SEW EURODRIVE

MOVI-PLC® *advanced*
DHE41B/DHF41B/DHR41B Controller

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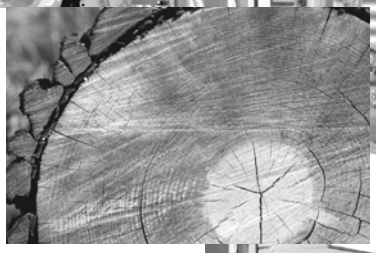
Manual



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1 General Notes

1.1 Structure of the safety notes

The safety notes in this manual are designed as follows:

Symbol	SIGNAL WORD!
	Nature and source of hazard. Possible consequence(s) if disregarded. • Measure(s) to avoid the hazard.

Symbol	Signal word	Meaning	Consequences if disregarded
Example: General hazard Specific hazard, e.g. electric shock	**HAZARD!**	Imminent hazard	Severe or fatal injuries
	WARNING!	Possible hazardous situation	Severe or fatal injuries
	CAUTION!	Possible hazardous situation	Minor injuries
	STOP!	Possible damage to property	Damage to the drive system or its environment
	NOTE	Useful information or tip. Simplifies handling of the drive system.	

1.2 Right to claim under warranty

A requirement of fault-free operation and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the documentation. Therefore, read the manual before you start operating the device!

Make sure that the manual is available to persons responsible for the plant and its operation, as well as to persons who work independently on the device. You must also ensure that the documentation is legible.

1.3 Exclusion of liability

You must comply with the information contained in the MOVIDRIVE® documentation to ensure safe operation 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.

1.4 Copyright notice

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Any reproduction, modification, distribution or unintended use, in whole or in part, is prohibited.

2 Safety Notes

2.1 Other applicable documentation

- Only specialists are allowed to perform installation and startup observing relevant accident prevention regulations and the MOVIDRIVE® MDX60B/61B, MOVITRAC® B or MOVIAXIS® operating instructions!
- Read through this manual carefully before you commence installation and startup of the DH.41B option.
- As a prerequisite to fault-free operation and fulfillment of warranty claims, you must adhere to the information in the documentation.

2.2 Safety functions

The MOVIDRIVE® MDX60B/61B drive inverters may not perform safety functions without higher-level safety systems. Use higher-level safety systems to ensure protection of equipment and personnel. For safety applications, ensure that the information in the following publications is observed: "Safe Disconnection for MOVIDRIVE® MDX60B/61B".

2.3 Hoist applications

MOVIDRIVE® MDX60B/61B, MOVITRAC® B and MOVIAXIS® are not designed for use as a safety device in hoist applications.

Use monitoring systems or mechanical protection devices as safety features to avoid possible damage to property or injury to people.

2.4 Disposal

Observe current national regulations.

Dispose of the following materials separately in accordance with the country-specific regulations in force, as:

- Electronics scrap
- Plastics
- Sheet metal
- Copper

3 Introduction

Content of this manual

This user manual describes:

- Installation of the MOVI-PLC® *advanced* DH.41B controller in MOVIDRIVE® MDX61B
- The interfaces and LEDs of the MOVI-PLC® *advanced* DH.41B controller
- Installation of the MOVI-PLC® *advanced* DH.41B controller in the MOVIDRIVE® MDX61B and MOVITRAC® B inverters, in the MOVIAXIS® servo inverter and as a compact controller
- The engineering access to the MOVI-PLC® *advanced* DH.41B controller
- The project planning and startup of the MOVI-PLC® *advanced* DH.41B controller and of the controlled inverters and servo boosters

Additional documentation

To configure and startup the MOVI-PLC® *advanced* DH.41B controller simply and effectively, you should also request the following publications in addition to this manual:

- "MOVI-PLC® *advanced* DHF41B Fieldbus Interfaces PROFIBUS DP-V1 and DeviceNet" manual
- "MOVI-PLC® *advanced* DHR41B Fieldbus Interfaces PROFINET IO, EtherNet/IP, Modbus TCP/IP" manual
- "MOVI-PLC® Programming in the PLC Editor" system manual
- "MPLCMotion_MDX and MPLCMotion_MX Libraries for MOVI-PLC®" manual
- "MPLCMotion_MC07 and MPLCMotion_MM Libraries for MOVI-PLC®" manual
- MOVIDRIVE® MDX60/61B system manual
- MOVITRAC® B system manual
- MOVIAXIS® system folder

The "MOVI-PLC® Programming in the PLC Editor" system manual contains instructions for IEC 61131-3 compliant MOVI-PLC® programming.

The library manuals describe the motion libraries for MOVI-PLC® to control the MOVIDRIVE® MDX60B/61B, MOVIAXIS®, MOVITRAC® B, and MOVIMOT® inverters.

3.1 MOVI-PLC® – Motion Control with integrated control technology

Characteristics

MOVI-PLC® is a family of programmable logic controllers for inverters. It allows drive solutions, logic processing and sequence controls to be automated simply and efficiently using IEC 61131-3 compliant programming languages.

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

Control categories

- MOVI-PLC® *basic* DHP11B allows for coordinated single axis movements and integration of external inputs/outputs as well as drive operator panels (DOP). This makes MOVI-PLC® *basic* DHP11B suitable for the task of module controller and also for that of stand-alone controller for machines of medium complexity.
- MOVI-PLC® *advanced* DH.41B is characterized by a greater variety of interfaces and higher performance, which allows complex calculations and, for example, interpolated movements. MOVI-PLC® *advanced* is suitable for automating cells and machines. The integrated Ethernet interface allows for connecting MOVI-PLC® *advanced* directly to the control level.

3.2 MOVI-PLC® advanced DH.41B controller

Characteristics

The MOVI-PLC® *advanced* DH.41B controller is available in two variants:

- As **control card** MOVI-PLC® *advanced* DH.41B as an option for MOVIDRIVE® B and MOVITRAC® B inverters and for MOVIAXIS® servo inverters
- As **compact controller** MOVI-PLC® *advanced* DH.41B prepared for installation on a DIN rail. As a compact controller, it is designed for controlling inverters (→ chapter "Technical Data").

Unit types

The MOVI-PLC® *advanced* DH.41B is available in 3 variants, which differ in the integrated fieldbus interfaces:

Unit design of MOVI-PLC® *advanced* DH.41B	Fieldbus interfaces
DHE41B	Ethernet TCP/IP, UDP
DHF41B	Ethernet TCP/IP, UDP, PROFIBUS DP-V1, DeviceNet
DHR41B	Ethernet TCP/IP, UDP, PROFINET, EtherNet/IP, ModbusTCP/IP

Engineering

The engineering of the MOVI-PLC® *advanced* DH.41B controller includes the following activities:

- Configuration
- Parameterization
- Programming

These activities are carried out using the MOVITOOLS® MotionStudio engineering software. The software has a number of useful features for startup and diagnostics of all SEW-EURODRIVE units. The connection between the MOVI-PLC® *advanced* DH.41B controller and the engineering PC is established via the Ethernet 2 communication interface.

Communication interfaces

The MOVI-PLC® *advanced* controller DH.41B is equipped with numerous communication interfaces.

The two system bus interfaces CAN 1 and CAN 2 are used primarily for connection, controlling several inverters and integrating decentralized I/O modules.

This machine module can be operated via the integrated fieldbus interface with a higher-level controller.

Engineering is performed via the integrated Ethernet 2 communication interface.

An operator terminal (e.g. DOP11B) or a gearmotor with integrated MOVIMOT® frequency inverter are connected to the RS485 interfaces.

Automation topologies

Use as a standalone machine controller

You can also use the MOVI-PLC® *advanced* DH.41B controller as a control unit for an entire machine.

If used without a higher-level PLC, the MOVI-PLC® *advanced* DH.41B controller takes over all control tasks, including controlling drives and other actuators, as well as evaluating decentralized inputs and outputs.

In a stand-alone topology, operator terminals (DOP11B) function as the interface between the operator and machine.

You can connect MOVI-PLC® *advanced* DH.41B directly to the company's Ethernet network.

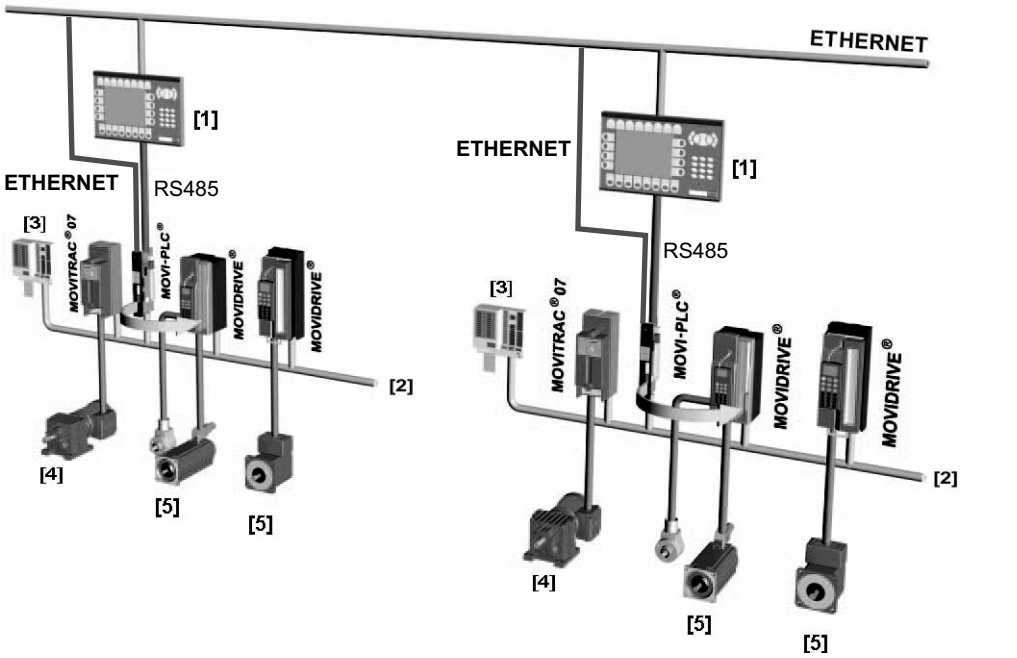

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Figure 1: Example of a topology when using MOVI-PLC® advanced DH.41B as the standalone control for a complete machine

[1] Operator terminal (e.g. DOP11B drive operator panel)

[2] System bus (CAN 1, CAN 2, Ethernet 1)

[3] Inputs and outputs (terminals)

[4] Asynchronous motor

[5] Synchronous servomotor/asynchronous servomotor

Use as a module controller

You can also use the MOVI-PLC® *advanced* DH.41B controller for decentralized automation of a machine module (→ following figure). In this way, the MOVI-PLC® *advanced* DH.41B controller coordinates motion sequences in the axis system.

The controller is connected to a higher-level PLC via the PROFIBUS interface or via one of the integrated fieldbus interfaces.

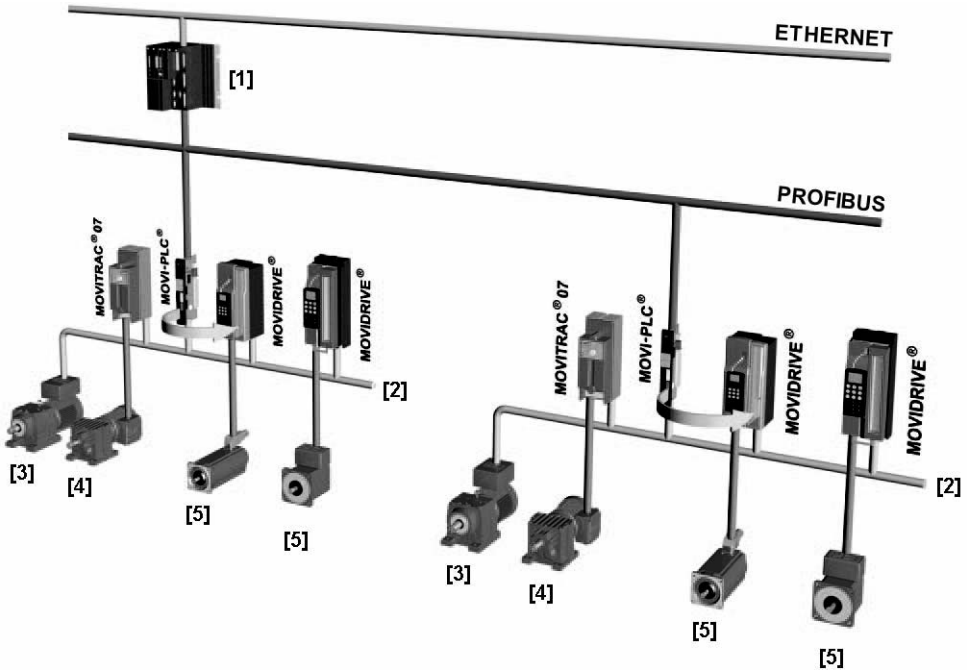

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Figure 2: Example of a topology for controlling each machine module using a MOVI-PLC® advanced DH.41B controller

[1] Higher-level PLC

[2] System bus (CAN 1, CAN 2)

[3] MOVIMOT® (via fieldbus interface DeviceNet MFD.../connected directly to MOVI-PLC® via RS485 interface COM2)

[4] Asynchronous motor

[5] Synchronous servomotor/asynchronous servomotor

System buses CAN 1, CAN 2 and Ethernet 1

You can use the MOVI-PLC® *advanced* DH.41B controller to control a machine module by coupling several inverters via the system bus. In this way, MOVI-PLC® *advanced* DH.41B controls all the drives within the machine module and in doing so takes off load from the master controller (e.g. machine or system PLC). You can connect a maximum of *64* of the following units to the MOVI-PLC® *advanced* DH.41B controller via system buses CAN 1, CAN 2 and Ethernet 1:

- MOVITRAC® B frequency inverter
- MOVIDRIVE® MDX60B/61B drive inverter
- MOVIAXIS® servo inverter
- Gearmotor with integrated frequency inverter MOVIMOT® (Fieldbus interface DeviceNet MFD... required)

Configuring the PROFIBUS interface

The PROFIBUS station address is set using the DIP switches on the front of the MOVI-PLC® *advanced* DH.41B controller. This manual setting means the MOVI-PLC® *advanced* DH.41B controller can be integrated into the PROFIBUS environment and switched on within a very short period of time. The higher-level PROFIBUS master can set the parameters automatically (parameter download).

This option offers the following advantages:

- Less time required to start up the system
- Simple documentation of the application program as all important parameter data can be transferred from the program of the higher-level controller.

Cyclical and acyclical data exchange via PROFIBUS DP

While process data is usually exchanged cyclically, drive parameters are read or written acyclically using functions such as *Read* and *Write* or via the MOVILINK® parameter channel. This parameter data exchange enables you to implement applications in which all the important drive parameters are stored in the master programmable controller, so that there is no need to make parameter settings manually on the inverter itself.

Cyclical and acyclical data exchange via PROFIBUS DP-V1

The PROFIBUS DP-V1 specification introduced new acyclical *Read*/*Write* services within the context of the PROFIBUS DP-V1 expansions. These acyclical services are inserted in special telegrams during cyclical bus operation to ensure compatibility between PROFIBUS DP (version 0) and PROFIBUS DP-V1 (version 1).

PROFIBUS monitoring functions

Using a fieldbus system requires additional monitoring functions for the drive technology, for example, time monitoring of the fieldbus (PROFIBUS timeout). The function module that addresses the PROFIBUS issues a PROFIBUS timeout using the relevant fault information. This allows the application to respond to the PROFIBUS timeout.

RS485 interfaces COM1 and COM2

Connect one of the following devices each to the RS485 interfaces COM1 or COM2:

- DOP11B operator terminal
- Gearmotor with integrated frequency inverter MOVIMOT®

Ethernet 2

You can implement the following functions and connections via the communication interface Ethernet 2:

- Engineering
- Connection of a DOP11B operator terminal
- For visualization (for example: OPC interface)
- Connection to master level

Binary inputs and outputs

Binary inputs and outputs enable you to switch actuators (e.g. valves) and evaluate binary input signals (e.g. sensors). You can freely use the binary inputs and outputs in the PLC Editor of the MOVITOOLS® MotionStudio software in programming.

Diagnostics

The LEDs of the MOVI-PLC® *advanced* DH.41B controller indicate the following states:

- Power supply of binary inputs and outputs
- General status of the MOVI-PLC® *advanced* DH.41B controller
- Status of the control program
- Status of the PROFIBUS interface
- Status of the DeviceNet interface
- Status of the Ethernet interface
- Status of both CAN interfaces

You can connect operator terminals to perform diagnostics. It is recommended to connect an operator terminal to the communication interface Ethernet 2.

4 Mounting/Installation Instructions

4.1 Mounting options for the MOVI-PLC® advanced DH.41B controller

Observe the following mounting instructions:

	NOTES
	• **You can insert the MOVI-PLC® *advanced* DH.41B controller in the MOVIDRIVE® MDX61B inverter, but not in the MOVIDRIVE® MDX60B inverter.** • **Option cards can only be installed or removed for MOVIDRIVE® MDX61B drive inverters sizes 1 to 6.** • **Only SEW-EURODRIVE engineers may install or remove option cards for MOVIDRIVE® MDX61B size 0 drive inverters.** • **Only SEW-EURODRIVE engineers may install or remove MOVI-PLC® *advanced* DH.41B controllers for MOVIAXIS® as well as install MOVI-PLC® DH.41B/UOH..B compact controllers.**

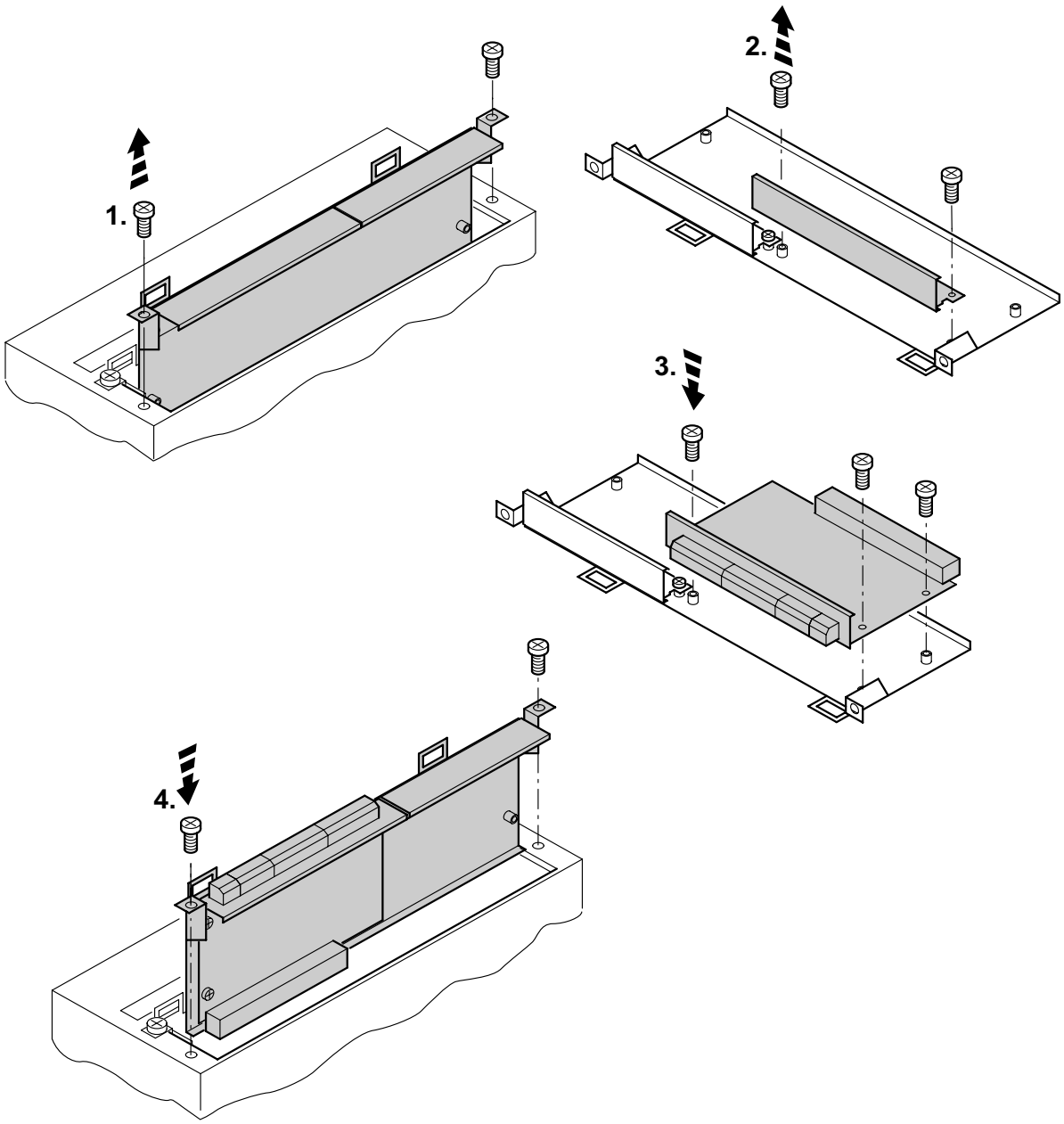
4.2 Mounting MOVI-PLC® advanced DH.41B in MOVIDRIVE® MDX61B

- The MOVI-PLC® *advanced* DHE41B controller must be plugged into the fieldbus slot of the MOVIDRIVE® MDX61B. If the fieldbus slot is not available, you can plug the DHE41B option into the expansion slot.
- The MOVI-PLC® *advanced* DHF41B/DHR41B controller must be plugged into the expansion slot of the MOVIDRIVE® MDX61B. It cannot be installed in MOVIDRIVE® MDX61B size 0.

Before you begin **Observe the following notes before installing or removing the MOVI-PLC® *advanced* DH.41B controller:**

- Disconnect the drive inverter from power. Switch off the DC 24 V and the line voltage.
- Take appropriate measures to avoid electrostatic charges (use discharge strap, conductive shoes, etc.) before touching the MOVI-PLC® *advanced* DH.41B.
- **Before installing** the MOVI-PLC® *advanced* DH.41B controller, remove the keypad and the front cover.
- **After installing** the MOVI-PLC® *advanced* DH.41B controller, replace the keypad and the front cover.
- Keep the MOVI-PLC® *advanced* DH.41B controller in its original packaging until immediately before you are ready to install it.
- Hold the MOVI-PLC® *advanced* DH.41B controller by its edges only. Do not touch any components.
- Never place the MOVI-PLC® *advanced* DH.41B controller on a conductive surface.

Basic procedure for installing and removing an option card in/from MOVIDRIVE® MDX61B



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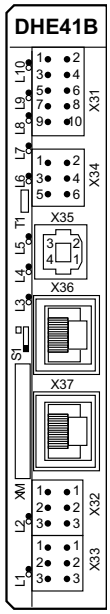
1. Remove the retaining screws holding the card retaining bracket. Pull the card retaining bracket out evenly from the slot (do not twist).
2. Remove the retaining screws of the black cover plate on the card retaining bracket. Remove the black cover plate.
3. Position the option card onto the retaining bracket so that the retaining screws fit into the corresponding bores on the card retaining bracket.
4. Insert the retaining bracket with installed option card into the slot, pressing slightly so it is seated properly. Secure the card retaining bracket with the retaining screws.
5. Follow the instructions in reverse order when removing the option card.

4.3 Installing the MOVI-PLC® advanced DHE41B controller

4.3.1 Function description of the terminals, DIP switches and LEDs

Front view MOVI-PLC® *advanced* controller DHE41B	Designation	LED DIP switches Terminal		Function
 60108AXX	**LED**	**LED 1** **LED 2** **LED 3** **LED 4** **LED 5** **LED 6** **LED 7** **LED 8** **LED 9** **LED10**	CAN 1 status CAN 2 status IEC progr. status PLC status User LED DIO6/7 DIO4/5 DIO2/3 DIO0/1 24 V / I/O OK	Status of CAN 1 system bus Status of CAN 2 system bus Status of control program Status of control firmware Freely programmable Status input or output DIO 6/7 Status input or output DIO 4/5 Status input or output DIO 2/3 Status input or output DIO 0/1 Status of voltage supply I/O
	Terminal X31: **Binary inputs and outputs** **(plug-in terminals)**	**X31:1** **X31:2** **X31:3** **X31:4** **X31:5** **X31:6** **X31:7** **X31:8** **X31:9** **X31:10**	+24 V input REF24V DIO 0 DIO 1 DIO 2 DIO 3 DIO 4 DIO 5 DIO 6 DIO 7	Voltage input DC+24 V Reference potential for binary signals Binary input or output (DIO 0) Binary input or output (DIO 1) Binary input or output (DIO 2) Binary input or output (DIO 3) Binary input or output (DIO 4) Binary input or output (DIO 5) Binary input or output (DIO 6) Binary input or output (DIO 7)
	Terminal X34: **RS485 interfaces COM1, COM2** **(plug-in terminals)**	**X34:1** **X34:2** **X34:3** **X34:4** **X34:5** **X34:6**	RS+ RS+ insulated RS– RS– insulated DGND GND insulated	Signal RS485+ (COM 1) Signal RS485+ insulated (COM 2) Signal RS485– (COM 1) Signal RS485– insulated (COM 2) Reference potential (COM 1) Reference potential (COM 2)
	Connector X35: **USB connection** **(In preparation)**	**X35:1** **X35:2** **X35:3** **X35:4**	USB+5 V USB– USB+ DGND	DC 5 V power supply Signal USB– Signal USB+ Reference potential
	Connector X36: **Connection Ethernet 1** **System bus (RJ45 socket)**	**X36**		Standard Ethernet assignment
	Connector X37: **Connection Ethernet 2** **(RJ45 socket)**	**X37**		
	Terminal X32: **System bus CAN 2** **(electrically isolated)** **(plug-in terminals)**	X32:1 X32:2 X32:3	REF_CAN 2 CAN 2H CAN 2L	Reference potential for system bus CAN 2 System bus CAN 2 high System bus CAN 2 low
	Terminal X33: **System bus CAN 1** **(plug-in terminals)**	**X33:1** **X33:2** **X33:3**	DGND CAN 1H CAN 1L	Reference potential for system bus CAN 1 System bus CAN 1 high System bus CAN 1 low
	DIP switch	**S1**	Top Bottom	Default IP address (192.168.10.4) Ethernet 2 connection

4.3.2 Connection of binary inputs and outputs (connector X31)

Connector X31 provides 8 binary inputs or outputs (e.g. for controlling external actuators/sensors).

You can define the binary inputs and outputs in the PLC editor of the MOVITOOLS® MotionStudio software.

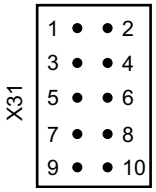


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Figure 3: 12-pin connector for connecting binary inputs and outputs

Binary inputs

- The binary inputs are electrically isolated by optocouplers.
- The permitted input voltages are defined according to IEC 61131.

  +13 V ... +30 V = "1" = Contact closed

  –3 V ... +5 V = "0" = Contact open

Interrupt inputs

- You can use binary inputs X31:6 to X31:10 as interrupt inputs. The response time until the ISR (interrupt service routine) is processed is less than 100 ms.

Binary outputs

- The binary outputs are electrically isolated by optocouplers.
- The binary outputs are short-circuit proof but not interference-voltage-proof.
- The maximum permitted output current is 150 mA per binary output. All eight binary outputs can be operated simultaneously with this current.

	STOP!
STOP	The supply voltage must be present on X31:1/2 for using the binary inputs and outputs. The MOVI-PLC® controller can be damaged. In this case, the specified function of the binary inputs and outputs is no longer ensured. If the supply voltage is stopped, you must turn off all other current supplies to X31:1 ... 10, e.g. the DC 24 V from switches and sensors at the binary inputs.

- To avoid the danger of maximum voltage peaks, you may not connect inductive loads to the supply voltage or to the binary inputs or outputs without free-wheeling diodes.

Cable specification

- Only connect cables with a minimum core cross section of 0.25 mm^2 (AWG23) and a maximal core cross section of 1 mm^2 (AWG18). IEC 60999 does allow clamping without conductor end sleeves.
- Choose the type and core cross section of the connected cable in dependency of the required cable length and the load expected from your application.

For more information on binary inputs or outputs, refer to chapter "Technical Data" on page 61.

4.3.3 Connecting system bus CAN 2 (connector X32) / CAN 1 (connector X33)

Do not connect more than 64 units to the CAN 2 or CAN 1 system bus. The system bus supports the address range 0 ... 63.

NOTES

- The CAN 2 system bus is electrically isolated. Therefore, it is recommended to use the CAN 2 (X32) interface for connecting field devices (e.g. CANopen inputs and outputs).
- The CAN 1 system bus is **not** electrically isolated. Therefore, it is recommended to use the CAN 1 (X33) interface to connect inverters via the system bus in the control cabinet.
- SEW-EURODRIVE recommends connecting a maximum of 64 inputs and 64 outputs via I/O modules to the MOVI-PLC® *basic* DHP11B.. controller.
- No CAN system bus connection is necessary for communication between MOVIDRIVE® MDX61B and its installed controller MOVI-PLC® *advanced* if you use the 'DPRAM' channel (→ "MOVI-PLC® Programming in the PLC Editor" system manual). A CAN system bus connection is, however, necessary if modules from the MPLCMotion_MDX and MPLCprocessdata libraries are employed.

The CAN system bus supports transmission systems compliant with ISO 11898. The Serial Communication manual contains detailed information about the CAN system bus. This manual can be ordered from SEW-EURODRIVE.

Wiring diagram for CAN 2 system bus

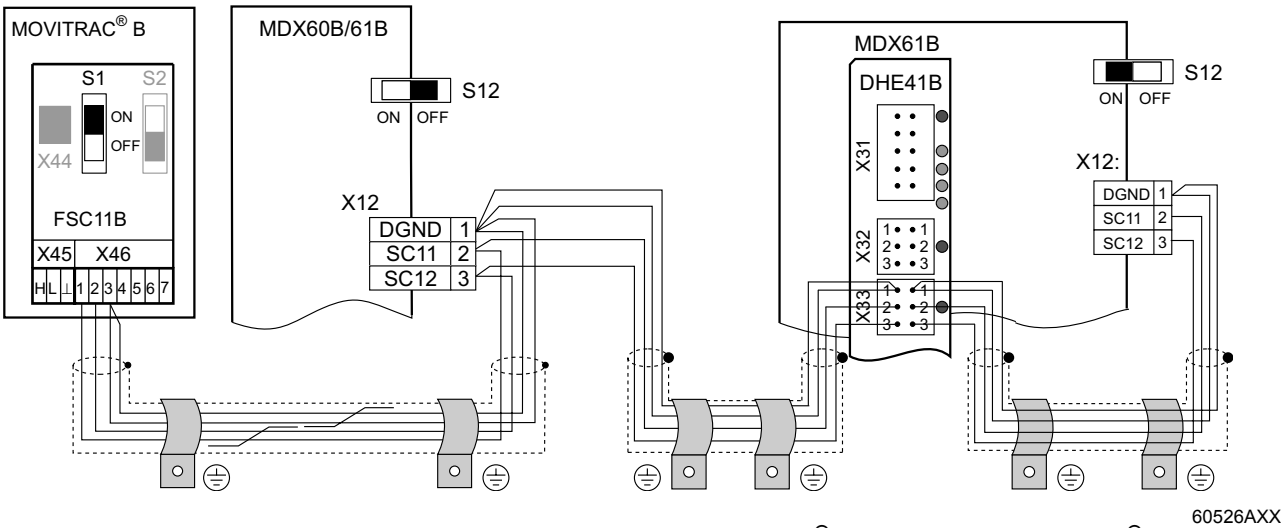

Figure 4: CAN 2 system bus connection taking the example of a MOVIDRIVE® MDX60B/61B / MOVITRAC® B inverter

Cable specification

- Use a 2x2-core twisted and shielded copper cable (data transmission cable with braided copper shield). IEC 60999 does allow clamping without conductor end sleeves. The cable must meet the following specifications:
  - Core cross section 0.2 ... 1.0 mm^2 (AWG 24 ... 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.

Cable length

- The permitted total cable length depends on the baud rate setting of the system bus:
  - 125 kbaud → 500 m
  - 250 kbaud → 250 m
  - **500 kBaud → 100 m**
  - 1000 kbaud → 40 m

Terminating resistor

- Switch on the system bus terminating resistor at the start and end of the CAN 2 system bus connection (MOVIDRIVE® B, DIP switch S12 = ON; MOVITRAC® B, DIP switch S1 = ON). For all other devices, switch off the terminating resistor (MOVIDRIVE® B, DIP switch S12 = OFF; MOVITRAC® B, DIP switch S1 = OFF). If the MOVI-PLC® *advanced* DH.41B controller is, for example, located at the end of the CAN 2 system bus, you have to connect a terminating resistor of 120 O between pins X32:2 and X32:3 (for CAN 1: terminating resistor between pins X33:2 and pin X33:3).

	STOP!
STOP	• There **must not** be any potential displacement between the units connected via the CAN 2 system bus. • There **must not** be any potential displacement between the units connected via the CAN 1 system bus. • Take suitable measures to avoid potential displacement, such as connecting the unit ground connectors using a separate cable.

4.3.4 Connection of the RS485 interface (connector X34)

	STOP!
STOP	• There must not be any potential displacement between the units connected via the RS485. Take suitable measures to avoid a potential displacement, e.g. by connecting the unit ground connectors using a separate lead. • Dynamic terminating resistors are installed. **Do not connect any external terminating resistors.**

You can connect one of the following devices to the RS485 interfaces COM1/2 (connector X34):

- DOP11A operator terminals
- Gearmotor with integrated frequency inverter MOVIMOT®

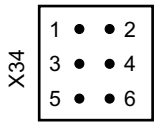

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Figure 5: 6-pole connector for connecting the RS485 interfaces COM1/2

	NOTE
	For more information on how to connect the DOP11B operator terminal, refer to the chapters "Installation" and "Pin assignment" in the "DOP11B Operator Terminals" system manual.

4.3.5 Connecting the Ethernet 1 system bus (connector X36)

The Ethernet 1 interface (connector X36) is reserved for the system bus.

4.3.6 Connection of the Ethernet 2 interface (connector X37)

You can connect an engineering PC to the Ethernet 2 interface (connector X37).

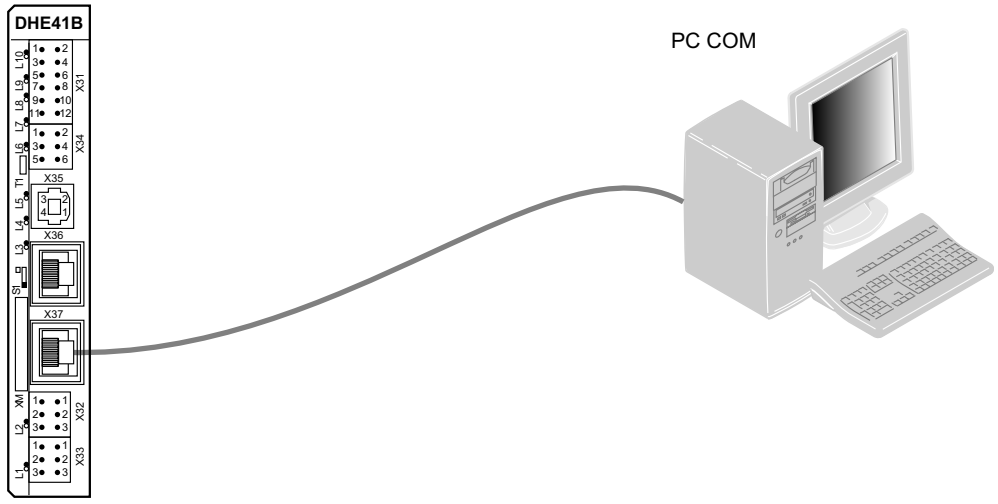

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Figure 6: Example: Connecting an engineering PC via the Ethernet 2 interface to X37

Using the Ethernet 2 interface, the MOVI-PLC® *advanced* DHE41B controller can also exchange data via UDP/TCP with another controller.

4.3.7 Operating displays of the MOVI-PLC® *advanced* DHE41B controller

The MOVI-PLC® *advanced* DHE41B controller has 10 LEDs (L1 ... L10) that display the current status of the MOVI-PLC® *advanced* DHE41B controller and its interfaces.

LED L1 (CAN 1 status)

The LED **L1** indicates the **status** of the **CAN 1** system bus.

Status of the LED L1	Diagnostics	Troubleshooting
Orange	The CAN 1 system bus is being initialized.	-
Green	The CAN 1 system bus is initialized.	
Flashing green (0,5 Hz)	The CAN 1 system bus is currently in SCOM suspend mode.	
Flashing green (1 Hz)	The CAN 1 system bus is currently in SCOM On mode.	
Red	The CAN 1 system bus is off (BUS-OFF).	1. Check and correct the cabling of the CAN 1 system bus. 2. Check and correct the baud rate set for the CAN 1 system bus. 3. Check and correct the terminating resistors of the CAN 1 system bus.
Flashing red (1 Hz)	Warning on the CAN 1 system bus.	1. Check and correct the cabling of the CAN 1 system bus. 2. Check and correct the baud rate set for the CAN 1 system bus.

LED L2 (CAN 2 status)

The LED **L2** indicates the **status** of the **CAN 2** system bus.

Status of the LED L2	Diagnostics	Troubleshooting
Orange	The CAN 2 system bus is being initialized.	-
Green	The CAN 2 system bus is initialized.	-
Flashing green (0,5 Hz)	The CAN 2 system bus is currently in SCOM suspend mode.	-
Flashing green (1 Hz)	The CAN 2 system bus is currently in SCOM On mode.	-
Red	The CAN 2 system bus is off (BUS-OFF).	1. Check and correct the cabling of the CAN 2 system bus. 2. Check and correct the baud rate set for the CAN 2 system bus. 3. Check and correct the terminating resistors of the CAN 2 system bus.
Flashing red (1 Hz)	Warning on the CAN 2 system bus.	1. Check and correct the cabling of the CAN 2 system bus. 2. Check and correct the baud rate set for the CAN 2 system bus.

LED L3 (IEC program status)

The LED **L3** indicates the **status** of the **IEC-61131 control program**.

Status of L3	Diagnostics	Troubleshooting
Green	IEC program is running.	-
Off	No program is loaded.	Load a program into the controller.
Flashing orange (1 Hz)	Program has stopped.	Bootloader update required (see chapter "SD memory card type OMH41B-T.")

LED L4 (PLC status)

The LED **L4** indicates the **status of the firmware** of the MOVI-PLC® *advanced* DHE41B controller.

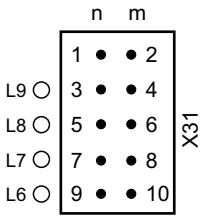
Status of the LED L4	Diagnostics	Troubleshooting
Flashing green (1 Hz)	The firmware of the MOVI-PLC® *advanced* DHE41B controller is running correctly.	-
Red	• No SD card plugged in. • File system of the SC card corrupt	
Flashing orange (1 Hz)	Program has stopped.	Bootloader update required (see chapter "SD memory card type OMH41B-T.")

LED L5 (user)

The LED **L5** is freely programmable in the IEC program.

LED L6, L7, L8, L9 (DIO n/m)

The LEDs **L6, L7, L8, L9** indicate the **status of the binary inputs and outputs (X31:3 - X31:10) n or m** (e. g. DIO2/3).



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State of the LEDs L6, L7, L8, L9	Diagnostics	Troubleshooting
Off	No voltage present.	-
Green	Voltage at LED n.	
Red	Voltage at LED m.	
Orange	Voltage at LED n. and m.	

LED L10 (24V / I/O OK)

The LED **L10** indicates the **status** of the **voltage supply for binary inputs and outputs.**

Status of the LED L10	Diagnostics	Troubleshooting
Green	Voltage supply for the binary inputs/outputs is OK.	-
Off	Voltage supply for the binary inputs/outputs is not applied.	1. Switch off the inverter in which the MOVI-PLC® *advanced* DHE41B controller is installed. 2. Check and correct the cabling of the binary inputs/outputs according to the electrical wiring diagram. 3. Check current consumption of the connected actuators (max. current → chapter 8). 4. Switch on the inverter in which the MOVI-PLC® *advanced* DHE41B controller is installed.
Orange	Voltage supply for the binary inputs/outputs is applied. However, one of the following faults has occurred: • Overload on one or several binary inputs/outputs • Overtemperature of the output driver • Short circuit in at least one of the binary inputs/outputs	

4.3.8 DIP switch S1 default IP address

With the DIP switch S1, you can set a default IP address for the Ethernet 2 connection. The set IP address is adopted during the next boot process.

S1 switch setting	Meaning
Top	Default IP address 192.168.10.4
Bottom	Addresses set in the configuration file (see sec. 4.3.1)

4.3.9 SD memory card type OMH41B-T.

The SD memory card is required for operation of the MOVI-PLC® *advanced* DH.41B controller. It stores the firmware, the IEC program and user data (e. g. recipes). It is used in connection with a MOVIAXIS® master module for data backup and automatic parameterization in case an axis is replaced.

The SD memory card OMH41B-T.. is plugged into the DH.41B option. If delivery also includes a compact controller, a MOVIAXIS® master module or an inverter with installed DH.41B option, the SD memory card is already installed in the DH.41B option.

The SD memory card is available in 11 different variants (T0 ... T10). The different variants allow for the execution of different technology functions. The technology level can be changed by replacing the SD memory card.

Variants

SD memory card OMH41B-T.		
Technology level T0-T10	**Part number**	**Description**
T0	1821 204 2	• Speed control management • Positioning, e.g. with the MPLCMotion_MDX library
T1	1821 205 0	Additional technology functions for T0: • Electronic cam • Electronic gear unit • Cam control
T2	1821 206 9	Additional technology functions for T1: • Application modules, e.g. Handling, SyncCrane
T3	1821 967 5	Required for path interpolation. Technology level depends on the required functionality and number of calculated kinematics.
T4	1821 968 3	
T5	1821 969 1	
T6	1821 970 5	
T7	1821 971 3	
T8	1821 972 1	
T9	1821 974 8	
T10	1821 975 6	

Bootloader update

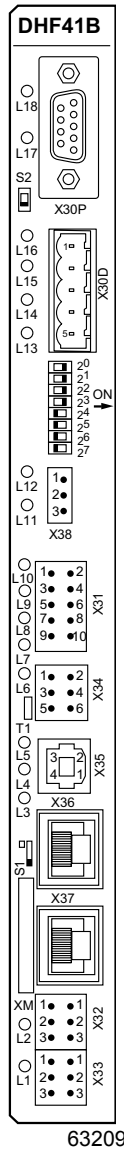
When the LEDs L3 and L4 flash orange at a 1 Hz frequency after power-on, a bootloader update is required. Proceed as follows:

- Do not switch off the power supply during the entire process.
- Press the reset button T1 on the front of the DH.41B option for 3 seconds. When the bootloader update starts, only LED 4 is flashing.
- The bootloader update has been successful when L4 flashes green.

4.4 Installing the MOVI-PLC® advanced DHF41B controller

4.4.1 Function description of the terminals, DIP switches and LEDs

	NOTE
	The connections identical with DHE41B are described in section "Installation of the MOVI-PLC® *advanced* DHE41B controller".

Front view MOVI-PLC® *advanced* DHF41B controller	Designation	LED DIP switches Terminal		Function
 63209AXX	**LED**	**LED 1** **LED 2** **LED 3** **LED 4** **LED 5** **LED 6** **LED 7** **LED 8** **LED 9** **LED 10** **LED 11** **LED 12** **LED 13** **LED 14** **LED 15** **LED 16** **LED 17** **LED 18**	CAN 1 status CAN 2 status IEC progr. status PLC status User LED DIO6/7 DIO4/5 DIO2/3 DIO0/1 24V / I/O OK - - BUSOFF Bit strobe I/O: Polled I/O Mod/Net Fault Profibus Run Profibus	Status of CAN 1 system bus Status of CAN 2 system bus Status of control program Status of control firmware Freely programmable Status input or output DIO6/7 Status input or output DIO4/5 Status input or output DIO2/3 Status input or output DIO0/1 Status of voltage supply I/O Reserved Reserved The two-color LEDs 13 ... 16 display the current status of the fieldbus interface and the DeviceNet system Status of PROFIBUS bus electronics Status of PROFIBUS communication
	Terminal X30P: PROFIBUS (Sub-D9)	**X30P:9** **X30P:8** **X30P:7** **X30P:6** **X30P:5** **X30P:4** **X30P:3** **X30P:2** **X30P:1**	GND (M5V) RxD/TxD-N N.C. VP (P5V/100 mA) GND (M5V) CNTR-P RxD / TxD-P N.C. N.C.	Reference potential for PROFIBUS Signal receive transmit negative Terminal unassigned DC+5 V potential for bus terminator Reference potential for PROFIBUS PROFIBUS control signal for repeater Signal receive transmit positive Terminal unassigned Terminal unassigned
	Terminal X30D: DeviceNet (plug-in terminals)	**X30D:1** **X30D:2** **X30D:3** **X30D:4** **X30D:5**	V– CAN_L DRAIN CAN_H V+	0 V 24 CAN_L DRAIN CAN_H 24 V
	DIP switch S2 Switching between PROFIBUS/DeviceNet	**S2**	Top Bottom	Fieldbus interface PROFIBUS (X30P) active Fieldbus interface DeviceNet (X30D) active

Front view MOVI-PLC® *advanced* DHF41B controller	Designation	LED DIP switches Terminal		Function
	For PROFIBUS mode: DIP switches for setting the PROFIBUS Station address	**2^0** **2^1** **2^2** **2^3** **2^4** **2^5** **2^6**		Significance: 1 Significance: 2 Significance: 4 Significance: 8 Significance: 16 Significance: 32 Significance: 64
	For operation via DeviceNet: DIP switches for setting The MAC-ID and for setting the baud rate	**2^0** **2^1** **2^2** **2^3** **2^4** **2^5** **2^6** **2^7**		The DIP switches 2^0 ... 2^5 are used to set the MAC-ID (**M**edia **A**ccess **C**ontrol **Id**entifier). The MAC-ID represents the node address (address range 0 ... 63) Setting the baud rate Setting the baud rate
	Connector X38: SafetyBus (plug-in terminals)	**X38:1** **X38:2** **X38:3**		Reserved Reserved Reserved
	Terminal X31: Binary inputs and outputs (plug-in terminals, color: BK))	**X31:1** **X31:2** **X31:3** **X31:4** **X31:5** **X31:6** **X31:7** **X31:8** **X31:9** **X31:10**	+24 V input REF24V DIO 0 DIO 1 DIO 2 DIO 3 DIO 4 DIO 5 DIO 6 DIO 7	Voltage input DC+24 V Reference potential for binary signals Binary input or output Binary input or output Binary input or output Binary input or output Binary input or output Binary input or output Binary input or output Binary input or output
	Terminal X34: RS485 interfaces COM1, COM2 (plug-in terminals, color: BK)	**X34:1** **X34:2** **X34:3** **X34:4** **X34:5** **X34:6**	RS+ RS+ insulated RS– RS– insulated DGND GND insulated	Signal RS485+ (COM 1) Signal RS485+ insulated (COM 2) Signal RS485– (COM 1) Signal RS485– insulated (COM 2) Reference potential (COM 1) Reference potential (COM 2)
	Connector X35: USB connection (in preparation)	**X35:1** **X35:2** **X35:3** **X35:4**	USB+5 V USB– USB+ DGND	DC 5 V power supply Signal USB– Signal USB+ Reference potential
	Connector X36: Connection Ethernet 1 System bus (RJ45 socket)	**X36**		Standard Ethernet assignment
	Connector X37: Connection Ethernet 2 (RJ45 socket)	**X37**		
	Terminal X32: System bus CAN 2 (electrically isolated) (plug-in terminals, color: YE/BK)	X32:1 X32:2 X32:3	REF_CAN 2 CAN 2H CAN 2L	Reference potential for system bus CAN 2 System bus CAN 2 high System bus CAN 2 low
	Terminal X33: System bus CAN 1 (plug-in terminals, color: YE/BK)	**X33:1** **X33:2** **X33:3**	DGND CAN 1H CAN 1L	Reference potential for system bus CAN 1 System bus CAN 1 high System bus CAN 1 low
	DIP switch S1	**S1**	Top Bottom	Default IP address Ethernet 2 connection
	Reset button T1	**T1**		Reset

4.4.2 PROFIBUS connection (connector X30P)

Connection to the PROFIBUS system takes place using a 9-pin sub D plug according to IEC 61158. The T-bus connection must be made using a plug with the corresponding configuration. The following figure shows the PROFIBUS connector that is connected to X30P of the MOVI-PLC® *advanced* DHF41B controller.

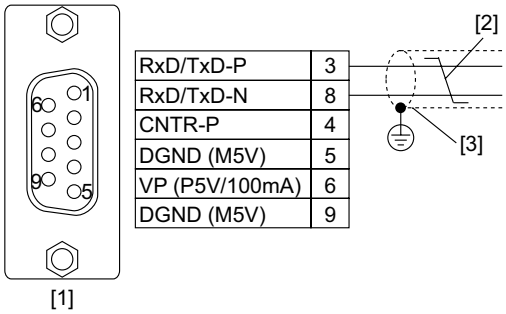


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Figure 7: Assignment of 9-pin D-sub plug to IEC 61158

[1] 9-pin sub D plug

[2] Signal line, twisted

[3] Conductive connection over a large area is necessary between plug housing and the shield

MOVI-PLC®/ PROFIBUS connection

As a rule, the MOVI-PLC® *advanced* DHF41B controller 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 is carried out via these two pins. The RS485 signals RxD/TxD-P and RxD/TxD-N must be connected to the same contacts in all PROFIBUS stations. Otherwise the bus components cannot communicate 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).

Baud rates greater than 1.5 MBaud

The MOVI-PLC® *advanced* DHF41B controller with baud rates > 1.5 MBaud can only be operated with special 12 MBaud PROFIBUS connectors.

Bus terminator

You do not need to equip the MOVI-PLC® *advanced* DHF41B controller with bus terminating resistors. This allows the PROFIBUS system to be put into operation more easily and reduces the number of possible problems and faults during installation.

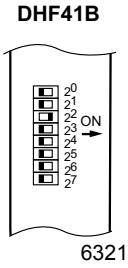
If the MOVI-PLC® *advanced* DHF41B controller is located at the start or end of a PROFIBUS segment and if there is only one PROFIBUS cable connected to the MOVI-PLC® *advanced* DHF41B controller, you must use a connector with an integrated bus terminating resistor.

Switch on the bus terminating resistors for this PROFIBUS connector.

Setting the station address

The PROFIBUS station address is set using DIP switches 2^0 ... 2^6 on the MOVI-PLC® *advanced* DHF41B controller.

The MOVI-PLC® *advanced* DHF41B controller supports the address range 0...125.



The default setting for the station address is 4:

$2^0 \rightarrow$ Significance: $1 \times 0 = 0$
$2^1 \rightarrow$ Significance: $2 \times 0 = 0$
$2^2 \rightarrow$ Significance: $4 \times 1 = 4$
$2^3 \rightarrow$ Significance: $8 \times 0 = 0$
$2^4 \rightarrow$ Significance: $16 \times 0 = 0$
$2^5 \rightarrow$ Significance: $32 \times 0 = 0$
$2^6 \rightarrow$ Significance: $64 \times 0 = 0$

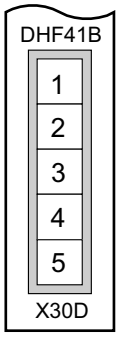
Any change made to the PROFIBUS station address during ongoing operation does not take effect immediately. You have to switch the compact controller or the inverter in which the MOVI-PLC® *advanced* DHF41B controller is installed on and off again for the changes to take effect (power + 24 V off/on).

4.4.3 Connecting DeviceNet (connector X30D)

The connection to the DeviceNet fieldbus system is in preparation.

Pin assignment

The assignment of connecting terminals is described in the DeviceNet specification (Volume I, Appendix A).



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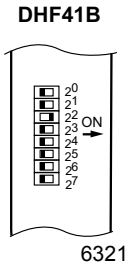
The DHF41B option card is opto-decoupled on the driver side in accordance with the DeviceNet specification (Volume I, Chapter 9). This means the CAN bus driver must be powered with 24 V voltage via the bus cable. The cable to be used is also described in the DeviceNet specification (Volume I, Appendix B). The connection must be made according to the color code specified in the following table.

Pin no.	Signal	Meaning	Color coding
1	V–	0 V 24	BK
2	CAN_L	CAN_L	BU
3	DRAIN	DRAIN	blank
4	CAN_H	CAN_H	WH
5	V+	24 V	RD

Setting the station address

The DeviceNet station address is set using DIP switches 2^0 ... 2^5 on the MOVI-PLC® *advanced* DHF41B controller.

The MOVI-PLC® *advanced* DHF41B controller supports the address range 0..0.63.



The default setting for the station address is 4:

$2^0 \rightarrow$ Significance: $1 \times 0 = 0$
$2^1 \rightarrow$ Significance: $2 \times 0 = 0$
$2^2 \rightarrow$ Significance: $4 \times 1 = 4$
$2^3 \rightarrow$ Significance: $8 \times 0 = 0$
$2^4 \rightarrow$ Significance: $16 \times 0 = 0$
$2^5 \rightarrow$ Significance: $32 \times 0 = 0$

Any change made to the DeviceNet station address during ongoing operation does not take effect immediately. You have to switch the compact controller or the inverter in which the MOVI-PLC® *advanced* DHF41B controller is installed on and off again for the changes to take effect (power + 24 V off/on).

Setting the baud rate

The baud rate is set with DIP switches 2^6 and 2^7.

DIP switches		Baud rate
2^6	2^7	
0	0	125 kbaud
1	0	250 kbaud
0	1	500 kbaud
1	1	Invalid

4.4.4 Connecting SafetyBus (connector X38)

The connection to the SafetyBus bus system is in preparation.

4.4.5 Operating displays of MOVI-PLC® *advanced* DHF41B

	NOTE
	The LEDs identical with DHE41B are described in section "Operating displays of the MOVI-PLC® *advanced* DHE41B controller.

LEDs 11, 12 LEDs 11 and 12 are reserved.

LED L13 (BUS-OFF) The LED **L13 (BUS-OFF)** displays the physical status of the bus node.

Status of the LED L13	Status	Meaning
Off	NO ERROR	The number of bus errors is in the normal range (error active status).
Flashing red (125 ms cycle)	BUS WARNING	The unit is performing a DUP-MAC check and cannot send any messages because no other stations are connected to the bus (error passive state)
Flashing red (1 s cycle)		The number of physical bus errors is too high. No more error telegrams are actively written to the bus (error passive state).
Red light	BUS ERROR	• BusOff state • The number of physical bus errors has increased despite a switch to the error-passive state. Access to the bus is switched off.
Yellow light	POWER OFF	External voltage supply has been turned off or is not connected.

LED L14 (BIO) The LED **L14 (Bit-strobe I/O)** monitors the bit-strobe I/O connection.

Status of the LED L14	Status	Meaning
Flashing green (125 ms cycle)	DUP-MAC check	Unit is performing DUP-MAC check
Off	Not switched on / off-line but not DUP-MAC check	• Unit is off-line • Unit is switched off
Flashing green (1 s cycle)	Online and in operational mode	• Unit is on-line • DUP MAC check performed successfully • A BIO connection is being established with a master (configuring state) • Missing, incorrect or incomplete configuration
Lights up green	Online, operational mode and connected	• Online • A BIO connection has been established (established state)
Flashing red (1 s cycle)	Minor fault or connection timeout	• Invalid number of process data is set via DIP switches • A correctable fault has occurred • Bit-strobe I/O connection is in timeout state
Red light	Critical fault or critical link failure	• An error that cannot be corrected has occurred • BusOff • DUP-MAC check has detected an error

LED L15 (PIO)

The LED **L15 (Polled I/O)** monitors the polled I/O connection.

Status of the LED L15	Status	Meaning
Flashing green (125 ms cycle)	DUP-MAC check	Unit is performing DUP-MAC check
Off	Not switched on / off-line but not DUP-MAC check	• Unit is off-line • Unit is switched off
Flashing green (1 s cycle)	Online and in operational mode	• Unit is on-line • DUP MAC check performed successfully • A polled I/O connection is being established with a master (configuring state) • Missing, incorrect or incomplete configuration
Lights up green	Online, operational mode and connected	• Online • A polled I/O connection has been established (established state)
Flashing red (1 s cycle)	Minor fault or connection timeout	• Invalid baud rate set via DIP switches • A correctable fault has occurred • Polled I/O connection is in timeout status
Red light	Critical fault or critical link failure	• An error that cannot be corrected has occurred • BusOff • DUP-MAC check has detected an error

LED L16 (Mod/Net)

The function of the LED **L16 (Mod/Net** = Module/Network Status) described in the following table is specified in the DeviceNet specification.

Status of the LED L16	Status	Meaning
Off	Not switched on / OffLine	• Unit is off-line • Unit performs DUP MAC check • Unit is switched off
Flashing green (1 s cycle)	Online and in operational mode	• The unit is on-line and no connection has been established • DUP MAC check performed successfully • A connection has not yet been established with a master • Missing, incorrect or incomplete configuration
Lights up green	Online, operational mode and connected	• Online • Connection to a master has been established • Connection is active (established state)
Flashing red (1 s cycle)	Minor fault or connection timeout	• A correctable fault has occurred • Polled I/O or/and bit-strobe I/O connection are in timeout status • DUP-MAC check has detected an error
Red light	Critical fault or critical link failure	• A correctable fault has occurred • BusOff • DUP-MAC check has detected an error

LED L17 (Fault Profibus)

The LED **L17 (Fault** Profibus) indicates that communication via the PROFIBUS interface is working properly.

Status of the LED L17	Diagnostics	Troubleshooting
Off	• The MOVI-PLC® *advanced* DHF41B controller exchanges data with the PROFIBUS-DP master (data exchange status).	-
Red	• Connection to the DP master has failed. • The MOVI-PLC® *advanced* DHF41B controller does not recognize the PROFIBUS baud rate. • Bus interruption has occurred. • PROFIBUS-DP master not in operation.	• Check the PROFIBUS connection on the unit. • Check project planning of the PROFIBUS DP master. • Check all the cables in the PROFIBUS network.
Flashing red (1 Hz)	• The MOVI-PLC® *advanced* DHF41B controller recognizes the baud rate, but the DP master does not communicate with MOVI-PLC® *advanced* DHF41B. • The MOVI-PLC® *advanced* DHF41B controller was either not configured in the DP master or it was configured incorrectly.	• Check and correct the PROFIBUS station address set in the MOVI-PLC® *advanced* DHF41B controller and in the configuration software of the DP master. • Check and correct the configuration of the DP master. • Use the GSD file **SEW_6007.GSD** with the designation *MOVI-PLC* for configuration.

LED L18 (Run Profibus)

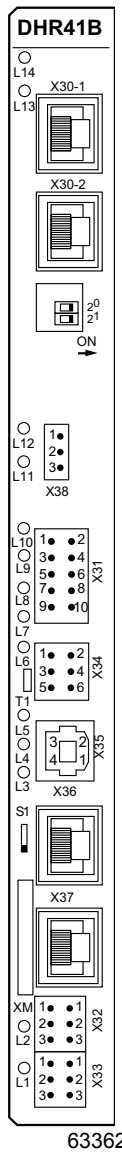
LED **L18 (Run Profibus)** indicates the proper functioning of the PROFIBUS electronics (hardware).

Status of the LED L18	Diagnostics	Troubleshooting
Green	• PROFIBUS hardware OK.	-
Flashing green (1 Hz)	• The PROFIBUS station address set on the DIP switches is more than 125. If the PROFIBUS station address is set to a value higher than 125, MOVI-PLC® *advanced* DHF41B will use PROFIBUS station address 4.	1. Check and correct the PROFIBUS station address on the DIP switches. 2. Switch on all drive inverters again. The modified PROFIBUS address will only take effect after a restart.

4.5 Installing the MOVI-PLC® advanced DHR41B controller

4.5.1 Function description of the terminals, DIP switches and LEDs

	NOTE
	The connections identical with DHE41B and DHF41B are described in the sections "Installation of the MOVI-PLC® *advanced* DHE41B/DHF41B controller".

Front view MOVI-PLC® *advanced* DHR41B controller	Designation	LED DIP switches Terminal		Function
 63362AXX	**LED**	**LED 1** **LED 2** **LED 3** **LED 4** **LED 5** **LED 6** **LED 7** **LED 8** **LED 9** **LED 10** **LED 11** **LED 12** **LED 13** **LED 14**	CAN 1 status CAN 2 status IEC progr. status PLC status User LED DIO6/7 DIO4/5 DIO2/3 DIO0/1 24V / I/O OK - - 	Status of CAN 1 system bus Status of CAN 2 system bus Status of control program Status of control firmware Freely programmable Status input or output DIO6/7 Status input or output DIO4/5 Status input or output DIO2/3 Status input or output DIO0/1 Status of voltage supply I/O Reserved Reserved Bus status Bus status
	Connector X30-1: Ethernet 3 (RJ45 socket)	**X30-1**		Standard Ethernet assignment
	Connector X30-2: Ethernet 4 (RJ45 socket)	**X30-2**		
	DIP switches 2^0, 2^1	**2^0** **2^1**	ON OFF ON OFF	Default IP address (192.168.10.4) Stored IP address / DHCP EtherNet/IP / Modbus TCP/IP PROFINET
	Connector X38: SafetyBus (plug-in terminals)	**X38:1** **X38:2** **X38:3**		Reserved Reserved Reserved
	Terminal X31: Binary inputs and outputs (plug-in terminals, color: BK))	**X31:1** **X31:2** **X31:3** **X31:4** **X31:5** **X31:6** **X31:7** **X31:8** **X31:9** **X31:10**	+24 V input REF24V DIO 0 DIO 1 DIO 2 DIO 3 DIO 4 DIO 5 DIO 6 DIO 7	Voltage input DC+24 V Reference potential for binary signals Binary input or output Binary input or output Binary input or output Binary input or output Binary input or output Binary input or output Binary input or output Binary input or output
	Terminal X34: RS485 interfaces COM1, COM2 (plug-in terminals, color: BK)	**X34:1** **X34:2** **X34:3** **X34:4** **X34:5** **X34:6**	RS+ RS+ insulated RS– RS– insulated DGND GND insulated	Signal RS485+ (COM 1) Signal RS485+ insulated (COM 2) Signal RS485– (COM 1) Signal RS485– insulated (COM 2) Reference potential (COM 1) Reference potential (COM 2)
	Connector X35: USB connection (in preparation)	**X35:1** **X35:2** **X35:3** **X35:4**	USB+5 V USB– USB+ DGND	DC 5 V power supply Signal USB– Signal USB+ Reference potential

Front view MOVI-PLC® *advanced* DHR41B controller	Designation	LED DIP switches Terminal		Function
	Connector X36: Connection Ethernet 1 System bus (RJ45 socket)	**X36**		Standard Ethernet assignment
	Connector X37: Connection Ethernet 2 (RJ45 socket)	**X37**		
	Terminal X32: System bus CAN 2 (electrically isolated) (plug-in terminals, color: YE/BK)	X32:1 X32:2 X32:3	REF_CAN 2 CAN 2H CAN 2L	Reference potential for system bus CAN 2 System bus CAN 2 high System bus CAN 2 low
	Terminal X33: System bus CAN 1 (plug-in terminals, color: YE/BK)	**X33:1** **X33:2** **X33:3**	DGND CAN 1H CAN 1L	Reference potential for system bus CAN 1 System bus CAN 1 high System bus CAN 1 low
	DIP switch S1	**S1**	Top Bottom	Default IP address Ethernet 2 connection
	Reset button T1	**T1**		Reset

4.5.2 Pin assignment

Use prefabricated, shielded RJ45 plug connectors compliant with IEC 11801, edition 2.0, category 5.

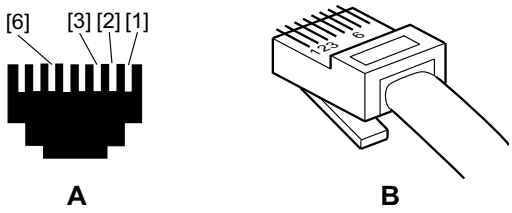


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Figure 8: Pin assignment of an RJ45 plug connector

A = Front view

B = View from back

[1] Pin 1 TX+ Transmit Plus

[2] Pin 2 TX– Transmit Minus

[3] Pin 3 RX+ Receive Plus

[6] Pin 6 RX– Receive Minus

MOVIDRIVE® B / MOVITRAC® B / Ethernet connection

To connect DHR41B to the Ethernet, connect the Ethernet interface X30-1 or X30-2 (RJ45 plug connector) to the other network stations using a category 5, class D twisted-pair cable in accordance with IEC 11801 edition 2.0. The integrated switch provides support for realizing a line topology and offers auto crossing functions.

	NOTES
	• According to IEC 802.3, the maximum cable length for 10/100 MBaud Ethernet (10BaseT/100BaseT), e.g. between two network stations, is 100 m. • We recommend that you do not directly connect end devices to the DHR41B option in order to minimize the load on the end devices caused by undesired multicast data traffic. Connect non-SEW devices via a network component that supports the IGMP snooping functionality (e.g. managed switch).

4.5.3 Shielding and routing bus cables

Only use shielded cables and connection elements that also meet the requirements of category 5, class 2 in compliance with IEC 11801 edition 2.0.

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.

STOP!

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 in accordance with relevant VDE regulations in such a case.

4.5.4 Setting the DIP switches 2^0 and 2^1

NOTE

The setting of the "2^0" DIP switch is only adopted with a power-on reset (switching on and off line voltage and DC 24 V backup voltage).

DIP switch 2^0

If the "2^0" switch is set to "1" (= ON), the following default IP address parameters are set when activating the DC 24 V backup voltage:

- IP address: 192.168.10.4
- Subnetwork mask: 255.255.255.0
- Default gateway: 1.0.0.0 for EtherNet/IP (192.168.10.4 for PROFINET)
- P785 DHCP / Startup Configuration: Saved IP parameters (DHCP is deactivated)

DIP switch 2^1

DIP switch "2^1" is used to set the fieldbus protocol that is currently used.

- 2^1 = "1" (= ON) the EtherNet/IP / Modbus TCP/IP fieldbus protocol is active
- 2^1 = "0" (= OFF) the PROFINET fieldbus protocol is active.

4.5.5 TCP / IP addressing and subnetworks

Introduction

The settings for the address of the IP protocol are made using the following parameters:

- MAC address
- IP address
- Subnetwork mask
- Standard gateway

The addressing mechanisms and subdivision of the IP networks into subnetworks are explained in this chapter to help you set the parameters correctly.

MAC address

The MAC address (Media Access Controller) is the basis for all address settings. The MAC address of an Ethernet device is a worldwide unique 6-byte value (48 bits). SEW Ethernet devices have the MAC address 00-0F-69-xx-xx-xx. The MAC address is difficult to handle for larger networks. This is why freely assignable IP addresses are used.

IP address

The IP address is a 32 bit value that uniquely identifies a station in the network. An IP address is represented by four decimal numbers separated by decimal points.

Example: 192.168.10.4

Each decimal number stands for one byte (= 8 bits) of the address and can also be represented using binary code (see following table).

Byte 1		Byte 2		Byte 3		Byte 4
11000000	.	10101000	.	00001010	.	00000100

The IP address comprises a network address and a station address (see following table).

Network address	Station address
192.168.10	4

The part of the IP address that denotes the network and the part that identifies the station is determined by the network class and the subnetwork mask.

Station addresses cannot consist of only zeros or ones (binary) because they represent the network itself or a broadcast address.

Network classes

The first byte of the IP address determines the network class and as such represents the division into network addresses and station addresses.

Value range Byte 1	Network class	Complete network address (Example)	Meaning
0 ... 127	A	10.1.22.3	10 = Network address 1.22.3 = Station address
128 ... 191	B	172.16.52.4	172.16 = Network address 52.4 = Station address
192 ... 223	C	192.168.10.4	192.168.10 = Network address 4 = Station address

This rough division is not sufficient for a number of networks. They also use an explicit, adjustable subnet mask.

Subnet mask

A subnet mask is used to divide the network classes into even finer sections. The subnet mask is represented by four decimal numbers separated by decimal points, in the same way as the IP address.

Example: 255.255.255.128

Each decimal number stands for one byte (= 8 bits) of the subnetwork mask and can also be represented using binary code (see following table).

Byte 1		Byte 2		Byte 3		Byte 4
11111111	.	11111111	.	11111111	.	10000000

If you compare the IP addresses with the subnet masks, you see that in the binary representation of the subnet mask all ones determine the network address and all the zeros determine the station address (see following table).

		Byte 1		Byte 2		Byte 3		Byte 4
IP address	Decimal	192	.	168.	.	10	.	129
	Binary	11000000	.	10101000	.	00001010	.	10000001
Subnetwork mask	Decimal	255	.	255	.	255	.	128
	Binary	11111111	.	11111111	.	11111111	.	10000000

The class C network with the address 192.168.10. is further subdivided into 255.255.255.128 using the subnetwork mask. Two networks are created with the address 192.168.10.0 and 192.168.10.128.

The following station addresses are permitted in the two networks:

- 192.168.10.1 ... 192.168.10.126
- 192.168.10.129 ... 192.168.10.254

The network stations use a logical AND operation for the IP address and the subnetwork mask to determine whether there is a communication partner in the same network or in a different network. If the communication partner is in a different network, the standard gateway is addressed for passing on the data.

Standard gateway

The standard gateway is also addressed via a 32-bit address. The 32-bit address is represented by four decimal numbers separated by decimal points.

Example: 192.168.10.1

The standard gateway establishes a connection to other networks. In this way, a network station that wants to address another station can use a logical AND operation with the IP address and the subnetwork mask to decide whether the desired station is located in the same network. If this is not the case, the station addresses the standard gateway (router), which must be part of the actual network. The standard gateway then takes on the job of transmitting the data packages.

DHCP (Dynamic Host Configuration Protocol)

Instead of setting the three parameters IP address, subnetwork mask and standard gateway manually, they can be assigned in an automated manner by a DHCP server in the Ethernet network.

This means the IP address is assigned from a table, which contains the allocation of MAC address to IP address.

Parameter P785 indicates whether the DHR41B option expects the IP parameters to be assigned manually or via DHCP.

4.5.6 Operating displays of the MOVI-PLC® *advanced* DHR41B controller in PROFINET mode

	NOTE
	The LEDs identical with DHE41B (L1 – L10) are described in section "Operating displays of the MOVI-PLC® *advanced* DHE41B controller".

There are 4 LEDs (L11, L12, L13, L14) on the DHR41B option card that display the current status of the DHR41B option, the PROFINET system and the safety options.

FS LED

LED **L12 (FAILSAFE-STATUS)** indicates the failsafe status on PROFINET.

Status of the "FS" LED	Cause of error	Troubleshooting
Green	• The safety option is currently performing a cyclical data exchange with the F-host (data exchange). • Standard operating state.	–
Red	• Fault status in the safety part. • No 24 V_LS supply voltage present.	• Read diagnostic in F-Host. • Eliminate the cause of the fault and acknowledge in the F-Host.
Off	• The safety option is currently in the initialization phase.	• Check voltage supply. • Check configuration of the bus master.
Flashing red / green	A fault occurred in the safety part; cause of the fault already remedied acknowledgement required.	Acknowledge fault in the F-Host (reintegration).

LED L13 (BUS-FAULT)

The LED **L13 (BUS FAULT)** displays the status of the PROFINET.

Status of the LED L13	Cause of error	Troubleshooting
Off	• PROFINET IO device is currently exchanging data with the PROFINET IO controller (Data Exchange).	-
Flashing green Flashing green/red	• The flashing function in the PROFINET IO controller project planning is activated to visually localize the stations.	-
Red	• Connection to the PROFINET IO controller has failed. • PROFINET IO device does not detect a link • Bus interruption • PROFINET IO controller is not in operation	• Check the PROFINET connection of the DHR41B option • Check the PROFINET IO controller • Check the cabling of your PROFINET network
Yellow Flashing yellow	• The STEP 7 hardware configuration contains a module that is not permitted.	• Switch the STEP 7 hardware configuration to ONLINE and analyze the status of the components of the slots in the PROFINET IO device.

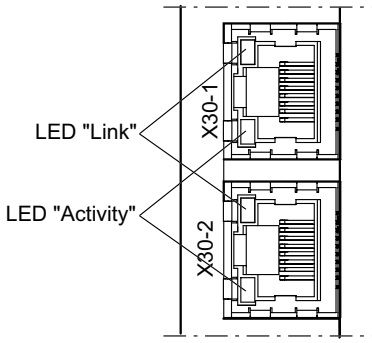
LED L14 (RUN)

LED **L14 (RUN)** indicates that the bus electronics are operating correctly.

Status of the LED L14	Cause of error	Troubleshooting
Green	• DHR41B hardware OK. • Proper operation	–
Off	• DHR41B is not ready for operation.	• Switch the unit on again. Consult SEW Service if the error occurs again.
Red	• Error in the DHR41B hardware	
Flashing green	• Hardware of the DHR41B does not boot up.	
Flashing yellow		• Switch the unit on again. Set default IP addressparameter via DIP switch "S1". Consult SEW service if the error occurs again.
Yellow		• Switch the unit on again. Consult SEW Service if the error occurs again.

LED Link / Activity

The two LEDs **Link (green)** and **Activity (yellow)**, integrated in the RJ45 plug connectors (X30-1, X30-2), display the status of the Ethernet connection.



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LED / Status	Meaning
Link / Green	There is an Ethernet connection.
Link / Off	There is no Ethernet connection.
Activity / Yellow	Data is currently being exchanged via Ethernet.

4.5.7 Setting the IP address parameters via DCP

Initial startup

For PROFINET IO, the IP address parameters are determined via the "DCP" protocol (**D**iscovery and **C**onfiguration **P**rotocol). DCP operates with device names (Device Name). The device name uniquely identifies a PROFINET IO station in the network. It is identified with the PROFINET IO controller for the project planning of the station and also set using the project planning software on the PROFINET IO device. With the aid of the device name, the controller identifies the device during startup and transfers the corresponding IP address parameters. Settings directly on the slave are no longer required.

Resetting the IP address parameters

If you do not know the IP address parameters and cannot access the inverter using the serial interface or the DBG60B keypad, you can reset the IP address parameters to the default values using the DIP switch "2^0".

This action resets the DHR41B option to the following default values:

- IP address: 192.168.10.4
- Subnetwork mask: 255.255.255.0
- Default gateway: 1.0.0.0
- PROFINET device name: PNETDeviceName_MACID

Proceed as follows to reset the IP address parameters to the default values:

- Switch off the 24 V DC supply voltage and the mains voltage.
- Set the DIP switch "2^0" on the DHR41B option to "1".
- Switch the DC 24 V supply voltage and the line voltage back on.
- Wait until the DHR41B option has booted up. The "RUN" LED is green when the option is ready.

You can now access the inverter via the IP address 192.168.10.4. Proceed as follows to set new IP address parameters:

- Start MOVITOOLS® MotionStudio.
- Select the address parameters you want.
- Set the DIP switch "2^0" on the DHR41B option to "0".
- The new address parameters are adopted after the device is switched off and switched on again.

4.5.8 Operating displays of the MOVI-PLC® *advanced* DHR41B controller in EtherNet/IP mode

The LEDs L13 and L14 of the DHR41B indicate the current condition of the DHR41B option and the EtherNet/IP system.

LED L13 (NETWORK STATUS)

LED **L13 (NETWORK STATUS)** indicates the status of the EtherNet/IP system.

Status of the LED L13	Meaning
Off	The DHR41B option does not yet have any IP parameters.
Flashing green/red	The DHR41B option card performs an LED test.
Flashing green	There is no controlling IO connection.
Green	There is a controlling EtherNet/IP IO connection.
Red	A conflict while assigning the IP address was detected. Another station in the network uses the same IP address.
Flashing red	The previously established controlling IO connection is in timeout status. The status is reset by restarting communication.

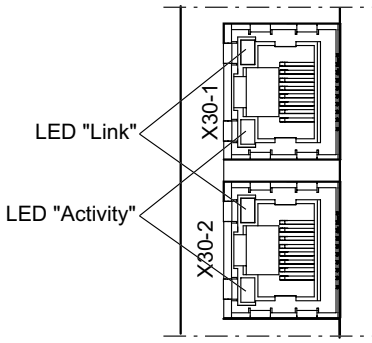
LED L14 (MODULE STATUS)

LED **L14 (MODULE STATUS)** indicates that the bus electronics are operating correctly.

Status of the LED L14	Meaning
Off	The DHR41B option card is not supplied with voltage or is defective
Flashing green	• If the NETWORK STATUS LED is off at the same time, the TCP/IP stack of the DHR41B option card will be started. If this status continues and DHCP is activated, the DHR41B option card waits for data from the DHCP server. • If the NETWORK STATUS LED is flashing green at the same time, the application of the DHR41B option card is started.
Flashing green/red	The DHR41B option card performs an LED test.
Green	Indicates the standard operating state of the DHR41B option card
Red	The DHR41B option card is in fault state.
Flashing red	A conflict while assigning the IP address was detected. Another station in the network uses the same IP address.

LED Link / Activity

The two LEDs **Link (green)** and **Activity (yellow)**, integrated in the RJ45 plug connectors (X30-1, X30-2), display the status of the Ethernet connection.



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LED / Status	Meaning
Link / Green	There is an Ethernet connection.
Activity / Yellow	Data is currently being exchanged via Ethernet.
Link / Off	There is no Ethernet connection.

4.5.9 Setting the IP address parameters

Initial startup

The "DHCP" protocol (**D**ynamic **H**ost **C**onfiguration **P**rotocol) is activated as the default setting for the DHR41B option. This means that the DHR41B option card expects its IP address parameters from a DHCP server.

	NOTE
	Rockwell Automation provides a DHCP server free-of-charge on their homepage. The tool is known as "BOOTP Utility" and can be downloaded from the following website: http://www.ab.com/networks/bootp.html.

Once the DHCP server has been configured and the settings have been made for the subnetwork screen and the standard gateway, the DHR41B must be inserted in the assignment list of the DHCP server. In doing so, the MAC ID of the DHR41B option is allocated a valid IP address.

	NOTE
	The configured IP address parameters are permanently adopted into the parameter set if DHCP is deactivated after the IP address has been assigned.

Changing the IP address parameters after successful initial startup

If the DHR41B was started using a valid IP address, you can also access the IP address parameters via the Ethernet interface.

The following options are available for changing the IP address parameters via Ethernet:

- With the MOVITOOLS® MotionStudio software via Ethernet
- With the EtherNet/IP TCP/IP interface object

You can also use the DBG60B keypad to change the IP address parameters. To do so, connect the DBG60B keypad to the serial interface (X24) of the UOH21B compact controller.

If the IP address parameters are assigned to the option DHR41B via a DHCP server, you can only change the parameters by adjusting the settings of the DHCP server.

The options listed above for changing the IP address parameters only come into effect once the supply voltages (mains **and** DC 24 V) have been switched off and back on again.

Deactivating / activating the DHCP

The type of IP address allocation is determined by the setting of the attribute *Configuration Control* of the EtherNet/IP TCP/IP interface object. The value is displayed or modified in the parameter *P785 DHCP/Startup Configuration*.

- Setting "Saved IP parameters"

  The saved IP address parameters are used.
- Setting "DHCP"

  The IP address parameters are requested by a DHCP server.

  If you use the DHCP server from Rockwell Automation, you can activate or deactivate the DHCP via a button. In this case, an EtherNet/IP telegram is sent to the TCP/IP interface object of the station that is being addressed.

Resetting the IP address parameters

If you do not know the IP address parameters and there is no serial interface or DGB60B keypad for reading the IP address, you can reset the IP address parameters to the default values using the DIP switch "2^0".

This action resets the DHR41B option to the following default values:

- IP address: 192.168.10.4
- Subnetwork mask: 255.255.255.0
- Default gateway: 1.0.0.0
- P785 DHCP/Startup Configuration: Saved IP parameters (DHCP is deactivated)

Proceed as follows to reset the IP address parameters to the default values:

- Switch off the 24 V DC supply voltage and the mains voltage.
- Set the DIP switch "2^0" on the DHR41B option to "1".
- Switch the DC 24 V supply voltage and the line voltage back on.
- Wait until the DHR41B option has booted up. The "MODULE STATUS" LED is green when the option is ready.
- Set the DIP switch "2^0" on the DHR41B option to "0".
- The following options are available to assign the new IP address:
  - With the MOVITOOLS® MotionStudio software via Ethernet
  - With the EtherNet/IP TCP/IP interface object

	NOTE
	• DHCP remains deactivated when you reset the DIP switch "2^0" to "0". You can reactivate DHCP via the EtherNet/IP TCP/IP interface object, parameter P785 or the DHCP server by Rockwell Automation. • DHCP remains active when resetting the values to the default setting (*P802 Factory setting*).

4.5.10 The integrated Ethernet switch

You can use the integrated Ethernet switch to achieve line topologies known from the fieldbus technology. Other bus topologies, such as star or tree, are also possible. Ring topologies are not supported.

	NOTE
	The number of industrial Ethernet switches connected to the line affects the telegram runtime. If a telegram passes through the units, the telegram runtime is delayed by the Store & Forward function of the Ethernet switch: • For a telegram length of 64 Byte by approximately 10 µs (at 100 Mbit/s) • For a telegram length of 1500 Byte by approximately 130 µs (at 100/Mbit/s) This means that the more units a telegram has to pass through, the higher the telegram runtime is.

Autocrossing: The two ports leading out of the Ethernet switch have autocrossing functionality. This means you can use patch or cross-over cables to connect the next Ethernet node.

Autonegotiation The baud rate and the duplex mode is negotiated by both Ethernet nodes when establishing the connection. The two Ethernet ports of the EtherNet/IP interface support autonegotiation functionality and operate at a baud rate of 100 Mbit or 10 Mbit in full duplex or half duplex mode.

Notes on multicast handling

- The integrated Ethernet switch does not provide a filter function for Ethernet multicast telegrams. Multicast telegrams that are usually sent from the adapters (DHR41B) to the scanners (PLC) are passed on to all switch ports.
- IGMP snooping (managed switch) is not supported.
- SEW-EURODRIVE recommends to connect DHR41B only with network components that support IGMP Snooping (e. g. managed switch) or in which protective measures against excessive multicast load are integrated (e. g. units from SEW-EURODRIVE). When using units that do not possess this function, the high load on the network can cause faults.

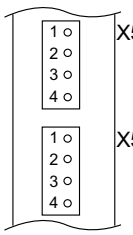
4.6 Installing the DH.41B option in MOVIDRIVE® MDX61B

	NOTE
	The MOVI-PLC® *advanced* DH.41B controller is installed according to chapter "Mounting options for the MOVI-PLC® *advanced* DH.41B controller". The MOVI-PLC® *advanced* DH.41B controller is powered via MOVIDRIVE® MDX61B. A separate voltage supply is only required for the binary inputs and outputs (connector X31).

4.7 Installation of the DH.41B option in the MOVIAXIS® MDX61B master module

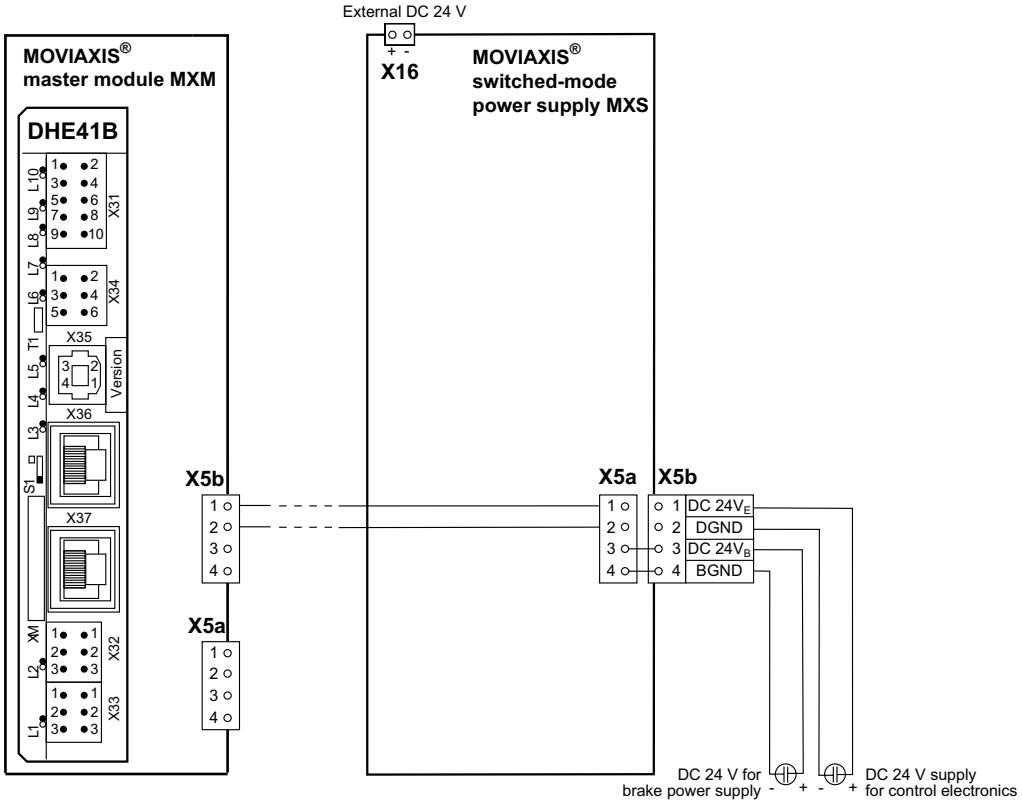
	NOTE
	The MOVI-PLC® *advanced* DH.41B controller is installed according to chapter "Mounting options for the MOVI-PLC® *advanced* DH.41B controller". To wire the system bus, connect connector X33 (CAN1) or X32 (CAN2) of MOVI-PLC® *advanced* DH.41B with connector X9 (MOVIAXIS® supply module signalizing bus or of a MOVIAXIS® axis module) or with connector X12 (CAN2 bus of a MOVIAXIS® axis module). The MOVIAXIS® master module also provides further connections as described below.

4.7.1 Function description of terminals X5a/X5b (MOVIAXIS® master module)

MOVIAXIS® master module MXM	Designation	Terminal		Function
 59233AXX	**X5b connector**	**X5b:1** **X5b:2** **X5b:3** **X5b:4**	DC 24 V_E DGND DC 24 V_B BGND	Voltage supply for control electronics Reference potential of control electronics Brake voltage supply Reference potential for brake connection
	X5a connector	X5a:1 X5a:2 X5a:3 X5a:4	DC 24 V_E DGND DC 24 V_B BGND	Voltage supply for control electronics Reference potential of control electronics Brake voltage supply Reference potential for brake connection

- The connectors X5a and X5b are connected in parallel. In this way, the voltage supply of the MOVIAXIS® master module can be provided from the right to X5b or from below to X5a. With connection to X5a, further modules can be connected via X5b (e.g. supply module, axis module). The voltage supply of brake (X5a/b:3, 4) is conducted by the MOVIAXIS® master module.
- The MOVI-PLC® *advanced* DH.41B controller can be supplied by the MOVIAXIS® switched mode power supply module (MXS) or from an external voltage supply. For this purpose, connect X5 between the individual devices.
- If the MOVI-PLC® *advanced* DH.41B controller is supplied with DC 24 V by the MOVIAXIS® switched-mode power supply module, the function of the MOVI-PLC® *advanced* DH.41B controller is maintained after disconnection from the power supply. This is the case if the DC link voltage is maintained or an external DC 24 V supply of the MOVIAXIS® switched-mode power supply unit is present.

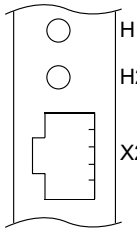
Wiring diagram

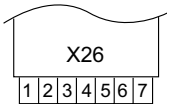


4.8 Installing the DH.41B option in MOVITRAC® B/compact controller

	NOTE
	The MOVI-PLC® *advanced* DH.41B controller is installed according to chapter "Mounting options for the MOVI-PLC® *advanced* DH.41B controller". The MOVITRAC® B option slot and the compact controller provide additional connections and operating displays for the MOVI-PLC® *advanced* DH.41B controller as described below.

4.8.1 Function description of terminals and LEDs

Front view MOVITRAC® B/ compact controller	Designation	LED Terminal		Function
 58905AXX	**LED**	**H1** **H2**		System fault Reserved
	Connector X24: RS485 COM 1 (RJ10 socket)	X24:4 X24:3 X24:2 X24:1	DGND RS– RS+ 5 V	Reference potential COM 1 Signal RS485– Signal RS485+ Voltage output DC+5 V

Lateral view Compact controller	Designation	Terminal		Function
 58906AXX	**Connector X26: CAN 1 and voltage supply (plug-in terminal)**	**X26:1** **X24:2** **X24:3** **X24:4** **X26:5** **X26:6** **X26:7**	CAN1H CAN1L DGND Reserved Reserved DGND DC 24 V	System bus CAN 1 high System bus CAN 1 low Reference potential controller/CAN1 - - Reference potential controller/CAN1 Voltage supply of controller

4.8.2 Connection of RS485 interface COM 1 (connector X24)

The connectors X24 and X34:1/3/5 are connected in parallel. You can connect a DOP11B operator terminal at X24. If X24 is unassigned, you can connect an operator terminal or a gearmotor with integrated MOVIMOT® frequency inveter to X34:1/3/5.

For more information, refer to section 4.4.5.

4.8.3 Connection of system bus CAN 1/power supply (connector X26)

X26:1/2/3 and connector X33 are connected in parallel (see sec. 4.3.3). MOVI-PLC® *advanced* DH.41B in the compact controller is supplied with power via X26:6/7.

The MOVI-PLC® *advanced* DH.41B controller can be supplied with the required voltage by MOVITRAC® B. For this purpose, connect X26:3 (6)/7 with X46:3 (6)/7 or with X12:9/8. If the MOVI-PLC® *advanced* DHE41B controller is supplied with DC 24 V by MOVITRAC® B, the function of the MOVI-PLC® *advanced* DHE41B controller is maintained after disconnection from the voltage supply. This requires an external DC 24 V supply to X12:8 / 9 of MOVITRAC® B.

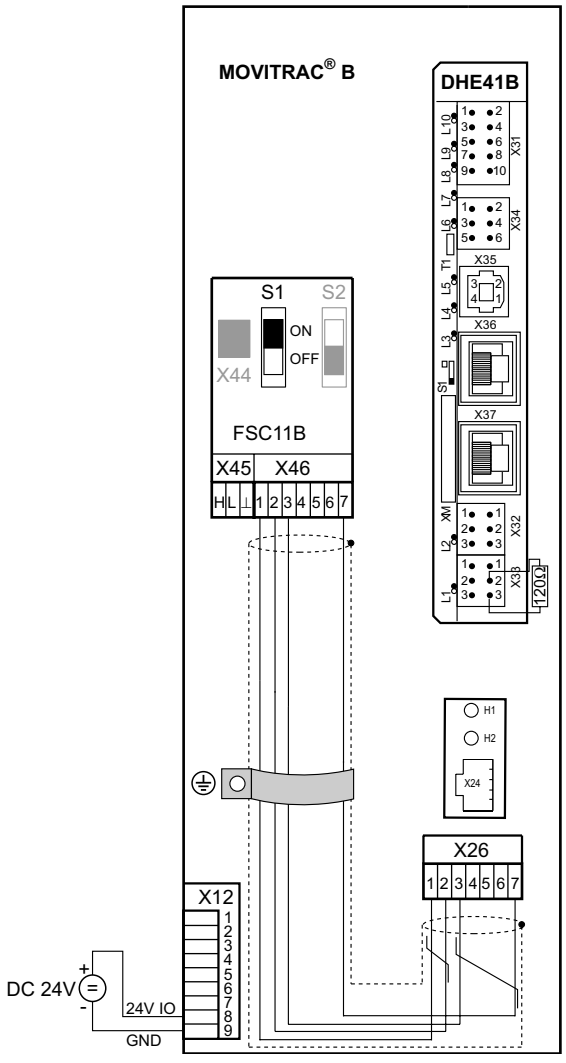


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Figure 9: Installation of MOVI-PLC® advanced DHE41B in MOVITRAC® B

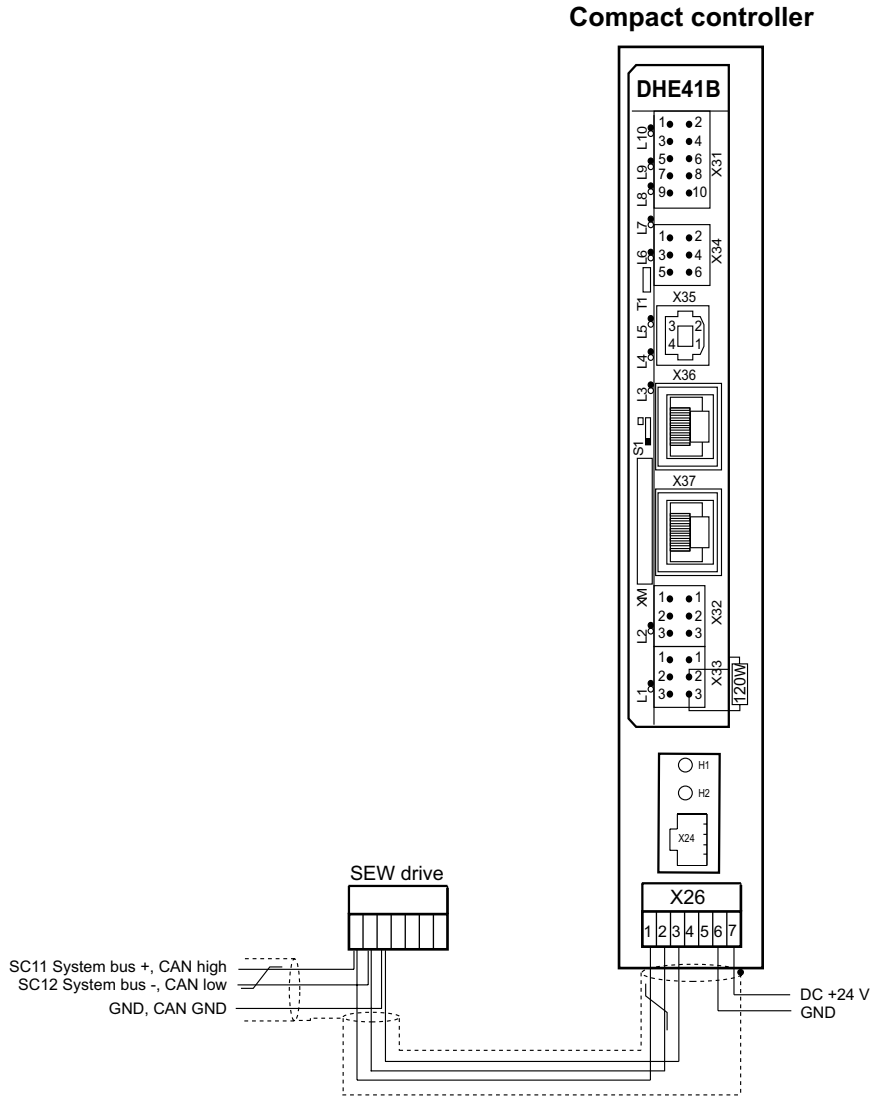

Figure 10: Installation of the MOVI-PLC® advanced DHE41B/UOH..B compact controller

4.8.4 MOVITRAC® B/compact controller option slot operating displays

LED H1 The LED **H1** signals correct operation via connection X26.

Status of LED H1	Diagnostics	Troubleshooting
OFF	• Correct operation of connection X26	-

LED H2 LED H2 is reserved.

4.9 Engineering interface of the MOVI-PLC® advanced DH.41B controller

The engineering access to the MOVI-PLC® *advanced* DH.41B controller is realized via the Ethernet 2 interface (connector X37). Engineering access to the MOVI-PLC® *advanced* DHF41B controller is also possible via PROFIBUS (connector X30P) and to the MOVI-PLC® *advanced* DHR41B controller via Ethernet (connector X30-1/2).

	NOTE
	For detailed information, refer to the "MOVI-PLC® *advanced* Fieldbus Interfaces PROFIBUS DP-V1, Ethernet TCP/IP, EtherNet/IP, DeviceNet, Modbus TCP/IP" manual.

4.10 Shielding and routing bus cables

Only use shielded cables and connection elements that also meet the requirements of category 5, class 2 in compliance with IEC 11801 edition 2.0.

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.

	STOP!
	In case of fluctuations in the earth 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.

5 Project Planning and Startup

This section provides information on project planning and startup

- For the MOVI-PLC® *advanced* DH.41B controller
- For inverters controlled through the MOVI-PLC® *advanced* DH..1B controller
- For the PROFIBUS DP master

5.1 Configuration with the MOVITOOLS® MotionStudio PC software

Project selection

- Start the MOVITOOLS® MotionStudio software.

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Figure 11: MOVITOOLS® MotionStudio start window

[1] Option [New project]

[2] Option [Open project]

- To create a new project, select the option [New project] [1].
- To open an existing project, select the option [Open project] [2].

Options for engineering access

You have two options to establish engineering access to the MOVI-PLC® *advanced* DH.41B controller via the Ethernet 2 interface (connector X37):

- For a point-to-point connection, connect the Ethernet 2 interface (X37) of the MOVI-PLC® *advanced* DH.41B controller directly to the Ethernet interface of the engineering PC. Use an interface of the engineering PC that is not used for connection of the PC to the Intranet/Internet. In this way, you avoid reconfiguration of the interface.
- Integrate the MOVI-PLC® *advanced* DH.41B controller in a network via the Ethernet 2 interface (X37). Edit the configuration file *NetConfig.cfg* in the "System" folder of the SD memory card to make the necessary address settings. You have the following options to access the *NetConfig.cfg* configuration file:
  - Take the SD memory card out of the MOVI-PLC® *advanced* DH.41B controller and insert it into a memory card write/read device.
  - First, establish a point-to-point connection to the MOVI-PLC® *advanced* DH.41B controller. Then access the *NetConfig.cfg* configuration file via an FTP client.

  For older network interfaces, it can be necessary to use a cross cable for the point-to-point connection.

Address settings for a point-to-point connection

- Setting the default IP address:
  - De-energize the MOVI-PLC® *advanced* DH.41B controller.
  - Switch the DIP switch to the upper position.
  - Re-energize the MOVI-PLC® *advanced* DH.41B controller. The IP address 192.168.10.4 and the net mask 255.255.255.0 are assigned automatically to the Ethernet 2 interface of the MOVI-PLC® *advanced* DH.41B controller.

- Setting other addresses:

  By manually editing the section <Ethernet2...> in the *NetConfig.cfg* configuration file in the "System" folder of the SD memory card, you can set other addresses.

  Example:

  <!-- Ethernet2 is engineering interface -->

  <Ethernet2>

  <IPAddress>192.168.10.4</IPAddress>

  <Netmask>255.255.255.0>/Netmask>

  <Gateway>192.168.10.1</Gateway>

  <Nameserver>0.0.0.0</Nameserver>

  <Hostname>MOVI-PLC_Eth2>/Hostname>

  </Ethernet2>

  Switch the DIP switch S1 to the lower position. This ensures that the addresses are adopted during the next boot process of the MOVI-PLC® *advanced* DH.1B controller.

- Setting the IP address of the PC interface:
  - Select the relevant PC interface under [Start] / [Settings] / [Network Connections]. In the context menu, select the properties window of the PC interface.
  - Activate the option "Use this IP address" in the property window of the "Internet protocol (TCP/IP)" entry.
  - Enter the net mask which is set in the MOVI-PLC® *advanced* DH.41B controller (e. g. 255.255.255.0, if DIP switch S1 is in the upper position).
  - Set the IP address depending on the net mask. The IP addresses of the MOVI-PLC® *advanced* DH.41B controller (Ethernet 2) and the PC interface must be different except for the areas defined by the net mask. In the area defined by the net mask, the IP addresses must be the same. The last byte of the IP address may neither be 0 nor 255.
    Example:

Net mask	
decimal	**binary**
255.255.255.0	11111111.11111111.11111111.00000000

In the example, the last 8 bits of the IP address of the MOVI-PLC® *advanced* DH..41B controller and the PC interface must be different.

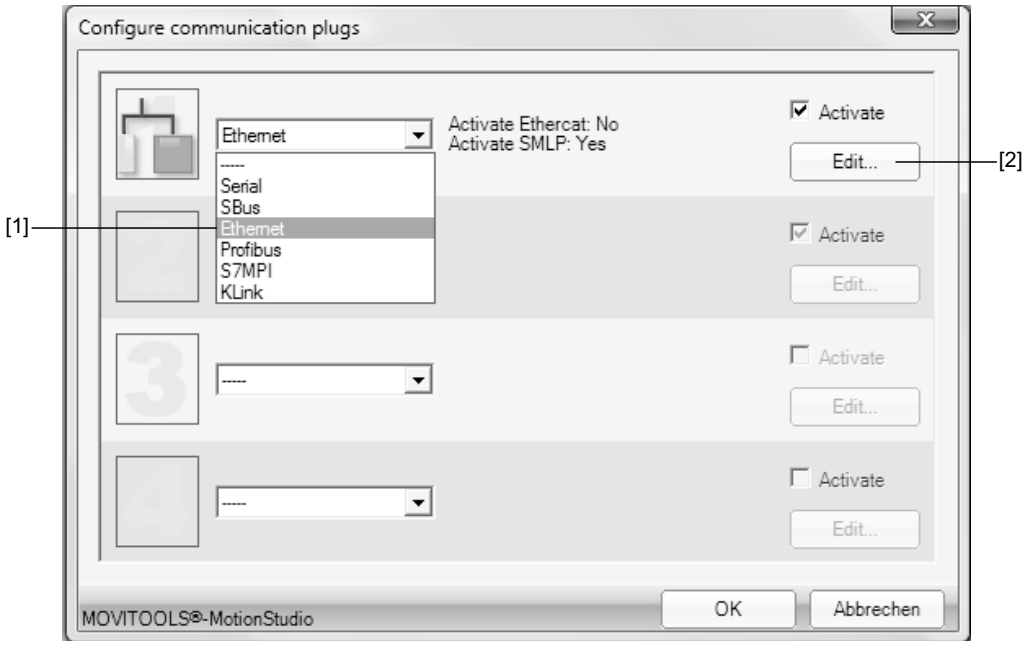
Address settings for engineering access via a network

Proceed as follows to establish engineering access to the MOVI-PLC® *advanced* DH.41B controller via an existing network:

- In the section <Ethernet2...> of the *NetConfig.cfg* configuration file in the "System" folder of the SD memory card, enter the following according to the specifications of your network administration:
  - IP address
  - Net mask
  - Gateway address
- Switch the DIP switch S1 to the lower position. This ensures that the new address settings are adopted during the next boot process of the MOVI-PLC® *advanced* DH.41B controller.

Setting the engineering access in MOVITOOLS® MotionStudio

- Open the menu item "Communication plugs" in MOVITOOLS® MotionStudio in the "Network" menu.



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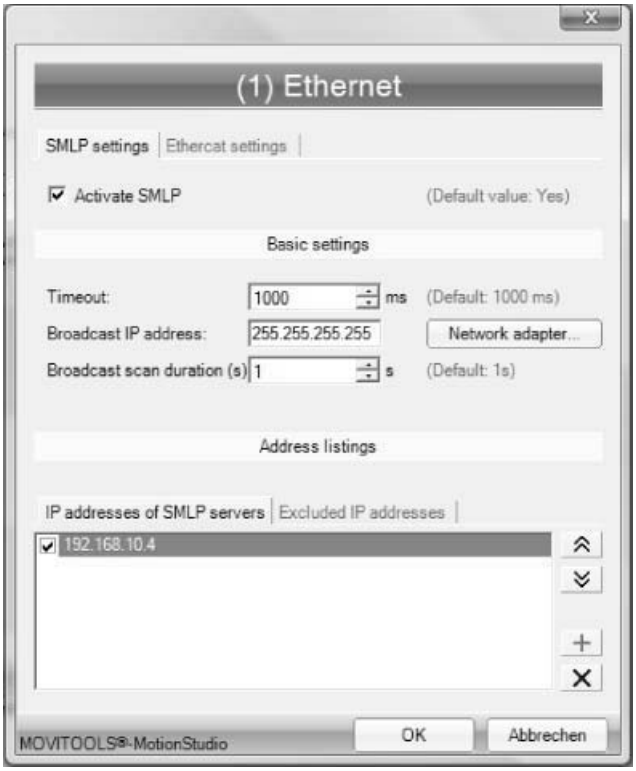
- Select the entry "Ethernet" [1] from the dropdown menu. Click on the <Edit> button [2]. Confirm your selection with <OK>.

- Right-click in the empty field "SMLP server IP addresses " and use menu item "Add IP address" to add the IP address of the Ethernet 2 interface of the MOVI-PLC® *advanced* DH.41B controller (see following figure). Confirm your entry with <OK>.



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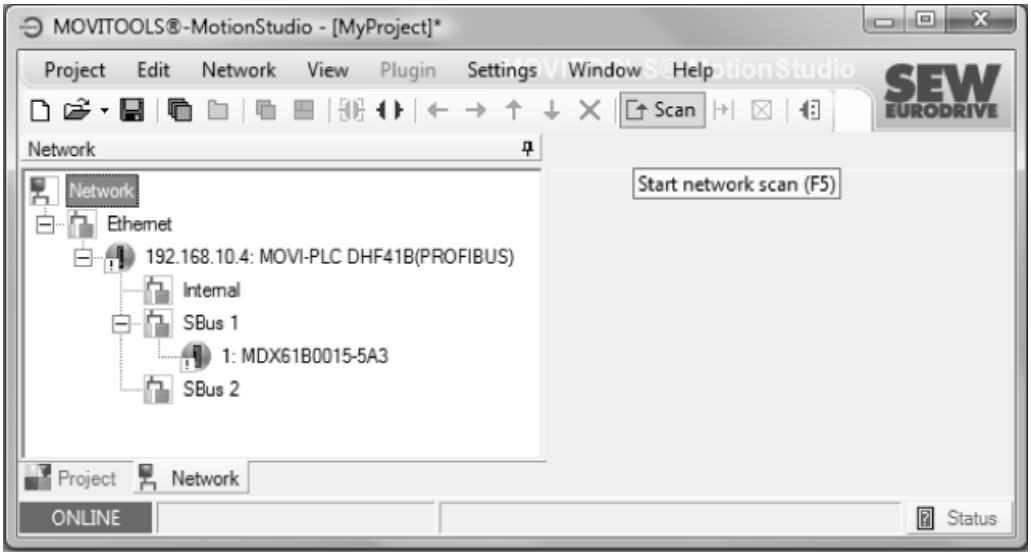
- You can also enter the network address (the part of the IP address in which the bits of the net mask are set) in the "Broadcast IP address" entry field when integrating the MOVI-PLC® *advanced* DH.41B controller in an existing network, filled up with set bits for sending broadcast messages in the specified network. In this case, no entry is required in the field "SMLP server IP addresses".

  Example:

  – IP address: 10.3.71.38
  – Net mask: 255.255.255.0
  – Broadcast IP address: 10.3.71.255

- Perform a network scan after this. To do so, click on the "Scan" symbol in MOVITOOLS® MotionStudio (see following figure).



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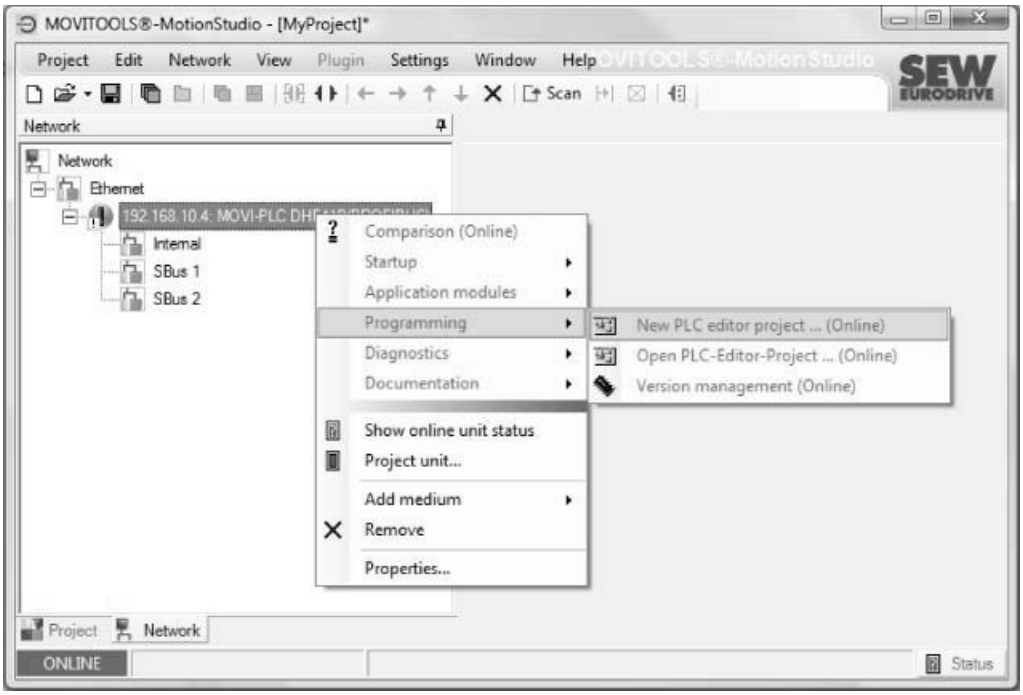
Unit-specific tool selection

- Click on the < > symbol (Scan) in MOVITOOLS® MotionStudio. The software now displays all units connected to the engineering PC in a tree structure (see following figure).



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- Start the PLC Editor. To do so, right-click on the "MOVI-PLC advanced DH.41B" entry, for example. Select "Programming" from the context menu. You can now create a new project or open an existing project in the PLC Editor.
- The PLC Editor serves for programming the MOVI-PLC® *advanced* DH.41B controller. For further information on programming the MOVI-PLC® *advanced* DH.41B controller, refer to the "MOVI-PLC® Programming in the PLC Editor" and the following manuals:
  - MPLCMotion_MDX and MPLCMotion_MX libraries for MOVI-PLC®
  - MPLCMotion_MC07 and MPLCMotion_MM libraries for MOVI-PLC®

5.2 Configuration and startup of the drives

How to configure and startup drives is described in the following library manuals:

Drive	Manual
MOVIDRIVE® B MOVIAXIS®	MPLCMotion_MDX and MPLCMotion_MX libraries for MOVI-PLC®
MOVITRAC® 07 / B MOVIMOT®	MPLCMotion_MC07 and MPLCMotion_MM libraries for MOVI-PLC®

NOTE

For operation of the MOVI-PLC® *advanced* DH.41B controller in MOVIDRIVE® MDX61B, the MOVIDRIVE® MDX61B inverter must have at least firmware version ".16" or higher.

This applies regardless of whether the inverter is controlled via the installed MOVI-PLC® *advanced* DH.41B controller, or whether the slot of the inverter is only used for installation of the MOVI-PLC® *advanced* DH.41B controller whilst simultaneously used to control other inverters (e.g. MOVITRAC® B).

5.3 Configuration and startup in the PLC Editor

NOTE

- For detailed information on configuration and startup of the MOVI-PLC® *advanced* DH.41B controller, refer to the MOVI-PLC® Programming in the PLC Editor" system manual.
- For information on configuring the master of the different fieldbus systems, refer to the "MOVI-PLC® *advanced* Fieldbus Interfaces PROFIBUS DP-V1, Ethernet TCP/IP, EtherNet/IP, DeviceNet, Modbus TCP/IP" manual.

5.4 Replacing the unit

When exchanging a MOVI-PLC® *advanced* DHF41B controller, a compact controller or a controlled drive, proceed as described in sections 4.2 and 4.3. Plug the SD card of the old controller into the new controller.

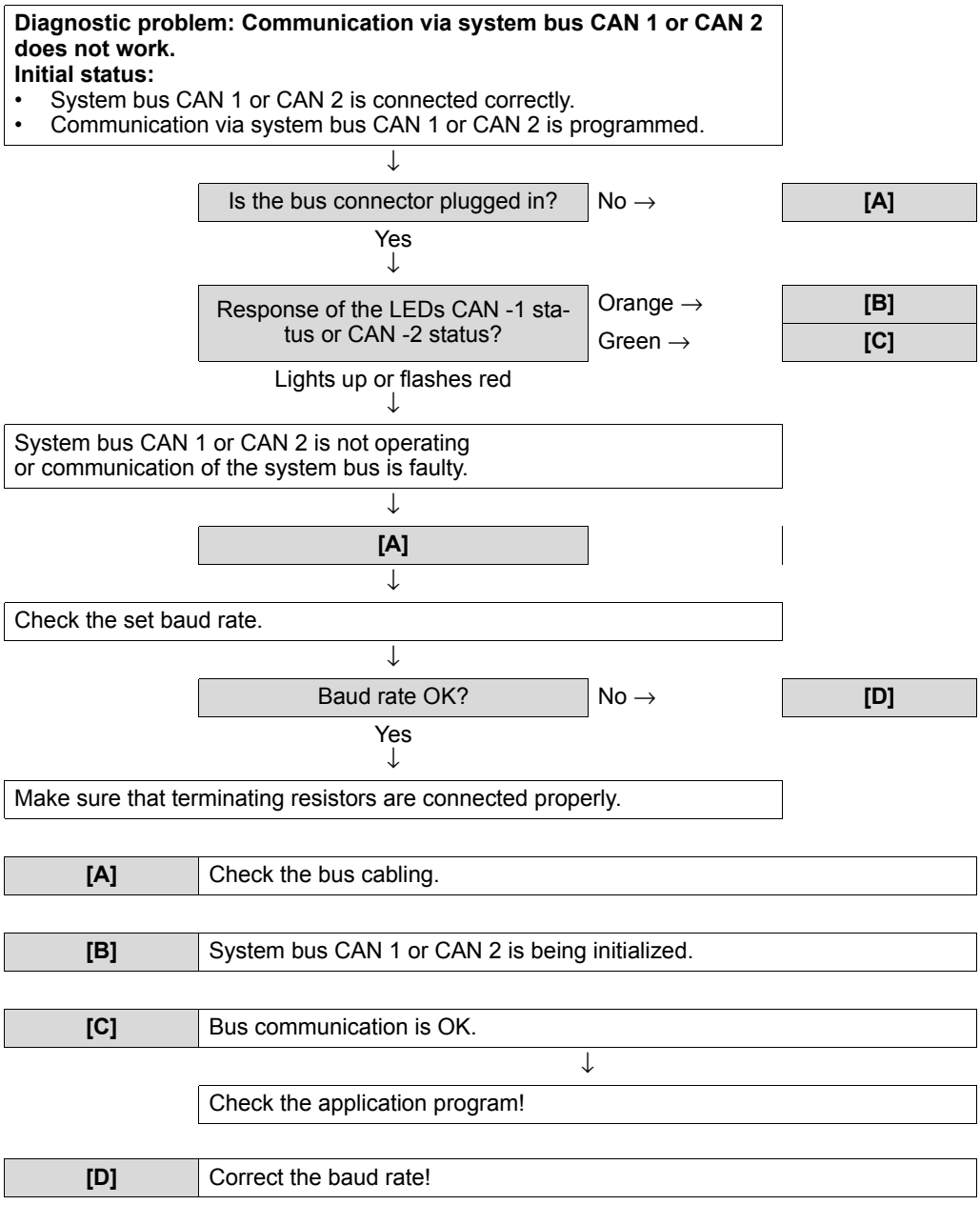
NOTE

The variable values stored remanently on the MOVI-PLC® *advanced* DH.41B controller are not stored on the SD card by default. This can be programmed through the application (IEC program), or the data backup must be imported through the project management in MOVITOOLS® MotionStudio.

You can find important information on changing drives in the manuals of the respective inverters.

6 Error Diagnostics

6.1 Diagnostic procedure for system bus CAN 1/CAN 2



6.2 Diagnostic procedure for PROFIBUS-DP

Diagnostic problem: The MOVI-PLC® advanced DHF41B controller is not working on the PROFIBUS.
Initial status:
- The MOVI-PLC® *advanced* DHF41B controller is physically connected to the PROFIBUS.
- The MOVI-PLC® *advanced* DHF41B controller was configured in the DP master and bus communication is active.

↓

Is the bus connector plugged in? — No → **[A]**

Yes ↓

Response of the LED Fault Profibus? — OFF → **[B]**; ON → **[C]**

FLASHES ↓

The MOVI-PLC® *advanced* DHF41B controller recognizes the baud rate, but was either not configured in the DP master or it was configured incorrectly.

↓

Check whether the configured PROFIBUS address is the same as the address set on the DIP switches.

↓

PROFIBUS addresses identical? — No → **[D]**

Yes ↓

You may have configured an incorrect unit type or defined the configuration incorrectly.

↓

Delete the configuration for the MOVI-PLC® *advanced* DHF41B controller from the DP network.

↓

Configure the MOVI-PLC® *advanced* DHF41B controller again, choosing the unit designation 'MOVI-PLC'.
Use a predefined configuration to simplify the process. Do not change any of the preset configuration data!
Assign the address range for your control system.

↓

Load the configuration in the DP master and start the bus communication again.

[A]	Check the bus cabling.
[B]	The MOVI-PLC® *advanced* DHF41B controller is currently exchanging data cyclically with the DP master.
[C]	The MOVI-PLC® *advanced* DHF41B controller does **not** recognize the baud rate! Check the bus cabling.
[D]	Adapt the bus addresses.

7 Technical Data and Dimension Drawings

7.1 General technical data

The general technical data listed in the following table apply to:

- The MOVI-PLC® *advanced* DH.41B controller installed in the inverter
- The MOVI-PLC® *advanced* DH.41B/UOH..B compact controller

Interference resistance	Complies with EN 61800-3
Ambient temperature	Integrated in MOVIDRIVE® MDX61B: • 0 °C ... +60 °C (Derating at 40 °C ... 60 °C see MOVIDRIVE® MDX60B/61B system manual) Installed in MOVITRAC® B (AC 230 V; AC 400/500 V to 4 kW): • –10 °C ... +60 °C (Derating at 40 °C ... 60 °C see MOVITRAC® B system manual) Installed in MOVITRAC® B (AC 400/500 V over 4 kW): • 0 °C ... +60 °C (Derating at 40 °C ... 60 °C see MOVITRAC® B system manual) Installed in the MOVIAXIS® master module: • 0 °C ... +45 °C Compact controller: • –10 °C ... +60 °C
Climate class	EN 60721-3-3, class 3K3
Storage temperature	–25 °C ... +70 °C
Climate class	EN 60721-3-3, class 3K3
Type of cooling	Convection cooling
Degree of protection	IP20
Operating mode	Continuous duty (see MOVIDRIVE® MDX60B/61B, MOVITRAC® B, MOVIAXIS® system manuals)
Pollution class	2 according to IEC 60664-1 (VDE0110-1)
Installation altitude	max. 4000 m (asl)

7.2 MOVI-PLC® advanced DHE41B controller

MOVI-PLC® *advanced* DHE41B controller	
Part number	MOVI-PLC® *advanced* DHE41B: 1821 160 7
Electrical supply	The following applies for all units (MDX, MX, compact controller): • You will have to supply the binary inputs and outputs with DC 24 V (X31:1/2) separately. Integrated in MOVIDRIVE® MDX61B: • Power consumption: P_{max} = 6.8 W • The MOVI-PLC® *advanced* DHE41B controller is supplied by MOVIDRIVE® MDX61B via backplane connector. • In the case of disconnection from the line voltage, continued function is guaranteed by DC 24 backup (external DC 24 V supply to X10:9/10 of /MOVIDRIVE MDX61B required).® Installed in the MOVIAXIS® master module (MXM): • Power consumption: P_{max} = 8.5 W • U = DC 24 V (–15 % / +20 %) • I_{max} = 600 mA • The MOVI-PLC® *advanced* DHE41B.. controller can be supplied by the MOVIAXIS® switched mode power supply module (MXS) or from an external voltage supply. For this purpose, connect X5 between the individual devices. • If the MOVI-PLC® *advanced* DHE41B controller is supplied with DC 24 V by the MOVIAXIS® switched-mode power supply module, the function of the MOVI-PLC® *advanced* DHE41B.. controller is maintained after disconnection from the line voltage (external DC 24 V supply at X16 of the MOVIAXIS® switched-mode power supply module required).
Potential levels	The MOVI-PLC® *advanced* DHE41B controller has the following potential levels: • Potential controller/CAN 1/COM1 • Potential COM2 • Potential binary inputs and outputs • Potential system bus CAN 2
Memory	• Program memory: 8 MByte (for application program, incl. IEC libraries) • Data memory: 4 MByte (for IEC application) • Retain data: 32 kByte • System variables (retain): 8 kByte
Binary inputs X31:3...X31:10 Internal resistance Signal level	Isolated (optocoupler), PLC-compatible (IEC 61131-2), cycle time 1 ms, available unfiltered and filtered (filter constant ca. 2 ms) Can be configured as binary input or output X31:6...X31:10 are interrupt capable (response time <100 ms) $R_i \approx 3\ k\Omega$, $I_E \approx 10$ mA DC (+13 V...+30 V) = "1" = contact closed (according to IEC 61131) DC (–3 V...+5 V) = "0" = contact open (according to IEC 61131)
Binary outputs X31:3...X31:10 Signal level	PLC compatible, (IEC 61131-2) response time 1 ms Can be configured as binary input or output Maximum permitted output current I_{A_max} = DC 150 mA per binary output All 8 binary outputs can be subject to the maximum approved output current I_{A_max} load at the same time. "0" = 0 V "1" = DC+24 V
System bus CAN 2 X32:1 ... X32:3 **System bus CAN 1** X33:1 ... X33:3	• System bus CAN 1 and CAN 2 to CAN specification 2.0, parts A and B, transmission technology to ISO 11898, max. 64 stations, • The CAN 2 system bus is electrically isolated • Max. 64 stations per CAN system bus, • Max. 64 SCOM transmit objects/256 receive objects per CAN system bus • Address range 0..0.63 • Baud rate: 125 kBaud...1 MBaud • If X32 or X33 is the bus terminator, you must connect a terminating resistor (120 Ω) externally. • You can remove connectors X32 or X33 without interrupting the system bus. • The system bus can be run in layer 2 (SCOM cyclic, acyclic) or in accordance with the SEW-MOVILINK® protocol.
Ethernet 1	System bus, reserved
Ethernet 2	• TCP/IP • Connection options: Engineering PC, other controller, Intranet
USB	USB 1.0 for connecting an engineering PC (in preparation)

MOVI-PLC® *advanced* DHE41B controller	
RS485 interface COM1/2 X34:1 ... X34:6	• One DOP11A operator panel or one gearmotor with integrated MOVIMOT® frequency inverter can be connected per RS485 interface. • I/O standard, 57.6 / 9.6 kBaud, max. total cable length 200 m • Dynamic terminating resistor with fixed installation • COM 2 is isolated from the MOVI-PLC® *advanced* controller
SD memory card OMH41B-T0...T10	• PC readable • Includes: – Firmware – IEC program – Data • At least 128 MB memory
Engineering	Engineering is performed via the Ethernet 2 interface (X37). The engineering of all SEW components connected to the MOVI-PLC® *advanced* DHE41B controller can be carried out using the MOVI-PLC® *advanced* DHE41B controller. Engineering of the MOVI-PLC® *advanced* DHE41B controller cannot be performed via the inverters. • MOVITOOLS® MotionStudio PC software with PLC-Editor

7.3 MOVI-PLC® advanced DHF41B controller

	NOTE
	The connections identical with DHE41B are described in section "MOVI-PLC® *advanced* DHE41B controller".

MOVI-PLC® *advanced* DHF41B controller	
Part number	MOVI-PLC® *advanced* DHF41B: 1821 161 5
Electrical supply	Integrated in MOVIDRIVE® MDX61B: • Power consumption: P_{max} = 8 W Installed in the MOVIAXIS® master module (MXM): • Power consumption: P_{max} = 10 W
Potential levels	The MOVI-PLC® *advanced* DHF41B controller has the following potential levels: • Potential controller/CAN 1/COM1 • Potential COM2 • Potential binary inputs and outputs • Potential system bus CAN 2 • Potential PROFIBUS
PROFIBUS connection X30P:1 ... X30P:9	Via 9-pin sub D connector, pin assignment according to IEC 61158
Bus terminator	Not integrated. Implement bus termination with suitable PROFIBUS connector with switchable terminating resistors.
Automatic baud rate detection	9.6 kBaud ... 12 MBaud
Protocol options	PROFIBUS DP and DP-V1 to IEC 61158
GSD file	SEW_6007.GSD
DP ID number	Not yet assigned
DeviceNet connection X30D:1 ... X30D:5	• 2-wire bus and 2-wire supply voltage DC 24 V with 5-pole Phoenix terminal • Pin assignment according to DeviceNet specification
Communication protocol	Master/slave connection set according to DeviceNet specification version 2.0
Number of process data words	• Programmable via IEC function (0 ... 64 process data words) • A parameter channel can be used as option in addition to the process data words.
Baud rate	125, 250 or 500 kBaud, can be set using DIP switches 2^6 and 2^7
Bus cable length	For thick cable according to DeviceNet specification 2.0 appendix B: • 500 m at 125 kBaud • 250 m at 250 kBaud • 100 m at 500 kBaud
Transmission level	ISO 11 98 - 24 V
MAC ID	0 ... 63, can be set using DIP switch2^0 ... 2^5 Max. 64 stations

MOVI-PLC® *advanced* DHF41B controller	
Supported services	• Polled I/O: 1 ... 10 words • Bit-Strobe I/O: 1 ... 4 words • Explicit messages: – Get_Attribute_Single – Set_Attribute_Single – Reset – Allocate_MS_Connection_Set – Release_MS_Connection_Set
Engineering	Additional engineering access via the PROFIBUS interface (X30P)

7.4 MOVI-PLC® advanced DHR41B controller

	NOTE
	The connections identical with DHE41B/DHF41B are described in the sections "MOVI-PLC® *advanced* DHE41B/DHF41B controller".

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

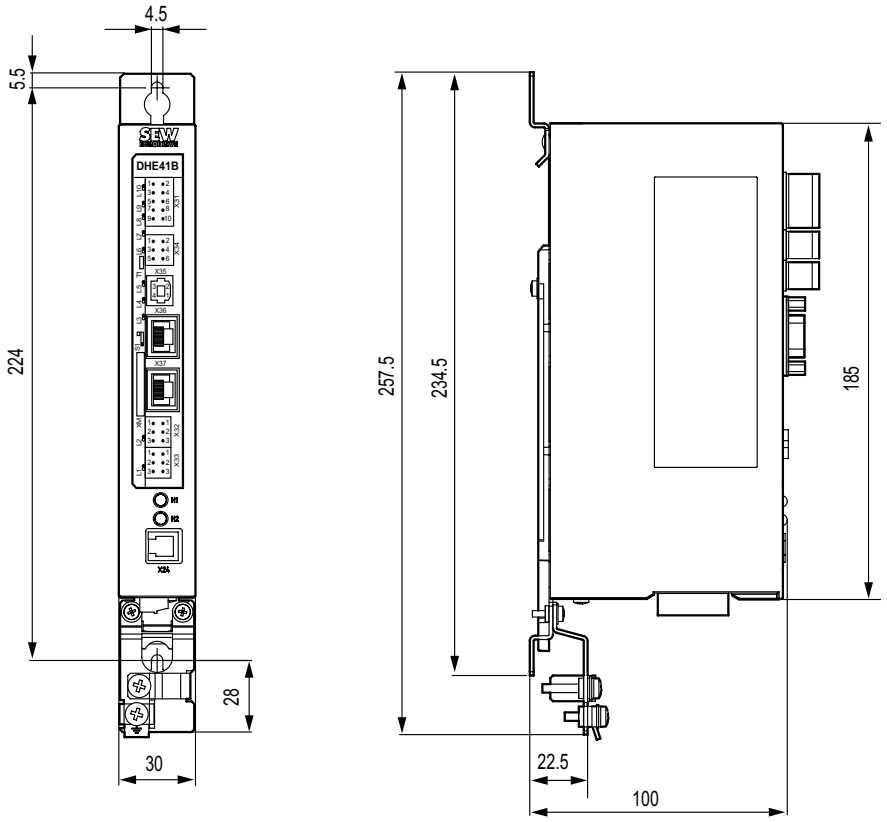
7.5 MOVI-PLC® advanced compact controllers

MOVI-PLC® *advanced* compact controller	
Unit versions	• MOVI-PLC® *advanced* DHE41B/UOH11B • MOVI-PLC® *advanced* DHF41B/UOH21B • MOVI-PLC® *advanced* DHR41B/UOH21B
Electrical supply	• X26: U = DC 24 V (–15 % / +20 %) DGND is to be grounded (PELV) • Power consumption P_{max} = 8.5 W, I_{max} = 600 mA • X31: You will have to supply the binary inputs and outputs with DC 24 V separately.

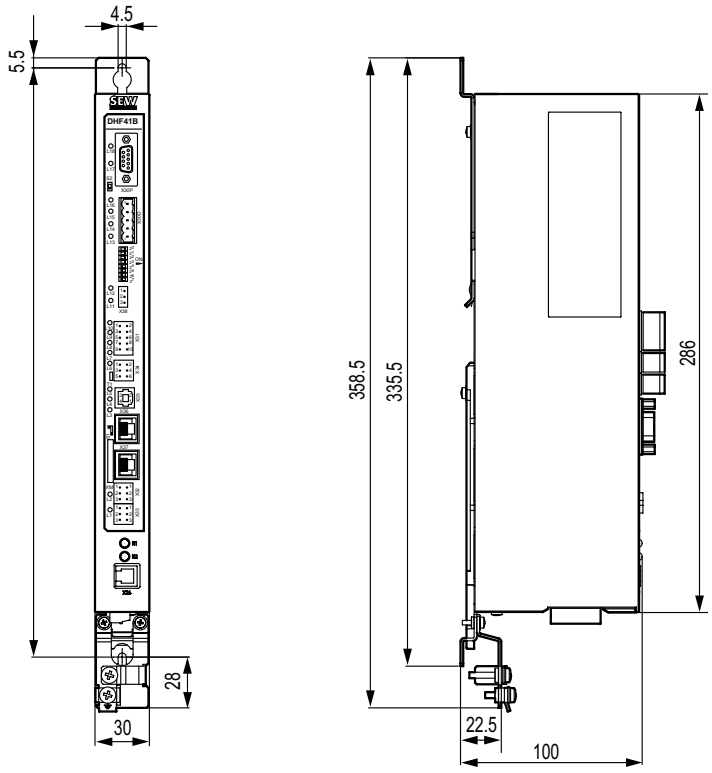
	NOTES
	Note the following: • The CAN1 system bus is connected in parallel to X33 and X26. • The RS485 interface COM 1 is connected in parallel to X34 and X24. • Further technical data is identical to that of Sec. 7.1 and 7.2.

7.6 Dimension drawings of MOVI-PLC® advanced DH.41B/UOH..B

7.6.1 DHE41B/UOH11B dimension drawing



7.6.2 DHF/DHR41B/UOH21B dimension drawing



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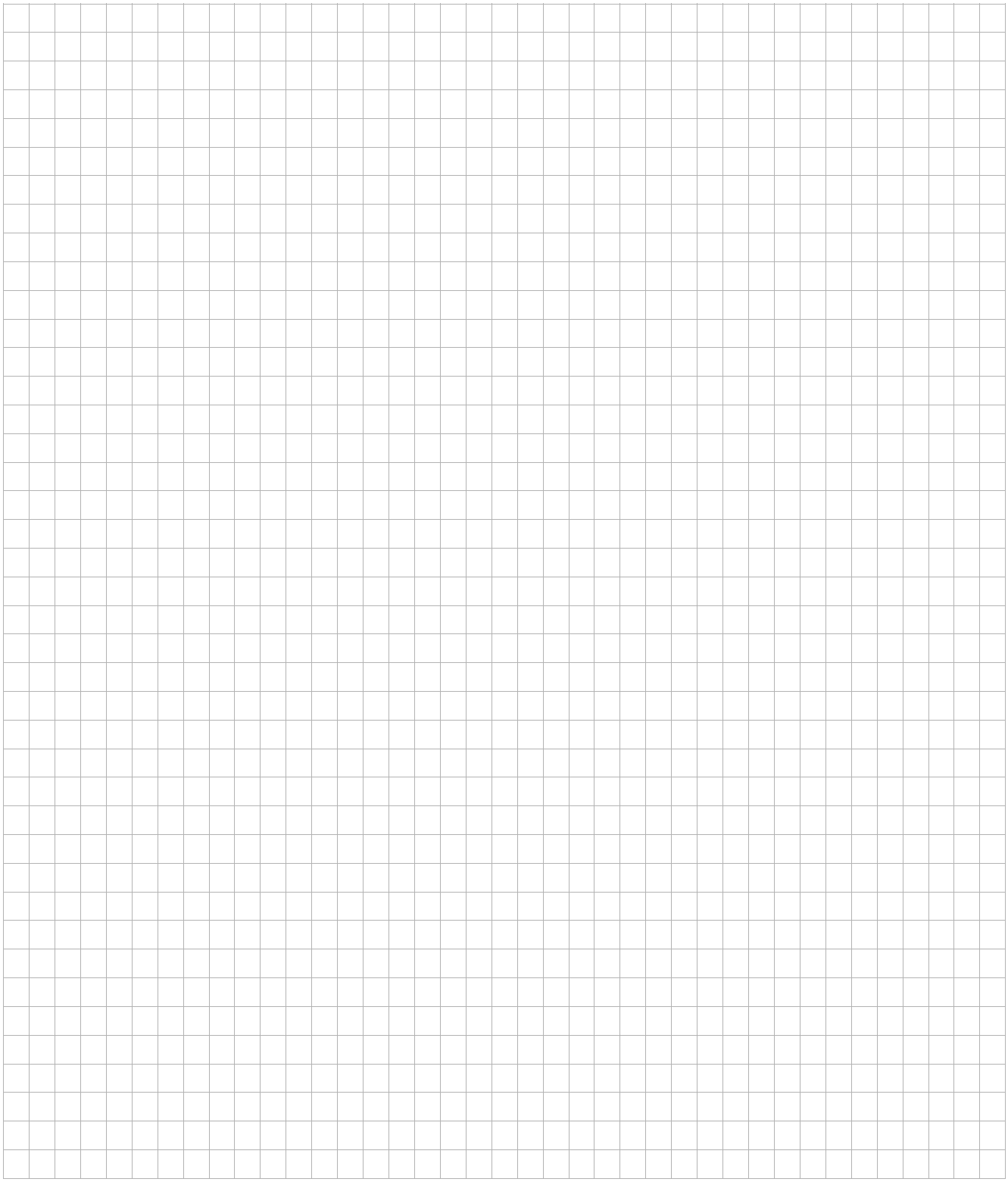

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