Mendig	Tel. +49 2652 9713-30 Fax +49 2652 9713-40 tb-koblenz@sew-eurodrive.de
	Lahr	SEW-EURODRIVE GmbH & Co KG Europastraße 3/1 D-77933 Lahr / Schwarzwald	Tel. +49 7821 90999-60 Fax +49 7821 90999-79 tb-lahr@sew-eurodrive.de
	Langenfeld	SEW-EURODRIVE GmbH & Co KG Siemensstraße 1 D-40764 Langenfeld	Tel. +49 2173 8507-10 Fax +49 2173 8507-50 tb-langenfeld@sew-eurodrive.de
	Magdeburg	SEW-EURODRIVE GmbH & Co KG Breiteweg 53 D-39179 Barleben	Tel. +49 39203 7577-1 Fax +49 39203 7577-9 tb-magdeburg@sew-eurodrive.de
	Mannheim	SEW-EURODRIVE GmbH & Co KG Besselstraße 26 D-68219 Mannheim	Tel. +49 621 71683-10 Fax +49 621 71683-22 tb-mannheim@sew-eurodrive.de
	München	SEW-EURODRIVE GmbH & Co KG Domagkstraße 5 D-85551 Kirchheim	Tel. +49 89 90955-110 Fax +49 89 90955-150 tb-muenchen@sew-eurodrive.de
	Münster	SEW-EURODRIVE GmbH & Co KG Hafenplatz 4 D-48155 Münster	Tel. +49 251 41475-11 Fax +49 251 41475-50 tb-muenster@sew-eurodrive.de

Germany			
	Nürnberg	SEW-EURODRIVE GmbH & Co KG Plattenäckerweg 6 D-90455 Nürnberg	Tel. +49 911 98884-50 Fax +49 911 98884-60 tb-nuernberg@sew-eurodrive.de
	Regensburg	SEW-EURODRIVE GmbH & Co KG Im Gewerbepark A15 D-93059 Regensburg	Tel. +49 941 46668-68 Fax +49 941 46668-66 tb-regensburg@sew-eurodrive.de
	Rhein-Main	SEW-EURODRIVE GmbH & Co KG Niederstedter Weg 5 D-61348 Bad Homburg	Tel. +49 6172 9617-0 Fax +49 6172 9617-50 tb-rheinmain@sew-eurodrive.de
	Stuttgart	SEW-EURODRIVE GmbH & Co KG Friedrich-List-Straße 46 D-70771 Leinfelden-Echterdingen	Tel. +49 711 16072-0 Fax +49 711 16072-72 tb-stuttgart@sew-eurodrive.de
	Ulm	SEW-EURODRIVE GmbH & Co KG Dieselstraße 14 D-89160 Dornstadt	Tel. +49 7348 9885-0 Fax +49 7348 9885-90 tb-ulm@sew-eurodrive.de
	Würzburg	SEW-EURODRIVE GmbH & Co KG Nürnbergerstraße 118 D-97076 Würzburg-Lengfeld	Tel. +49 931 27886-60 Fax +49 931 27886-66 tb-wuerzburg@sew-eurodrive.de
	Zwickau / Meerane	SEW-EURODRIVE GmbH & Co KG Dänkritzer Weg1 D-08393 Meerane	Tel. +49 3764 7606-0 Fax +49 3764 7606-20 tb-zwickau@sew-eurodrive.de

France			
Production **Sales** **Service**	**Haguenau**	SEW-USOCOME 48-54 route de Soufflenheim B. P. 20185 F-67506 Haguenau Cedex	Tel. +33 3 88 73 67 00 Fax +33 3 88 73 66 00 http://www.usocome.com sew@usocome.com
Production	**Forbach**	SEW-USOCOME Zone industrielle Technopôle Forbach Sud B. P. 30269 F-57604 Forbach Cedex	Tel. +33 3 87 29 38 00
Assembly **Sales** **Service**	**Bordeaux**	SEW-USOCOME Parc d'activités de Magellan 62 avenue de Magellan - B. P. 182 F-33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09
	Lyon	SEW-USOCOME Parc d'affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15
	Nantes	SEW-USOCOME Parc d’activités de la forêt 4 rue des Fontenelles F-44140 Le Bignon	Tel. +33 2 40 78 42 00 Fax +33 2 40 78 42 20
	Paris	SEW-USOCOME Zone industrielle 2 rue Denis Papin F-77390 Verneuil I'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
Technical Offices	**Alsace**	SEW-USOCOME 1 rue Auguste Gasser F-68360 Soultz	Tel. +33 3 89 74 51 62 Fax +33 3 89 76 58 71
	Aquitaine / Charentes	SEW-USOCOME Parc d'activités de Magellan 62 avenue de Magellan B. P. 182 F-33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09

France			
	Auvergne / Limousin	SEW-USOCOME Farges F-19600 Chasteaux	Tel. +33 5 55 20 12 10 Fax +33 5 55 20 12 11
	Lower Normandy	SEW-USOCOME 5 rue de la Limare F-14250 Brouay	Tel. +33 2 31 37 92 86 Fax +33 2 31 74 68 15
	Bourgogne	SEW-USOCOME 10 rue de la poste F-71350 Saint Loup Géanges	Tel. +33 3 85 49 92 18 Fax +33 3 85 49 92 19
	Brittany	SEW-USOCOME Parc d’activités de la forêt 4 rue des Fontenelles F-44140 Le Bignon	Tel. +33 2 28 21 12 52 Fax +33 2 28 21 12 84
	Centre / Poitou	SEW-USOCOME Parc d’activités de la forêt 4 rue des Fontenelles F-44140 Le Bignon	Tel. +33 2 40 78 42 11 Fax +33 2 40 78 42 20
	Champagne-Ardenne	SEW-USOCOME Impasse des Ouises F-10120 Saint André les Vergers	Tel. +33 3 25 79 63 24 Fax +33 3 25 79 63 25
	Franche-Comté	SEW-USOCOME 5 route de Besançon Maison B F-25870 Devecey	Tel. +33 3 81 60 20 47 Fax +33 3 81 87 75 93
	Île-de-France East / Aisne	SEW-USOCOME 45 rue des Cinelles F-77700 Bailly Romainvilliers	Tel. +33 1 64 17 02 47 Fax +33 1 64 17 66 49
	Île-de-France North / Picardy	SEW-USOCOME 25bis rue Kléber F-92300 Levallois Perret	Tel. +33 1 41 05 92 74 Fax +33 1 41 05 92 75
	Île-de-France South	SEW-USOCOME 6 chemin des bergers Lieu-dit Marchais F-91410 Roinville sous Dourdan	Tel. +33 1 60 81 10 56 Fax +33 1 60 81 10 57
	Lorraine / Alsace North	SEW-USOCOME 1 rue de la forêt F-54250 Champigneulles	Tel. +33 3 83 96 28 04 Fax +33 3 83 96 28 07
	Midi-Pyrénées / Roussillon	SEW-USOCOME 179 route de Grazac F-31190 Caujac	Tel. +33 5 61 08 15 85 Fax +33 5 61 08 16 44
	Nord-Pas-de-Calais	SEW-USOCOME 209 route d’Hesdigneul F-62360 Hesdin l’Abbé	Tel. +33 3 21 10 86 86 Fax +33 3 21 10 86 87
	Paris / Île-de-France West	SEW-USOCOME 42 avenue Jean Jaurès F-78580 Maule	Tel. +33 1 30 90 89 86 Fax +33 1 30 90 93 15
	Pays de la Loire	SEW-USOCOME Parc d’activités de la forêt 4 rue des Fontenelles F-44140 Le Bignon	Tel. +33 2 51 70 54 04 Fax +33 2 51 70 54 05
	Provence-Alpes-Côte d’Azur	SEW-USOCOME Résidence Les Hespérides Bât. B2 67 boulevard des Alpes F-13012 Marseille	Tel. +33 4 91 18 00 11 Fax +33 4 91 18 00 12

France			
	Rhône-Alpes East	SEW-USOCOME Montée de la Garenne F-26750 Génissieux	Tel. +33 4 75 05 65 95 Fax +33 4 75 05 65 96
	Rhône-Alpes North	SEW-USOCOME Parc d'affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 03 Fax +33 4 72 15 37 15
	Rhône-Alpes West	SEW-USOCOME Parc d'affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 04 Fax +33 4 72 15 37 15

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

Argentina			
Assembly **Sales** **Service**	**Buenos Aires**	SEW EURODRIVE ARGENTINA S.A. Centro Industrial Garin, Lote 35 Ruta Panamericana Km 37,5 1619 Garin	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 sewar@sew-eurodrive.com.ar http://www.sew-eurodrive.com.ar

Australia			
Assembly **Sales** **Service**	**Melbourne**	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au
Sales **Service**	**Adelaide**	SEW-EURODRIVE PTY. LTD. 9C Park Way Mawson Lakes, SA 5095	Tel. +61 8 8161 4000 Fax +61 8 8161 4002 enquires@sew-eurodrive.com.au
	Brisbane	SEW-EURODRIVE PTY.LTD. 1 /34 Collinsvale St Rocklea, Queensland, 4106	Tel. +61 7 3276 5100 Fax +61 7 3276 5102 enquires@sew-eurodrive.com.au
	Perth	SEW-EURODRIVE PTY. LTD. 10 Colin Jamieson Drive Welshpool, WA 6106	Tel. +61 8 9251-4900 Fax +61 8 9251-4903 enquires@sew-eurodrive.com.au
Technical Office	**Townsville**	SEW-EURODRIVE PTY. LTD. 12 Leyland Street Garbutt, QLD 4814	Tel. +61 7 4779 4333 Fax +61 7 4779 5333 enquires@sew-eurodrive.com.au

Austria			
Assembly **Sales** **Service**	**Wien**	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 A-1230 Wien	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://www.sew-eurodrive.at sew@sew-eurodrive.at
Technical Offices	**Linz**	SEW-EURODRIVE Ges.m.b.H. Reuchlinstr. 6/3 A-4020 Linz	Tel. +43 732 655 109-0 Fax +43 732 655 109-20 tb-linz@sew-eurodrive.at
	Graz	SEW-EURODRIVE Ges.m.b.H. Grabenstraße 231 A-8045 Graz	Tel. +43 316 685 756-0 Fax +43 316 685 755 tb-graz@sew-eurodrive.at

Austria			
	Dornbirn	SEW-EURODRIVE Ges.m.b.H. Lustenauerstraße 27/1 A-6850 Dornbirn	Tel. +43 5572 3725 99-0 Fax +43 5572 3725 99-20 tb-dornbirn@sew-eurodrive.at
Bangladesh			
Sales	**Dhaka**	Jainex Industrial and Engineering Ltd B 12 Apon Nibash East Nasirabad Bangladesh	Tel. +880 1713103502 Fax +880 31 613041 jainexbd@onlinectg.net
Belarus			
Sales	**Minsk**	SEW-EURODRIVE BY RybalkoStr. 26 BY-220033 Minsk	Tel.+375 17 298 47 56 / 298 47 58 Fax +375 17 298 47 54 http://www.sew.by sales@sew.by
Belgium			
Assembly **Sales** **Service**	**Brussels**	**SEW Caron-Vector** Research park Haasrode Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.be info@sew-eurodrive.be
Service Compe-tence Center	**Industrial Gears**	**SEW Caron-Vector** Rue de Parc Industriel, 31 BE-6900 Marche-en-Famenne	Tel. +32 84 219-878 Fax +32 84 219-879 http://www.sew-eurodrive.be service-wallonie@sew-eurodrive.be
	Antwerp	**SEW Caron-Vector** Glasstraat, 19 BE-2170 Merksem	Tel. +32 3 64 19 333 Fax +32 3 64 19 336 http://www.sew-eurodrive.be service-antwerpen@sew-eurodrive.be
Brazil			
Production **Sales** **Service**	**Sao Paulo**	SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaiolli, 152 - Rodovia Presidente Dutra Km 208 Guarulhos - 07251-250 - SP SAT - SEW ATENDE - 0800 7700496	Tel. +55 11 2489-9133 Fax +55 11 2480-3328 http://www.sew-eurodrive.com.br sew@sew.com.br
Bulgaria			
Sales	**Sofia**	BEVER-DRIVE GmbH Bogdanovetz Str.1 BG-1606 Sofia	Tel. +359 2 9151160 Fax +359 2 9151166 bever@mail.bg
Cameroon			
Sales	**Douala**	Electro-Services Rue Drouot Akwa B.P. 2024 Douala	Tel. +237 33 431137 Fax +237 33 431137 electrojemba@yahoo.fr
Canada			
Assembly **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, ON L6T 3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca l.watson@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. Tilbury Industrial Park 7188 Honeyman Street Delta, BC V4G 1G1	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca

Canada			
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Lasalle, PQ H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 a.peluso@sew-eurodrive.ca
	Additional addresses for service in Canada provided on request!		

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

China			
Production **Assembly** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25323273 info@sew-eurodrive.cn http://www.sew-eurodrive.com.cn
Assembly **Sales** **Service**	**Suzhou**	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew-eurodrive.cn
	Guangzhou	SEW-EURODRIVE (Guangzhou) Co., Ltd. No. 9, JunDa Road East Section of GETDD Guangzhou 510530	Tel. +86 20 82267890 Fax +86 20 82267922 guangzhou@sew-eurodrive.cn
	Shenyang	SEW-EURODRIVE (Shenyang) Co., Ltd. 10A-2, 6th Road Shenyang Economic Technological Development Area Shenyang, 110141	Tel. +86 24 25382538 Fax +86 24 25382580 shenyang@sew-eurodrive.cn
	Wuhan	SEW-EURODRIVE (Wuhan) Co., Ltd. 10A-2, 6th Road No. 59, the 4th Quanli Road, WEDA 430056 Wuhan	Tel. +86 27 84478388 Fax +86 27 84478389 wuhan@sew-eurodrive.cn
	Xi'An	SEW-EURODRIVE (Xi'An) Co., Ltd. No. 12 Jinye 2nd Road Xi'An High-Technology Industrial Development Zone Xi'An 710065	Tel. +86 29 68686262 Fax +86 29 68686311 xian@sew-eurodrive.cn

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

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

Czech Republic			
Sales	**Prague**	SEW-EURODRIVE CZ S.R.O. Business Centrum Praha Lužná 591 CZ-16000 Praha 6 - Vokovice	Tel. +420 255 709 601 Fax +420 220 121 237 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz

Czech Republic			
Technical Offices	**Brno**	SEW-EURODRIVE CZ S.R.O. Křenová 52 CZ -60200 Brno	Tel. +420 543 256 151 +420 543 256 163 Fax +420 543 256 845
	Hradec Králové	SEW-EURODRIVE CZ S.R.O. Čechova 498 CZ-50202 Hradec Králové	Tel. +420 495 510 141 Fax +420 495 521 313
	Plzeň	SEW-EURODRIVE CZ S.R.O. Areal KRPA a.s. Zahradni 173/2 CZ-32600 Plzeň	Tel. +420 378 775 300 Fax +420 377 970 710
	Ostrava	SEW-EURODRIVE CZ S.R.O. Studentská 6202/17 CZ-708 00 Ostrava-Poruba	Tel. +420 597 329 044 Mobile +420 724 889 965
	Klatovy	SEW-EURODRIVE CZ S.R.O. Technická kancelář Klatovy Domažlická 800 CZ-33901 Klatovy	Tel. +420 376 310 729 Fax +420 376 310 725

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

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

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

Finland			
Assembly **Sales** **Service**	**Lahti**	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi
Technical Offices	**Helsinki**	SEW-EURODRIVE OY Luutnantintie 5 FIN-00410 Helsinki	Tel. +358 201 589-300 Fax + 358 9 5666-311 sew@sew.fi
	Vaasa	SEW-EURODRIVE OY Hietasaarenkatu 18 FIN-65100 Vaasa	Tel. +358 201 589-300 Fax +358 6 3127-470 sew@sew.fi
	Rovaniemi	SEW-EURODRIVE OY Valtakatu 4 A FIN-96100 Rovaniemi	Tel. +358 201 589-300 Fax +358 201 589-239 sew@sew.fi
Production **Assembly**	**Karkkila**	SEW Industrial Gears Oy Valurinkatu 6, PL 8 FI-03600 Karkkila, 03601 Karkkila	Tel. +358 201 589-300 Fax +358 201 589-310 sew@sew.fi http://www.sew-eurodrive.fi

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

Great Britain			
Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate P.O. Box No.1 Normanton, West-Yorkshire WF6 1QR	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk
Technical Offices	**London**	SEW-EURODRIVE Ltd. 764 Finchely Road, Temple Fortune London N.W.11 7TH	Tel. +44 20 8458-8949 Fax +44 20 8458-7417
	Midlands	SEW-EURODRIVE Ltd. 5 Sugar Brook court, Aston Road, Bromsgrove, Worcs B60 3EX	Tel. +44 1527 877-319 Fax +44 1527 575-245
	Scotland	SEW-EURODRIVE Ltd. Scottish Office No 37 Enterprise House Springkerse Business Park Stirling FK7 7UF Scotland	Tel. +44 17 8647-8730 Fax +44 17 8645-0223

Greece			
Sales **Service**	**Athens**	Christ. Boznos & Son S.A. 12, K. Mavromichali Street P.O. Box 80136 GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr
Technical Office	**Thessaloniki**	Christ. Boznos & Son S.A. Asklipiou 26 562 24 Evosmos, Thessaloniki	Tel. +30 2 310 7054-00 Fax +30 2 310 7055-15 info@boznos.gr

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

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

Iceland			
Sales	**Reykjavik**	Vélaverk ehf. Bolholti 8, 3h. IS - 105 Reykjavik	Tel. +354 568 3536 Fax +354 568 3537 velaverk@velaverk.is

India			
Registered Office **Assembly** **Sales** **Service**	**Vadodara**	SEW-EURODRIVE India Private Limited Plot No. 4, GIDC POR Ramangamdi • Vadodara - 391 243 Gujarat	Tel. +91 265 3045200, +91 265 2831086 Fax +91 265 3045300, +91 265 2831087 http://www.seweurodriveindia.com sales@seweurodriveindia.com subodh.ladwa@seweurodriveindia.com
Assembly **Sales** **Service**	**Chennai**	SEW-EURODRIVE India Private Limited Plot No. K3/1, Sipcot Industrial Park Phase II Mambakkam Village Sriperumbudur - 602105 Kancheepuram Dist, Tamil Nadu	Tel. +91 44 37188888 Fax +91 44 37188811 c.v.shivkumar@seweurodriveindia.com
Technical Offices	**Ahmedabad**	SEW-EURODRIVE India Private Limited 306, Shaan office complex, Behind Sakar-IV, Ellisebridge, Ashram Road Ahmedabad – Gujarat	Tel. +91 79 40072067/68 Fax +91 79 40072069 subodh.ladwa@seweurodriveindia.com
	Bengaluru	SEW-EURODRIVE India Private Limited 308, Prestige Centre Point 7, Edward Road Bengaluru - 560052 - Karnataka	Tel. +91 80 22266565 Fax +91 80 22266569 salesbang@seweurodriveindia.com ganesh@seweurodriveindia.com
	Chennai	SEW-EURODRIVE India Private Limited 2nd Floor, Josmans Complex, No. 5, McNichols Road, Chetpet Chennai - 600031 - Tamil Nadu	Tel. +91 44 42849813 Fax +91 44 42849816 saleschen@seweurodriveindia.com c.v.shivkumar@seweurodriveindia.com
	Coimbatore	SEW-EURODRIVE India Private Limited Office No 60 Arpee Centre (Opp Annapoorna Hotel) 420 N, NSR Road, Saibaba Colony Coimbatore 641 0111 - Tamil Nadu	Tel. +91 422 2455420 Fax +91 422 2443988 salescmb@seweurodriveindia.com p.selvakumar@seweurodriveindia.com
	Cuttack	SEW-EURODRIVE India Private Limited Plot No.- 1764, Nuasahi, Nayapalli Bhubaneswar-12 Orissa	Tel. +91 9937446333 manoranjan.sahoo@seweurodriveindia.com
	Hyderabad	SEW-EURODRIVE India Private Limited 408, 4th Floor, Meridian Place Green Park Road Amerpeet Hyderabad - 500016 - Andhra Pradesh	Tel. +91 40 23414698 Fax +91 40 23413884 saleshyd@seweurodriveindia.com ma.choudary@seweurodriveindia.com
	Jamshedpur	SEW-EURODRIVE India Private Limited Flat No.: B/2, B.S. Apartment Road No.: 4, Contractor’s area, Bistupur Jamshedpur 831 001 - Chhattisgarh	Tel. +91 9934123671 siddaratha.mishra@seweurodriveindia.com
	Kolkata	SEW EURODRIVE India Private Limited 2nd floor, Room No. 35 Chowringhee Court 55, Chowringhee Road Kolkata - 700 071 - West Bengal	Tel. +91 33 22827457 Fax +91 33 22894204 saleskal@seweurodriveindia.com a.j.biswas@seweurodriveindia.com
	Lucknow	SEW-EURODRIVE India Private Limited 69, Shiv Vihar Colony Vikas Nagar-5 Lucknow 226022 - Uttar Pradesh	Tel. +91 9793627333 amit.nigam@seweurodriveindia.com
	Mumbai	SEW-EURODRIVE India Private Limited 312 A, 3rd Floor, Acme Plaza, J.B. Nagar, Andheri Kurla Road, Andheri (E) Mumbai - 400059 - Maharashtra	Tel. +91 22 28348440 Fax +91 22 28217858 salesmumbai@seweurodriveindia.com p.s.ray@seweurodriveindia.com

India			
	Nagpur	SEW-EURODRIVE India Private Limited Piyush S .Kudawale Ganga Residency, 204, Shahu Nagar, Manewada-Besa Road, Post- Mhalgi Nagar, Nagpur - 440034	Tel. +91 9561089525 piyush.kudawale@seweurodriveindia.com
	New Delhi	SEW-EURODRIVE India Private Limited 418-419, Suneja Tower-1 District Centre, Janak Puri New Delhi 110 058	Tel. +91 11 25544111 Fax +91 11 25544113 salesdelhi@seweurodriveindia.com vikram.juneja@seweurodriveindia.com
	Pune	SEW-EURODRIVE India Private Limited Lunawat Prism 4th floor, S. No. 148, Neena Co-Operative Housing Society, Paud Road, Pune 411038 - Maharashtra	Tel. +91 20 25380730 / 735 Fax +91 20 25380721 salespune@seweurodriveindia.com praveen.hosur@seweurodriveindia.com
	Raipur	SEW-EURODRIVE India Private Limited A-42, Ashoka Millenium Complex, Ring Road-1, Raipur 492 001 - Chhattisgarh	Tel. +91 771 4090765 Fax +91 771 4090765 sutanu.sarkar@seweurodriveindia.com

Indonesia			
Sales	**Medan II**	PT. Serumpun Indah Lestari Jl. Pulau Solor NO. 8 Kawasan Industri Medan II	Tel. +62 61 687 1221 Fax +62 61 687 1429 serumpunindah@yahoo.com

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

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

Italy			
Assembly **Sales** **Service**	**Solaro**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 799781 http://www.sew-eurodrive.it sewit@sew-eurodrive.it
Technical Offices	**Bologna**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via della Grafica, 47 I-40064 Ozzano dell'Emilia (Bo)	Tel. +39 051 65-23-801 Fax +39 051 796-595
	Caserta	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Viale Carlo III Km. 23,300 I-81020 S. Nicola la Strada (Caserta)	Tel. +39 0823 219011 Fax +39 0823 421414
	Milan	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 02 96 980229 Fax +39 02 96 799781
	Pescara	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Viale Europa,132 I-65010 Villa Raspa di Spoltore (PE)	Tel. +39 085 41-59-427 Fax +39 085 41-59-643
	Torino	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Filiale Torino c.so Unione Sovietica 612/15 - int. C I-10135 Torino	Tel. +39 011 3473780 Fax +39 011 3473783

Italy			
	Verona	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via P. Sgulmero, 27/A I-37132 Verona	Tel. +39 045 89-239-11 Fax +39 045 97-6079

Ivory Coast			
Sales	**Abidjan**	SICA Société industrielle & commerciale pour l'Afrique 165, Boulevard de Marseille 26 BP 1115 Abidjan 26	Tel. +225 21 25 79 44 Fax +225 21 25 88 28 sicamot@aviso.ci

Japan			
Assembly **Sales** **Service**	**Iwata**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373855 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp
Technical Offices	**Fukuoka**	SEW-EURODRIVE JAPAN CO., LTD. C-go, 5th-floor, Yakuin-Hiruzu-Bldg. 1-5-11, Yakuin, Chuo-ku Fukuoka, 810-0022	Tel. +81 92 713-6955 Fax +81 92 713-6860 sewkyushu@jasmine.ocn.ne.jp
	Osaka	SEW-EURODRIVE JAPAN CO., LTD. Higobashi Shimizu Bldg. 10th flor 1-3-7 Tosabori, Nishi-ku Osaka, 550-0001	Tel. +81 6 6444--8330 Fax +81 6 6444--8338 sewosaka@crocus.ocn.ne.jp
	Tokyo	SEW-EURODRIVE JAPAN CO., LTD. Omarimon Yusen Bldg. 13th floor 3-23-5 Nishinbashi, Minato-ku Tokyo 105-0003	Tel. +81 3 3239-0469 Fax +81 3 3239-0943 sewtokyo@basil.ocn.ne.jp

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

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

Lebanon			
Sales	**Beirut**	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 510 532 Fax +961 1 494 971 ssacar@inco.com.lb
Jordan Kuwait Saudi Arabia Syria	**Beirut**	Middle East Drives S.A.L. (offshore) Sin El Fil. B. P. 55-378 Beirut	Tel. +961 1 494 786 Fax +961 1 494 971 info@medrives.com http://www.medrives.com

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

Luxembourg			
Assembly **Sales** **Service**	**Brussels**	**SEW Caron-Vector** Research park Haasrode Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.be info@sew-eurodrive.be

Malaysia			
Assembly **Sales** **Service**	**Johore**	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my
Technical Offices	**Kota Kinabalu**	SEW-EURODRIVE Sdn Bhd (Kota Kinabalu Branch) Lot No. 2,1st Floor, Inanam Baru Phase III, Miles 5.1 /2, Jalan Tuaran, Inanam 89350 Kota Kinabalu Sabah, Malaysia	Tel. +60 88 424792 Fax +60 88 424807
	Kuala Lumpur	SEW-EURODRIVE Sdn. Bhd. No. 2, Jalan Anggerik Mokara 31/46 Kota Kemuning Seksyen 31 40460 Shah Alam Selangor Darul Ehsan	Tel. +60 3 5229633 Fax +60 3 5229622 sewpjy@po.jaring.my
	Kuching	SEW-EURODRIVE Sdn. Bhd. Lot 268, Section 9 KTLD Lorong 9, Jalan Satok 93400 Kuching, Sarawak East Malaysia	Tel. +60 82 232380 Fax +60 82 242380
	Penang	SEW-EURODRIVE Sdn. Bhd. No. 38, Jalan Bawal Kimsar Garden 13700 Prai, Penang	Tel. +60 4 3999349 Fax +60 4 3999348 seweurodrive@po.jaring.my

Mauritania			
Sales	**Zouérate**	AFRICOM - SARL En Face Marché Dumez P.B. 88 Zouérate	Tel. +222 544 0 314 Fax +222 544 0 538 cybertiris@mauritel.mr

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

Morocco			
Sales	**Casablanca**	Afit Route D'El Jadida KM 14 RP8 Province de Nouaceur Commune Rurale de Bouskoura MA 20300 Casablanca	Tel. +212 522633700 Fax +212 522621588 fatima.haquiq@premium.net.ma http://www.groupe-premium.com

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	VECTOR Aandrijftechniek B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 http://www.vector.nu info@vector.nu

New Zealand			
Assembly **Sales** **Service**	**Auckland**	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz
Technical Office	**Palmerston North**	SEW-EURODRIVE NEW ZEALAND LTD. C/-Grant Shearman, RD 5, Aronui Road Palmerston North	Tel. +64 6 355-2165 Fax +64 6 355-2316 sales@sew-eurodrive.co.nz

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

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

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

Poland			
Assembly **Sales** **Service**	**Lodz**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Łódź	Tel. +48 42 676 53 00 Fax +48 42 676 53 45 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl
	24 Hour Service		Tel. +48 602 739 739 (+48 602 SEW SEW) serwis@sew-eurodrive.pl
Technical Office	**Tychy**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Fabryczna 5 PL-43-100 Tychy	Tel. +48 32 32 32 610 Fax +48 32 32 32 647
	Bydgoszcz	SEW-EURODRIVE Polska Sp.z.o.o. ul. Fordońska 246 PL-85-959 Bydgoszcz	Tel. +48 52 3606590 Fax +48 52 3606591
	Poznan	SEW-EURODRIVE Polska Sp.z.o.o. ul. Romana Maya 1 PL-61-371 Poznań	Tel. +48 61 8741640 Fax +48 61 8741641
	Radom	SEW-EURODRIVE Polska Sp.z.o.o. ul. Słowackiego 84 PL-26-600 Radom	Tel. +48 48 365 40 50 Fax +48 48 365 40 51

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

Portugal			
Technical Offices	**Lisboa**	SEW-EURODRIVE, LDA. Núcleo Empresarial I de São Julião do Tojal Rua de Entremuros, 54 Fracção I P-2660-533 São Julião do Tojal	Tel. +351 21 958-0198 Fax +351 21 958-0245 esc.lisboa@sew-eurodrive.pt
	Porto	SEW-EURODRIVE, LDA. Av. 25 de Abril, 68 4440-502 Valongo	Tel. +351 229 350 383 Fax +351 229 350 384 MobilTel. +351 9 32559110 esc.porto@sew-eurodrive.pt
Romania			
Sales **Service**	**Bucharest**	Sialco Trading SRL str. Madrid nr.4 011785 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro
Russia			
Assembly **Sales** **Service**	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 36 195220 St. Petersburg Russia	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru
Technical Office	**Yekaterinburg**	ZAO SEW-EURODRIVE Kominterna Str. 16 Office 614 RUS-620078 Ekaterinburg	Tel. +7 343 310 3977 Fax +7 343 310 3978 eso@sew-eurodrive.ru
	Irkutsk	ZAO SEW-EURODRIVE 5-Armii Str., 31 RUS-664011 Irkutsk	Tel. +7 3952 25 5880 Fax +7 3952 25 5881 iso@sew-eurodrive.ru
	Moskau	ZAO SEW-EURODRIVE Malaja Semjonowskaja Str. д. 9, корпус 2 RUS-107023 Moskau	Tel. +7 495 9337090 Fax +7 495 9337094 mso@sew-eurodrive.ru
	Novosibirsk	ZAO SEW-EURODRIVE pr. K Marksa 30 RUS-630087 Novosibirsk	Tel. +7 383 3350200 Fax +7 383 3462544 nso@sew-eurodrive.ru
	Togliatti	ZAO SEW-EURODRIVE Sportivnaya Str. 4B, office 2 Samarskaya obl. RUS-445057 Togliatti	Tel. +7 8482 710529 Fax +7 8482 810590
Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 338 494 770 Fax +221 338 494 771 senemeca@sentoo.sn http://www.senemeca.com
Serbia			
Sales	**Beograd**	DIPAR d.o.o. Ustanicka 128a PC Košum, IV floor SCG-11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 office@dipar.rs
Singapore			
Assembly **Sales** **Service**	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com

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

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

South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 http://www.sew.co.za info@sew.co.za
	Cape Town	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 cfoster@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaco Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 cdejager@sew.co.za
	Nelspruit	SEW-EURODRIVE (PTY) LTD. 7 Christie Crescent Vintonia P.O.Box 1942 Nelspruit 1200	Tel. +27 13 752-8007 Fax +27 13 752-8008 robermeyer@sew.co.za
Technical Offices	**Port Elizabeth**	SEW-EURODRIVE PTY LTD. 8 Ruan Access Park Old Cape Road Greenbushes 6000 Port Elizabeth	Tel. +27 41 3722246 Fax +27 41 3722247 dtait@sew.co.za
	Richards Bay	SEW-EURODRIVE PTY LTD. 103 Bulion Blvd Richards Bay P.O. Box 458 Richards Bay, 3900	Tel. +27 35 797-3805 Fax +27 35 797-3819 jswart@sew.co.za

South Korea			
Assembly **Sales** **Service**	**Ansan-City**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate 1048-4, Shingil-Dong Ansan 425-120	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-korea.co.kr master.korea@sew-eurodrive.com
	Busan	SEW-EURODRIVE KOREA Co., Ltd. No. 1720 - 11, Songjeong - dong Gangseo-ku Busan 618-270	Tel. +82 51 832-0204 Fax +82 51 832-0230 master@sew-korea.co.kr
Technical Offices	**Daegu**	SEW-EURODRIVE KOREA Co., Ltd. No.1108 Sungan officetel 87-36, Duryu 2-dong, Dalseo-ku Daegu 704-712	Tel. +82 53 650-7111 Fax +82 53 650-7112
	DaeJeon	SEW-EURODRIVE KOREA Co., Ltd. No. 1502, Hongin officetel 536-9, Bongmyung-dong, Yusung-ku Daejeon 305-301	Tel. +82 42 828-6461 Fax +82 42 828-6463
	Kwangju	SEW-EURODRIVE KOREA Co., Ltd. 4fl., Dae-Myeong B/D 96-16 Unam-dong, Buk-ku Kwangju 500-170	Tel. +82 62 511-9172 Fax +82 62 511-9174
	Seoul	SEW-EURODRIVE KOREA Co., Ltd. No.504 Sunkyung officetel 106-4 Kuro 6-dong, Kuro-ku Seoul 152-054	Tel. +82 2 862-8051 Fax +82 2 862-8199

Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 Fax +34 94 43184-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es
Technical Offices	**Barcelona**	Delegación Barcelona Avenida Francesc Maciá 40-44 Oficina 4.2 E-08208 Sabadell (Barcelona)	Tel. +34 93 7162200 Fax +34 93 7233007
	Lugo	Delegación Noroeste Apartado, 1003 E-27080 Lugo	Tel. +34 639 403348 Fax +34 982 202934
	Madrid	Delegación Madrid Gran Via. 48-2° A-D E-28220 Majadahonda (Madrid)	Tel. +34 91 6342250 Fax +34 91 6340899
	Seville	MEB Pólogono Calonge, C/A Nave 2 - C E-41.077 Sevilla	Tel. +34 954 356 361 Fax +34 954 356 274 mebsa.sevilla@mebsa.com
	Valencia	MEB Músico Andreu i Piqueres, 4 E-46.900 Torrente (Valencia)	Tel. +34 961 565 493 Fax +34 961 566 688 mebsa.valencia@mebsa.com

Sri Lanka			
Sales	**Colombo**	SM International (Pte) Ltd 254, Galle Raod Colombo 4, Sri Lanka	Tel. +94 1 2584887 Fax +94 1 2582981

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

Sweden			
Sales	**Göteborg**	SEW-EURODRIVE AB Gustaf Werners gata 8 S-42132 Västra Frölunda	Tel. +46 31 70968 80 Fax +46 31 70968 93 goteborg@sew.se
	Stockholm	SEW-EURODRIVE AB Björkholmsvägen 10 S-14146 Huddinge	Tel. +46 8 44986 80 Fax +46 8 44986 93 stockholm@sew.se
	Malmö	SEW-EURODRIVE AB Borrgatan 5 S-21124 Malmö	Tel. +46 40 68064 80 Fax +46 40 68064 93 malmo@sew.se
	Skellefteå	SEW-EURODRIVE AB Trädgårdsgatan 8 S-93131 Skellefteå	Tel. +46 910 7153 80 Fax +46 910 7153 93 skelleftea@sew.se

Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch
Technical Offices	**Rhaetian Switzerland**	André Gerber Es Perreyres CH-1436 Chamblon	Tel. +41 24 445 3850 Fax +41 24 445 4887
	Bern / Solothurn	Rudolf Bühler Muntersweg 5 CH-2540 Grenchen	Tel. +41 32 652 2339 Fax +41 32 652 2331
	Central Switzerland, Aargau	Armin Pfister Stierenweid CH-4950 Huttwill, BE	Tel. +41 62 962 54 55 Fax +41 62 962 54 56
	Zürich, Ticino	Gian-Michele Muletta Fischerstrasse 61 CH-8132 Egg bei Zürich	Tel. +41 44 994 81 15 Fax +41 44 994 81 16
	Bodensee and East Switzerland	Markus Künzle Eichweg 4 CH-9403 Goldach	Tel. +41 71 845 2808 Fax +41 71 845 2809

Taiwan (R.O.C.)			
Sales	**Nan Tou**	Ting Shou Trading Co., Ltd. No. 55 Kung Yeh N. Road Industrial District Nan Tou 540	Tel. +886 49 255353 Fax +886 49 257878
	Taipei	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			
Assembly **Sales** **Service**	**Chonburi**	SEW-EURODRIVE (Thailand) Ltd. 700/456, Moo.7, Donhuaroh Muang Chonburi 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com
Technical Offices	**Bangkok**	SEW-EURODRIVE (Thailand) Ltd. 6th floor, TPS Building 1023, Phattanakarn Road Suanluang Bangkok,10250	Tel. +66 2 7178149 Fax +66 2 7178152 sewthailand@sew-eurodrive.com

Thailand			
	Hadyai	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 sewthailand@sew-eurodrive.com
	Khonkaen	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 sew-thailand@sew-eurodrive.com
Tunisia			
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Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 / 4419164 Fax +90 216 3055867 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr
Technical Offices	**Adana**	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Kizilay Caddesi 8 Sokak No 6 Daðtekin Is Merkezi Kat 4 Daire 2 TR-01170 SEYHAN / ADANA	Tel. +90 322 359 94 15 Fax +90 322 359 94 16
	Ankara	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Özcelik Is Merkezi, 14. Sok, No. 4/42 TR-06370 Ostim/Ankara	Tel. +90 312 385 33 90 Fax +90 312 385 32 58
	Bursa	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Üçevler Mah. Bayraktepe Sok. Akay İş Merkezi Kat:3 No: 7/6 TR Nilüfer/Bursa	Tel. +90 224 443 45 60 Fax +90 224 443 45 58
	Izmir	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. 1203/11 Sok. No. 4/613 Hasan Atli Is Merkezi TR-35110 Yenisehir-İzmir	Tel. +90 232 469 62 64 Fax +90 232 433 61 05
Ukraine			
Sales **Service**	**Dnepropetrovsk**	SEW-EURODRIVE Str. Rabochaja 23-B, Office 409 49008 Dnepropetrovsk	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua
Sales	**Kiev**	SEW-EURODRIVE GmbH S. Oleynika str. 21 02068 Kiev	Tel. +380 44 503 95 77 Fax +380 44 503 95 78 kso@sew-eurodrive.ua
	Donetsk	SEW-EURODRIVE GmbH 25th anniversary of RKKA av. 1-B, of. 805 Donetsk 83000	Tel. +380 62 38 80 545 Fax +380 62 38 80 533 dso@sew-eurodrive.ua

United Arab Emirates			
Sales **Service**	**Sharjah**	Copam Middle East (FZC) Sharjah Airport International Free Zone P.O. Box 120709 Sharjah	Tel. +971 6 5578-488 Fax +971 6 5578-499 copam_me@eim.ae
Uruguay			
Sales	**Montevideo**	SEW-EURODRIVE Uruguay, S. A. Jose Serrato 3569 Esqina Corumbe CP 12000 Montevideo	Tel. +598 2 21181-89 Fax +598 2 21181-89 sewuy@sew-eurodrive.com.uy
USA			
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Assembly **Sales** **Service**	**Northeast Region**	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
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	Southwest Region	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
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	Additional addresses for service in the USA provided on request!		
Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 http://www.sew-eurodrive.com.ve ventas@sew-eurodrive.com.ve sewfinanzas@cantv.net
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Sales	**Ho Chi Minh City**	Nam Trung Co., Ltd 91 - 93 Tran Minh Quyen Street, District 10, HCMC	Tel. +84 8 8301026 Fax +84 8 8392223 namtrungco@hcm.vnn.vn

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