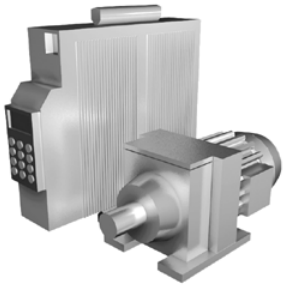
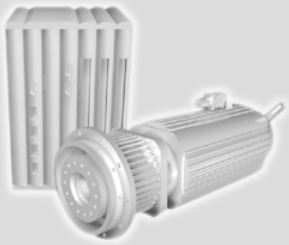
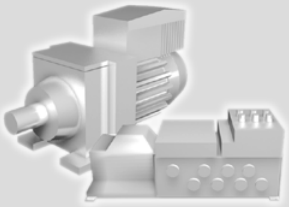
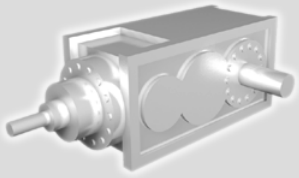
SEW EURODRIVE









MOVIDRIVE® *compact* MCH4_A

Edition 11/2006

11535415 / EN

Operating Instructions

SEW EURODRIVE

1 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 the safety notes are disregarded. • Measure(s) to prevent the danger.

Pictogram	Signal word	Meaning	Consequences in case of disregard
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
	**STOP!**	Possible damage to property	Damage to the drive system or its environment
	**NOTE**	Useful information or a tip Simplifies the handling of the drive system	

	CAUTION!
	**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 operating the unit! Make sure that the operating instructions are available to persons responsible for the plant and its operation, as well as to persons who work independently on the unit. You must also ensure that the documentation is legible.

Exclusion of liability:

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

2 Safety Notes

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

2.1 General information

Never install damaged products or take them into operation. Submit a complaint to the shipping company immediately in the event of damage.

During operation, drive inverters can have live, bare and movable or rotating parts as well as hot surfaces, depending on their enclosure.

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

Consult the documentation for additional information.

2.2 Target group

Only qualified personnel are authorized to install, start up, repair or service the units (observe IEC 60364 or CENELEC HD 384 or DIN VDE 0100 and IEC 60664 or DIN VDE 0110 as well as national accident prevention guidelines).

Qualified personnel in the context of these basic safety notes are: all persons familiar with installation, assembly, startup and operation of the product who possess the necessary qualifications.

All persons involved in any other work, such as transportation, storage, operation and disposal, must have suitable training.

2.3 Designated use

Drive inverters are components intended for installation in electrical systems or machines.

In case of installation in machines, startup of the drive inverters (i.e. start of designated operation) is prohibited until it is determined that the machine meets the requirements stipulated in the EC Directive 98/37/ EC (machine guideline); observe EN 60204.

Startup (i.e. start of designated operation) is only permitted with adherence to EMC (89/336/EEC) guideline.

The drive inverters meet the requirements stipulated in low voltage guideline 73/23/EEC. The harmonized standards of the EN 61800-5-1/DIN VDE T105 series in connection with EN 60439-1/VDE 0660 part 500 and EN 60146/VDE 0558 are applied to these drive inverters.

Technical data and information on the connection requirements are given on the nameplate and in the documentation; they have to be observed under all circumstances.

Safety functions

The MOVIDRIVE® *compact* drive inverters may not perform safety functions without higher-level safety systems. Use higher-level safety systems to ensure protection of personnel and equipment.

2.4 Transportation, putting into storage

Observe the notes on transportation, storage and proper handling. Observe the climatic conditions as stated in the section "General technical data."

2.5 Installation

Installation and cooling of the devices must take place according to the guidelines listed in the corresponding documentation.

Protect the drive inverters from excessive strain. Especially during transportation and handling, do not allow the components to be deformed or insulation spaces altered. Avoid contact with electronic components and contacts.

Drive inverters contain components that can be damaged by electrostatic energy and improper handling. Prevent mechanical damage or destruction of electric components (may pose health risk!)

The following applications are prohibited unless measures are expressly taken to make them possible:

- Use in potentially explosive atmospheres
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, radiation, etc.
- Use in non-stationary applications that are subject to mechanical vibration and shock loads in excess of the requirements in EN 50178

2.6 Electrical connection

Observe the applicable national accident prevention guidelines when working on live drive inverters (e.g. BGV A3).

Perform electrical installation according to the pertinent regulations (e.g. line cross sections, fusing, protective conductor connection). For any additional information, refer to the applicable documentation.

You will find notes on EMC-compliant installation, such as shielding, grounding, arrangement of filters and routing of lines, in the documentation of the drive inverters. Always observe these notes even with drive inverters bearing the CE marking. The manufacturer of the system or machine is responsible for maintaining the limits established by the EMC legislation.

Preventive measures and protection devices must correspond to the regulations in force (e.g. EN 60204 or EN 61800-5-1).

Required preventive measures: Ground the unit.

2.7 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.

2.8 Operation

Systems with integrated drive inverters must be equipped with additional monitoring and protection devices, if necessary, according to the applicable safety guidelines, such as the law governing technical equipment, accident prevention regulations, etc. Changes to the drive inverter using the operating software are permitted.

Do not touch live components or power connections immediately after disconnecting the drive inverters from the supply voltage because there may still be some charged capacitors. Note the respective reference plates on the drive inverter.

Keep all covers and doors closed during operation.

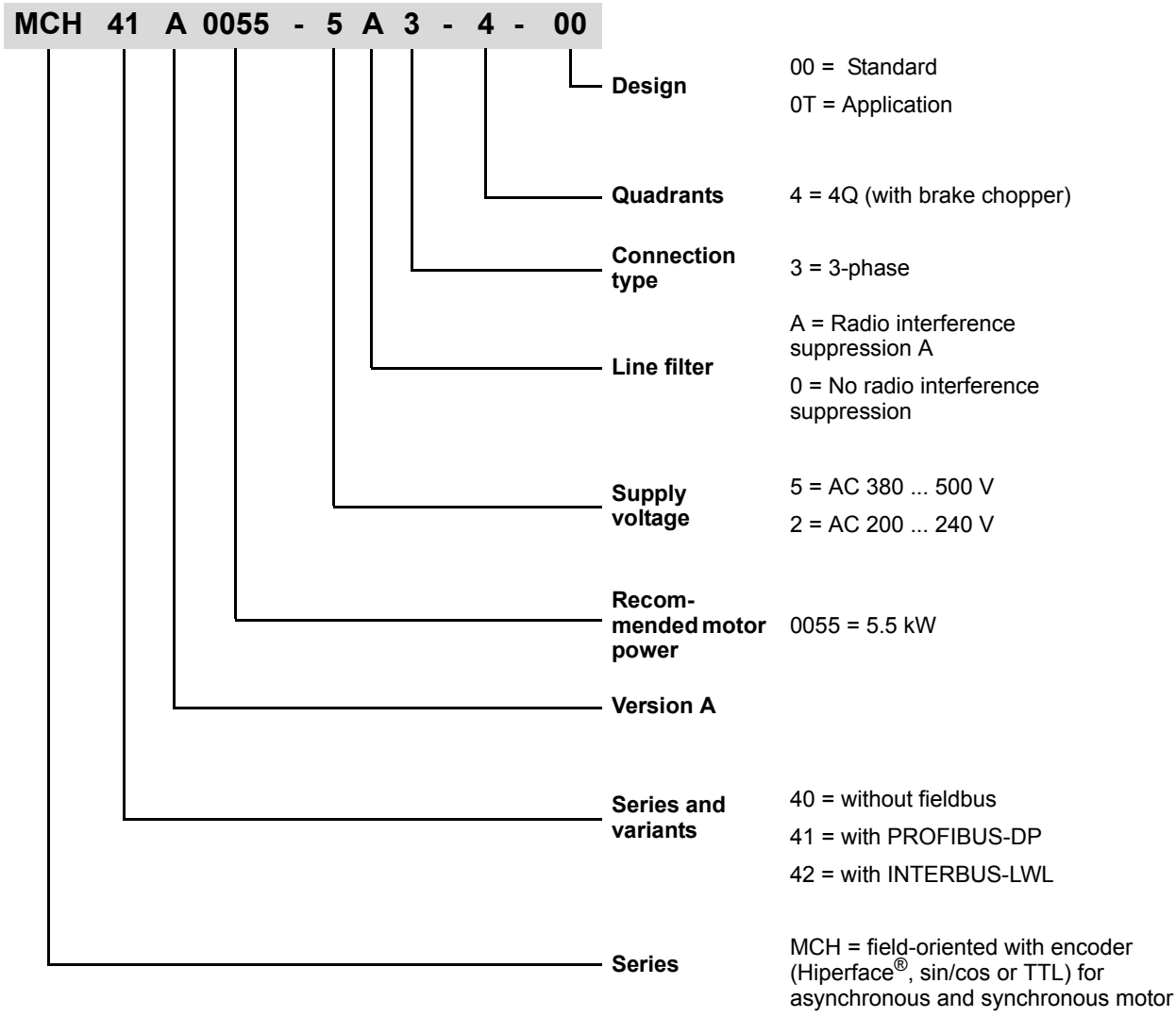
The fact that the status LED and other display elements are no longer illuminated does not indicate that the unit has been disconnected from the power supply and no longer carries any voltage.

Mechanical blocking or internal safety functions of the unit can cause a motor standstill. Removing the cause of the problem or performing a reset can result in the drive re-starting on its own. If, for safety reasons, this is not permitted for the driven machine, disconnect the unit from the mains before correcting the fault.

3 Unit Design

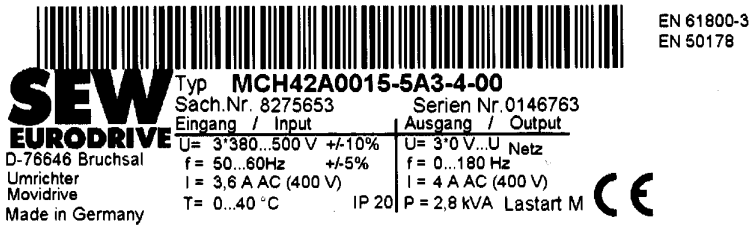
3.1 Unit designation, nameplates and scope of delivery

Sample unit designation



Sample nameplate

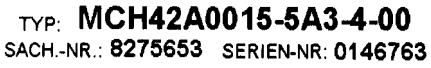
The complete nameplate is attached to the side of the unit.



05230AXX

Figure 1: Complete nameplate

A type label is attached to the front of the control unit (above the TERMINAL slot).



05231AXX

Figure 2: Type label

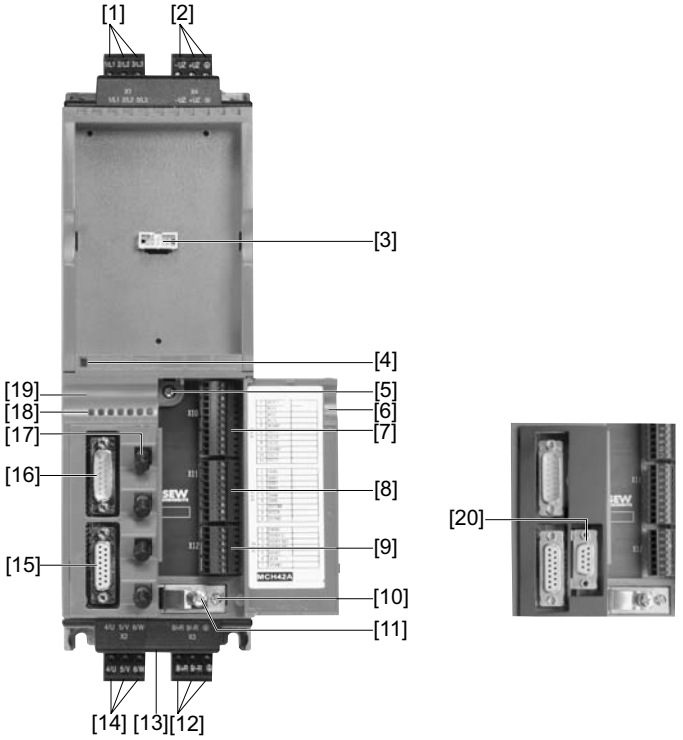
Scope of delivery

- MCH: Connector housing for all signal terminals (X10 ... X12), connected
- Additionally for size 1: Connector housing for the power terminals (X1 ... X4), connected
- Additionally for sizes 1 and 2: Shield clamp for power section
- Additionally for sizes 4 and 5: Touch guard for power terminals.

3.2 Size 1 MCH4_A

MCH4_A...-5A3 (AC 400/500 V units): 0015 ... 0040

MCH4_A...-2A3 (AC 230 V units): 0015 ... 0037



60122AXX

[1] X1: Power supply connection 1/L1, 2/L2, 3/L3, separable

[2] X4: Connection for DC link connection $-U_Z/+U_Z$ and PE connection, separable

[3] TERMINAL: Slot for DBG keypad or USS21A/USB11A option

[4] V1: Operation LED

[5] Retaining screw A for connection unit

[6] Panel on connection unit with label

[7] X10: Electronics terminal strip, separable

[8] X11: Electronics terminal strip, separable

[9] X12: Electronics terminal strip, separable

[10] Retaining screw B for connection unit

[11] Screw of the shield clamp for the control unit

[12] X3: Braking resistor connection 8/+R, 9/–R and PE connection, separable

[13] Connection for shield clamp of the power section (not visible)

[14] X2: Motor connection 4/U, 5/V, 6/W

[15] X15: Motor encoder input (15-pole Sub-D socket)

[16] X14: Incremental encoder simulation output or external encoder input (15-pole Sub-D connector)

[17] Only for MCH42A X30 ... X33: INTERBUS-LWL connections

[18] Diagnostic LEDs INTERBUS-LWL

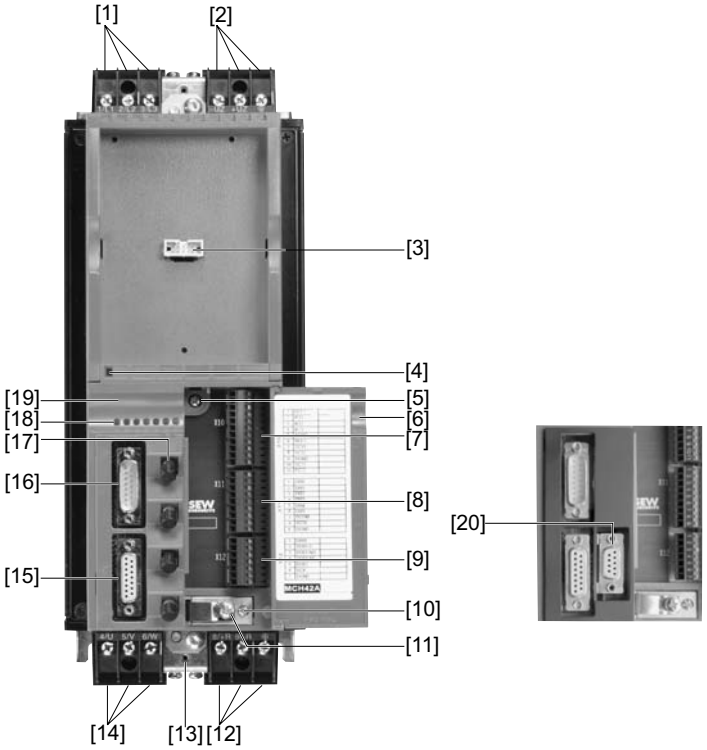
[19] Connection unit, removable

[20] Only for MCH41A X30: PROFIBUS-DP connection (9-pole Sub-D socket)

3.3 Size 2 MCH4_A

MCH4_A...-5A3 (AC 400/500 V units): 0055 ... 0110

MCH4_A...-2A3 (AC 230 V units): 0055 / 0075



60124AXX

[1] X1: Power supply connection 1/L1, 2/L2, 3/L3

[2] X4: Connection for DC link connection $-U_Z$/ $+U_Z$/ and PE connection

[3] TERMINAL: Slot for DBG keypad or USS21A/USB11A option

[4] V1: Operation LED

[5] Retaining screw A for connection unit

[6] Panel on connection unit with label

[7] X10: Electronics terminal strip, separable

[8] X11: Electronics terminal strip, separable

[9] X12: Electronics terminal strip, separable

[10] Retaining screw B for connection unit

[11] Screw of the shield clamp for the control unit

[12] X3: Braking resistor connection 8/+R, 9/–R and PE connection

[13] Connection for shield clamp of the power section (not visible)

[14] X2: Motor connection 4/U, 5/V, 6/W

[15] X15: Motor encoder input (15-pole Sub-D socket)

[16] X14: Incremental encoder simulation output or external encoder input (15-pole Sub-D connector)

[17] Only for MCH42A X30 ... X33: INTERBUS-LWL connections

[18] Diagnostic LEDs INTERBUS-LWL

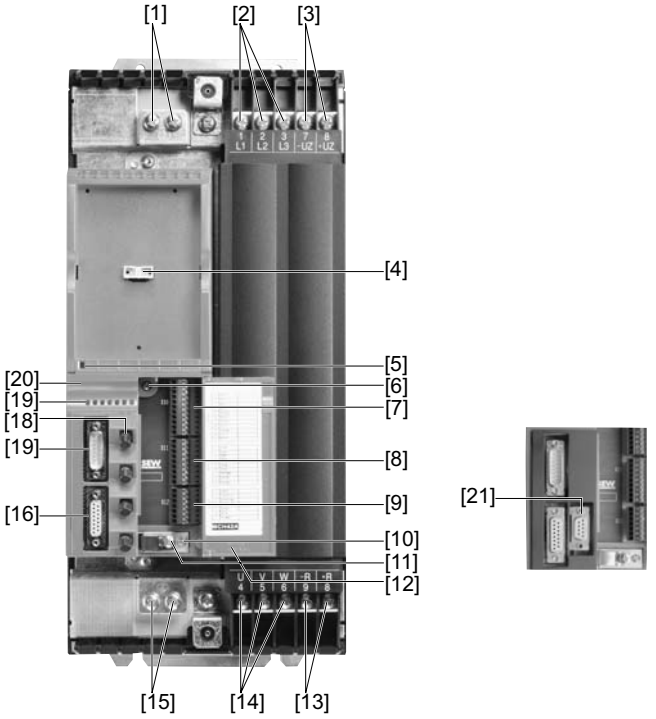
[19] Connection unit, removable

[20] Only for MCH41A X30: PROFIBUS-DP connection (9-pole Sub-D socket)

3.4 Size 3 MCH4_A

MCH4_A...-503 (AC 400/500 V units): 0150 ... 0300

MCH4_A...-203 (AC 230 V units): 0110 / 0150



60126AXX

[1] PE connections

[2] X1: Power supply connection 1/L1, 2/L2, 3/L3

[3] X4: Connection for DC link connection $-U_Z$/ $+U_Z$/ and PE connection

[4] TERMINAL: Slot for DBG keypad or USS21A/USB11A option

[5] V1: Operation LED

[6] Retaining screw A for connection unit

[7] X10: Electronics terminal strip, separable

[8] X11: Electronics terminal strip, separable

[9] X12: Electronics terminal strip, separable

[10] Retaining screw B for connection unit

[11] Screw of the shield clamp for the control unit

[12] Panel on connection unit with label

[13] X3: Braking resistor connection 8/+R, 9/–R and PE connection

[14] X2: Motor connection 4/U, 5/V, 6/W

[15] PE connections

[16] X15: Motor encoder input (15-pole Sub-D socket)

[17] X14: Incremental encoder simulation output or external encoder input (15-pole Sub-D connector)

[18] Only for MCH42A X30 ... X33: INTERBUS-LWL connections

[19] Diagnostic LEDs INTERBUS-LWL

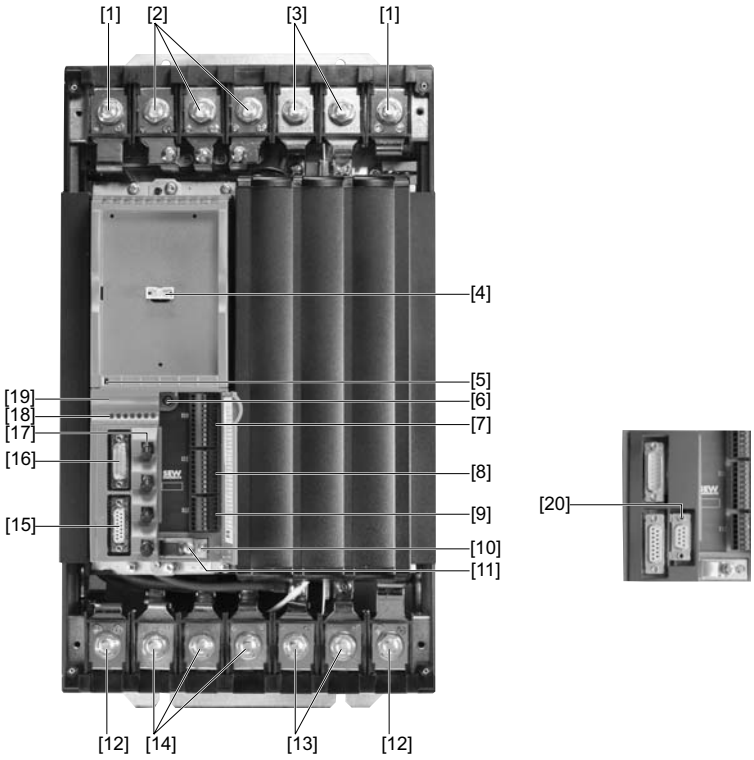
[20] Connection unit, removable

[21] Only for MCH41A X30: PROFIBUS-DP connection (9-pole Sub-D socket)

3.5 Size 4 MCH4_A

MCH4_A...-503 (AC 400/500 V units): 0370 / 0450

MCH4_A...-203 (AC 230 V units): 0220 / 0300



60131AXX

[1] PE connections

[2] X1: Power supply connection 1/L1, 2/L2, 3/L3

[3] X4: Connection for DC link connection $-U_Z$/ $+U_Z$/ and PE connection

[4] TERMINAL: Slot for DBG keypad or USS21A/USB11A option

[5] V1: Operation LED

[6] Retaining screw A for connection unit

[7] X10: Electronics terminal strip, separable

[8] X11: Electronics terminal strip, separable

[9] X12: Electronics terminal strip, separable

[10] Retaining screw B for connection unit

[11] Screw of the shield clamp for the control unit

[12] PE connections

[13] X3: Braking resistor connection 8/+R, 9/–R and PE connection

[14] X2: Motor connection 4/U, 5/V, 6/W

[15] X15: Motor encoder input (15-pole Sub-D socket)

[16] X14: Incremental encoder simulation output or external encoder input (15-pole Sub-D connector)

[17] Only for MCH42A X30 ... X33: INTERBUS-LWL connections

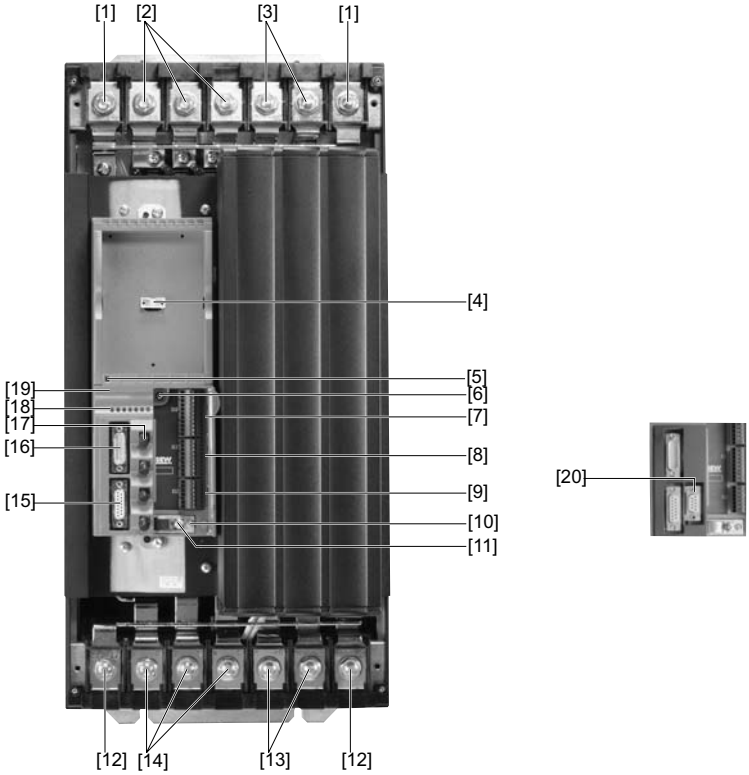
[18] Diagnostic LEDs INTERBUS-LWL

[19] Connection unit, removable

[20] Only for MCH41A X30: PROFIBUS-DP connection (9-pole Sub-D socket)

3.6 Size 5 MCH4_A

MCH4_A...-503 (AC 400/500 V units): 0550 / 0750



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[1] PE connections

[2] X1: Power supply connection 1/L1, 2/L2, 3/L3

[3] X4: Connection for DC link connection $-U_Z$/ $+U_Z$/ and PE connection

[4] TERMINAL: Slot for DBG keypad or USS21A/USB11A option

[5] V1: Operation LED

[6] Retaining screw A for connection unit

[7] X10: Electronics terminal strip, separable

[8] X11: Electronics terminal strip, separable

[9] X12: Electronics terminal strip, separable

[10] Retaining screw B for connection unit

[11] Screw of the shield clamp for the control unit

[12] PE connections

[13] X3: Braking resistor connection 8/+R, 9/–R and PE connection

[14] X2: Motor connection 4/U, 5/V, 6/W

[15] X15: Motor encoder input (15-pole Sub-D socket)

[16] X14: Incremental encoder simulation output or external encoder input (15-pole Sub-D connector)

[17] Only for MCH42A X30 ... X33: INTERBUS-LWL connections

[18] Diagnostic LEDs INTERBUS-LWL

[19] Connection unit, removable

[20] Only for MCH41A X30: PROFIBUS-DP connection (9-pole Sub-D socket)

4 Installation

4.1 Installation instructions for the basic unit

Tightening torques

- Only use **genuine connection elements**. Note the **permitted tightening torques** for MOVIDRIVE® power terminals.
  - Size 1 → 0.6 Nm
  - Size 2 → 1.5 Nm
  - Size 3 → 3.5 Nm
  - Sizes 4 and 5 → 14 Nm

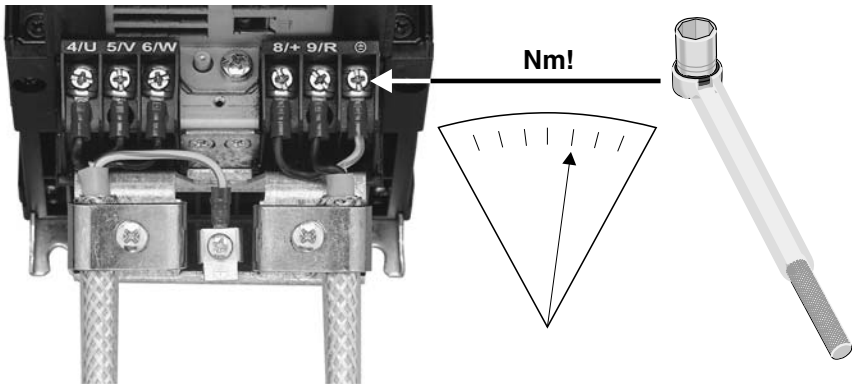

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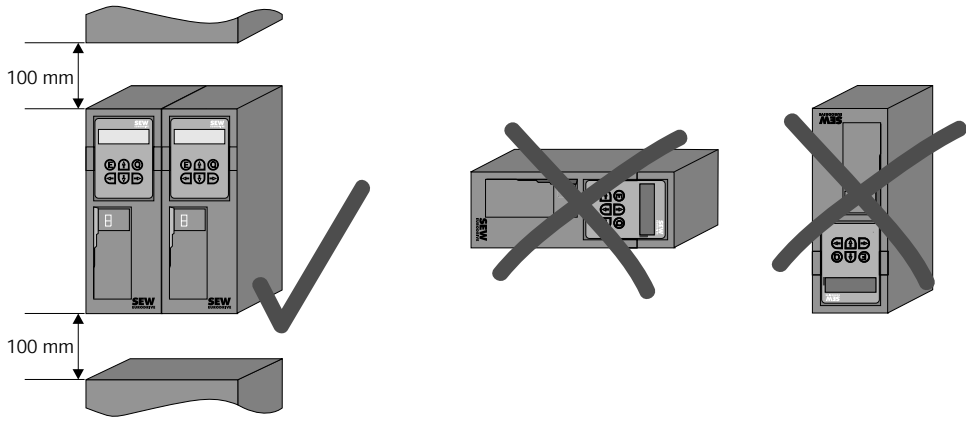
Figure 3: Observe the tightening torques

- The **permitted tightening torque** of the **signal terminals** is 0.6 Nm.

Minimum clearance and mounting position

- Leave **100 mm clearance at the top and bottom** for optimum cooling. There is no need for clearance at the sides. You can line up the units directly next to one another. With sizes 4 and 5 do not install any components that are sensitive to high temperatures within 300 mm of the top of the unit. Only install the units **vertically**. You must not install them horizontally, tilted or upside down.



60136AXX

Figure 4: Minimum clearance and mounting position of the units

Separate cable ducts

- Route **power cables** and **electronics cables** in **separate cable ducts**.

Fuses and earth-leakage circuit breakers

- Install the **fuses at the beginning of the supply system lead** after the supply bus junction (→ Wiring diagram for basic unit, power section and brake).
- SEW-EURODRIVE recommends that you do not use earth-leakage circuit breakers. However, if an earth-leakage circuit breaker is stipulated for direct or indirect protection against contact, observe the **following information in accordance with EN 61800-5-1:**

WARNING!

Incorrect earth-leakage circuit breaker installed.

Severe or fatal injuries.

MOVIDRIVE® can cause direct current in the protective earth. In cases where an earth-leakage circuit breaker is used for protection against direct or indirect contact, only install a type B earth-leakage circuit breaker on the **power supply end of the MOVIDRIVE® unit**.

Mains and brake contactors

- Only use **contactors in utilization category AC-3** (EN 60947-4-1) as mains and brake contactors.

NOTES

- Only use the **mains contactor K11** (→ Sec. "Wiring diagram for basic unit") to **switch the inverter on and off**. Do not use it for jog mode. Use the commands "Enable/Stop", "CW/Stop" or "CCW/Stop" for jog mode.
- Observe a minimum switch-off time of 10 s for the input contactor K11.

More than four units

- With **more than four units** on an **input contactor** configured for the total current: Insert a **3-phase line choke in the circuit** to limit the inrush current.

PE power supply connection (→ EN 61800-5-1)

- For a **supply system lead < 10 mm^2**: Route a **second PE conductor with the cross section of the supply system lead** parallel to the protective earth via separate terminals or use a **copper protective earth conductor with a cross section of 10 mm^2**.
- For a **supply system lead 10 mm^2 ... 16 mm^2**: Route a **copper protective earth conductor with the cross section of the power supply line**.
- For a **supply system lead 16 mm^2 ... 35 mm^2**: Route a **copper protective earth conductor with the cross section of 16 mm^2**.
- For a **supply system lead > 35 mm^2**: Route a **copper protective earth conductor with half the cross section of the power supply line**.

IT systems

- SEW-EURODRIVE recommends using **earth-leakage monitors with pulse-code measurement** for voltage supply systems with a non-grounded star point (**IT systems**). Using such devices prevents the earth-leakage monitor mis-tripping due to the ground capacitance of the inverter. **No EMC limits are specified for interference emission** in **voltage supply systems without grounded star point** (IT systems).

Cross sections

- Supply system lead: **Cross section according to rated input current** I_{mains} at rated load.
- Motor lead: **Cross section according to rated output current** I_{rated}.
- Electronics cables for MCH:
  - Only single cores 0.20...1.5 mm^2 (AWG 24...12)
  - Use right-angled crimping pliers with 1.5 mm^2 (AWG 16)

Unit output

STOP	**STOP!** MOVIDRIVE® can suffer irreparable damage if you connect capacitive loads. • **Only connect ohmic/inductive loads (motors).** • Never connect capacitive loads.

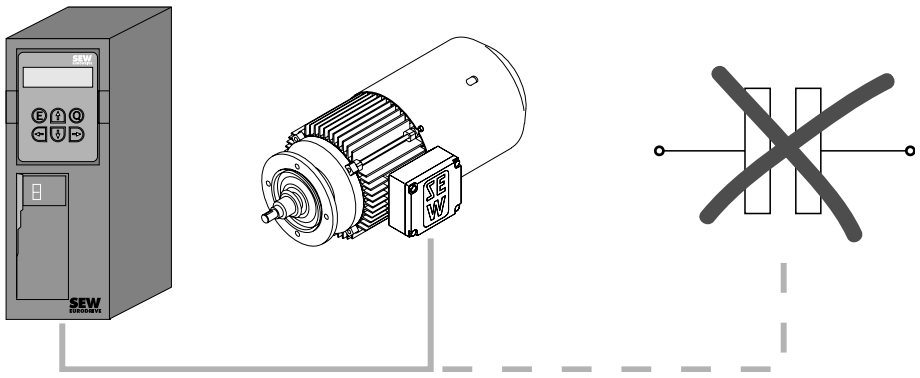


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Figure 5: Only connect ohmic/inductive loads; do not connect capacitive loads

Connecting braking resistors

- Use **two tightly twisted leads or a 2-core shielded power cable**. Cross section according to the rated output current of the inverter.
- Protect the braking resistor with a **bimetallic relay / thermal overload 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 of 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.
- Install the **flat-type braking resistors** together with the appropriate **touch guard**.

Installing braking resistors BW... / BW..-T / BW...-P

- Permitted mounting options:
  - on horizontal surfaces
  - on vertical surfaces with brackets at the bottom and perforated sheets at top and bottom
- Mounting not permitted:
  - on vertical surfaces with brackets at the top, right or left

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.

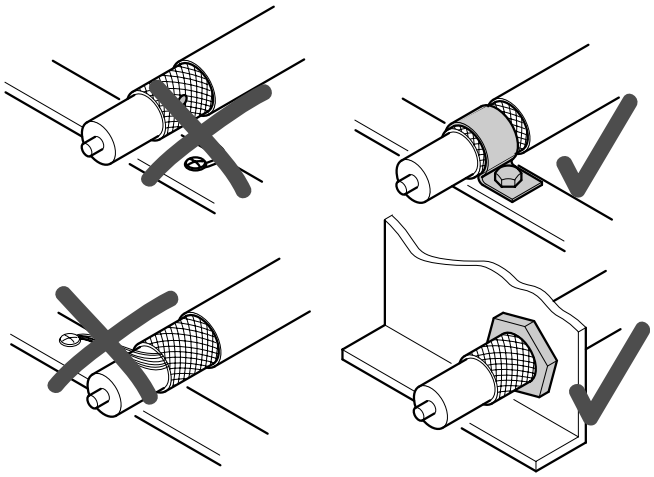
- Choose a suitable installation location. Braking resistors are usually installed on top of the control cabinet.
- Do not touch the braking resistors.

Binary inputs / binary outputs

- The **binary inputs** are electrically **isolated** by optocouplers.
- The **binary outputs** are **short-circuit proof** and **protected against external voltage to DC 30 V.** External voltages > DC 30 V can cause irreparable damage to binary outputs.

EMC compliant installation

- Only use **shielded control cables**.
- All cables except for the supply system lead must be **shielded**. As an alternative to shielding, the HD.. output choke option can be used for the motor cable to achieve the emitted interference limit values.
- When using shielded motor cables, e.g. prefabricated motor cables from SEW-EURODRIVE, you must keep the **unshielded conductors between the shield and connection terminal of the inverter as short as possible**.
- Apply the **shield by the shortest possible route and make sure it is grounded over a wide area at both ends**. Ground one end of the shield via a suppression capacitor (220 nF / 50 V) to avoid ground loops. If using double-shielded cables, ground the outer shield on the controller end and the inner shield on the other end.



60028AXX

Figure 6: Correct shield connection using metal clamp (shield clamp) or cable gland

- You can also use **grounded sheet-metal ducts or metal pipes** to **shield the cables**. **Route** the **power and control cables separately**.
- Provide **high frequency compatible grounding** for the **inverter** and **all additional units** (wide area metal-on-metal contact between the unit housing and ground, e.g. unpainted control cabinet mounting panel).

	NOTE
	• This is a product with restricted availability in accordance with IEC 61800-3. It may cause interference in residential environments. In this case, the operator may need to implement appropriate measures. • For detailed information on EMC compliant installation, refer to the publication "Electromagnetic Compatibility in Drive Engineering" from SEW-EURODRIVE.

Line filter

- **Sizes 1 and 2** are fitted with a **line filter as standard**. This line filter ensures that **limit value class A is maintained on the supply side**. Use an NF...-... line filter as an option to maintain the class B limit.
- The **NF...-... input filter option** is required for **sizes 3 to 5** to maintain class A and B limits.
- Install the **line filter close to the inverter** but outside the minimum clearance for cooling.
- Do not switch between the line filter and MOVIDRIVE®.
- Keep the **length of the cable between the line filter and inverter to an absolute minimum**, and never more than 400 mm. Unshielded, twisted cables are sufficient. Use also unshielded lines for the supply system lead.
- This line filter must be mounted either **directly at the entry point into the switch cabinet or close to the inverter** if **several inverters are connected to the same line filter**. The line filter must be chosen on the basis of the total current of the connected inverters.
- **No EMC limits are specified for interference emission** in **voltage supply systems without earthed star point** (IT systems). The **effectiveness of line filters** in IT systems is **severely limited.**

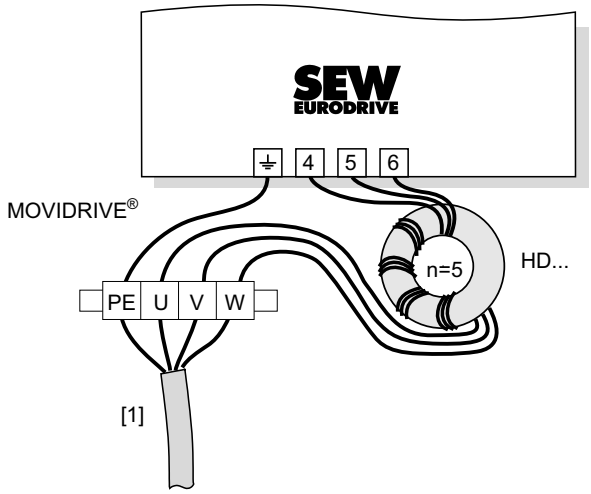
Interference emission

SEW-EURODRIVE recommends the following **EMC measures on the output side to maintain the class A and B limits**:

- Shielded motor cable
- HD... output choke option

HD... output choke

- Install the **output choke close to the inverter** but outside the minimum clearance for cooling.
- Route **all three phases of the motor cable [1] through the output choke**. To achieve a higher filter effect, **do not route the PE conductor through the output choke**.



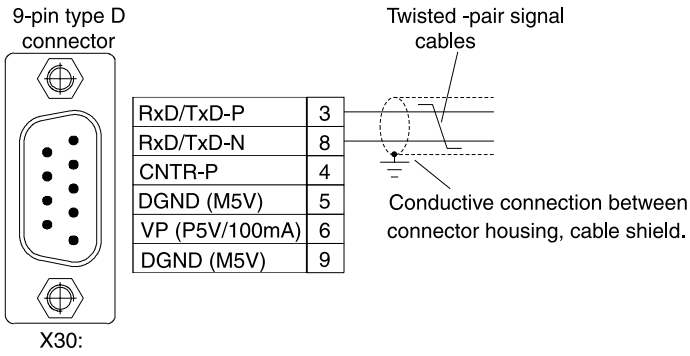
60029AXX

[1] Motor cable

4.2 Installation notes for PROFIBUS-DP interface (MCH41A)

Pin assignment

For connection to the PROFIBUS network, use a 9-pole Sub-D connector in accordance with IEC 61158 (→ following figure). The T-bus connection must be made using a plug with the corresponding configuration.



02893AEN

As a rule, the MOVIDRIVE® *compact* drive inverter is connected to the PROFIBUS system using a shielded twisted-pair cable. Observe the maximum supported transmission rate when selecting the bus connector.

The twisted-pair cable is connected to the PROFIBUS connector using pins 3 (RxD/TxD-P) and 8 (RxD/TxD-N). Communication takes place via these two contacts. The RS485 signals RxD/TxD-P and RxD/TxD-N must be connected to the same contacts in all PROFIBUS stations. Otherwise, no communication is possible via the bus medium. The PROFIBUS interface sends a TTL control signal for a repeater or fiber optic adapter (reference = pin 9) via pin 4 (CNTR-P).

Shielding and routing bus cables

The PROFIBUS interface supports RS485 transmission technology and requires the cable type A to IEC 61158 specified as the physical medium for PROFIBUS. This cable must be a shielded, twisted-pair cable.

Correct shielding of the bus cable attenuates electrical interference that may occur in industrial environments. The following measures ensure the best possible shielding:

- Manually tighten the mounting screws on the connectors, modules, and equipotential bonding conductors.
- Use only connectors with a metal housing or a metallized housing.
- Connect the shielding in the connector over a wide surface area.
- Apply the shielding of the bus line on both ends.
- Route signal and bus cables in separate cable ducts. Do not route them parallel to power cables (motor leads).
- Use metallic, grounded cable racks in industrial environments.
- Route the signal cable and the corresponding equipotential bonding close to each other using the shortest possible route.
- Avoid using plug connectors to extend bus cables.
- Route the bus cables closely along existing grounding surfaces.

	NOTE
	In case of fluctuations in the ground potential, a compensating current may flow via the bilaterally connected shield that is also connected to the protective earth (PE). Make sure you supply adequate equipotential bonding according in accordance with relevant VDE regulations in such a case.

Bus termination for MCH41A

MCH41A is not provided with bus terminating resistors. This enables the bus system to be taken into operation more easily and reduces the number of error sources.

Use a connector with an integrated bus terminating resistor if the inverter is at the beginning or end of a PROFIBUS segment and only one PROFIBUS cable leads to the inverter.

Switch on the bus terminating resistors for this PROFIBUS connector.

Setting the station address with MCH41A

The PROFIBUS station address is set using DIP switches 1 ... 8 (significance 2^0... 2^6) under the connection unit (→ Sec. "Removing the connection unit" on page 38). MOVIDRIVE® *compact* supports the address range 0 to 125.

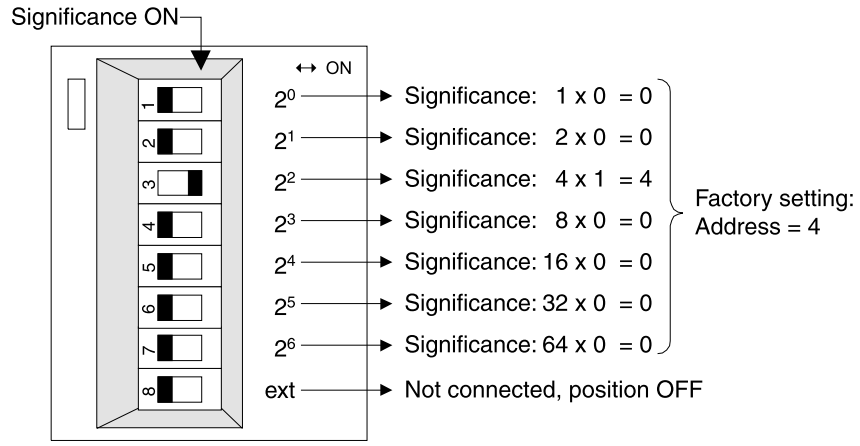


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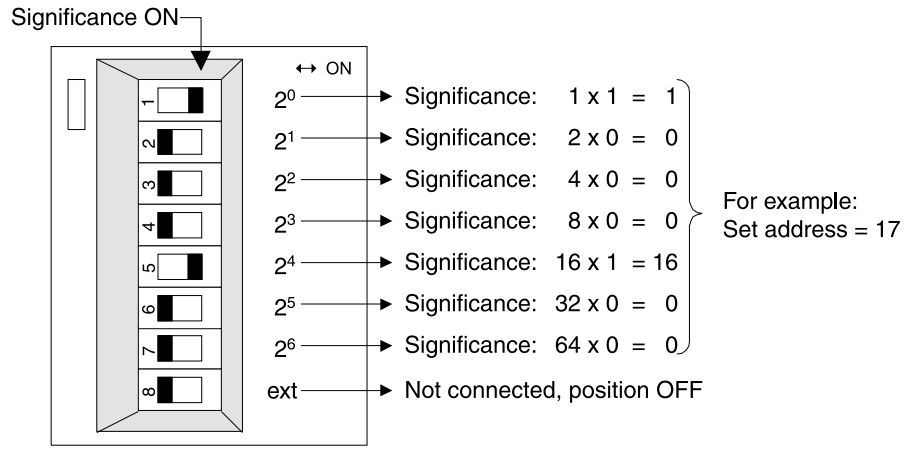
Figure 7: Setting the PROFIBUS station address with MCH41A

The PROFIBUS station address can only be set using the DIP switches when the connection is removed. Therefore, the address cannot be changed during operation. The change only comes into effect when the drive inverter is switched on again (power supply + DC 24 V OFF/ON). The drive inverter displays the current station address in fieldbus monitor parameter P092 "Fieldbus address" (display with DBG11B or MOVITOOLS/SHELL).

Example: Setting station address 17



05528AEN

Figure 8: Setting station address 17

4.3 Installation notes for the INTERBUS-LWL interface (MCH42A)

Bus connection via fiber optic cable (LWL)

The bus connection is made using a fiber optic cable. Polymer fiber cables and HCS cables may be used for this purpose.

Polymer fiber cables

This type of cable is used for distances of up to 70 meters between two INTERBUS participants. Depending on the system, several designs are available. This type of cable is characterized by simple and cost-effective installation.

HCS cable

This type of cable can be used for distances up to 500 m because they are characterized by considerably lower attenuation compared to polymer fibers.

The bus cable must be at least 1 m long. For shorter distances, use cable jumpers from Phoenix Contact.

	NOTE
	For more information on proper routing of fiber optic cables, please refer to the Fiber Optic Installation Guidelines from Phoenix Contact (item designation IBS SYS FOC ASSEMBLY).

Check list for installing fiber optic cables

Installing fiber optic cables

- Do not exceed the maximum cable length
- Observe the permitting bending radii
- Do not squeeze or bend fiber optic cables
- Do not exceed the tensile load when installing the cable
- The optical fiber cable must be uncoiled using an uncoiling device

Protective measures for fiber optic cables

- Protect fiber optic cables against strain and impermissibly small bending radii
- Install the cables without loops
- Protect cables against sharp edges
- Use a special cable type if fiber optic cables are installed in special areas (e.g. in the ground or close to welding robots)

Prefabricating fiber optic cables

- Strip off the outer cable sheath and the individual wire without damaging them
- Fix the individual wire in the connector (strain relief)
- Polish and install the front of the connector according to the guidelines

Measuring fiber optic cables

- Check whether the light intensity complies with the limit values (optical diagnostics using CMD tool or fiber-optic measuring instrument)

Connecting fiber optic connectors

The fiber optic cable is connected to MOVIDRIVE® *compact* MCH42A using F-SMA connectors. Two connectors are required each for the incoming and outgoing remote bus (transmitter and receiver). SEW-EURODRIVE recommends using F-SMA connectors with bending protection to ensure that the optimum bending radius is maintained.

Order information

F-SMA connector (e.g. Phoenix Contact).

Article designation	Designation
F-SMA connector set for polymer fiber cables (4 connectors) with bending protection	PSM-SET-FSMA/4-KT

Pin assignment

INTERBUS remote bus with fiber optic cable

Connection	Signal	Direction	Wire color of FO cable
X30	FO Remote IN (Incoming remote bus)	Receive data	Orange (OG)
X31		Send data	Black (BK)
X32	FO Remote OUT (outgoing remote bus)	Receive data	Black (BK)
X33		Send data	Orange (OG)

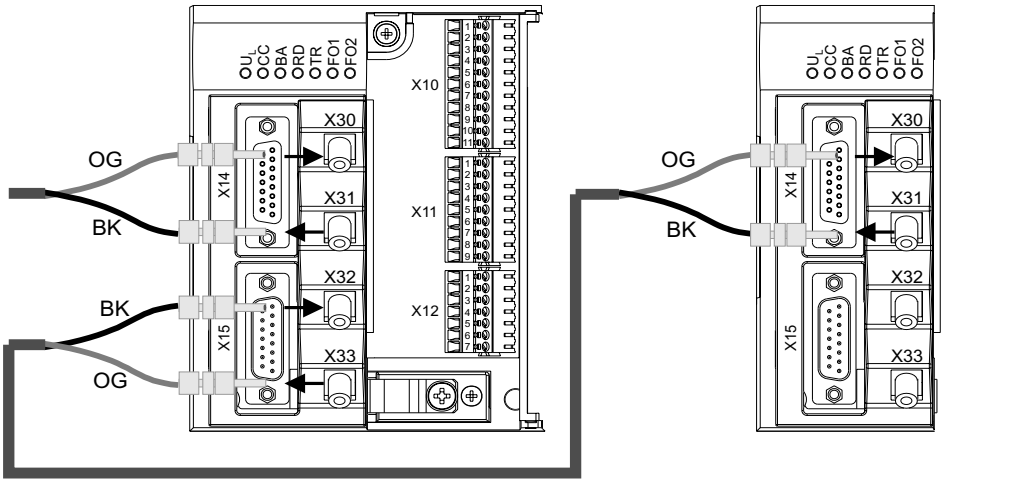


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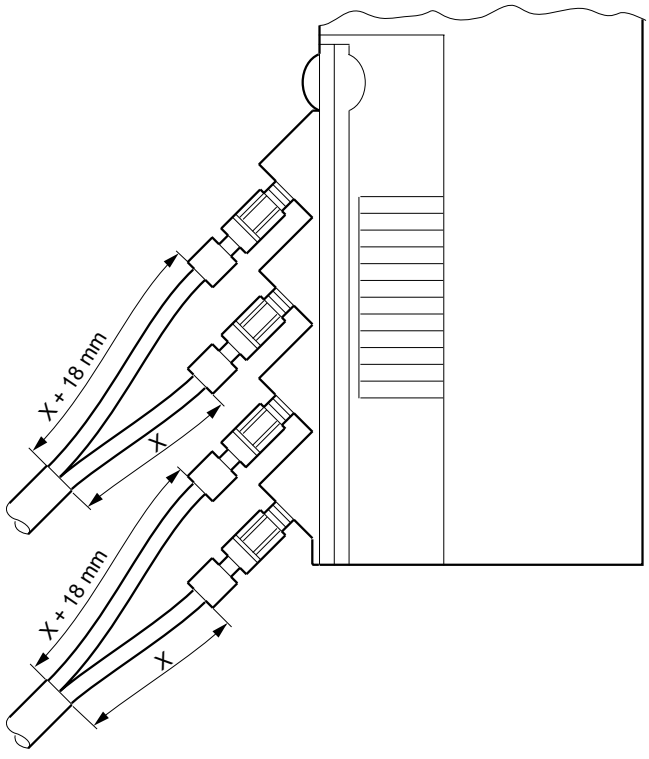
Figure 9: FO connection assignment

Length of the fiber optic cable

Use fiber optic cables of different lengths to prevent the fiber optic cables from bending. Observe the length data in the following figure.



50589BXX

Figure 10: Different lengths of the fiber optic cables

Setting the DIP switches

The six DIP switches S1 to S1 under the connection unit are used for setting the process data length, the PCP length and the baud rate.

STOP	**STOP!**
	You can only access the DIP switches when the connection unit is removed (→ Sec. "Removing the connection unit" on page 38). Before removing the connection unit, you must disconnect the power supply and DC 24 V auxiliary voltage. You cannot change the DIP switches when the system is in operation.

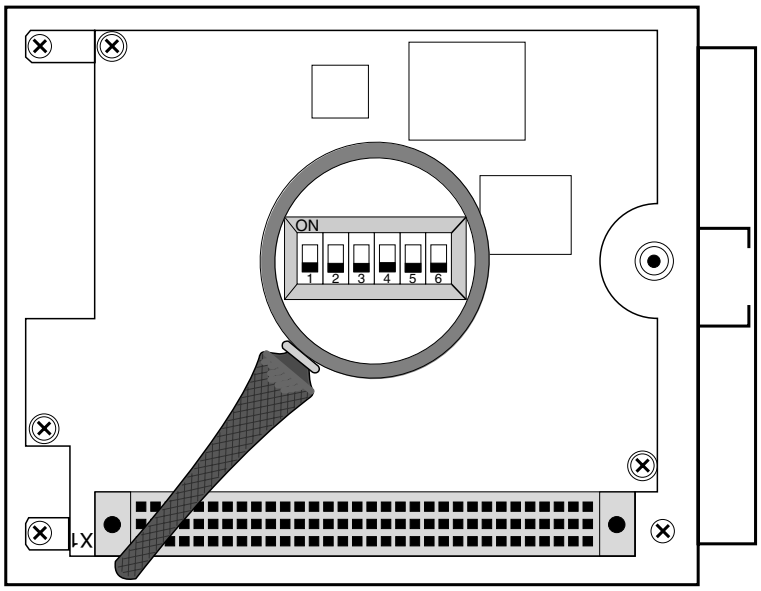


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Figure 11: DIP switches S1... S6 under the connection unit

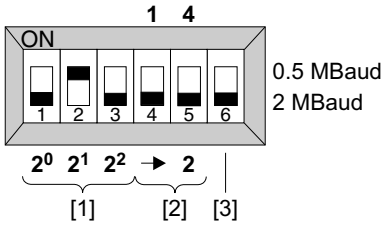

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Figure 12: Settings for DIP switches S1 ... S6

[1] Number of process data items (1 to 6 PD), for example 2 PD

[2] Number of PCP words (1, 2 or 4), for example 2 PCP words

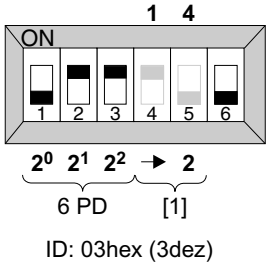
[3] Baud rate (ON = 0.5 MBaud, OFF = 2 MBaud), for example 2 MBaud

If the DIP switch settings are incorrect, the drive inverter responds with the ID code "Microprocessor not ready" (38 hex).

Setting the process data and PCP length

A maximum of six INTERBUS data words can be exchanged between the INTERBUS interface and the inverter. These data words can be distributed between the process data channel and the PCP channel using DIP switches S1 to S5. The restriction to six data words results in settings that cannot be mapped onto the INTERBUS.

The inverter issues the "Microprocessor not ready" ID code (38hex) if the setting is incorrect. The red TR LED indicates that the setting is incorrect. The following figure shows the limit conditions for setting the process data length and PCP length with the following restrictions:



05217AXX

Figure 13: Settings for operating the inverter with 6 process data items

[1] The PCP settings with S4 and S5 are not in effect.

Process data length in words	PCP length	ID-Code
6	PCP setting not in effect; no PCP channel available	03hex (3dec)

Examples:

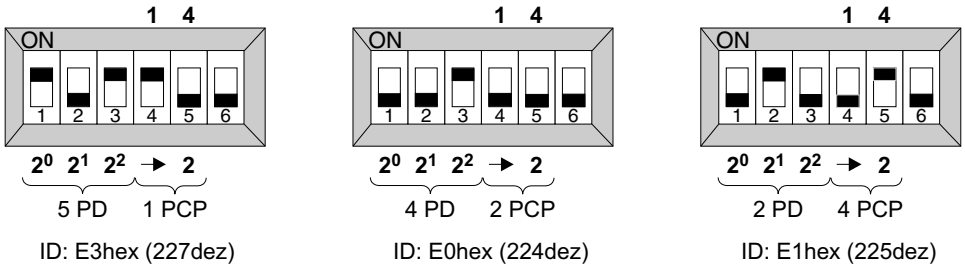


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Figure 14: Examples for setting the PCP length and maximum process data length

PCP length	**Maximum process data length**	**ID-Code**
1 word	5 words	E3 hex (227dec)
2 words	4 words	E0 hex (224dec)
4 words	2 words	E1 hex (225dec)
	If maximum length is exceeded or the setting is 0 or 7 PD	38 hex (56dec) = "Microprocessor not ready"

All settings not listed here result in the ID code "Microprocessor not ready." The inverter then signals 0PD in parameter P090 "PD configuration" and indicates that the setting is incorrect by means of the red TR LED.

4.4 UL compliant installation

Note the following points for UL-compliant installation:

- Only use copper cables with the **following rated thermal values** as connection cables:
  - MOVIDRIVE® *compact* MCH4_A0015 ... 0300: Rated thermal value 60 °C / 75 °C
  - MOVIDRIVE® *compact* MCH4_A0370 ... 0750: Rated thermal value 75 °C
- **Permitted tightening torques** for MOVIDRIVE® *compact* power terminals:
  - Size 1 → 0.6 Nm
  - Size 2 → 1.5 Nm
  - Size 3 → 3.5 Nm
  - Sizes 4 and 5 → 14 Nm
- MOVIDRIVE® *compact* drive inverters are **suited for operation on voltage supply systems with grounded star point** (TN and TT systems) that supply a maximum current according to the following tables and have a max. voltage of AC 240 V for MOVIDRIVE® *compact* MCH4_A...2_3 (AC 230 V units) and AC 500 V for MOVIDRIVE® *compact* MCH4_A...-5_3 (AC 400/500 V units). The performance data of the fuses must not exceed the values listed in the tables.

400/500 V units

MOVIDRIVE® *compact* MCH4_A...5_3	Max. supply current	Max. supply voltage	Fuses
0015/0022/0030/0040	AC 10000 A	AC 500 V	AC 35 A / 600 V
0055/0075/0110	AC 5000 A	AC 500 V	AC 30 A / 600 V
0150/0220	AC 5000 A	AC 500 V	AC 175 A / 600 V
0300	AC 5000 A	AC 500 V	AC 225 A / 600 V
0370/0450	AC 10000 A	AC 500 V	AC 350 A / 600 V
0550/0750	AC 10000 A	AC 500 V	AC 500 A / 600 V

230 V units

MOVIDRIVE® *compact* MCH4_A...2_3	Max. supply current	Max. supply voltage	Fuses
0015/0022/0037	AC 5000 A	AC 240 V	AC 30 A / 250 V
0055/0075	AC 5000 A	AC 240 V	AC 110 A / 250 V
0110	AC 5000 A	AC 240 V	AC 175 A / 250 V
0150	AC 5000 A	AC 240 V	AC 225 A / 250 V
0220/0300	AC 10000 A	AC 240 V	AC 350 A / 250 V

STOP!

The UL approval becomes void if the following conditions are not adhered to:

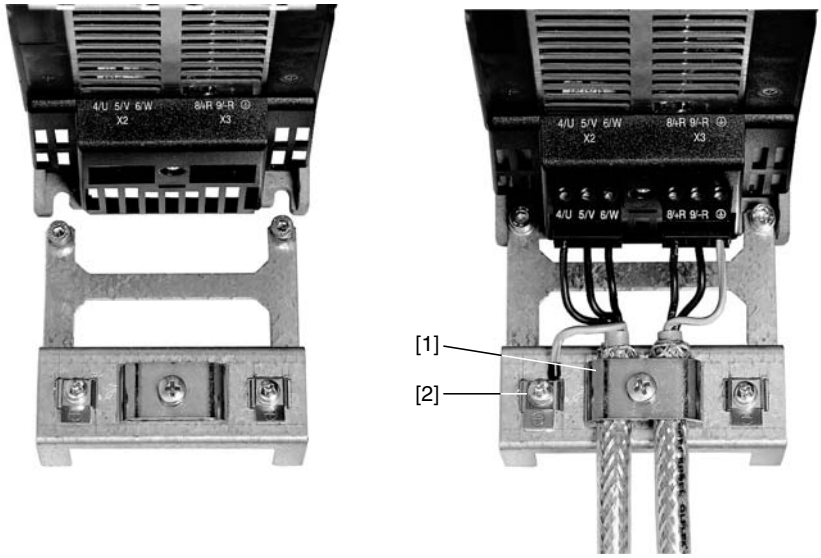
- Use only tested units with a **limited output voltage** (V_{max} = DC 30 V) and **limited output current** (I ≤ 8 A) as an **external DC 24 V voltage source**.
- **UL certification does not apply to operation in voltage supply systems with a non-grounded star point (IT systems).**

4.5 Shield clamps

The shield clamps for the power sections provide you with a very easy way of installing the shield for the motor and brake cables. Apply the shield and PE conductor as shown in the figures.

Shield clamp for power section, size 1

A shield clamp is supplied as standard for the power section with MOVIDRIVE® *compact* size 1. Install this shield clamp together with the unit's retaining screws.



02012CXX

Figure 15: Attaching the shield clamp of the power section (MOVIDRIVE® compact size 1)

[1] Shield clamp
[2] PE connection (⏚)

Shield clamp for power section, size 2

A shield clamp for the power section is supplied as standard with two retaining screws for MOVIDRIVE® *compact* size 2. Install these shield clamp using the two retaining screws.

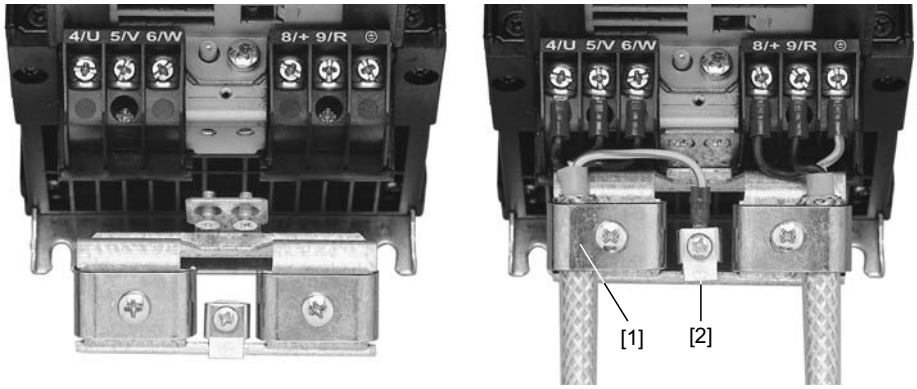


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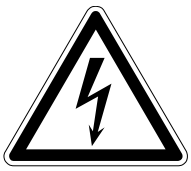
Figure 16: Attaching the shield clamp of the power section (MOVIDRIVE® compact size 2)

[1] Shield clamp
[2] PE connection (⏚)

4.6 Touch guard



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.

When the touch guard is installed, MOVIDRIVE® *compact* sizes 4 and 5 provide enclosure protection IP10; without touch guard IP00.

Two touch guards with 8 retaining screws are supplied as standard with MOVIDRIVE® *compact* sizes 4 and 5. Install the touch guard on both covers of the power section terminals.

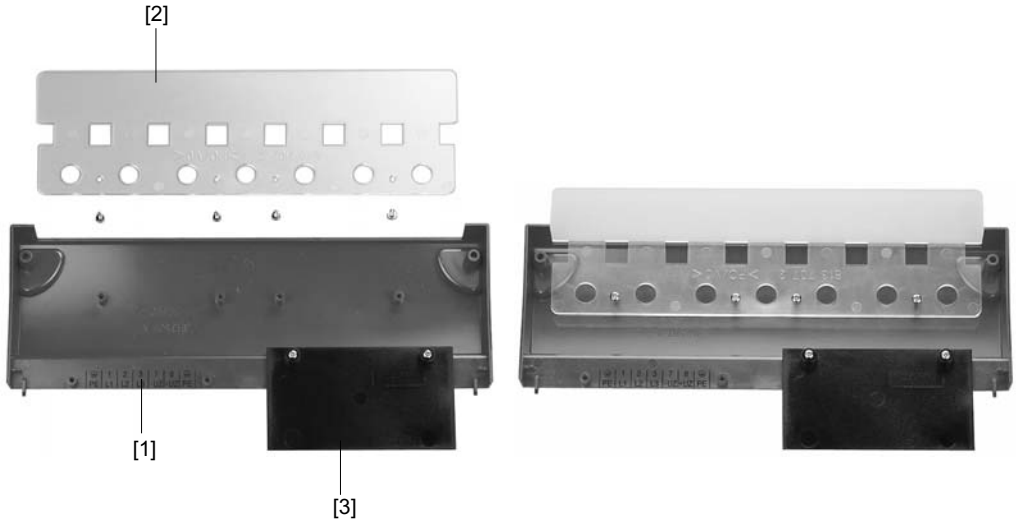
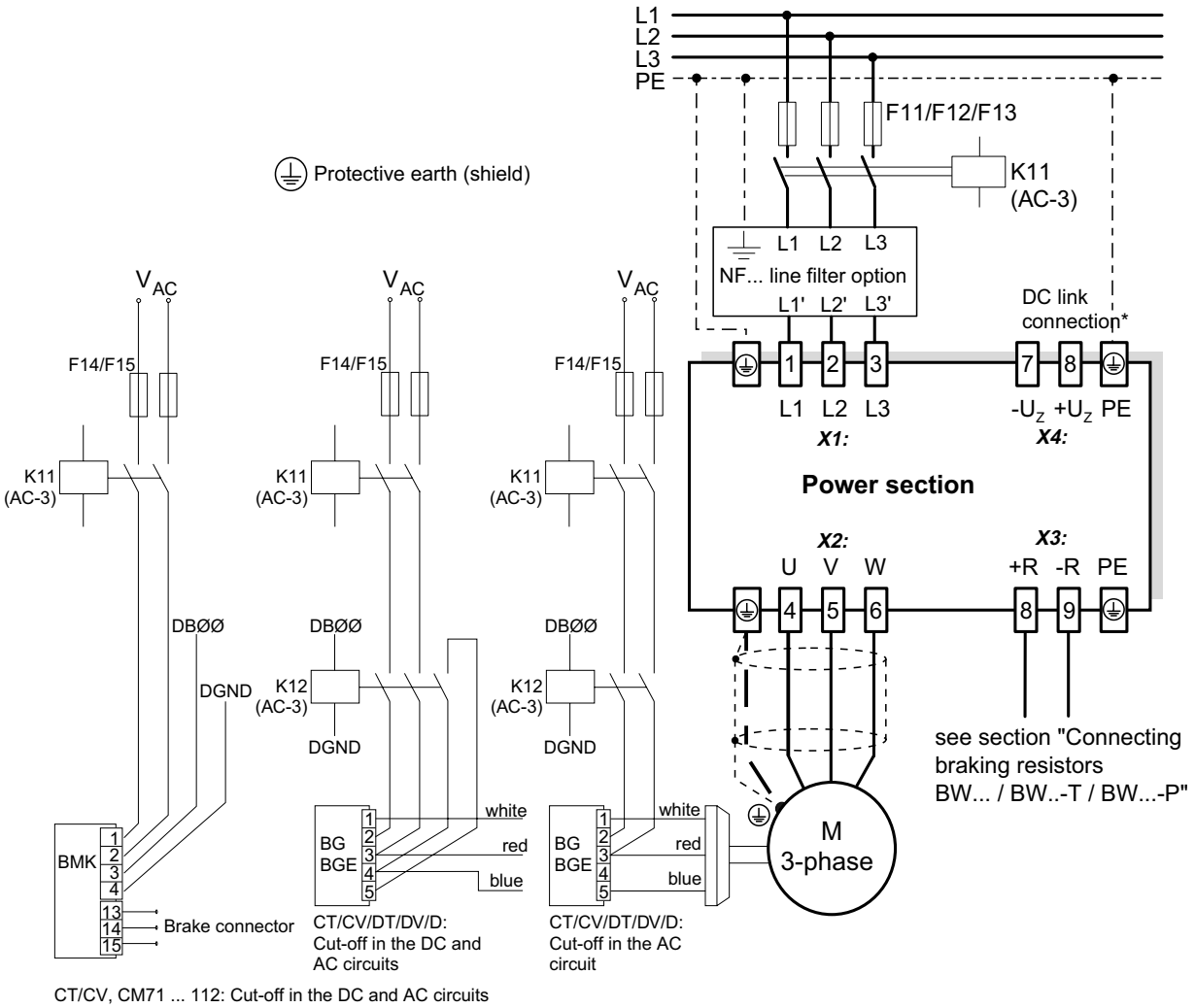


Figure 17: Touch guard for MOVIDRIVE® compact sizes 4 and 5

[1] Cover
[2] Connection plate
[3] Aperture

4.7 Wiring diagram for basic unit

Wiring the power section and brake



55310CEN

Figure 18: Wiring diagram, power section and brake

* With sizes 1 and 2, 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).

Important: Read the operating instructions for the motors when connecting the brake.

STOP	**STOP!**
	If the brake rectifier is connected via the supply system lead, the braking function is restricted. • 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:

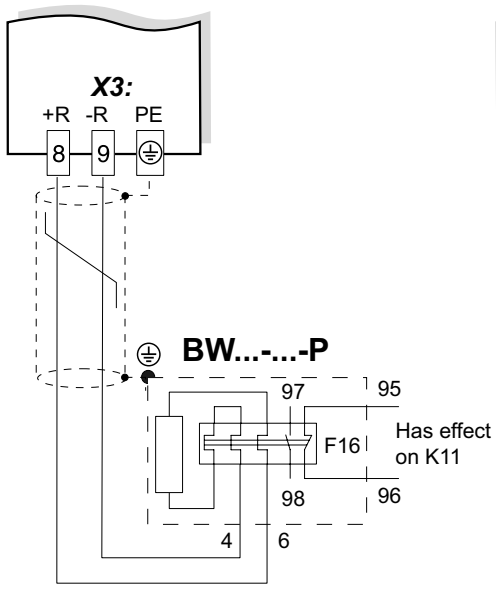
– All hoist applications
– Drives that require a rapid brake response time
– CFC and SERVO operating modes

Brake rectifier in control cabinet

Install the connection cables between the brake rectifier and the brake separately from other power cables when installing the brake rectifier in the control cabinet. Joint installation is only permitted with shielded power cables.

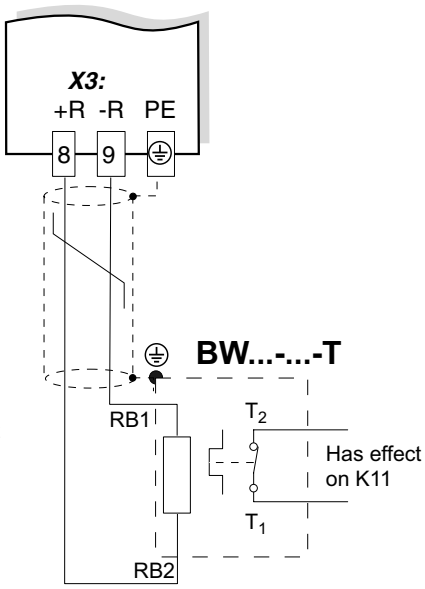
Connecting BW... / BW...-...-T /BW...-...-P braking resistors

Power section



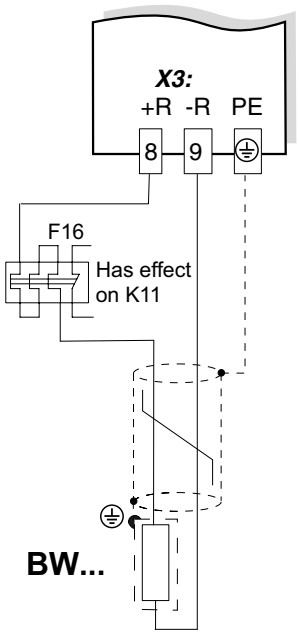
When the auxiliary contact trips, K11 must be opened and DIØØ"/Controller inhibit" assigned a "0" signal. Do not interrupt the resistor circuit!

Power section



When the internal temperature switch triggers, K11 must be opened and DIØØ"/Controller inhibit assigned a "0" signal. Do not interrupt the resistor circuit!

Power section

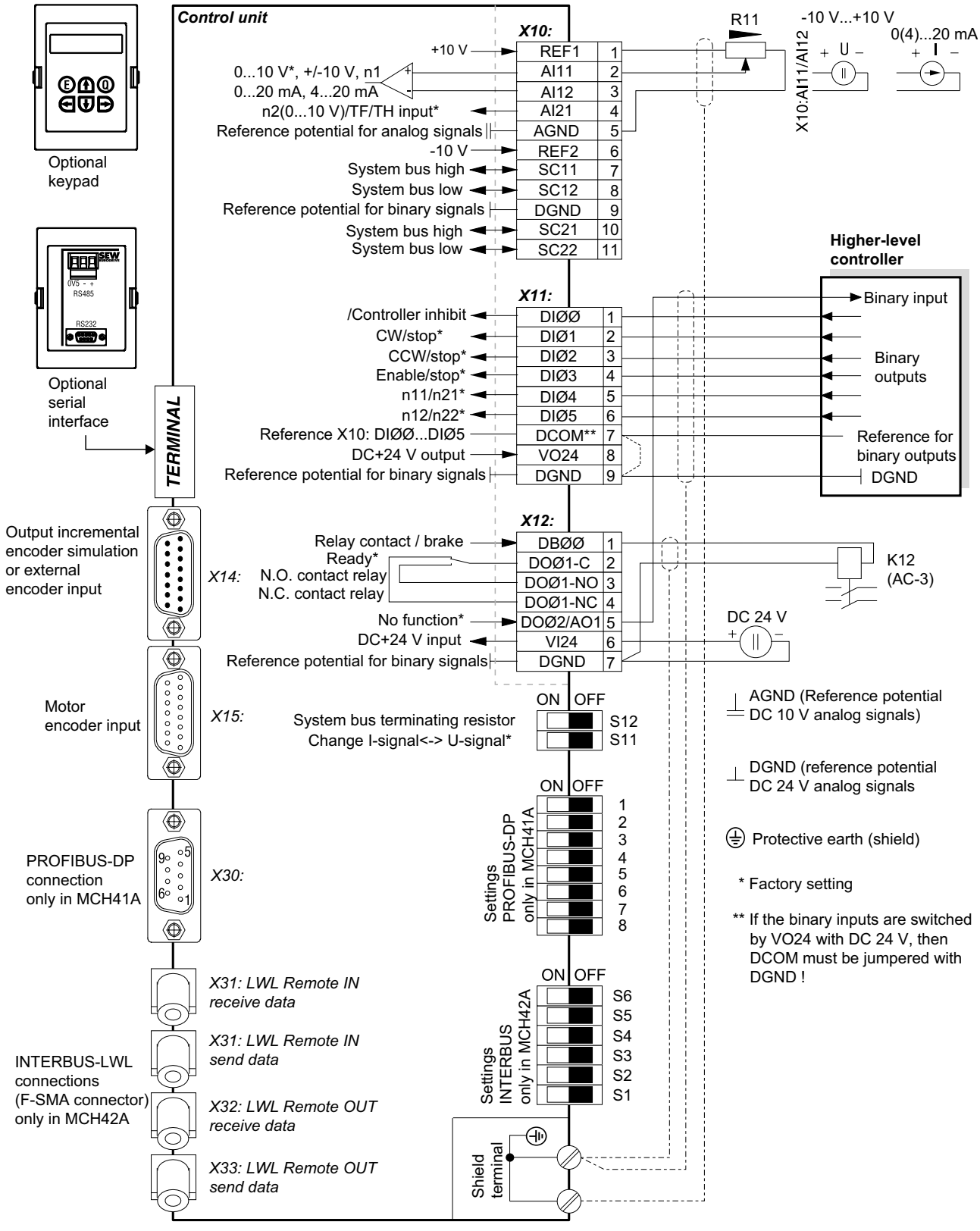


When the external bimetallic relay (F16) triggers, K11 must be opened and DIØØ"/Controller inhibit" assigned a "0" signal. Do not interrupt the resistor circuit!

59500AEN

Braking resistor type	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

MCH4_A: Wiring diagram for the control unit



- **MCH41A (with PROFIBUS-DP) / MCH42A (with INTERBUS-LWL):** SEW-EURODRIVE recommends that you always supply these units with DC 24 V at terminal X10:24 (VI24). This external DC 24 V voltage supply must be able to provide 50 W continuous power and 100 W peak power (1s).
- Analog input AI21 (X10:4) can be used either as a 10 V voltage input or as a TF/TH input. It is switched over using parameter P120.
- You can only access DIP switches S11, S12, 1 ... 8 and S1 ... S6 when the connection unit is removed (→ Sec. "Removing the connection unit").
- For an explanation of the function of DIP switches 1 ... 8, see the sections "Bus termination for MCH41A" and "Setting the station address with MCH41A" on page 23 and page 24 .
- The function of the DIP switches S1 ... S6 is explained in the section "DIP switch settings."
- The TF/TH line must either be shielded or routed at a distance of at least 0.2 m from power cables (e.g. motor or brake cables). The TF/TH line must be separately shielded if hybrid cables are used for the motor and TF/TH connection.

	NOTE
	TF can be connected to X15:6 and X15:14 or X10:1 and X10:4. • If TF is connected to X15, set *P530 sensor type 1* to "TF/TH." • If TF is connected to X10, set *P120 AI2 operating mode* to "TF/TH." With *P835 Response TF signal* you have to set the fault response.

Analog output AO1

For MCH4_A, the binary output DOØ2 (X12:5) can also be used as 0(4)...20 mA analog output AO1. Switch the settings with parameters P621 "Binary output DOØ2" and P642 "Operating mode AO1".

Function of X12:5	P621 "Binary output DOØ2"	P642 "Operating mode AO1"
Binary output DOØ2	≠ set NO FUNCTION	= set OFF
Analog output AO1	= set NO FUNCTION	≠ set OFF
	≠ set NO FUNCTION	≠ set OFF
No function	= set NO FUNCTION	= set OFF

MCH4_A: Functional description of the terminals on the basic 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 connection Motor connection Braking resistor connection DC link connection	
X10:1 **X10:2/3** **X10:4** **X10:5** **X10:6**	**REF1** **AI11/12** **AI21** **AGND** **REF2**	DC+10 V (max. 3 mA) for setpoint potentiometer Setpoint input n1 (differential input or input with AGND reference potential), signal form → P11_ / S11 Either setpoint input n2 (0...10 V) or TF/TH input, setting → P120 Reference potential for analog signals (REF1, REF2, AI..) DC−10 V (max. 3 mA) for setpoint potentiometer	
X10:7/8 **X10:9** **X10:10/11**	**SC11/SC12** **DGND** **SC21/SC22**	System bus high/low, electrically connected with SC21/SC22 (X10:10/X10:11) Reference potential system bus System bus high/low, electrically connected with SC11/SC12 (X10:7/X10:8)	
X11:1 **X11:2** **X11:3** **X11:4** **X11:5** **X11:6**	**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 "CW/stop" Binary input 4, factory setting to "Enable/Stop" Binary input 5, factory setting "n11/n21" Binary input 6, factory setting "n11/n22"	• The binary inputs are electrically isolated by optocouplers. • Selection options for binary inputs 2 to 6 (DIØ1 ... DIØ5) → Parameter menu P60_
X11:7	**DCOM**	Reference for binary inputs DIØØ to DIØ5 (X11:1 to X11:6) • Switching binary inputs with DC+24 V external voltage: DCOM (X11:7) must be connected to the reference potential of the external voltage. – Without jumper DCOM-DGND (X11:7-X11:9) → Isolated binary inputs – With jumper DCOM-DGND (X11:7-X11:9) → Non-isolated binary inputs • Switching binary inputs with DC+24 V from VO24 (X11:8) → DCOM-DGND jumper required.	
X11:8 **X11:9**	**VO24** **DGND**	Auxiliary supply voltage DC+24 V (max. DC 200 mA) for external command switches Reference potential for binary signals	
X12:1 **X12:2** **X12:3** **X12:4** **X12:5** **X12:6** **X12:7**	**DBØØ** **DOØ1-C** **DOØ1-NO** **DOØ1-NC** **DOØ2/AO1** **VI24** **DGND**	Binary output 0, with fixed assignment "/Brake", max. load capacity DC 150 mA (short-circuit proof, protected against external voltage to DC 30 V) Shared contact binary output 1, factory setting "Ready" Normally open contact binary output 1, max. load capacity of relay contacts DC 30 V and DC 0.8 A NC contact binary output 1 Binary output 2, factory setting "No function," load capacity max. DC 50 mA (short-circuit proof, protected against external voltage to DC 30 V), can also be used as analog output AO1, switch using P621 and P642 Selection options for binary outputs 1 and 2 (DOØ1 and DOØ2) → Parameter menu P62_ **Do not apply external voltage to binary outputs DBØØ (X12:1) and DOØ2/AO1 (X12:5).** Input DC+24 V voltage supply (backup voltage, unit diagnosis when supply system off) Reference potential for binary signals	
X14:1 **X14:2** **X14:3** **X14:4** **X14:5/6** **X14:7** **X14:8** **X14:9** **X14:10** **X14:11** **X14:12** **X14:13/14** **X14:15**	**Input for external encoder or output for incremental encoder simulation**	Signal track A (K1) Signal track B (K2) Signal track C (K0) DATA + Reserved switchover Reference potential DGND Signal track A (K1) Signal track B (K2) Signal track C (K0) DATA - Reserved DC+12 V (max. DC 180 mA)	The following encoders can be connected as external encoders: • Hiperface encoder type AS1H, ES1H or AV1H • sin/cos encoder type ES1S, ES2S or EV1S • 5 V TTL sensor with DC -24 V voltage supply type ES1R, ES2R or EV1R • 5 V TTL sensor with DC 5 V voltage supply type ES1T, ES2T or EV1T via option DWI11A 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 with a DC 24 V supply voltage.
X15:1 **X15:2** **X15:3** **X15:4** **X15:5** **X15:6** **X15:7** **X15:8** **X15:9** **X15:10** **X15:11** **X15:12** **X15:13** **X15:14** **X15:15**	**Motor encoder input**	Signal track A (K1) Signal track B (K2) Signal track C (K0) DATA + Reserved TF2 Reserved Reference potential DGND Signal track A (K1) Signal track B (K2) Signal track C (K0) DATA - Reserved TF2 DC+12 V (max. DC 180 mA)	The following encoders can be connected: • Hiperface encoder type AS1H or ES1H • sin/cos encoder type ES1S, ES2S or EV1S • 5 V TTL sensor with DC -24 V voltage supply type ES1R, ES2R or EV1R • 5 V TTL sensor with DC 5 V voltage supply type ES1T, ES2T or EV1T via option DWI11A The DC 12 V supply voltage from X14 and X15 is sufficient to operate SEW encoders with a DC 24 V supply voltage.
S1 ... S6		DIP switches for INTERBUS settings → Sec. "DIP switch settings" (page 27)	
S11: **S12:**		Change I-signal DC (0(4)...20 mA) ↔ U-signal DC (-10 V...0...10 V, 0...10 V), factory set to U signal. Switch system bus terminating resistor on/off; factory setting: OFF.	
TERMINAL		Slot for option DBG11B or options USS21A / USB11A	

MCH42A: Assigning electronics terminals and the label

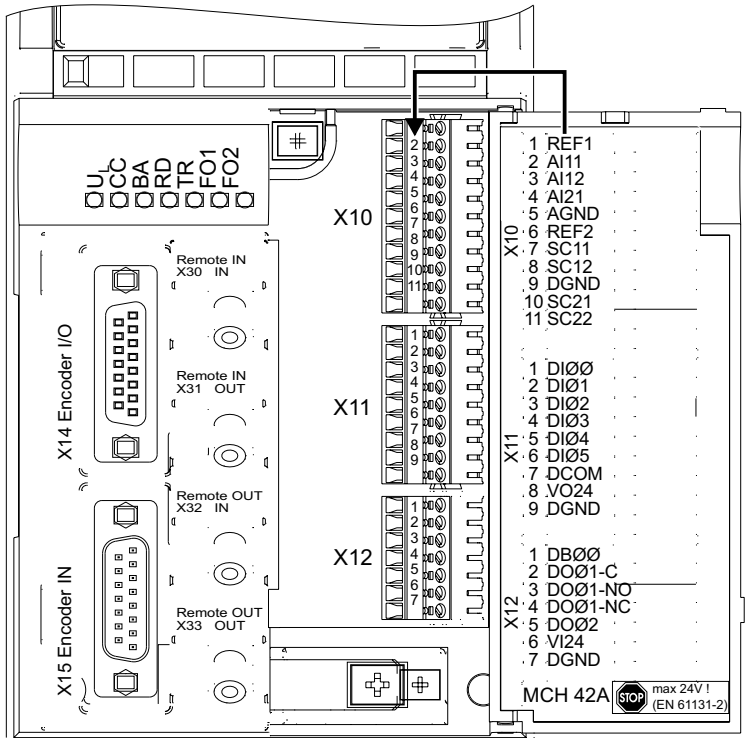


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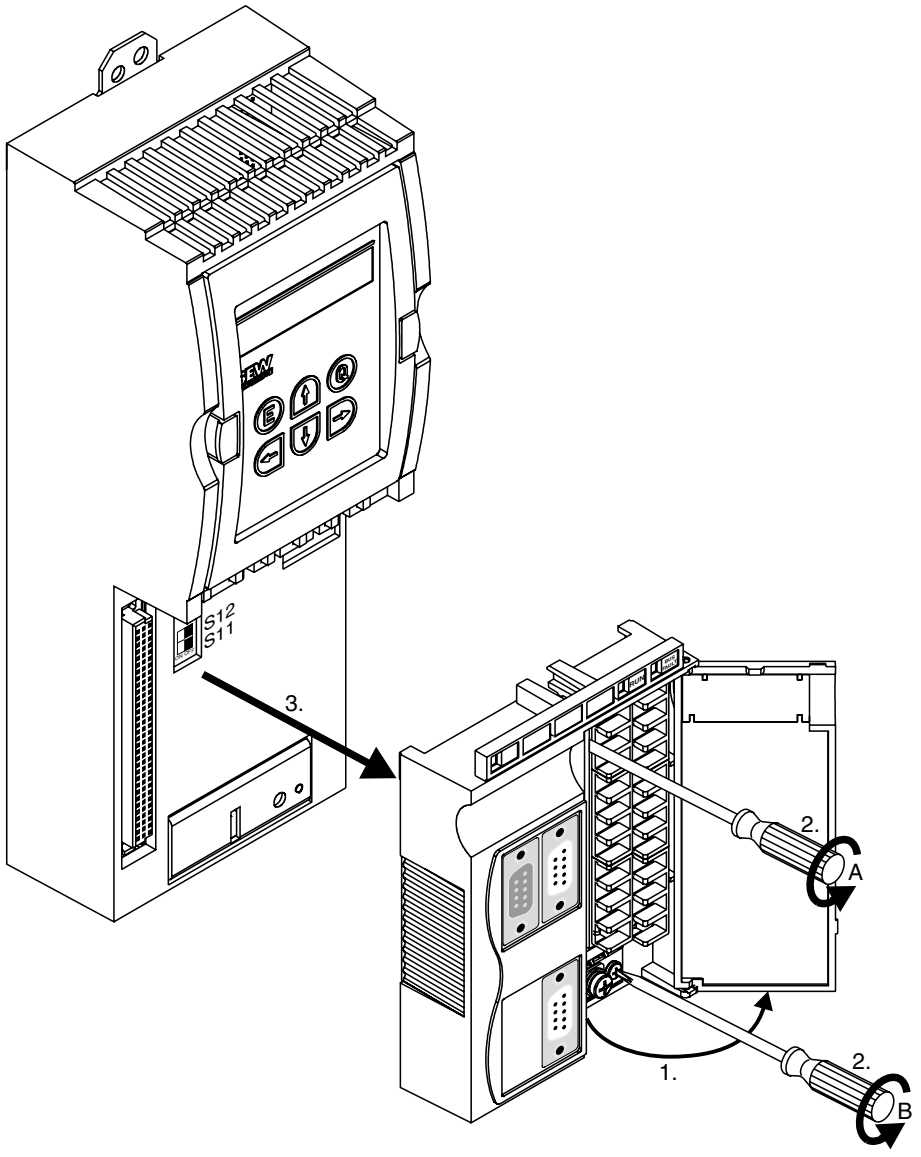
Figure 19: Electronics terminals and label on MCH42A

4.8 Removing the connection unit

	NOTE
	Turn off the supply voltage and DC 24 V auxiliary voltage before removing the connection unit.

For simple installation of the control leads, remove the entire connection unit from the control unit. You have to remove the connection unit to set the DIP switches for PROFIBUS (1 ... 10), INTERBUS (S1...S6), signal switchover n1 (S11) and SBus terminating resistor (S12). Proceed as follows:

1. Open the panel of the connection unit.
2. Loosen retaining screws A and B; they are captive screws and cannot fall out.
3. Remove the connection unit from the control module.



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Follow the instructions in reverse order when installing the connection unit.

4.9 Assignment of braking resistors, chokes and filters

AC 400/500 V units, sizes 1 and 2

MOVIDRIVE® *compact* MC_4A...-5A3				0015	0022	0030	0040	0055	0075	0110
Size				1				2		
Braking resistors BW... / BW..-...-T	**Trip current**	**Part number BW...**	**Part number BW...-...-T**							
BW100-005	I_F = 0.8 A_{RMS}	826 269 1								
BW100-006/ BW100-006-T	I_F = 2.4 A_{RMS}	821 701 7	1820 419 8							
BW168/BW168-T	I_F = 3.4 A_{RMS}	820 604 X	1820 133 4							
BW268/BW268-T	I_F = 4.2 A_{RMS}	820 715 1	1820 417 1							
BW147/BW147-T	I_F = 5 A_{RMS}	820 713 5	1820 134 2							
BW247/BW247-T	I_F = 6.5 A_{RMS}	820 714 3	1820 084 2							
BW347/BW347-T	I_F = 9.2 A_{RMS}	820 798 4	1820 135 0							
BW039-012/ BW039-012-T	I_F = 5.5 A_{RMS}	821 689 4	1820 136 9							
BW039-026-T	I_F = 8.1 A_{RMS}		1820 415 5							
BW039-050-T	I_F = 11.3 A_{RMS}		1820 137 7							
Line chokes		**Part number**								
ND020-013	ΣI_{mains} = AC 20 A	826 012 5								
ND045-013	ΣI_{mains} = 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	**Internal diameter**	**Part number**								
HD001	d = 50 mm	813 325 5		for cable cross sections 1.5 ... 16 mm^2 (AWG 16 ... 6)						
HD002	d = 23 mm	813 557 6		for cable cross sections ≤ 1.5 mm^2 (AWG 16)						
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**								
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 %)**

AC 400/500 V units, sizes 3 to 5

MOVIDRIVE® *compact* MC_4_A...-503					0150	0220	0300	0370	0450	0550	0750
Size					3			4		5	
Braking resistors BW... / BW...-...-T BW...-...-P	Trip current	Part number BW...	Part number BW...-...-T	Part number BW...-...-P							
BW018-015/ BW018-015-P	I_F = 9.1 A_{RMS}	821 684 3		1820 416 3				C	C		
BW018-035-T	I_F = 13.9 A_{RMS}		1820 138 5					C	C		
BW018-075-T	I_F = 20.4 A_{RMS}		1820 139 3					C	C		
BW915-T	I_F = 32.6 A_{RMS}		1820 413 9								
BW012-025/ BW012-025-P	I_F = 14.4A_{RMS}	821 680 0		1820 414 7							
BW012-050-T	I_F = 20.4 A_{RMS}		1820 140 7								
BW012-100-T	I_F = 28.8 A_{RMS}		1820 141 5								
BW106-T	I_F = 47.4 A_{RMS}		1820 083 4								
BW206-T	I_F = 54.7 A_{RMS}		1820 412 0								
Line chokes		Part number									
ND045-013	ΣI_{mains} = AC 45 A	826 013 3				A					
ND085-013	ΣI_{mains} = AC 85 A	826 014 1				B			A		
ND150-013	ΣI_{mains} = AC 150 A	825 548 2							B		
Line filter		Part number									
NF035-503	V_{max} = AC 550 V	827 128 3			A						
NF048-503		827 117 8			B	A					
NF063-503		827 414 2				B	A				
NF085-503		827 415 0					B		A		
NF115-503		827 416 9							B	A	
NF150-503		827 417 7								B	
NF210-503		827 418 5									
Output chokes	Inside 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	D	D

A In rated operation (100 %)

B With variable torque load (125 %)

C Connect two braking resistors in parallel and set twice the trip current at F16 (2 x I_F)

D Connect two output filters in parallel

E In rated operation (100 %): One output filter
With variable torque load (125 %): Connect two output filters in parallel

AC 230 V units, sizes 1 to 4

MOVIDRIVE® *compact* MC_4_A...-2_3				0015	0022	0037	0055	0075	0110	0150	0220	0300
Size				1			2		3		4	
Braking resistors BW...-.../ BW...-...-T	**Trip current**	**Part number BW...**	**Part number BW...-...-T**									
BW039-003	I_F = 2.7 A_{RMS}	821 687 8										
BW039-006	I_F = 3.9 A_{RMS}	821 688 6										
BW039-012 BW039-012-T	I_F = 5.5 A_{RMS}	821 689 4	1 820 136 9									
BW039-026-T	I_F = 8.1 A_{RMS}		1 820 415 5									
BW027-006	I_F = 4.7 A_{RMS}	822 422 6										
BW027-012	I_F = 6.6 A_{RMS}	822 423 4										
BW018-015-T	I_F = 9.1 A_{RMS}		1 820 416 3						C	C	C	C
BW018-035-T	I_F = 13.9 A_{RMS}		1 820 138 5						C	C	C	C
BW018-075-T	I_F = 20.4 A_{RMS}		1 820 139 3						C	C	C	C
BW915-T	I_F = 32.6 A_{RMS}		1 820 413 9						C	C	C	C
BW012-025-T	I_F = 14.4 A_{RMS}		1 820 414 7									
BW012-050-T	I_F = 20.4 A_{RMS}		1 820 140 7									
BW012-100-T	I_F = 28.8 A_{RMS}		1 820 141 5									
BW106-T	I_F = 47.4 A_{RMS}		1 820 083 4								C	C
BW206-T	I_F = 54.7 A_{RMS}		1 820 412 0								C	C
Line chokes		**Part number**										
ND020-013	ΣI_{mains} = AC 20 A	826 012 5					A					
ND045-013	ΣI_{mains} = AC 45 A	826 013 3					B		A			
ND085-013	ΣI_{mains} = AC 85 A	826 014 1							B		A	
ND150-013	ΣI_{mains} = 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	**Inside diameter**	**Part number**										
HD001	d = 50 mm	813 325 5	for cable cross sections 1.5 ... 16 mm^2 (AWG 16 ... 6)									
HD002	d = 23 mm	813 557 6	for cable cross sections ≤ 1.5 mm^2 (AWG 16)									
HD003	d = 88 mm	813 558 4	for cable cross sections > 16 mm^2 (AWG 6)									

A **In rated operation (100 %)**

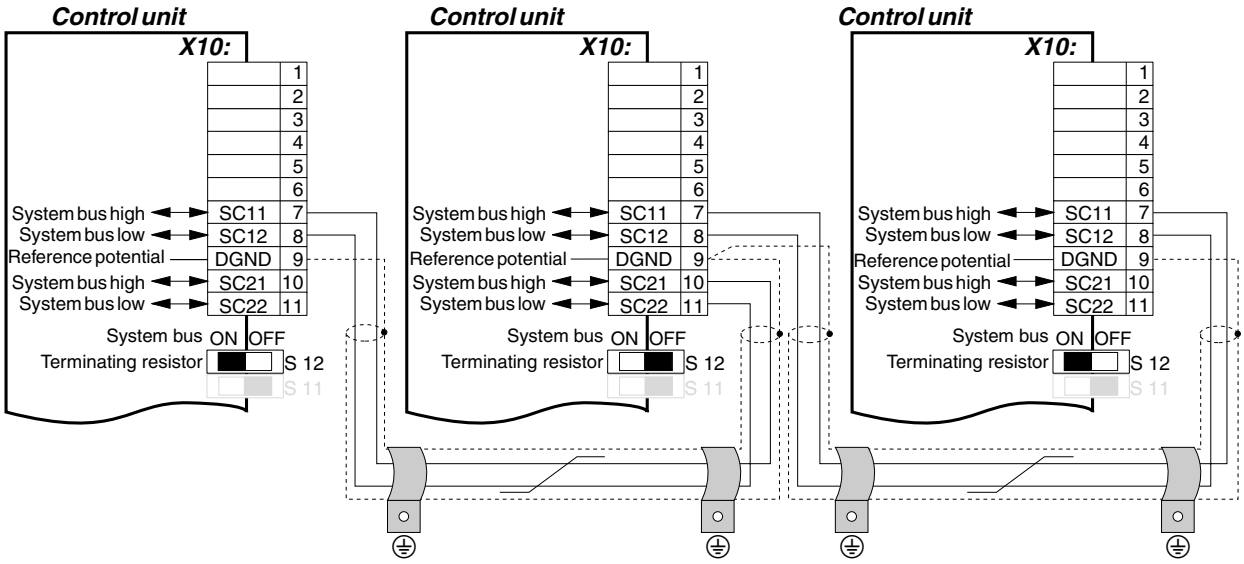
B **With variable torque load (125 %)**

C **Connect two braking resistors in parallel and set twice the trip current on F16 ($2 \times I_F$)**

4.10 Installing the system bus (SBus)

	NOTE
	Only if P884 "SBus baud rate" = 1000 kBaud: Do not combine MOVIDRIVE® *compact* MCH4_A units with other MOVIDRIVE® units in the same system bus system. The units may be combined at baud rates ≠ 1000 kBaud.

Wiring diagram for SBus MOVIDRIVE® compact MCH4_A



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SBus MCH4_A: Connect the terminating equipment to SC11/SC12. SC21/SC22 are only active when S12 = OFF.

Cable specification

- Use a 2-core twisted and shielded copper cable (data transmission cable with braided copper shield). The cable must meet the following specifications:
  - Core cross section 0.75 mm^2 (AWG 18)
  - Line resistance 120 Ω at 1 MHz
  - Capacitance per unit length ≤ 40 pF/m at 1 kHz

  Suitable cables include CAN bus or DeviceNet cables.

Shielding

- Connect the shield at both ends to the electronics shield clamp of the inverter or the master controller and ensure the shield is connected over a large area. Also connect the ends of the shield to DGND.

Cable length

- The permitted total cable length depends on the baud rate setting of the SBus (P816):
  - 125 kBaud → 320 m
  - 250 kBaud → 160 m
  - **500 kBaud → 80 m**
  - 1000 kBaud → 40 m

Terminating resistor

- Switch on the system bus terminating resistor (S12 = ON) at the start and end of the system bus connection. Disconnect the terminating resistor at the other devices (S12 = OFF).

STOP!

There must not be any potential displacement between the units connected with the SBus. This can restrict the functionality of the units.

Take suitable measures to avoid a potential displacement, e.g. by connecting the unit ground connectors using a separate lead.

4.11 Connecting option USS21A (RS232 and RS485)

Part number

Interface adapter option USS21A: 822 914 7

RS232 connection

- Use a standard shielded interface cable with a 1:1 connection for connecting the RS232 interface.

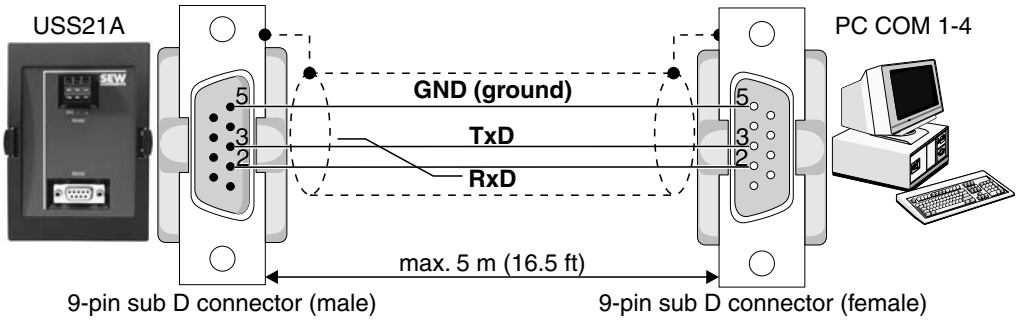

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Figure 20: USS21A - PC connection cable (1:1 connection assignment)

RS485 connection

Read the following connection instructions carefully:

- Use a 2-core twisted and shielded copper cable (data transmission cable with braided copper shield). The cable must meet the following specifications:
  - Core cross section 0.5 ... 0.75 mm^2 (AWG 20 ... 18)
  - Cable resistance 100 ... 150 Ω at 1 MHz
  - Capacitance per unit length ≤ 40 pF/m at 1 kHz
- Connect the shield at both ends to the electronics shield clamp of the inverter and ensure the shield is connected over a large area. Also connect the ends of the shield to DGND.

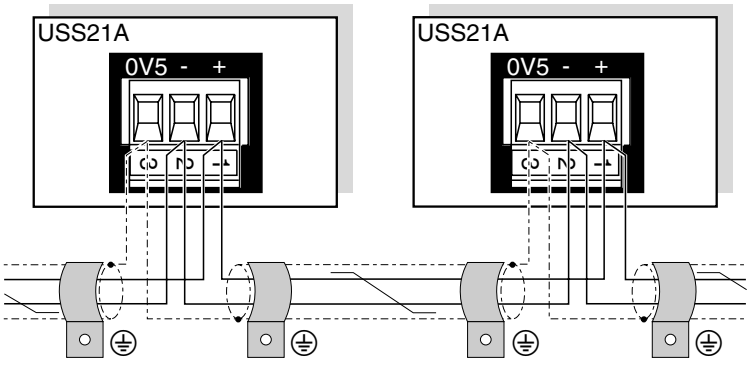

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Figure 21: RS485 interface of USS21A

EIA standard

The RS485 interface of the USS21A complies with the EIA standard:

- Max. transmission rate 9600 Baud
- Max. 32 stations (each unit with USS21A counts as 2 stations)
- Max. total cable length 200 m
- Dynamic terminating resistor with fixed installation

4.12 Connecting the interface adapter USB11A / DKG11A

Part number

- 824 831 1 Interface adapter USB11A
- 819 558 7 Serial interface cable DKG11A (length 3 m)

Description

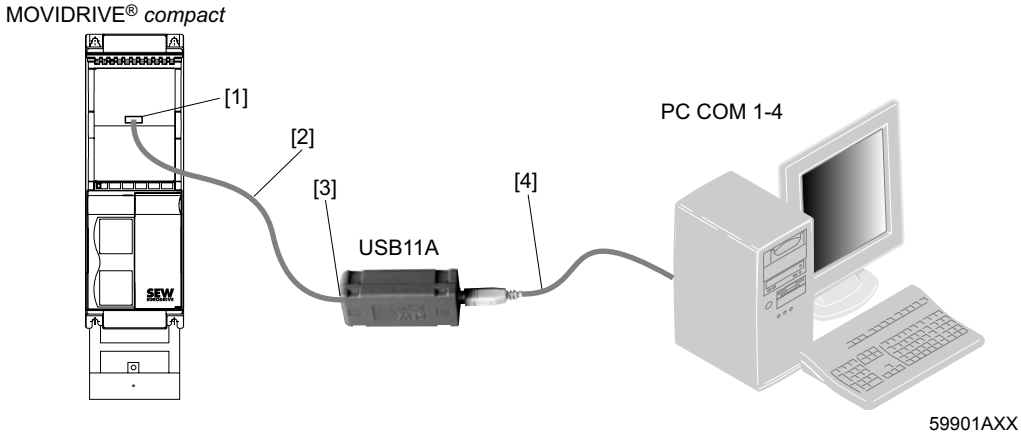
Option USB11A enables a PC or laptop with a USB interface to be connected to the TERMINAL slot of MOVIDRIVE® *compact*. The USB11A interface adapter supports USB1.1 and USB2.0.

Scope of delivery

- The scope of delivery for the USB11A includes:
  - USB11A interface adapter
  - USB connection cable PC - USB11A (type USB A-B)
  - CD-ROM with drivers and MOVITOOLS®
- The USB11A interface adapter supports USB 1.1 and USB 2.0.
- The scope of delivery for the USB11A **does not** include:
  - DKG11A connection cable (length 3 m, part number 819 558 7) for connecting MOVIDRIVE® *compact* - USB11A.

Connecting MOVIDRIVE® - USB11A - PC

- MOVIDRIVE® *compact* is connected to USB11A (cable RJ10-TERMINAL) using the serial interface cable type DKG11A (length 3 m, part number 819 558 7).
- USB11A is connected to the PC using a commercially available, shielded USB connection cable type USB A-B.



Dimension drawing

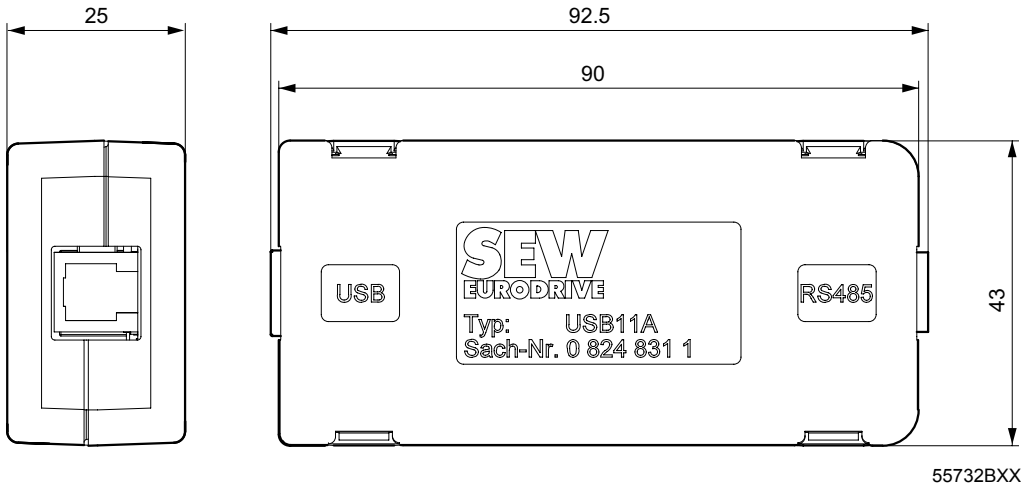


Figure 22: USB11A dimension drawing, dimensions in mm

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)
Enclosure	IP20
Weight	300 g
Dimensions	92.5 x 43 x 25 mm

4.13 Connection of motor encoder and external encoder

	NOTE
	The wiring diagrams do now show the view onto the cable end. They show the connection to the motor or MOVIDRIVE®. The core colors specified in the wiring diagrams are in accordance with the IEC 757 color code and correspond to the core colors used in the prefabricated cables from SEW-EURODRIVE. For more details, refer to the "SEW Encoder Systems" manual, which can be obtained from SEW-EURODRIVE.

General installation instructions

- Max. line length inverter - encoder: 100 m with a capacitance per unit length ≤ 120 nF/km.
- MCH4_A: Core cross section
  - Hiperface® encoders, sin/cos encoders and TTL sensors with DC 5 V supply (via DWI11A): 0.25 ... 0.5 mm^2 (AWG 23 ... 20)
  - TTL encoder with DC 12 ... 24 V supply: 0.5 mm^2 (AWG 20)
- If you cut a core of the encoder cable, isolate the cut-off end of the core.
- Use shielded cables with twisted pair conductors and make sure they are grounded on both ends over a large surface area:
  - At the encoder in the cable gland or in the encoder plug
  - At the inverter in the housing of the Sub-D connector and at the electronics shield clamp of the inverter
- Use an encoder connector and Sub-D connector with metal housing.
- Route the encoder cable separately from the power cables.
- Encoder with cable gland: Observe the permitted diameter of the encoder cable to ensure that the cable gland functions correctly.

Shielding

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 illustration).

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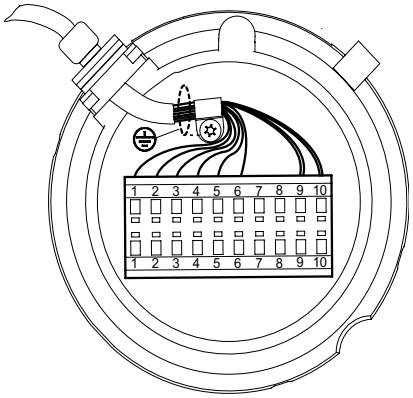
On the encoder/resolver

Connect the shield on the encoder/resolver side at the respective earthing clamps (→ following illustration). When using an EMC screw fitting, apply the shield over a wide area in the cable gland. For drives with a plug connector, connect the shield on the encoder plug.



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Prefabricated cables

SEW-EURODRIVE offers prefabricated cables for connecting encoders. We recommend using these prefabricated cables.

Motor encoder

You can connect the following motor encoders at X15 on the MOVIDRIVE® *compact* units:

- MCH4_A
  - Hiperface® encoder
  - High-resolution sin/cos encoders with signal voltage AC 1 V_{SS}
  - TTL sensors with signal level to RS422

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Figure 23: SEW encoder with plug connector or connecting terminals

Voltage supply

Connect encoders with DC 12 ... 24 V voltage supply (max. DC 180 mA) directly at X15. These encoders are then powered by the inverter.

Connect encoders with a DC 5 V voltage supply via the "DC 5 V encoder power supply type DWI11A" option (part number 822 759 4).

sin/cos encoders You can also connect the high-resolution sin/cos encoders ES1S, ES2S or EV1S to MOVIDRIVE® *compact* MCH4_A. Connect the sin/cos encoder as follows:

Connection to MCH4_A

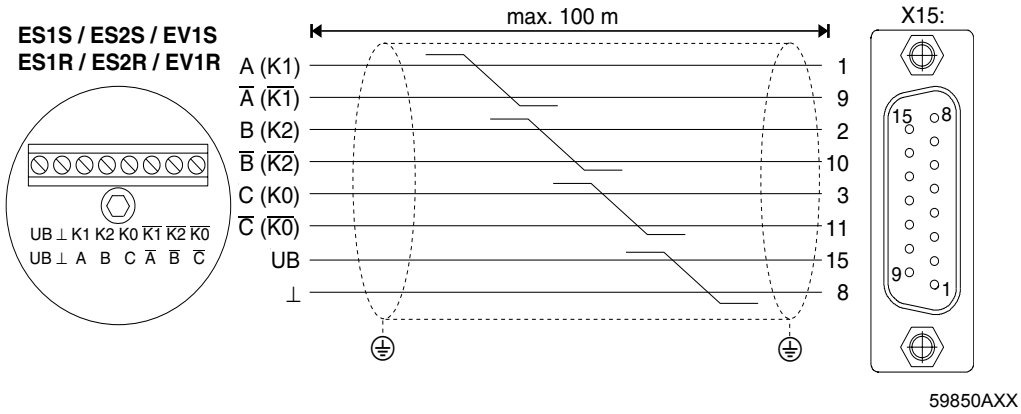

Figure 24: Connecting the sin/cos encoder to MCH4_A as a motor encoder

TTL sensor

TTL sensors from SEW-EURODRIVE are available with DC 12...24 V and DC 5 V voltage supply.

DC 12...24 V voltage supply

Connect TTL sensors with DC 12 ... 24 V voltage supply ES1R, ES2R or EV1S in the same way as the high-resolution sin/cos encoders.

DC 5 V voltage supply

TTL sensors with a DC 5 V voltage supply ES1T, ES2T or EV1T must be connected via the "DC 5 V encoder power supply type DWI11A" option (part number 822 759 4). You must also connect the sensor cable to be able to correct the supply voltage of the encoder. Connect this encoder as follows:

Connection to MCH4_A

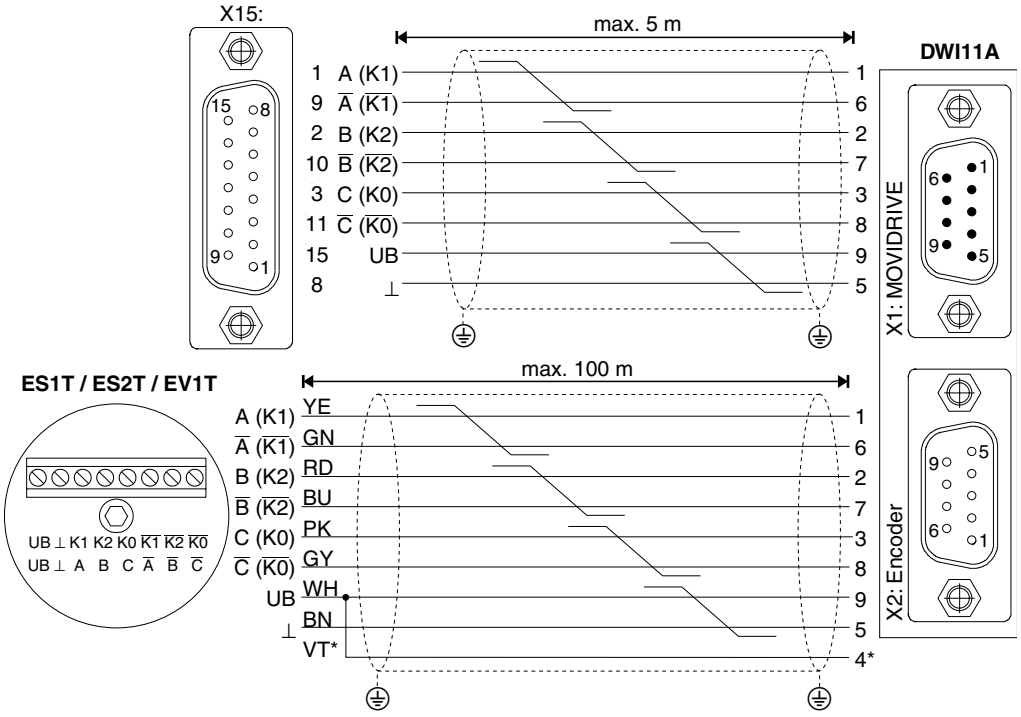

Figure 25: Connecting the TTL sensor via DWI11A to MCH4_A as a motor encoder

* Connect the sensor cable (VT) on the encoder to UB, do not jumper with DWI11A!

Part numbers of the prefabricated cables:

- Encoders ES1T / ES2T / EV1T → DWI11A X2:Encoder
  - For fixed routing: 198 829 8
  - For cable carrier routing: 198 828 X

Hiperface® encoder

Hiperface encoders AS1H, ES1H and AV1H are recommended for operation with MOVIDRIVE® *compact* MCH4_A. Depending on the motor type and motor configuration, you can connect the encoder using either a plug connector or via the terminal box.

CM71...112 with plug connector

Connect the Hiperface® encoder as follows:

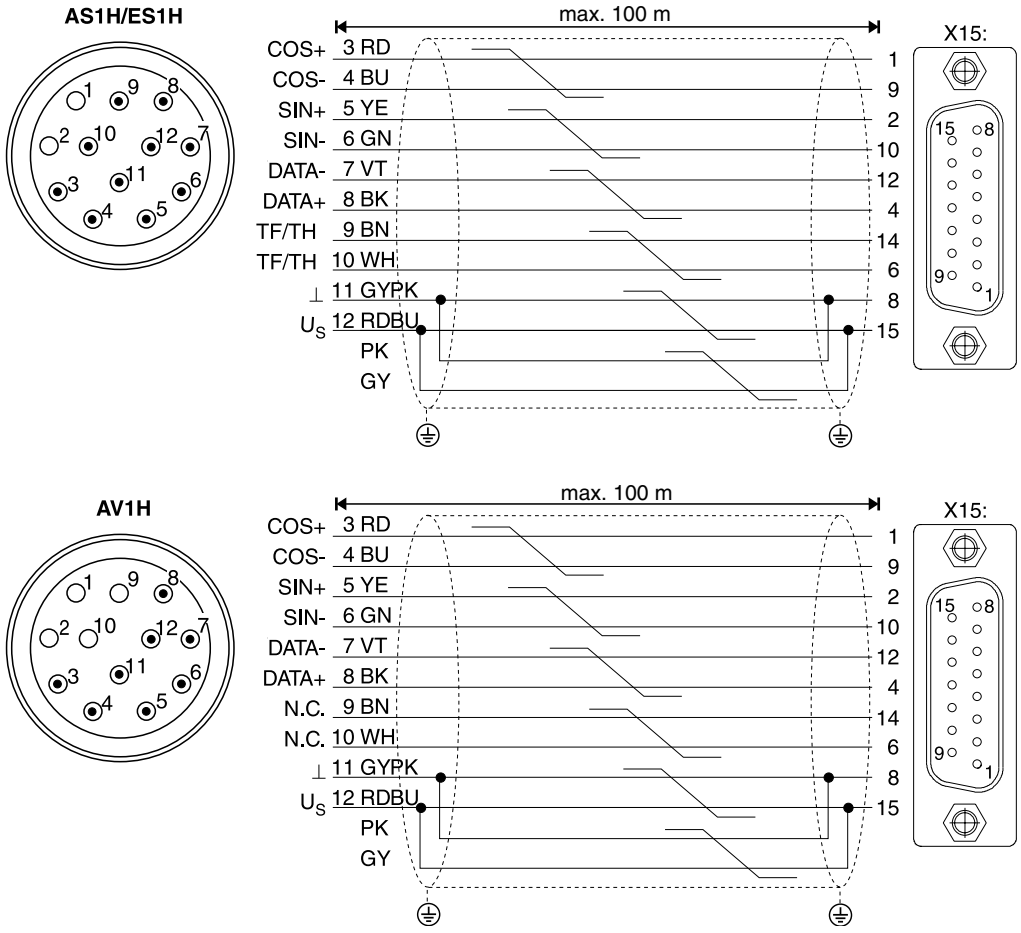

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Figure 26: Connecting a Hiperface® encoder to MCH4_A as a motor encoder

Part numbers of the prefabricated cables:

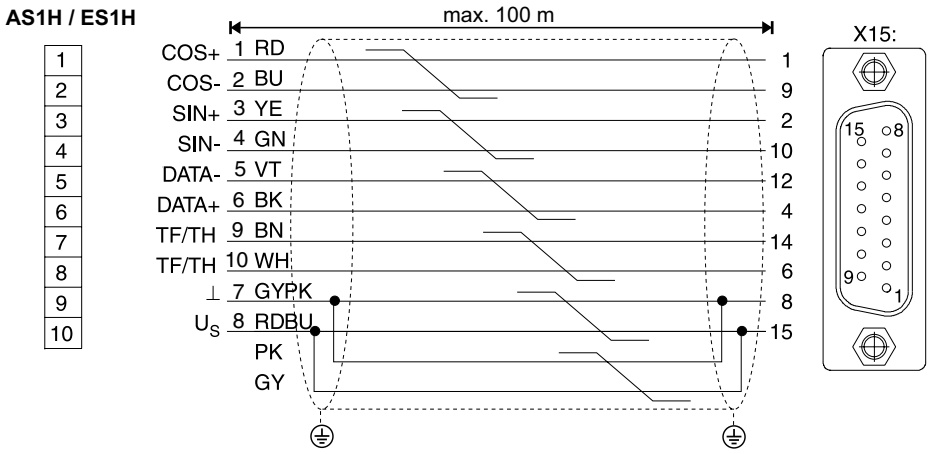
- For fixed routing: 199 488 3
- For cable carrier routing: 199 320 8

Part numbers of the prefabricated extension cables:

- For fixed routing: 199 539 1
- For cable carrier routing: 199 540 5

CM71...112 with terminal box

Connect the Hiperface® encoder as follows:



59856AXX

Figure 27: Connecting a Hiperface® encoder to MCH4_A as a motor encoder

Part numbers of the prefabricated cables:

- For fixed routing: 199 591 X
- For cable carrier routing: 199 592 8

External encoders

You can connect the following motor encoders at X14 on the MOVIDRIVE® *compact* MCH4_A units:

- Hiperface® encoder
- High-resolution sin/cos encoders with signal voltage AC 1 V_{SS}
- DC 5 V TTL sensors with signal level to RS422

Voltage supply

Connect encoders with DC 12/24 V voltage supply (max. 180 mA) directly at X14. These encoders are then powered by the inverter.

Connect encoders with a DC 5 V voltage supply via the "DC 5 V encoder power supply type DWI11A" option (part number 822 759 4).

DC 5 V TTL sensor

DC 5 V TTL sensors from SEW-EURODRIVE are available with D 24 V and DC 5 V voltage supply.

DC 24 V voltage supply

Connection to MCH4_A:

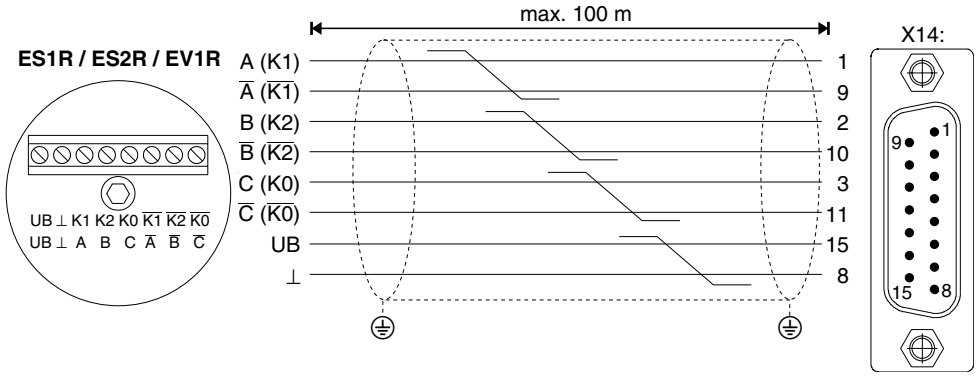


Figure 28: Connecting the TTL sensor to MCH4_A as an external encoder

DC 5 V voltage supply

Connect DC 5 V TTL sensors with a DC 5 V voltage supply ES1T, ES2T or EV1T using the "DC 5 V encoder power supply type DWI11A" option (part number 822 759 4). You must also connect the sensor cable to be able to correct the supply voltage of the encoder.

Connection to MCH4_A:

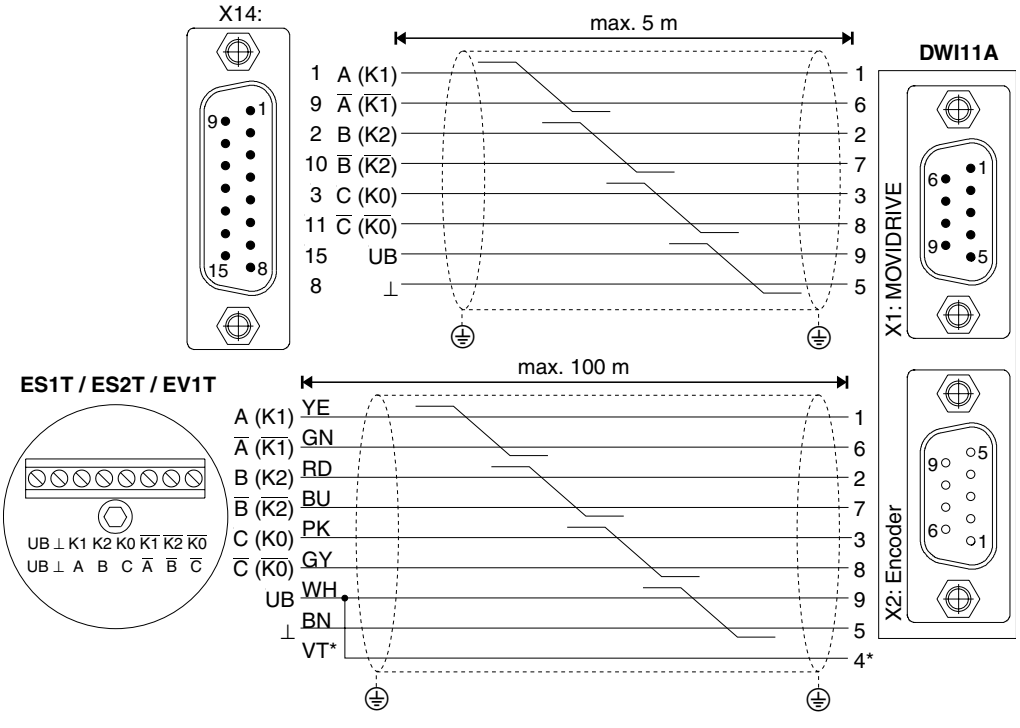


Figure 29: Connecting the TTL sensor to MCH4_A as an external encoder

* Connect the sensor cable (VT) on the encoder to UB, do not jumper with DWI11A!

Part numbers of the prefabricated cables:

- Encoders ES1T / ES2T / EV1T → DWI11A X2:Encoder
  - For fixed routing: 198 829 8
  - For cable carrier routing: 198 828 X

Hiperface® encoder

Hiperface® encoders AS1H are recommended for operation with MOVIDRIVE® *compact* MCH4_A. Connect the Hiperface® encoder as follows:

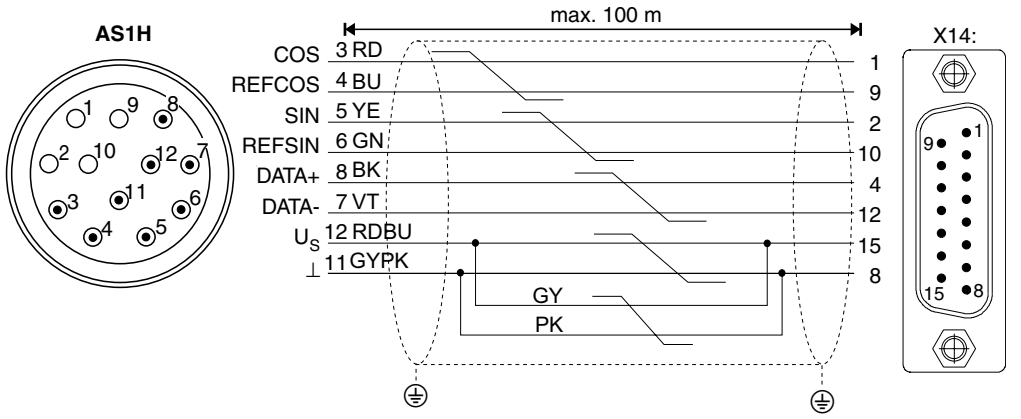


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Figure 30: Connecting the SEW Hiperface® encoder to MCH4_A as an external encoder

Part numbers of the prefabricated cables:

- Encoder AS1H → MCH_4A X14:
  - For fixed routing: 199 415 8
  - For cable carrier routing: 199 416 6

sin/cos encoders

Connect the sin/cos encoder as follows:

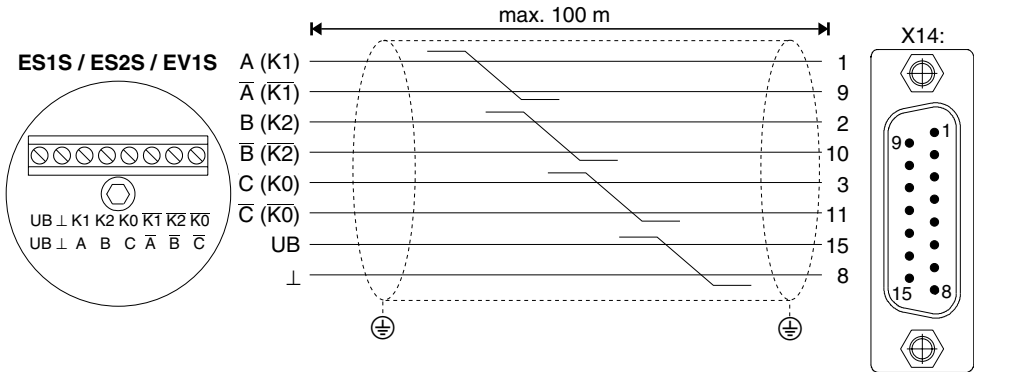

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Figure 31: Connecting the sin/cos encoder to MCH4_A as an external encoder

Incremental encoder simulation

You can also use X14 as the output for incremental encoder simulation. For this purpose, you must jumper "switchover" (X14:7 on MCH4_A) with DGND (X14:8 on MCH4_A). X14 then supplies incremental encoder signals with a signal level in accordance with RS422. The number of pulses is:

- For MCH4_A with Hiperface encoder 1024 pulses/revolution
- For MCH4_A with sin/cos encoder or TTL sensor as at X15 Motor encoder input

Connection to MCH4_A

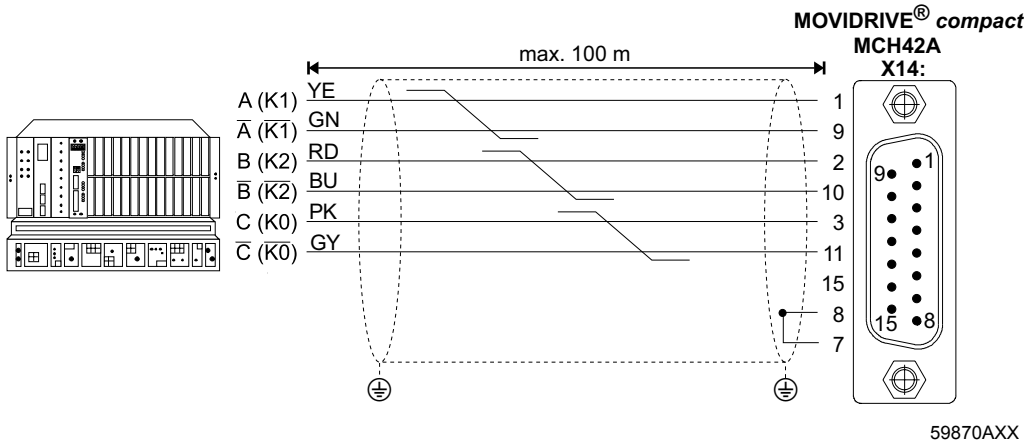

Figure 32: Connecting the incremental encoder simulation to MCH4_A

Master/slave connection

X14-X14 connection (= master/slave connection) of two MOVIDRIVE® *compact* units.

	NOTE
	The Sub-D sockets on the cable ends are labeled "MASTER" and "SLAVE." Make sure that you plug the socket labeled "MASTER" into X14 of the master unit and the socket labeled "SLAVE" into X14 of the slave unit.

MCH4_A

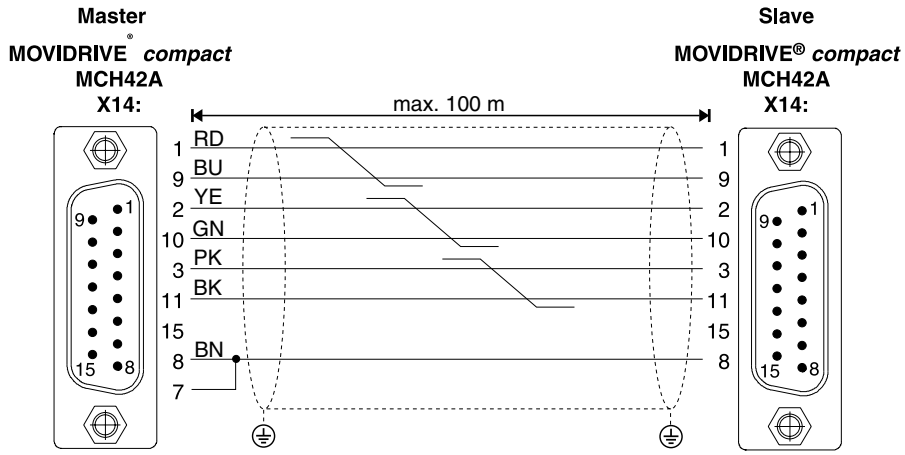

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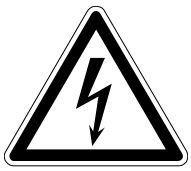
Figure 33: X14-X14 connection for MCH4_A

Part number of the prefabricated cable:

- Fixed installation only: 199 417 4

5 Startup

5.1 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.

NOTE

Startup in accordance with this section is necessary for the VFC operating modes with speed control, all CFC operating modes and SERVO operating modes. The startup functions described in this section are used to set the inverter so it is optimally adapted to the connected motor and to the given boundary conditions.

Prerequisites

The drive must be configured correctly to ensure that startup is successful. Refer to the MOVIDRIVE® *compact* system manual (sections 4 and 5) for detailed project planning instructions and an explanation of the parameters.

VFC operating modes without speed control

The factory settings of MOVIDRIVE® *compact* drive inverters are set to be taken into operation with the SEW motor adapted to the correct power level (MCH4_A...-5_3: 4-pole and rated voltage 3 × AC 400 V / 50 Hz or MCHA...-2_3: 4-pole and rated voltage 3 × AC 230 V / 60 Hz). The motor can be connected and the drive started immediately in accordance with the section "Starting the motor" (→ page 68) .

Inverter/motor combinations

The following tables indicate which inverter/motor combinations this applies to.

AC 400/500 V units

MOVIDRIVE® *compact* MCH4_A in VFC operating mode	SEW motor
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

AC 230 V units

MOVIDRIVE® *compact* MCH4_A in VFC operating mode	SEW motor
0015-2A3-4	DT90L4
0022-2A3-4	DV100M4
0037-2A3-4	DV100L4
0055-2A3-4	DV132S4
0075-2A3-4	DV132M4
0110-203-4	DV160M4
0150-203-4	DV180M4
0220-203-4	DV180L4
0300-203-4	DV225S4

Hoist applications

⚠ DANGER!

Risk of fatal injury if the hoist falls.

Severe or fatal injuries.

Do not use MOVIDRIVE® *compact* drive inverters for any safety functions in conjunction with hoist applications. Use monitoring systems or mechanical protection devices to ensure safety.

5.2 Preliminary work and resources

- Check the installation.

⚠ DANGER!

Risk of crushing if the motor starts up unintentionally.

Severe or fatal injuries.

- Prevent unintentional start up of the motor by disconnecting electronics terminal block X11.
- Furthermore, additional safety precautions must be taken depending on the application to avoid injury to people and damage to machinery.

- Performing **startup with the DBG11B keypad**:

  Plug the DBG11B keypad into the TERMINAL slot.

- For **startup with a PC and MOVITOOLS®**:

  Plug the USS21A or USB11A option into the TERMINAL slot. Connect the USS21A/USB11A option to the PC with an interface cable (RS232). If not already available, install MOVITOOLS® on the PC. Start MOVITOOLS®.

- Switch on the mains voltage and, if applicable, the DC 24 V supply voltage.

  If you are using the DBG11B keypad, the following message is displayed for approximately 13 s.

```
SELFTEST
MOVIDRIVE
```

- Check that the default parameter settings are correct (e.g. factory setting).
- Check the terminal assignment that has been set (→ P60_).

NOTE

A group of **parameter values is changed automatically** at startup. The description of parameter P700 "Operating modes" explains which parameters are affected by this step. Refer to the MOVIDRIVE® **compact** system manual, section 4 "Parameters", for the **parameter description**.

5.3 Startup with the DBG11B keypad

General information

Startup with the DBG11B keypad is only possible **with MCF and MCV/MCH in the VFC operating modes**. Startup in CFC and SERVO operating modes is only possible using the MOVITOOLS® 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, power factor cosφ and rated speed
- Rated power supply voltage

The encoder type and encoder resolution are required for starting up the speed controller.

SEW encoder type	Startup parameter	
	Encoder type	Encoder resolution
AS1H, ES1H, AV1H	HIPERFACE®	1024
ES1S, ES2S, EV1	SINE ENCODER	1024
ES1R, ES2R, EV1R ES1T[1], ES2T[1], EV1T[1]	INCREM. ENCOD. TTL	1024
ES1C, ES2C, EV1C	INCREM. ENCOD. HTL	1024

1) The DC 5 V TTL sensors ES1T, ES2T and EV1T must be connected via the DWI11A option (→ section Installation).

- Motor data
  - SEW motor: Brake yes or no and flywheel fan yes or no.
  - Non-SEW motor: Mass moment of inertia of motor, brake and fan
- Stiffness of the control system (factory setting = 1; suitable as the initial value for most applications)

  If the drive tends to oscillate → setting < 1

  Transient recovery time is too long → Setting > 1

  Setting range for most applications: 0.70 ... 1 ... 1.40
- Converted mass moment of inertia of the load (gear unit + driven machine) on the motor shaft If the mass moment of inertia of the load cannot be determined → use 1...20 times the value of the mass moment of inertia of the motor.
- Time required for the shortest ramp

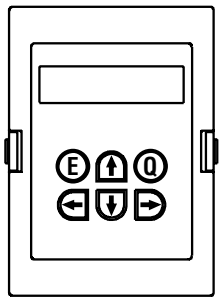
NOTE

If you are using a TTL sensor (encoder type INCREM.ENCODER TTL), sin/cos encoder (encoder type SINE ENCODER):

- Activate encoder monitoring (P504 = "ON") after completing 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!

Startup functions of DBG11B

Detailed description of the keypad → Sec. "Operating displays":



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← and → at the same time	Commence startup.
↑ key	Next menu item or next highest value in edit mode.
↓ key	Previous menu item or next lowest value in edit mode.
→ key	Go one menu level lower or enter edit mode of the menu item.
← key	Go one menu level higher or leave edit mode of the menu item.
Q key	Terminate startup and go back to basic display.
E key	Terminate startup and go back to basic display.

Switching the language on the DBG11B keypad

- The keypad is in the basic display.

```
CONTROLLER INHIBIT
CURRENT:       0  A
```

- Press the ↓ key twice. Parameter group 8 is displayed.

```
8..   UNIT
      FUNCTIONS
```

- Press the → key twice and the ↑ key once. Parameter P801 "Language" is displayed. Go to the edit mode by pressing the → key. Use the ↓ or ↑ key to select the language and leave edit mode by pressing the ← key.

```
801   GERMAN
      LANGUAGE
```

- Press the Q button. The basic display appears.

Structure of the startup menu

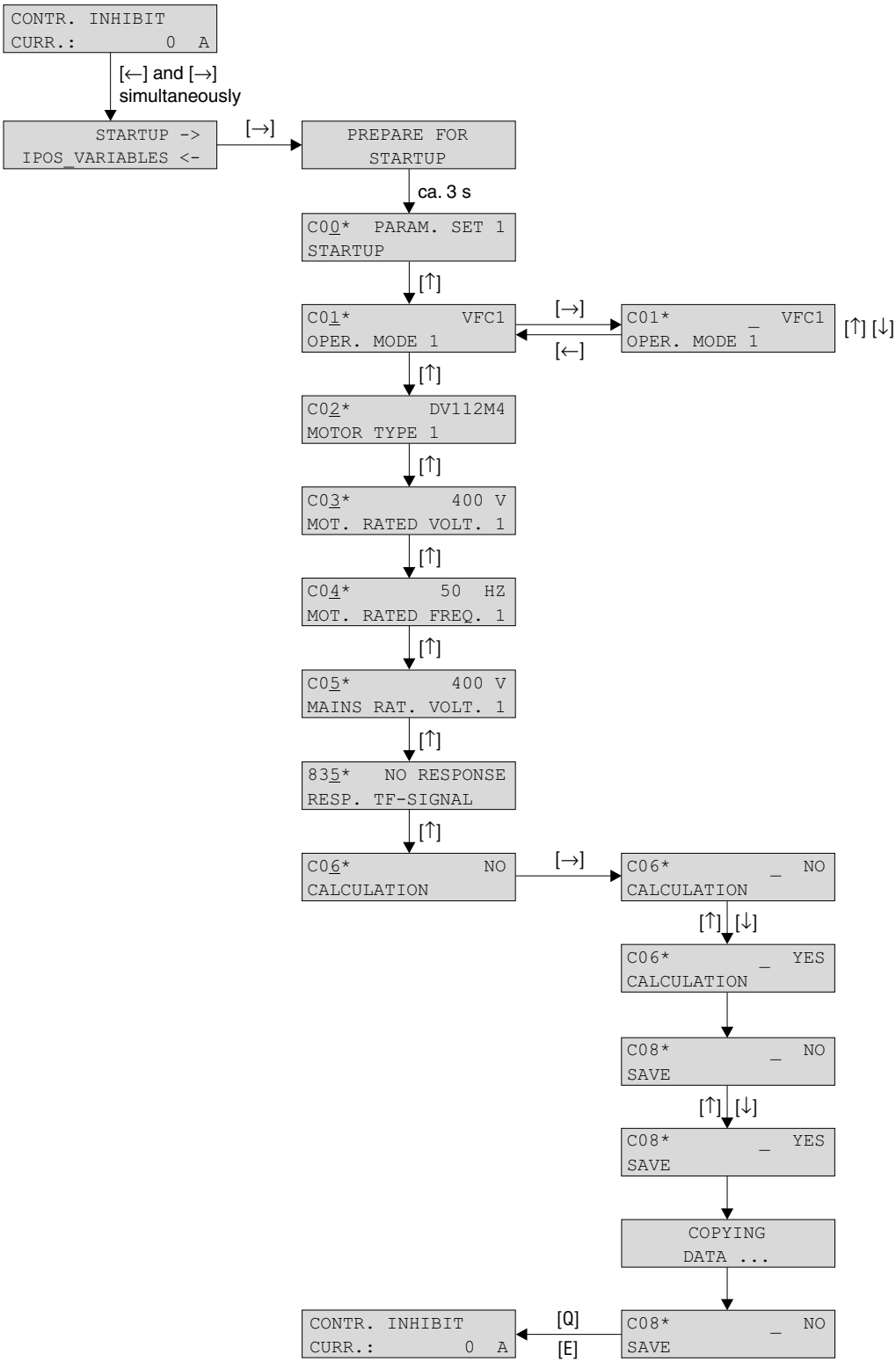

Figure 34: Structure of the startup menu

Startup procedure

1. Enter a "0" signal at terminal DIØØ "/CONTROLLER INHIBIT".

```
CONTROLLER INHIBIT
CURRENT:       0 A
```

2. Activate the startup menu by pressing the ← and → keys on the DBG11B at the same time.

```
STARTUP PARAMET. →
 IPOS_VARIABLES ←
```

3. Press the → key to commence startup. The first window of the startup menu appears. The menu items are indicated with a * as the fourth character. Menu items that only appear in the startup menu start with a *. The other menu items have the number of the parameter list (page 72). Once you have finished with a menu item, use the ↑ key to go to the next menu item.

```
  STARTUP PARAMET.
PREPARE FOR STARTUP
```

4. Select a parameter set, e.g. parameter set 1.

```
C00*  PARAM. SET 1
STARTUP PARAMET.
```

5. Set the operating mode, e.g. VFC1.

```
C01*           VFC1
OPERATING MODE 1
```

6. Select the connected motor. 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.

```
C02*        DV112M4
MOTOR TYPE 1
```

```
C02*     NON-SEW
MOTOR
MOTOR TYPE 1
```

7. Enter the rated motor voltage for the selected connection type according to the value specified on the nameplate.

```
C03*        400   V
RATED MOTOR VLTG 1
```

   Example: Nameplate 230Δ/400人 50 Hz
   人 connection → Enter "400 V".
   Δ connection, transition point at 50 Hz → enter "230 V".
   Δ connection, transition point at 87 Hz → Also enter "230 V".
   However, after startup first set parameter P302 "MAXIMUM SPEED 1" to the value for 87 Hz and then start the drive.

   Example: Nameplate 400Δ/690人 50 Hz
   Only Δ connection possible → Enter "400 V".
   人 connection is not possible.

8. Enter the rated frequency specified on the motor nameplate.
   Example: 230Δ/400人 50 Hz
   Enter 50 Hz in 人 and Δ connection.

```
C04*        50    Hz
RATED MOTOR FREQ. 1
```

FOR SEW MOTORS

9. The motor values are stored for SEW 2 and 4-pole motors and need not be entered.

FOR NON-SEW MOTORS

9. Enter the following motor nameplate data:
   - Rated motor current, note the connection type (人 or Δ).
   - Rated power of the motor
   - Power factor cosφ
   - Rated speed of the motor

10. Enter the rated mains voltage.

```
C05*        400   V
RATED MAINS VLTG 1
```

11. If a TF/TH is not connected → set "NO RESPONSE." If a TF/TH is connected, set the required fault response.

```
835*  NO RESPONSE
RESP. TF SIGNAL
```

12. Start the calculation for startup by choosing "YES."

```
C06*        NO
CALCULATION
```

FOR SEW MOTORS

13. The calculation is performed.

FOR NON-SEW MOTORS

13. For non-SEW motors, a calibration process is required to perform the calculation:
    - When prompted, set a "1" signal at terminal DIØØ "/CONTROL.INHIBIT."
    - Enter a "0" signal at terminal DIØØ "/CONTROLLER INHIBIT" after the calibration process is complete.
    - If the motor cannot be calibrated (energized), estimate the motor parameters.

14. The "SAVE" menu command appears automatically. The keypad is already in edit mode.

```
C08*        _NO
SAVE
```

15. Set "SAVE" to "YES". The data (motor parameters) is copied to the non-volatile memory of MOVIDRIVE®.

```
     DATA IS
BEING COPIED...
```

16. The startup procedure is now complete. Leave the startup menu by pressing the E or the Q key. The basic display appears.

```
CONTROLLER INHIBIT
CURRENT:    0  A
```

- After startup is complete, copy the parameter set from MOVIDRIVE® to the DBG11B keypad (P807 "MDX → DBG"). This way, the DBG11B can be used to transfer the parameter set to other MOVIDRIVE® units (P 806 "DBG → MDX").
- Enter parameter settings that differ from the factory setting in the parameter list (→ page 72).
- In the case of non-SEW motors, set the correct brake application time (P732 / P735).
- For starting the motor, refer to the "Starting the motor" section (→ page 68).
- With Δ connection and transition point at 87 Hz → set parameter P302/312 "Maximum speed 1/2" to the value for 87 Hz.

Starting up the speed controller

First startup is performed without the speed controller.

Important: Select the VFC-n-CONTROL operating mode.

```
C01*  VFC n-CTRL
OPERATING MODE 1
```

Structure

Structure of the startup menu for the speed controller:

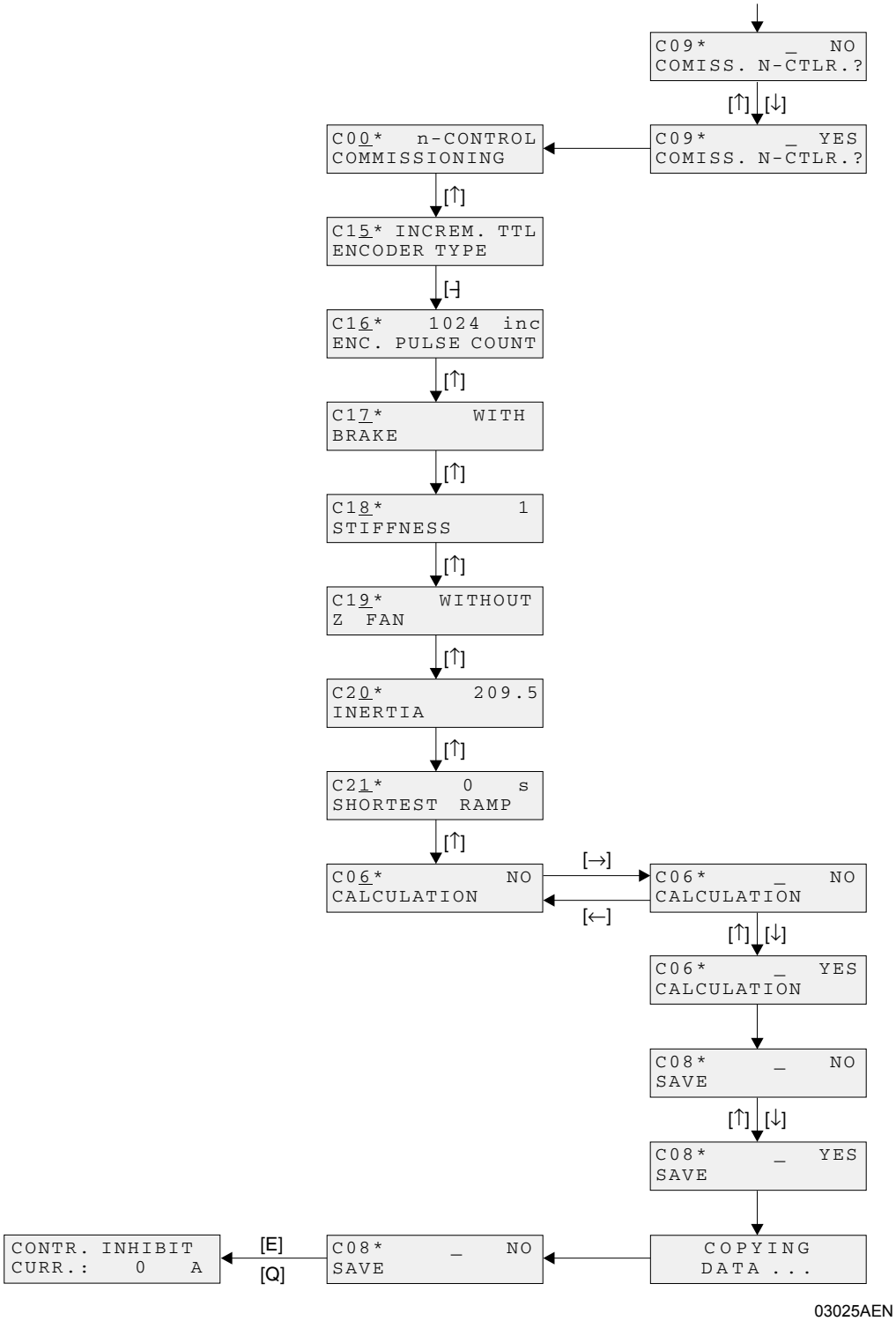

Figure 35: Structure of startup with speed controller

Startup procedure

1. Press "YES" to commence the speed controller startup. All mass moments of inertia must be entered in the unit [10^{-4} kgm^2].
2. Press the ↑ key to move on to the next menu item.
3. Enter the correct encoder type.
4. Enter the correct encoder resolution.

FOR SEW MOTORS

5. Enter whether the motor has a brake.
6. Set the stiffness of the control system.
7. Enter whether the motor has a flywheel fan (Z fan).

FOR NON-SEW MOTORS

5. Enter the moment of inertia of the motor.
6. Set the stiffness of the control system.
7. Set the moment of inertia of the brake and fan.

8. Enter the mass moment of inertia of the load (gear unit + driven machine) extrapolated for the motor shaft.
9. Enter the time for the shortest ramp you want.
10. Start the calculation for speed controller startup by choosing "YES."
11. The "SAVE" menu command appears automatically. Set "SAVE" to "YES". The data is copied to the non-volatile memory of MOVIDRIVE®.
12. The "SAVE" menu command appears again. Leave startup by pressing the E or Q button; the basic display appears.

- After startup is complete, copy the parameter set from MOVIDRIVE® to the DBG11B keypad (P807 "MDX → DBG"). This way, the DBG11B can be used to transfer the parameter set to other MOVIDRIVE® units (P 806 "DBG → MDX").
- Enter parameter settings that differ from the factory setting in the parameter list (→ page 72).
- In the case of non-SEW motors, set the correct brake application time (P732 / P735).
- For starting the motor, refer to the "Starting the motor" section (→ page 68).
- With Δ 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**.
- If a Hiperface encoder is connected, it is always monitored regardless of the setting of parameter P504.

5.4 Startup with PC and MOVITOOLS®

General information

- Terminal DIØØ "/CONTROLLER INHIBIT" must receive a "0" signal!
- Start MOVITOOLS®.
- Select the language you want in the "Language" selection field.
- From the "PC-COM" drop down menu, select the PC port (e.g. COM 1) to which the inverter is connected.
- In the "Device Type" field, select the option "Movidrive."
- Press the <Update> button to display the connected inverter.

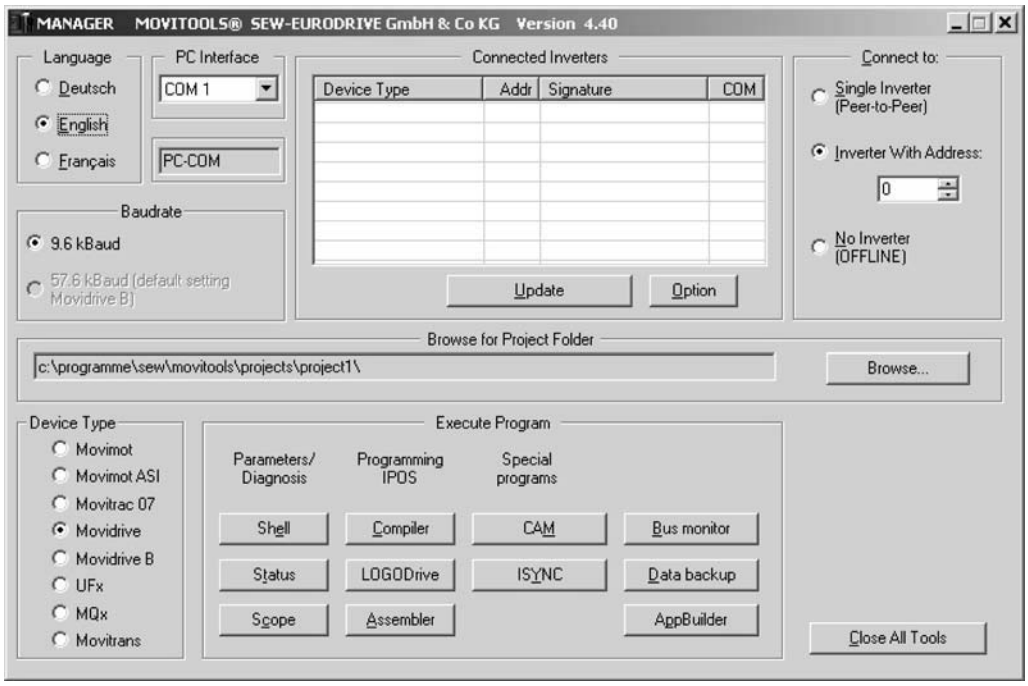

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Figure 36: MOVITOOLS® initial screen

Commencing startup

- In the "Execute Program" group box, press the <Shell> button under "Parameters/Diagnosis". The Shell program is started.
- In the Shell program, select the [Startup] / [Startup...] menu command. MOVITOOLS® opens the startup menu. Follow the instructions of the startup assistant. For questions on startup, refer to the MOVITOOLS® online help.

5.5 Starting the motor

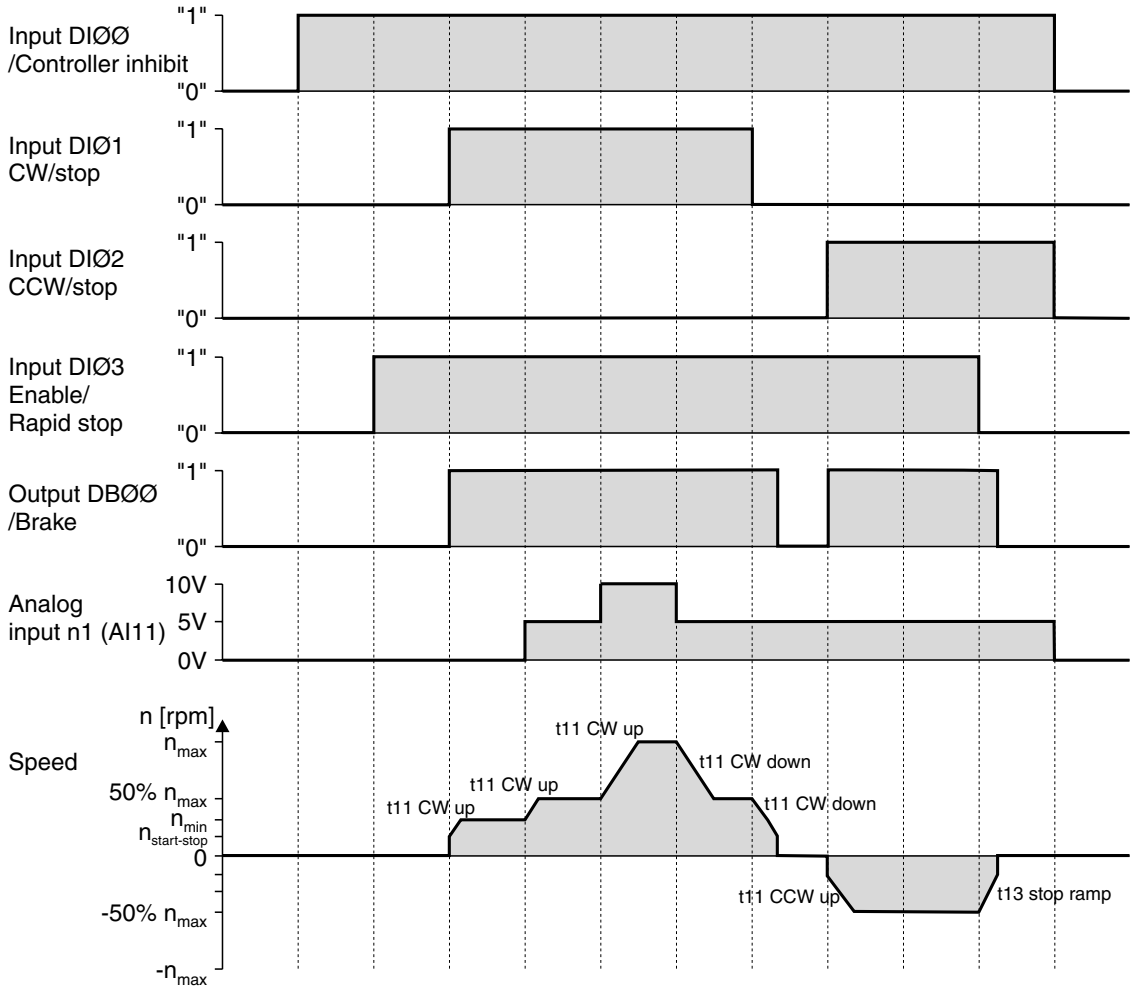
Analog setpoint selection

The following table shows which signals must be present on terminals AI1 and DIØØ...DIØ3 when the "UNIPOL/FIX.SETPT" setpoint (P100) is selected, in order to operate the drive with analog setpoint specification.

Function	AI11 Analog input n1	DIØØ /Controller inhibit	DIØ1 CW/Stop	DIØ2 CCW/Stop	DIØ3 Enable/Stop
Controller inhibit	X	"0"	X	X	X
Stop	X	"1"	X	X	"0"
Enable and stop	X	"1"	"0"	"0"	"1"
Clockwise at 50% n_{max}	5 V	"1"	"1"	"0"	"1"
Clockwise with n_{max}	10 V	"1"	"1"	"0"	"1"
Counterclockwise with 50% n_{max}	5 V	"1"	"0"	"1"	"1"
Counterclockwise with n_{max}	10 V	"1"	"0"	"1"	"1"

Travel diagram

The following travel diagram is an example of how the motor is started with the wiring of terminals DIØØ ... DIØ3 and analog setpoints. Binary input DBØØ "/Brake" is used for switching brake contactor K12.



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	NOTE
	The motor is not energized in the event of controller inhibit (DIØØ = "0"). A motor without brake will coast to standstill.

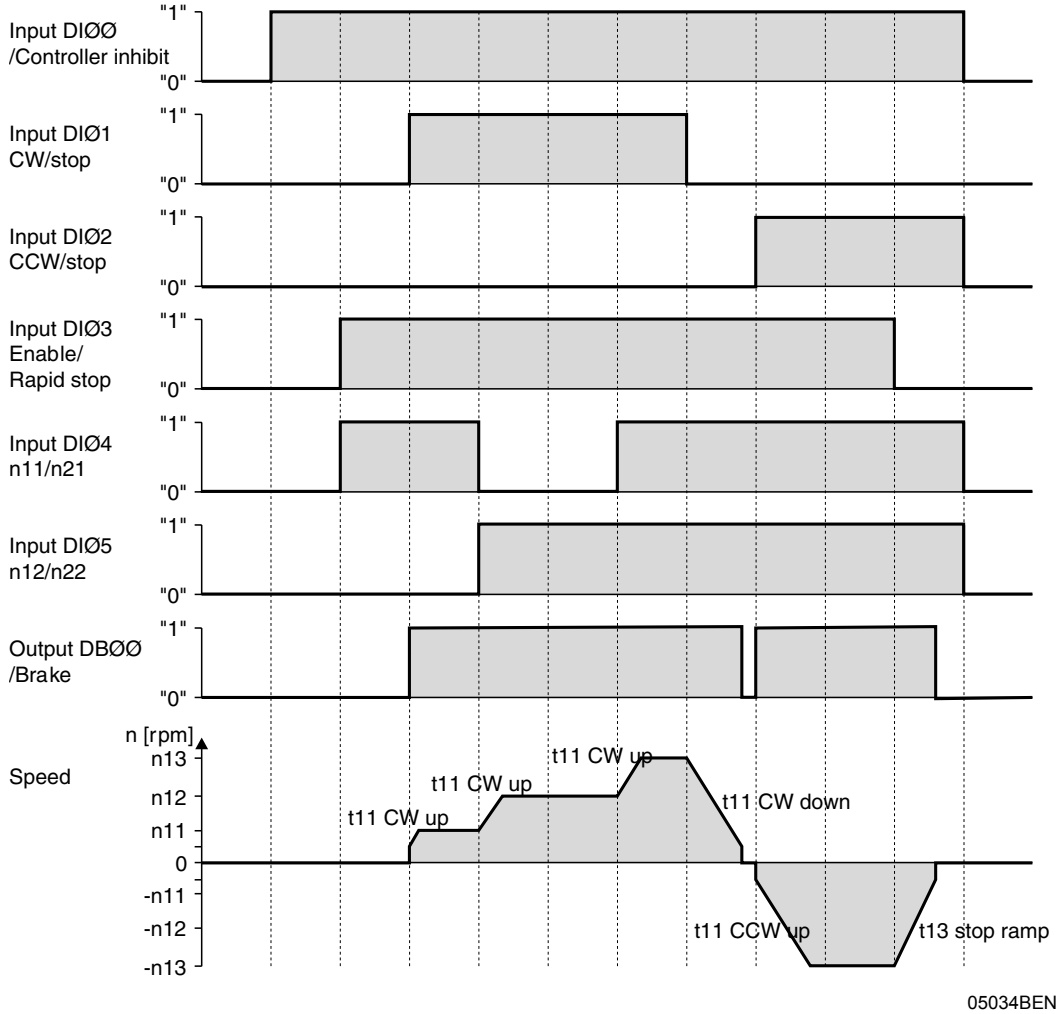
Fixed setpoints

The following table shows which signals must be present on terminals DIØØ ... DIØ5 when the "UNIPOL/FIX.SETPT" setpoint is selected (P100), to operate the drive with the fixed setpoints.

Function	DIØØ /Controller inhibit	DIØ1 CW/Stop	DIØ2 CCW/Stop	DIØ3 Enable/Stop	DIØ4 n11/n21	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"

Travel diagram

The following travel diagram is an example of how the drive is started with the wiring of terminals DIØØ DIØ5 and the internal fixed setpoints. Binary output DBØØ "/Brake" is used for switching brake contactor K12.



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NOTE

The motor is not energized in the event of controller inhibit (DIØØ = "0"). A motor without brake will coast to standstill.

Manual operation with DBG11B

The inverter is controlled using the DBG11B keypad with the manual operation function. To start manual operation the inverter must be assigned the status "No enable." The state "No enable" means DIØØ/Controller inhibit = "1" and the binary inputs CW/stop, DIØ2 CCW/stop and DIØ3 Enable/stop with programmed factory settings = "0".

The binary input DIØØ/Controller inhibit is also in effect in manual operation. The other binary inputs are not in effect during manual operation. Binary input DIØØ /Controller inhibit must be assigned a "1" signal to enable the drive to be started in manual operation. The drive can also be stopped in manual operation by setting DIØØ to "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 keypad (→ Figure 37).

Manual operation remains active when the power supply is switched off and on; however, the inverter is then inhibited. Setting the direction of rotation with the → key or ← key enables and starts the drive with n_{min} in the selected direction. You can increase and decrease the speed using the ↑ and ↓ keys. The rate of change is 150 1/min per second.

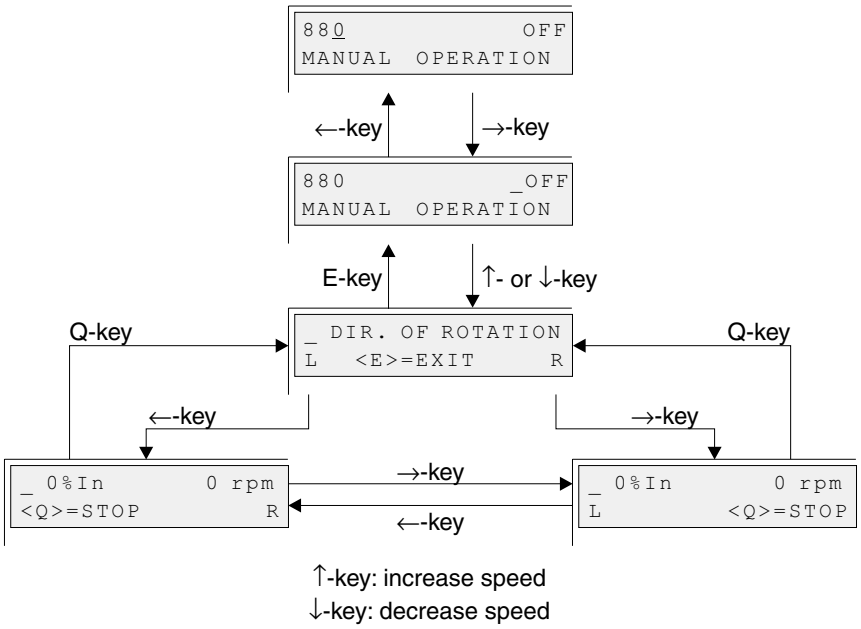

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Figure 37: Manual operation with DBG11B

	NOTE
	The signals at the binary inputs take effect as soon as manual operation is finished. Binary input 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. Check that the programmed binary inputs DIØ1 CW/stop, DIØ2 CCW/stop and DIØ3 Enable/rapid stop are assigned a "0" signal when you end manual operation.

⚠ DANGER!

Risk of crushing if the motor starts up unintentionally.

Severe or fatal injuries.

- Prevent unintentional start up of the motor by disconnecting electronics terminal block X11.
- Furthermore, additional safety precautions must be taken depending on the application to avoid injury to people and damage to machinery.

5.6 Complete parameter list

General information

- The parameters of the quick menu are marked by a "/" (= display on the DBG11B keypad).
- The factory setting for the parameter is highlighted in bold.

Par.	Name	Value range
DISPLAY VALUES		
00_	**Process values**	
000	Speed	–5000...0...5000 1/min
001/	User display	[Text]
002	Frequency	0... 1100 Hz
003	Actual position	-2^{31}–1...0...2^{31}–1 inc
004	Output current	0...200 % I_N
005	Active current	–200...0...200 % 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 status	
011	Operating state	
012	Error status	
013	Current parameter set	1/2
014	Heat sink temperature	–20...0...100 °C
015	Hours of operation	0...25000 h
016	Enable hours	0...25000 h
017	Work	kWh
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 basic unit**	
030	Binary input DIØØ	/CONTROL.INHIBIT
031	Binary input DIØ1	
032	Binary input DIØ2	
033	Binary input DIØ3	
034	Binary input DIØ4	
035	Binary input DIØ5	
036/	Status of binary inputs on basic unit	
05_	**Binary outputs basic unit**	
050	Binary output DBØØ	/BRAKE
051	Binary output DOØ1	
052	Binary output DOØ2	
053/	Status of binary outputs on basic unit	

Par.	Name	Value range
07_	**Unit data**	
070	Unit type	
071	Rated unit current	
076	Firmware basic unit	
077	Technology function	
08_	**Error memory**	
080/	Error t-0	
081	Error t-1	
082	Error t-2	
083	Error t-3	
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	Setting range Factory setting	after start-up	Par.	Name Parameter set 2	Setting range Factory setting	after start-up
1__	**SETPOINTS / RAMP GENERATORS**						
10_	**Setpoint selection**						
100/	Setpoint source	**UNIPOL/FIX.SETPT**					
101	Control signal source	**TERMINALS**					
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**					
113	AI1 voltage offset	–10...**0**...10 V					
114	AI1 speed offset	–5000...**0**...5000 1/min					
115	Filter speed setpoint	0...**5**...100 ms 0 = Filter off					
12_	**Analog input AI2**						
120	AI2 operating mode	**NO FUNCTION**					
13_	**Speed ramps 1**			**14_**	**Speed ramps 2**		
130/	Ramp t11 up CW	0...**2**...2000 s		140	Ramp t21 up CW	0...**2**...2000 s	
131/	Ramp t11 down CW	0...**2**...2000 s		141	Ramp t21 down CW	0...**2**...2000 s	
132/	Ramp t11 up CCW	0...**2**...2000 s		142	Ramp t21 up CCW	0...**2**...2000 s	
133/	Ramp t11 down CCW	0...**2**...2000 s		143	Ramp t21 up CCW	0...**2**...2000 s	
134/	Ramp t12 UP=DOWN	0...**2**...2000 s		144	Ramp t22 UP=DOWN	0...**2**...2000 s	
135	S pattern t12	**0**...3		145	S pattern t22	**0**...3	
136/	Stop ramp t13	0...**2**...20 s		146	Stop ramp t23	0...**2**...20 s	
137/	Emergency stop ramp t14	0...**2**...20 s		147	Emergency stop ramp t24	0...**2**...20 s	
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	ON / **OFF**					
16_	**Fixed setpoints 1**			**17_**	**Fixed setpoints 2**		
160/	Internal setpoint n11	–5000...0...**150** ...5000 1/min		170	Internal setpoint n21	–5000...0...**150** ...5000 1/min	
161/	Internal setpoint n12	–5000...0...**750** ...5000 1/min		171	Internal setpoint n22	–5000...0...**750** ...5000 1/min	
162/	Internal setpoint n13	–5000...0...**1500** ...5000 1/min		172	Internal setpoint n23	–5000...0...**1500** ...5000 1/min	
2__	**CONTROLLER PARAMETERS**						
20_	**Speed control (only parameter set 1)**						
200	P-gain n-controller	0.1...**2**...32					
201	Time constant n-controller	0...**10**...300 ms					
202	Gain Accel. feedforw.	**0**...32					
203	Filter accel. feedforw.	**0**...100 ms					
204	Filter speed actual value	**0**...32 ms					
205	Load feedforward	**0**...150 %					
206	Sampling time n-controller	**1 ms** / 0.5 ms					
207	Load feedforw. VFC	**0**...150 %					
21_	**Hold controller**						
210	P gain hold controller	0.1...**2**...32					
22_	**Internal synchronous operation (only parameter set 1)**						
228	Feedforward filter (DRS)	**0**...100 ms		Only with MOVITOOLS®. Not visible on the DBG11B keypad.			

Par.	Name Selectable par. Parameter set 1	Setting range Factory setting	after start-up	Par.	Name Parameter set 2	Setting range Factory setting	after start-up
3__	**MOTOR PARAMETERS**						
30_	**Limits 1**			**31_**	**Limits 2**		
300/	Start/stop speed 1	0...**60**...150 1/min		310	Start/stop speed 2	0...**60**...150 1/min	
301/	Minimum speed 1	0...**60** ... 5500 rpm		311	Minimum speed 2	0...**60** ... 5500 rpm	
302/	Maximum speed 1	0...**1500** ... 5500 rpm		312	Maximum speed 2	0...**1500** ... 5500 rpm	
303/	Current limit 1	0...**150** % I_N		313	Current limit 2	0...**150** % I_N	
304	Torque limit	**0**...150 %					
32_	**Motor compensation 1 (asynchr.)**			**33_**	**Motor compensation 2 (asynchr.)**		
320/	Automatic adjustment 1	**ON** / OFF		330	Automatic adjustment 2	**ON** / OFF	
321	Boost 1	**0**...100 %		331	Boost 2	**0**...100 %	
322	IxR compensation 1	**0**...100 %		332	IxR compensation 2	**0**...100 %	
323	Premagnetizing time 1	0...**0.1**...2 s		333	Premagnetizing time 2	0...**0.1**...2 s	
324	Slip compensation 1	**0**...500 1/min		334	Slip compensation 2	**0**...500 1/min	
34_	**Motor protection**						
340	Motor protection 1	**OFF/ ON ASYNCHRONOUS / ON SERVO**		342	Motor protection 2	**OFF/ ON ASYNCHRONOUS / ON SERVO**	
341	Cooling type 1	**FAN COOLED** / FORCED COOLING		343	Cooling type 2	**FAN COOLED** / FORCED COOLING	
35_	**Direction of rotation of the motor**						
350	Reversal direction of rotation 1	ON / **OFF**		351	Reversal direction of rotation 2	ON / **OFF**	
360	Startup	YES / **NO**		Only available in DBG11B, not in MOVITOOLS®.			
4__	**REFERENCE SIGNALS**						
40_	**Speed reference signal**						
400	Speed reference value	0...**1500**...5000 1/min					
401	Hysteresis	0...**100**...500 1/min					
402	Deceleration time	0...**1**...9 s					
403	Signal = “1“ if:	**n < n_{ref}** / n > n_{ref}					
41_	**Speed window signal**						
410	Window center	0...**1500**...5000 1/min					
411	Range width	**0**...5000 1/min					
412	Deceleration time	0...**1**...9 s					
413	Signal = “1“ if:	**INSIDE** / OUTSIDE					
42_	**Speed setpoint/actual value comparison**						
420	Hysteresis	1...**100**...300 1/min					
421	Deceleration time	0...**1**...9 s					
422	Signal = “1“ if:	**n <> n_{setpt}** / n = n_{setpt}					
43_	**Current reference signal**						
430	Current reference value	0...**100**...150 % I_N					
431	Hysteresis	0...**5**...30 % I_N					
432	Deceleration 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	Deceleration time	0...**1**...9 s					
442	Signal = “1“ if:	I = I_{max} / **I < I_{max}**					

Par.	Name Selectable par. Parameter set 1	Setting range Factory setting	after start-up	Par.	Name Parameter set 2	Setting range Factory setting	after start-up
5__	**MONITORING FUNCTIONS**						
50_	**Speed monitoring**						
500	Speed monitoring 1	**OFF** / MOTOR /REGENERATIVE /MOT&REGEN.MODE		502	Speed monitoring 2	**OFF** / MOTOR /REGENERATIVE /MOT&REGEN.MODE	
501	Deceleration time 1	0...**1**...10 s		503	Deceleration time 2	0...**1**...10 s	
504	Encoder monitoring	ON / **OFF**					
52_	**Mains OFF monitoring**						
520	Mains OFF response time	**0**...5 s					
521	Mains OFF response	**CONTROL.INHIBIT** EMERGENCY STOP					
53_	**Motor temperature protection**						
530	Sensor type 1	**No sensor** / TF-TH					
531	Sensor type 2	**No sensor** / TF-TH					
6__	**TERMINAL ASSIGNMENT**						
60_	**Binary inputs basic unit**						
-	Binary input DIØØ	With fixed assignment with: **/CONTROLLER INHIBIT**					
600	Binary input DIØ1	**CW/STOP**		The following functions can be programmed: NO FUNCTION • ENABLE/RAP.STOP • CW/STOP • CCW/STOP • n11(n13) • n21(n23) • n12(n13) • n22(n23) • FIX SETPT SW.OV. • PAR. SWITCHOVER • RAMP SWITCHOVER • MOTOR POT UP • MOTOR POT DOWN • /EXT. FAULT • FAULT RESET • /HOLD CONTROL • /LIM. SWITCH CW • /LIM. SWITCH CCW • IPOS INPUT • REFERENCE CAM • REF.TRAVEL START • SLAVE FREE RUNN. • SETPOINT HOLD • MAINS ON • DRS SET ZERO.		
601	Binary input DIØ2	**CCW/STOP**					
602	Binary input DIØ3	**ENABLE/STOP**					
603	Binary input DIØ4	**n11/n21**					
604	Binary input DIØ5	**n12/n22**					
62_	**Binary outputs basic unit**			The following signals can be programmed: NO FUNCTION • /FAULT • READY • OUTP. STAGE ON • ROT. FIELD ON • BRAKE RELEASED • BRAKE APPLIED • MOTOR STAND-STILL • PARAMETER SET • SPEED REFERENCE • SPEED WINDOW • SP/ACT.VAL.COMP. • CURR. REFERENCE • Imax-SIGNAL • /MOTOR UTILIZ. 1 • /MOTOR UTILIZ. 2 • IPOS IN POSITION • IPOS REFERENCE • IPOS OUTPUT • /IPOS FAULT			
-	Binary output DBØØ	With fixed assignment with: **/BRAKE**					
620	Binary output DOØ1	**READY FOR OPERATION**					
621	Binary output DOØ2	**NO FUNCTION**					
64_	**Analog output**						
640	Analog output AO1	**ACTUAL SPEED**		The following functions can be programmed: NO FUNCTION • RAMP INPUT • SPEED SETPOINT • ACTUAL SPEED • ACTUAL FREQUENCY • OUTPUT CURRENT • ACTIVE CURRENT • UNIT UTZILIZATION • IPOS OUTPUT • RELATIVE TORQUE			
641	Scaling AO1	-10...0...**1**...10					
642	Operating mode AO1	**OFF** / 0...20 mA / 4...20 mA					
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& IPOS CFC CFC & M-CONTROL CFC&IPOS SERVO SERVO&M-CONTROL SERVO&IPOS		701	Operating mode 2	**VFC 2** VFC 2 & GROUP VFC 2 & HOIST VFC 2 & DC BRAK. VFC 2 & FLYSTART	
71_	**Standstill current**						
710	Standstill current 1	**0**...50 % I_{mot}		711	Standstill current 2	**0**...50 % I_{mot}	

Par.	Name Selectable par. Parameter set 1	Setting range Factory setting	after start-up	Par.	Name Parameter set 2	Setting range Factory setting	after start-up
72_	**Setpoint stop function**						
720	Setpoint stop function 1	ON / **OFF**		723	Setpoint stop function 2	ON / **OFF**	
721	Stop setpoint 1	0...**30**.. .500 1/min		724	Stop setpoint 2	0...**30**...500 1/min	
722	Start offset 1	0...**30**...500 1/min		725	Start offset 2	0...**30**...500 1/min	
73_	**Brake function**						
730	Brake function 1	**ON** / OFF		733	Brake function 2	**ON** / OFF	
731	Brake release time 1	**0**...2 s		734	Brake release time 2	**0**...2 s	
732	Brake application time 1	0...**0.2**...2 s		735	Brake application time 2	0...**0.2**...2 s	
74_	**Speed skip function**						
740	Skip window center 1	0...**1500**...5000 1/min		742	Skip window center 2	0...**1500**...5000 1/min	
741	Skip width 1	**0**...300 1/min		743	Skip width 2	**0**...300 1/min	
75_	**Master/slave function**						
750	Slave setpoint	**MASTER-SLAVE OFF** SPEED (SBus) TORQUE (SBus) LOAD SHARE (SBus)					
751	Scaling slave setpoint	-10...0...**1**...10					
8__	**UNIT FUNCTIONS**						
80_	**Setup**						
802/	Factory setting	YES / **NO**					
803/	Parameter lock	ON / **OFF**					
804	Reset statistics data	**NO** ERROR MEMORY kWh COUNTER OPERATING HOURS					
800/	Short menu	**ON** / OFF		The languages available depend on the DBG version. These parameters are only available in the DBG11B keypad, not in MOVITOOLS®.			
801/	Language	**DE** / EN / FR / ES / PT					
806	Copy DBG→MDX	YES / **NO**					
807	Copy MDX→DBG	YES / **NO**					
81_	**Serial communication**						
810	RS485 Address	**0**...99					
811	RS485 group address	**100**...199					
812	RS485 Timeout delay	**0**...650 s					
813	SBus address	**0**...63					
814	SBus group address	**0**...63					
815	SBus timeout delay	0...**0.1** 650 s					
816	SBus baud rate	125/250/**500**/1000 kBaud					
817	SBus synchronization ID	**0**...1023					
818	CAN synchronization ID	0...**1**...2047					
819	Fieldbus timeout delay	0...**0.5**...650 s					
82_	**Brake operation**						
820/	4-quadrant operation 1	**ON** / OFF		821	4-quadrant operation 2	**ON** / OFF	

Par.	Name Selectable par. Parameter set 1	Setting range Factory setting	after start-up	Par.	Name Parameter set 2	Setting range Factory setting	after start-up
83_	**Fault responses**						
830	Response EXT. FAULT	**EMERG. STOP/FAULT**		The following error responses can be programmed: NO RESPONSE • DISPLAY FAULT • IMM. STOP/FAULT • EMERG. STOP/FAULT • RAPID STOP/FAULT • IMM. STOP/WARN. • EMERG. STOP/WARN. • IMM. STOP/WARN.			
831	Response FIELDBUS TIMEOUT	**RAPID STOP/WARNG**					
832	Response MOTOR OVERLOAD	**EMERG. STOP/FAULT**					
833	Response RS485 TIMEOUT	**RAPID STOP/WARNG**					
834	Response LAG ERROR	**EMERG. STOP/FAULT**					
835/	Response TF SIGNAL	**NO RESPONSE**					
836	Response SBus TIMEOUT	**EMERG. STOP/FAULT**					
84_	**Reset behavior**						
840/	Manual reset	YES / **NO**					
841	Auto reset	ON / **OFF**					
842	Restart time	1...**3**...30 s					
85_	**Scaling actual speed value**						
850	Scaling factor numerator	**1**...65535					
851	Scaling factor denominator	**1**...65535					
852	User-defined unit	**1/min**		Can only be set using MOVITOOLS®.			
86_	**Modulation**						
860	PWM frequency 1	**4**/8/12/16 kHz		861	PWM frequency 2	**4**/8/12/16 kHz	
862	PWM fix 1	ON / **OFF**		863	PWM fix 2	ON / **OFF**	
864	PWM frequency CFC	4/**8**/16 kHz					
87_	**Process data description**						
870	Setpoint description PO1	**CONTROL WORD 1**					
871	Setpoint description PO2	**SPEED**					
872	Setpoint description PO3	**NO FUNCTION**					
873	Actual value description PI1	**STATUS WORD 1**					
874	Actual value description PI2	**SPEED**					
875	Actual value description PI3	**OUTPUT CURRENT**					
876	PO data enable	**ON** / OFF					
877	DeviceNet PD configuration	0...**3**...5					
88_	**Manual operation**						
880	Manual operation	ON / **OFF**					

Par.	Name Selectable par. Parameter set 1	Setting range Factory setting	after start-up	Par.	Name Parameter set 2	Setting range Factory setting	after start-up
9__	**IPOS PARAMETERS**						
90_	**IPOS Reference travel**						
900	Reference offset	-2^{31}...**0**...$2^{31}-1$ Inc					
901	Reference speed 1	0...**200**...5000 1/min					
902	Reference speed 2	0...**50**...5000 1/min					
903	Reference travel type	**0**...7					
904	Reference travel to zero pulse	**Yes** / No					
91_	**IPOS Travel parameters**						
910	Gain X controller	0.1...**0.5**...32					
911	Positioning ramp 1	0...**1**...20 s					
912	Positioning ramp 2	0...**1**...20 s					
913	Positioning speed CW	0...**1500**...5000 1/min					
914	Positioning speed CCW	0...**1500**...5000 1/min					
915	Speed feedforward	–199.99...0...**100** ...199.99 %					
916	Ramp type	**LINEAR** / SINE / SQUARED / BUSRAMP					
92_	**IPOS Monitoring**						
920	CW SW limit switch	-2^{31}...**0**...$2^{31}-1$ Inc					
921	CCW SW limit switch	-2^{31}...**0**...$2^{31}-1$ Inc					
922	Position window	0...**50**...32767 inc					
923	Lag error window	**0**...$2^{31}-1$ inc					
93_	**IPOS Special functions**						
930	Override	ON / **OFF**					
931	IPOS CTRL word Task 1	START / **STOP**/ HOLD		Only available in DBG11B, not in MOVITOOLS®/SHELL!			
932	IPOS CTRL word Task 2	START / **STOP**		Only available in DBG11B, not in MOVITOOLS®/SHELL! Display parameter cannot be edited using DBG11B.			
94_	**IPOS Variables/encoder**						
940	IPOS variables edit	ON / **OFF**		Only available in DBG11B keypad, not in MOVITOOLS®!			
941	Source actual position	**Motor encoder (X15)** Ext. encoder (X14) Absolute encoder (DIP)					
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®, not visible on the DBG11B keypad.			
945	Synchronous encoder type X14	TTL / SIN/COS / HIPERFACE					
946	Counting direction X14	**NORMAL**/INVERTED					
95_	**DIP**						
950	Encoder type	**NO ENCODER**					
951	Counting direction	**NORMAL**/INVERTED					
952	Cycle frequency	**1**...200%					
953	Position offset	$-(2^{31}-1)$...**0**...$2^{31}-1$					
954	Zero point offset	$-(2^{31}-1)$...**0**...$2^{31}-1$					
955	Encoder scaling	**x1**/x2/x4/x8/x16/x32/x64					
96_	**IPOS Modulo function**						
960	Modulo function	**OFF** / SHORT / CW / CCW					
961	Modulo numerator	**0**...2^{31}					
962	Modulo denominator	**0**...2^{31}					
963	Mod. encoder resolution	0...**4096**...20000					

5.7 Starting the inverter with PROFIBUS-DP (MCH41A)

Configuring the PROFIBUS-DP interface

The drive inverter must be given a specific DP configuration by the DP master to define the type and number of input and output data used for transmission. You have the option of

- Controlling the drive using process data
- Reading and writing all drive parameters using the parameter channel

The following figure shows a schematic view of the data exchange between the programmable controller (DP master) and the MOVIDRIVE® drive inverter (DP slave) with the process data and parameter channel.

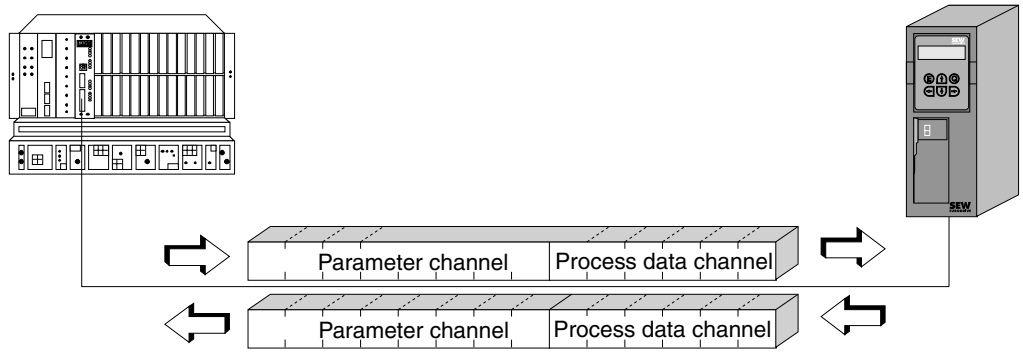


Figure 38: Communication via PROFIBUS-DP

Process data configuration

MOVIDRIVE® *compact* drive inverters make it possible to have different DP configurations for exchanging data between the DP master and the inverter. The following table provides additional information on all possible DP configurations for the MOVIDRIVE® *compact* range. The “Process data configuration” column shows the name of the configuration. The texts will also be displayed as selection list within the project planning software for the DP master. The DP configurations column shows which configuration data is sent to the inverter when the PROFIBUS DP connection is being established.

Process Data Configuration	Meaning / notes	DP Configuration	
		0	1
1 PD	Control via one process data word	240_{dec}	-
2 PD	Control via 2 process data words	241_{dec}	-
3 PD	Control via 3 process data words	242_{dec}	-
6 PD	Control via 6 process data words	0_{dec}	245_{dec}
10 PD	Control via 10 process data words	0_{dec}	249_{dec}
Param + 1 PD	Control via one process data word Parameter setting via 8 byte parameter channel	243_{dec}	240_{dec}
Param + 2 PD	Control via 2 process data words Parameter setting via 8 byte parameter channel	243_{dec}	241_{dec}
Param + 3 PD	Control via 3 process data words Parameter setting via 8 byte parameter channel	243_{dec}	242_{dec}
Param + 6 PD	Control via 6 process data words Parameter setting via 8 byte parameter channel	243_{dec}	245_{dec}
Param + 10 PD	Control via 10 process data words Parameter setting via 8 byte parameter channel	243_{dec}	249_{dec}

DP Configuration "Universal-Configuration"

Selecting the 'Universal configuration' DP configuration gives you two DP identifiers defined as 'blank spaces' (often also referred to as DP modules) with the entry 0_{dec}. You can then configure these identifiers individually observing the following peripheral conditions:

Module 0 (DP identifier 0) defines the parameter channel of the inverter:

Length	Function
0	Parameter channel deactivated
8 bytes or 4 words	Parameter channel is used

Module 1 (DP identifier 1) defines the process data channel of the inverter:

Length	Function
2 bytes or 1 word	1 process data word
4 bytes or 2 words	2 process data words
6 bytes or 3 words	3 process data words
12 bytes or 6 words	6 process data words
20 bytes or 10 words	10 process data words

The following figure shows the structure of the configuration data defined in IEC 61158. These configuration data are transmitted to the inverter during the initial start of the DP master.

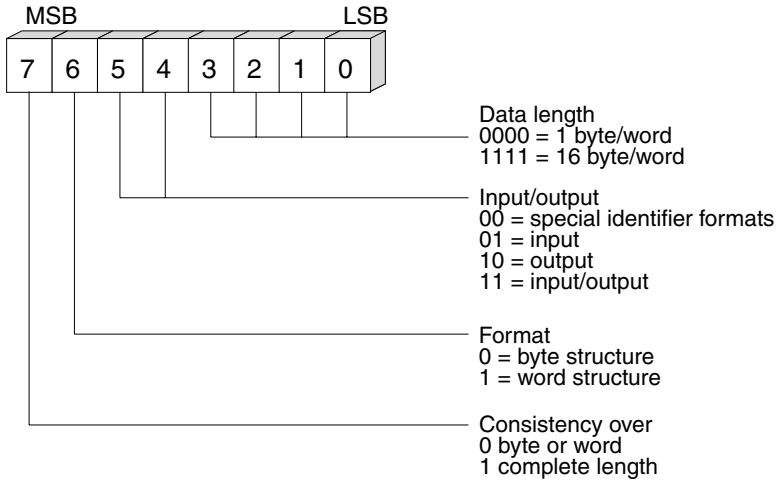


Figure 39: Format of the identifier byte Cfg_Data to IEC 61158

NOTE

Observe for MCF/MCV/MCS41A (does not apply to MCH41A):

The "special identifier formats" coding is not supported. Only use the setting “Integrity over entire length” for data transmission!

Data consistency

Consistent data is data that has to be transmitted between the programmable controller and the drive inverter as one block at all times and must never be transmitted separately.

Data consistency is especially important for transmitting position values or complete positioning tasks. This is because data that is not transmitted consistently could be from different program cycles of the programmable controller, which would lead to undefined values being transmitted to the drive inverter.

For PROFIBUS DP, data communication between the programmable controller and drive engineering devices is usually carried out with the setting “Data integrity over entire length.”

External diagnostics

For MOVIDRIVE® *compact*, it is possible to activate automatic generation of external diagnostic alarms via PROFIBUS-DP during the project planning in the DP master. If this function has been activated, MOVIDRIVE® *compact* sends an external diagnostic signal to the DP master every time a malfunction occurs. You then have to program corresponding algorithms in the program of the DP master system to evaluate the diagnostic information. These algorithms can be quite complex.

Recommendation

In principle, it is not necessary to activate the external diagnostic function because MOVIDRIVE® *compact* transmits the current drive status in status word 1 during every PROFIBUS-DP cycle.

Information on Simatic S7 Master systems

Diagnostic alarms may also be triggered by the PROFIBUS DP system in the DP master even if external diagnostic generation is deactivated. As a result, the corresponding operating blocks (e.g. OB84 for S7-400 or OB82 for S7-300) should always be created in the controller.

See the Read-me file in the GSD file for additional information.

Ident number

Each DP master and DP slave must have its individual ident number which is assigned by the PROFIBUS users organization. This ident number is used for uniquely identifying the connected unit. When the PROFIBUS DP master is started up, it compares the ident numbers of the connected DP slaves with the ident numbers configured by the user. The user data transfer will only be activated after the DP master has ensured that the connected station addresses and device types (ident numbers) correspond to the project planning data. This procedure achieves a high degree of safety with respect to project planning errors.

The ident number is defined as an unsigned 16-bit number (Unsigned16). The PROFIBUS users organization has defined the following identity numbers for the MOVIDRIVE® *compact* driver inverter series:

- MOVIDRIVE® compact MCF/MCV/MCS41A → 6002_{hex} (24578_{dec})
- MOVIDRIVE® compact MCH41A → 6003_{hex} (24579_{dec})

Control via PROFIBUS-DP

The inverter is controlled via the process data channel which is one, two or three I/O words in length. These process data words may be mapped in the I/O or peripheral area of the controller if a programmable controller is used as DP master and can be addressed as usual (see following figure).

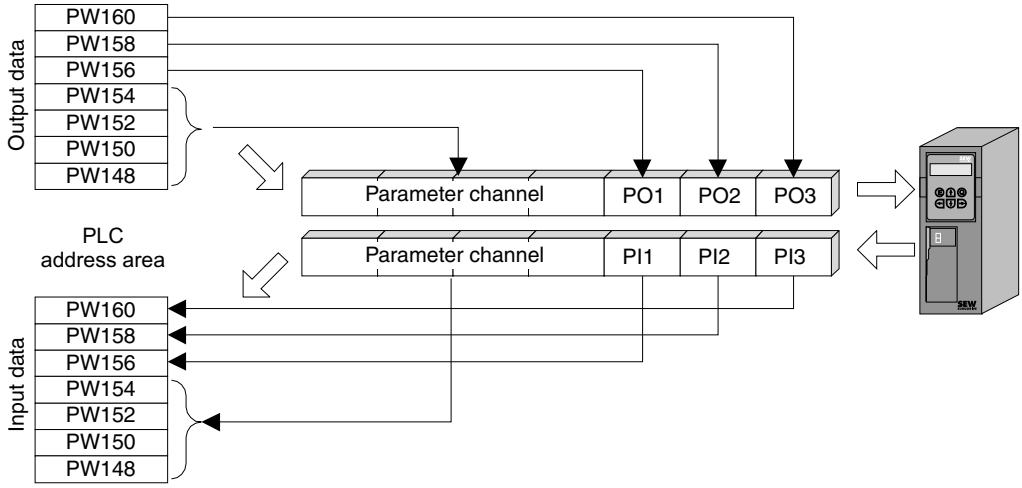


Figure 40: Assignment of the I/O area in the PLC

Control example for Simatic S5

While the process input data (actual values) for a Simatic S5 may be read in via load commands, the process output data (setpoints) can be sent with transfer commands. Based on Figure 40, the example shows the syntax for processing of the process input and output data of the MOVIDRIVE® drive inverter. The factory setting for the process data channel is displayed in the comment.

STEP5 sample program

In the example, the MOVIDRIVE® unit is configured using the "3 PD" process data configuration to the input addresses PW156 ... 161 and output addresses PW156 ... 161. The consistent access may take place in the sequence "Last byte first".

The CPU type will mainly determine data consistency in Simatic S5. You will find further information on correct programming with data consistency in the manuals on CPU or DP master components in Simatic S5.

```
//Consistent input of actual values
    L PW 160        //Load PI3 (no function)
    L PW 158        //Load PI2 (actual speed value)
    L PW 156        //Load PI1 (status word 1)

//Consistent output of setpoints
L   KH 0
T PW 160        Write //0hex to PO3 (without function)

L KF +1500
T PW 158        Write //1500dec to PO2 (speed setpoint = 300 1/min)

L   KH 0006
T PW 156        Write //6hex to PO1 (control word = enable)
```

Control example for Simatic S7

The drive inverter is controlled using Simatic S7 in accordance with the selected process data configuration either directly using load and transfer commands or by means of special system functions SFC 14 DPRD_DAT and SFC15 DPWR_DAT.

In principle, S7 data lengths of 3 bytes or more than 4 bytes must be transmitted using system functions SFC14 and SFC15. Consequently, the data in the following table applies:

Process data configuration	Program access
1 PD	Load / transfer commands
2 PD	Load / transfer commands
3 PD	System functions SFC14/15 (length 6 bytes)
6 PD	System functions SFC14/15 (length 12 bytes)
10 PD	System functions SFC14/15 (length 20 bytes)
Param + 1 PD	Parameter channel: System functions SFC14/15 (length 8 bytes) Process data: Load / transfer commands
Param + 2 PD	Parameter channel: System functions SFC14/15 (length 8 bytes) Process data: Load / transfer commands
Param + 3 PD	Parameter channel: System functions SFC14/15 (length 8 bytes) Process data: System functions SFC14/15 (length 6 bytes)
Param + 6 PD	Parameter channel: System functions SFC14/15 (length 8 bytes) Process data: System functions SFC14/15 (length 12 bytes)
Param + 10 PD	Parameter channel: System functions SFC14/15 (length 8 bytes) Process data: System functions SFC14/15 (length 20 bytes)

STEP7 example program

In this example, the project planning for MOVIDRIVE® *compact* has the process data configuration "3 PD" at input addresses PIW576... and output addresses POW576.... A data block DB3 is created with about 50 data words.

When SFC14 is called, the process input data is copied to data block DB3, data words 0, 2 and 4. When SFC15 is called after the control program has been processed, the process output data are copied from data words 20, 22 and 24 to the output address POW 576 ...

Note the length information in bytes for the RECORD parameter. The length information must correspond to the configured length.

Refer to the online help for STEP7 for further information about the system functions.

```
//Start of cyclical program processing in OB1
BEGIN
NETWORK
TITLE =Copy PI data from servo drive to DB3, word 0/2/4
CALL SFC  14 (DPRD_DAT)                  //Read DP slave record
     LADDR  := W#16#240                  //Input address 576
     RET_VAL:= MW 30                     //Result in flag word 30
     RECORD := P#DB3.DBX 0.0 BYTE 6      //Hand

NETWORK
TITLE =PLC program with drive application
// PLC program uses the process data in DB3 for
// drive control
L DB3.DBW 0                              //Load PI1 (status word 1)
L DB3.DBW 2                              //Load PI2 (actual speed value)
L DB3.DBW 4                              //Load PI3 (no function)

L W#16#0006
T  DB3.DBW 20            //Write 6hex to PO1 (control word = enable)
L 1500
T  DB3.DBW 22            //Write 1500dec to PO2 (speed setpoint = 300 1/min)
L W#16#0000
T  DB3.DBW 24            //Write 0hex to PO3 (has no function)

//End of cyclical program processing in OB1
NETWORK
TITLE =Copy PO data from DB3, word 20/22/24 to the inverter
CALL SFC  15 (DPWR_DAT)                  //Write DP slave record
     LADDR  := W#16#240                  //Output address 576 = 240hex
     RECORD := P#DB3.DBX 20.0 BYTE 6     //Pointer on DB/DW
     RET_VAL:= MW 32                     //Result in flag word 32
```

NOTE

For further information and sample applications regarding control via the process data channel, especially coding of the control and status word, see the manual on the fieldbus unit profile, which you can order from SEW.

Parameter setting using PROFIBUS-DP

With PROFIBUS-DP, the drive parameters are accessed via the MOVILINK® parameter channel. This channel offers extra parameter services in addition to the conventional READ and WRITE services.

Structure of the parameter channel

To set the parameters of peripheral units via fieldbus systems that do not provide an application layer, it is necessary to emulate the most important functions and services such as READ and WRITE for reading and writing parameters. You will have to define a parameter process data object (PPO) for PROFIBUS-DP. This PPO is transmitted cyclically. In addition to the process data channel, it contains a parameter channel by means of which acyclical parameter values can be exchanged (→ Figure 41).

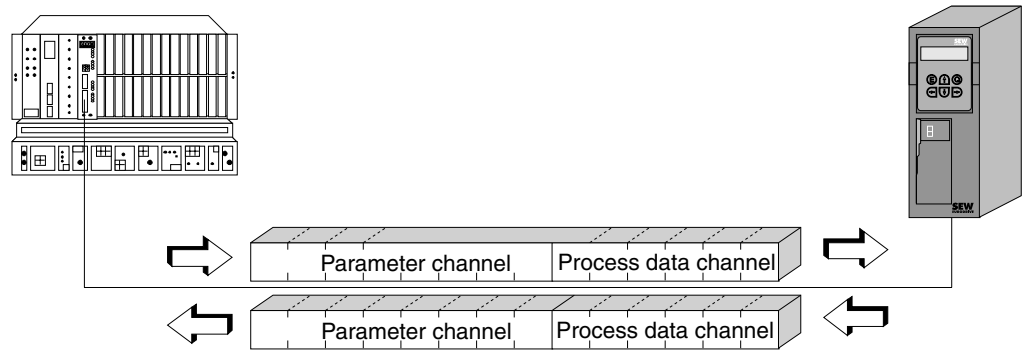


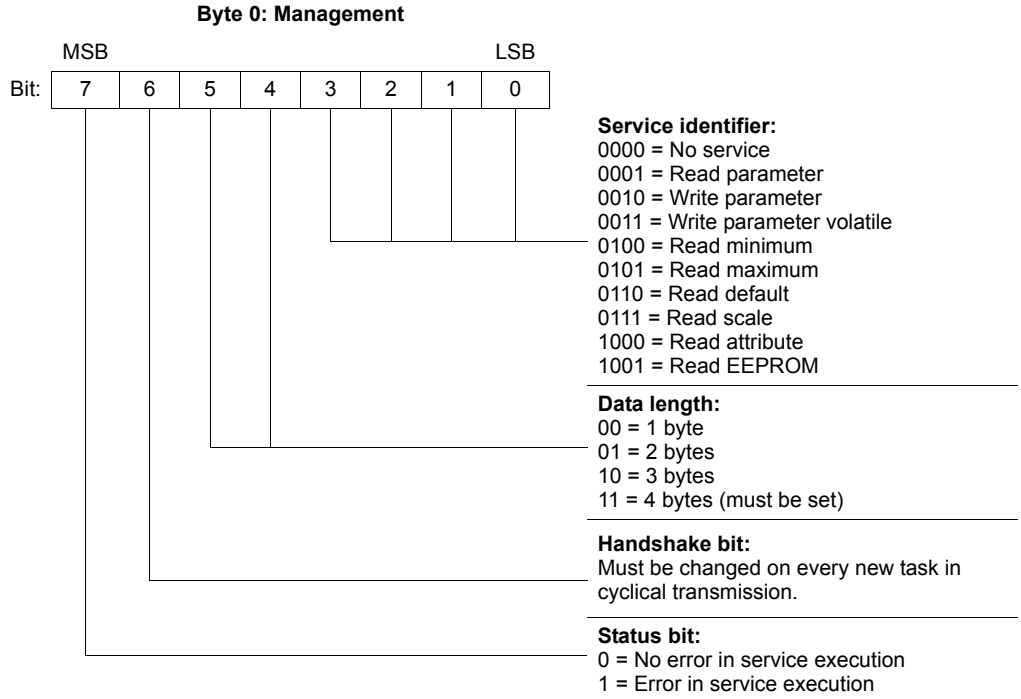
Figure 41: Parameter process data object for PROFIBUS-DP

The following structure shows the parameter channel. In principle, the parameter channel is made up of a management byte, an index word, a reserved byte and four data bytes.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Management	Reserved	Index high	Index low	MSB data	Data	Data	LSB data
		Parameter index			4-byte data		

Management of the parameter channel

The entire procedure for setting parameters is coordinated with byte 0: "Management". This byte provides important service parameters such as service identifier, data length, version and status of the service performed. Bits 0, 1, 2 and 3 contain the service identifier. These bits determine which service is to be executed. Bit 4 and bit 5 specify the data length in bytes for the write service; it should be set to 4 bytes for all SEW drive inverters.



Bit 6 is used as an acknowledgment between the controller and the drive inverter. It triggers the execution of the transmitted service in the drive inverter. In PROFIBUS-DP the parameter channel is transmitted cyclically with the process data. For this reason, the implementation of the service in the drive inverter must be triggered by edge control using the handshake bit 6. For this purpose, the value of this bit is altered (toggled) for each new service that is to be executed. The drive inverter uses the handshake bit to signal whether the service has been executed or not. The service was executed if the handshake bit received in the controller is identical with the transmitted handshake bit. Status bit 7 indicates whether it was possible to execute the service properly or if errors occurred.

Index addressing

"Byte 2: Index high" and "Byte 3: Index low" determines the parameter read or written via the fieldbus system. The parameters of a drive inverter are addressed with a uniform index regardless of the connected fieldbus system. Byte 1 should be viewed as reserved and must always be set to 0x00.

Data range

The data is located in byte 4 to byte 7 of the parameter channel. This means up to 4 bytes of data can be transmitted per service. The data is always entered with right-justification; that is, byte 7 contains the least significant data byte (Data LSB) whereas byte 4 is the most significant data byte (Data MSB).

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Management	Reserved	Index high	Index low	MSB data	Data	Data	LSB data
				High byte 1	Low byte 1	High byte 2	Low byte 2
				High word		Low word	
				Double word			

Incorrect execution of a service

The status bit in the management byte is set to signal that a service has been executed incorrectly. If the received handshake bit is identical to the transmitted handshake bit, the drive inverter has executed the service. If the status bit now signals an error, the error code is entered in the data range of the parameter telegram. Bytes 4 through 7 provide the return code in a structured format (→ section "Return codes of parameter setting" on page 88).

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Management	Reserved	Index high	Index low	**Error class**	**Error code**	**Add. code high**	**Add. code low**

↓

Status bit = 1: Incorrect performance of service

Return codes for parameter setting

In the event of an incorrect parameter setting, the drive inverter sends back various return codes to the master that set the parameters. These codes provide detailed information about what caused the error. All of these return codes are structured in accordance with IEC 61158. The MQI distinguishes between the following elements:

- Error class
- Error code
- Additional code

These return codes apply to all communication interfaces of MOVIDRIVE®.

Error class

The error class element provides a more exact classification of the error type. MOVIDRIVE® *compact* supports the following error classes defined to IEC 61158:

Class (hex)	Designation	Meaning
1	vfd state	Status error of the virtual field device
2	application reference	Error in application program
3	definition	Definition error
4	resource	Resource error
5	service	Error during execution of service
6	access	Access error
7	ov	Error in the object list
8	other	Other error (see additional code)

The error class is generated by the communication software of the fieldbus gateway if there is an error in communication, with the exception of error class 8 = "Other error". Return codes sent from the drive inverter system are all included in "Error class 8 = Other error." The error can be identified more precisely using the additional code element.

Error code

The error code element provides a means for more precisely identifying the cause of the error within the error class. It is generated by the communication software of the fieldbus interface in the event of an error in communication. Only error code 0 (Other error code) is defined for error class 8, "Other error." In this case, detailed identification is available in the additional code.

Additional code

The additional code contains SEW-specific return codes for incorrect parameter setting of the drive inverter. They are returned to the master under Error Class 8 = "Other Error". The following table shows all possible codings for the additional code.

Error class: 8 = "Other error"

Add. code high (hex)	Add. code low (hex)	Meaning
00	00	No error
00	10	Illegal parameter index
00	11	Function / parameter not implemented
00	12	Read access only
00	13	Parameter lock is active
00	14	Factory setting is active
00	15	Value for parameter too large
00	16	Value for parameter too small
00	17	Required option card missing for this function/parameter
00	18	Error in system software
00	19	Parameter access via RS-485 process interface on X13 only
00	1A	Parameter access via RS-485 diagnostic interface only
00	1B	Parameter is access-protected
00	1C	Controller inhibit required
00	1D	Invalid value for parameter
00	1E	Factory setting was activated
00	1F	Parameter was not saved in EEPROM
00	20	Parameter cannot be changed with enabled output stage

Special return codes (special cases)

Errors in parameter settings, which cannot be identified either automatically by the application layer of the fieldbus system or by the system software of the drive inverter, are treated as special cases. The possible causes for such errors are as follows:

- Incorrect coding of a service via parameter channel
- Incorrect length specification of a service via parameter channel
- Internal communication error

Incorrect service code in the parameter channel

Incorrect code was specified in the management byte or reserved byte during parameter setting via the parameter channel. The following table shows the return code for this special case.

	Code (dec)	Meaning
Error class:	5	Service
Error code:	5	Illegal parameter
Add. code high:	0	-
Add. code low:	0	-

Correcting the error:

Check bits 0 and 1 in the parameter channel.

Incorrect length specification in parameter channel

A data length other than 4 data bytes was specified in a write service during configuration via the parameter channel. The following table displays the return codes.

	Code (dec)	Meaning
Error class:	6	Access
Error code:	8	Type conflict
Add. code high:	0	-
Add. code low:	0	-

Correcting the error:

Check bit 4 and bit 5 for the data length in the management byte of the parameter channel.

Internal communication error

The return code listed in the following table is sent back if a communication error has occurred within the system. The requested parameter service may not have been performed and should be repeated. If this error occurs again, switch off the drive inverter completely and then back on again so it is re-initialized.

	Code (dec)	Meaning
Error class:	6	Access
Error code:	2	Hardware fault
Add. code high:	0	-
Add. code low:	0	-

Correcting the error:

Repeat the parameter service. If the error occurs again, switch the drive inverter off and back on again (mains voltage + ext. DC 24 V). Contact SEW Service for advice if this error occurs continuously.

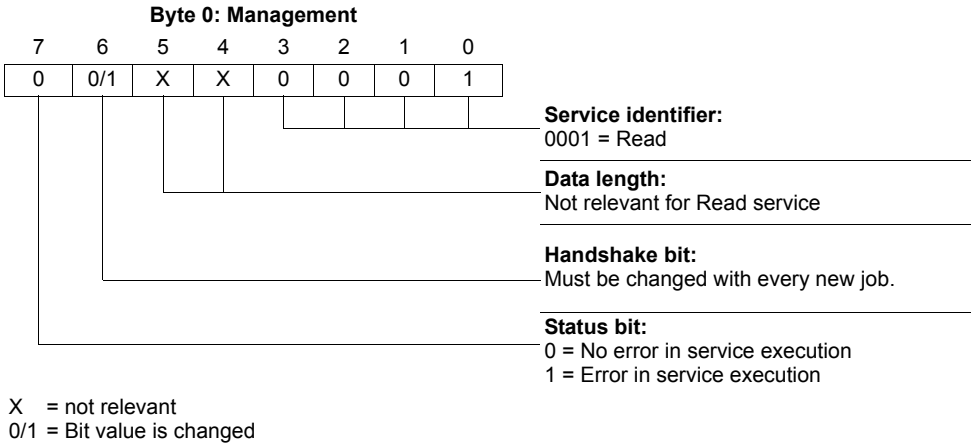
Reading a parameter via PROFIBUS-DP (Read)

To execute a READ service via the parameter channel, due to the cyclical transfer of the parameter channel, the handshake bit may be changed only after the complete parameter channel has been set up for the specific service. As a result, adhere to the following sequence when reading a parameter:

1. Enter the index of the parameter to be read in byte 2 (Index high) and byte 3 (Index low).
2. Enter the service identifier for the Read service in the management byte (byte 0).
3. Transfer the read service to the inverter by changing the handshake bit.

Since this is a read service, the sent data bytes (bytes 4 ... 7) and the data length (in the management byte) are ignored and do not need to be set.

The inverter now processes the read service and sends back the service confirmation by changing the handshake bit.



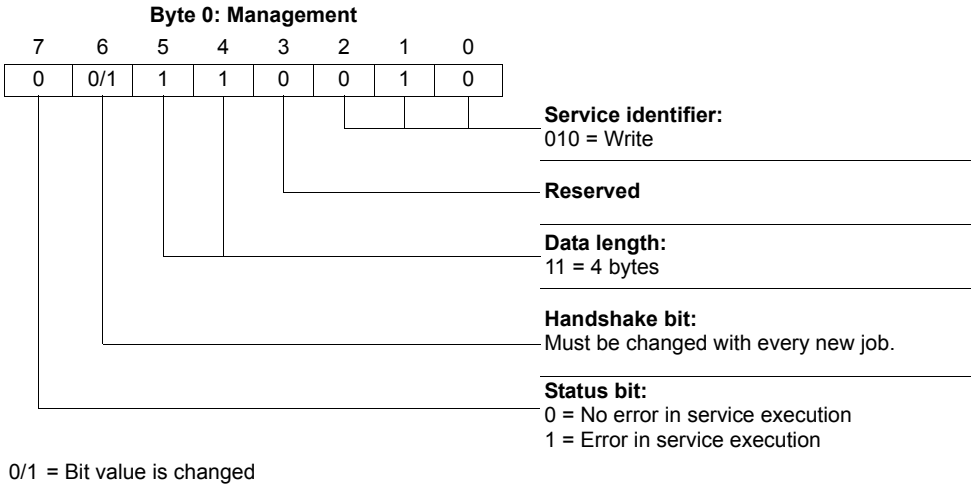
The data length is not relevant, you only need to enter the service identifier for the READ service. This service is now activated in the drive inverter when the handshake bit changes. It would be possible to activate the read service with the management byte coding 01_{hex} or 41_{hex}.

Writing a parameter via PROFIBUS-DP (Write)

To execute a WRITE service via parameter channel, the handshake bit may be changed only after the complete parameter channel has been prepared according to the service because of the cyclical transfer of the parameter channel. Observe the following sequence when writing a parameter:

1. Enter the index of the parameter to be written in byte 2 (Index high) and byte 3 (Index low).
2. Enter the data to be written in bytes 4... 7.
3. Enter the service identifier and the data length for the Write service in the management byte (byte 0).
4. Transfer the Write service to the inverter by changing the handshake bit.

The inverter now processes the Write service and sends back the service confirmation by changing the handshake bit.



0/1 = Bit value is changed

The data length is 4 bytes for all parameters of SEW drive inverters. This service is now transferred to the drive inverter when the handshake bit changes. This means a Write service to SEW drive inverters generally has the management byte coding 32_{hex} or 72_{hex}.

Programming with PROFIBUS-DP

Taking the example of the WRITE service, the following figure represents a process of setting parameters between the controller and the drive inverter via PROFIBUS-DP (→ Figure 42). To simplify the process, only the management byte of the parameter channel is displayed in Figure 42.

The parameter channel is only received and returned by the drive inverter while the controller is preparing the parameter channel for the Write service. The service is not activated until the moment when the handshake bit is changed (in this example, when it changes from 0 to 1). The drive inverter now interprets the parameter channel and processes the write service, but continues to answer all messages with handshake bit = 0. The executed service is acknowledged with a change of the handshake bit in the response message of the drive inverter. The controller now detects that the received handshake bit is once again the same as the one which was sent. It can now prepare another parameter setting procedure.

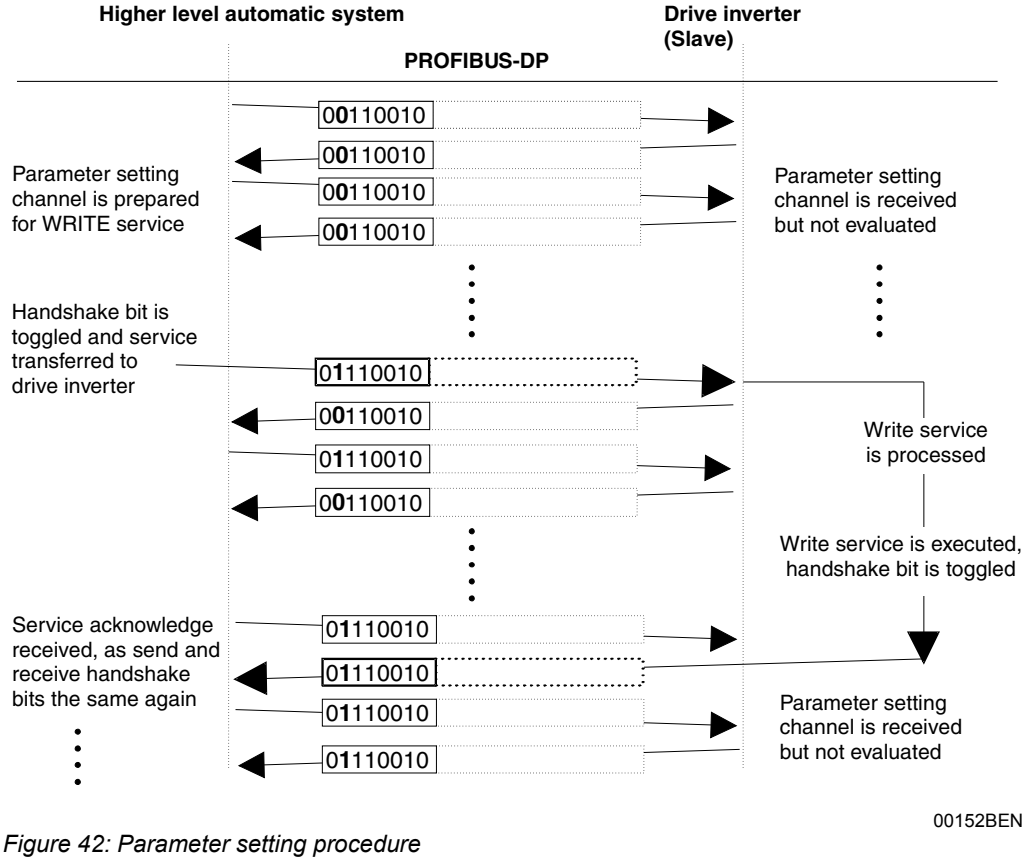


Figure 42: Parameter setting procedure

Parameter data format

When parameters are set via the fieldbus interface, the same parameter coding is used as with the serial RS485 interfaces or the system bus.

The data formats and value ranges for the individual parameters are listed in the "MOVIDRIVE® Serial Communication" manual available from SEW.

5.8 Starting up the inverter with INTERBUS (MCH42A)

The parameters of the MOVIDRIVE® *compact* MCH42A inverter can be set straight away via INTERBUS without any further settings once the INTERBUS interface has been installed. For example, all parameters can be set by the master programmable controller after power-on.

To do this, control source and setpoint source must be set to FIELDBUS in the inverter (P100 = FIELDBUS and P101 = FIELDBUS). The FIELDBUS setting means the inverter parameters are set for control and setpoint entry via INTERBUS. The inverter then responds to the process output data sent by the master programmable controller.

Activation of the control signal source/setpoint source FIELDBUS is signaled to the higher-level controller using the "Fieldbus mode active" bit in the status word. For safety reasons, you must also enable the inverter at the terminals for control via the fieldbus system. Consequently, you must wire or program the terminals in such a way that the inverter is enabled via the input terminals.

The simplest way of enabling the inverter on the terminal side is to set the DIØØ (/CONTROLLER INHIBIT) input terminal to a "1" signal and to program the input terminals DIØ1 ... DIØ3 to "NO FUNCTION."

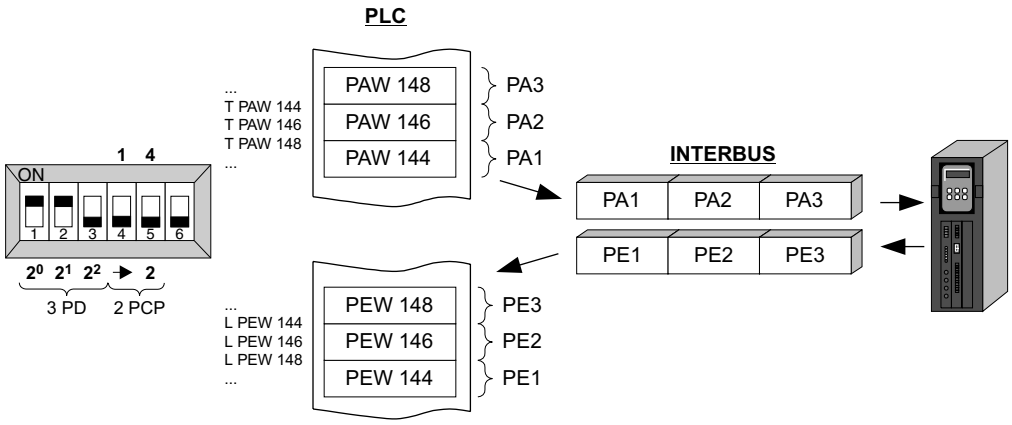
Preliminary work for startup

1. Enable the inverter at the terminals. To do so, set a "1" signal at X11:1 (DIØØ "/CONTROLLER INHIBIT"), for example using a jumper to X11:8 (VO24).
2. Only switch on the DC 24 V voltage supply; do not switch on the supply voltage yet. You can now set the inverter parameters without the motor starting up unintentionally.
3. Set the control source and setpoint source to FIELDBUS on (P100 = FIELDBUS and P101 = FIELDBUS).
4. Set binary inputs DIØ1 to DIØ3 to "No function" (P600 to P602 = "No function").

Project planning for the INTERBUS system

Project planning for the inverter in the INTERBUS interface module using the "CMD tool" configuration software CMD (Configuration Monitoring Diagnosis) involves two steps.

1. Creating a bus structure
2. Device description and addressing the process data



03713AXX

Figure 43: Project planning example for 3PD + 2PCP

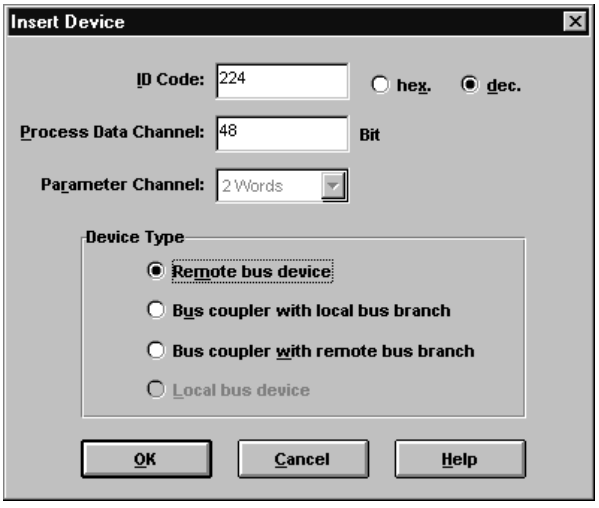
The figures below show the settings in the CMD tool for an inverter which is configured with 3PD + 2PCP as shown in Figure 43to the input/output addresses 144...149 of the controller.

Configuring the bus structure

The bus structure can be configured online or offline using the CMD tool.

Offline configuration: Insert with ID code

In offline status, the inverter is configured in the CMD tool using the "Edit / Insert with ID code" menu item. In accordance with Figure 44, you must specify the entries for the ID code, process data channel and the device type.



03714AXX

Figure 44: Offline configuration with CMD tool

	NOTE
	Not all combinations are possible because the inverter can occupy a maximum of six words in the INTERBUS.

Information for offline configuration in the CMD tool

The following table shows the possible settings. The ID code setting must match the DIP switches S4 and S5. The process data channel setting must match the DIP switches S1 to S3, otherwise, INTERBUS operation is not possible.

	Program settings	Function (MOVIDRIVE display)
ID-Code	227 dec (E3 hex)	Parameter channel: 1 word
Process data channel:	16 bit	1 process data word (param+1PD)
	32 bit	2 process data words (param + 2 PD)
	48 bit	3 process data words (param + 3 PD)
	64 bit	4 process data words (param + 4 PD)
	80 bit	5 process data words (param + 5 PD)
ID-Code	224 dec (E0 hex)	Parameter channel: 2 words
Process data channel:	16 bit	1 process data word (param+1PD)
	32 bit	2 process data words (param + 2 PD)
	48 bit	3 process data words (param + 3 PD)
	64 bit	4 process data words (param + 4 PD)
ID-Code	225 dec (E1 hex)	Parameter channel: 4 words
Process data channel:	16 bit	1 process data word (param+1PD)
	32 bit	2 process data words (param + 2 PD)
ID-Code	3 dec (03 hex)	Parameter channel: -
Process data channel:	96 bit	6 process data words (6PD)

Online configuration: Configuration frame / Read in

The INTERBUS system can also be installed completely at first, and then the DIP switches S1 to S6 can be set. Next, the CMD tool can be used to read in the entire bus structure (configuration frame). All devices are automatically detected with their data width settings.

Creating a device description

An individual device description for the inverter in the INTERBUS system can be created for unique identification and description of the INTERBUS participants.

The following entries are important:

Device description

The fields "Manufacturer Name" and "Device Type must be given the following names

- Manufacturer name: SEW-EURODRIVE
- Device type: MOVIDRIVE

so that the parameters for the drive can be set with a management PC from the production control level via the INTERBUS interface module (Figure 45).

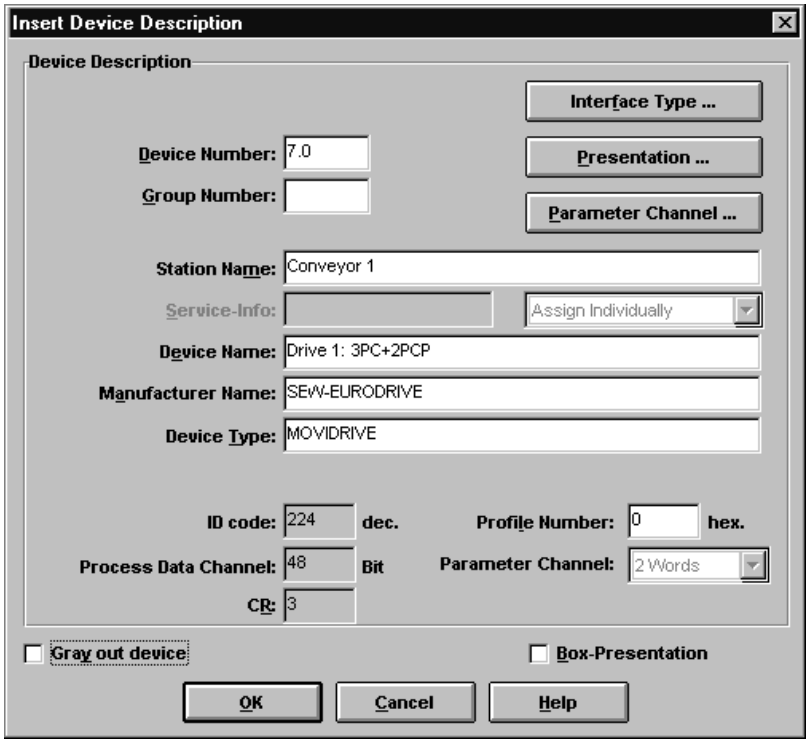


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Figure 45: Device description for MOVIDRIVE® compact MCH42A

Interface type

Select "Fiber optic remote bus (FO remote bus)" as the interface type

Display

For easy identification of the inverter, CMD tool version 4.50 and higher allows to copy your own ICO files into the ".\IBSCMD\Pict32\" directory (Figure 46). The "INTERBUS description files for CMD tool" can be found on the SEW website at http://www.SEW-EURODRIVE.com under "Downloads / Software".

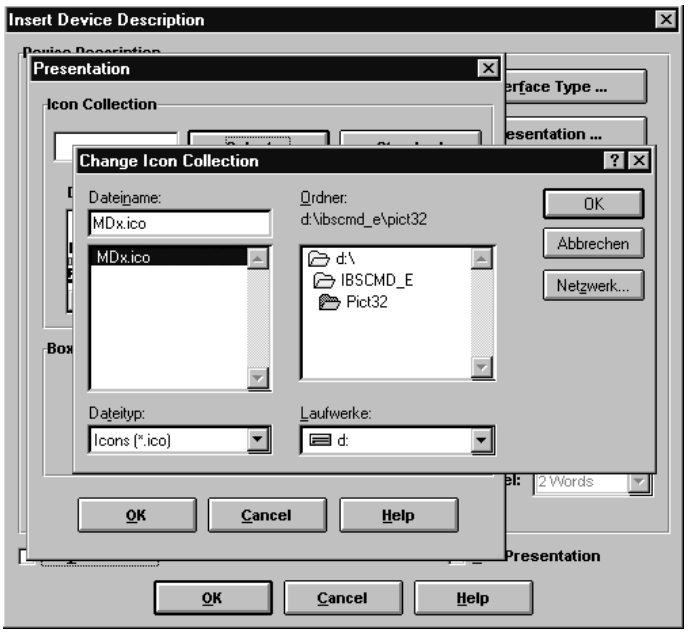

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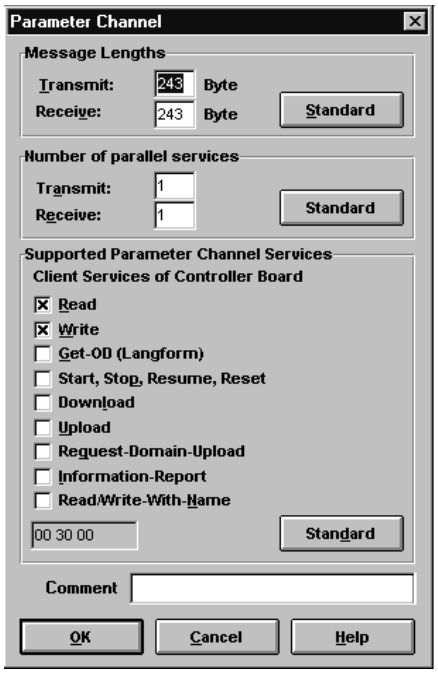
Figure 46: Linking the device description with the ICO file

Parameter channel

Make the following settings for the parameter channel if you want to use the PCP channel for setting the inverter parameters in your application:

- Message Lengths / Transmit / Receive

  243 bytes each
- Supported Parameter Channel Services (Standard): Read / Write (Standard)

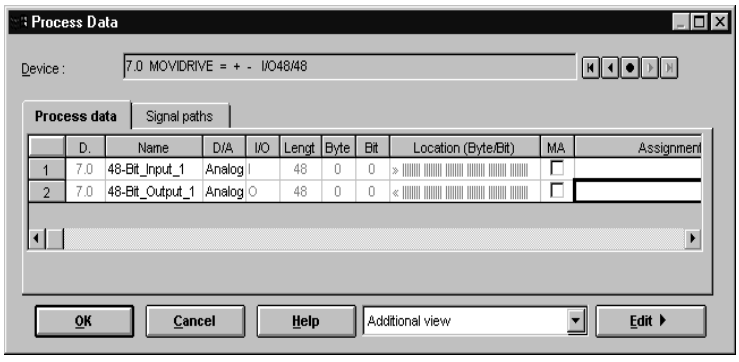


03717AXX

Figure 47: Setting the parameter channel (PCP)

Assigning process data

INTERBUS process data of the inverter is assigned to the program addresses of the control system using the "Process Data" context menu.



03718AXX

Figure 48: Assigning INTERBUS process data and PLC program addresses

A sample program (STEP7) for controlling the inverter using the process data of the INTERBUS can be found in the "Control via process data" section.

Testing the PCP connection

You can use the MONITOR mode of the CMD tool to test the PCP connection to the inverter. The following figures illustrate the procedure for the PCP test. This procedure establishes a PCP connection to the device and reads the parameter list (object directory) saved in the device.

Set the CMD tool to "Monitoring" mode.

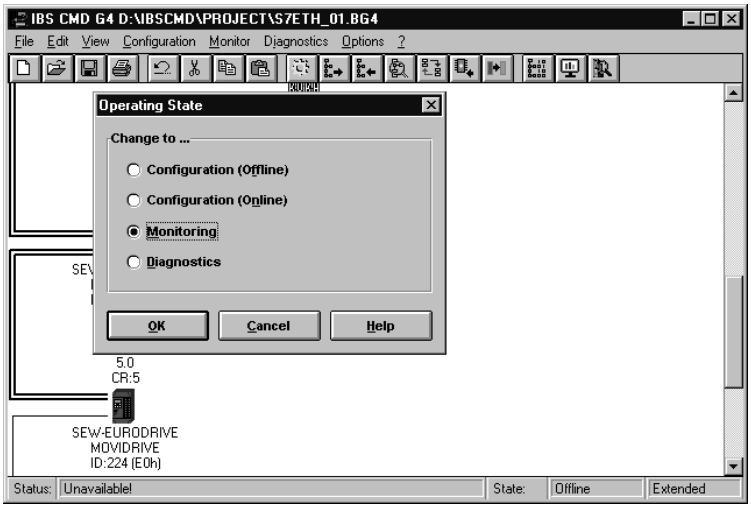


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Figure 49: Setting the CMD tool to "MONITORING" mode

Click the inverter to which you want to establish a PCP connection. Open the context menu by clicking the right mouse button and select the menu item "Device Parameterization."

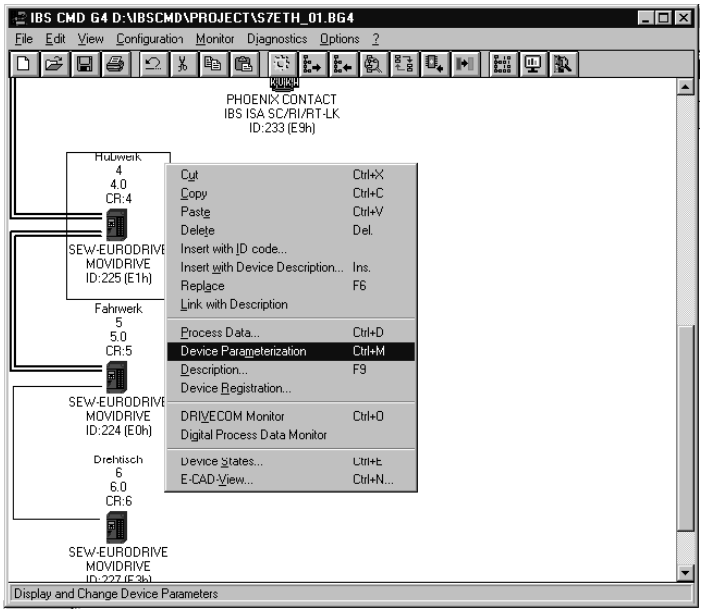

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Figure 50: Testing the PCP device parameterization

In the "Device Parameterization" window, select "Device / Read Parameter List" from the menu.

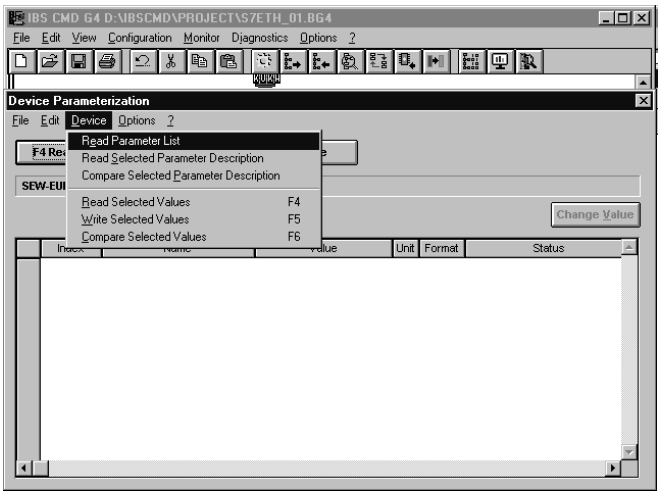

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Figure 51: Window for device parameterization using the CMD tool

If the device parameters have been read in, project planning of the PCP channel was performed correctly. The read-in process can be aborted.

If an error message appears instead of the progress indicator, check the PCP configuration and allocation of CRs. If necessary, format the parameterization memory of the interface module again and then write the new project in the parameterization memory. Next, perform the parameterization procedure of the interface module again and repeat this test sequence for checking the PCP connection.

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Figure 52: The CMD tool reads device parameters, i.e. PCP communication is OK.

Basic overview

The MOVIDRIVE® *compact* MCH42A inverter offers a standardized interface for parameterization using the "Peripherals Communication Protocol" (PCP). This INTERBUS communication channel gives you complete access to all drive parameters of the MOVIDRIVE® inverter.

The PCP channel must be configured with the corresponding ID code so you can access parameter values in the inverter. There are one, two or four words available in the INTERBUS protocol for the PCP channel. You can vary the speed of access to parameter values via the PCP channel using the number of PCP words.

Additional PCP channel for startup and diagnostics

The PCP interface is implemented with PCP version 3. Apart from the familiar PCP channel between the control system (PLC) and the inverter, it is now possible to establish an additional (logical) PCP channel between the interface module and the inverter. This additional PCP channel can be used by a supervisory computer, for example, to access the inverter parameter values via the Ethernet / Interbus communication pathway.

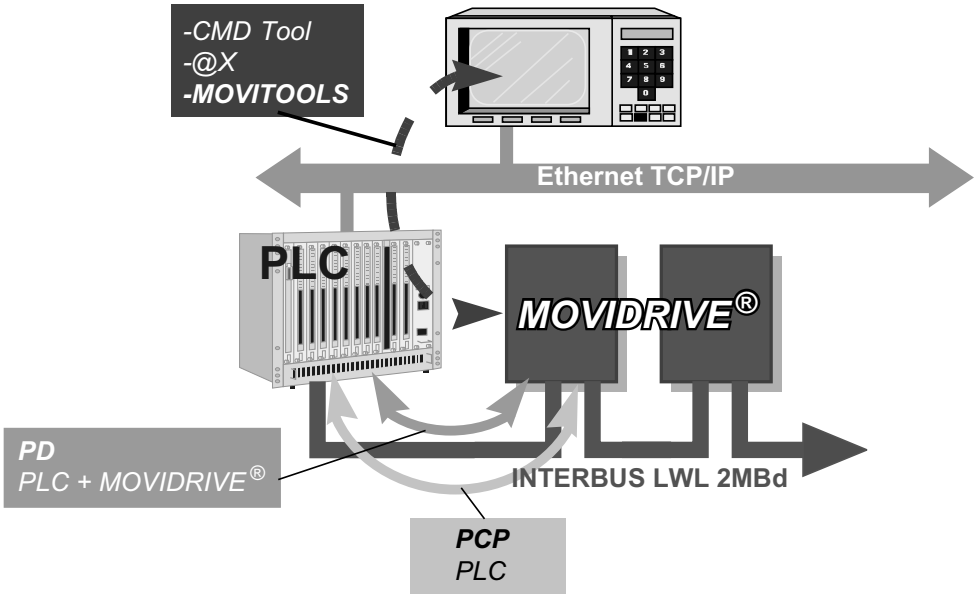


Figure 53: Communication channels with PCP version 3

Figure 53 shows an example of a system topology with Ethernet TCP/IP level and INTERBUS level. An INTERBUS interface module with Ethernet TCP/IP interface that functions as a gateway between the two communication levels is used for this purpose.

Apart from the "CMD Tool", the supervisory computer also runs INTERBUS "@utomationXplorer" and "MOVITOOLS" for programming and setting the parameters of the SEW inverter on the INTERBUS. This arrangement allows for using the existing bus infrastructure for startup and maintenance. This facilitates startup and diagnostics of the entire automation system because the INTERBUS cable is now not only used for control purposes but also for startup and diagnostics of all components used on the fieldbus.

PCP services

The MOVIDRIVE® *compact* MCH42A inverter supports the PCP services shown in Figure 54. However, only the following services are important for setting the inverter parameters:

- Establishing a connection ("Initiate")
- Reading parameter values ("Read")
- Writing parameter values ("Write")
- Disconnecting a connection ("Abort")

Refer to the user manual for PCP communication of your INTERBUS interface module for a detailed description of the PCP services.

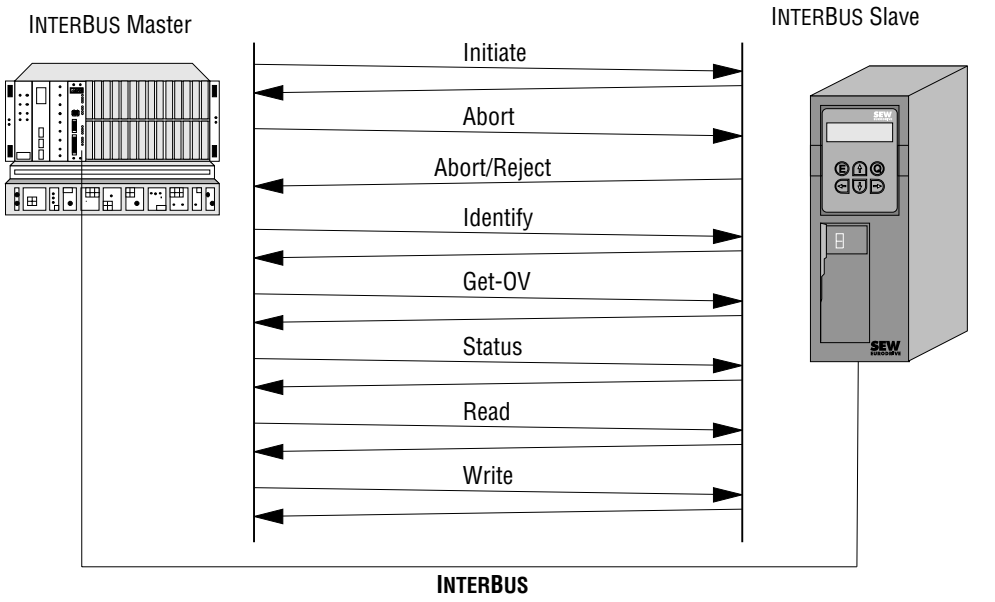


Figure 54: PCP services supported by MOVIDRIVE®

Establishing the communication connection with "Initiate"

The "Initiate" PCP service establishes a communication connection for exchanging parameters between an INTERBUS interface module and the MOVIDRIVE® inverter. Connection is always established by the INTERBUS interface module. While the connection is being established, various agreements concerning the communication link are checked, such as supported PCP services, user data length, etc. After the connection has been established successfully, the inverter responds with a positive "Initiate-Response." If the connection could not be established, then the agreements for the communication connection on the INTERBUS interface module do not match those on the MOVIDRIVE® inverter. The inverter answers with "Initiate-Error-Response." In this case, compare the configured communications relations of the INTERBUS interface module with that of the inverter.

Any attempt to re-establish an existing communication connection generally results in an abort. The communication connection will then no longer exist so the "Initiate" PCP service must be executed a third time to re-establish communication.

Disconnecting the the communication connection with "Abort"

The "Abort" PCP service breaks off an existing communication connection between the INTERBUS interface module and the MOVIDRIVE® inverter. Abort is an unconfirmed PCP service that can be triggered by the INTERBUS interface module and by MOVIDRIVE®.

Reading parameter values with "Read"

The "Read" PCP service gives the INTERBUS interface module read access to all communication objects (drive parameters) of the MOVIDRIVE® inverter. All drive parameters and their codes are listed in detail in the MOVIDRIVE® Fieldbus Unit Profile and Parameter List documentation.

Writing parameter values with "Write"

The PCP service "Write" is used to grant the INTERBUS interface module write access to all MOVIDRIVE® drive parameters. If a drive parameter is accessed incorrectly (e.g. value is too high), the inverter generates a "Write Error Response" with exact information on the cause of the error.

Parameters in the object list

The "Read" and "Write" PCP services give the INTERBUS interface module access to all parameters defined in the object list. All drive parameters that can be accessed via the bus system are defined as communications objects in the static object list. All objects in the static object list are addressed using indices. The following table shows the structure of the object list for the MOVIDRIVE® *compact* MCH42A inverter.

The index range is divided into three logical sections. The drive parameters are addressed with indices 8300 ... 8800dec. The parameter index can be found in the SEW MOVIDRIVE® Parameter List documentation. Indices below 8300dec are handled directly by the INTERBUS interface and should not be regarded as drive parameters of the inverter.

Parameter index (decimal)	Designation of the communications object
8296	Download parameter block
8297	Last PCP index
8298	MOVILINK® parameter channel, cyclic
8299	MOVILINK® parameter channel, acyclic
8300 ... 8800	Drive parameter for MOVIDRIVE® (can be accessed directly with the "Read" and "Write" PCP services, see the MOVIDRIVE® parameter list in the SEW documentation for information about the parameter index)
8801... 9999	Drive parameters for MOVIDRIVE® (these parameters can only be accessed via the MOVILINK® parameter channel)
>10000	Table, program and variable memory (these parameters can only be accessed via the MOVILINK® parameter channel)

Object description of the drive parameters

The drive parameters of the MOVIDRIVE® inverter are described in detail in the SEW documentation MOVIDRIVE® Parameter List. As well as the parameter index, this gives you additional information about coding, the range of values and the meaning of the parameter data.

The object description in the object list is identical for all drive parameters. Even parameters that can only be read receive the attribute Read all/Write all in the object list because the inverter performs the corresponding check itself and provides a return code, if necessary. The following table shows the object description for all drive parameters.

Index:	8300 ... 8800
Object code:	7 (simple variable)
Data type index:	10 (octet string)
Length:	4
Local address:	
Password:	
Access groups:	
Access rights:	Read all / Write all
Name[16]:	-
Extension length:	-

Object "Download parameter block"

The "Download parameter block" object can be used to write a maximum of 38 MOVIDRIVE® drive parameters at the same time with a single write service. Consequently, this object offers the possibility to set the parameters of the inverter, for example during the starting phase, with a single call of the write service. Because only a few parameters generally have to be changed, this parameter block with a maximum of 38 parameters is sufficient for nearly all applications. The user data area is set to 38 x 6 + 2 Byte = 230 Byte (Type Octet String). The following table shows the structure of the "Download parameter block" object.

Octet	Meaning	Note
0	Reserved (0)	
1	Number of parameter	1 ... 38 parameter
2	Index high	1st parameter
3	Index low	
4	MSB data	
5	Data	
6	Data	
7	LSB data	
8	Index high	
...	...	
223	LSB data	
224	Index high	38th parameter
225	Index low	
226	MSB data	
227	Data	
228	Data	
229	LSB data	

The "download parameter block" object is only handled locally on the INTERBUS interface and is defined as in the following table.

Index:	8296
Object code:	7 (simple variable)
Data type index:	10 (octet string)
Length:	230
Local address:	
Password:	
Access groups:	
Access rights:	Write all
Name[16]:	-
Extension length:	-

The WRITE service to the "Download parameter block" object on the INTERBUS interface starts a parameterization mechanism that writes sequentially all parameters listed in the user data area of the object into the DPRAM and, by doing so, sets the parameters of the inverter. After successful processing of the download parameter block, i.e. all parameters transferred by the INTERBUS interface module were written, the write service is ended with a positive write response. In the event of a fault, a negative write response is returned. Consequently, the return code contains more details about the type of error and the parameter number (no. 1 to 38) where the error occurred (see example).

```
Example: Error writing the 11th parameter Write Error Response:
Error class: 8  Other
Error code:  0  Other
Additional code High: 11dec Error writing parameter 11
Additional code Low: 15hex Value too high
```

	NOTE
	Observe the following notes when using the download parameter block: • Do not execute any factory setting within the download parameter block! • After activating a parameter lock, all subsequently written parameters are rejected.

Object "Last PCP index"

This object is 4 bytes long and, when read access is made, it returns the numerical value of the last index which can be addressed directly using the PCP services. PCP accesses to indices that are higher than this numerical value must be performed using the "MOVILINK® acyclic parameter channel" object.

Index:	8297
Object code:	7 (simple variable)
Data type index:	10 (octet string)
Length:	4
Local address:	
Password:	
Access groups:	
Access rights:	Read all
Name[16]:	-
Extension length:	-

Object "MOVILINK® cyclic parameter channel"

This object is 8 bytes long and contains the cyclic MOVILINK® parameter channel. All MOVILINK® communication services can be performed by cyclically alternating reading and writing of this object. The communications service is performed only with the change of the handshake bit in the management byte. The MOVILINK® parameter channel allows for access to all indices and, therefore, also to the IPOS$^{plus®}$ variable and program memory.

The following table shows the structure of this communications object. Refer to the MOVIDRIVE® "Fieldbus Unit Profile and Parameter List" documentation for information about the structure of the parameter channel.

Octet	0	1	2	3	4	5	6	7
Meaning	Management	Reserved	Index high	Index low	MSB data	Data	Data	LSB data
Note	Management	Reserved	Parameter index		4-byte data			

The "MOVILINK® parameter channel cyclical" object is only handled locally on the INTERBUS interface.

Index:	8298
Object code:	7 (simple variable)
Data type index:	10 (octet string)
Length:	8
Local address:	
Password:	
Access groups:	
Access rights:	Read all / Write all
Name[16]:	-
Extension length:	-

The following table shows the process of a parameter access via the cyclic MOVILINK® parameter channel. The inverter will only start executing the service when the master has changed the handshake bit in the parameter channel. To do this, the master must read the parameter channel at the beginning of parameterization to obtain the current status of the handshake bit in the inverter. The master can now initiate the evaluation of the parameter channel in the inverter by changing the handshake bit.

The inverter now executes the service coded in the parameter channel and re-enters the service confirmation in the parameter channel. The master receives the service confirmation with the next read access to the "MOVILINK® cyclic parameter channel." The following table shows the process of the cyclically called read/write services for the "MOVILINK cyclic parameter channel."

Control (master)	MOVIDRIVE® (slave)
1. "READ MOVILINK® cyclic parameter channel" to evaluate the status of the handshake bit.	
READ 8298 (parameter channel) →	
← Data = parameter channel	
2. Initiate execution of the service coded in the parameter channel with WRITE on the "MOVILINK® cyclic parameter channel" object and the handshake bit toggle.	
WRITE 8298 (parameter channel) →	
← OK	
3. READ "MOVILINK® cyclic parameter channel" and evaluation of service confirmation in the parameter channel.	
READ 8298 (parameter channel) →	
← Data = parameter channel with result	

Object "MOVILINK® acyclic parameter channel"

The "MOVILINK® acyclic parameter channel" object is 8 bytes long and contains the MOVILINK® parameter channel. This object can be used for acyclical parameter access, i.e. the inverter executes the processing of the service coded in the parameter channel every time it receives a WRITE service to this object. The handshake bit is not evaluated. The following table shows the structure of the "MOVILINK® acyclic parameter channel". Refer to the "MOVIDRIVE® Fieldbus Unit Profile and Parameter List" documentation for information on the structure of the parameter channel.

Octet	0	1	2	3	4	5	6	7
Meaning	Management	Reserved	Index high	Index low	MSB data	Data	Data	LSB data
Note	Management	Reserved	Parameter index		4-byte data			

Two different operations are involved when setting the inverter parameters via the acyclic MOVILINK® parameter channel:

- Parameter channel performs a write service
- Parameter channel performs a read service

Parameter channel performs a write service

If a write type service is executed via the acyclic parameter channel (e.g. write parameter or write parameter volatile), the inverter responds with the current service confirmation after the service has been executed. An incorrect write access returns the corresponding error code.

This option offers the advantage that the write service can be processed upon sending a single WRITE "MOVILINK® parameter channel" and the service confirmation can be accomplished by evaluating the "Write Confirmation." The following table shows the execution of write services via the acyclic MOVILINK® parameter channel.

Control (master)	**MOVIDRIVE® (slave)**
1. Initiate the service coded in the parameter channel by means of a WRITE to the "MOVILINK® parameter channel cyclical" object.	
WRITE 8298 (parameter channel) →	
← Service confirmation (OK/fault code)	

The WRITE service coded in the parameter channel is executed and the service confirmation is returned immediately as response.

Parameter channel performs a read service

To read a parameter via the parameter channel, it is necessary to execute a PCP WRITE service first. The PCP WRITE service specifies where the data of the inverter should be made available. A read service must be executed on the acyclic parameter channel so that these data can reach the master. This means that the execution of read services via the parameter channel always requires a PCP WRITE and then a PCP READ service. The following table shows how read services are executed via the acyclical MOVILINK® parameter channel.

Control (master)	**MOVIDRIVE® (slave)**
1. Initiate the service coded in the parameter channel by means of a WRITE to the "MOVILINK® parameter channel cyclical" object.	
WRITE 8298 (parameter channel) →	
	OK ←
2. READ "MOVILINK® cyclic parameter channel" and evaluation of service confirmation in the parameter channel.	
READ 8298 (parameter channel) →	
	Data = parameter channel with result ←

1. Receipt is confirmed immediately; parameter channel is evaluated and requested service is executed.
2. Service confirmation is entered into parameter channel and can be evaluated via READ access in the master.

The MOVILINK® acyclic parameter channel is handled only locally on the INTERBUS interface and is defined as shown in the following table.

Index:	8299
Object code:	7 (simple variable)
Data type index:	10 (octet string)
Length:	8
Local address:	
Password:	
Access groups:	
Access rights:	Read all / Write all
Name[16]:	-
Extension length:	-

Return codes of parameter setting

In the event of an incorrect parameter setting, the inverter sends back various return codes to the master which set the parameters. These codes provide detailed information about what caused the error. All of these return codes are structured in accordance with IEC 61158. The inverter distinguishes between the following elements:

- Error class
- Error code
- Additional code

These return codes apply to all MOVIDRIVE® communication interfaces.

Error class

The error class element provides a more exact classification of the error type. In accordance with IEC 61158, the system differentiates between the error classes listed in table 1.

Class (hex)	Designation	Meaning
1	vfd state	Status error of the virtual field device
2	application reference	Error in application program
3	definition	Definition error
4	resource	Resource error
5	service	Error during execution of service
6	access	Access error
7	ov	Error in the object list
8	other	Other error (see additional code)

Except for error class 8 = other error, the error class is generated by the communications software of the fieldbus card in case of a faulty communication. Return codes sent from the inverter system are all in Error class 8 = Other error. The error can be identified more precisely using the additional code element.

Error code

The error code element allows for a more detailed identification of the error cause within the error class and is generated by the communications software of the fieldbus card in case of a faulty communication. For error class 8 = other error, only error code = 0 (other error code) is defined. In this case, detailed identification is available in the additional code.

Additional code

The additional code contains SEW-specific return codes for faulty parameterization of the inverter. They are returned to the master under error class 8 = other error. Table 2 shows all possible codings for the additional code.

Add. code high (hex)	Add. code low (hex)	Meaning
00	00	No error
00	10	Illegal parameter index
00	11	Function / parameter not implemented
00	12	Read access only
00	13	Parameter lock is active
00	14	Factory setting is active
00	15	Value for parameter too large
00	16	Value for parameter too small
00	17	Required option card missing for this function/parameter
00	18	Error in system software
00	19	Parameter access only via RS-485 process interface to X13
00	1A	Parameter access only via RS-485 diagnostics interface
00	1B	Parameter is access-protected
00	1C	Controller inhibit required
00	1D	Invalid value for parameter
00	1E	Factory setting was activated
00	1F	Parameter was not saved in EEPROM
00	20	Parameter cannot be changed with enabled output stage

Special case "Internal communication error"

The return code listed in the following table is sent back if a communication error has occurred between the INTERBUS interface and the inverter system. The PCP service transmitted via the fieldbus may not have been executed and should be repeated. If this error occurs again, switch off the inverter completely and then back on again so it is re-initialized.

	Code (dec)	Meaning
Error class:	6	Access
Error code:	2	Hardware fault
Add. code high:	0	-
Add. code low:	0	-

Error correction

Repeat the read or write service. If the error occurs again, switch the inverter off and back on again. If this error occurs permanently, consult the SEW Electronics Service.

Control via process data

The inverter is controlled via process data by reading/writing the program addresses to which the INTERBUS process data of the inverter are mapped. Example for a simple STEP7 program for Simatic S7:

```
L  W#16#0006
T  PAW  144   //Write 6hex to PO1 (control word = enable)
L 1500
T  PAW  146   //Write 1500dec to PO2 (speed setpoint value = 300 1/min)
L  W#16#0000
T  PAW  148  //Write 0hex to PO3 (no function based on factory setting)
```

Please refer to the Fieldbus Unit Profile manual for more information about controlling the inverter via process data channel, in particular regarding the coding of the control and status word.

Parameter setting via the PCP interface

This section describes how parameters and IPOS$^{plus®}$ variables can be read or written using the standardized INTERBUS PCP services "Read" and "Write." The example applies to all 4th generation (G4) INTERBUS interface modules and is explained using PHOENIX terminology.

The coding examples shown in the following sections are shown in the same way as in the INTERBUS user manual "Peripherals Communication Protocol (PCP)" by Phoenix Contact.

Prerequisites

You should have the following user manuals:

- INTERBUS user manual "Peripherals Communication Protocol (PCP)", PHOENIX CONTACT, IBS SYS PCP G4 UM
- MOVIDRIVE® Fieldbus Unit Profile manual

Coding examples

The coding examples shown in the following sections are shown in the same way as in the INTERBUS user manual "Peripherals Communication Protocol (PCP)" by Phoenix Contact.

All information in a PCP service is presented word by word in column format. This means you can regard a word as PLC word (e.g. Simatic data word). In each case, the right column shows a coding example for the MOVIDRIVE® inverter.

The "Communication Reference (CR)" is used for selecting the inverter for which you want to set the parameters. In the following examples, CR = 02 hex was assigned to the inverter in the CMD tool. The index defines the drive parameter that should be accessed.

Device description of the inverter in the CMD tool

Before you can use the PCP channel of the inverter, you have to configure the device description for the inverter in the CMD tool.

Process of a parameterization sequence

The peripherals communication protocol (PCP) of the INTERBUS standardizes access to the parameter data of INTERBUS stations and prescribes the following procedure:

- Initializing the PCP connection with the "Initiate" service
- Reading or writing parameters with the "Read" and "Write" services.
- The communication link can be disconnected with the "Abort" service if it is no longer required (the service is not described here because it is usually not required; see PCP manual).
- Initializing the PCP connection with the "Initiate" service

The drive parameters of the inverter are not accessed until the PCP connection has been established with "Initiate_Request". This can be done, for example, once during system startup.

Word	Meaning		Coding (hex)
1	Command_Code = Initiate_Request		00 8B
2	Parameter_Count		00 02
3	-	Comm._Reference	00 02
4	Password	Access_Groups	00 00
Bits	15 ... 8	7 ... 0	

You should receive the positive message "Initiate_Confirmation_ after the service has been sent (refer to the PCP manual in case of a negative message).

Reading a drive parameter

The "Read" service is used for reading a drive parameter (with index ≤ 8800). All drive parameters are generally 4 bytes long (1 double word).

Example

Reading P130 ramp t11 UP CW (index 8470 dec = 2116 hex)

Word	Meaning		Coding (hex)
1	Command_Code = Read_Request		00 81
2	Parameter_Count		00 03
3	Invoke_ID	Comm._Reference	00 02
4	Index		21 16
5	Subindex	-	00 00
Bits	15 ... 8	7 ... 0	

Once you have sent this service, you should receive the positive message "Read_Confirmation".

Word	Meaning		Coding (hex)
1	Message_Code = Read_Confirmation (+)		80 81
2	Parameter_Count		00 05
3	Invoke_ID	Comm._Reference	00 02
4	Result (+)		00 00
5	-	Length	00 04
6	Data [1]	Data [2]	00 00
7	Data [3]	Data [4]	07 D0
Bits	15 ... 8	7 ... 0	

The parameter data are represented in Motorola format (Simatic format) as follows:

Data [1] = High Byte	Data [2] = Low Byte	Data [3] = High Byte	Data [4] = Low Byte
00 hex	00 hex	07 hex	D0 hex

00 00 07 D0 hex = 2000 dec (= 2000 ms ramp)

Refer to the appendix in the "MOVIDRIVE®Fieldbus Unit Profile" manual for more information on coding drive parameters.

Word	Meaning		Coding (hex)
1	Message_Code = Read_Confirmation		80 81
2	Parameter_Count		00 03
3	Invoke_ID	Comm._Reference	00 02
4	Error_Class	Error_Code	08 00
5	Additional_Code		00 10
Bits	15 ... 8	7 ... 0	

The table shows the "Value for parameter too great" return code, by way of example.

Writing a drive parameter

The "Write" service is used for writing a drive parameter (with index ≤ 8800). All drive parameters are generally 4 bytes long (1 double word).

Example

Writing the ramp time 1.65 s to P130 "Ramp t11 UP CW"

Index: 8470 dec = 2116 hex

Value: 1.65s = 1650 ms = 1650 dec = 0000 0672 hex)

The parameter data are represented in Motorola format (Simatic format) as follows:

Data [1] = High Byte	Data [2] = Low Byte	Data [3] = High Byte	Data [4] = Low Byte
00 hex	00 hex	06 hex	72 hex

Refer to the appendix in the "MOVIDRIVE ®Fieldbus Unit Profile" manual for more information on coding drive parameters.

Word	Meaning		Coding (hex)
1	Command_Code = Write_Request		00 82
2	Parameter_Count		00 05
3	Invoke_ID	Comm._Reference	00 02
4	Index		21 16
5	Subindex	Length	00 04
6	Data [1]	Data [2]	00 00
7	Data [3]	Data [4]	06 72
Bits	15 ... 8	7 ... 0	

Word	Meaning		Coding (hex)
1	Message_Code = Write_Confirmation (+)		80 82
2	Parameter_Count		00 02
3	Invoke_ID	Comm._Reference	00 02
4	Result (+)		00 00
Bits	15 ... 8	7 ... 0	

Once you have sent this service, you should receive the positive message "Write_Confirmation".

Word	Meaning		Coding (hex)
1	Message_Code = Write_Confirmation (-)		80 82
2	Parameter_Count		00 03
3	Invoke_ID	Comm._Reference	00 02
4	Error_Class	Error_Code	08 00
5	Additional_Code		00 15
Bits	15 ... 8	7 ... 0	

The table shows the "Value for parameter too great" return code, by way of example.

Writing IPOS$^{plus®}$ variables / parameters via MOVILINK®

The inverters offer special parameter access via the MOVILINK® parameter channel for universal write access to all inverter data (parameters, IPOS$^{plus®}$ variables, IPOS$^{plus®}$ program code, etc.). The following section illustrates the mechanism by which, for example, IPOS$^{plus®}$ variables can be changed via the parameter channel.

The acyclic parameter channel can be used via index 8299 dec (206B hex).

Example

Writing the value 74565 of the IPOS$^{plus®}$ variable H0 = Index 11000 dec (2AF8 hex)

Value to be written = 74565 dec (0001 2345 hex)

Word	Meaning		Coding (hex)
1	Command_Code = Write_Request		00 82
2	Parameter_Count		00 07
3	Invoke_ID	Comm._Reference	00 02
4	Index = MOVILINK® parameter channel		206B
5	Subindex	Length	00 08
6	Data [1] = Management byte	Data [2] = Reserved	32 00
7	Data [3/4] = Index (e.g. IPOS$^{plus®}$ variable)		2A F8
8	Data [5]	Data [6]	00 01
9	Data [7]	Data [8]	23 45
Bits	15 ... 8	7 ... 0	

You will receive the "Write_Confirmation" after this service has been sent. Once again, you can use the return codes for evaluating a negative message.

Reading IPOS$^{plus®}$ variables / parameters via MOVILINK®

The inverter offers special parameter access via the MOVILINK® parameter channel for universal read access to all inverter data (parameters, IPOS$^{plus®}$ variables, IPOS$^{plus®}$ program code, etc.). The following section illustrates the mechanism by which, for example, IPOS$^{plus®}$ variables can be read via the parameter channel. A two-step procedure is required for this purpose:

- Writing the MOVILINK® parameter channel with the command "Read IPOS variable H0"
- Reading the MOVILINK® parameter channel

The MOVILINK® parameter channel (acyclic) can be used via index 8299 dec (206B hex).

Example

Reading the IPOS$^{plus®}$ variable H0 = Index 11000 dec (2AF8 hex)

Refer to the "MOVIDRIVE® Fieldbus Unit Profile" manual for a detailed description of the MOVILINK® parameter channel.

Word	Meaning		Coding (hex)
1	Command_Code = Write_Request		00 82
2	Parameter_Count		00 07
3	Invoke_ID	Comm._Reference	00 02
4	Index = MOVILINK® parameter channel		206B
5	Subindex	Length	00 08
6	Data [1] = Management byte	Data [2] = Reserved	31 00
7	Data [3/4] = Index (e.g. IPOS$^{plus®}$ variable)		2A F8
8	Data [5]	Data [6]	00 00
9	Data [7]	Data [8]	00 00
Bits	15 ... 8	7 ... 0	

Once the positive "Write_Confirmation (+)" has been received, read access takes place on the MOVILINK® parameter channel, which means data that has been read during the previous read operation defined by "Write_Request" are read into the interface module.

Word	Meaning		Coding (hex)
1	Command_Code = Read_Request		00 81
2	Parameter_Count		00 03
3	Invoke_ID	Comm._Reference	00 02
4	Index = MOVILINK® parameter channel		206B
5	Subindex	-	00 00
Bits	15 ... 8	7 ... 0	

Once you have sent this service, you should receive the positive message "Read_Confirmation".

Word	Meaning		Coding (hex)
1	Message_Code = Read_Confirmation (+)		80 81
2	Parameter_Count		00 07
3	Invoke_ID	Comm._Reference	00 02
4	Result (+)		00 00
5	-	Length	00 08
6	Data [1] = Management byte	Data [2] = Reserved	31 00
7	Data [3/4] = Index (e.g. IPOS$^{plus®}$ variable)		2A F8
8	Data [5]	Data [6]	00 01
9	Data [7]	Data [8]	23 45
Bits	15 ... 8	7 ... 0	

Word	Meaning		Coding (hex)
1	Message_Code = Read_Confirmation		80 81
2	Parameter_Count		00 03
3	Invoke_ID	Comm._Reference	00 02
4	Error_Class	Error_Code	08 00
5	Additional_Code		00 10
Bits	15 ... 8	7 ... 0	

You can use the return codes for evaluating a negative message.

Writing IPOS$^{plus®}$ variables / parameters via download parameter block

MOVIDRIVE® inverters enable you to use the download parameter block to write several IPOS$^{plus®}$ variables and/or parameters at the same time with a single PCP service.

The download parameter block is always 230 bytes long. A maximum of 42 drive parameters or IPOS$^{plus®}$ variables can be written in one block.

Example

Three values of the inverter are to be written with one "Write_Request":

Parameter/variable name	Index	Value to be written
IPOS$^{plus®}$ variable H0	11000 dec (2AF8 hex)	1 dec (1 hex)
IPOS$^{plus®}$ variable H1	11001 dec (2AF9 hex)	-40000 dec (FFFF63C0 hex)
P130 Ramp t11 up CW	8470 dec (2116 hex)	1500 dec (05DC hex)

You will receive the "Write_Confirmation" after this service has been sent. Once again, you can use the return codes for evaluating a negative message. The individual parameters of the download parameter block in the inverter are written one after the other. This means if there is a negative "Write_Confirmation" in the high part of the Additional_Code, the parameter number at which the error occurred is entered.

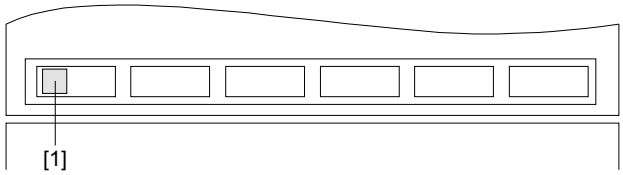
Word	Meaning		Coding (hex)
1	Command_Code = Write_Request		00 82
2	Parameter_Count = 118 words (= 76 hex)		00 76
3	Invoke_ID	Comm._Reference	00 02
4	Index = Download parameter block		20 68
5	Subindex	Length = 230 bytes (= E6 hex)	00 E6
6	Data [1] = Reserved	Data [2] = Number of parameters	00 03
7	Data [3/4] = Index of 1st parameter (e.g. IPOS$^{plus®}$ variable H0)		2A F8
8	Data [5]	Data [6]	00 00
9	Data [7]	Data [8]	00 01
10	Data [9/10] = Index of 1st parameter (e.g. IPOS$^{plus®}$ variable H1)		2A F9
11	Data [11]	Data [12]	FF FF
12	Data [13]	Data [14]	63 C0
13	Data [15/16] = Index of the 1st parameter (P130 ramp t11)		21 16
14	Data [17]	Data [18]	00 00
15	Data [19]	Data [20]	05 DC
...	...	...	...
Bits	15 ... 8	7 ... 0	

You will receive the "Write_Confirmation" after this service has been sent. Once again, you can use the return codes for evaluating a negative message. The individual parameters of the download parameter block in the inverter are written one after the other. This means if there is a negative "Write_Confirmation" in the high part of the Additional_Code, the parameter number at which the error occurred is entered.

6 Operation

6.1 Operating displays for MC_40A (without fieldbus)

The operating status of MOVIDRIVE® *compact* MC_40A are displayed on LED V1.



05428BXX

Figure 55: MOVIDRIVE® compact MC_40A operating display

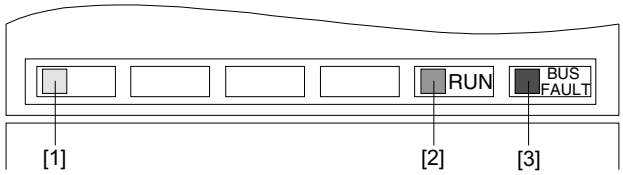
[1] Operation LED V1 (three colors: green/red/yellow)

Operation LED V1 The operating status of MOVIDRIVE® *compact* MC_40A is displayed by the three-color LED V1 (green/red/yellow).

Color		Operating state	Description
-	**OFF**	Without voltage	No supply voltage and no DC 24 V backup voltage.
Yellow	**Steady light**	Controller inhibit or No enable	Unit ready but controller inhibit active (DIØØ = "0") or no enable.
Green	**Steady light**	Enable	Motor is energized.
Red	**Steady light**	Locking system error	Error causes unit to disconnect.
Yellow	**Flashing**	Unit not ready	Factory setting in progress or DC 24 V backup mode without supply voltage.
Green	**Flashing**	Flying start in process	Operating mode VFC & FLYING START is set and inverter connected to a rotating motor.
Green/red	**Flashing 0.5 s green / 0.5 s red**	Limit switch contacted	Limit switch reached in "enable" operating status.
Yellow/red	**Flashing 0.5 s yellow / 0.5 s red**	Limit switch contacted	Limit switch reached in "Controller inhibit" operating status.
Green/red	**Flashing green green red red**	Display or wait system error	Fault in "enable" operating status. Fault is only displayed and does not lead to a switch-off.
Yellow/red	**Flashing yellow yellow red red**	Display or wait system error	Fault in "controller inhibit" operating status. Fault is only displayed and does not lead to a switch-off.
Green/yellow	**0.75 s green / 0.75 s yellow**	Timeout active	Enable ineffective, inverter is waiting for a valid telegram.

6.2 Operating displays for MC_41A (PROFIBUS-DP)

The operating status of MOVIDRIVE® *compact* MC_41A are displayed on the following LEDs.



02902BXX

Figure 56: MOVIDRIVE® compact MC_41A operating displays

[1] Operation LED V1 (three colors: green/red/yellow)

[2] PROFIBUS-DP LED "RUN" (green)

[3] PROFIBUS-DP LED "BUS-FAULT" (red)

Operation LED V1

The operating status of MOVIDRIVE® *compact* MC_41A are displayed by the three-color LED V1 (green/red/yellow).

Color		Operating state	Description
-	**OFF**	Without voltage	No supply voltage and no DC 24 V backup voltage.
Yellow	**Steady light**	Controller inhibit or No enable	Unit ready but controller inhibit active (DIØØ = "0") or no enable.
Green	**Steady light**	Enable	Motor is energized.
Red	**Steady light**	Locking system error	Error causes unit to disconnect.
Yellow	**Flashing**	Unit not ready	Factory setting in progress or DC 24 V backup mode without supply voltage.
Green	**Flashing**	Flying start in process	Operating mode VFC & FLYING START is set and inverter connected to a rotating motor.
Green/red	**Flashing 0.5 s green / 0.5 s red**	Limit switch contacted	Limit switch reached in "enable" operating status.
Yellow/red	**Flashing 0.5 s yellow / 0.5 s red**	Limit switch contacted	Limit switch reached in "Controller inhibit" operating status.
Green/red	**Flashing green green red red**	Displaying or waiting system error	Fault in "enable" operating status. Fault is only displayed and does not lead to a switch-off.
Yellow/red	**Flashing yellow yellow red red**	Displaying or waiting system error	Fault in "controller inhibit" operating status. Fault is only displayed and does not lead to a switch-off.
Green/yellow	**0.75 s green / 0.75 s yellow**	Timeout active	Enable ineffective, inverter is waiting for a valid telegram.

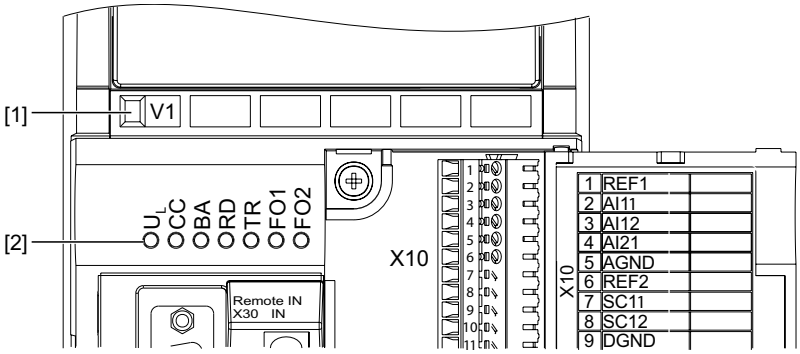
PROFIBUS-DP LEDs

The "RUN" LED (green) indicates that the bus electronics are operating correctly. The "BUS FAULT" LED (red) displays PROFIBUS-DP errors.

RUN	BUS FAULT	Meaning
ON	**ON**	Connection to the DP master has failed; check bus connection. Unit cannot detect a baud rate, check setting in DP master. Bus interruption or DP master out of order.
ON	**OFF**	Unit is currently exchanging data with the DP master (data exchange).
ON	**FLASHES**	Unit has detected the baud rate, but is not addressed by DP master. Set the unit address (P092) and the address in the project planning software of the DP master to the same value. Unit was not configured in DP master or configured incorrectly. Check project planning, use GSD file SEW_6002.GSD.
OFF	**-**	Hardware fault in bus electronics. Switch unit off/on; contact SEW service if the error occurs again.
FLASHES	**-**	PROFIBUS address set to a value greater than 125. Set address ≤ 125.

6.3 Operating displays of MCH42A (INTERBUS LWL)

The operating status of MOVIDRIVE® *compact* MCH42A are displayed on the following LEDs.



05225BXX

Figure 57: MOVIDRIVE® compact MCH42A operating displays

1. Operation LED V1 (three colors: green/red/yellow)
2. INTERBUS-LWL LEDs

Operation LED V1

The operating status of MOVIDRIVE® *compact* MCH42A are displayed by the three-color LED V1 (green/red/yellow).

Color		Operating state	Description
-	**OFF**	Without voltage	No supply voltage and no DC 24 V backup voltage.
Yellow	**Steady light**	Controller inhibit or No enable	Unit ready but controller inhibit active (DIØØ = "0") or no enable.
Green	**Steady light**	Enable	Motor is energized.
Red	**Steady light**	Locking system error	Error causes unit to disconnect.
Yellow	**Flashing**	Unit not ready	Factory setting in progress or DC 24 V backup mode without supply voltage.
Green	**Flashing**	Flying start in process	Operating mode VFC & FLYING START is set and inverter connected to a rotating motor.
Green/red	**Flashing 0.5 s green / 0.5 s red**	Limit switch contacted	Limit switch reached in "enable" operating status.
Yellow/red	**Flashing 0.5 s yellow / 0.5 s red**	Limit switch contacted	Limit switch reached in "Controller inhibit" operating status.
Green/red	**Flashing green green red red**	Displaying or waiting system error	Fault in "enable" operating status. Fault is only displayed and does not lead to a switch-off.
Yellow/red	**Flashing yellow yellow red red**	Displaying or waiting system error	Fault in "controller inhibit" operating status. Fault is only displayed and does not lead to a switch-off.
Green/ yellow	**0.75 s green / 0.75 s yellow**	Timeout active	Enable ineffective, inverter is waiting for a valid telegram.

INTERBUS-LWL LEDs

The INTERBUS-LWL LEDs display the current status of the fieldbus interface and the INTERBUS system:

U_L	Logic voltage (green = OK)
CC	Cable check (green = OK)
BA	Bus active (green = OK)
RD	Remote bus disabled (red = OFF)
TR	Transmit (green = PCP active)
FO1	Fiber optic 1 (yellow = not OK)
FO2	Fiber optic 2 (yellow = not OK)

The following figure shows the patterns of the INTERBUS-LWL LEDs that occur frequently. The following tables explain the meanings of the LED patterns in more detail.

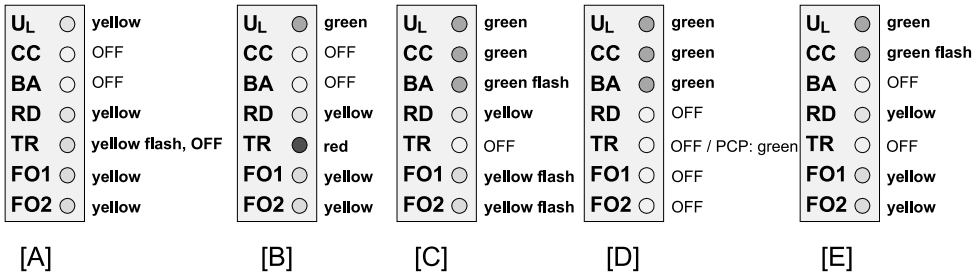


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Figure 58: Frequent LED patterns

[A] Power-on of inverter (INTERBUS not yet active)

[B] Incorrect setting of DIP switches (INTERBUS not yet active)

[C] Initialization phase of INTERBUS system

[D] Correct INTERBUS operation

[E] Incorrect baud rate

LED U_L "U logic" (green)

State	Meaning	Remedy
On	Power supply of bus electronics is present	-
Off	Power supply of bus electronics is missing	Check that the connection unit is seated correctly and the DC 24 V voltage supply for the inverter is applied.

LED CC "Cable check" (green)

State	Meaning	Remedy
On	Incoming remote bus connection is functioning properly	-
Off	Incoming remote bus connection is faulty	Check the incoming fiber optic remote bus and the LED FO1.

LED BA "Bus active" (green)

State	Meaning	Remedy
On	Data transfer on the INTERBUS is active	-
Off	No data transfer; INTERBUS is stopped	Check the incoming fieldbus cable. Use the diagnostic display on the INTERBUS interface module (master) to localize the fault further.

LED RD "Remote bus disable" (yellow)

State	Meaning	Remedy
On	Outgoing remote bus switched off	-
Off	Outgoing remote bus not switched off	-

LED FO1 "Fiber optic 1" (yellow)

State	Meaning	Remedy
On	Monitoring of incoming fiber optic cable. If the previous participant • has optical line diagnostics, the system reserve for optical transmission has been exceeded • does not have optical line diagnostics, a control of the optical transmission power is not possible	Check the incoming fiber optic cable for cable quality, correct connector installation, bending radius, etc. Use the special optical diagnostics of the CMD tool or a fiber optic measurement instrument for further localization of faults.
Off	Incoming fiber optic cable is functioning properly	-

LED FO2 "Fiber optic 2" (yellow)

State	Meaning	Remedy
On	Monitoring of continuing fiber optic cable. If the next participant • has optical line diagnostics, the system reserve for optical transmission has been exceeded • does not have optical line diagnostics, a control of the optical transmission power is not possible	Check the continuing fiber optic cable for cable quality, correct connector installation, bending radius, etc. Use the special optical diagnostics of the CMD tool or a fiber optic measurement instrument for further localization of faults.
Off	Continuing fiber optic cable is functioning properly	-

LED TR "Transmit" (green)

State	Meaning	Remedy
The green color of the LED TR corresponds to the INTERBUS standard.		
Off	No PCP communication	-
Green	PCP communication is active or INTERBUS startup (parameter access via INTERBUS PCP channel)	-

LED TR "Transmit" (yellow or red)

State	Meaning	Remedy
The LED TR indicates states within the system that usually do not occur during INTERBUS operation.		
Off or green	Normal operation (see table for TR = green)	-
Yellow Flashing	Inverter is currently in the initialization phase	-
Red Continuous	Incorrect DIP switch configuration selected, INTERBUS operation is not possible.	Check the settings of the DIP switches S1. Correct the DIP switch settings, if necessary, and switch the unit on again.
Flashing red	Incorrect DIP switch configuration or INTERBUS interface defective, INTERBUS operation is not possible.	Check the position of DIP switches S1 to S6. If the settings are correct, contact the SEW Electronics Service.

6.4 DBG11B keypad

Basic displays

CONTROLLER INHIBIT CURRENT: 0 A	Display when X11:1 (DIØØ "/CONTROLLER INHIBIT") = "0".
NO ENABLE CURRENT: 0 A	Display for X11:1 (DIØØ "/CONTROLLER INHBIT") = "1" and disabled inverter ("ENABLE/STOP" = "0").
SPEED 942 1/min CURRENT: 2.51 A	Display for enabled inverter.
NOTE XX XXXXXXXXXXXXXXXXXX	Information message
FAULT XX XXXXXXXXXXXXXXXXXX	Fault display

DBG11B copy function

You can use the DBG11B keypad to copy parameter sets from one MOVIDRIVE® unit to other MOVIDRIVE® units. To do so, copy the parameter set to the keypad with P 807 (MD_ → DBG). Plug the keypad into another MOVIDRIVE® unit and copy the parameter set with P 806 (DBG → MD_). You can plug in or remove the keypad during operation.

No connection between inverter and DBG11B

If a connection cannot be established with the keypad once the mains power has been switched on or the DC 24 V supply connected, one of the following fault messages can appear:

COMMUNIC. ERROR NO SERIAL LINK	There may also be a fault in the MOVIDRIVE® unit
ERROR WHILE COPY FLASH ERR. XX	Error in the DBG11B keypad
FATAL ERROR! CODE CRC WRONG	

Try to establish the connection by removing the keypad and plugging it in again. If you cannot establish a connection, send the unit (DBG11B keypad, maybe also MOVIDRIVE®) to SEW-EURODRIVE for repair or replacement.

Selected via menu

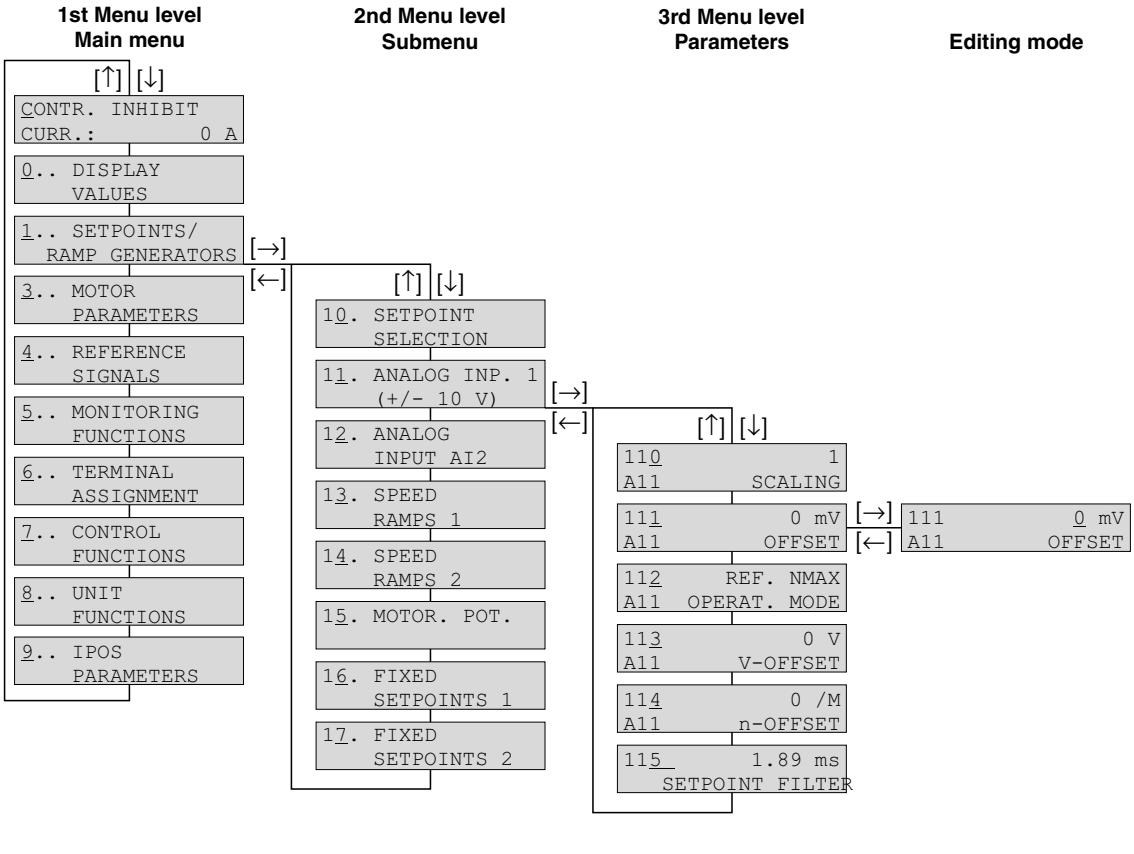

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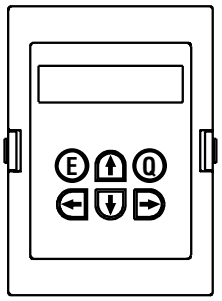
Figure 59: Menu structure



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← or → key	Change the menu level, in the 3rd menu level (parameter), enter (→) or leave (←) the edit mode. The parameter can only be changed in edit mode. Pressing the ← and → keys at the same time, triggers startup (→ Sec. "Startup").	
↑ or ↓ key	Select the menu item; in edit mode, select higher or lower value. The new value takes effect when you release the ↑ or ↓ key in edit mode.	
Q key	Back to the basic display; in startup mode, startup is terminated.	
E key	Startup:	Termination of startup
	Normal operation:	Signature is displayed; the signature can only be entered or changed using MOVITOOLS/SHELL. It is used to identify the parameter set or the unit.
	Manual mode:	Leave manual mode
	In case of malfunction:	Reset parameter P840 is called up

DBG11B quick menu

The DBG11B keypad has a detailed parameter menu with all parameters and a quick menu with the most frequently used parameters. You can switch between the two menus in any operating state using P800 ("Short menu"). The quick menu is displayed as the default setting. The quick menu is shown in the display with a "/" after the parameter number. In the parameter list, the parameters of the quick menu are indicated by a "/".

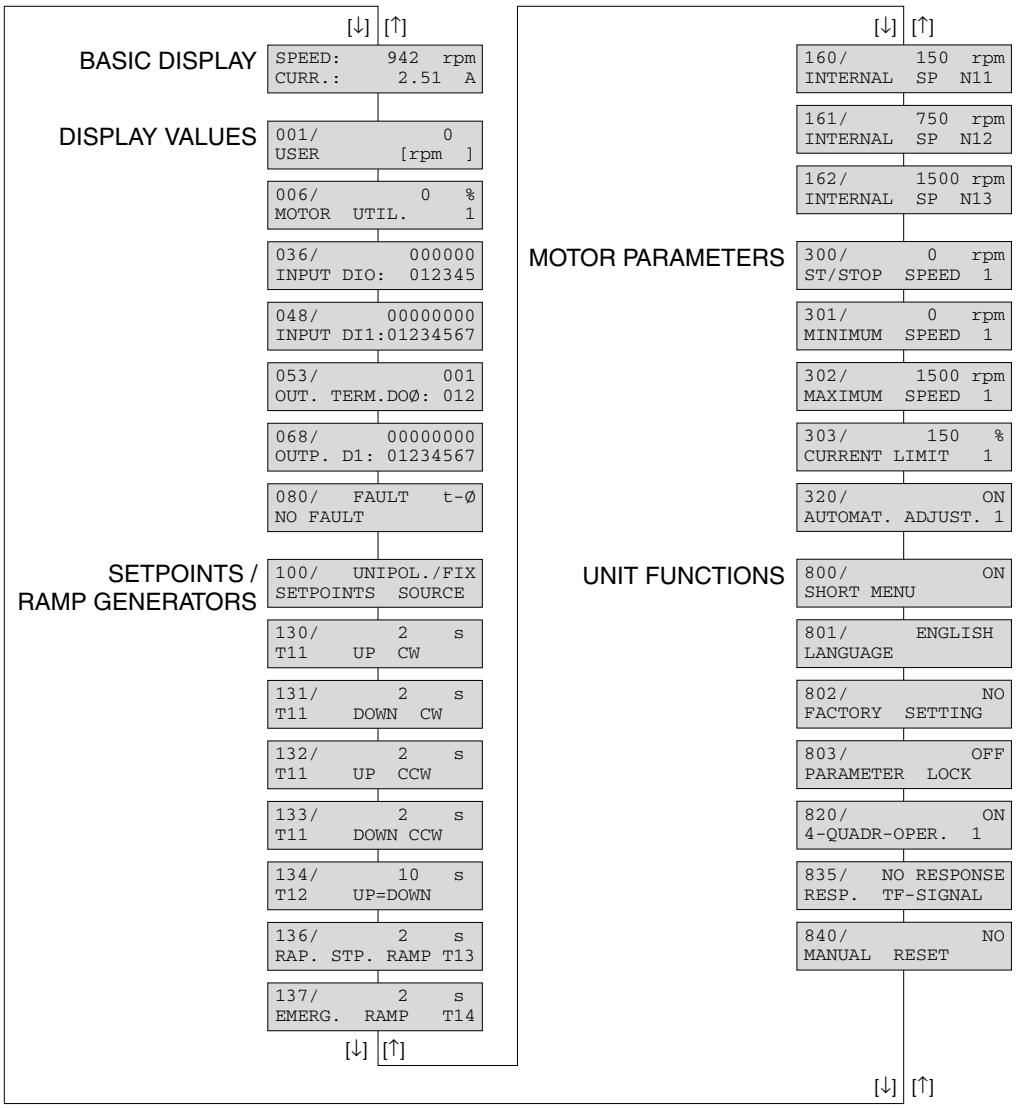

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Figure 60: DBG11B quick menu

IPOS$^{plus®}$

MOVITOOLS® is required to program IPOS$^{plus®}$. The DBG11B keypad only allows you to edit and change IPOS$^{plus®}$ parameters (P9__).

The IPOS$^{plus®}$ program is also stored in the DBG11B keypad when it is saved and is consequently also transferred to another MOVIDRIVE® unit when the parameter set is copied.

Parameter P931 can be used to start and stop the IPOS$^{plus®}$ program from the DBG11B keypad.

Information messages

Information messages on the DBG11B (ca. 2 s long) or in MOVITOOLS/SHELL (message that can be acknowledged):

No.	Text in DBG11B/SHELL	Description
1	ILLEGAL INDEX	Index addressed via interface not available.
2	NOT IMPLEMENT.	• Attempt to execute a function that is not implemented. • An incorrect communication service has been selected. • Manual operation selected via invalid interface (e.g. fieldbus).
3	READ ONLY VALUE	You tried to change a read only value.
4	PARAM. LOCKED	Parameter lock P803 = "ON", Parameter cannot be altered.
5	SETUP ACTIVE	You tried to change parameters when factory setting is active.
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.
--		
--		
11	ONLY TERMINAL	Manual mode must be exited via TERMINAL (DBG11B or USS21A).
12	NO ACCESS	Access to selected parameter denied.
13	CTRL. INHIBIT MISSING	Set terminal DIØØ "/Controller inhibit" = "0" for the selected function.
14	INVALID VALUE	You tried to enter an invalid value.
--		
16	PARAM. NOT LOCKED	Overflow of EEPROM buffer, e.g. through 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." • You tried to change to manual mode during live operation.

7 Service

7.1 Fault information

Fault memory

The error memory (P080) stores the last five error messages (errors t-0 to t-4). The error message of longest standing is deleted whenever more than five error messages have occurred. When the fault occurs, the following information is saved: fault that occurred • status of binary inputs/outputs • operating status of the inverter • inverter status • heat sink temperature • speed • output current • active current • unit utilization • DC link voltage • ON hours • enable hours • parameter set • motor utilization.

Switch-off responses

There are three switch-off responses depending on the fault; the inverter remains inhibited in fault status:

Immediate 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 (→ P300/P310), 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 (→ P300/P310), the brake is applied (DBØØ "/Brake" = "0"). The output stage goes to high resistance after the brake reaction time has elapsed (P732 / P735).

Reset

An error message can be acknowledged by:

- Switching the power supply off and on again.

  Recommendation: Observe a minimum switch-off time of 10 s for the supply system contactor K11.
- Reset via input terminals, i.e. via an appropriately assigned binary input.
- Manual reset in SHELL (P840 = "YES" or [Parameter] / [Manual reset]).
- Manual reset using the DBG11B (pressing the <E> key in the event of a fault gives direct access to parameter P840).

⚠ 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.

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 once again receives valid data via the interface, which is monitored with a timeout.

7.2 Fault list

A dot in the "P" column indicates that the response is programmable (P83_ Fault response). The factory set error response appears in the "Response" column.

Fault code	Designation	Response	P	Possible cause	Measure
00	No error	-			
01	Overcurrent	Immediate shut-off		• Short circuit output • Motor too large • Faulty output stage	• Rectify the short circuit • Connect a smaller motor • Contact SEW Service for advice if the output stage is defective.
03	ground fault	Immediate shut-off		ground fault • in the incoming cable • in the inverter • in the motor	• Eliminate ground fault • Consult SEW Service
04	Brake chopper	Immediate switch-off		• Too much regenerative power • Braking resistor circuit interrupted • Short circuit in the braking resistor circuit • Brake resistor has too high resistance • Brake chopper is defective • possibly also ground fault	• Extend deceleration ramps • Check supply cable to braking resistor • Check technical data of braking resistor • Replace MOVIDRIVE® if the brake chopper is defective • Check for ground fault.
07	DC link overvoltage	Immediate switch-off		• DC link voltage too high • possibly also ground fault	• Extend deceleration ramps • Check supply cable to the braking resistor • Check technical data of braking resistor • Check for ground fault.
08	n-monitoring	Immediate switch-off		• 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.	• Reduce load • Increase deceleration time setting (P501 or P503). • Check encoder connection, possibly swap over A/A and B/B in pairs • Check encoder voltage supply • Check current limitation • Extend ramps if necessary • Check motor cable and motor • Check mains phases
09	Startup	Immediate switch-off		Inverter has not been taken into operation for the selected operating mode.	Perform startup for the required operating mode.
10	IPOS-ILLOP	Emergency stop		• Incorrect command detected during execution of the IPOS$^{plus®}$ program. • Incorrect conditions during command execution. • Function does not exist in inverter.	• 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) • Use another function
11	Excessive temperature	Emergency stop		Thermal overload of inverter	Reduce load and/or ensure adequate cooling.
12	Resolver 14 bit	Emergency stop		14-bit resolver evaluation is active and the actual speed is > 3600 1/min	Set *P302 Maximum speed 1* to max. 3600 1/min
13	Control signal source	Immediate switch-off		Control signal source not defined or defined incorrectly.	Set correct control signal source (P101).
14	Encoder	Immediate switch-off		• 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.
15	24 V internal	Immediate disconnection		No internal DC 24 V supply voltage.	Check power supply connection. Consult SEW service if the error occurs again.
17-24	System error	Immediate disconnection		Malfunction of inverter electronics, possibly due to EMC influence.	Check ground connections and shielding and correct, if necessary. Contact SEW service if this error occurs again.
25	EEPROM	Rapid stop		Error while accessing EEPROM	Activate factory settings, perform reset and reset parameters. Contact SEW service if the error occurs again.
26	External terminal	Emergency stop	•	Read in external error signal via programmable input.	Eliminate specific cause of error; reprogram terminal if necessary.
27	No limit switches	Emergency stop		• 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 limit switch connections • Reprogram terminals

Fault code	Designation	Response	P	Possible cause	Measure
28	Fieldbus Timeout	Rapid stop	•	No communication between master and slave within the projected response monitoring.	• Check communications routine of the master • Extend fieldbus timeout time (P819)/deactivate monitoring
29	Limit switch contacted	Emergency stop		Limit switch was reached in IPOS operating mode.	• Check travel range • Correct operator program
30	Emergency stop Timeout	Immediate disconnection		• Drive overloaded • Emergency stop ramp too short.	• Check project planning • Extend emergency stop ramp
31	TF trip	No Response	•	• Motor too hot, TF sensor has tripped • TF sensor of motor not connected or connected incorrectly • Connection of MOVIDRIVE® and TF on motor interrupted	• Let motor cool off and reset error • Check connections/link between MOVIDRIVE® and TF • Set P835 to "No response"
32	IPOS Index overflow	Emergency stop		Programming principles violated leading to internal system stack overflow	Check IPOS$^{plus®}$ user program and correct if necessary (→ IPOS$^{plus®}$ manual)
33	Setpoint source	Immediate disconnection		Setpoint source not defined or defined incorrectly	Set correct setpoint source (P100)
35	Operating mode	Immediate disconnection		Operating mode not defined or defined incorrectly	Use P700 or P701 to set correct operating mode
37	System watchdog	Immediate disconnection		Error during execution of system software	Contact SEW Service.
38	System software	Immediate disconnection		System error	Contact SEW Service.
39	Reference travel	Immediate disconnection		• 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.
41	IPOS watchdog option	Immediate disconnection		• Error in communication between system software and option software • Watchdog in the IPOS program. • An application module has been loaded in a MOVIDRIVE® unit without the application version. • The wrong technology function has been set if an application module is used.	• Consult SEW Service • Check IPOS$^{plus®}$ program • Check whether the unit has been activated for the application version (P079) • Check the selected technology function (P078)
42	Lag error	Immediate disconnection	•	• Encoder connected incorrectly • Acceleration ramps too short • P component of positioning controller too small • Incorrectly set speed controller parameters • Value of lag fault tolerance too small	• Check encoder connection • Extend ramps • Set P component to higher value • Reset speed controller parameters • Increase lag fault tolerance • Check wiring of encoder, motor and mains phase. • Check whether mechanical system components can move freely or if they are blocked
43	RS485 timeout	Rapid stop	•	Connection between inverter and PC interrupted.	Check connection between inverter and PC. Contact SEW Service if necessary.
44	Unit utilization	Immediate disconnection		Unit utilization (IxT value) exceeds 125 %	• Decrease power output • Extend ramps • If suggested actions not possible, use larger inverter
45	Initialization	Immediate disconnection		• No parameters set for EEPROM in power section, or parameters set incorrectly.	• Restore factory settings Consult SEW Service if the fault still cannot be reset
47	System bus timeout	Rapid stop	•	Error during communication via system bus.	Check system bus connection.
77	IPOS control word	No Response		**In IPOS operating mode only:** • An attempt was made to set an invalid automatic mode (via external controller). • P916 set incorrectly.	• Check serial connection to external controller • Check write values of external controller • Set correct value for P916

Fault code	Designation	Response	P	Possible cause	Measure
78	IPOS SW limit switch	No Response		**In IPOS operating mode only:** Programmed target position is outside travel range delimited by software limit switches.	• Check the user program • Check position of software limit switches
81	Start condition	Immediate disconnection		**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.	• 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
82	Open output	Immediate disconnection		**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	•	Motor utilization too high.	• Reduce load • Extend ramps • Observe longer pause times
85	Copy	Immediate disconnection		Error while copying parameters.	Check connection between inverter and PC
87	Technology function	Immediate disconnection		Attempt made to load the parameter set for an application version unit with the technology function activated into a standard version unit.	Activate the factory settings (P802 = YES) and reset the unit
88	Flying start	Immediate disconnection		**Only in VFC n-CTRL operating mode:** Actual speed > 5000 1/min when inverter enabled.	Inverter not enabled before actual speed is ≤ 5000 1/min.
94	EEPROM checksum	Immediate disconnection		Inverter electronics disrupted, possibly due to effect of EMC or a defect.	Send unit in for repair
99	IPOS ramp calculation error	Immediate disconnection		**In IPOS operating mode only:** 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.

7.3 SEW Electronics Service

Send in for repair

Please contact the **SEW-EURODRIVE electronics service if a fault cannot be rectified** (→ "Customer and spare parts service").

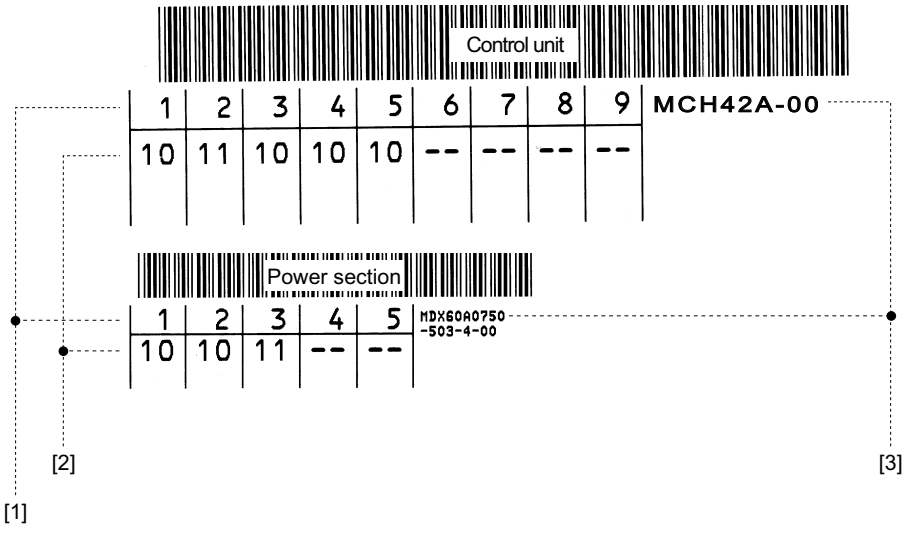
When contacting SEW electronics service, always quote the digits on the status label so that our service personnel can assist you more effectively.

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

- Serial number (→ nameplate)
- Unit designation
- Standard version or application version
- Digits on the status label
- Short description of application (drive application, control via terminals or serial)
- Connected motor (motor type, motor voltage, ⅄ or Δ connection)
- Nature of the error
- Accompanying circumstances
- Your own presumptions as to what has happened
- Any unusual events preceding the problem, etc.

Status label

The MOVIDRIVE® units have a status label for the power section and one for the control unit. They are attached to the side of the unit next to the nameplate.



59868AEN

[1] Component / part

[2] Status

[3] Unit designation

7.4 Extended storage

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

Procedure when maintenance has been neglected:

Electrolytic capacitors are used in the inverters. They are subject to aging effects when deenergized. This effect can damage the capacitors if the unit is connected using the rated voltage after a longer period of storage.

If you have not performed maintenance regularly, SEW-EURODRIVE recommends that you increase the supply voltage slowly up to the maximum voltage. This can be done, for example, by using a variable transformer for which the output voltage has been set according to the following overview. We recommend that you increase the voltage from 0 V to the first stage after a few seconds.

The following stages are recommended:

AC 400/500 V units:

- Stage 1: AC 350 V for 15 minutes
- Stage 2: AC 420 V for 15 minutes
- Stage 3: AC 500 V for 1 hour

AC 230 V units:

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

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

7.5 Waste disposal

Dispose of materials separately in accordance with the current regulations in force, for example:

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

8 Technical Data and Dimension Drawings

8.1 CE marking, UL approval and unit designation

CE marking

- Low voltage directive

  MOVIDRIVE® *compact* drive inverters comply with the regulations of the Low Voltage Directive 73/23/EEC.

- Electromagnetic compatibility (EMC)

  MOVIDRIVE® *compact* drive inverters are designed for use as components for installation in machines and systems. They comply with the EMC product standard EN 61800-3 "Variable-speed electrical drives." Provided the installation instructions are complied with, they satisfy the appropriate requirements for CE marking of the entire machine/system in which they are installed, on the basis of the EMC Directive 89/336/EEC.

  MOVIDRIVE® *compact* drive inverters size 1 and 2 are equipped with a line filter as standard. These units comply with limit class A to EN 55011 and EN 55014 on the line side without further measures.

CE

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

UL / cUL / GOST-R

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

C-Tick

C-Tick approval has been granted for the entire MOVIDRIVE® *compact* unit series. C-Tick certifies conformity with ACA (Australian Communications Authority) standards.

8.2 General technical data

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

MOVIDRIVE® *compact*	All sizes
Interference immunity	Fulfills EN 61800-3
Interference emission with EMC-compliant installation	Sizes 1 to 5: • Comply with EN 61800-3 • According to class B limit to EN 55011 and EN 55014 Sizes 1 and 2: • Comply with class A limit to EN 55011 and EN 55014 on the line side without further measures
Ambient temperature ϑ_U **Derating ambient temperature** **Climate class**	0 °C...+50 °C when I_D = 100 % I_N and f_{PWM} = 4 kHz 0 °C...+40 °C when I_D = 125 % I_N and f_{PWM} = 4 kHz 0 °C...+40 °C when I_D = 100 % I_N and f_{PWM} = 8 kHz Derating: • 2.5 % I_N per K between 40 °C - 50 °C • 3.5 % I_N per K between 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 51751)	Forced cooling Temperature-controlled fan, response threshold at ϑ = 45°C
Enclosure EN 60529 (NEMA 1) **Sizes 1 to 3** **Sizes 4 and 5**	IP20 IP00 (power connections); IP10 with mounted Plexiglas cover supplied as standard
Operating mode	Continuous operation with 50 % overload capacity
Overvoltage category	III according to IEC 60664-1 (VDE 0110-1)
Pollution class	2 according to IEC 60664-1 (VDE 0110-1)
Installation altitude	Up to h ≤ 1000 m without restrictions. At h ≥ 1,000 m and above the following restrictions apply: • From 1000 m to max. 4,000 m: – I_N reduction by 1% per 100 m • From 2,000 m to max. 4,000 m: – AC 230 V units: V_N reduction by AC 3 V per 100 m – AC 500 V units: V_N reduction by AC 6 V per 100 m Over 2,000 m only overvoltage class 2; external measures required for overvoltage class 3. Overvoltage classes according to DIN VDE 0110-1.

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

8.3 MOVIDRIVE® compact MCH4_A...-5_3 (AC 400/500 V units)

Size 1

60517AXX

MOVIDRIVE® *compact*		0015-5A3-4-0_	0022-5A3-4-0_	0030-5A3-4-0_	0040-5A3-4-0_
INPUT					
Supply voltage	V_{mains}	3 × AC 380 V –10 % ... 3 × AC 500 V +10 %			
Supply frequency	f_{mains}	50 Hz ... 60 Hz ±5 %			
Rated mains current[1] I_{mains} (when V_{mains} = 3 × AC 400 V)	**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] (when V_{mains} = 3 × AC 400...500 V)	S_N	2.8 kVA	3.8 kVA	4.9 kVA	6.6 kVA
Rated output current[1] (when V_{mains} = 3 × AC 400 V)	I_N	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 the capacity utilization			
Internal current limitation		I_{max} = 0...150 % can be set in menu (P303 / P313)			
Minimum permitted braking resistor value (4Q operation)	R_{BRmin}	68 Ω			
Output voltage	U_A	Max. V_{mains}			
PWM frequency	f_{PWM}	Can be set: 4/8/12/16 kHz			
Speed range / resolution	n_A / Δn_A	–5500 ... 0 ... +5500 min^{-1} / 0.2 min^{-1} across the entire range			
GENERAL INFORMATION					
Power loss at P_N	P_{Vmax}	85 W	105 W	130 W	180 W
Cooling air consumption		40 m^3/h			
Weight		2.8 kg			
Dimensions	**W × H × D**	105 × 315 × 161 mm			

1) When V_{mains} = 3 × AC 500 V, the mains currents and output currents must be reduced by 20 % compared to the rated data.

2) The performance data apply to f_{PWM} = 4 kHz (factory setting for VFC operating modes).

MCH4_A standard version (VFC/CFC/SERVO)	0015-5A3-4-00	0022-5A3-4-00	0030-5A3-4-00	0040-5A3-4-00
Part number MCH40A (without fieldbus)	827 603 X	827 604 8	827 605 6	827 606 4
Part number MCH41A (with PROFIBUS-DP)	827 649 8	827 650 1	827 651 X	827 652 8
Part number MCH42A (with INTERBUS-LWL)	827 565 3	827 566 1	827 567 X	827 568 8
MCH4_A application version (VFC/CFC/SERVO)	**0015-5A3-4-0T**	**0022-5A3-4-0T**	**0030-5A3-4-0T**	**0040-5A3-4-0T**
Part number MCH40A (without fieldbus)	827 626 9	827 627 7	827 628 5	827 629 3
Part number MCH41A (with PROFIBUS-DP)	827 672 2	827 673 0	827 674 9	827 675 7
Part number MCH42A (with INTERBUS-LWL)	827 158 5	827 159 3	827 160 7	827 161 5
VFC operating mode	Recommended motor power → MOVIDRIVE® *compact* system manual, section "Project Planning"			
CFC/SERVO operating mode (f_{PWM} = 8 kHz) Continuous output current = 100% I_N I_D	AC 4 A	AC 5.5 A	AC 7 A	AC 9.5 A
Recommended motor power	→ MOVIDRIVE® *compact* system manual, section "Project Planning"			

Size 2

60518AXX

MOVIDRIVE® *compact*		0055-5A3-4-0_	0075-5A3-4-0_	0110-5A3-4-0_
INPUT				
Supply voltage	V_{mains}	3 × AC 380 V –10 % ... 3 × AC 500 V +10 %		
Supply frequency	f_{mains}	50 Hz ... 60 Hz ±5 %		
Rated mains current[1] I_{mains} (when V_{mains} = 3 × AC 400 V)	**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] (when V_{mains} = 3 × AC 400...500 V)	S_N	8.7 kVA	11.2 kVA	16.8 kVA
Rated output current[1] (when V_{mains} = 3 × AC 400 V)	I_N	AC 12.5 A	AC 16 A	AC 24 A
Current limitation	I_{max}	Motor and regenerative 150 % I_N, duration depending on the capacity utilization		
Internal current limitation		I_{max} = 0...150 % can be set in menu (P303 / P313)		
Minimum permitted braking resistor value (4Q operation)	R_{BRmin}	47 Ω		22 Ω
Output voltage	U_A	Max. V_{mains}		
PWM frequency	f_{PWM}	Can be set: 4/8/12/16 kHz		
Speed range / resolution	n_A / Δn_A	–5500 ... 0 ... +5500 min^{-1} / 0.2 min^{-1} across the entire range		
GENERAL INFORMATION				
Power loss at P_N	P_{Vmax}	220 W	290 W	400 W
Cooling air consumption		80 m^3/h		
Weight		5.9 kg		
Dimensions	**W × H × D**	130 × 335 × 213 mm		

1) When V_{mains} = 3 × AC 500 V, the mains currents and output currents must be reduced by 20 % compared to the rated data.

2) The performance data apply to f_{PWM} = 4 kHz (factory setting for VFC operating modes).

MCH4_A standard version (VFC/CFC/SERVO)	0055-5A3-4-00	0075-5A3-4-00	0110-5A3-4-00
Part number MCH40A (without fieldbus)	827 607 2	827 608 0	827 609 9
Part number MCH41A (with PROFIBUS-DP)	827 653 6	827 654 4	827 655 2
Part number MCH42A (with INTERBUS-LWL)	827 569 6	827 570 X	827 571 8
MCH4_A application version (VFC/CFC/SERVO)	**0055-5A3-4-0T**	**0075-5A3-4-0T**	**0110-5A3-4-0T**
Part number (withot fieldbus)	827 630 7	827 631 5	827 632 3
Part number (with PROFIBUS-DP)	827 676 5	827 677 3	827 678 1
Part number (with INTERBUS-LWL)	827 162 3	827 163 1	827 164 X
VFC operating mode	Recommended motor power → MOVIDRIVE® *compact* system manual, section "Project Planning"		
CFC/SERVO operating mode (f_{PWM} = 8 kHz) Continuous output current = 100% I_N I_D	AC 12.5 A	AC 16 A	AC 24 A
Recommended motor power	→ MOVIDRIVE® *compact* system manual, section "Project Planning"		

Size 3

60519AXX

MOVIDRIVE® *compact*		0150-503-4-0_	0220-503-4-0_	0300-503-4-0_
INPUT				
Supply voltage	V_{mains}	3 × AC 380 V –10 % ... 3 × AC 500 V +10 %		
Supply frequency	f_{mains}	50 Hz ... 60 Hz ±5 %		
Rated mains current[1] **I_{mains} (when V_{mains} = 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] **(when V_{mains} = 3 × AC 400...500 V)**	S_N	22.2 kVA	31.9 kVA	41.6 kVA
Rated output current[1] **(when V_{mains} = 3 × AC 400 V)**	I_N	AC 32 A	AC 46 A	AC 60 A
Current limitation	I_{max}	Motor and regenerative 150 % I_N, duration depending on the capacity utilization		
Internal current limitation		I_{max} = 0...150 % can be set in menu (P303 / P313)		
Minimum permitted braking resistor value (4Q operation)	R_{BRmin}	15 Ω	12 Ω	
Output voltage	U_A	Max. V_{mains}		
PWM frequency	f_{PWM}	Can be set: 4/8/12/16 kHz		
Speed range / resolution	n_A / Δn_A	–5500 ... 0 ... +5500 min^{-1} / 0.2 min^{-1} across the entire range		
GENERAL INFORMATION				
Power loss at P_N	P_{Vmax}	550 W	750 W	950 W
Cooling air consumption		180 m^3/h		
Weight		14.3 kg		
Dimensions	**W × H × D**	200 × 465 × 233 mm		

1) When V_{mains} = 3 × AC 500 V, the mains currents and output currents must be reduced by 20 % compared to the rated data.

2) The performance data apply to f_{PWM} = 4 kHz (factory setting for VFC operating modes).

MCH4_A standard version (VFC/CFC/SERVO)	0150-503-4-00	0220-503-4-00	0300-503-4-00
Part number MCH40A (without fieldbus)	827 610 2	827 611 0	827 612 9
Part number MCH41A (with PROFIBUS-DP)	827 656 0	827 657 9	827 658 7
Part number MCH42A (with INTERBUS-LWL)	827 572 6	827 573 4	827 574 2
MCH4_A application version (VFC/CFC/SERVO)	**0150-503-4-0T**	**0220-503-4-0T**	**0300-503-4-0T**
Part number MCH40A (without fieldbus)	827 633 1	827 634 X	827 635 8
Part number MCH41A (with PROFIBUS-DP)	827 679 X	827 680 3	827 681 1
Part number MCH42A (with INTERBUS-LWL)	827 165 8	827 166 6	827 167 4
VFC operating mode	Recommended motor power → MOVIDRIVE® *compact* system manual, section "Project Planning"		
CFC/SERVO operating mode (f_{PWM} = 8 kHz) Continuous output current = 100% I_N I_D	AC 32 A	AC 46 A	AC 60 A
Recommended motor power	→ MOVIDRIVE® *compact* system manual, section "Project Planning"		

Size 4

60520AXX

MOVIDRIVE® *compact*		0370-503-4-0_	0450-503-4-0_
INPUT			
Supply voltage	V_{mains}	3 × AC 380 V –10 % ... 3 × AC 500 V +10 %	
Supply frequency	f_{mains}	50 Hz ... 60 Hz ±5 %	
Rated mains current[1] I_{mains} (when V_{mains} = 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] (when V_{mains} = 3 × AC 400...500 V)	S_N	51.1 kVA	62.3 kVA
Rated output current[1] (when V_{mains} = 3 × AC 400 V)	I_N	AC 73 A	AC 89 A
Current limitation	I_{max}	Motor and regenerative 150 % I_N, duration depending on the capacity utilization	
Internal current limitation		I_{max} = 0...150 % can be set in menu (P303 / P313)	
Minimum permitted braking resistor value (4Q operation)	R_{BRmin}	6 Ω	
Output voltage	U_A	Max. V_{mains}	
PWM frequency	f_{PWM}	Can be set: 4/8/12/16 kHz	
Speed range / resolution	n_A / Δn_A	–5500 ... 0 ... +5500 min^{-1} / 0.2 min^{-1} across the entire range	
GENERAL INFORMATION			
Power loss at P_N	P_{Vmax}	1200 W	1450 W
Cooling air consumption		180 m^3/h	
Weight		26.3 kg	
Dimensions	**W × H × D**	280 × 522 × 233 mm	

1) When V_{mains} = 3 × AC 500 V, the mains currents and output currents must be reduced by 20 % compared to the rated data.

2) The performance data apply to f_{PWM} = 4 kHz (factory setting for VFC operating modes).

MCH4_A standard version (VFC/CFC/SERVO)	0370-503-4-00	0450-503-4-00
Part number MCH40A (without fieldbus)	827 613 7	827 614 5
Part number MCH41A (with PROFIBUS-DP)	827 659 5	827 660 9
Part number MCH42A (with INTERBUS-LWL)	827 575 0	827 576 9
MCH4_A application version (VFC/CFC/SERVO)	**0370-503-4-0T**	**0450-503-4-0T**
Part number MCH40A (without fieldbus)	827 636 6	827 637 4
Part number MCH41A (with PROFIBUS-DP)	827 682 X	827 683 8
Part number MCH42A (with INTERBUS-LWL)	827 168 2	827 169 0
VFC operating mode	Recommended motor power → MOVIDRIVE® *compact* system manual, section "Project Planning"	
CFC/SERVO operating mode (f_{PWM} = 8 kHz) Continuous output current = 100% I_N I_D	AC 73 A	AC 89 A
Recommended motor power	→ MOVIDRIVE® *compact* system manual, section "Project Planning"	

Size 5

60521AXX

MOVIDRIVE® *compact*		0550-503-4-0_	0750-503-4-0_
INPUT			
Supply voltage	V_{mains}	3 × AC 380 V –10 % ... 3 × AC 500 V +10 %	
Supply frequency	f_{mains}	50 Hz ... 60 Hz ±5 %	
Rated mains current[1] I_{mains} (when V_{mains} = 3 × AC 400 V)	**100 %** **125 %**	AC 94.5 A AC 118.1 A	AC 117.0 A AC 146.3 A
OUTPUT			
Apparent output power[2] (when V_{mains} = 3 × AC 400...500 V)	S_N	73.5 kVA	91.0 kVA
Rated output current[1] (when V_{mains} = 3 × AC 400 V)	I_N	AC 105 A	AC 130 A
Current limitation	I_{max}	Motor and regenerative 150 % I_N, duration depending on the capacity utilization	
Internal current limitation		I_{max} = 0...150 % can be set in menu (P303 / P313)	
Minimum permitted braking resistor value (4Q operation)	R_{BRmin}	6 Ω	4 Ω
Output voltage	U_A	Max. V_{mains}	
PWM frequency	f_{PWM}	Can be set: 4/8/12/16 kHz	
Speed range / resolution	n_A / Δn_A	–5500 ... 0 ... +5500 min^{-1} / 0.2 min^{-1} across the entire range	
GENERAL INFORMATION			
Power loss at P_N	P_{Vmax}	1700 W	2000 W
Cooling air consumption		360 m^3/h	
Weight		34.3 kg	
Dimensions	**W × H × D**	280 × 610 × 330 mm	

1) When V_{mains} = 3 × AC 500 V, the mains currents and output currents must be reduced by 20 % compared to the rated data.

2) The performance data apply to f_{PWM} = 4 kHz (factory setting for VFC operating modes).

MCH4_A standard version (VFC/CFC/SERVO)	0550-503-4-00	0750-503-4-00
Part number MCH40A (without fieldbus)	827 615 3	827 616 1
Part number MCH41A (with PROFIBUS-DP)	827 661 7	827 662 5
Part number MCH42A (with INTERBUS-LWL)	827 577 7	827 578 5
MCH4_A application version (VFC/CFC/SERVO)	**0550-503-4-0T**	**0750-503-4-0T**
Part number MCH40A (without fieldbus)	827 638 2	827 639 0
Part number MCH41A (with PROFIBUS-DP)	827 684 6	827 685 4
Part number MCH42A (with INTERBUS-LWL)	827 170 4	827 171 2
VFC operating mode	Recommended motor power → MOVIDRIVE® *compact* system manual, section "Project Planning"	
CFC/SERVO operating mode (f_{PWM} = 8 kHz) Continuous output current = 100% I_N I_D	AC 105 A	AC 130 A
Recommended motor power	→ MOVIDRIVE® *compact* system manual, section "Project Planning"	

8.4 MOVIDRIVE® compact MCH4_A...-2_3 (AC 230 V units)

Size 1

02570AXX

MOVIDRIVE® *compact*		0015-2A3-4-0_	0022-2A3-4-0_	0037-2A3-4-0_
INPUT				
Supply voltage	V_{mains}	3 × AC 200 V –10 % ... 3 × AC 240 V +10 %		
Supply frequency	f_{mains}	50 Hz ... 60 Hz ±5 %		
Rated mains current I_{mains} **(when V_{mains} = 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] **(when V_{mains} = 3 × AC 230...240 V)**	S_N	2.7 kVA	3.4 kVA	5.8 kVA
Rated output current (when V_{mains} = 3 × AC 230 V)	I_N	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 the capacity utilization		
Internal current limitation		I_{max} = 0...150 % can be set in menu (P303 / P313)		
Minimum permitted braking resistor value (4Q operation)	R_{BRmin}	27 Ω		
Output voltage	U_A	Max. V_{mains}		
PWM frequency	f_{PWM}	Can be set: 4/8/12/16 kHz		
Speed range / resolution	n_A / Δn_A	–5500 ... 0 ... +5500 min^{-1} / 0.2 min^{-1} across the entire range		
GENERAL INFORMATION				
Power loss at P_N	P_{Vmax}	110 W	126 W	210 W
Cooling air consumption		40 m^3/h		
Weight		2.8 kg		
Dimensions	**W × H × D**	105 × 315 × 161 mm		

1) The performance data apply to f_{PWM} = 4 kHz (factory setting for VFC operating modes).

MCH4_A standard version (VFC/CFC)	0015-2A3-4-00	0022-2A3-4-00	0037-2A3-4-00
Part number MCH40A (without fieldbus)	827 617 X	827 618 8	827 619 6
Part number MCH41A (with PROFIBUS-DP)	827 663 3	827 664 1	827 665 X
Part number MCH42A (with INTERBUS-LWL)	827 588 2	827 589 0	827 590 4
MCH4_A application version (VFC/CFC)	**0015-2A3-4-0T**	**0022-2A3-4-0T**	**0037-2A3-4-0T**
Part number MCH40A (without fieldbus)	827 640 4	827 641 2	827 642 0
Part number MCH41A (with PROFIBUS-DP)	827 686 2	827 687 0	827 688 9
Part number MCH42A (with INTERBUS-LWL)	827 579 3	827 580 7	827 581 5
VFC operating mode	Recommended motor power → MOVIDRIVE® *compact* system manual, section "Project Planning"		
CFC/SERVO operating mode (f_{PWM} = 8 kHz) Continuous output current = 100% I_N I_D	AC 7.3 A	AC 8.6 A	AC 14.5 A
Recommended motor power	→ MOVIDRIVE® *compact* system manual, section "Project Planning"		

Size 2

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MOVIDRIVE® *compact*		0055-2A3-4-0_	0075-2A3-4-0_
INPUT			
Supply voltage	V_{mains}	3 × AC 200 V –10 % ... 3 × AC 240 V +10 %	
Supply frequency	f_{mains}	50 Hz ... 60 Hz ±5 %	
Rated mains current I_{mains} **(when V_{mains} = 3 × AC 230 V)**	**100 %** **125 %**	AC 19.5 A AC 24.4 A	AC 27.4 A AC 34.3 A
OUTPUT			
Apparent output power[1] **(when V_{mains} = 3 × AC 230...240 V)**	S_N	8.8 kVA	11.6 kVA
Rated output current (when V_{mains} = 3 × AC 230 V)	I_N	AC 22 A	AC 29 A
Current limitation	I_{max}	Motor and regenerative 150 % I_N, duration depending on the capacity utilization	
Internal current limitation		I_{max} = 0...150 % can be set in menu (P303 / P313)	
Minimum permitted braking resistor value (4Q operation)	R_{BRmin}	12 Ω	
Output voltage	U_A	Max. V_{mains}	
PWM frequency	f_{PWM}	Can be set: 4/8/12/16 kHz	
Speed range / resolution	n_A / Δn_A	–5500 ... 0 ... +5500 min^{-1} / 0.2 min^{-1} across the entire range	
GENERAL INFORMATION			
Power loss at P_N	P_{Vmax}	300 W	380 W
Cooling air consumption		80 m^3/h	
Weight		5.9 kg	
Dimensions	**W × H × D**	130 × 335 × 213 mm	

1) The performance data apply to f_{PWM} = 4 kHz (factory setting for VFC operating modes).

MCH4_A standard version (VFC/CFC)	0055-2A3-4-00	0075-2A3-4-00
Part number MCH40A (without fieldbus)	827 620 X	827 621 8
Part number MCH41A (with PROFIBUS-DP)	827 666 8	827 667 6
Part number MCH42A (with INTERBUS-LWL)	827 591 2	827 592 0
MCH4_A application version (VFC/CFC)	**0055-2A3-4-0T**	**0075-2A3-4-0T**
Part number MCH40A (without fieldbus)	827 643 9	827 644 7
Part number MCH41A (with PROFIBUS-DP)	827 689 7	827 690 0
Part number MCH42A (with INTERBUS-LWL)	827 582 3	827 583 1
VFC operating mode	Recommended motor power → MOVIDRIVE® *compact* system manual, section "Project Planning"	
CFC/SERVO operating mode (f_{PWM} = 8 kHz) Continuous output current = 100% I_N I_D	AC 22 A	AC 29 A
Recommended motor power	→ MOVIDRIVE® *compact* system manual, section "Project Planning"	

Size 3

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MOVIDRIVE® *compact*		0110-203-4-0_	0150-203-4-0_
INPUT			
Supply voltage	V_{mains}	3 × AC 200 V –10 % ... 3 × AC 240 V +10 %	
Supply frequency	f_{mains}	50 Hz ... 60 Hz ±5 %	
Rated mains current I_{mains} (when V_{mains} = 3 × AC 230 V)	**100 %** **125 %**	AC 40 A AC 50 A	AC 49 A AC 61 A
OUTPUT			
Apparent output power[1] (when V_{mains} = 3 × AC 230...240 V)	S_N	17.1 kVA	21.5 kVA
Rated output current (when V_{mains} = 3 × AC 230 V)	I_N	AC 42 A	AC 54 A
Current limitation	I_{max}	Motor and regenerative 150 % I_N, duration depending on the capacity utilization	
Internal current limitation		I_{max} = 0...150 % can be set in menu (P303 / P313)	
Minimum permitted braking resistor value (4Q operation)	R_{BRmin}	7.5 Ω	5.6 Ω
Output voltage	U_A	Max. V_{mains}	
PWM frequency	f_{PWM}	Can be set: 4/8/12/16 kHz	
Speed range / resolution	n_A / Δn_A	–5500 ... 0 ... +5500 min^{-1} / 0.2 min^{-1} across the entire range	
GENERAL INFORMATION			
Power loss at P_N	P_{Vmax}	580 W	720 W
Cooling air consumption		180 m^3/h	
Weight		14.3 kg	
Dimensions	**W × H × D**	200 × 465 × 233 mm	

1) The performance data apply to f_{PWM} = 4 kHz (factory setting for VFC operating modes).

MCH4_A standard version (VFC/CFC)	**0110-203-4-00**	**0150-203-4-00**
Part number MCH40A (without fieldbus)	827 622 6	827 623 4
Part number MCH41A (with PROFIBUS-DP)	827 668 4	827 669 2
Part number MCH42A (with INTERBUS-LWL)	827 593 9	827 594 7
MCH4_A application version (VFC/CFC)	**0110-203-4-0T**	**0150-203-4-0T**
Part number MCH40A (without fieldbus)	827 645 5	827 646 3
Part number MCH41A (with PROFIBUS-DP)	827 691 9	827 692 7
Part number MCH42A (with INTERBUS-LWL)	827 584 X	827 585 8
VFC operating mode	Recommended motor power → MOVIDRIVE® *compact* system manual, section "Project Planning"	
CFC/SERVO operating mode (f_{PWM} = 8 kHz) **Continuous output current = 100% I_N I_D**	AC 42 A	AC 54 A
Recommended motor power	→ MOVIDRIVE® *compact* system manual, section "Project Planning"	

Size 4

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MOVIDRIVE® *compact*		0220-203-4-0_	0300-203-4-0_
INPUT			
Supply voltage	V_{mains}	3 × AC 200 V –10 % ... 3 × AC 240 V +10 %	
Supply frequency	f_{mains}	50 Hz ... 60 Hz ±5 %	
Rated mains current I_{mains} (when V_{mains} = 3 × AC 230 V)	**100 %** **125 %**	AC 72 A AC 90 A	AC 86 A AC 107 A
OUTPUT			
Apparent output power[1] (when V_{mains} = 3 × AC 230...240 V)	S_N	31.8 kVA	37.8 kVA
Rated output current (when V_{mains} = 3 × AC 230 V)	I_N	AC 80 A	AC 95 A
Current limitation	I_{max}	Motor and regenerative 150 % I_N, duration depending on the capacity utilization	
Internal current limitation		I_{max} = 0...150 % can be set in menu (P303 / P313)	
Minimum permitted braking resistor value (4Q operation)	R_{BRmin}	3 Ω	
Output voltage	U_A	Max. V_{mains}	
PWM frequency	f_{PWM}	Can be set: 4/8/12/16 kHz	
Speed range / resolution	n_A / Δn_A	–5500 ... 0 ... +5500 min^{-1} / 0.2 min^{-1} across the entire range	
GENERAL INFORMATION			
Power loss at P_N	P_{Vmax}	1100 W	1300 W
Cooling air consumption		180 m^3/h	
Weight		26.3 kg	
Dimensions	**W × H × D**	MCH: 280 × 522 × 233 mm	

1) The performance data apply to f_{PWM} = 4 kHz (factory setting for VFC operating modes).

MCH4_A standard version (VFC/CFC)	0220-203-4-00	0300-203-4-00
Part number MCH40A (without fieldbus)	827 624 2	827 625 0
Part number MCH41A (with PROFIBUS-DP)	827 670 6	827 671 4
Part number MCH42A (with INTERBUS-LWL)	827 595 5	827 596 3
MCH4_A application version (VFC/CFC)	**0220-203-4-0T**	**0300-203-4-0T**
Part number MCH40A (without fieldbus)	827 647 1	827 648 X
Part number MCH41A (with PROFIBUS-DP)	827 693 5	827 694 3
Part number MCH42A (with INTERBUS-LWL)	827 586 6	827 587 4
VFC operating mode	Recommended motor power → MOVIDRIVE® *compact* system manual, section "Project Planning"	
CFC/SERVO operating mode (f_{PWM} = 8 kHz) Continuous output current = 100% I_N I_D	AC 80 A	AC 95 A
Recommended motor power	→ MOVIDRIVE® *compact* system manual, section "Project Planning"	

8.5 MOVIDRIVE® compact MCH electronics data

MOVIDRIVE® *compact*	**Setpoint processing and speed ramps**	
MCH40A	**Version without fieldbus interface.**	
MCH41A	**Version with PROFIBUS-DP interface.**	
Protocol option Baud rate Connection technology Bus terminator Station address Name of the GSD file DP ident. number	PROFIBUS DP to IEC 61158 Automatic baud rate detection from 9.6 kbaud to 12 Mbaud 9-pole sub D connector, pin assignment to IEC 61158 Not integrated; connect using suitable PROFIBUS connector with terminating resistors that can be activated 0 ... 125, adjustable via DIP switches SEW_6003.GSD 6003_{hex} (24579_{dec})	
MCH42A	**Version with INTERBUS fiber optic cable (LWL) interface.**	
Protocol option Baud rate Connection technology	INTERBUS to EN 61158-2 with optically controlled LWL interface 500 kBaud and 2 MBaud, can be selected via DIP switch 4 F-SMA connectors (2 × remote bus input and 2 × remote bus output)	
Valid for all versions		
Voltage supply X10:1 for setpoint input X10:6	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 X10:2/X10:3 (Differential input) Operating mode AI11/AI12 Resolution Internal resistance	AI11/AI12: Voltage or current input, can be set with S11 and P11_, sampling interval 1 ms Voltage input: n1 = DC (0...+10 V) or DC (–10 V...0...+10 V) 12 bit R_i = 40 kΩ (external voltage supply) R_i = 20 kΩ (supply from REF1/REF2)	Current input: n1 = DC (0...20 mA or 4...20 mA) 11 bit R_i = 250 Ω
Setpoint input n2 X10:4 TF/TH input Resolution	Analog input DC (0 ... 10 V) or optionally (→ P120) TF/TH input with response threshold at $R_{TF} \geq 2.9$ kΩ ± 10 % 10 Bit	
Internal setpoints	Parameter set 1: n11/n12/n13 = –5000...0...+5000 min^{-1} Parameter set 2: n21/n22/n23 = –5000...0...+5000 min^{-1}	
Time ranges of the speed ramps at Δn = 3000 min^{-1}	1st ramp t11/t21 Up: 0.0...2000 s Down: 0.0...2000 s 2nd ramp t12/t22 Up = down: 0.0...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	

MOVIDRIVE® *compact*		Additional electronics data	
Auxiliary voltage output[1]	X11:8	VO24: V_{OUT} = DC 24 V, maximum current carrying capacity I_{max} = DC 200 mA	
Ext. voltage supply[1] X12:6		VI24: V_{IN} = DC 24 V –15 % / +20 % according to EN 61131-2	
Binary inputs Internal resistance	X11:1...X11:6	DIØØ...DIØ5: Isolated (optocoupler), PLC compatible (EN 61131), sampling interval 5 ms $R_i \approx 3\ k\Omega$, $I_E \approx 10$ mA	
Signal level		DC (+13 V...+30 V) = "1" = Contact closed DC (–3 V...+5 V) = "0" = Contact open	Fulfills EN 61131
Function	X11:1 X11:2...X11:6	DIØØ: fixed assignment with "/Controller inhibit" DIØ1...DIØ5: Selection option → Parameter menu P60_	
Binary outputs[1]	X12:1/X12:5	DBØØ/DOØ2: PLC-compatible (EN 61131-2), response time 5 ms	
Signal level		"0" = 0 V "1" = +24 V **Important:**Do not apply external voltage!	
Function	X12:1 X12:5	DBØØ: With fixed assignment "/Brake", I_{max} = DC 150 mA (short-circuit proof, protected against external voltage up to DC 30 V) DOØ2: Selection option → parameter menu P62_, I_{max} = DC 50 mA (short-circuit proof and protected against external voltage up to DC 30 V)	
Analog output	X12:5	AOØ1: → Menu P64_, resolution 8 bit, I_{max} = DC 20 mA (short-circuit proof)	
Relay output	X12:2/3/4	DOØ1: Load capacity of the relay contacts U_{max} = DC 30 V, I_{max} =DC 800 mA	
Function	X12:2 X12:3 X12:4	DOØ1-C: Shared relay contact DOØ1-NO: Normally open contact DOØ1-NC: Normally closed contact	Selection option → Parameter menu P62_
System bus (SBus) X10:7/10 X10:8/11		SC11/21: SBus high SC12/22: SBus low	CAN bus according to CAN specification 2.0, parts A and B, transmission technology according to ISO 11898, max. 64 stations, terminating resistor (120Ω) can be activated using DIP switch.
Input motor encoder [1]	X15:	Permitted encoder types: • Hiperface encoder • sin/cos encoder AC 1 V_{SS} • TTL sensor Encoder power supply: DC + 12 V, I_{max} = DC 180 mA	
Output for incremental encoder simulation or external encoder input[1]	X14:	Output for incremental encoder simulation: Signal level to RS422 The number of pulses is: • 1024 pulses/revolution (Hiperface encoder on X15) • as at X51: Motor encoder input (sin/cos encoder or TTL sensor on X15)	External encoder input (max. 200 kHz): Permitted encoder types: • Hiperface encoder • sin/cos encoder AC 1 V_{SS} • TTL sensor Encoder power supply: DC+12 V, I_{max} = DC 180 mA
Reference terminals	X10:5 X10:9/X11:9/X12:7 X11:7	AGND: Reference potential for analog signals n1 and n2 and terminals X10:1 and X10:6. DGND: Reference potential for binary signals, system bus (SBus), encoder and resolver. DCOM: Reference potential for binary inputs X10:9...X10:14 (DIØØ...DIØ5).	
Permitted line cross section		Only one core per terminal: 0.1...2.5 mm^2 (AWG 24..0.16) Use right-angled crimping pliers with 1.5 mm^2 (AWG 16)	

1) **MCH40A (without fieldbus):** The unit provides a current of I_{max} = DC 400 mA for the DC+24 V outputs (VO24, DBØØ, DOØ2, encoder supply). If this value is insufficient, a DC 24 V voltage supply must be connected to X10:24 (VI24). This external DC 24 V voltage supply must be able to provide 50 W continuous power and 100 W peak power (1 s).

MCH41A (with PROFIBUS-DP) or MCH42A (with INTERBUS-LWL): SEW-EURODRIVE recommends that you always supply these units with DC 24 V at terminal X10:24 (VI24). This external DC 24 V voltage supply must be able to provide 50 W continuous power and 100 W peak power (1 s).
The DC 24 V outputs X10:16 (VO24), X10:21 (DBØØ) and X10:19 (DOØ2) may be supplied with a total maximum current of I_{max} = DC 400 mA.

Front view of MCH42A control unit

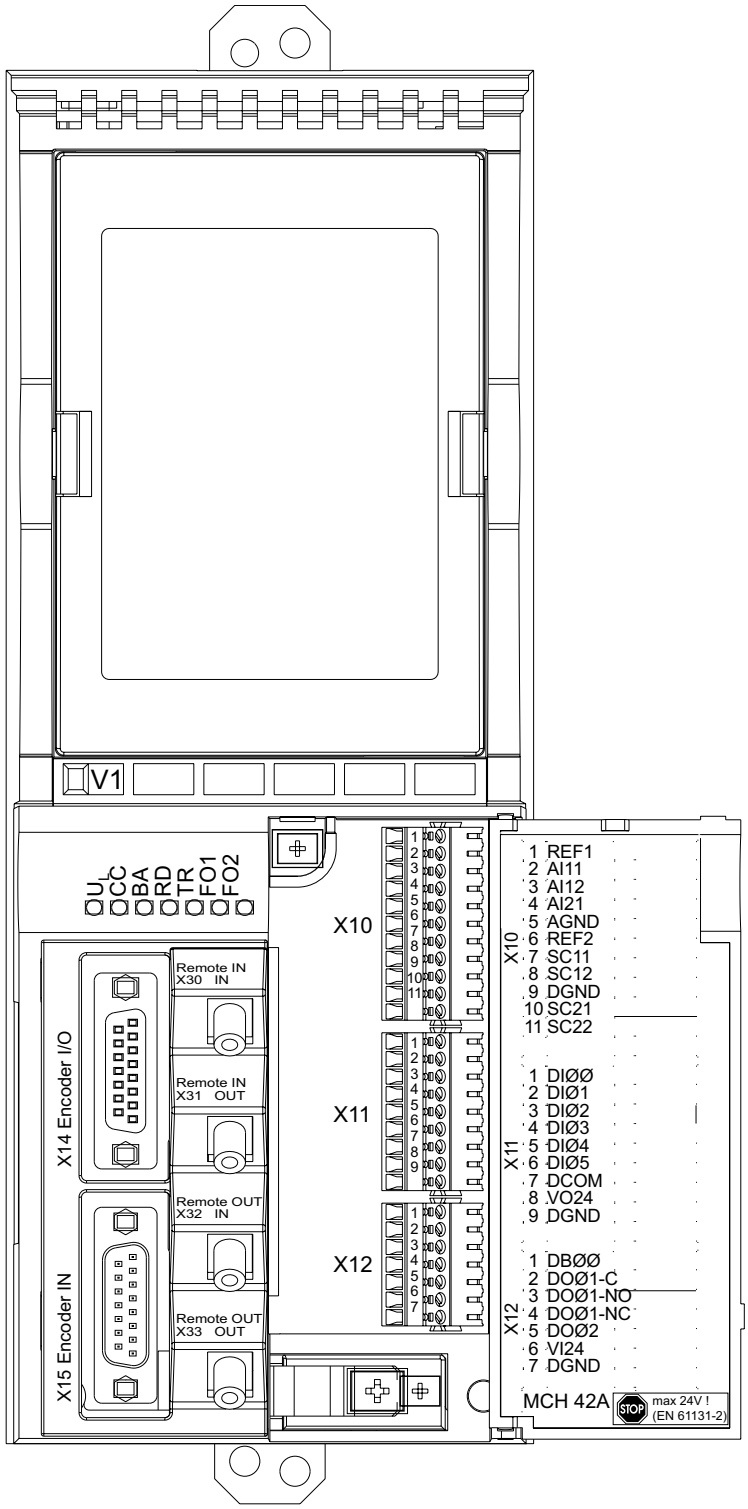

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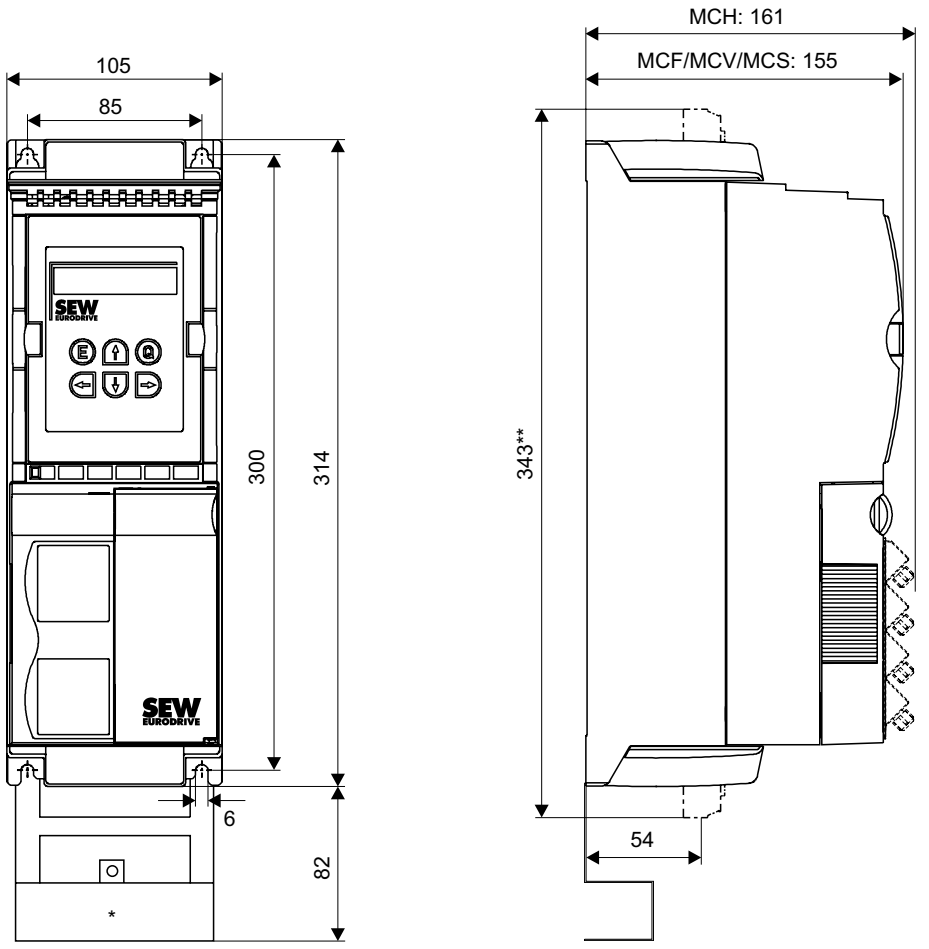
Figure 61: Front view of MCH42A control unit

8.6 MOVIDRIVE® compact dimension drawings

Dimension drawing for size 1 (0015 ... 0040-5A3 and 0015 ... 0037-2A3)



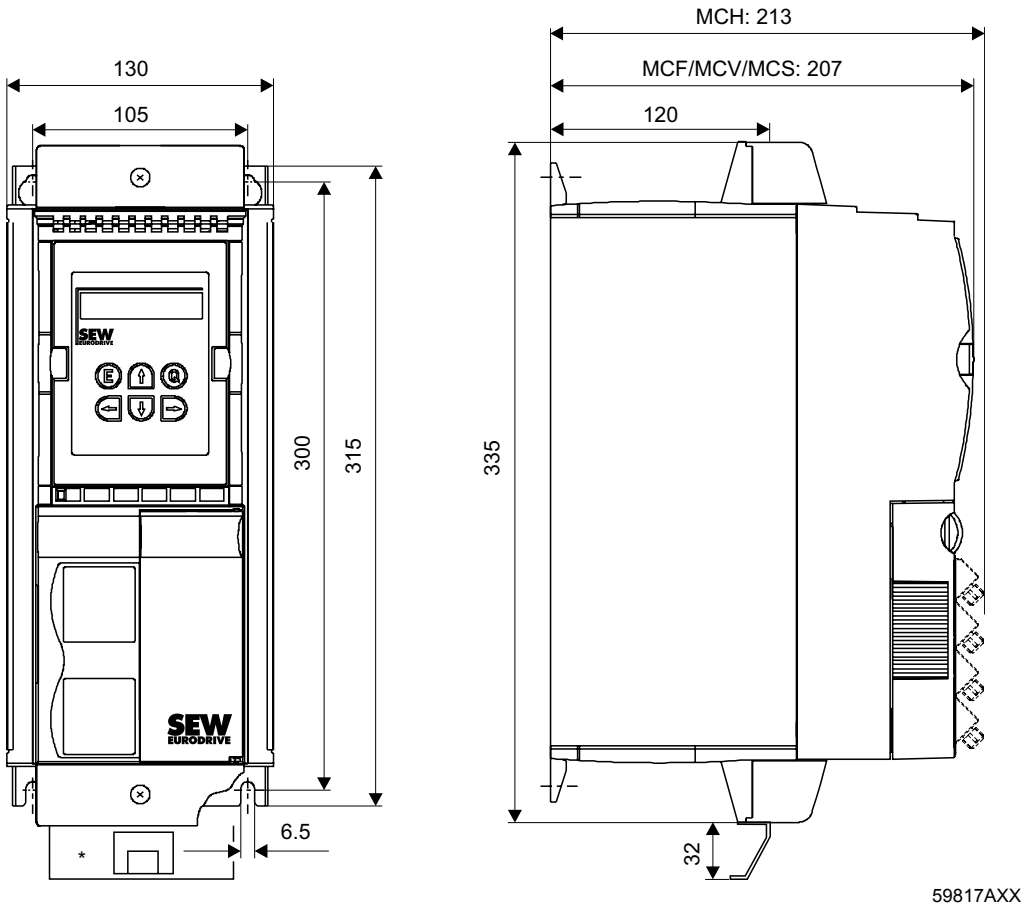
All dimensions in mm

* Power shield clamp

** Unit dimensions including connected power terminals

	NOTE
	Leave at least 100 mm clearance above and below the unit to ensure optimum cooling. There is no need for clearance at the sides. You can line up the units directly next to one another.

Dimension drawing for size 2 (0055 ... 0110-5A3 and 0055 / 0075-2A3)

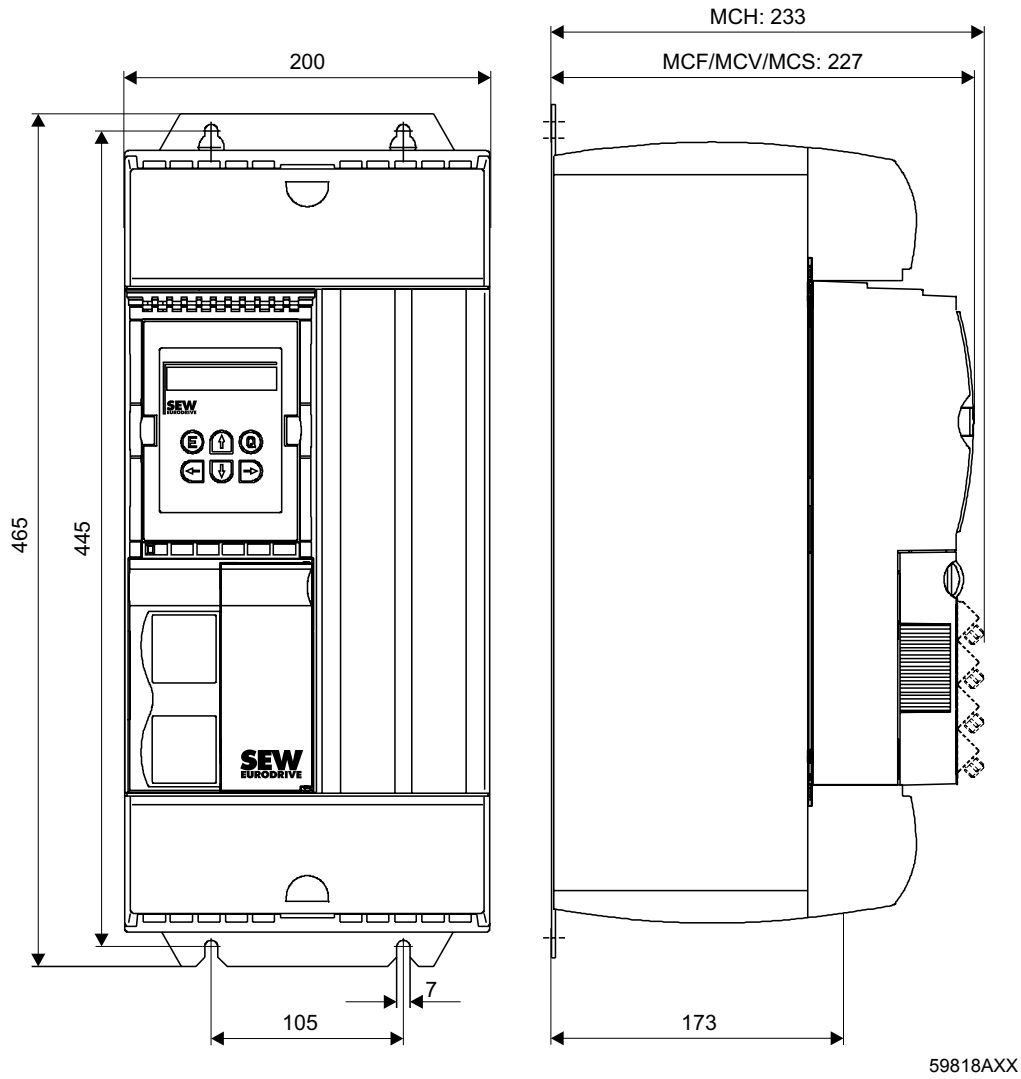


All dimensions in mm

* Power shield clamp

	NOTE
	Leave at least 100 mm clearance above and below the unit to ensure optimum cooling. There is no need for clearance at the sides. You can line up the units directly next to one another.

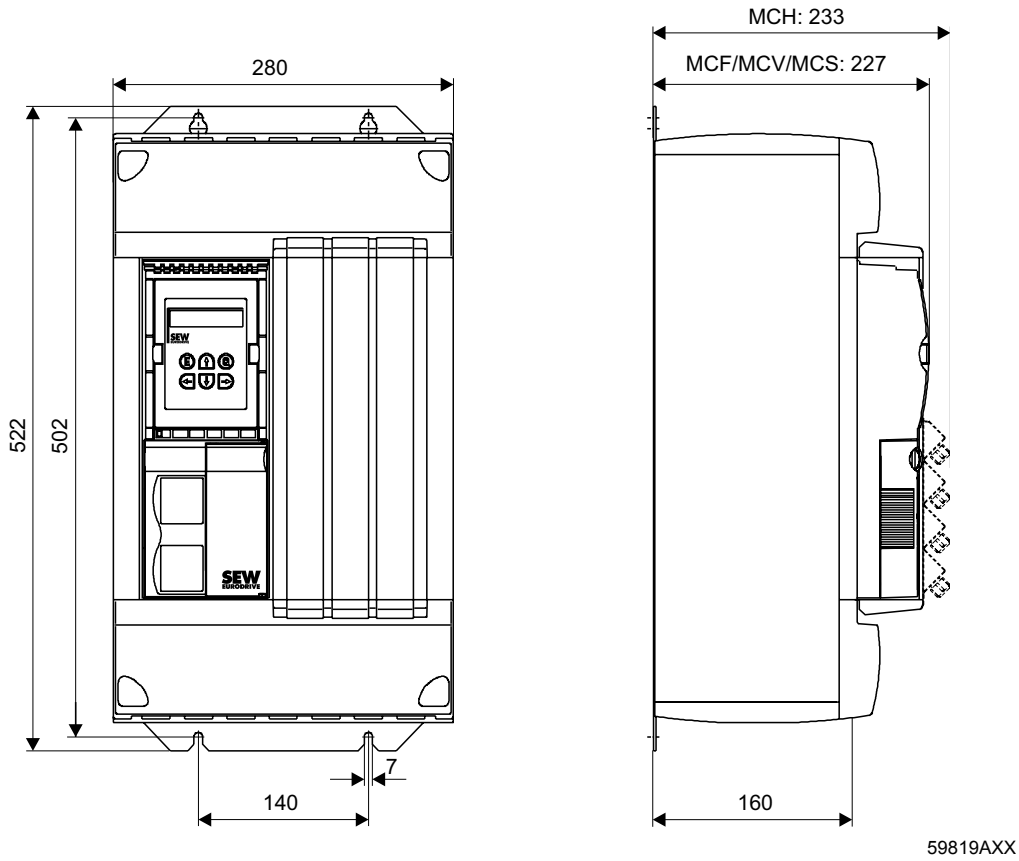
Dimension drawing for size 3 (0150 ... 0300-503 and 0110 / 0150-203)



All dimensions in mm

	NOTE
	Leave at least 100 mm clearance above and below the unit to ensure optimum cooling. There is no need for clearance at the sides. You can line up the units directly next to one another.

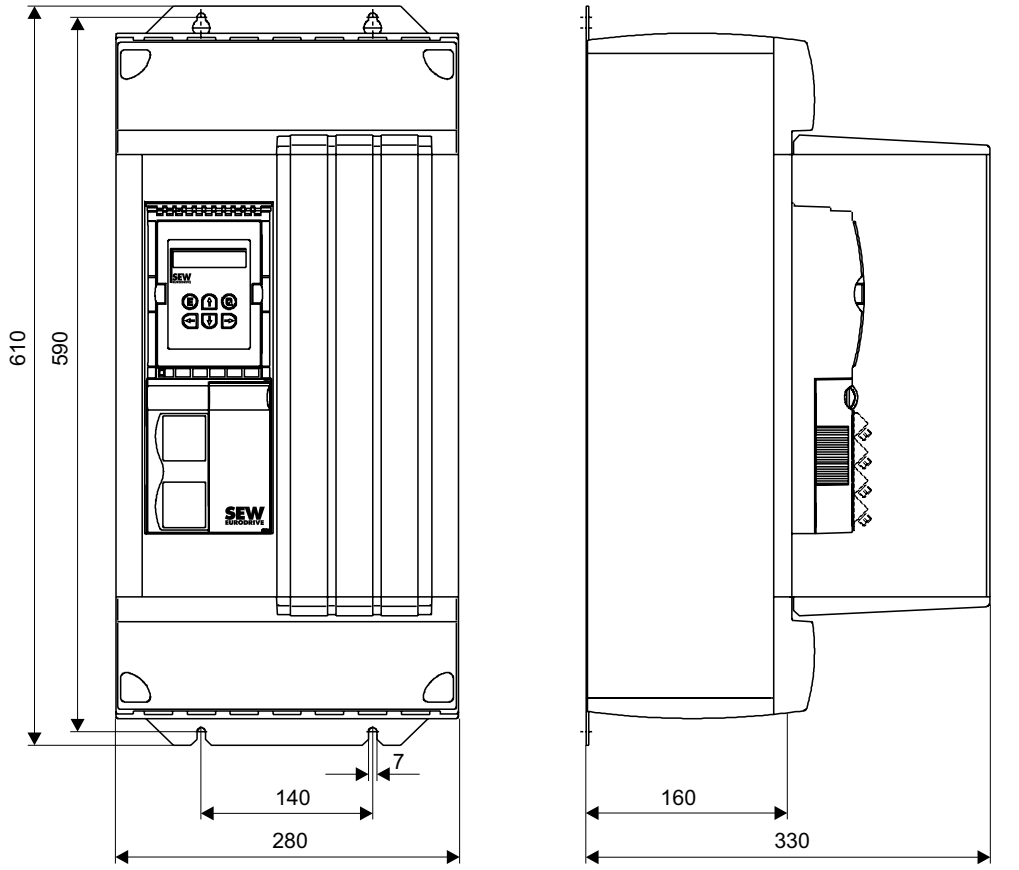
Dimension drawing for size 4 (0370 / 0450-503 and 0220 / 0300-203)



All dimensions in mm

	NOTE
	Leave at least 100 mm clearance above and below the unit to ensure optimum cooling. There is no need for clearance at the sides. You can line up the units directly next to one another.

Dimension drawing for size 5 (0550 / 0750-503)



All dimensions in mm

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

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Address List

Germany			
Headquarters **Production** **Sales**	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal P.O. Box Postfach 3023 • D-76642 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-1970 http://www.sew-eurodrive.de sew@sew-eurodrive.de
Service **Competence Center**	**Central** Gear units / Motors	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 1 D-76676 Graben-Neudorf	Tel. +49 7251 75-1710 Fax +49 7251 75-1711 sc-mitte-gm@sew-eurodrive.de
	Central Electronics	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal	Tel. +49 7251 75-1780 Fax +49 7251 75-1769 sc-mitte-e@sew-eurodrive.de
	North	SEW-EURODRIVE GmbH & Co KG Alte Ricklinger Straße 40-42 D-30823 Garbsen (near Hannover)	Tel. +49 5137 8798-30 Fax +49 5137 8798-55 sc-nord@sew-eurodrive.de
	East	SEW-EURODRIVE GmbH & Co KG Dänkritzer Weg 1 D-08393 Meerane (near Zwickau)	Tel. +49 3764 7606-0 Fax +49 3764 7606-30 sc-ost@sew-eurodrive.de
	South	SEW-EURODRIVE GmbH & Co KG Domagkstraße 5 D-85551 Kirchheim (near München)	Tel. +49 89 909552-10 Fax +49 89 909552-50 sc-sued@sew-eurodrive.de
	West	SEW-EURODRIVE GmbH & Co KG Siemensstraße 1 D-40764 Langenfeld (near Düsseldorf)	Tel. +49 2173 8507-30 Fax +49 2173 8507-55 sc-west@sew-eurodrive.de
	Drive Service Hotline / 24 Hour Service		+49 180 5 SEWHELP +49 180 5 7394357
	Additional addresses for service in Germany provided on request!		

France			
Production **Sales** **Service**	**Haguenau**	SEW-USOCOME 48-54, route de Soufflenheim B. P. 20185 F-67506 Haguenau Cedex	Tel. +33 3 88 73 67 00 Fax +33 3 88 73 66 00 http://www.usocome.com sew@usocome.com
Production	**Forbach**	SEW-EUROCOME Zone Industrielle Technopole 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
	Paris	SEW-USOCOME Zone industrielle 2, rue Denis Papin F-77390 Verneuil l'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
	Additional addresses for service in France provided on request!		

Algeria			
Sales	**Alger**	Réducom 16, rue des Frères Zaghnoun Bellevue El-Harrach 16200 Alger	Tel. +213 21 8222-84 Fax +213 21 8222-84

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

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
	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://sew-eurodrive.at sew@sew-eurodrive.at

Belgium			
Assembly **Sales** **Service**	**Brüssel**	SEW Caron-Vector S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.sew-eurodrive.be info@caron-vector.be

Brazil			
Production **Sales** **Service**	**Sao Paulo**	SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaiolli, 50 Caixa Postal: 201-07111-970 Guarulhos/SP - Cep.: 07251-250	Tel. +55 11 6489-9133 Fax +55 11 6480-3328 http://www.sew.com.br sew@sew.com.br
	Additional addresses for service in Brazil provided on request!		

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

Cameroon			
Sales	**Douala**	Electro-Services Rue Drouot Akwa B.P. 2024 Douala	Tel. +237 4322-99 Fax +237 4277-03

Canada			
Assembly **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, Ontario L6T3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca l.reynolds@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. 7188 Honeyman Street Delta. B.C. V4G 1 E2	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger LaSalle, Quebec 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 25322611 gm-tianjin@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 P. R. China	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew.com.cn
	Additional addresses for service in China provided on request!		

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

Croatia			
Sales **Service**	**Zagreb**	KOMPEKS d. o. o. PIT Erdödy 4 II HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@net.hr

Czech Republic			
Sales	**Praha**	SEW-EURODRIVE CZ S.R.O. Business Centrum Praha Lužná 591 CZ-16000 Praha 6 - Vokovice	Tel. +420 220121234 Fax +420 220121237 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz

Denmark			
Assembly **Sales** **Service**	**Kopenhagen**	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

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 sew@sew.fi http://www.sew-eurodrive.fi

Gabon			
Sales	**Libreville**	Electro-Services B.P. 1889 Libreville	Tel. +241 7340-11 Fax +241 7340-12

Great Britain			
Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate P.O. Box No.1 GB-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

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

Hong Kong			
Assembly **Sales** **Service**	**Hong Kong**	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 2 7960477 + 79604654 Fax +852 2 7959129 sew@sewhk.com

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

India			
Assembly **Sales** **Service**	**Baroda**	SEW-EURODRIVE India Pvt. Ltd. Plot No. 4, Gidc Por Ramangamdi • Baroda - 391 243 Gujarat	Tel. +91 265 2831086 Fax +91 265 2831087 http://www.seweurodriveindia.com mdoffice@seweurodriveindia.com
Technical Offices	**Bangalore**	SEW-EURODRIVE India Private Limited 308, Prestige Centre Point 7, Edward Road Bangalore	Tel. +91 80 22266565 Fax +91 80 22266569 salesbang@seweurodriveinindia.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

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

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

Ivory Coast			
Sales	**Abidjan**	SICA Ste industrielle et commerciale pour l'Afrique 165, Bld de Marseille B.P. 2323, Abidjan 08	Tel. +225 2579-44 Fax +225 2584-36

Japan			
Assembly **Sales** **Service**	**Toyoda-cho**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373814 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp

Korea			
Assembly **Sales** **Service**	**Ansan-City**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate Unit 1048-4, Shingil-Dong Ansan 425-120	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-korea.co.kr master@sew-korea.co.kr

Latvia			
Sales	**Riga**	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 7139253 Fax +371 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 4947-86 +961 1 4982-72 +961 3 2745-39 Fax +961 1 4949-71 gacar@beirut.com

Lithuania			
Sales	**Alytus**	UAB Irseva Naujoji 19 LT-62175 Alytus	Tel. +370 315 79204 Fax +370 315 56175 info@irseva.lt http://www.sew-eurodrive.lt

Luxembourg			
Assembly **Sales** **Service**	**Brüssel**	CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.sew-eurodrive.lu info@caron-vector.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

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

Morocco			
Sales	**Casablanca**	Afit 5, rue Emir Abdelkader MA 20300 Casablanca	Tel. +212 22618372 Fax +212 22618351 richard.miekisiak@premium.net.ma

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

Norway			
Assembly **Sales** **Service**	**Moss**	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 241-020 Fax +47 69 241-040 http://www.sew-eurodrive.no sew@sew-eurodrive.no

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 67710-90 Fax +48 42 67710-99 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl

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

Romania			
Sales **Service**	**Bucuresti**	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

Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 849 47-70 Fax +221 849 47-71 senemeca@sentoo.sn

Serbia and Montenegro			
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 dipar@yubc.net

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. Rybnicna 40 SK-83107 Bratislava	Tel. +421 2 49595201 Fax +421 2 49595200 http://www.sew.sk sew@sew-eurodrive.sk
	Zilina	SEW-Eurodrive SK s.r.o. ul. Vojtecha Spanyola 33 SK-010 01 Zilina	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-97411 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk

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

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

South Africa			
	Capetown	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 dswanepoel@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaceo Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 dtait@sew.co.za

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

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 info@sew-eurodrive.se

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

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

Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service 5, Rue El Houdaibiah 1000 Tunis	Tel. +216 71 4340-64 + 71 4320-29 Fax +216 71 4329-76 tms@tms.com.tn

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 / 164 3838014/15 Fax +90 216 3055867 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr

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

USA			
Production **Assembly** **Sales** **Service**	**Greenville**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manuf. +1 864 439-9948 Fax Ass. +1 864 439-0566 Telex 805 550 http://www.seweurodrive.com cslyman@seweurodrive.com

USA			
Assembly **Sales** **Service**	**San Francisco**	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, California 94544-7101	Tel. +1 510 487-3560 Fax +1 510 487-6381 cshayward@seweurodrive.com
	Philadelphia/PA	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
	Dayton	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 440-3799 cstroy@seweurodrive.com
	Dallas	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Additional addresses for service in the USA provided on request!		

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

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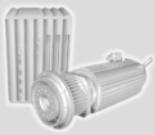

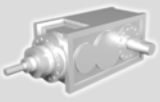

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