



SEW
EURODRIVE

Manual



Communication Interface
FSE24B EtherCAT®
for MOVITRAC® B





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1 General Information

1.1 How to use the documentation

The manual is part of the product and contains important information on operation and service. The manual is written for all employees who assemble, install, startup, and service the product.

The manual must be accessible and legible. Make sure that persons responsible for the system and its operation, as well as persons who work independently on the unit, have read through the manual carefully and understood it. If you are unclear about any of the information in this documentation, or if you require further information, contact SEW-EURODRIVE.

1.2 Structure of the safety notes

1.2.1 Meaning of the signal words

The following table shows the grading and meaning of the signal words for safety notes, notes on potential risks of damage to property, and other notes.

| Signal word | Meaning | Consequences if disregarded |
|--------------------|---|---|
| ▲ DANGER | Imminent danger | Severe or fatal injuries |
| ▲ WARNING | Possible dangerous situation | Severe or fatal injuries |
| ▲ CAUTION | Possible dangerous situation | Minor injuries |
| NOTICE | Possible damage to property | Damage to the drive system or its environment |
| INFORMATION | Useful information or tip: Simplifies the handling of the drive system. | |

1.2.2 Structure of section safety notes

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

This is the formal structure of a section safety note:

▲ SIGNAL WORD



Type and source of danger.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the danger.

1.2.3 Structure of embedded safety notes

Embedded safety notes are directly integrated in the instructions just before the description of the dangerous action.

This is the formal structure of an embedded safety note:

- **▲ SIGNAL WORD** Nature and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the danger.



1.3 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.

1.4 Exclusion of liability

You must observe this documentation and the documentation of the connected devices from SEW-EURODRIVE 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.

1.5 Copyright

© 2010 – SEW-EURODRIVE. All rights reserved.

Copyright law prohibits the unauthorized duplication, modification, distribution, and use of this document, in whole or in part.

1.6 Other applicable documentation

The following publications and documents apply to the connected units:

- "MOVITRAC® B" operating instructions
- For units with functional safety, also observe the corresponding manual "Functional Safety" or "Safe Disconnection – Conditions".
- Installation and startup only by qualified electricians observing the relevant accident prevention regulations and the operating instructions of the connected units.

1.7 Product names and trademarks

EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.



2 Safety Notes

2.1 Bus systems

A bus system makes it possible to adapt frequency inverters to the particulars of the machinery within wide limits. As with all bus systems, there is a danger of invisible, external (as far as the inverter is concerned) modifications to the parameters which give rise to changes in the unit behavior. This may result in unexpected, though not uncontrolled, system behavior.

2.2 Safety functions

MOVITRAC® B inverters may not perform any 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 publication "Safe Disconnection for MOVITRAC® B" is observed.

2.3 Hoist applications

MOVITRAC® B may not be used as a safety device in hoist applications. Use monitoring systems or mechanical protection devices as safety equipment to avoid possible damage to property or injury to people.

2.4 Disposal

Observe the applicable national regulations.

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

- Electronics scrap
- Plastics
- Sheet metal



3 Introduction

3.1 General information

3.1.1 Content of this manual

This user manual illustrates:

- The installation of the FSE24B EtherCAT® communication option in the MOVITRAC® B frequency inverter.
- The startup of MOVITRAC® B in the EtherCAT® fieldbus system.
- The configuration of the EtherCAT® masters via XML files.
- The operation of MOVITOOLS® MotionStudio via EtherCAT®.

3.1.2 Additional documentation

For information on how to connect MOVITRAC® B simply and effectively to the EtherCAT® fieldbus system, you should request the following documentation on fieldbus technology in addition to this user manual for the FSE24B EtherCAT® option:

- Manual "MOVITRAC® B Communication and Fieldbus Unit Profile"
- MOVITRAC® B system manual

Apart from describing the fieldbus parameters and the corresponding coding, the "MOVITRAC® B Communication and Fieldbus Unit Profile" manual and the MOVITRAC® B system manual provide examples to illustrate the different control concepts and possible applications.

3.2 Characteristics

3.2.1 MOVITRAC® B and EtherCAT®

The unit behavior of the inverter that forms the basis of EtherCAT® operation is referred to as the unit profile. It is independent of any particular fieldbus and is therefore a uniform feature. This allows the user to develop fieldbus-independent drive applications. This makes it much easier to change to other bus systems, such as CANopen (option FSC).

3.2.2 Access to all information

MOVITRAC® B offers digital access to all drive parameters and functions via the EtherCAT® communication interface. The frequency inverter is controlled via fast, cyclic process data. You can use this process data channel to enter setpoints (e.g. setpoint speed, ramp generator time for acceleration/deceleration, etc.) and to trigger various drive functions such as enable, controller inhibit, normal stop, rapid stop, etc. At the same time you can use this channel to read back actual values from the frequency inverter, such as the actual speed, current, unit status, error number and reference signals.

3.2.3 Cyclic data exchange via EtherCAT®

Process data is usually exchanged cyclically between the EtherCAT® master and the MOVITRAC® B frequency inverters. The cycle time is specified during the configuration of the EtherCAT® master.



3.2.4 Acyclic data exchange via EtherCAT®

Acyclic READ/WRITE services are introduced in line with the EtherCAT® specification. They are transmitted during normal cyclical operation along with the messages without affecting the performance of the process data communication via EtherCAT®.

Read and write access to the drive parameters is made possible via SDO (Service Data Objects), which are implemented according to CoE (CAN application protocol over EtherCAT®) or VoE services (Vendor-specific over EtherCAT®).

This parameter data exchange enables you to implement applications in which all the important drive parameters are stored in the higher-level programmable controller, so that there is no need to make parameter settings manually on the drive inverter itself.

3.2.5 Configuration of the EtherCAT® communication option

The EtherCAT® communication option is designed so that all fieldbus-specific settings are made during startup of the EtherCAT® system. This means the frequency inverter can be integrated into the EtherCAT® environment and switched on quickly.

3.2.6 Monitoring functions

Using a fieldbus system requires additional monitoring functions for the drive technology, for example, time monitoring of the fieldbus (fieldbus timeout) or rapid stop concepts. You can, for example, adapt the monitoring functions of MOVITRAC® B specifically to your application. You can determine, for instance, which of the frequency inverter's error responses should be triggered in the event of a bus error. For many applications, a rapid stop would be the preferred response, but you can also set other error responses. As the control terminals also function in fieldbus operation, you can still implement fieldbus-independent emergency stop concepts via the terminals of the frequency inverter.

3.2.7 Diagnostics

The MOVITRAC® B inverter offers numerous diagnostic options for startup and service purposes. For example, you can use the integrated fieldbus monitor to control both set-point values sent from the higher-level controller as well as the actual values.



4 Assembly and Installation Notes

4.1 Installation of the FSE24B communication option

INFORMATION



- MOVITRAC® B does not need a certain firmware status if you only want to use process data objects with 3 process data words.
The MOVITRAC® firmware 18225632.11 is required if
 - 10 process data words are to be transmitted to and from MOVITRAC® B
 - Advanced diagnostics via parameter group 09_ (bus diagnostics) is to be used
- Always attach the front module to the unit with the screw that is included in the delivery. For size 0, mount the spacer bolt first. The bolt is already installed in sizes 1 and higher. The screw establishes a high-frequency EMC connection between the basic unit and the front module.
- The FSE24B communication option cannot be used together with other communication options (FSC) or I/O expansions (FIO) in MOVITRAC® B.
- When using the FSE24B communication option, one additional diagnostic interface (RS485) is available.
- The system bus (CAN) of MOVITRAC® B is used for an internal connection to the FSE24B front module, which means it is no longer available for other functions.
- The FSE24B can be supplied with DC 24 V via the X47 connector, so that the bus is still operational even when MOVITRAC® is switched off or the FSE24B communication option is unplugged. MOVITRAC® B is also supplied with power.
- If the FSE24B communication option is only supplied with power by MOVITRAC® B, the voltage supply must not be deactivated via parameter *P808 Auxiliary voltage output VIO24*.
- If the communication option FSE24B is supplied only via MOVITRAC® B, resetting an inverter error may cause the communication unit to perform a reset as well, which briefly interrupts the EtherCAT® line. In order to prevent the brief interruption of the EtherCAT® line, the FSE24B must be supplied with DC 24 V via X47.



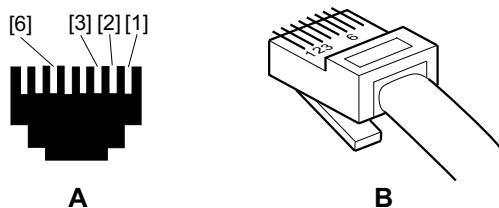
4.2 Connection and terminal assignment

| Front view of FSE24B | Terminal description, LED | Function |
|----------------------|--|---|
| | X44: RJ10 plug connector LED RUN (green) LED ERR (red) LED SYS-F (red) X47 X30 IN: RJ45 plug connector X30 OUT: RJ45 plug connector | RS485 interface for diagnostic purposes. Shows the operating status of bus electronics and communication. Displays EtherCAT® errors. Displays the status of the communication between FSE24B and MOVITRAC® B. Connection of the DC 24 V supply for the FSE24B communication option and MOVITRAC® B. 1: DC 24 V 2: GND Incoming EtherCAT® connection. Outgoing EtherCAT® connection. |



4.3 Pin assignment X30 IN/OUT

Use prefabricated, shielded RJ45 plug connectors to IEC11801 edition 2.0, category 5.



3011902475

- A View from front
- 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

4.3.1 FSE24B – EtherCAT® connection

The FSE24B communication option is equipped with two RJ45 connectors for a linear bus structure. The EtherCAT® master is connected (if necessary, via additional EtherCAT® slaves) to X30 IN (RJ45) with a shielded, twisted-pair cable. Additional EtherCAT® units are then connected via X30 OUT (RJ45).

INFORMATION



In accordance with IEC 802.3, the maximum permitted cable length for 100 MBd Ethernet (100BaseT), e.g. between two FSE24B units, is 100 m.

4.4 Shielding and routing bus cables

Only use shielded cables and connection elements that also meet the requirements of category 5, class D according to IEC11801, edition 2.0.

Correct shielding of the bus cable attenuates electrical interference that can 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 metalized housing.
- Connect the shielding in the connector over a wide surface area.
- Apply the shielding of the bus cable 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.



INFORMATION



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 in accordance with relevant VDE regulations in such a case.

4.5 Bus termination

Bus termination (e.g. with bus terminating resistors) is not necessary. If no slave is connected to an EtherCAT® device, it recognizes this immediately.

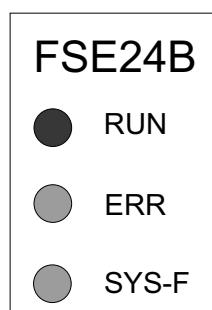
4.6 Setting the station address

EtherCAT® devices from SEW-EURODRIVE do not have an address that can be set on the unit. The units are detected by their position in the bus structure and are assigned an address by the EtherCAT® master. The addresses can be displayed, for example, using the FBG60B keypad (parameter P093).

You can set a fixed, additional device ID at the back of the FSE24B using the DIP switches S1 and S2. The device ID can be read in MOVITOOLS® MotionStudio via parameter group P09_ or via SDO access to index 10497, subindex 3, from the EtherCAT® master.

4.7 Status LEDs of FSE24B

The FSE24B EtherCAT® communication option has three LEDs that indicate the current status of the FSE24B, the EtherCAT® system, and the connection to MOVITRAC® B.



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4.7.1 LED RUN (green)

The **RUN** LED (green) indicates the status of the FSE24B communication option.

| Condition | State | Description |
|----------------------|------------------|---|
| Off | INIT | Option FSE24B communication option is in the state INIT. |
| Flashing | PRE-OPERATIONAL | Mailbox communication is possible but no process data communication |
| Flashing once | SAFE-OPERATIONAL | Mailbox and process data communication is possible. The slave outputs are not output yet. |
| On | OPERATIONAL | Mailbox and process data communication is possible. |

4.7.2 LED ERR (red)

The LED **ERR** (red) indicates an EtherCAT® error.

| Condition | Error | Description |
|-----------------------------|-------------------------------------|---|
| Off | No error | The EtherCAT® communication of FSE24B is in the operating state. |
| Flickering | Boot error | A boot error was detected. The state INIT was achieved, but the "Change" parameter in the AL status register has been set to "0x01:change/error". |
| Flashing | Invalid configuration | General configuration error. |
| Flashing once | Unprompted state change | The slave application has changed the EtherCAT® state automatically. The "Change" parameter in the AL state register is set to "0x01:change/error". |
| Flashing twice | Timeout of the application watchdog | A watchdog timeout has occurred in the application. |
| Flashing three times | Reserved | - |
| Flashing four times | Reserved | - |
| On | PDI watchdog timeout | A PDI watchdog timeout occurred. |



Definition of display statuses

| Display | Definition | Timeline | |
|----------------------|--|----------|------------|
| On | Display is switched on permanently. | | |
| Off | Display is switched off permanently. | | |
| Flickering | The display switches between on and off with a frequency of 10 Hz. | | 3013055499 |
| Flickering once | The display flickers once very shortly, followed by an off phase. | | 3013416843 |
| Flashing | Display switches on and off at a frequency of 2.5 Hz (200 ms on, 200 ms off). | | 3013456907 |
| Flashing once | The display flashes once shortly (200 ms), followed by a longer off phase (1000 ms). | | 3013459851 |
| Flashing twice | The display flashes twice in quick succession, followed by an off phase. | | 3013463435 |
| Flashing three times | The display flashes three times in quick succession, followed by an off phase. | | 3013466379 |
| Flashing four times | The display flashes four times in quick succession, followed by an off phase. | | 3014762123 |

4.7.3 LED SYS-F (red)

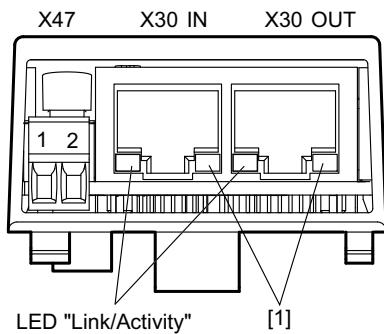
The LED **SYS-F** (red) shows the status of the communication between the FSE24B front module and MOVITRAC® B.

| Condition | Error | Description |
|-----------|------------------|---|
| Off | No error | Communication between the FSE24B front module and MOVITRAC® B is without faults. |
| On | No communication | No communication between the FSE24B front module and MOVITRAC® B. Check the P88. parameters in MOVITRAC® B: <ul style="list-style-type: none"> • Baud rate (CAN) = 500 kBd • Profile (CAN) = MOVLINK® • SBus address = 0 |



4.7.4 LED Link/Activity (green)

Each EtherCAT® port for incoming EtherCAT® cables (X30 IN) and outgoing EtherCAT® cables (X30 OUT) has a "Link/Activity" LED. It indicates whether the EtherCAT® connection to the preceding or following unit is available and active.



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[1] = No function



5 Configuration and Startup

This chapter contains information about the configuration of the EtherCAT® master and startup of MOVITRAC® B for fieldbus operation.

INFORMATION



The latest versions of the XML files for FSE24B are available on the SEW website (www.sew-eurodrive.com) under the heading "Software".

5.1 Validity of the XML file for the FSE24B communication option

INFORMATION



Do not edit or amend the entries in the XML file. SEW assumes no liability for inverter malfunctions caused by a modified XML file!

5.2 Configuration of the EtherCAT® master for MOVITRAC® B with XML file

5.2.1 XML file for running the FSE24 communication option on MOVITRAC® B

For the configuration of the EtherCAT® master, you can use a special XML file (SEW_FSE24B.XML). Copy this file into a designated directory of your configuration software.

Refer to the manuals of the respective configuration software for details on the procedure.

The XML files standardized by the EtherCAT® Technology Group (ETG) can be read by all EtherCAT® masters.

5.2.2 Project planning procedure

Proceed as follows to configure MOVITRAC® B with EtherCAT® fieldbus interface:

1. Install (copy) the XML file according to the requirements of your project planning software. Once the file has been installed correctly, the unit appears next to the slave stations (under SEW-EURODRIVE → Drives) with the designation *MOVITRAC+FSE24B*.
2. Use the menu item [Insert] to add the unit to the EtherCAT® structure. The address is assigned automatically. For easier identification, you can give the unit a name.
3. Select the process data configuration required for your application (see chapter "PDO configuration").
4. Link the I/O or periphery data with the input and output data of the application program.

After configuration, you can start the EtherCAT® communication. The LEDs RUN and ERR indicate the communication status of FSE24B (see chapter "Status LEDs of FSE24B").

5.2.3 Configuration of process data objects (PDO)

In the CoE (CAN application protocol over EtherCAT®) variant, EtherCAT® uses the process data objects (PDO) defined in the CANopen standard for cyclic communication be-



Configuration and Startup

Configuration of the EtherCAT® master for MOVITRAC® B with XML file

tween master and slave. In line with CANopen, a difference is made between Rx (receive) and Tx (transmit) process data objects.

Rx process data objects

Rx process data objects (Rx-PDO) are received by the EtherCAT® slave. They transport process output data (control values, setpoints, digital output signals) from the EtherCAT® master to the EtherCAT® slave.

Tx process data objects

Tx process data objects (TX-PDO) are returned from the EtherCAT® slave to the EtherCAT® master. They transfer process input data (actual values, statuses, digital input information, etc.).

Two PDOs of different size can be used for cyclic process input and output data for communication with the FSE24B of MOVITRAC® B.

- *OutputData1* (standard 3 PO)

Static PDO with 3 cyclic process output data words that are connected in fixed configuration with the standard process data of MOVITRAC® B (see "MOVITRAC® B Communication and Fieldbus Unit Profile" manual).

- *OutputData1* (standard 10 PO)

Static PDO with 10 cyclic process output data words that are connected in fixed configuration with the standard process data of MOVITRAC® B (see "MOVITRAC® B Communication and Fieldbus Unit Profile" manual). The process output data words 4 – 10 can only be used via IPOS^{plus®}.

- *InputData1* (standard 3 PI)

Static PDO with 3 cyclic process input data words that are connected in fixed configuration with the standard process data of MOVITRAC® B (see "MOVITRAC® B Communication and Fieldbus Unit Profile" manual).

- *InputData1* (standard 10 PI)

Static PDO with 10 cyclic process input data words that are connected in fixed configuration with the standard process data of MOVITRAC® B (see "MOVITRAC® B Communication and Fieldbus Unit Profile" manual). The process input data words 4 – 10 can only be used via IPOS^{plus®}.

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- Either 3 or 10 process data words can be transmitted in each direction. If, for example, PDO *OutputData1* (standard 3 PO) is used, PDO *InputData1* (standard 3 PI) must be used as well.
- Both input PDO or both output PDO may not be activated at the same time.

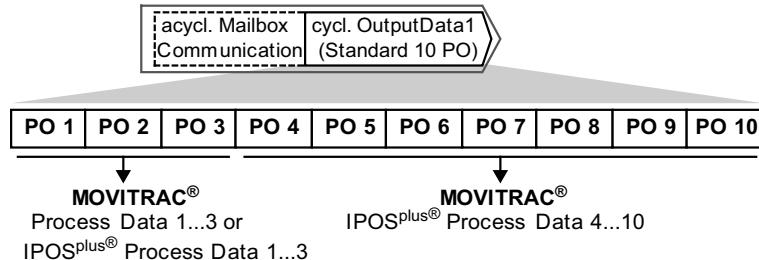
List of the possible process data objects (PDO) for FSE24B MOVITRAC® B

| Index | Size | Name | Mapping | Sync Manager | Sync Unit |
|----------------------|----------|------------------------------|---------------|--------------|-----------|
| 1600hex (5632dec) | 6 bytes | OutputData1 (standard 3 PO) | Fixed content | 2 | 0 |
| 1601hex (5633dec) | 20 bytes | OutputData1 (standard 10 PO) | Fixed content | 2 | 0 |



| Index | Size | Name | Mapping | Sync Manager | Sync Unit |
|----------------------|----------|-----------------------------|---------------|--------------|-----------|
| 1A00hex (6656dec) | 6 bytes | InputData1 (standard 3 PI) | Fixed content | 3 | 0 |
| 1A01hex (6657dec) | 20 bytes | InputData1 (standard 10 PI) | Fixed content | 3 | 0 |

Example: Static PDO for 10 cyclic process data words



3015756555

The process output data transported with *OutputData1* are assigned according to the following table. The process output data PO1 – PO3 can be linked with various process data (control words, setpoints) via the process data configuration in the MOVITRAC® B frequency inverter (see "MOVITRAC® B Communication and Fieldbus Unit Profile" manual). The process output data PO4 – PO10 are only available in IPOS^{plus}®.

Assignment of the preset process output data

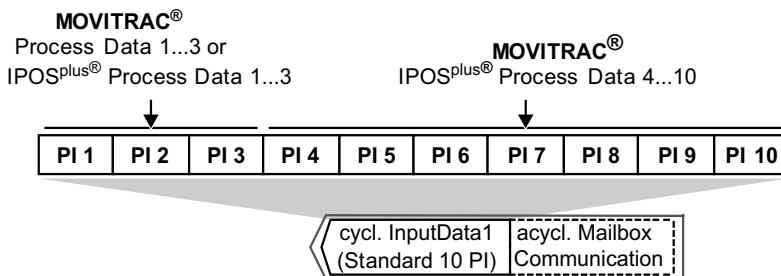
| Index.Subindex | Offset in the PDO | Name | Data type | Size in bytes |
|---------------------------|-------------------|------|-----------|---------------|
| 3DB8.0hex (15800.0dec) | 0.0 | PO1 | UINT | 2 |
| 3DB9.0hex (15801.0dec) | 2.0 | PO2 | UINT | |
| 3DBA.0hex (15802.0dec) | 4.0 | PO3 | UINT | |
| 3DBB.0hex (15803.0dec) | 6.0 | PO4 | UINT | |
| 3DBC.0hex (15804.0dec) | 8.0 | PO5 | UINT | |
| 3DBD.0hex (15805.0dec) | 10.0 | PO6 | UINT | |
| 3DBE.0hex (15806.0dec) | 12.0 | PO7 | UINT | |
| 3DBF.0hex (15807.0dec) | 14.0 | PO8 | UINT | |
| 3DC0.0hex (15808.0dec) | 16.0 | PO9 | UINT | |
| 3DC1.0hex (15809.0dec) | 18.0 | PO10 | UINT | |



Configuration and Startup

Configuration of the EtherCAT® master for MOVITRAC® B with XML file

Example: Assignment of the preset process output data

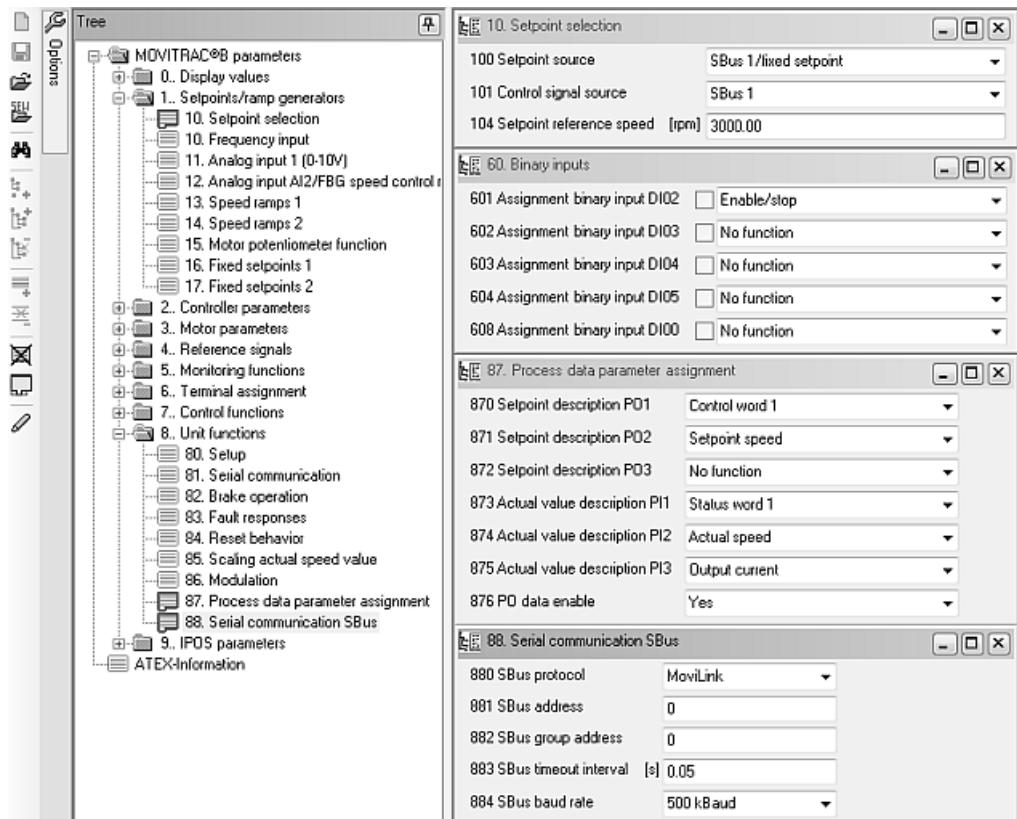


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The process input data transferred with *InputData1* are permanently assigned according to the following table. The process input data PI1 – PI3 can be linked with various process data (status words, actual values) via the process data configuration in the MOVITRAC® B frequency inverter (see "MOVITRAC® B Communication and Fieldbus Unit Profile" manual). The process input data PI4 – PI10 are only available in IPOSplus®.

| Index.Subindex | Offset in the PDO | Name | Data type | Size in bytes |
|---------------------------|-------------------|------|-----------|---------------|
| 3E1C.0hex (15900.0dec) | 0.0 | PI1 | UINT | 2 |
| 3E1D.0hex (15901.0dec) | 2.0 | PI2 | UINT | |
| 3E1E.0hex (15902.0dec) | 4.0 | PI3 | UINT | |
| 3E1F.0hex (15903.0dec) | 6.0 | PI4 | UINT | |
| 3E20.0hex (15904.0dec) | 8.0 | PI5 | UINT | |
| 3E21.0hex (15905.0dec) | 10.0 | PI6 | UINT | |
| 3E22.0hex (15906.0dec) | 12.0 | PI7 | UINT | |
| 3E23.0hex (15907.0dec) | 14.0 | PI8 | UINT | |
| 3E24.0hex (15908.0dec) | 16.0 | PI9 | UINT | |
| 3E25.0hex (15909.0dec) | 18.0 | PI10 | UINT | |

5.3 Setting the MOVITRAC® B frequency inverter



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To control the MOVITRAC® B frequency inverter via EtherCAT®, you must set the parameters *P100 Setpoint source* and *P101 Control signal source* to "SBus". With the setting "SBus", the MOVITRAC® B frequency inverter is parameterized for receiving the setpoints from the FSE24B communication option. The inverter's SBUS address (*P881 SBus address*) must be set to "0" to ensure flawless communication. As of firmware version "11" this setting is performed automatically when using the FSE24B communication option. The MOVITRAC® B frequency inverter now responds to the process output data transmitted from the master programmable controller.

FSE24B automatically sets the SBUS1 timeout interval (*P883*) to 20 ms to ensure that the MOVITRAC® B frequency inverter can stop when the communication with the higher level controller is interrupted.

For safety reasons, you must also enable the frequency inverter at the terminals for control via the fieldbus system. Consequently, you must wire and program the terminals in such a way that the inverter is enabled via the input terminals. The simplest way of enabling the frequency inverter at the terminals is to connect the DI01 (function CW/STOP) input terminal to a +24 V signal and to program the remaining input terminals to NO FUNCTION.

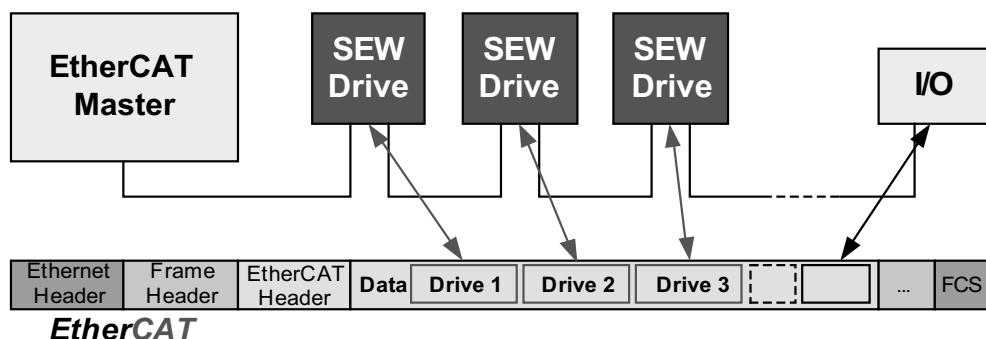


6 Operating Behavior in Connection with EtherCAT®

This chapter describes the basic behavior of the frequency inverter in connection with EtherCAT® with control via process data objects (PDO) for fieldbus communication.

6.1 Control of the MOVITRAC® B frequency inverter

The MOVITRAC® B frequency inverter is controlled via the fixed PDO, which are 3 or 10 process data words long. When using an EtherCAT® master, the process data words are directly mapped in the process image and can so be addressed directly by the control program.



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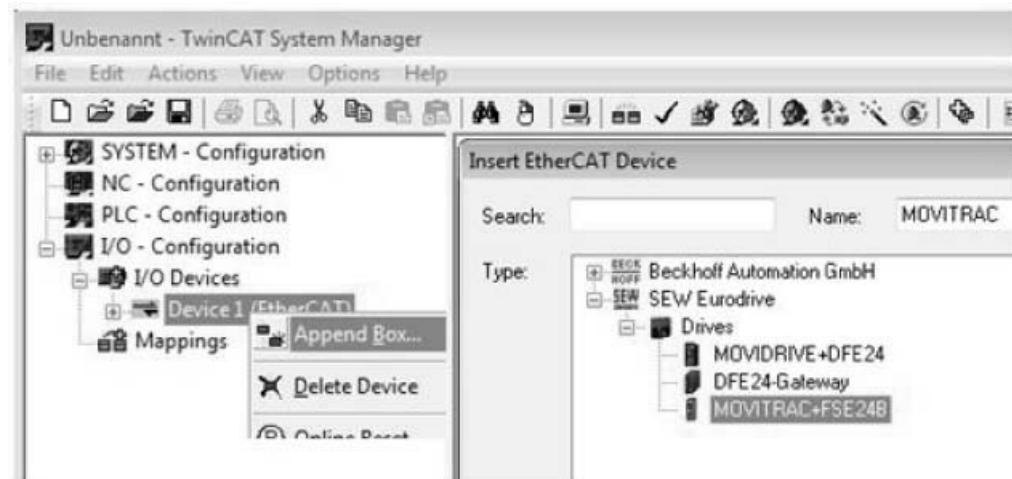


For more information about control via the process data channel, in particular regarding the coding of the control and status word, refer to the "MOVITRAC® B Communication and Fieldbus Unit Profile" manual



6.1.1 Control example in TwinCAT with MOVITRAC® B

Once the file *SEW_FSE24B.xml* has been copied to the TwinCAT subdirectory "*\IO\EtherCAT*", you can use the function "Append box" in the "offline" mode to insert a MOVITRAC® B in the EtherCAT® structure (see following figure).



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In "online" mode (i.e. when connected with the EtherCAT® line), you can use the symbol "Find devices" to search the EtherCAT® line for connected MOVITRAC® units (see following figure).

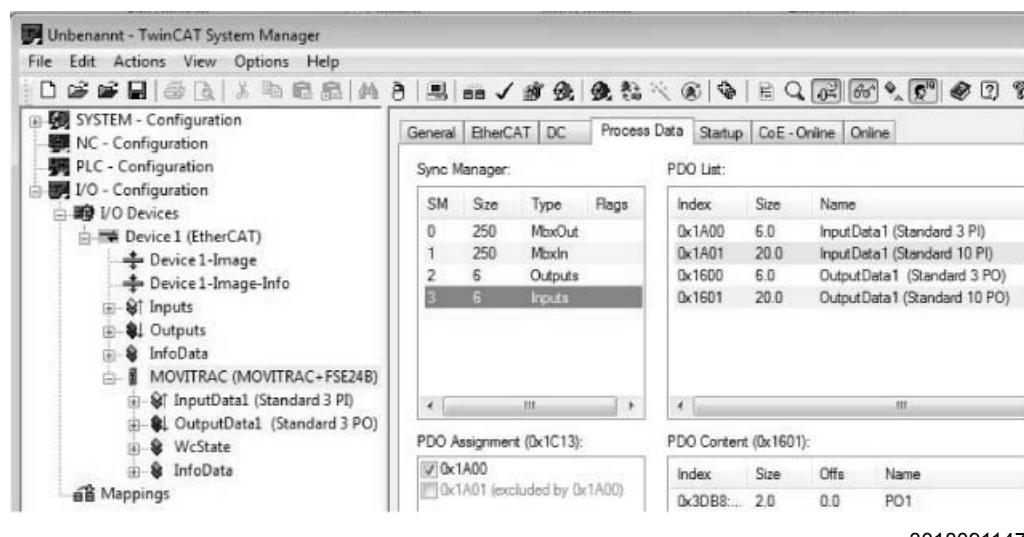


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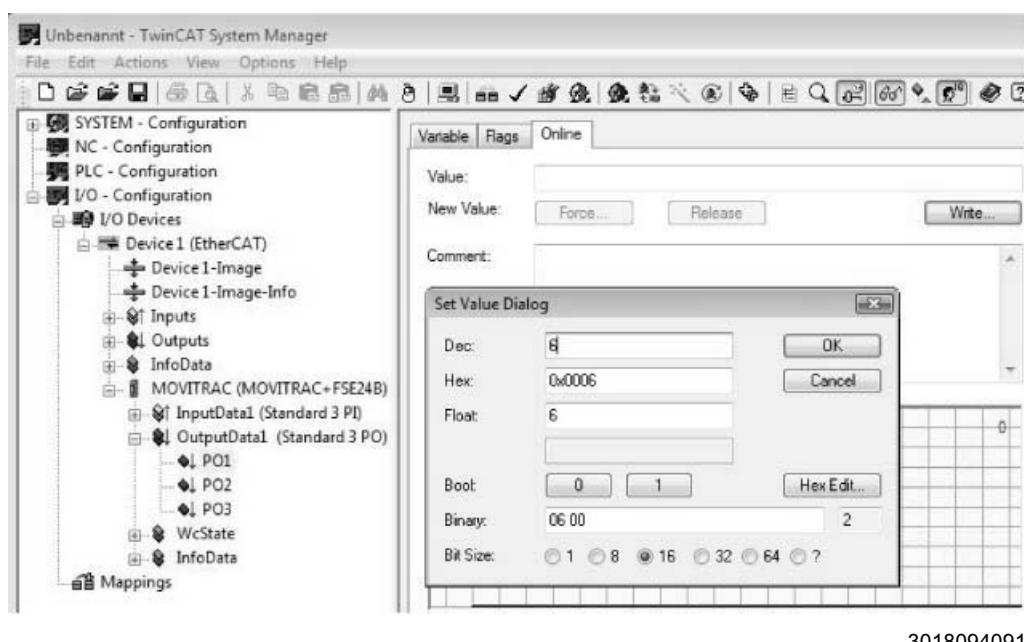
For the simplest form of process data transport, only the two PDOs *InputData1* and *OutputData1* are required.



Operating Behavior in Connection with EtherCAT® Control of the MOVITRAC® B frequency inverter



Now, you can link the process data words to the PLC program or write data into them for manual testing as shown in the following figure.



First, mark the process output data PO1. In the window that appears, choose the tab page "Online". Click on the "Write" button. The "Set Value Dialog" window opens. Enter your data in the field "Dec" or "Hex". Handle the PO2 process output data in the same way.

The process input and output data words are assigned and scaled in MOVITRAC® B in the parameter group 87_ or defined via an IPOS^{plus®} program or application module.

For more information, refer to the MOVITRAC® B system manual and the "MOVITRAC® B Communication and Fieldbus Unit Profile" manual.

6.1.2 Communication timeout between EtherCAT®, FSE24B and MOVITRAC® B

If the data transmission via EtherCAT® is interrupted or faulty, the response monitoring time configured in the master elapses in the FSE24B communication option. The ERR



LED of FSE24B indicates that no new user data is being received. At the same time, FSE24B interrupts the process data communication with MOVITRAC® B, which means that after 20 ms, the SBus timeout response (P836) set in MOVITRAC® B is triggered.

If the FSE24B communication option can no longer address a MOVITRAC® B unit, it sends the error code *F111 System error* on status word 1 (if set in parameter group 87_) to the EtherCAT® master. SYS-F LED (system error) is lit.

The status of the EtherCAT® connection, the assigned EtherCAT® address and other status information is displayed in parameter group 09_ (bus diagnostics) (with MOVITRAC® firmware 18225632.11 and higher).

6.1.3 Unit error

The FSE24B communication option detect a series of errors and locks subsequently. All status LEDs are off.

6.2 Parameterization via EtherCAT®

The SDO services READ and WRITE, which are common in CoE (CAN application protocol over EtherCAT®), provide access to the drive parameter in EtherCAT®.

6.2.1 SDO services READ and WRITE

The user interface is displayed differently depending on the EtherCAT® master or configuration environment. In each case, however, the following data is required for executing the SDO command.

| SDO-READ | Description |
|------------------------------------|---|
| Slave address (16 bit) | EtherCAT® address of the inverter from which data is to be read. |
| Index (16 bit) Subindex (8 bit) | Address in the object dictionary from which the data is to be read. |
| Data Data length | Structure for storing the received data and its length. |

| SDO-WRITE | Description |
|------------------------------------|--|
| Slave address (16 bit) | EtherCAT® address of the inverter to which data is to be written. |
| Index (16 bit) Subindex (8 bit) | Address in the object dictionary to which the data is to be written. |
| Data Data length | Structure in which the data to be written is stored. |

For the SDO services READ and WRITE, other flags and parameters might be necessary:

- For activating the function
- For in-progress message or error message
- For timeout monitoring
- For reporting errors during the execution



6.2.2 Example of reading a parameter in TwinCAT via EtherCAT®

The function SDO-READ is available for reading parameters. The index of the parameter to be read is necessary. The parameter index is displayed in the parameter tree via tool tip.

For implementation in TwinCAT, the function module *FB_EcCoESdoRead* is required. This function module is available in the *TcEtherCAT.lib* library. This function module can be integrated in two steps.

1. Creating an instance of the function module *FB_EcCoESdoRead*.
2. The inputs of the function module are assigned as follows:
 - sNetID: Net ID of the EtherCAT® master
 - nSlaveAddr: EtherCAT® address of the SEW unit from which data is to be read.
 - nIndex: Index of the parameter to be read.
 - nSubIndex: Subindex of the parameter to be read.
 - pDstBuf: Pointer to the data range in which the read parameter is to be stored.
 - cbBufLen: Maximum memory size for parameters to be read in byte.
 - bExecute: A positive edge starts the read process.
 - tTimeout: Timeout interval of the function module.

The output flags *bBusy* and *bError* indicate the status of the service. *nErrId* shows the error number when the *bError* flag is set if an error occurs.

The function module is integrated in TwinCAT as follows:

```

TwinCAT PLC Control - ReadPdo.pro - [MAIN (PRG-ST)]
File Edit Project Insert Extras Online Window Help
POUs MAIN (PRG)
0001 PROGRAM MAIN
0002 VAR
0003   Read_Data: DWORD;
0004   ReadSdo: FB_EcCoESdoRead;
0005 END_VAR
0006
0007 IF ReadSdo.bBusy = FALSE THEN
0008   ReadSdo(bexecute:=TRUE);(*rising edge for the execute input*)
0009 ELSE
0010   ReadSdo(
0011     sNetId:= '192.168.187.1.2.1', (*AMS Net-ID of the EtherCAT-master*)
0012     nSlaveAddr:= 1001,           (*EtherCAT-Address of the SEW device*)
0013     nIndex:= 8325,             (*e.g. DC link voltage index*)
0014     nSubIndex:= 0,
0015     pDstBuf:= ADR(Read_Data), (*pointer to the variable*)
0016     cbBufLen:= 4,              (*number of Bytes of the index*)
0017     bExecute:= FALSE,
0018     tTimeout:= T#500ms,
0019   );
0020 END_IF
0021
0022 Loading library 'CATWINCAT\PLCLIB\TcUtilities.lib'
0023
0024 Target: Local (192.168.187.1.1.1), Run Time: 1 TwinCAT Config Mod

```

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SEW parameter always have a data length of 4 bytes (1DWord). Refer to the "MOVITRAC® B Communication and Fieldbus Unit Profile" manual for more details and information on scaling.

In the above example, the DC link voltage was read off (index 8325, subindex 0). For example, the figure 639000 is received, which - according to the fieldbus unit profile - corresponds to a voltage of 639 V.

6.2.3 Example of writing a parameter in TwinCAT via EtherCAT®

The function SDO-WRITE is available for writing parameters. The index of the parameter to be written is necessary. You can display the parameter index in the SHELL program or in the parameter tree using the key combination [CTRL + F1].

For implementation in TwinCAT, the function module *FB_EcCoESdoWrite* is required. This function module is available in the *TcEtherCAT.lib* library. You can integrate this function module in two steps.

1. Creating an instance of the function module *FB_EcCoESdoWrite*
2. The inputs of the function module are assigned as follows:
 - sNetID: Net ID of the EtherCAT® master
 - nSlaveAddr: EtherCAT® address of the SEW unit from which data is to be written.
 - nIndex: Index of the parameter to be written.
 - nSubIndex: Subindex of the parameter to be written.
 - pDstBuf: Pointer to the data range in which the data to be written is located.
 - cbBufLen: Amount of data to be sent, in bytes.
 - bExecute: A positive edge starts the writing process.
 - tTimeout: Timeout interval of the function module.

The output flags *bBusy* and *bError* indicate the status of the service. *nErrId* shows the error number when the *bError* flag is set if an error occurs.



The function module is integrated in TwinCAT as follows:

```

TwinCAT PLC Control - WriteSDO.pro - [MAIN (PRG-ST)]
File Edit Project Insert Extras Online Window Help
POUs MAIN (PRG)
0001 PROGRAM MAIN
0002 VAR
0003     Write_Data: DWORD:=100000; (*set internal setpoint n11 to 100 1/min*)
0004     WriteSdo: FB_EcCoESdoWrite;
0005 END_VAR
0006
0007 IF WriteSdo.bBusy = FALSE THEN
0008     WriteSdo(bexecute:=TRUE);(*rising edge for the execute input*)
0009 ELSE
0010     WriteSdo(
0011         sNetId:= '192.168.187.1.2.1', (*AMS NetID of the EtherCAT-master*)
0012         nSlaveAddr:= 1001,          (*EtherCAT-Address of the SEW device*)
0013         nIndex:= 8489,            (*Index of the internal setpoint n11*)
0014         nSubIndex:= 0,
0015         pSrcBuf:= ADR(Write_Data),(*pointer to the source variable*)
0016         cbBufLen:= 4,              (*number of Bytes of the index*)
0017         bExecute:= FALSE,
0018         tTimeout:= T#500ms
0019     );
0020 END_IF

```

Loading library 'C:\TWINCAT\PLC\LIB\STANDARD.LIB'

Target: Local (192.168.187.1.1), Run Time: 1 TwinCAT Config Mod

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SEW parameter always have a data length of 4 bytes (1DWord). Refer to the "Fieldbus Unit Profile" manual for more details and information on scaling.

In the above example, the internal setpoint n11 (index 8489, subindex 0) was set to a speed of 100 rpm. According to the "MOVITRAC® B Communication and Fieldbus Unit Profile" manual, the required speed must be multiplied by a factor of 1000.

6.3 Parameterization return codes

In the event of an incorrect parameterization, the inverter sends back various return codes to the parameterized master. These codes provide detailed information about the cause for the error. Refer to the "MOVITRAC® B Communication and Fieldbus Unit Profile" manual for a description of the return codes.



7 Operating MOVITOOLS® MotionStudio via EtherCAT®

The use of the engineering software MOVITOOLS® MotionStudio is described in detail in the "MOVITRAC® B Communication and Fieldbus Unit Profile" manual and in the MOVITRAC® B system manual. This chapter only describes the peculiarities of the communication via EtherCAT® in detail.

7.1 About MOVITOOLS® MotionStudio

7.1.1 Tasks

The software package enables you to perform the following tasks:

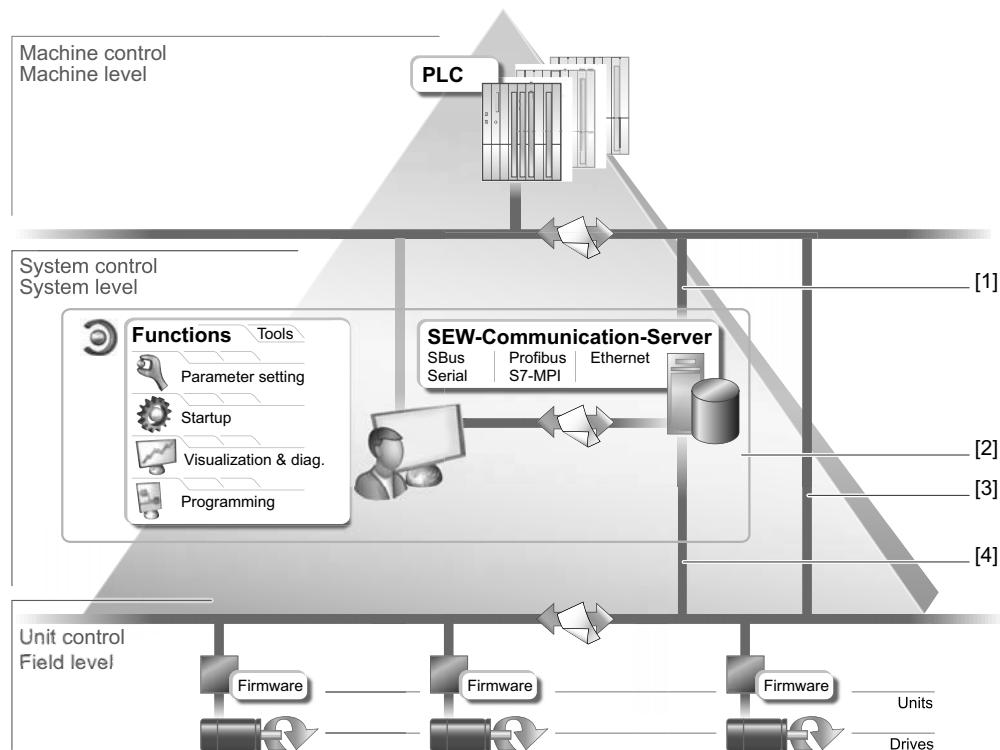
- Establishing communication with units
- Executing functions with the units

7.1.2 Functional principle

Overview

The following figure illustrates the functional principle of the MOVITOOLS® MotionStudio software package.

Note that the illustration shows only the logical communication correlation and not the hardware connections.



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- [1] Communication channel for fieldbus or Industrial Ethernet
- [2] MOVITOOLS® MotionStudio software package with integrated SEW Communication Server
- [3] Communication between fieldbus nodes or Industrial Ethernet
- [4] Communication channel via interface adapter to SBus (CAN) or serial



Engineering via interface adapters If your unit supports the "SBus" or "Serial" communication options, you can use a suitable interface adapter for engineering.

The interface adapter is additional hardware that you can obtain from SEW-EURODRIVE. You can use it to connect your engineering PC with the respective communication option of the unit.

The type of interface adapter you require depends on the communication options of the respective unit.

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

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

MOVITOOLS® MotionStudio supports the following types of communication channels:

- Serial (RS485) via interface adapters
- System bus (SBus) via interface adapters
- Ethernet
- EtherCAT®
- Fieldbus (PROFIBUS DP/DP-V1)
- Tool Calling Interface

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

Executing functions of the units The software package offers uniformity in executing the following functions:

- Parameterization (e. g. in the parameter tree of the unit)
- Startup
- Visualization and diagnostics
- Programming

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

- MotionStudio
- MOVITOOLS®

MOVITOOLS® MotionStudio provides the right tools for every unit type.



7.2 First steps

7.2.1 Starting the software and creating a project

Proceed as follows to start MOVITOOLS® MotionStudio and create a project:

1. Start the MOVITOOLS® MotionStudio from the Windows start menu via:
[Start] / [Programs] / [SEW] / [MOVITOOLS MotionStudio] / [MOVITOOLS MotionStudio]
2. Create a project with a name and directory.

7.2.2 Establishing communication and scanning the network

Proceed as follows to establish a communication with MOVITOOLS® MotionStudio and scan your network:

1. Set up a communication channel to communicate with your units.
For detailed information on how to configure a communication channel, refer to the section "Communication via ...".
2. Scan your network (unit scan). Press the [Start network scan] button [1] in the toolbar.



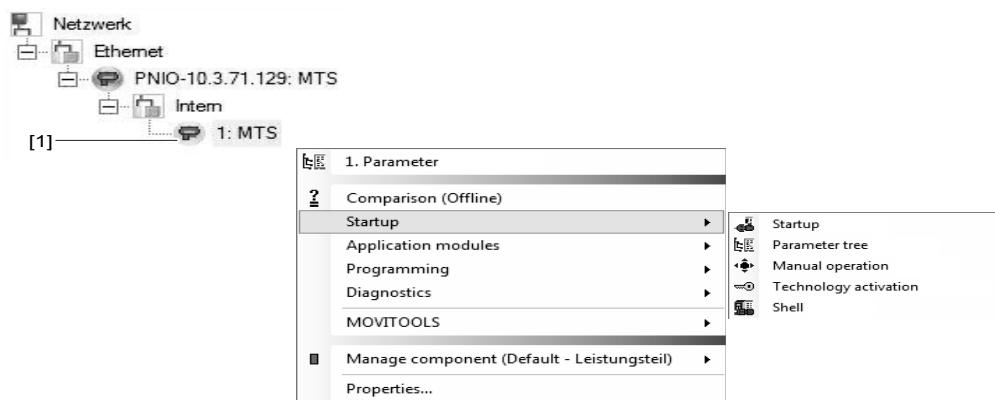
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7.2.3 Configuring units

Proceed as follows to configure a unit:

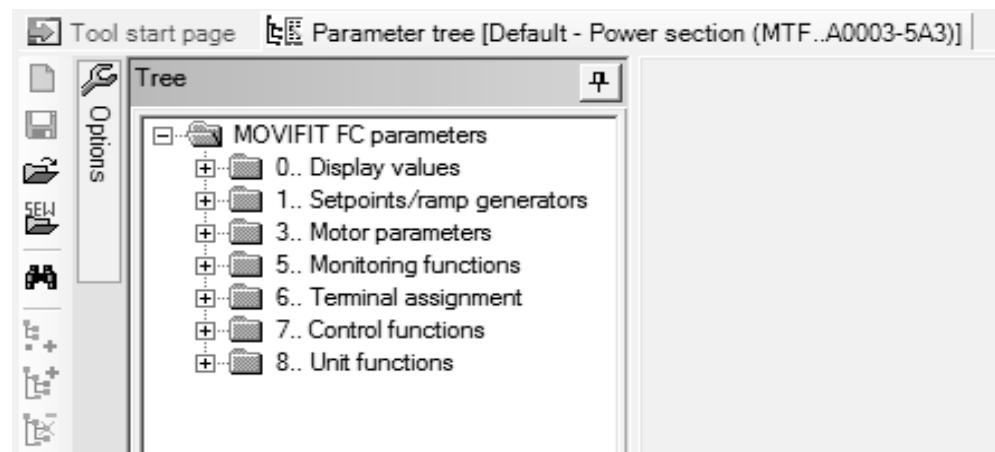
1. Select the unit (usually the power section [1]) in the network view.
2. Right-click to open the context menu and display the tools for configuring the unit.



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The example shows the context menu with the tools for a MOVIFIT® unit. The communication mode is set to "online" and the unit is scanned in the network view.

3. Select a tool (e.g. "Parameter tree") to configure the unit.



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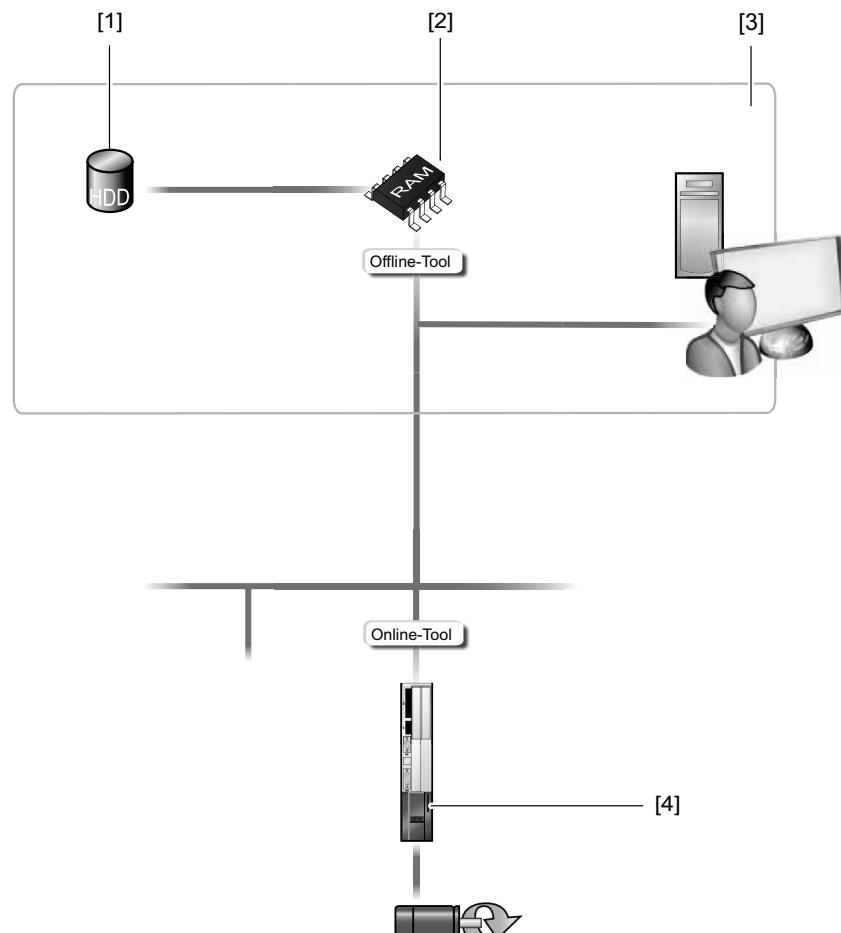


7.3 Connection Mode

7.3.1 Overview

MOVITOOLS® MotionStudio differentiates between "online" and "offline" communication mode. You can select the communication mode yourself. Depending on the selected communication mode, you can choose offline or online tools specific to your unit.

The following figure illustrates the two types of tools:



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[1] Hard drive of the engineering PC

[2] RAM of the engineering PC

[3] Engineering PC

[4] Unit

| Tools | Description |
|---------------|---|
| Offline tools | <p>Changes made using offline tools affect "ONLY" the RAM [2].</p> <ul style="list-style-type: none"> Save your project so that the changes can be stored on the hard disk [1] of your engineering PC [3]. Perform the "Download (PC -> unit)" function if you want to transfer the changes to your unit [4] as well. |
| Online tools | <p>Changes made using online tools affect "ONLY" the unit [4].</p> <ul style="list-style-type: none"> Perform the "Upload (unit -> PC)" function if you want to transfer the changes to your RAM [2]. Save your project so that the changes can be stored on the hard disk [1] of your engineering PC [3]. |



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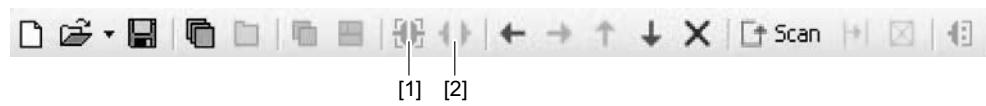
- The "online" communication mode is **NOT** a response message which informs you that you are currently connected to the unit or that your unit is ready for communication. Should you require this feedback, observe section "Setting the cyclical accessibility test" in the online help (or the manual) of MOVITOOLS® MotionStudio.
- Project management commands (such as download and upload), the online unit status, and the unit scan work independent of the set communication mode.
- MOVITOOLS® MotionStudio starts up in the communication mode that you set before you closed down.

7.3.2 Selecting the communication mode (online or offline)

Proceed as follows to select the communication mode:

1. Select the communication mode:

- "Switch to online mode" [1] for functions (online tools) that should directly influence the unit.
- "Switch to offline mode" [2] for functions (offline tools) that should influence your project.



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- [1] "Switch to online mode" symbol
 [2] "Switch to offline mode" symbol

2. Select the unit node.

3. Right-click to open the context menu and display the tools for configuring the unit.



7.4 Communication via EtherCAT®

7.4.1 Overview

EtherCAT® provides the user with acyclic parameter services in addition to cyclic process data. This acyclic data exchange takes place via the mailbox gateway of the EtherCAT® master.

The parameter services of MOVITOOLS® MotionStudio are integrated into the EtherCAT® telegrams via the mailbox gateway in the EtherCAT® master. The feedback of the drives is transferred by the EtherCAT® slave in the same way to the mailbox gateway and further to MOVITOOLS® MotionStudio.

The following cases must be distinguished for the installation of the mailbox gateway and MOVITOOLS® MotionStudio:

- Case 1: Installation on the same unit (page 36)
 - The EtherCAT® master and MOVITOOLS® MotionStudio run on **the same** unit. No additional hardware required.
- Case 2: Installation on different units (without SEW controller) (page 37)
 - The EtherCAT® master and MOVITOOLS® MotionStudio run on **different** units. This is the case if no suitable (Windows-based) operating system is available or MOVITOOLS® MotionStudio is to be run on a separate PC. The EtherCAT® master needs a second Ethernet interface that is connected to the engineering PC on which MOVITOOLS® MotionStudio is running.
- Case 3: Installation on different units (with SEW controller as EtherCAT® master)
 - The network topology is identical to case 2. If you use an SEW controller, you merely have to set the engineering access in MOVITOOLS® MotionStudio accordingly. The routing via the mailbox gateway and the EtherCAT® communication with downstream drives is performed automatically.

You can use PROFIBUS or Ethernet (SMLP not EtherCAT®) as engineering access to the SEW controller. For detailed information, refer to the documentation of the SEW controllers.

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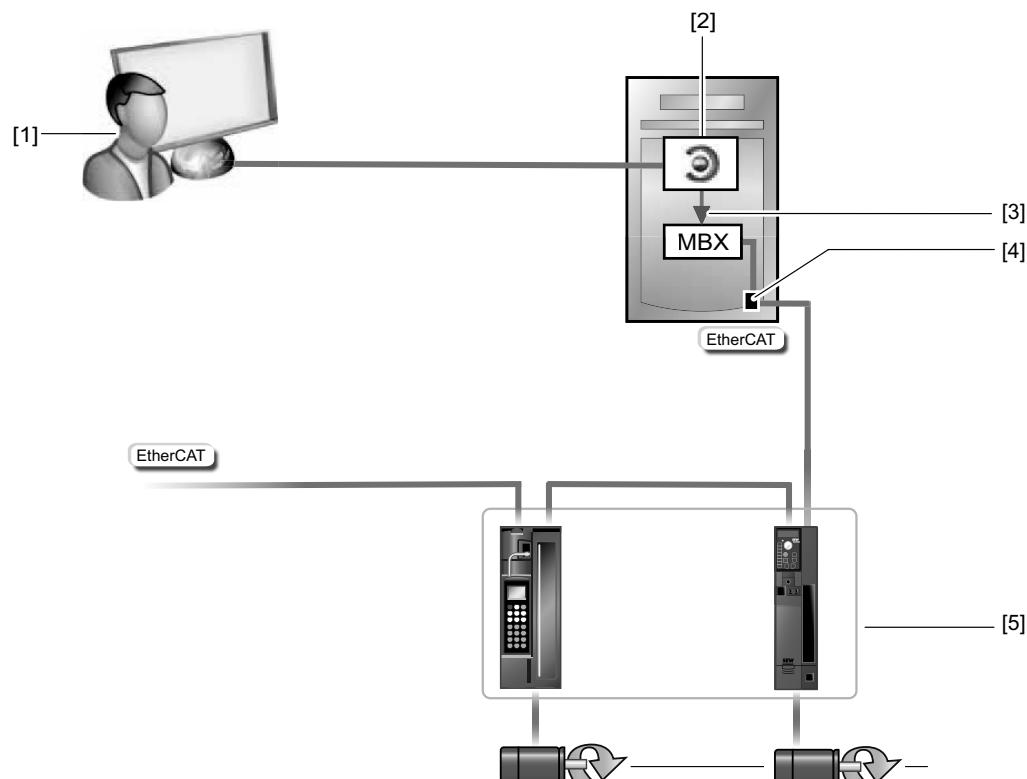
Unassigned EtherCAT® interfaces of an EtherCAT® slave must not be used for engineering purposes.

- Use only the EtherCAT® master interface intended for engineering for this purpose.



Case 1: Installation in the same unit

The illustration shows case 1: case: The EtherCAT® master and MOVITOOLS® MotionStudio are installed in **the same** unit.



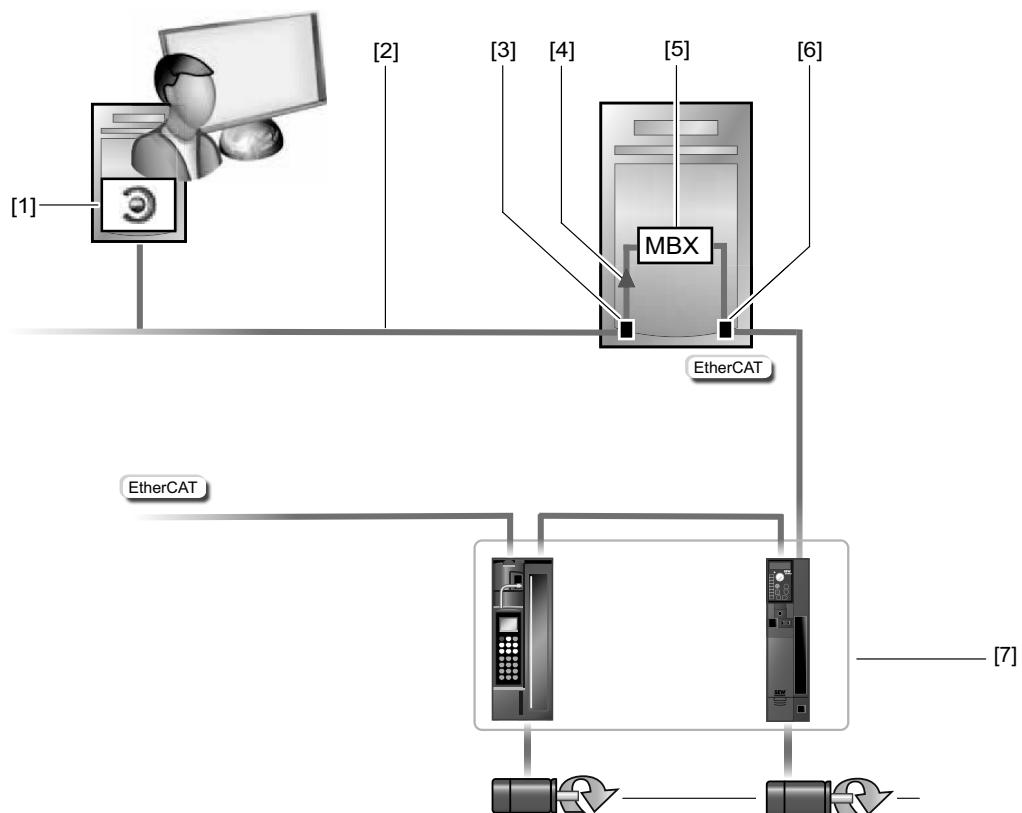
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- [1] Monitor
- [2] PC with EtherCAT® master with integrated mailbox gateway (MBX) and MOVITOOLS® MotionStudio
- [3] Internal IP routing
- [4] EtherCAT® interface
- [5] Units (examples) with EtherCAT® interfaces



Case 2: Installation in different units

The illustration shows case 2: case: The EtherCAT® master and MOVITOOLS® MotionStudio are installed in **different units**.



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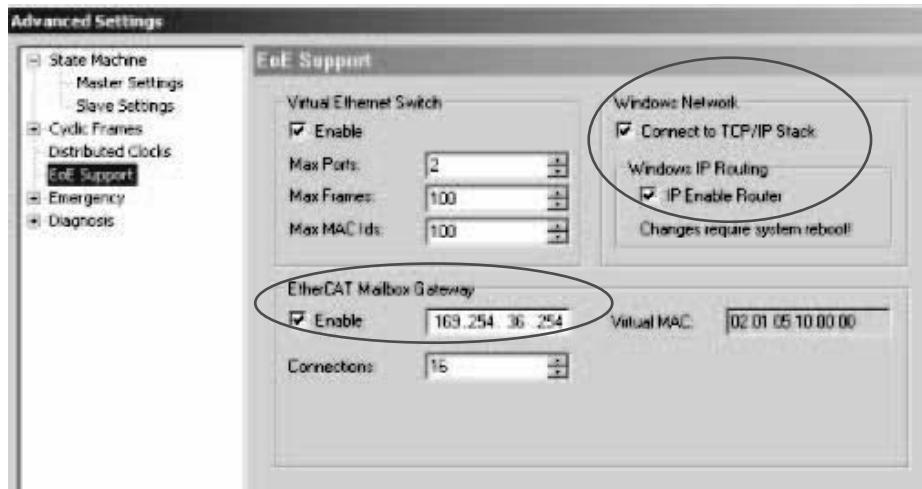
- [1] PC with Ethernet interface and MOVITOOLS® MotionStudio
- [2] Ethernet network
- [3] Engineering interface of the EtherCAT® master
- [4] Internal IP routing
- [5] EtherCAT® master (e.g. TwinCAT system) with integrated mailbox gateway (MBX)
- [6] EtherCAT® interface
- [7] Units (examples) with EtherCAT® interfaces



7.4.2 Configuration of the mailbox gateway in the EtherCAT® master

- Activate VoE/EoE support on the EtherCAT® controller.
- Activate the connection with the TCP/IP stack and IP routing.
- Specify the IP address of the EtherCAT® mailbox gateway. The IP address is usually assigned by the engineering tool (e.g. TwinCAT) and should not be changed.

In the TwinCAT program of the company Beckhoff, the above settings look as follows:



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7.4.3 Configuring the network at the engineering PC

If MOVITOOLS® MotionStudio and the EtherCAT® master are running on the same PC, you do not have to make any additional network settings.

If the EtherCAT® master is connected to an Ethernet network via an engineering interface, PCs in the same subnet can access SEW drives on EtherCAT® with MOVITOOLS® MotionStudio (see following figure). To do so, the telegrams from the engineering PC are routed via the Ethernet interface of the EtherCAT® master to the mailbox gateway (so-called routing).

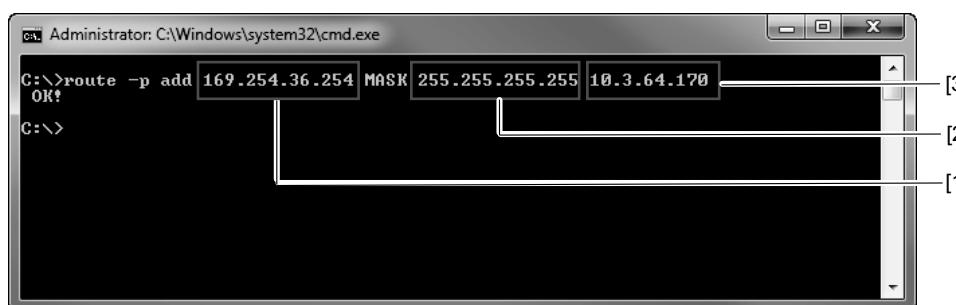
Two variants are available for routing:

1. Variant: Defining a static route.

In this variant, an entry is added to the routing table of the engineering PC that routes the engineering data via the EtherCAT® master to the mailbox gateway.

The command for creating a static route in the DOS box is:

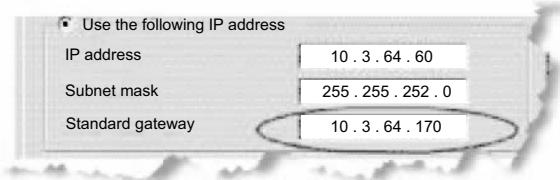
```
route -p add [Target] MASK [Netmask] [Gateway]
```



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- [1] [Target]: corresponds to the IP address of the EtherCAT® mailbox gateway in the EtherCAT® master
- [2] [Netmask]: is usually set to 255.255.255.255 (host routing)
- [3] [Gateway]: corresponds to the IP address of the EtherCAT® master (engineering interface) in the Ethernet network

- 2. Variant: Access to the mailbox gateway by determining the standard gateway on the engineering PC. In this variant, the IP address of the EtherCAT® master is specified as standard gateway.
 - On the engineering PC, open the dialog window for setting the network properties.
 - Make the following entries depending on the network:



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- | | |
|-------------------|--|
| IP address: | IP address of the engineering PC |
| Subnet mask: | Subnet mask of the engineering PC |
| Standard gateway: | IP address of the EtherCAT® master (engineering interface) in the Ethernet network |



7.4.4 Checking the network settings

Irrespective of whether MOVITOOLS® MotionStudio and the EtherCAT® master are running on the same PC or the EtherCAT® mailbox gateway is accessed via routing, you should check the network settings.

You can use the ping command to check whether the communication path to the EtherCAT® mailbox gateway is established correctly. To do so, proceed as follows:

- Open a command-line interface window on your engineering PC to enter a DOS command.
- Enter "ping" and the IP address of the EtherCAT® mailbox gateway. The complete command line for the described network setting (example) is:
`Ping 169.254.61.254`
- If there is no response to the ping command, repeat the steps described in the two previous sections:
 - Configuration of the mailbox gateway in the EtherCAT® master (page 38)
 - Configuring the network at the engineering PC (page 39)

INFORMATION

Settings of the EtherCAT® master are not adopted

- If the settings of the EtherCAT® master are not accepted, perform a reboot.





7.4.5 Communication settings in MOVITOOLS® MotionStudio

Configuring the communication channel with EtherCAT®

Proceed as follows to configure a communication channel for EtherCAT®:

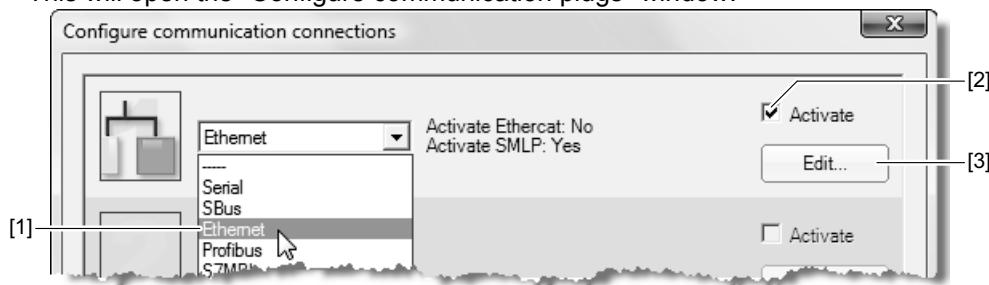
1. Click on "Configure communication plugs" [1] in the toolbar.



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[1] "Configure communication plugs" symbol

This will open the "Configure communication plugs" window.



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[1] "Type of communication" dropdown menu

[2] "Activate" checkbox

[3] [Edit] button

2. From the dropdown menu [1], select "Ethernet" as the communication type.

In the example, "ETHERNET" is activated as the communication type for the first communication channel [2].

3. Click [Edit] [3] in the right section of the window.

This will display the settings for the "Ethernet" communication type.

4. Set the communication parameters. Follow the instructions described in the section "Setting communication parameters for EtherCAT®".

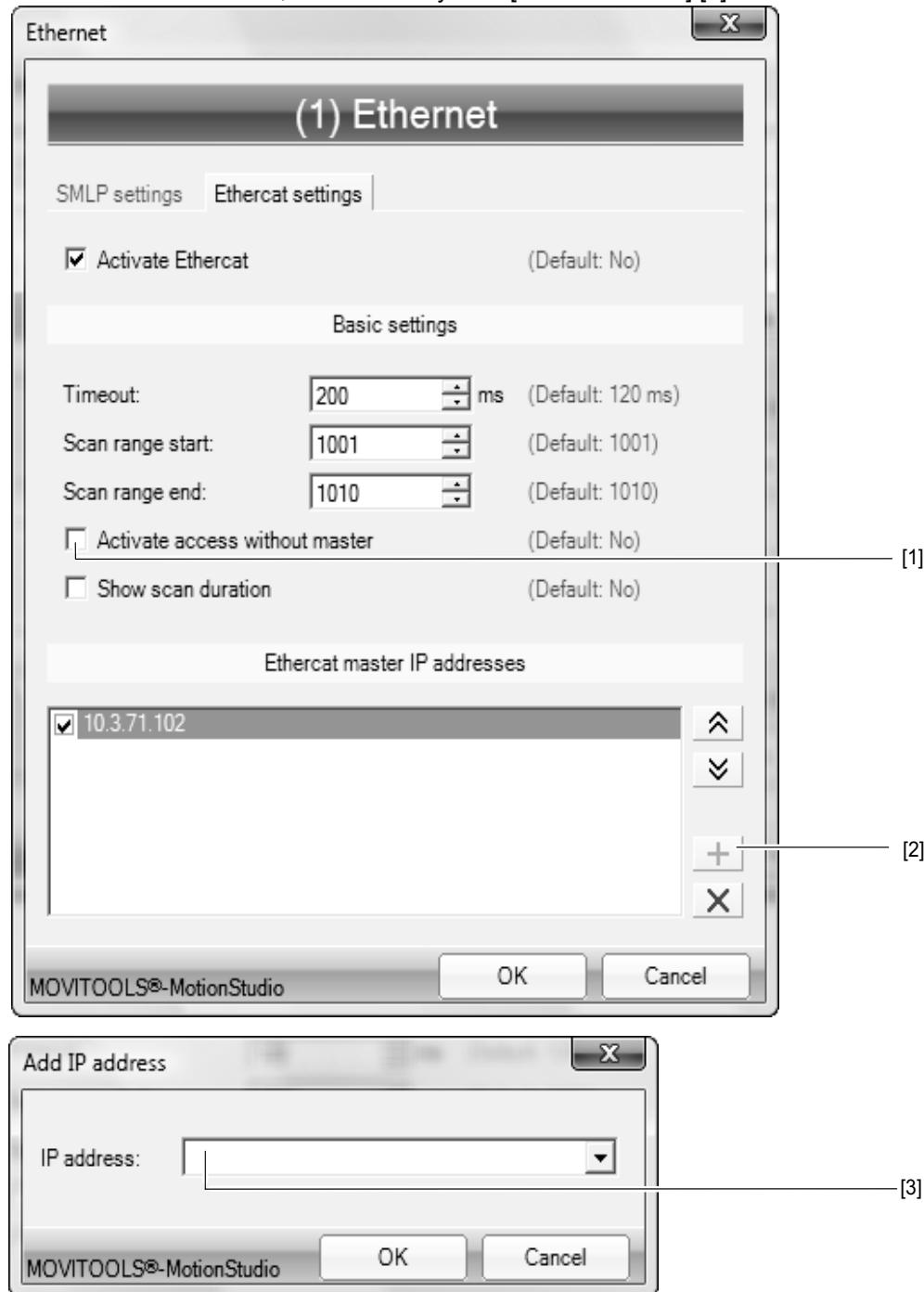
Setting communication parameters for EtherCAT®

Proceed as follows to set the EtherCAT® communication parameters:

1. Set up the EtherCAT® protocol. Select the "EtherCAT settings" tab.
2. Tick the "Activate EtherCAT" checkbox.
3. Change the set communication parameters if necessary. Refer to the detailed description of the communication parameters for EtherCAT®.



4. To add an IP address, click on the symbol [Add IP address] [2].



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- [1] "Activate access without master" check box
Note: Activate this check box only if no other master is available.

If no EtherCAT® master is available, you can activate a parameterization master in MOVITOOLS® MotionStudio.

- [2] [Add IP address] button
[3] "IP address" edit box

5. Enter the IP address of the mailbox gateway (in the EtherCAT® master) in the "IP address" input field [3] and click the [OK] button.



Communication parameters for EtherCAT®

The following table describes the communication parameters for EtherCAT®:

| Communication parameters | Description | Information |
|-----------------------------|--|--|
| Timeout | Waiting time in [ms] that the client waits for a response from the server after it has made a request. | <ul style="list-style-type: none"> Default setting: 200 ms Increase the value as required if a delay in communication is causing malfunctions. |
| Scan range of: | Start address for the EtherCAT® scan range | By entering values here, you can limit the EtherCAT® scan range and thereby shorten the length of time it takes to scan the unit. |
| Scan range end: | Stop address for the EtherCAT® scan range | |
| IP address EtherCAT® master | IP address of the mailbox gateway in the EtherCAT® master | - |

7.5 Executing functions with the units

7.5.1 Parameterizing units

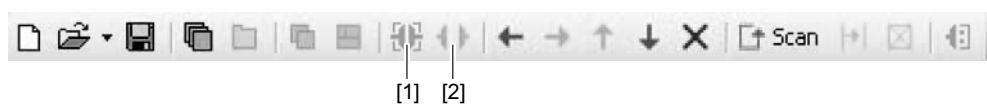
Units are parameterized in the parameter tree. The parameter tree shows all unit parameters grouped in folders.

You can manage unit parameters using the context menu or the toolbar. The following steps illustrate how to read or edit unit parameters.

7.5.2 Reading or changing unit parameters

Proceed as follows to read or change device parameters:

1. Switch to the required view (project view or network view).
2. Select the connection mode:
 - Click the "Switch to online mode" button [1] if you want to read or change parameters directly in the **unit**.
 - Click the "Switch to offline mode" button [2] if you want to read or change parameters in the **project**.



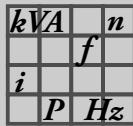
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[1] "Switch to online mode" icon

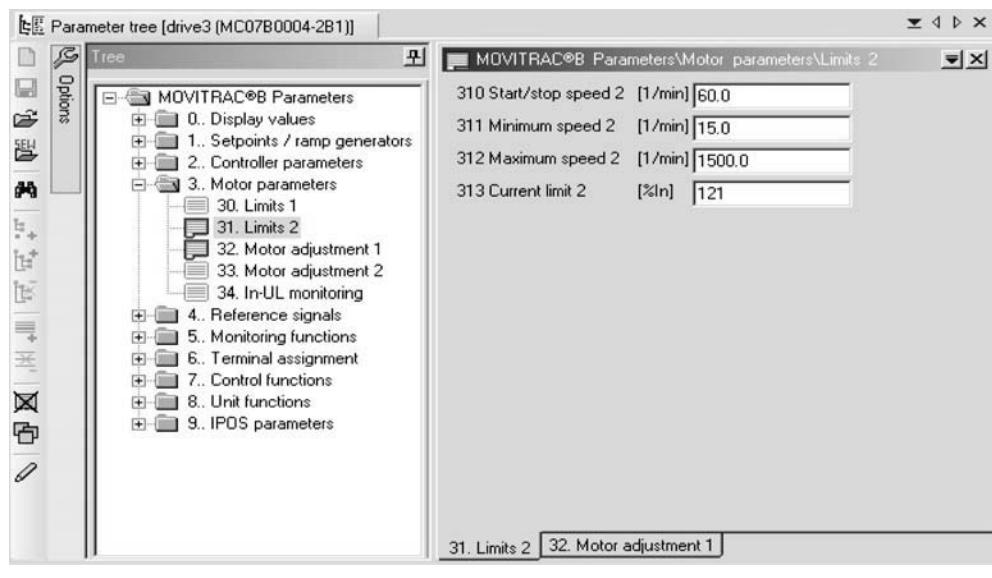
[2] "Switch to offline mode" icon

3. Select the unit you want to parameterize.
4. Open the context menu and select the command [Startup] / [Parameter tree].

Now the "Parameter tree" view opens in the right part of the monitor.



5. Expand the "Parameter tree" to the node you require.



6. Double-click to display a particular group of unit parameters.
7. Press the enter key to finalize any changes you make to numerical values in the input fields.

INFORMATION



- For detailed information about unit parameters, refer to parameter list for the unit.

7.5.3 Starting up units (online)

Proceed as follows to start up the units (online):

1. Switch to the network view.
2. Click on "Switch to online mode" [1] in the toolbar.



[1] "Switch to online mode" icon

3. Select the unit you want to startup.
4. Open the context menu and select the command [Startup] / [Startup].
The Startup wizard opens.
5. Follow the instructions of the startup wizard and then load the startup data onto your unit.



8 Error Diagnostics

8.1 Diagnostic procedures

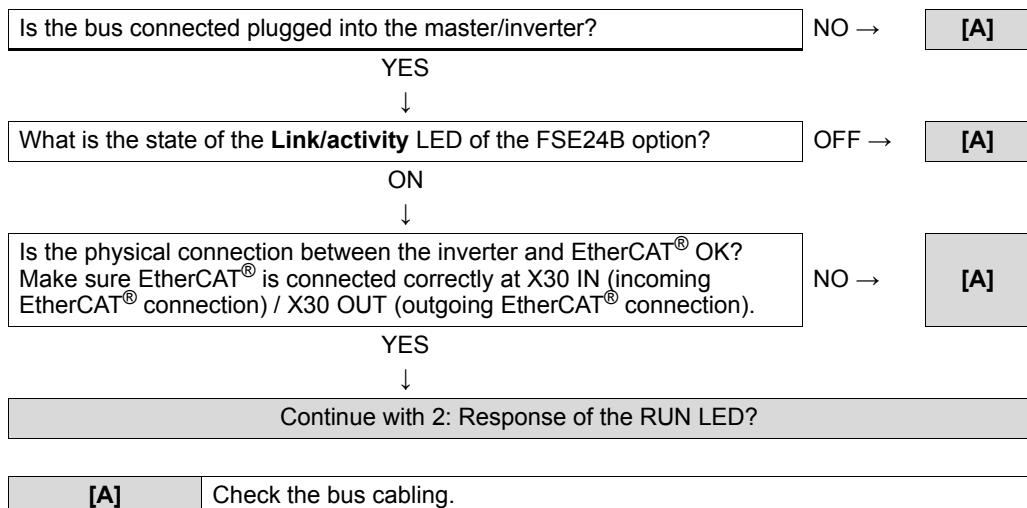
The diagnostics procedures described in the following section demonstrate the fault analysis methods for the following problems:

- Inverter does not operate on EtherCAT®
- Inverter cannot be controlled using the EtherCAT® master.

For more information dealing specifically with the inverter parameter settings for various fieldbus applications, refer to the "MOVITRAC® B Communication and Fieldbus Unit Profile" manual and the MOVITRAC® B system manual.

Observe the notes regarding the voltage supply in chapter "Installing the communication option FSE24B".

Step 1: Check the connection between the inverter and EtherCAT®



Step 2: Response of the RUN LED?

| | | | |
|----------------------|--|-------|---|
| OFF | Has the master switched the slave to INIT state? | YES → | A |
| NO → | | | B |
| Flashing green | Slave is in PRE-OPERATIONAL state. | → | C |
| Lights up green once | Slave is in SAFE-OPERATIONAL state. | → | C |
| Lights up green | Slave is in OPERATIONAL state. | → | C |
| A | Startup the bus in the master. | | |
| B | Option FSE24B is defective. | | |
| C | Continue with 3: Response of the ERR LED? | | |

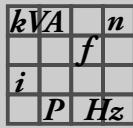


Step 3: Response of the ERR LED?

| | |
|--|---|
| OFF | Case 1: RUN LED lights up green (slave is in OPERATIONAL state). |
| | ↓ EtherCAT® communication of the FSE24B option is in the operating state. |
| Case 2: • RUN LED flashes green (slave is in PRE-OPERATIONAL state). • RUN LED lights up green once (slave is in SAFE-OPERATIONAL state). | ↓ Startup the bus in the master and activate the state OPERATIONAL in the slave. |
| | ↓ Start process data communication. |
| Flickering | Requirement: • RUN LED flashes green (slave is in PRE-OPERATIONAL state) • RUN LED lights up green once (slave is in SAFE-OPERATIONAL state). |
| | ↓ A boot error was detected. Boot the FSE24B option. |
| Flashes red twice | ↓ If the ERR LED continues to flicker, option FSE24B is defective. |
| | Case 1: RUN LED lights up green (slave is in OPERATIONAL state). |
| Case 2: • RUN LED flashes green (slave is in PRE-OPERATIONAL state) • RUN LED lights up green once (slave is in SAFE-OPERATIONAL state). | ↓ Fieldbus timeout, activate process output data. |
| | ↓ Watchdog timeout → Start bus in the master and switch slave to OPERATIONAL state. |
| Lights up red once | ↓ Start process data communication. |
| | Requirement: • RUN LED flashes green (slave is in PRE-OPERATIONAL state) • RUN LED lights up green once (slave is in SAFE-OPERATIONAL state). |
| | ↓ An unprompted state change has occurred. Repair the configuration error and start the bus in the master again. |
| | ↓ Switch the slave to OPERATIONAL state. |
| | ↓ Start the process data communication. |



| | |
|----------|---|
| Flashing | Requirement: <ul style="list-style-type: none">• RUN LED flashes green (slave is in PRE-OPERATIONAL state)• RUN LED lights up green once (slave is in SAFE-OPERATIONAL state). |
| | ↓ |
| | Invalid configuration. Repair the configuration error and start the bus in the master again. |
| | ↓ |
| | Switch the slave to OPERATIONAL state. |
| | ↓ |
| | Start the process data communication. |



9 Technical Data

9.1 FSE24B communication option for MOVITRAC® B

| FSE24B communication option (MOVITRAC® B) | |
|--|---|
| Part number | 1824 006 2 |
| External voltage supply: | U = DC 24 V (-15 %, +20 %) I _{max} = DC 60 mA |
| Power consumption | P _{max.} = 1.5 W |
| Standards | IEC 61158, IEC 61784-2 |
| Baud rate | 100 MBaud full duplex |
| Connection technology | 2 × RJ45 (8x8 modular jack) |
| Bus termination | Not integrated, as bus termination is activated automatically. |
| OSI layer | Ethernet II |
| Station address | Setting via EtherCAT® master (display with P093) |
| XML file name | SEW_FSE24B.xml |
| Vendor ID | 0x59 (CANopenVendor ID) |
| EtherCAT® services | CoE and EoE(VoE) |
| Firmware status of MOVIDRIVE® B | <ul style="list-style-type: none"> The transmission of 3 process input and output data words does not require any particular firmware status. The transmission of up to 10 process input and output data words and the display of fieldbus status parameters in parameter group P09_ is possible as of MOVITRAC® B firmware status 18225632.11. |
| Tools for startup | <ul style="list-style-type: none"> Engineering program MOVITOOLS® MotionStudio version 5.40 or later. Engineering at the PC via EtherCAT®, advanced diagnostics using the fieldbus status parameters in parameter group P09_ is possible with MOVITOOLS® MotionStudio 5.70 or later. |



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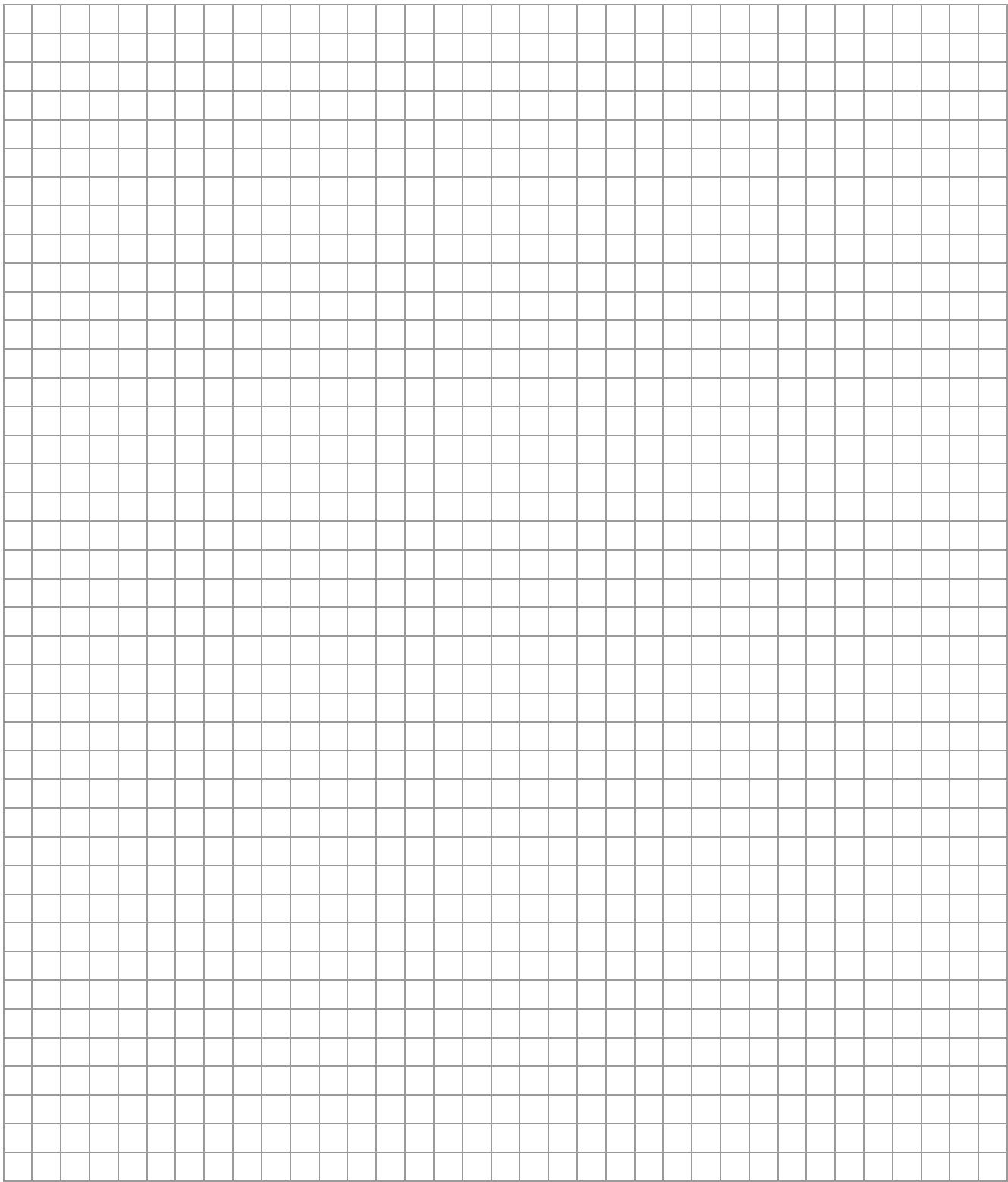
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Driving the world

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