Manual

Fieldbus Interface DFE24B EtherCAT®

Edition 04/2013
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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 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.

<table>
<thead>
<tr>
<th>Signal word</th>
<th>Meaning</th>
<th>Consequences if disregarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>▲ DANGER</td>
<td>Imminent danger</td>
<td>Severe or fatal injuries</td>
</tr>
<tr>
<td>▲ WARNING</td>
<td>Possible dangerous situation</td>
<td>Severe or fatal injuries</td>
</tr>
<tr>
<td>▲ CAUTION</td>
<td>Possible dangerous situation</td>
<td>Minor injuries</td>
</tr>
<tr>
<td>NOTICE</td>
<td>Possible damage to property</td>
<td>Damage to the drive system or its environment</td>
</tr>
<tr>
<td>INFORMATION</td>
<td>Useful information or tip: Simplifies the handling of the drive system.</td>
<td></td>
</tr>
</tbody>
</table>

1.2.2 Structure of the section safety notes

Section safety notes do not apply to a specific action but to several actions pertaining to one subject. The symbols used either indicate a general hazard 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 the 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 Type and source of danger.

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

© 2012 – 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:

• "MOVIDRIVE® MDX60B/61B" operating instructions
• "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

All product names in this documentation are trademarks or registered trademarks of their respective titleholders.

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

MOVIDRIVE® B and 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 "Functional safety for MOVITRAC® B" is observed.

2.3 Hoist applications

MOVIDRIVE® B and the MOVITRAC® B are not designed for use 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 DFE24B EtherCAT® option card in the MOVIDRIVE® MDX61B drive inverter.
- The use of the DFE24B EtherCAT® option card in the MOVITRAC® B frequency inverter and in the UOH11B gateway housing.
- The startup of the MOVIDRIVE® B on the EtherCAT® fieldbus system.
- The startup of the MOVITRAC® B on the EtherCAT® gateway.
- The configuration of the EtherCAT® master via XML files.
- The operation of MOVITOOLS® MotionStudio via EtherCAT®.

3.1.2 Additional documentation

For information on how to connect MOVIDRIVE® 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 DFE24B EtherCAT® option:

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

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

3.2 Characteristics

3.2.1 MOVIDRIVE® B, MOVITRAC® B and EtherCAT®

The unit behavior of the inverter which 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 feature allows the user to develop fieldbus-independent drive applications. This makes it much easier to change to other bus systems, such as DeviceNet (DFD option).

3.2.2 Access to all information

MOVIDRIVE® MDX61B and MOVITRAC® B offer digital access to all drive parameters and functions via the EtherCAT® communication interface. The 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 also use this channel to read back actual values from the inverter, such as actual speed, current, unit status, error number or reference signals.

3.2.3 Cyclic data exchange via EtherCAT®

Process data is usually exchanged cyclically between the EtherCAT® master and the MOVIDRIVE® B and MOVITRAC® B 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 MOVIDRIVE® B/ MOVITRAC® B specifically to your application. You can determine, for instance, which of the drive 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 functions of the control terminals are still active in fieldbus operation, you can still implement fieldbus-independent emergency stop concepts via the drive inverter terminals.

3.2.7 Diagnostics

MOVIDRIVE® B and MOVITRAC® B provide numerous diagnostics options for startup and service. For example, you can use the integrated fieldbus monitor to control both setpoint values sent from the higher-level controller as well as the actual values.
4 Assembly and Installation Notes

This section provides you with information on assembly and installation for the DFE24B option card in MOVIDRIVE® MDX61B, MOVITRAC® B and the UOH11B gateway housing.

4.1 Installing the DFE24B option card in MOVIDRIVE® MDX61B

**INFORMATION**

- Only SEW-EURODRIVE personnel may install or remove option cards for MOVIDRIVE® MDX61B size 0.
- Users may only install or remove option cards for MOVIDRIVE® MDX61B sizes 1 to 7.
- Plug the DFE24B option card into the fieldbus slot [1].
- The DFE24B option is powered with voltage via MOVIDRIVE® B. A separate voltage supply is not required.

4.1.1 Before you start

Plug the DFE24B option card into the fieldbus slot.

**Observe the following notes before installing or removing an option card:**

- Disconnect the inverter from the power. Disconnect the DC 24 V supply and the line voltage.
- Take appropriate measures (discharge strap, conductive shoes, etc.) to protect the option card from electrostatic charge before touching it.
- **Before installing** the option card, remove the keypad and the front cover (see MOVIDRIVE® MDX60B/61B operating instructions, "chapter Installation").
Assembly and Installation Notes
Installing the DFE24B option card in MOVIDRIVE® MDX61B

- After having installed the option card, replace the keypad and the front cover (see MOVIDRIVE® MDX60B/61B operating instructions, section "Installation").
- Keep the option card in its original packaging until immediately before you are ready to install it.
- Hold the option card by its edges only. Do not touch any components.
4.1.2 Basic procedure for installing/removing an option card

1. Remove the two retaining screws holding the card retaining bracket. Pull the card retaining bracket out evenly from the slot (do not twist!).

2. Remove the 2 retaining screws from 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 three retaining screws fit into the corresponding bores on the card retaining bracket.

4. Insert the retaining bracket with the installed option card into the slot, pressing slightly so it is seated properly. Secure the card retaining bracket with the two retaining screws.

5. To remove the option card, follow the instructions in reverse order.
4.2 Installing the DFE24B option card in MOVITRAC® B

INFORMATION

• MOVITRAC® B does not require a special firmware status.
• Only SEW-EURODRIVE may install or remove option cards for MOVITRAC® B.

4.2.1 Connecting the system bus (SBus 1) between a MOVITRAC® B unit and the DFE24B option card

INFORMATION

• DFE24B has an integrated SBus terminating resistor and must always be installed at the start of the SBus connection.
• DFE24B always has the SBus address 0.

<table>
<thead>
<tr>
<th>X46</th>
<th>X26</th>
<th>Terminal assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>SC11 SBus +, CAN high</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>SC12 SBus -, CAN low</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>GND, CAN GND</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>DC 24 V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>X12</th>
<th>Terminal assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>DC 24 V input</td>
</tr>
<tr>
<td>9</td>
<td>GND reference potential for binary inputs</td>
</tr>
</tbody>
</table>
To simplify cabling, the DFE24B option can be supplied with DC 24 V from X46:7 of MOVITRAC® B to X26:7. In this case the DC 24 V voltage supply of the MOVITRAC® B must be connected to terminals X12:8 and X12:9.

Activate the bus terminating resistor at the FSC11B option (S1 = ON).

### 4.2.2 Connecting the system bus (SBus 1) between several MOVITRAC® B units

<table>
<thead>
<tr>
<th>MOVITRAC® B</th>
<th>Terminal assignment</th>
<th>DFE24B via UOH11B gateway housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>X46:1</td>
<td>SC11 (System bus high, incoming)</td>
<td>X26:1 SC11 SBus +, CAN High</td>
</tr>
<tr>
<td>X46:2</td>
<td>SC12 (System bus low, incoming)</td>
<td>X26:2 SC12 SBus -, CAN Low</td>
</tr>
<tr>
<td>X46:3</td>
<td>GND (System bus reference)</td>
<td>X26:3 GND, CAN GND</td>
</tr>
<tr>
<td>X46:4</td>
<td>SC21 (System bus high, outgoing)</td>
<td></td>
</tr>
<tr>
<td>X46:5</td>
<td>SC22 (System bus low, outgoing)</td>
<td></td>
</tr>
<tr>
<td>X46:6</td>
<td>GND (System bus reference)</td>
<td></td>
</tr>
<tr>
<td>X46:7</td>
<td>DC 24 V</td>
<td>X26:7 DC 24 V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>X12</th>
<th>Terminal assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>X12:8</td>
<td>DC +24 V input</td>
</tr>
</tbody>
</table>
Please note:

- Use a 2×2-core twisted pair and shielded copper cable (data transmission cable with braided copper shield). Connect the shield on both sides to the electronics shield clamp of the MOVITRAC® B over a large area. Additionally for a 2-core cable, connect the shield ends to the GND. The cable must meet the following specifications:
  - Cable cross section 0.25 mm² (AWG18) – 0.75 mm² (AWG18)
  - Cable resistance 120 Ω at 1 MHz
  - Capacitance per unit length ≤ 40 pF/m (12 pF/ft) at 1 kHz
Suitable cables are CAN or DeviceNet cables.

- The permitted total cable length depends on the baud rate setting of the SBus:
  - 250 kBd: 160 m (528 ft)
  - 500 kBd: 80 m (264 ft)
  - 1000 kBd: 40 m (132 ft)

- Connect the system bus terminating resistor (S1 = ON) at the end of the system bus connection. Switch off the terminating resistor on the other units (S1 = OFF). The DFE24B gateway must always be connected either at the beginning or the end of the system bus connection and feature a permanently installed terminating resistor.

**INFORMATION**

There must not be any potential displacement between the units connected via the SBus. Take suitable measures to avoid potential displacement, e.g. by connecting the unit ground connectors using a separate lead.

<table>
<thead>
<tr>
<th>X12</th>
<th>Terminal assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>X12:9</td>
<td>GND reference potential for binary inputs</td>
</tr>
</tbody>
</table>
### 4.3 Assembling and installing the DFE24B/UOH11B gateway housing

The following figure shows the connection of the DFE24B option via the UOH11B:X26 gateway housing.

The gateway housing is supplied with DC 24 V via X26.

<table>
<thead>
<tr>
<th><strong>UOH11B gateway housing</strong></th>
<th><strong>X26</strong></th>
<th><strong>Terminal assignment</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>X26:1</td>
<td>SC11 system bus +, CAN high</td>
<td></td>
</tr>
<tr>
<td>X26:2</td>
<td>SC12 system bus –, CAN low</td>
<td></td>
</tr>
<tr>
<td>X26:3</td>
<td>GND, CAN GND</td>
<td></td>
</tr>
<tr>
<td>X26:4</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td>X26:5</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td>X26:6</td>
<td>GND, CAN GND</td>
<td></td>
</tr>
<tr>
<td>X26:7</td>
<td>DC 24 V</td>
<td></td>
</tr>
</tbody>
</table>
4.4 Connection and terminal description of the DFE24B option

4.4.1 Part number

EtherCAT® interface option DFE24B: 1821 126 7

INFORMATION

- The "EtherCAT® interface option DFE24B" is only possible in connection with MOVITRAC® B and MOVIDRIVE® MDX61B, not with MOVIDRIVE® MDX60B.
- Plug the DFE24B option into the fieldbus slot.

<table>
<thead>
<tr>
<th>Front view of DFE24B</th>
<th>Description</th>
<th>DIP switch Terminal</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RUN: EtherCAT® operating LED (orange/green)</td>
<td></td>
<td>Shows the operating status of bus electronics and communication.</td>
</tr>
<tr>
<td></td>
<td>ERR: EtherCAT® error LED (red)</td>
<td></td>
<td>Displays EtherCAT® errors.</td>
</tr>
<tr>
<td></td>
<td>DIP switch</td>
<td>AS</td>
<td>Auto-setup for gateway operation</td>
</tr>
<tr>
<td></td>
<td>LED Link/Activity (green)</td>
<td>F1</td>
<td>Reserved</td>
</tr>
<tr>
<td></td>
<td>X30 IN: Incoming EtherCAT connection</td>
<td></td>
<td>Shows that the EtherCAT® connection with the upstream unit is available/active.</td>
</tr>
<tr>
<td></td>
<td>LED Link/Activity (green)</td>
<td></td>
<td>Shows that the EtherCAT® connection with the downstream unit is available/active.</td>
</tr>
<tr>
<td></td>
<td>X31 OUT: Outgoing EtherCAT connection</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Front view of MOVITRAC® B and UOH11B</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LED H1 (red)</td>
<td>System error (only for gateway functionality)</td>
</tr>
<tr>
<td></td>
<td>LED H2 (green)</td>
<td>Reserved</td>
</tr>
<tr>
<td></td>
<td>X24 X terminal</td>
<td>RS485 interface for diagnostics via PC and MOVITOOLS® Motion-Studio</td>
</tr>
</tbody>
</table>

![Front view of DFE24B](image1)
![Front view of MOVITRAC® B and UOH11B](image2)
4.5 **Pin assignment X30 IN / X31 OUT**

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

![A View from front](image1)

![B View from back](image2)

- [6] Pin 6 RX- Receive Minus
- [3] Pin 3 RX+ Receive Plus
- [2] Pin 2 TX– Transmit Minus
- [1] Pin 1 TX+ Transmit Plus

**4.5.1 DFE24B – EtherCAT® connection**

Option DFE24B is equipped with RJ45 two 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 X31 OUT (RJ45).

**INFORMATION**

In accordance with IEC 802.3, the maximum permitted cable length for 100 MBaud Ethernet (100BaseT), e.g. between two DFE24B units, is 100 m.

**4.6 Shielding and routing bus cables**

Only use shielded cables and connection elements that also meet the requirements of category 5, class D according to IEC 11801, 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 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.

4.7 **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.

4.8 **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 DBG60B keypad (parameter P093).

4.9 **DFE24B operating displays**

There are two LEDs on the DFE24B EtherCAT® option card that display the current status of the DFE24B option and the EtherCAT® system.

| DFE24B | RUN | ERR |
4.9.1 LED RUN (green/orange)

The LED RUN (green/orange) indicates the status of the DFE24B option.

<table>
<thead>
<tr>
<th>Condition</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>INIT</td>
<td>Option DFE24B is in the state INIT.</td>
</tr>
<tr>
<td>Flashing green</td>
<td>PRE-OPERATIONAL</td>
<td>Mailbox communication is possible but no process data communication</td>
</tr>
<tr>
<td>Flashing once (green)</td>
<td>SAFE-OPERATIONAL</td>
<td>Mailbox and process data communication is possible. The slave outputs are not output yet.</td>
</tr>
<tr>
<td>Green</td>
<td>OPERATIONAL</td>
<td>Mailbox and process data communication is possible.</td>
</tr>
<tr>
<td>Flickering green</td>
<td>INITIALISATION or BOOTSTRAP</td>
<td>Option DFE24B is booting and has not yet reached the state INIT. Option DFE24B is in the state BOOTSTRAP. The firmware is being downloaded.</td>
</tr>
<tr>
<td>Flashing orange</td>
<td>NOT CONNECTED</td>
<td>The DFE24B option was not yet addressed by an EtherCAT® master after switching it on.</td>
</tr>
</tbody>
</table>

4.9.2 LED ERR (red)

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

<table>
<thead>
<tr>
<th>Condition</th>
<th>Error</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>No error</td>
<td>The EtherCAT® communication of the DFE24B option is in operating state.</td>
</tr>
<tr>
<td>Flickering</td>
<td>Boot error</td>
<td>A boot error was detected. The state INIT was achieved, but the &quot;Change&quot; parameter in the AL status register has been set to &quot;0x01:change/error&quot;.</td>
</tr>
<tr>
<td>Flashing</td>
<td>Invalid configuration</td>
<td>General configuration error.</td>
</tr>
<tr>
<td>Flashing</td>
<td>Unprompted state change</td>
<td>The slave application has changed the EtherCAT® state automatically. The &quot;Change&quot; parameter in the AL state register is set to &quot;0x01:change/error&quot;.</td>
</tr>
<tr>
<td>Flashing twice</td>
<td>Timeout of the application watchdog</td>
<td>A watchdog timeout has occurred in the application.</td>
</tr>
<tr>
<td>Flashing three times</td>
<td>Reserved</td>
<td>-</td>
</tr>
<tr>
<td>Flashing four times</td>
<td>Reserved</td>
<td>-</td>
</tr>
<tr>
<td>On</td>
<td>PDI watchdog timeout</td>
<td>A PDI watchdog timeout occurred.</td>
</tr>
</tbody>
</table>
Definition of the display statuses

<table>
<thead>
<tr>
<th>Display</th>
<th>Definition</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>Display is switched on permanently.</td>
<td></td>
</tr>
<tr>
<td>Off</td>
<td>Display is switched off permanently.</td>
<td></td>
</tr>
<tr>
<td>Flickering</td>
<td>The display switches between on and off with a frequency of 10 Hz.</td>
<td><img src="3013055499" alt="Timeline" /></td>
</tr>
<tr>
<td>Flickering once</td>
<td>The display flickers once very shortly, followed by an off phase.</td>
<td><img src="3013416843" alt="Timeline" /></td>
</tr>
<tr>
<td>Flashing</td>
<td>Display switches on and off at a frequency of 2.5 Hz (200 ms on, 200 ms off).</td>
<td><img src="3013456907" alt="Timeline" /></td>
</tr>
<tr>
<td>Flashing once</td>
<td>The display flashes once shortly (200 ms), followed by a longer off phase (1,000 ms).</td>
<td><img src="3013459851" alt="Timeline" /></td>
</tr>
<tr>
<td>Flashing twice</td>
<td>The display lights up twice in succession, followed by an off phase.</td>
<td><img src="3013463435" alt="Timeline" /></td>
</tr>
<tr>
<td>Flashing three times</td>
<td>The display lights up three times in succession, followed by an off phase.</td>
<td><img src="3013466379" alt="Timeline" /></td>
</tr>
<tr>
<td>Flashing four times</td>
<td>The display lights up four times in succession, followed by an off phase.</td>
<td><img src="3014762123" alt="Timeline" /></td>
</tr>
</tbody>
</table>

4.9.3 LED Link/Activity (green)

Each EtherCAT® port for incoming EtherCAT® cables (X30 IN) and outgoing EtherCAT® cables (X31 OUT) has a "Link/Activity" LED. It indicates whether the EtherCAT® connection to the preceding or following unit is available and active.
4.9.4 Gateway LEDs

LEDs H1 and H2 indicate the communication status in gateway operation.

<table>
<thead>
<tr>
<th>Condition</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>System error</td>
<td>Gateway is not configured or one of the drives is inactive.</td>
</tr>
<tr>
<td>Off</td>
<td>SBus ok</td>
<td>Gateway is configured correctly.</td>
</tr>
<tr>
<td>Flashing</td>
<td>Bus scan</td>
<td>Gateway checks the bus.</td>
</tr>
</tbody>
</table>

**INFORMATION**

- LED H2 (green) is currently reserved.
- X terminal X24 is the RS485 interface for diagnostics via PC and MOVITOOLS® MotionStudio.
5 Project Planning and Startup

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

INFORMATION

The current version of the XML file for the DFE24B control card is available on the SEW homepage (http://sew-eurodrive.de) under the heading "Software".

5.1 Validity of the XML file for the DFE24B

The XML file is needed when DFE24B is used as a fieldbus option in MOVIDRIVE® B and as a gateway in MOVITRAC® B or a gateway housing (UOH11B).

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 MOVIDRIVE® B with XML file

5.2.1 XML file for running the DFE24B communication option on MOVIDRIVE® B

For the configuration of the EtherCAT® master, you can use a special XML file (SEW_DFE24B.XML). Copy this file into a designated directory of your configuration software.

Refer to the manuals for the appropriate project planning 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 MOVIDRIVE® 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 MOVIDRIVE+DFE24B.

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 "Configuration of the process data objects (PDO)").

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 the DFE24B (see chapter "Operating displays of the DFE24B option").

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-
between 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.).

In the DFE24B operating mode of MOVIDRIVE® B, two different PDO types can be used for cyclical process input and output data.

- **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 MOVIDRIVE® B (see "MOVIDRIVE® B Communication and Fieldbus Unit Profile" manual).

- **OutputData2 (Configurable PO)**
  Configurable PDO with up to 10 cyclical process input data words (16 Bit) and up to 8 cyclical system variables (32 Bit) that can be configured as required and connected to various process data of the drive inverter.

- **InputData1 (standard 10 PI)**
  Static PDO with 10 cyclic process output data words that are connected in fixed configuration with the standard process data of MOVIDRIVE® B (see "MOVIDRIVE® B Communication and Fieldbus Unit Profile" manual).

- **InputData2 (Configurable PI)**
  Configurable PDO with up to 10 cyclical process input data words (16 Bit) and up to 8 cyclical system variables (32 Bit) that can be configured as required and connected to various process data of the drive inverter.
List of the possible process data objects (PDO) for DFE24B MOVIDRIVE® B

<table>
<thead>
<tr>
<th>Index</th>
<th>Size</th>
<th>Name</th>
<th>Mapping</th>
<th>Sync Manager</th>
<th>Sync Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1600hex (5632dec)</td>
<td>6 bytes</td>
<td>OutputData1 (standard 10 PDO)</td>
<td>Fixed content</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>1602hex (5634dec)</td>
<td>2 – 52 byte</td>
<td>OutputData2 (Configurable PO)</td>
<td>-</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>1A00hex (6656dec)</td>
<td>20 bytes</td>
<td>InputData1 (standard 10PI)</td>
<td>Fixed content</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>1A01hex (6657dec)</td>
<td>2 – 52 byte</td>
<td>InputData2 (Configurable PI)</td>
<td>-</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

Example: Static PDO for 10 cyclic process data words

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 MOVIDRIVE® B (see “MOVIDRIVE® B Communication and Fieldbus Unit Profile” manual). The process output data PO4 – PO10 are only available in IPOSplus®.
Assignment of the preconfigured process output data for PDO OutputData1

<table>
<thead>
<tr>
<th>Index/Subindex</th>
<th>Offset in the PDO</th>
<th>Name</th>
<th>Data type</th>
<th>Size in bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3DB8.0hex</td>
<td>0.0</td>
<td>PO1</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DB9.0hex</td>
<td>2.0</td>
<td>PO2</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DBA.0hex</td>
<td>4.0</td>
<td>PO3</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DBB.0hex</td>
<td>6.0</td>
<td>PO4</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DBC.0hex</td>
<td>8.0</td>
<td>PO5</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DBD.0hex</td>
<td>10.0</td>
<td>PO6</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DBE.0hex</td>
<td>12.0</td>
<td>PO7</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DBF.0hex</td>
<td>14.0</td>
<td>PO8</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DCC.0hex</td>
<td>16.0</td>
<td>PO9</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DC1.0hex</td>
<td>18.0</td>
<td>PO10</td>
<td>UINT</td>
<td></td>
</tr>
</tbody>
</table>

Example: Assignment of the preconfigured process input data for PDO OutputData 1

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 MOVIDRIVE® B frequency inverter (see "MOVIDRIVE® B Communication and Fieldbus Unit Profile" manual). The process input data PI4 to PI10 are only available in IPOSplus®.
Configuration of the EtherCAT® master for MOVIDRIVE® B with XML file

Configurable PDO for up to 8 IPOSplus® variants and 10 process data words

The process data transported with OutputData2 and InputData2 can be configured as required with process data information according to the following table. 32-bit variables of type DINT and standard process data PO1 – PO10 and PI1 – PI10 can be configured. In this way, the PDO can be configured to suit each application.

Configurable PDO mapping for OutputData 2:

<table>
<thead>
<tr>
<th>Index.Subindex</th>
<th>Offset in the PDO</th>
<th>Name</th>
<th>Data type</th>
<th>Size in bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3E1C.0hex</td>
<td>0.0</td>
<td>PI1</td>
<td>UINT</td>
<td>1</td>
</tr>
<tr>
<td>3E1D.0hex</td>
<td>2.0</td>
<td>PI2</td>
<td>UINT</td>
<td>1</td>
</tr>
<tr>
<td>3E1E.0hex</td>
<td>4.0</td>
<td>PI3</td>
<td>UINT</td>
<td>1</td>
</tr>
<tr>
<td>3E1F.0hex</td>
<td>6.0</td>
<td>PI4</td>
<td>UINT</td>
<td>1</td>
</tr>
<tr>
<td>3E20.0hex</td>
<td>8.0</td>
<td>PI5</td>
<td>UINT</td>
<td>1</td>
</tr>
<tr>
<td>3E21.0hex</td>
<td>10.0</td>
<td>PI6</td>
<td>UINT</td>
<td>1</td>
</tr>
<tr>
<td>3E22.0hex</td>
<td>12.0</td>
<td>PI7</td>
<td>UINT</td>
<td>1</td>
</tr>
<tr>
<td>3E23.0hex</td>
<td>14.0</td>
<td>PI8</td>
<td>UINT</td>
<td>1</td>
</tr>
<tr>
<td>3E24.0hex</td>
<td>16.0</td>
<td>PI9</td>
<td>UINT</td>
<td>1</td>
</tr>
<tr>
<td>3E25.0hex</td>
<td>18.0</td>
<td>PI10</td>
<td>UINT</td>
<td>1</td>
</tr>
</tbody>
</table>

INFORMATION

If fewer than 10 process data words are to be transported, or if the PDO mapping is to be adjusted, use the configurable PDO instead of the static PDO.

Configurable PDO for up to 8 IPOSplus® variants and 10 process data words
Configurable PDO mapping for InputData 2:

max. 10 Process Data
PI1..10 (UINT)

max. 8 IPOSplus®
Variables (DINT)


- cyc. InputData2 (Configurable PI)
- acyc. Mailbox Communication

max. 8 IPOSplus®
Variables (DINT)
**Assignment of the configurable process input and output data for PDO OutputData2 and InputData2**

The maximum amount of configurable PDO OutputData2 and InputData2 data is:

- 10 process data words (type UINT)
- 8 IPOSPlus® variables (type DINT)

<table>
<thead>
<tr>
<th>Index.Subindex</th>
<th>Name</th>
<th>Data type</th>
<th>Size in bytes</th>
<th>Read</th>
<th>Write</th>
<th>Access attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>2AF8.0hex</td>
<td>Template Ipos-Var (0...1023)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Template for IPOSPlus® variables</td>
</tr>
<tr>
<td>2CBD.0hex</td>
<td>ModuloCtrl (H453)</td>
<td>DINT</td>
<td>4</td>
<td>4</td>
<td></td>
<td>Control word of the Modulo function</td>
</tr>
<tr>
<td>2CBE.0hex</td>
<td>ModTagPos (H454)</td>
<td>DINT</td>
<td>4</td>
<td>4</td>
<td></td>
<td>Modulo target position</td>
</tr>
<tr>
<td>2CBF.0hex</td>
<td>ModActPos (H455)</td>
<td>DINT</td>
<td>4</td>
<td>4</td>
<td></td>
<td>Modulo actual position</td>
</tr>
<tr>
<td>2CC0.0hex</td>
<td>ModCount (H456)</td>
<td>DINT</td>
<td>4</td>
<td>4</td>
<td></td>
<td>Modulo counter value</td>
</tr>
<tr>
<td>2CD1.0hex</td>
<td>StatusCount (H473)</td>
<td>DINT</td>
<td>4</td>
<td>4</td>
<td></td>
<td>IPOS status value</td>
</tr>
<tr>
<td>2CD2.0hex</td>
<td>Scope474</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Direct Scope variable</td>
</tr>
<tr>
<td>2CD3.0hex</td>
<td>Scope475</td>
<td>DINT</td>
<td>4</td>
<td>4</td>
<td></td>
<td>Direct Scope variable</td>
</tr>
<tr>
<td>2CD6.0hex</td>
<td>AnaOutIPOS2 (H478)</td>
<td>DINT</td>
<td>4</td>
<td>4</td>
<td></td>
<td>Analog output 2 option DIO11B</td>
</tr>
<tr>
<td>2CD7.0hex</td>
<td>AnaOutIPOS3 (H479)</td>
<td>DINT</td>
<td>4</td>
<td>4</td>
<td></td>
<td>Analog output option DIO11B</td>
</tr>
<tr>
<td>2CD8.0hex</td>
<td>OptOutIPOS (H480)</td>
<td>DINT</td>
<td>4</td>
<td>4</td>
<td></td>
<td>Optional digital outputs</td>
</tr>
<tr>
<td>2CD9.0hex</td>
<td>StdOutIPOS (H481)</td>
<td>DINT</td>
<td>4</td>
<td>4</td>
<td></td>
<td>Standard digital outputs</td>
</tr>
<tr>
<td>2CDA.0hex</td>
<td>OutputLevel (H482)</td>
<td>DINT</td>
<td>4</td>
<td>4</td>
<td></td>
<td>Status of the digital outputs</td>
</tr>
<tr>
<td>2CDB.0hex</td>
<td>InputLevel (H483)</td>
<td>DINT</td>
<td>4</td>
<td>4</td>
<td></td>
<td>Status of the digital inputs</td>
</tr>
<tr>
<td>2CDC.0hex</td>
<td>ControlWord (H484)</td>
<td>DINT</td>
<td>4</td>
<td>4</td>
<td></td>
<td>IPOSPlus® control word</td>
</tr>
<tr>
<td>2CE4.0hex</td>
<td>TargetPos (H492)</td>
<td>DINT</td>
<td>4</td>
<td>4</td>
<td></td>
<td>Target position</td>
</tr>
<tr>
<td>2CE7.0hex</td>
<td>LagDistance (H495)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lag distance</td>
</tr>
<tr>
<td>2CEB.0hex</td>
<td>SetpPosBus (H499)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bus position setpoint</td>
</tr>
<tr>
<td>2CCE.0hex</td>
<td>TpPos2_VE (H500)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Touch probe position 2 virtual encoder</td>
</tr>
<tr>
<td>2CED.0hex</td>
<td>TpPos1_VE (H501)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Touch probe position 1 virtual encoder</td>
</tr>
<tr>
<td>2CEE.0hex</td>
<td>TpPos2_Abs (H502)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Touch probe position 2</td>
</tr>
<tr>
<td>2CEF.0hex</td>
<td>TpPos1_Abs (H503)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Touch probe position 1</td>
</tr>
</tbody>
</table>
### Configuration of the EtherCAT® master for MOVIDRIVE® B with XML file

#### Project Planning and Startup

<table>
<thead>
<tr>
<th>Index.Subindex</th>
<th>Name</th>
<th>Data type</th>
<th>Size in bytes</th>
<th>Read</th>
<th>Write</th>
<th>Access attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>2CF0.0hex</td>
<td>TpPos2_Ext</td>
<td>DINT</td>
<td>4</td>
<td>4</td>
<td></td>
<td>Touch probe position 2 external</td>
</tr>
<tr>
<td></td>
<td>(H504)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2CF1.0hex</td>
<td>TpPos2_Mot</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Touch probe position 2 motor encoder</td>
</tr>
<tr>
<td></td>
<td>(H505)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2CF2.0hex</td>
<td>TpPos1_Ext</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Touch probe position 1 external</td>
</tr>
<tr>
<td></td>
<td>(H506)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2CF3.0hex</td>
<td>TpPos1_Mot</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Touch probe position 1 motor</td>
</tr>
<tr>
<td></td>
<td>(H507)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2CF4.0hex</td>
<td>ActPos_Mot16</td>
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<td></td>
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<td></td>
<td>Actual position motor 16 Bit</td>
</tr>
<tr>
<td></td>
<td>bit (H508)</td>
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<td></td>
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</tr>
<tr>
<td>2CF5.0hex</td>
<td>ActPos_Abs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Actual position absolute encoder</td>
</tr>
<tr>
<td></td>
<td>(H509)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2CF6.0hex</td>
<td>ActPos_Ext</td>
<td></td>
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<td></td>
<td></td>
<td>Actual position external encoder X14</td>
</tr>
<tr>
<td></td>
<td>(H510)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2CF7.0hex</td>
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<td></td>
<td></td>
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<td>Actual position motor encoder</td>
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<td></td>
<td>(H511)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3DB8.0hex</td>
<td>PO1</td>
<td>UINT</td>
<td>2</td>
<td>2</td>
<td></td>
<td>Standard process output data word PO1</td>
</tr>
<tr>
<td></td>
<td>(15800.0dec)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3DB9.0hex</td>
<td>PO2</td>
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<td></td>
<td></td>
<td>Standard process output data word PO2</td>
</tr>
<tr>
<td></td>
<td>(15801.0dec)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>3DBA.0hex</td>
<td>PO3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Standard process output data word PO3</td>
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<td></td>
<td></td>
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<tr>
<td>3DBB.0hex</td>
<td>PO4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Standard process output data word PO4</td>
</tr>
<tr>
<td></td>
<td>(15803.0dec)</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3DBC.0hex</td>
<td>PO5</td>
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<td></td>
<td></td>
<td></td>
<td>Standard process output data word PO5</td>
</tr>
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<tr>
<td>3DBD.0hex</td>
<td>PO6</td>
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<td></td>
<td></td>
<td>Standard process output data word PO6</td>
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<td>(15805.0dec)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3DBE.0hex</td>
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<td></td>
<td></td>
<td></td>
<td>Standard process output data word PO7</td>
</tr>
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<td></td>
<td>(15806.0dec)</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3DBF.0hex</td>
<td>PO8</td>
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<td></td>
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<td>Standard process output data word PO8</td>
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<tr>
<td></td>
<td>(15807.0dec)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3DC0.0hex</td>
<td>PO9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Standard process output data word PO9</td>
</tr>
<tr>
<td></td>
<td>(15808.0dec)</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3DC1.0hex</td>
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<td></td>
<td></td>
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<td>Standard process output data word PO10</td>
</tr>
<tr>
<td></td>
<td>(15801.0dec)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>3E1C.0hex</td>
<td>PI1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Standard process input data word PI1</td>
</tr>
<tr>
<td></td>
<td>(15900.0dec)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E1D.0hex</td>
<td>PI2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Standard process input data word PI2</td>
</tr>
<tr>
<td></td>
<td>(1590010dec)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E1E.0hex</td>
<td>PI3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Standard process input data word PI3</td>
</tr>
<tr>
<td></td>
<td>(15902.0dec)</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3E1F.0hex</td>
<td>PI4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Standard process input data word PI4</td>
</tr>
<tr>
<td></td>
<td>(15903.0dec)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E20.0hex</td>
<td>PI5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Standard process input data word PI5</td>
</tr>
<tr>
<td></td>
<td>(15904.0dec)</td>
<td></td>
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<td>3E21.0hex</td>
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<td>Standard process input data word PI6</td>
</tr>
<tr>
<td></td>
<td>(15905.0dec)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E22.0hex</td>
<td>PI7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Standard process input data word PI7</td>
</tr>
<tr>
<td></td>
<td>(15906.0dec)</td>
<td></td>
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<tr>
<td>3E23.0hex</td>
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<td></td>
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<td>Standard process input data word PI8</td>
</tr>
<tr>
<td></td>
<td>(15907.0dec)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E24.0hex</td>
<td>PI9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Standard process input data word PI9</td>
</tr>
<tr>
<td></td>
<td>(15908.0dec)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3E25.0hex</td>
<td>PI10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Standard process input data word PI10</td>
</tr>
<tr>
<td></td>
<td>(15909.0dec)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
5.3 Configuration of the EtherCAT® master for MOVITRAC® B/gateway with XML file

This section describes the configuration of the EtherCAT® master with MOVITRAC® B and the DFE24B gateway / UOH11B.

5.3.1 XML files for operation in MOVITRAC® B and UOH11B gateway housing

For the configuration of the EtherCAT® master, you can use a special XML file (SEW_DFE24B.XML). Copy this file to a folder in the configuration software.

Refer to the manuals for the appropriate project planning software for details on the procedure.

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

5.3.2 Project planning procedure

Proceed as follows to configure MOVITRAC® / gateways with the EtherCAT® 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 DFE24B-Gateway.

2. Use the menu item [Insert] to add the unit to the EtherCAT® structure. The address is assigned automatically. You can give the device a name to make it easier to identify.

3. 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 option DFE24B (see chapter "Operating displays of the DFE24B option").

INFORMATION

Plausibility of the configuration of process data objects:

- In the freely configurable process data objects OutputData2 and InputData2, cyclical process output data PO1 – 10 cannot be inserted when OutputData1 or InputData1 is configured at the same time.
- Multiple configuration of process data objects is not possible.
- Only standard process data objects PO1 – PO10, PI1 – PI10 or IPOSplus® variables (indices 11000.0 – 12023.0) can be configured as process data.
5.3.3 PDO configuration for DFE24B gateway for MOVITRAC® B

In the DFE24B gateway operating mode for MOVITRAC® B, a PDO is used for cyclical process input and output data.

- **OutputData1** (standard 24 PO)
  Static PDO with 24 cyclical process output data words that are connected in fixed configuration with the process data of a maximum of 8 lower-level MOVITRAC® B drives.

- **InputData1** (standard 24 PI)
  Static PDO with 24 cyclical process input data words that are connected in fixed configuration with the process data of a maximum of 8 lower-level MOVITRAC® B drives.

List of the possible process data objects for the DFE24B gateway:

<table>
<thead>
<tr>
<th>Index</th>
<th>Size</th>
<th>Name</th>
<th>Mapping</th>
<th>Sync Manager</th>
<th>Sync Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1601hex (5633dec) 48 bytes</td>
<td>OutputData1 (standard 24 PO)</td>
<td>Fixed content</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1A01hex (6657dec) 48 bytes</td>
<td>InputData1 (standard 24 PI)</td>
<td>Fixed content</td>
<td>3</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
Example: Assignment of the preconfigured process output data for OutputData 1

The process output data transported with OutputData1 are assigned according to the following table. For each inverter, the process output data PO1 ... PO3 can be connected with various process data (control words, setpoints) using the process data configuration in the MOVITRAC® B drive inverter (→ MOVITRAC® B operating instructions).

<table>
<thead>
<tr>
<th>Index.Subindex</th>
<th>Offset in the PDO</th>
<th>Name</th>
<th>Assignment</th>
<th>Data type</th>
<th>Size in bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3DB8.0hex</td>
<td>0.0</td>
<td>PO1</td>
<td>Drive 1 PO1</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DB9.0hex</td>
<td>2.0</td>
<td>PO2</td>
<td>Drive 1 PO2</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DBA.0hex</td>
<td>4.0</td>
<td>PO3</td>
<td>Drive 1 PO3</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DBB.0hex</td>
<td>6.0</td>
<td>PO4</td>
<td>Drive 2 PO1</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DBC.0hex</td>
<td>8.0</td>
<td>PO5</td>
<td>Drive 2 PO2</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DBD.0hex</td>
<td>10.0</td>
<td>PO6</td>
<td>Drive 2 PO3</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DBE.0hex</td>
<td>12.0</td>
<td>PO7</td>
<td>Drive 3 PO1</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DBF.0hex</td>
<td>14.0</td>
<td>PO8</td>
<td>Drive 3 PO2</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DC0.0hex</td>
<td>16.0</td>
<td>PO9</td>
<td>Drive 3 PO3</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DC1.0hex</td>
<td>18.0</td>
<td>PO10</td>
<td>Drive 4 PO1</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DC2.0hex</td>
<td>0.0</td>
<td>PO11</td>
<td>Drive 4 PO2</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DC3.0hex</td>
<td>2.0</td>
<td>PO12</td>
<td>Drive 4 PO3</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DC4.0hex</td>
<td>4.0</td>
<td>PO13</td>
<td>Drive 5 PO1</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DC5.0hex</td>
<td>6.0</td>
<td>PO14</td>
<td>Drive 5 PO2</td>
<td>UINT</td>
<td></td>
</tr>
<tr>
<td>3DC6.0hex</td>
<td>8.0</td>
<td>PO15</td>
<td>Drive 5 PO3</td>
<td>UINT</td>
<td></td>
</tr>
</tbody>
</table>
### Configuration of the EtherCAT® master for MOVITRAC® B/gateway with 3DC7.0hex (15815.0dec)

<table>
<thead>
<tr>
<th>Index.Subindex</th>
<th>Offset in the PDO</th>
<th>Name</th>
<th>Assignment</th>
<th>Data type</th>
<th>Size in bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3DC7.0hex</td>
<td>10.0</td>
<td>PO16</td>
<td>Drive 6 PO1</td>
<td>UINT</td>
<td>2</td>
</tr>
<tr>
<td>3DC8.0hex</td>
<td>12.0</td>
<td>PO17</td>
<td>Drive 6 PO2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3DC9.0hex</td>
<td>14.0</td>
<td>PO18</td>
<td>Drive 6 PO3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3DCA.0hex</td>
<td>16.0</td>
<td>PO19</td>
<td>Drive 7 PO1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3DCB.0hex</td>
<td>18.0</td>
<td>PO20</td>
<td>Drive 7 PO2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3DCC.0hex</td>
<td>18.0</td>
<td>PO21</td>
<td>Drive 7 PO3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3CDC.0hex</td>
<td>18.0</td>
<td>PO22</td>
<td>Drive 8 PO1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3DCE.0hex</td>
<td>18.0</td>
<td>PO23</td>
<td>Drive 8 PO2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3DCF.0hex</td>
<td>18.0</td>
<td>PO24</td>
<td>Drive 8 PO3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Configuration of the EtherCAT® master for MOVITRAC® B/gateway with Project Planning and Startup**

Fixed assignment of the configured process input data (PDO 1)

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" operating instructions).

<table>
<thead>
<tr>
<th>Index.Subindex</th>
<th>Offset in the PDO</th>
<th>Name</th>
<th>Assignment</th>
<th>Data type</th>
<th>Size in bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3E1C.0.hex</td>
<td>0.0</td>
<td>PI1</td>
<td>Drive 1 PI1</td>
<td>UINT</td>
<td>2</td>
</tr>
<tr>
<td>3E1D.0.hex</td>
<td>2.0</td>
<td>PI2</td>
<td>Drive 1 PI2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E1E.0.hex</td>
<td>4.0</td>
<td>PI3</td>
<td>Drive 1 PI3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E1F.0.hex</td>
<td>6.0</td>
<td>PI4</td>
<td>Drive 2 PI1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E20.0.hex</td>
<td>8.0</td>
<td>PI5</td>
<td>Drive 2 PI2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E21.0.hex</td>
<td>10.0</td>
<td>PI6</td>
<td>Drive 2 PI3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E22.0.hex</td>
<td>12.0</td>
<td>PI7</td>
<td>Drive 3 PI1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E23.0.hex</td>
<td>14.0</td>
<td>PI8</td>
<td>Drive 3 PI2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E24.0.hex</td>
<td>16.0</td>
<td>PI9</td>
<td>Drive 3 PI3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E25.0.hex</td>
<td>18.0</td>
<td>PI10</td>
<td>Drive 4 PI1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E26.0.hex</td>
<td>20.0</td>
<td>PI11</td>
<td>Drive 4 PI2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E27.0.hex</td>
<td>22.0</td>
<td>PI12</td>
<td>Drive 4 PI3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E28.0.hex</td>
<td>24.0</td>
<td>PI13</td>
<td>Drive 5 PI1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E29.0.hex</td>
<td>26.0</td>
<td>PI14</td>
<td>Drive 5 PI2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E2A.0.hex</td>
<td>28.0</td>
<td>PI15</td>
<td>Drive 5 PI3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5.3.4 Auto-setup for gateway operation

The auto setup function can be used to startup DFE24B as a gateway without a PC. The function is activated using the "AS" (auto setup) DIP switch.

**INFORMATION**

Switching on the "AS" (auto setup) DIP switch causes the function to be performed once. **The "AS" DIP switch must then remain in the ON position.** The function can be performed again by switching the DIP switch off and back on again.

First, the DFE24B searches on the lower-level SBus for drive inverters. This process is indicated by the LED \( H1 \) (system error) flashing briefly. For this purpose, different SBus addresses must be set for the drive inverters (P881). We recommend assigning the addresses beginning with address 1 in ascending order based on the arrangement of inverters in the control cabinet. The process image on the fieldbus side is expanded by three words for each detected drive inverter.

The \( H1 \) LED remains lit if no drive inverter was located. A total of up to eight drive inverters is taken into account.

After the search is completed, the DFE24B cyclically exchanges 3 process data words with each connected drive inverter. The process output data are read from the fieldbus, divided into blocks of three and transmitted. The drive inverters read the process input data, put them together and send them to the fieldbus master.

The cycle time of SBus communication is 2 ms per station.

Thus, for an application with 8 inverters on the SBus, the cycle time of the process data update is then \( 8 \times 2 \text{ ms} = 16 \text{ ms} \).

**INFORMATION**

If you change the process data assignment of the drive inverters connected to DFE24B, you must activate Auto-Setup again because the DFE24B saves these values only once during Auto-Setup. At the same time, the process data assignments of the connected drive inverters may not be changed dynamically after Auto-Setup.

<table>
<thead>
<tr>
<th>Index/Subindex</th>
<th>Offset in the PDO</th>
<th>Name</th>
<th>Assignment</th>
<th>Data type</th>
<th>Size in bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3E2B.0hex (15915.0dec)</td>
<td>30.0</td>
<td>PI16</td>
<td>Drive 6 PI1</td>
<td>UINT</td>
<td>2</td>
</tr>
<tr>
<td>3E2C.0hex (15916.0dec)</td>
<td>32.0</td>
<td>PI17</td>
<td>Drive 6 PI2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E2D.0hex (15917.0dec)</td>
<td>34.0</td>
<td>PI18</td>
<td>Drive 6 PI3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E2E.0hex (15918.0dec)</td>
<td>36.0</td>
<td>PI19</td>
<td>Drive 7 PI1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E2F.0hex (15919.0dec)</td>
<td>38.0</td>
<td>PI20</td>
<td>Drive 7 PI2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E30.0hex (15920.0dec)</td>
<td>40.0</td>
<td>PI21</td>
<td>Drive 7 PI3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E31.0hex (15921.0dec)</td>
<td>42.0</td>
<td>PI22</td>
<td>Drive 8 PI1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E32.0hex (15922.0dec)</td>
<td>44.0</td>
<td>PI23</td>
<td>Drive 8 PI2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E33.0hex (15923.0dec)</td>
<td>46.0</td>
<td>PI24</td>
<td>Drive 8 PI3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5.4 Setting the MOVIDRIVE® MDX61B inverter

The following settings are required for simple fieldbus operation.

However, to control the MOVIDRIVE® B drive inverter via EtherCAT®, you must first switch the drive inverter to control signal source (P101) and setpoint source (P100) = FIELDBUS. The FIELDBUS setting means the drive inverter parameters are set for control and setpoint entry via EtherCAT®. The MOVIDRIVE® B drive inverter then responds to the process output data transmitted by the PLC.

The parameters of the MOVIDRIVE® B drive inverter can be set straight away via EtherCAT® without any further settings once the EtherCAT® option card has been installed. For example, all parameters can be set by the PLC after power-on.

Activation of the control signal source and setpoint source FIELDBUS is signaled to the machine control using the "Fieldbus mode active" bit in the status word.

For safety reasons, you must also enable the MOVIDRIVE® B drive 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 inverter on the terminal side is to set the DIØØ input terminal (Function /CONTROLLER INHIBIT) to a +24 V signal and to program the input terminals DIØ1 ... DIØ7 to NO FUNCTION.

The procedure for a complete startup of the MOVIDRIVE® B inverter with EtherCAT® connection is described in chapter "Operating behavior on EtherCAT®" and chapter "Motion control via EtherCAT®".
5.5 Setting the MOVITRAC® B frequency inverter

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 DFE24B. The MOVITRAC® B frequency inverter now responds to the process output data transmitted from the master programmable controller. It is necessary to set the SBus1 timeout interval (P883) to a value other than 0 ms for the MOVITRAC® B inverter to stop if faulty SBus communication occurs. SEW-EURODRIVE recommends a value in the range between 50 and 200 ms.

Activation of the control signal source and setpoint source SBus is signaled to the machine control using the "SBus mode active" bit in the status word.

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 DIØ1 (function CW/STOP) input terminal to a +24 V signal and to program the remaining input terminals to NO FUNCTION.

INFORMATION

- Configure the parameter P881 SBus address to values 1 – 8 in ascending order.
- SBus address 0 is used by the DFE24B gateway, and so cannot be used here.
6 Operating Behavior on EtherCAT®

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

6.1 Controlling the MOVIDRIVE® MDX61B drive inverter

The MOVIDRIVE® B drive inverter is controlled using the fixed PDO, which are 10 I/O 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.

6.1.1 Control example in TwinCAT with MOVIDRIVE® MDX61B

Once the file SEW_DFE24B.xml has been copied to the TwinCAT subdirectory "\IOT\EtherCAT", you can use the function "Append box" in the "offline" mode to insert a MOVIDRIVE® B in the EtherCAT® structure (see following figure).

INFORMATION

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

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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 MOVIDRIVE® units (see following figure).

For simple fieldbus functionality, NC axes do not necessarily have to be created for each device that is found.

For the simplest form of process data transport, only the two PDOs InputData1 and OutputData1 are required. You can deactivate the configurable PDOs by deleting the marker for both PDOs (Input and Output) (see the following figure).
Now, you can link up to 10 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 10 process input and output data words are assigned and scaled in MOVIDRIVE® B in the 87_ parameter group or defined via an IPOSplus® program or application module.

For more information, refer to the "MOVIDRIVE® MDX60B/61B communication and fieldbus unit profile" manual.

6.1.2 EtherCAT® timeout (MOVIDRIVE® MDX61B)

If data transfer via EtherCAT® is disturbed or interrupted, the response monitoring time (standard value 100 ms) configured in the master elapses in MOVIDRIVE® MDX61B. The DFE24B *ERR* LED signals that no new user data can be received. At the same time, MOVIDRIVE® MDX61B performs the fault response selected with P831 Fieldbus timeout response.

P819 Fieldbus timeout displays the response monitoring time specified by the master during the EtherCAT® startup. The length of the timeout can only be changed via the master. Although modifications made using the keypad or MOVITOOLS® are displayed, they do not have any effect and are overwritten during the next startup process.

6.1.3 Fieldbus timeout response (MOVIDRIVE® MDX61B)

Parameter P831 Response Fieldbus Timeout is used to set the fault response that is triggered via the fieldbus timeout monitoring function. The parameters set here should match the configuration of the master system.
6.2 Controlling the MOVITRAC® B frequency inverter (gateway)

The frequency inverters connected to the gateway are controlled via the process data channel, which is up to 3 I/O words long for each inverter. 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.

PO = process output data / PI = process input data

The 24 process input and output data words in the PDO are transmitted from the gateway to up to 8 inverters connected via SBus as follows:

- Words 1, 2 and 3 to the inverter with the lowest SBus address (e.g. 1)
- Words 4, 5 and 6 to the inverter with the next highest SBus address (e.g. 2)
- ....

If fewer than 8 frequency inverters are connected to the gateway, the upper words in the PDO have no significance - they are not transmitted.

**INFORMATION**

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.
6.2.1 Control example in TwinCAT with MOVITRAC® B

Once the file `SEW_DFE24B.xml` has been copied to the TwinCAT subdirectory "\IO\EtherCAT", you can use the function "Append box" in the "offline" mode to insert a DFE24B gateway in the EtherCAT® structure (see following figure).

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).

It is not a good idea to create an NC axis for each DFE24B gateway that is found. In this case, an axis would have to be created for every MOVITRAC® B inverter connected to the DFE24B gateway. For simple fieldbus functionality, NC axes do not necessarily have to be created for each device that is found.
The first 3 process data words are exchanged with the first MOVITRAC® B unit on the DFE24B gateway. They can be connected to the PLC program or written for manual testing (see 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 3 process input and output data words are assigned and scaled in MOVITRAC® B in the 87_ parameter group or defined via an IPOSplus® program.

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

### 6.2.2 SBus timeout

If one or more drive inverters on the SBus can no longer be addressed by the DFE24B, the gateway enters error code F11 System fault, in status word 1 of the corresponding inverter. LED H1 (system fault) lights up. The fault is also displayed via diagnostics interface X24. It is necessary to set the SBus timeout interval (P883) of the MOVITRAC® B system error to a value other than 0 for the inverter to stop. The timeout response is set via parameter P836.

### 6.2.3 Unit error

The gateways detect a series of errors during the self test and respond by locking themselves. The exact error responses and remedies can be found in the list of errors. A hardware defect causes error F111 system fault to be displayed on the fieldbus process input data for status words 1 of all inverters. In this case, LED "H1" (system error) flashes at regular intervals on the DFE24B. The exact error code is displayed in the status of the gateway with MOVITOOLS® MotionStudio using diagnostics interface X24.
6.2.4 **DFE24B fieldbus timeout in gateway operation**

You can use the parameter \( P831 \) *Fieldbus timeout response* to set how the gateway should respond when EtherCAT® communication times out.

<table>
<thead>
<tr>
<th><strong>P831 Fieldbus timeout response</strong></th>
<th><strong>Description</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>No response</td>
<td>The drives on the lower-level SBus continue to work with the last set-point. These drives cannot be controlled when the EtherCAT® communication is interrupted.</td>
</tr>
<tr>
<td>( PA_{\text{DATA}} = 0 )</td>
<td>Rapid stop is activated for all drives that have a process data configuration with control word 1 or 2 when a EtherCAT® timeout is detected. For this, the gateway sets the bits 0 – 2 of the control word to 0. The drives are stopped via the rapid stop ramp.</td>
</tr>
</tbody>
</table>

### 6.3 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®.

**INFORMATION**

- Inverter configuration using the EtherCAT® parameter channel is only possible for MOVIDRIVE® MDX61B and the parameters of the DFE24B gateway.
- At present, the EtherCAT® SDO parameter channel does not enable access to parameters on inverters installed on the SBus below the gateway level.
- VoE services (Vendor specific over EtherCAT®) allow MOVITOOLS® MotionStudio to also access the MOTIVITRAC® B units connected to the gateway via SBus (see chapter "Operating MOVITOOLS® MotionStudio via EtherCAT®").

#### 6.3.1 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**

<table>
<thead>
<tr>
<th><strong>Description</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Slave address (16 bit)</td>
</tr>
<tr>
<td>Index (16 bit) Subindex (8 bit)</td>
</tr>
<tr>
<td>Data Data length</td>
</tr>
</tbody>
</table>

**SDO-WRITE**

<table>
<thead>
<tr>
<th><strong>Description</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Slave address (16 bit)</td>
</tr>
<tr>
<td>Index (16 bit) Subindex (8 bit)</td>
</tr>
<tr>
<td>Data Data length</td>
</tr>
</tbody>
</table>

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

- to activate the function
- to display in-process messages or error messages
- to monitor timeout times
- to report errors in the execution
6.3.2 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 Diagram]

```
0001 PROGRAM MAIN
0002 VAR
0003 Var_Data: DWORD;
0004 ReadSdo: FB_EcCoESdoRead;
0005 END_VAR

0001 IF ReadSdo.bBusy = FALSE THEN
0002 ReadSdo(bExecute = TRUE):"(rising edge to the execute input")
0003 ELSE
0004 END_IF

0005 ReadSdo
0006 sNetID = 192.168.187.1.2.1; (*AMS Net ID of the EtherCAT® master*)
0007 nSlaveAddr = 1001; (*EtherCAT® Address of the SEW device*)
0008 nIndex = 325; (*e.g. DC link voltage index*)
0009 nSubIndex = 0,
0010 pDestBuf = ADR(Read_Data); (*pointer to the variable*)
0011 cbBufLen = 4, (*number of Bytes of the index*)
0012 bExecute = FALSE,
0013 tTimeout = T#500ms,
0014 END_IF
```
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.

6.3.3 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 required. 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:
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 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.
6.4 Parameterization return codes

6.4.1 Elements

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. Generally, these return codes are structured according to the following elements.

- Error class
- Error code
- Additional code

6.4.2 Error class

The error class element (1 byte) provides a more exact classification of the error type.

<table>
<thead>
<tr>
<th>Class (hex)</th>
<th>Designation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>vfd state</td>
<td>Status error of the virtual field device</td>
</tr>
<tr>
<td>2</td>
<td>application reference</td>
<td>Error in application program</td>
</tr>
<tr>
<td>3</td>
<td>definition</td>
<td>Definition error</td>
</tr>
<tr>
<td>4</td>
<td>resource</td>
<td>Resource error</td>
</tr>
<tr>
<td>5</td>
<td>service</td>
<td>Error during execution of service</td>
</tr>
<tr>
<td>6</td>
<td>access</td>
<td>Access error</td>
</tr>
<tr>
<td>7</td>
<td>ov</td>
<td>Error in the object list</td>
</tr>
<tr>
<td>8</td>
<td>other</td>
<td>Other error</td>
</tr>
</tbody>
</table>

6.4.3 Error code

The error code element (1 Byte) allows for a more detailed identification of the error cause within the error class. For Error class 8 = Other error, only Error code = 0 (Other error code) is defined. In this case, detailed identification is made using the additional code.

6.4.4 Additional code

The additional code (2 bytes) includes the detailed error description.
### 6.4.5 List of implemented error codes for SDO services

<table>
<thead>
<tr>
<th>Error code</th>
<th>Error class</th>
<th>Error code</th>
<th>Additional code</th>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x00000000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>NO_ERROR</td>
<td>No error.</td>
</tr>
<tr>
<td>0x05030000</td>
<td>5</td>
<td>3</td>
<td>0</td>
<td>TOGGLE_BIT_NOT_CHANGED</td>
<td>Error in the toggle bit during segmented transfer.</td>
</tr>
<tr>
<td>0x05040000</td>
<td>5</td>
<td>4</td>
<td>0</td>
<td>SDO_PROTOCOL_TIMEOUT</td>
<td>Timeout during execution of service.</td>
</tr>
<tr>
<td>0x05040001</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>COMMAND_SPECIFIER_UNKNOWN</td>
<td>Unknown SDO service.</td>
</tr>
<tr>
<td>0x05040005</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>OUT_OF_MEMORY</td>
<td>Memory overflow during execution of SDO service.</td>
</tr>
<tr>
<td>0x06010000</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>UNSUPPORTED_ACCESS</td>
<td>Unauthorized access to an index.</td>
</tr>
<tr>
<td>0x06010001</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>WRITE_ONLY_ENTRY</td>
<td>Index may only be written to, but not be read.</td>
</tr>
<tr>
<td>0x06010002</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>READ_ONLY_ENTRY</td>
<td>Index may only be read, but not be written to; parameter lock active.</td>
</tr>
<tr>
<td>0x06020000</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>OBJECT_NOT_EXISTING</td>
<td>Object does not exist, incorrect index.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>There is no option card for this index.</td>
</tr>
<tr>
<td>0x06040041</td>
<td>6</td>
<td>4</td>
<td>41</td>
<td>OBJECT_CANT_BE_PDOMAPPED</td>
<td>Index cannot be mapped in a PDO.</td>
</tr>
<tr>
<td>0x06040042</td>
<td>6</td>
<td>4</td>
<td>42</td>
<td>MAPPED_OBJECTS_EXCEED_PDO</td>
<td>Number of mapped objects is too large for PDO.</td>
</tr>
<tr>
<td>0x06040043</td>
<td>6</td>
<td>4</td>
<td>43</td>
<td>PARAM_IS_INCOMPATIBLE</td>
<td>Incompatible data format for index.</td>
</tr>
<tr>
<td>0x06040047</td>
<td>6</td>
<td>4</td>
<td>47</td>
<td>INTERNAL_DEVICE_INCOMPATIBILITY</td>
<td>Internal unit error.</td>
</tr>
<tr>
<td>0x06060000</td>
<td>6</td>
<td>6</td>
<td>0</td>
<td>HARDWARE_ERROR</td>
<td>Internal unit error.</td>
</tr>
<tr>
<td>0x06070010</td>
<td>6</td>
<td>7</td>
<td>10</td>
<td>PARAM_LENGTH_ERROR</td>
<td>Data format for index is the wrong size.</td>
</tr>
<tr>
<td>0x06070012</td>
<td>6</td>
<td>7</td>
<td>12</td>
<td>PARAM_LENGTH_TOO_LONG</td>
<td>Data format for index is too large.</td>
</tr>
<tr>
<td>0x06070013</td>
<td>6</td>
<td>7</td>
<td>13</td>
<td>PARAM_LENGTH_TOO_SHORT</td>
<td>Data format for index is too small.</td>
</tr>
<tr>
<td>0x06090011</td>
<td>6</td>
<td>9</td>
<td>11</td>
<td>SUBINDEX_NOT_EXISTING</td>
<td>Subindex not implemented.</td>
</tr>
<tr>
<td>0x06090030</td>
<td>6</td>
<td>9</td>
<td>30</td>
<td>VALUE_EXCEEDED</td>
<td>Invalid value.</td>
</tr>
<tr>
<td>0x06090031</td>
<td>6</td>
<td>9</td>
<td>31</td>
<td>VALUE_TOO_GREAT</td>
<td>Value too high.</td>
</tr>
<tr>
<td>0x06090032</td>
<td>6</td>
<td>9</td>
<td>32</td>
<td>VALUE_TOO_SMALL</td>
<td>Value too low</td>
</tr>
<tr>
<td>0x06090036</td>
<td>6</td>
<td>9</td>
<td>36</td>
<td>MAX_VALUE_IS_LESS_THAN_MIN_VALUE</td>
<td>Upper limit for the value is smaller than the lower limit.</td>
</tr>
<tr>
<td>0x08000000</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>GENERAL_ERROR</td>
<td>General error</td>
</tr>
<tr>
<td>0x08000020</td>
<td>8</td>
<td>0</td>
<td>20</td>
<td>DATA_CANNOT_BE_READ_OR_STORED</td>
<td>Data access error</td>
</tr>
<tr>
<td>0x08000021</td>
<td>8</td>
<td>0</td>
<td>21</td>
<td>DATA_CANNOT_BE_READ_OR_STORED_BECAUSE_OF_LOCAL_CONTROL</td>
<td>Data access error due to local control.</td>
</tr>
<tr>
<td>0x08000022</td>
<td>8</td>
<td>0</td>
<td>22</td>
<td>DATA_CANNOT_BE_READ_OR_STORED_IN_THIS_STATE</td>
<td>Data access error due to unit status.</td>
</tr>
<tr>
<td>0x08000023</td>
<td>8</td>
<td>0</td>
<td>23</td>
<td>NO_OBJECT_DICTIONARY_IS_PRESENT</td>
<td>No object dictionary present.</td>
</tr>
</tbody>
</table>
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.

[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
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.

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.

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 Motion-
         Studio]
   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 tool-
      bar.
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.

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.
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:

<table>
<thead>
<tr>
<th>Tools</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offline tools</td>
<td>Changes made using offline tools affect &quot;ONLY&quot; the RAM [2].</td>
</tr>
<tr>
<td></td>
<td>• Save your project so that the changes can be stored on the hard disk [1] of your engineering PC [3].</td>
</tr>
<tr>
<td></td>
<td>• Perform the &quot;Download (PC -&gt; unit)&quot; function if you want to transfer the changes to your unit [4] as well.</td>
</tr>
<tr>
<td>Online tools</td>
<td>Changes made using online tools affect &quot;ONLY&quot; the unit [4].</td>
</tr>
<tr>
<td></td>
<td>• Perform the &quot;Upload (unit -&gt; PC)&quot; function if you want to transfer the changes to your RAM [2].</td>
</tr>
<tr>
<td></td>
<td>• Save your project so that the changes can be stored on the hard disk [1] of your engineering PC [3].</td>
</tr>
</tbody>
</table>

[1] Hard drive of the engineering PC
[2] RAM of the engineering PC
[3] Engineering PC
[4] Unit

9007200497934219
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.

2. Select the unit node.

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

INFORMATION

- 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.
7.4 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 54)
  – 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 55)
  – 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.

INFORMATION

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: The EtherCAT® master and MOVITOOLS® MotionStudio are installed in the same unit.

[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: The EtherCAT® master and MOVITOOLS® MotionStudio are installed in different units.

[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:
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]
   ```

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:

<table>
<thead>
<tr>
<th>IP address:</th>
<th>IP address of the engineering PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subnet mask:</td>
<td>Subnet mask of the engineering PC</td>
</tr>
<tr>
<td>Standard gateway:</td>
<td>IP address of the EtherCAT® master (engineering interface) in the Ethernet network</td>
</tr>
</tbody>
</table>
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 56)
  - Configuring the network at the engineering PC (page 57)

**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

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

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

This will open the "Configure communication plugs" window.

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].

![Add IP address dialog 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.

1. "Activate access without master" check box
   Note: Activate this check box only if no other master is available.
2. [Add IP address] button
3. "IP address" edit box

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

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.
The following table describes the communication parameters for EtherCAT®:

<table>
<thead>
<tr>
<th>Communication parameters</th>
<th>Description</th>
<th>Information</th>
</tr>
</thead>
</table>
| Timeout                       | Waiting time in [ms] that the client waits for a response from the server after it has made a request. | • 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.
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.
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 Motion Control via EtherCAT®

This chapter contains information about the EtherCAT® functions that enable clock synchronous operation of MOVIDRIVE® B connected to an EtherCAT® master, which is necessary for motion control applications.

8.1 EtherCAT® introduction

This section describes the functions and terms used for running SEW drive inverters on EtherCAT® in synchronous operation. Comprehensive, detailed technical information about EtherCAT® is available from the EtherCAT® user organization, e.g. at www.EtherCAT.org, and from the manufacturers of EtherCAT® master systems.

Based on the cascade control common in drive technology, the principal mechanisms for motion control applications are described here.

A position setpoint (x_ref) is the starting point. Using the position actual value (x_act), the position controller [1] calculates a speed setpoint (v_ref). The speed controller [2] uses the speed setpoint and actual speed value to calculate the torque setpoint (t_ref) to create torque in the motor powered by the inverter [3]. Depending on the counter-torque caused by the driven machine [4], the motor runs with a certain speed (measured by encoder [5]). Depending on the motor speed, a position change occurs, which is detected by a position encoder [5] on the motor. Depending on the application, control systems for torque, speed or position can be connected in the inverter or higher-level controller. MOVIDRIVE® B can handle all control systems, including position control. In this case, positioning travel can only be performed when a setpoint position is transferred to the inverter (e.g. "Bus Positioning" application module). The current position and, once the positioning command has been executed, a "ready message" is sent to the controller.

In motion control applications, positioning travel with target position and travel parameters such as speed and ramp time is administered in the motion controller that is usually the higher-level controller. The calculated track curve is then used to transfer a setpoint...
speed (→ chapter "Velocity mode") or a setpoint position (→ chapter "Position mode") to the inverter in very quick cycles. The inverter implements this setpoint speed or position and returns the current position. The motion controller knows by itself when the positioning command has been executed.

Since the higher-level controller transmits the setpoints cyclically, the acceleration and deceleration ramps are also calculated in this controller. No ramp function integrated into the drive is used here.

### 8.1.1 Clock Synchronism

For each control cycle, the controller reads in the position actual value and calculates the current speed (dx/dt) and probably other information such as acceleration, jerk, etc, from the position difference (dx) and the time difference (dt) of the previous control interval.

For this purpose, the control time-slices of the controller, bus transfer, the internal processing cycle of the inverter and, if necessary, external encoders, must be synchronized.

**Example**

This example is to demonstrate how aliasing effects can occur if controller, bus, inverter or encoder are not clock-synchronous (→ following figure).

- Control time slice of the controller: 5 ms
- Bus clock pulse: 5 ms, synchronous to the controller
- Processing time in the inverter: 5 ms, not synchronous

Since in this example, the inverter or encoder and the controller are not synchronized, the time slices will slowly drift apart because their quartz oscillators are not ideal. This can lead to jumps in the transmitted position value.

Whereas the speed \( v = \frac{dx}{dt_S} \approx \frac{dx}{dt_G} \) in control intervals 1 to 3 is only slightly inaccurate, there is considerable error in the speed calculation in the fifth control interval \( v = \frac{2dx}{dt_S} \). This incorrect speed calculated in one sample interval results in violent responses of the control algorithms in the controller and can even trigger error messages.

The problem described above caused by discreet sampling in different systems will usually only be a problem in motion control applications when the cycle time of the controller is short or similar to the internal processing cycles of the inverter and external encoders.
As a rule, EtherCAT® is designed for bus and control cycles to be synchronous.

**INFORMATION**

The Distributed Clock mechanism also makes sure that the internal processing time-slice of the inverter is synchronized too.

In MOVIDRIVE® B, the time-slices and data transfers are synchronized via the dual-port RAM of option DFE24B.

In velocity mode, a speed (or velocity) setpoint is transferred from the controller to the inverter and the actual position value is read from the inverter or a separate encoder.

In velocity mode, the inverter is a simple speed actuator. The control time-slices of the controller, bus transfer, the internal processing cycle of the inverter and the encoder must be synchronized.

Position referencing, monitoring of permitted travel ranges or limit switches, load-dependent ramp specification, and lag error monitoring are realized in the higher-level controller, not MOVIDRIVE® B.

To prevent unwanted excessive acceleration during longer control intervals (>1 ms), instead of adopting the speed setpoint directly, MOVIDRIVE® B uses linear interpolation. This means that for a setpoint cycle of 5 ms, the controller in MOVIDRIVE® B does not...
activate the required speed change every 5 ms in a single step, but rather in 5 small steps of 1 ms each.

**Position mode**

In position mode, a position setpoint is transferred cyclically from the controller to the inverter and the actual position value is returned by the inverter or a separate encoder. In Position mode, the inverter follows the constantly changing position setpoint and generates the required speed setpoint for the speed controller [2] from the position actual value (from [5] or [6]). The control time-slices of the controller, bus transfer, the internal processing cycles of the inverter and the encoder must be synchronized.

Once the position in the controller has been referenced to the position in the inverter, permitted travel ranges or limit switches can be monitored in the inverter. You must check carefully whether the settings for the load-dependent ramp specification and lag error monitoring in the inverter are plausible.

To prevent unwanted excessive acceleration during longer control intervals (>1 ms), instead of adopting the position setpoint directly, MOVIDRIVE® B uses linear interpolation. This means that for a setpoint cycle of 5 ms, the controller in MOVIDRIVE® B does not activate the required position change every 5 ms in a single step, but rather in 5 small steps of 1 ms each.

---

**Diagram Legend**

- $x_{\text{ref}}$: Position setpoint
- $x_{\text{act}}$: Position actual value
- $v_{\text{ref}}$: Speed setpoint
- $v_{\text{act}}$: Actual speed value
- $t_{\text{ref}}$: Torque setpoint
- $V$: Motor
- $X$: Encoder (V = speed; X = position)
- $t$: Time
- [1]: Position controller
- [2]: Speed controller
- [3]: Output stage of the inverter
- [4]: Driven machine
- [5]: Encoder
- [6]: Optional encoder

---
8.2 Settings in MOVIDRIVE® B with MOVITOOLS® MotionStudio

8.2.1 Velocity mode settings

You must make the following parameter settings in MOVITOOLS® MotionStudio to control a MOVIDRIVE® B unit in motion control with synchronous speed specification (see the following figure):

- P100 Setpoint source = Fieldbus
- P101 Control signal source = Fieldbus
- P700 Operating mode = SERVO + IPOS or CFC + IPOS
- P870 Setpoint description PO1 = Control word 1
- P873 Actual value description PI1 = Status word 1
Next, activate controller synchronization in the EtherCAT® network. To do so, make the following parameter settings (see the following figure):

- **P887** Synchronization ext. controller = ON
- **P888** Synchronization time SBus [ms] = 1
  
  The synchronization time must correspond exactly with the bus cycle.
- **P916** Ramp type = Interpolation velocity
- **P970** DPRAM Synchronization = YES
- **P971** Synchronization phase = 0

P971 can be used to optimize the phase angle if aliasing occurs. Set a phase angle of 0 ms as standard.
8.2.2 Position mode settings

You must make the following parameter settings in MOVITOOLS® MotionStudio to control a MOVIDRIVE® B unit in motion control with synchronous position specification (see the following figure):

- P100 Setpoint source = Fieldbus
- P101 Control signal source = Fieldbus
- P700 Operating mode = SERVO + IPOS or CFC + IPOS
- P87x Process data description
  - The control word and status word can be used depending on the controller and application. The control and status words can be set using parameters P870 – P876 or transferred to IPOSplus® variables and activated in accordance with the functions of the motion controller's status machine.
Next, activate controller synchronization in the EtherCAT® network. To do so, make the following parameter settings (see the following figure):

- P887 Synchronization ext. controller = ON
- P888 Synchronization time SBus [ms] = 1

The synchronization time must correspond exactly with the bus cycle.

- P916 Ramp type = "Position interpolation 16 bit"
- P970 DPRAM Synchronization = YES
- P971 Synchronization phase = 0

P971 can be used to optimize the phase angle if aliasing occurs. Set a phase angle of 0 ms as standard.

### 8.3 EtherCAT® master settings

For time slice synchronization, you must activate the function Distributed Clock. The bus cycle must correspond exactly with the synchronization time set in parameter P888. You should also activate the watchdog for timeout monitoring for the Sync Manager 0x1000 (Output Data) only.

Make sure you deactivate the fixed PDO (InputData1 and OutputData1).
8.3.1 Velocity mode settings

- The speed setpoint is written directly to system variable H499 via the configured PDO2 and is scaled as follows:
  - 1 digit ÷ 0.2 rpm, that is, a value of 5000 ÷ rpm

  The parameters used in the controller must be scaled before they are transferred to the inverter.

- The control word is transferred via PDO1 together with the speed setpoint in PDO2.

- The position that is transferred to the controller is read directly from system variable H511 via the configurable PDO2. The position is scaled as follows:
  - 4096 digits represent one revolution

  The position that is read in must then be scaled to the parameters used in the controller.

- The status word is transferred via PI1 together with the actual position value in PDO2.

8.3.2 Position mode settings

- The position setpoint is written directly to system variable H499 via the configured PDO2 and is scaled as follows:
  - 1 motor revolution ÷ $2^{16}$

  The parameters used in the controller must be scaled accordingly before they are transferred to the inverter.

- The control word can be transferred as follows:
  - Via PO1 together with the position setpoint in PDO2
  - Directly to a system variable in IPOS$^{\text{plus}}$® if the status machine has to be optimized. The application-specific adjustment of the status machine is then executed as an IPOS$^{\text{plus}}$® program or as a PLC program in the motion controller.

- The position that is transferred to the controller is read directly from system variable H508 via the configurable PDO2. The position is scaled as follows:
  - 1 motor revolution ÷ $2^{16}$

  The position that is read in must then be scaled to the parameters used in the controller.

- The status word can either be transferred via PI1 together with the position setpoint in PDO2, or - if the status machine is adapted for a particular application in IPOS$^{\text{plus}}$® - read in directly from a system variable in IPOS$^{\text{plus}}$®.
8.4 Example TwinCAT

8.4.1 Parameterizing clock synchronous operation

Make the settings shown in the following figures.

For clock synchronous operation, select the "DC for synchronization" option on the DC (Distributed Clock) tab page. Make sure that the cycle time in the "Cycle time" field is the same as the synchronization time specified in P888.
Activate timeout monitoring for Sync Manager 0x1000. To do so, in the “Edit Sync Manager” window activate the “Trigger” checkbox in the “Watchdog” group box (see following figure).

8.4.2 NC axis parameterization

Then, the NC axis has been parameterized (see the following figure).

On the "Settings" tab page, select the "Standard" option in the "Axis Type" field and the system unit (e.g. °) in the "Unit" field.
Set the maximum speed and the lag error monitoring on the "Global" tab page.
Set the ramp times on the "Dynamics" tab page.

INFORMATION

The settings you make must suit the mechanical components and match the settings made in the inverter.
8.4.3 Encoder parameterization

The "CANopen DS402" is specified as encoder (under "Axis x_Enc") and configured as follows (see following figure).

The scaling factor results from the following formula:

\[
360 \degree / (4096 \text{ inc/revolution}) = 0.087890625 \degree/\text{inc}
\]

8.4.4 Velocity mode

In Velocity mode, "Drive connected to KLXXX..." is selected (under "Axis x_Drive"). Enter the following values in the "Analog" tab page (see following figure):

The speed setpoint ("Reference velocity") = maximum motor speed × 6 is entered with the conversion factor "at Output Ratio [0.0 – 1.0]" = (maximum motor speed × 5) / 2^{15}
In the PDO assignment, PDO1 is deactivated and the setpoint speed and control word or actual position (H511) and status word are defined in PDO2 (see following figures).

In the PDO assignment, PDO1 is deactivated and the setpoint speed and control word or actual position (H511) and status word are defined in PDO2 (see following figures).
Finally, the drive’s setpoint speed and actual position are linked with the NC axis and the control word and status word 1 are controlled with the PLC task in accordance with the description in the fieldbus unit profile (see following figure).
9 Error Diagnostics

9.1 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 "MOVIDRIVE® MDX60B/61B Communication and Fieldbus Unit Profile" manual and the MOVIDRIVE® MDX60B/61B system manual.

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

<table>
<thead>
<tr>
<th>Is the bus connected plugged into the master/inverter?</th>
<th>NO → [A]</th>
</tr>
</thead>
<tbody>
<tr>
<td>How is the Link/activity LED reacting on option DFE24B?</td>
<td>OFF → [A]</td>
</tr>
<tr>
<td>Is the physical connection between the inverter and EtherCAT® OK? Make sure EtherCAT® is connected correctly at X30 IN (incoming EtherCAT® connection) / X31 OUT (outgoing EtherCAT® connection).</td>
<td>NO → [A]</td>
</tr>
</tbody>
</table>

Continue with 2: Response of the RUN LED?

[A] Check the bus cabling.

Step 2: Response of the RUN LED?

<table>
<thead>
<tr>
<th>OFF</th>
<th>Has the master switched the slave to INIT state?</th>
<th>YES → [A]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NO → [B]</td>
<td></td>
</tr>
</tbody>
</table>

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 DFE24B 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 DFE24B 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 | Prerequisite:  
[• 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 option DFE24B.  
↓ If the ERR LED continues to flicker, option DFE24B is defective. |

| Flashes red twice | **Case 1:** RUN LED lights up green (slave is in OPERATIONAL state).  
↓ Fieldbus timeout, activate process output data. |
|-------------------|-------------------------------------------------------------------------------------------------------------|
|                   | **Case 2:**  
[• RUN LED flashes green (slave is in PRE-OPERATIONAL state)  
• RUN LED lights up green once (slave is in SAFE-OPERATIONAL state).]  
↓ Watchdog timeout → Start bus in the master and switch slave to OPERATIONAL state.  
↓ Start process data communication. |

| Lights up red once | Prerequisite:  
[• 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 Prerequisite:

- 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.

9.2 List of errors

INFORMATION

- The following error list applies to option DFE24B in gateway operation.
- When operating option DFE24B in MOVIDRIVE® B, the corresponding error codes can be found in the MOVIDRIVE® MDX60B/61B operating instructions.

<table>
<thead>
<tr>
<th>Error code</th>
<th>Designation</th>
<th>Response</th>
<th>Cause</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>Stack overflow</td>
<td>SBus communication</td>
<td>Inverter electronics disrupted, possibly due to effect of EMC</td>
<td>Check grounding and shielding and improve, if necessary. Consult SEW Service if the error reoccurs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>stopped</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Stack underflow</td>
<td>SBus communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>stopped</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>NMI</td>
<td>SBus communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>stopped</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Undefined opcode</td>
<td>SBus communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>stopped</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Protection fault</td>
<td>SBus communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>stopped</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Illegal word operand access</td>
<td>SBus communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>stopped</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Illegal instruction access</td>
<td>SBus communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>stopped</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Eeprom</td>
<td>SBus communication</td>
<td>Error while accessing EEPROM</td>
<td>Restore factory settings, perform reset and parameterize DFE again. Contact SEW service if the error occurs again.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>stopped</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Fieldbus timeout</td>
<td>Default: PO data = 0</td>
<td>No communication between master and slave within the projected response monitoring.</td>
<td>• Check communications routine of the master</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Error response</td>
<td></td>
<td>• Extend the fieldbus timeout interval (response monitoring) in the master configuration or deactivate monitoring</td>
</tr>
<tr>
<td></td>
<td></td>
<td>adjustable via P831</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Watchdog error</td>
<td>SBus communication</td>
<td>Error while executing system software</td>
<td>Consult SEW Service.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>stopped</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>Error Initialization</td>
<td>SBus communication</td>
<td>Error after self-test during reset</td>
<td>Perform a reset. Consult SEW Service if the error reoccurs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>stopped</td>
<td></td>
<td></td>
</tr>
<tr>
<td>111</td>
<td>Device timeout system error</td>
<td>None</td>
<td>Check the red system error LED (H1) of DFx If this LED lights up red or flashes, one or more stations on the SBus were not addressed within the timeout time. If the red system error LED (H1) is flashing, the error is in the DFx itself. In this case, error F111 was only reported to the controller via fieldbus.</td>
<td>Check voltage supply, SBus cabling and SBus terminating resistors. Switch DFx off and on again. If the error is still present, query the error via diagnostic interface and perform the action described in this table.</td>
</tr>
</tbody>
</table>
## 10 Technical Data

### 10.1 DFE24B option for MOVIDRIVE® MDX61B

<table>
<thead>
<tr>
<th>Option DFE24B (MOVIDRIVE® MDX61B)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Part number</td>
<td>1821 126 7</td>
</tr>
<tr>
<td>Power consumption</td>
<td>P = 3 W</td>
</tr>
<tr>
<td>Standards</td>
<td>IEC 61158, IEC 61784-2</td>
</tr>
<tr>
<td>Baud rate</td>
<td>100 MBaud full duplex</td>
</tr>
<tr>
<td>Connection technology</td>
<td>2 × RJ45 (8x8 modular jack)</td>
</tr>
<tr>
<td>Bus termination</td>
<td>Not integrated, as bus termination is activated automatically.</td>
</tr>
<tr>
<td>OSI layer</td>
<td>Ethernet II</td>
</tr>
<tr>
<td>Station address</td>
<td>Setting via EtherCAT® master (display with P093)</td>
</tr>
<tr>
<td>XML file name</td>
<td>SEW_DFE24B.xml</td>
</tr>
<tr>
<td>Vendor ID</td>
<td>0x59 (CANopenVendor ID)</td>
</tr>
</tbody>
</table>
| EtherCAT services | • CoE (CANopen over EtherCAT®)  
  • VoE (Simple MOVILINK® Protocol over EtherCAT®) |
| Firmware status of MOVIDRIVE® B | 824 854 0.18 or higher (display with P076). |
| Tools for startup | • MOVITOOLS® MotionStudio engineering software version 5.40 and higher.  
  • DBG60B keypad |
10.2 DFE24B option for MOVITRAC® B and gateway housing

<table>
<thead>
<tr>
<th>Option DFE24B (MOVITRAC® B gateway)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>External voltage supply</strong></td>
</tr>
<tr>
<td>U = DC 24 V (–15 %, +20 %)</td>
</tr>
<tr>
<td>I_{\text{max}} = DC 200 mA</td>
</tr>
<tr>
<td>P_{\text{max}} = 3.4 W</td>
</tr>
<tr>
<td><strong>Standards</strong></td>
</tr>
<tr>
<td>IEC 61158, IEC 61784-2</td>
</tr>
<tr>
<td><strong>Baud rate</strong></td>
</tr>
<tr>
<td>100 MBaud full duplex</td>
</tr>
<tr>
<td><strong>Connection technology</strong></td>
</tr>
<tr>
<td>2 × RJ45 (8x8 modular jack)</td>
</tr>
<tr>
<td><strong>Bus termination</strong></td>
</tr>
<tr>
<td>Not integrated, as bus termination is activated automatically.</td>
</tr>
<tr>
<td><strong>OSI layer</strong></td>
</tr>
<tr>
<td>Ethernet II</td>
</tr>
<tr>
<td><strong>Station address</strong></td>
</tr>
<tr>
<td>Setting via EtherCAT® master (display with P093)</td>
</tr>
<tr>
<td><strong>XML file name</strong></td>
</tr>
<tr>
<td>SEW_DFE24B.xml</td>
</tr>
<tr>
<td><strong>Vendor ID</strong></td>
</tr>
<tr>
<td>0x59 (CANopenVendor ID)</td>
</tr>
<tr>
<td><strong>EtherCAT services</strong></td>
</tr>
<tr>
<td>• CoE (CANopen over EtherCAT®)</td>
</tr>
<tr>
<td>• VoE (Simple MOVILINK® Protocol over EtherCAT®)</td>
</tr>
<tr>
<td><strong>Firmware status of MOVIDRIVE® B</strong></td>
</tr>
<tr>
<td>No special firmware status required.</td>
</tr>
<tr>
<td><strong>Tools for startup</strong></td>
</tr>
<tr>
<td>• MOVITOOLS® MotionStudio engineering software version 5.40 and higher.</td>
</tr>
<tr>
<td>• FBG60B keypad</td>
</tr>
</tbody>
</table>
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