1 Important Notes

- This manual does not replace the detailed operating instructions!
- Installation and startup only by trained personnel observing applicable accident prevention regulations and the MOVIDRIVE® operating instructions!

Documentation

- Read this manual carefully before you commence installation and startup of MOVIDRIVE® drive inverters with this application module.
- This manual assumes that the user has access to and is familiar with the MOVIDRIVE® documentation, in particular the MOVIDRIVE® system manual.
- In this manual, cross references are marked with "→". For example, (→ Sec. X.X) means: Further information can be found in section X.X of this manual.
- A requirement of fault-free operation and fulfillment of any rights to claim under guarantee is that the documentation is observed.

Safety and warning instructions

Always follow the safety and warning instructions contained in this publication!

- Electrical hazard
  Possible consequences: Severe or fatal injuries.

- Hazard
  Possible consequences: Severe or fatal injuries.

- Hazardous situation
  Possible consequences: Slight or minor injuries.

- Harmful situation
  Possible consequences: Damage to the unit and the environment.

- Tips and useful information.
2  System Description

2.1  Application fields

The “Constant tension center winder” application module is particularly suited to applications in which endless material has to be wound or unwound.

The “Constant tension center winder” application module is especially suited for the following sectors:
  • Paper, cardboard
  • Plastic
  • Textiles
  • Sheet metal

The “Constant tension center winder” offers the following advantages in these applications:
  • User-friendly user interface
  • You only have to enter the parameters required for the “Constant tension center winder” (ratios, diameters, tensile force)
  • User-friendly application programs guide you through the process of setting parameters, so there is no need for complicated programming
  • Monitor mode for optimum diagnosis
  • You do not need any programming experience
  • It does not take long to get to know the system
2.2 Application example

**Winder/Unwinder**  
A winder or unwinder represents a typical application example of the “Constant tension center winder” application module. The following illustration shows an unwinder with one drive each for the take-up roller and the pull-off roller. Normally speaking, the pull-off roller operates with speed control, in which case the material is unwound at a constant web speed. The winder determines the tensile force, while the speed signal from the pull-off roller functions as a control signal.

![Application example of a winder](image1)

*Fig. 1: Application example of a winder*

**Rewinder**  
A rewinder represents another field of application. The endless material is unwound for processing and rewound immediately.

![Application example of a rewinder](image2)

*Fig. 2: Application example of a rewinder*
2.3 Program identification

There are two ways in which you can identify the application program last loaded into the MOVIDRIVE® unit.

1. With PC and MOVITOOLS:
   - Connect MOVIDRIVE® to the PC via the serial port.
   - Start MOVITOOLS.
   - Select "Execute Program/Compiler."
   - In Compiler, select "Display/Program Information".

   ![Program Information](image1)

   **Fig. 3: Starting the program information function**

   - The "Program Information" window appears. The entries here tell you which application software is saved in the MOVIDRIVE® unit. The version number is also displayed.

   ![Program Information](image2)

   **Fig. 4: "Program Information" window**
2. Using the DBG11A keypad, no PC required:
   - Select parameter P940 “Edit IPOS variables.”
   - Set parameter P940 to ON. The keypad now displays "000V."
   - Press the ↑ key to increment the numbers and the → key to move the cursor to the right. Set "128V."
   - The keypad now displays the content of variable H128 in decimal and hexadecimal notation.

   ![Image](image.png)

   \[ \begin{align*}
   \text{128V} & \quad 0200010100 \\
   & \quad = \text{0BEBE974 HEX}
   \end{align*} \]

   Fig. 5: Variable H128

   - The meaning of the decimal value in the first line is as follows:

     | Program version |
     |-----------------|
     | 00001 = Table positioning |
     | 00002 = Table positioning via fieldbus |
     | 00003 = Positioning via bus |
     | 00004 = Extended positioning via bus |
     | 00005 = Absolute positioning |
     | 00006 = Reserved |
     | 00007 = Reserved |
     | 00008 = Reserved |
     | 00009 = Reserved |
     | 00010 = Constant tension center winder |
     | 00011 = Reserved |
     | 00012 = Reserved |
     | ... |
     | 00100 = Crane control |
     | ... |
     | 1 = Positioning |
     | 2 = Winding technology |
     | 3 = Sequence control system |
     | 4 = Multi-axis application |
     | ... |
3 Project Planning

3.1 Pre-requisites

PC and software

The "Constant tension center winder" application module is implemented as an IPOS® program and forms part of the SEW MOVITOOLS software package. In order to use MOVITOOLS, you must have a PC with one of the following operating systems: Windows® 95, Windows® 98, Windows NT® version 4.0 or Windows® 2000.

Inverters, motors and encoders

- **Inverters**

  The "Constant tension center winder" can only be implemented on MOVIDRIVE® units with technology version (...)0T. The inverter can be controlled using either terminals or a bus with MOVIDRIVE® MDV/MDS. Terminal control is not possible with MOVIDRIVE® compact. You can use the system bus provided as standard or the PROFIBUS-DP interface. You have to use MOVIDRIVE® compact MCV/MCS41A for PROFIBUS-DP.

  It is essential for the "Constant tension center winder" to have encoder feedback, i.e. it can only be implemented on MOVIDRIVE® MDV/MDS or MOVIDRIVE® compact MCV/MCS, not on MOVIDRIVE® MDF or MOVIDRIVE® compact MCF.

<table>
<thead>
<tr>
<th>Control via</th>
<th>Possible with MOVIDRIVE® compact MCV/MCS40A</th>
<th>Possible with MOVIDRIVE® compact MCV/MCS41A</th>
<th>MDV/MDS60A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminals</td>
<td>No</td>
<td>No</td>
<td>Yes, with DIO11A option</td>
</tr>
<tr>
<td>System bus</td>
<td>Yes, without option</td>
<td>Yes, without option</td>
<td>Yes, without option</td>
</tr>
<tr>
<td>PROFIBUS-DP</td>
<td>Yes, without option</td>
<td>Yes, without option</td>
<td>Yes, with option DFP21A or DFP11A</td>
</tr>
<tr>
<td>PROFIBUS-FMS, INTERBUS, CAN, DeviceNet</td>
<td>No</td>
<td>Yes, without option</td>
<td>Yes, with DFP11A, DFI11A, DFI21A, DFC11A, DFO11A or DFD11A option</td>
</tr>
</tbody>
</table>

MOVIDRIVE® MDV/MDS with bus control: The optional "terminal expansion board type DIO11A" is not allowed to be connected for operation with bus control. If the DIO11A option is connected, the virtual terminals cannot be addressed via the bus.

- **Motors and encoders**
  
  - For operation on MOVIDRIVE® MDV or MOVIDRIVE® compact MCV: Asynchronous servomotors CT/CV (encoder installed as standard) or AC motors DR/DT/DV/D with encoder option.
  
  - For operation on MOVIDRIVE® MDS or MOVIDRIVE® compact MCS: Synchronous servomotors DS/DY, resolver installed as standard.
3 Functional description

3.2 Functional description

The "Constant tension center winder" application offers the following characteristics:

- **Calculating the winding diameter:** For this function, it is necessary for either a master encoder or a MOVIDRIVE® drive with speed feedback to be installed on the pull-off roller.

  The speed of the take-up roller \( n_1 \), the speed of the pull-off roller or the master encoder \( n_2 \) and the diameter of the pull-off roller \( d_0 \) are known. The winding diameter \( d \) is then calculated as follows: \( d = \frac{n_2}{n_1} \times d_0 \)

- **Adjustable winding curve:** With many materials, it is necessary to reduce the tensile stress as the winding diameter increases. You can set the winding characteristics in accordance with your requirements using a user-friendly editor. This is done either in a freely defined fashion with a table or using a hyperbolic function.

- **Determining friction coefficients:** The speed-dependent friction coefficients of the mechanism and the gear unit are ascertained during a teach-in run. The friction coefficients are needed in order to calculate the tensile force accurately.

- **Calculating tensile force:** It must be possible to set the tensile force extremely accurately in order for the winder to function correctly. The following parameters are taken into account when calculating the tensile force setpoint value:
  - Current winding diameter
  - Winding characteristics
  - Friction coefficients of the mechanical components

- **Extensive diagnostics:** During operation, the monitor displays all the important data, e.g. current diameter, web speed, current tensile force and material length.

- **Simple connection to the machine control (PLC).**

**Operating modes**

The functions are implemented with three operating modes:

- **Jog mode (DI1Ø = "0" and DI11 = "0")**
  - As seen onto the drive side of the motor: The motor turns clockwise (= winding to the right) when there is a "1" signal at binary input DIØ1, the motor turns counterclockwise (= winding to the left) when there is a "1" signal at binary input DIØ2. Bear in mind whether you are using a 2 or 3-stage gear unit.

  - The drive is moved at a fixed speed setting in jog mode.
  - The drive turns with the maximum possible torque in jog mode (= 150 % \( I_N \)), regardless of the set tensile force value.
Functional description

• **Teach-in, determining the friction curve (DIØ = "1" and DI11 = "0")**
  Start the teach-in run with DIØ1 = "1." During this teach-in run, the drive automatically determines the speed-dependent friction coefficients of the gear unit and the mechanical components. These friction coefficients are needed for calculating the tensile force setpoints accurately.

• **Automatic mode, constant torque (DIØ = "0" and DI11 = "1")**
  The torque is kept constant irrespective of the current diameter. Consequently, the web tension reduces reciprocally to the winding diameter.
  The winding characteristics are not evaluated in this operating mode.
  Start automatic mode with DIØ1 (winding to the right) = "1" or DIØ2 (winding to the left) = "1".

• **Automatic mode, constant web tension (DIØ = "1" and DI11 = "0")**
  The torque is set in relation to the winding diameter, the friction coefficients and the winding characteristics. Consequently, the web tension, i.e. the tensile stress in the material, is kept constant.
  The winding characteristics are evaluated in this operating mode.
  Start automatic mode with DIØ1 (winding to the right) = "1" or DIØ2 (winding to the left) = "1".
Measuring the web speed

3.3 Measuring the web speed

The web speed has to be measured in order to calculate the current diameter of the winding roller. This is done by either using a master encoder or a second MOVIDRIVE® drive with speed feedback on the pull-off roller.

**Master encoder**

The schematic illustration below shows the configuration with a master encoder on the reversing roller:

![Configuration with master encoder](image)

*Fig. 7: Configuration with master encoder*

Keep the following points in mind for correct function:

- The reversing roller must be located as close to the winding roller as possible.
- There must not be any slip between the material and the reversing roller.
- The diameter of the reversing roller is not allowed to change.
- Use an incremental encoder for 24 V\(_{DC}\) voltage supply as the master encoder, with signals according to RS-422 (5 V TTL).
- The relationship between the travel resolution of the motor encoder and the travel resolution of the master encoder must not be greater than 15:1.
- Connect the master encoder signal to MOVIDRIVE® input X14 of the winding drive.

![Motor encoder connection diagram](image)

*Fig. 8: Motor encoder on X15 and master encoder on X14*
Pull-off roller with drive

The schematic illustration below shows the configuration with a second MOVIDRIVE® drive on the pull-off roller:

![Diagram](image)

Fig. 9: Configuration with drive on the pull-off roller

The following points must be borne in mind for correct function:

- The pull-off roller must be located as close to the take-up roller as possible.
- There must not be any slip between the material and the pull-off roller.
- The diameter of the pull-off roller is not allowed to change.
- Use the "Encoder connection master X14 → slave X14" cable (part number 815 355 8) to connect the two MOVIDRIVE® inverters. Note the master/slave assignment of the cable.
- X14-X14 connection: Connect a maximum of three slaves to one master.

![Diagram](image)

Fig. 10: Motor encoder on X15 and X14-X14 connection
3.4 Process data assignment

You can also start the "Constant tension center winder" application module via a bus. All MOVIDRIVE® fieldbus options are supported, as is the system bus (SBus) which is provided as standard. The virtual terminals in control word 2 are used for bus control (→ MOVIDRIVE® Fieldbus Unit Profile).

Please note: The MOVIDRIVE® option of "terminal expansion board type DIO11A" is not allowed to be installed for bus control!

**Process output data**

The assignment of the process output data words is as follows:

- **PO1**: Control word
- **PO2**: Tensile stress setpoint (IPOS PO DATA)
- **PO3**: Setpoint for the material length to be wound (IPOS PO DATA)
- **PO4**: Either material length, diameter or web speed (IPOS PI DATA)

**Virtual input terminals**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>P617 Controller inhibit/enable</td>
</tr>
<tr>
<td>7</td>
<td>P616 Enable/rapid stop</td>
</tr>
<tr>
<td>6</td>
<td>P615 Enable/stop</td>
</tr>
<tr>
<td>5</td>
<td>P614 Ramp switchover</td>
</tr>
<tr>
<td>4</td>
<td>P613 Parameter set switchover</td>
</tr>
<tr>
<td>3</td>
<td>P612 Error reset</td>
</tr>
<tr>
<td>2</td>
<td>P611 Reserved</td>
</tr>
<tr>
<td>1</td>
<td>P610 Error reset</td>
</tr>
</tbody>
</table>

**Fixed assignment**

<table>
<thead>
<tr>
<th>Virtual terminal 8</th>
<th>Dl17 → P617 Controller inhibit/enable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual terminal 7</td>
<td>Dl16 → P616 Enable/rapid stop</td>
</tr>
<tr>
<td>Virtual terminal 8</td>
<td>Dl15 → P615 Enable/stop</td>
</tr>
<tr>
<td>Virtual terminal 5</td>
<td>Dl14 → P614 Ramp switchover</td>
</tr>
<tr>
<td>Virtual terminal 4</td>
<td>Dl13 → P613 Parameter set switchover</td>
</tr>
<tr>
<td>Virtual terminal 3</td>
<td>Dl12 → P612 Error reset</td>
</tr>
<tr>
<td>Virtual terminal 2</td>
<td>Dl11 → P611 Error reset</td>
</tr>
<tr>
<td>Virtual terminal 1</td>
<td>Dl10 → P610 Reserved</td>
</tr>
</tbody>
</table>

**Process output data**

The assignment of the process output data words is as follows:

- **PO1**: Control word
- **PO2**: Tensile stress setpoint
Process data assignment

- PO3: Specification of material length to be wound

  PO3 Specification of material length to be wound
  
<table>
<thead>
<tr>
<th>15</th>
<th>14</th>
<th>13</th>
<th>12</th>
<th>11</th>
<th>10</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>[m]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

  **Process input data**
  
  The assignment of the process input data words is as follows:
  
  - PI1: Status word 2

    Virtual output terminals
    
    | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
    |---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
    | Virtual terminal 8 | DO17 → P637 | Output stage enabled |
    | Virtual terminal 7 | DO16 → P636 | Inverter ready |
    | Virtual terminal 6 | DO15 → P635 | PO data enabled |
    | Virtual terminal 5 | DO14 → P634 | Current ramp generator set |
    | Virtual terminal 4 | DO13 → P633 | Current parameter set |
    | Virtual terminal 3 | DO12 → P632 | Fault/warning |
    | Virtual terminal 2 | DO11 → P631 | CW limit switch active |
    | Virtual terminal 1 | DO10 → P630 | CCW limit switch active |

  - PI2: Actual tensile stress

    PI2 Actual tensile stress
    
    | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
    |---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
    | [N] |

  - PI3: Either

    - Current material length [m]
    - Current winding diameter [mm]
    - Current web speed [m/min]

    PI3 Material length, winding diameter or web speed
    
    | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 1 | 0 |
    | [m] or [mm] or [m/min] |
4 Installation

4.1 Software

MOVITOOLS

The "Constant tension center winder" application module is part of the SEW MOVITOOLS software package (version 2.60 and higher). Proceed as follows to install MOVITOOLS on your computer:

- Insert the MOVITOOLS CD into the CD ROM drive of your PC.
- Select "Start/Run...".
- Type "\{Drive letter of your CD drive\}:setup" and press the Enter key.
- The MOVITOOLS setup menu appears. Follow the instructions of the installation wizard.

You can now use Program Manager to start MOVITOOLS. If a MOVIDRIVE® unit is connected to your PC, select the correct port (PC COM port) and set peer-to-peer connection. Select <Update> to display the inverter in the "Connected Inverters" window.

Technology version (from version 2.70)

The "Constant tension center winder" application module can be used with MOVIDRIVE® units in the technology version (-0T). The application modules cannot be used with units in the standard version (-00).
4.2 MDV/MDS60A with "terminal expansion board DIO11A" option

Fig. 13: Wiring diagram for MOVIDRIVE® MDV/MDS60A basic unit with DIO11A option
4.3 MOVIDRIVE® MDV/MDS60A bus installation

Overview

For the bus installation, please note the information in the relevant fieldbus manuals which are included with the fieldbus interfaces. Please refer to the operating instructions for information on the installation of the system bus (SBus).

Fig. 14: Bus types

Please note: The MOVIDRIVE® option of "terminal expansion board type DIO11A" is not allowed to be installed for bus control!
The PROFIBUS documentation package contains detailed information. This package can be ordered from SEW. This documentation package contains the GSD files and type files for MOVIDRIVE® in order to help with project planning and to facilitate startup.

### Technical data

<table>
<thead>
<tr>
<th>Option</th>
<th>PROFIBUS fieldbus interface type DFP21A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part number</td>
<td>823 618 6</td>
</tr>
<tr>
<td>Resources for startup/diagnostics</td>
<td>MOVITOOLS software and DBG11A keypad</td>
</tr>
<tr>
<td>Protocol option</td>
<td>PROFIBUS-DP to EN 50170 V2 / DIN E 19245 P3</td>
</tr>
<tr>
<td>Supported baud rates</td>
<td>Automatic detection of baud rate from 9.6 kbaud...12 Mbaud</td>
</tr>
<tr>
<td>Connection</td>
<td>9-pin sub D socket</td>
</tr>
<tr>
<td></td>
<td>Assignment to EN 50170 V2 / DIN 19245 P3</td>
</tr>
<tr>
<td>Bus termination</td>
<td>Not integrated, must be implemented in the PROFIBUS connector.</td>
</tr>
<tr>
<td>Station address</td>
<td>0...125 can be set using DIP switch</td>
</tr>
<tr>
<td>GSD file</td>
<td>SEW_6003.GSD</td>
</tr>
<tr>
<td>DP identity number</td>
<td>6003 hex = 24579 dec</td>
</tr>
<tr>
<td>Weight</td>
<td>0.2 kg (0.44 lb)</td>
</tr>
</tbody>
</table>

1. Green LED: RUN
2. Red LED: BUS FAULT
3. DIP switch for setting the station address.
4. 9-pin sub D socket: Bus connection

### Pin assignment

**Fig. 15: Assignment of 9-pin sub D plug to EN 50170 V2**

1. 9-pin sub D plug
2. Twist the signal wires together!
3. Conductive connection is necessary between plug housing and shield!
MOVIDRIVE® MDV/MDS60A bus installation

**PROFIBUS (DFP11A)**

The PROFIBUS documentation package contains detailed information. This package can be ordered from SEW. This documentation package contains the GSD files and type files for MOVIDRIVE® in order to help with project planning and to facilitate startup.

### Technical data

<table>
<thead>
<tr>
<th>Option</th>
<th>PROFIBUS fieldbus interface type DFP11A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part number</td>
<td>822 724 1</td>
</tr>
<tr>
<td>Resources for startup/diagnostics</td>
<td>MOVITools software and DBG11A keypad</td>
</tr>
</tbody>
</table>
| Protocol options | • PROFIBUS-DP to EN 50170 V2 / DIN E 19245 P3  
• PROFIBUS-FMS to EN 50170 V2 / DIN E 19245 P3  
• Mixed mode PROFIBUS DP/FMS (combi-slave) |
| Supported baud rates | Automatic detection of baud rate:  
• 9.6 kbaud  
• 19.2 kbaud  
• 93.75 kbaud  
• 187.5 kbaud  
• 500 kbaud  
• 1500 kbaud |
| Connection | 9-pin sub D socket  
Assignment to EN 50170 V2 / DIN 19245 P3 |
| Bus termination | Can be activated for cable type A (up to 1500 kbaud) to EN 50170 V2 / DIN 19245 P3 |
| Station address | 0...125 can be set using DIP switch |
| Default bus parameter | Min-T<sub>SDR</sub> for FMS/DP or DP mode  
Can be selected via DIP switch |
| GSD file | SEW_6000.GSD |
| Weight | 0.2 kg (0.44 lb) |

1. Green LED: RUN  
2. Red LED: BUS FAULT  
3. DIP switch for setting the station address and changing from FMS/DP mixed mode to pure DP mode.  
4. DIP switch for switching the bus terminating resistor on and off  
5. 9-pin sub D socket: Bus connection

### Pin assignment

![Pin assignment diagram](image)

**Fig. 16: Assignment of 9-pin sub D plug to EN 50170 V2**

1. 9-pin sub D plug  
2. Twist the signal wires together!  
3. Conductive connection is necessary between plug housing and shield!
The INTERBUS documentation package contains detailed information. This package can be ordered from SEW.

Technical data

<table>
<thead>
<tr>
<th>Option</th>
<th>INTERBUS fieldbus interface type DFI11A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part number</td>
<td>822 723 3</td>
</tr>
<tr>
<td>Resources for startup/diagnostics</td>
<td>MOVITOOLS software and DBG11A keypad</td>
</tr>
<tr>
<td>Connection</td>
<td>Remote bus input: 9-pin sub D plug</td>
</tr>
<tr>
<td></td>
<td>Remote bus output: 9-pin sub D socket</td>
</tr>
<tr>
<td></td>
<td>RS-485 transmission technology, 6-core shielded and twisted-pair cable</td>
</tr>
<tr>
<td>Module ID</td>
<td>E3_{hex} ≈ 227_{dec}</td>
</tr>
<tr>
<td>Weight</td>
<td>0.2 kg (0.44 lb)</td>
</tr>
</tbody>
</table>

1. DIP switch for setting the number of process data items
2. 4 × green LED: Diagnostic LEDs
3. 1 × red LED: Diagnostic LED
4. 9-pin sub D plug: Remote bus input
5. 9-pin sub D socket: Remote bus output

Pin assignment

Conductor color abbreviations to IEC 757.

Fig. 17: Assignment of the 9-pin sub D socket of the incoming remote bus cable and the 9-pin sub D plug of the outgoing remote bus cable

1. 9-pin sub D socket of the incoming remote bus cable
2. Twist the signal wires together!
3. Conductive connection is necessary between plug housing and shield!
4. 9-pin sub D plug of the outgoing remote bus cable
5. Jumper pin 5 with pin 9!
MOVIDRIVE® MDV/MDS60A bus installation

**INTERBUS with fiber optic cable (DFI21A)**

The INTERBUS FO documentation package contains detailed information. This package can be ordered from SEW.

**Technical data**

<table>
<thead>
<tr>
<th>Option</th>
<th>INTERBUS fieldbus interface type DFI21A (FO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part number</td>
<td>823 093 5</td>
</tr>
<tr>
<td>Resources for startup/diagnostics</td>
<td>MOVITOLS software, DBG11A keypad and CMD tool</td>
</tr>
<tr>
<td>Supported baud rates</td>
<td>500 kbaud and 2 Mbaud, changeover via DIP switch</td>
</tr>
<tr>
<td>Connection</td>
<td>Remote bus input: 2 F-SMA plugs</td>
</tr>
<tr>
<td></td>
<td>Remote bus output: 2 F-SMA plugs</td>
</tr>
<tr>
<td>Weight</td>
<td>0.2 kg (0.44 lb)</td>
</tr>
</tbody>
</table>

**Connection assignment**

<table>
<thead>
<tr>
<th>Position</th>
<th>Signal</th>
<th>Direction</th>
<th>FO core color</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>FO remote IN</td>
<td>Receive data</td>
<td>Orange (OG)</td>
</tr>
<tr>
<td>4</td>
<td>Incoming remote bus</td>
<td>Send data</td>
<td>Black (BK)</td>
</tr>
<tr>
<td>5</td>
<td>FO remote OUT</td>
<td>Receive data</td>
<td>Black (BK)</td>
</tr>
<tr>
<td>6</td>
<td>Outgoing remote bus</td>
<td>Send data</td>
<td>Orange (OG)</td>
</tr>
</tbody>
</table>
The CAN bus documentation package contains detailed information. This package can be ordered from SEW.

### Technical data

<table>
<thead>
<tr>
<th>Option</th>
<th>CAN fieldbus interface type DFC11A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part number</td>
<td>822 725 X</td>
</tr>
<tr>
<td>Resources for startup/diagnostics</td>
<td>MOVITOOLS software and DBG11A keypad</td>
</tr>
<tr>
<td>Supported baud rates</td>
<td>Can be selected via DIP switch:</td>
</tr>
<tr>
<td></td>
<td>• 125 kbaud</td>
</tr>
<tr>
<td></td>
<td>• 250 kbaud</td>
</tr>
<tr>
<td></td>
<td>• 500 kbaud</td>
</tr>
<tr>
<td></td>
<td>• 1000 kbaud</td>
</tr>
<tr>
<td>Connection</td>
<td>9-pin sub D plug</td>
</tr>
<tr>
<td></td>
<td>Assignment to CiA standard</td>
</tr>
<tr>
<td></td>
<td>2-core twisted cable to ISO 11898</td>
</tr>
<tr>
<td>Bus termination</td>
<td>Can be switched on using DIP switch (120 Ω)</td>
</tr>
<tr>
<td>Address range</td>
<td>0...63 can be selected via DIP switch</td>
</tr>
<tr>
<td>Weight</td>
<td>0.2 kg (0.44 lb)</td>
</tr>
</tbody>
</table>

1. Green LED: TxD
2. Red LED: RxD
3. DIP switch for setting the process data length and baud rate
4. DIP switch for setting the base ID and switching the bus terminating resistor on and off
5. 9-pin sub D plug: Bus connection

### Pin assignment

1. Green LED: TxD
2. Red LED: RxD
3. DIP switch for setting the process data length and baud rate
4. DIP switch for setting the base ID and switching the bus terminating resistor on and off
5. 9-pin sub D plug: Bus connection

**Fig. 18: Assignment of 9-pin sub D socket of the bus cable**

(1) 9-pin sub D socket
(2) Twist the signal wires together!
(3) Conductive connection is necessary between plug housing and shield!
MOVIDRIVE® MDV/MDS60A bus installation

CANopen (DFO11A)

The CANopen documentation package contains detailed information. This package can be ordered from SEW.

Technical data

<table>
<thead>
<tr>
<th>Option</th>
<th>CANopen fieldbus interface type DFO11A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part number</td>
<td>823 162 1</td>
</tr>
<tr>
<td>Resources for startup/diagnostics</td>
<td>MOVITOLS software and DBG11A keypad</td>
</tr>
<tr>
<td>Supported baud rates</td>
<td>Can be selected via DIP switch:</td>
</tr>
<tr>
<td></td>
<td>• 125 kbaud</td>
</tr>
<tr>
<td></td>
<td>• 250 kbaud</td>
</tr>
<tr>
<td></td>
<td>• 500 kbaud</td>
</tr>
<tr>
<td></td>
<td>• 1000 kbaud</td>
</tr>
<tr>
<td>Connection</td>
<td>9-pin sub D plug</td>
</tr>
<tr>
<td></td>
<td>Assignment to CiA standard</td>
</tr>
<tr>
<td></td>
<td>2-core twisted cable to ISO 11898</td>
</tr>
<tr>
<td>Bus termination</td>
<td>Can be switched on using DIP switch (120 Ω)</td>
</tr>
<tr>
<td>Address range</td>
<td>1...127 can be selected via DIP switch</td>
</tr>
<tr>
<td>Weight</td>
<td>0.2 kg (0.44 lb)</td>
</tr>
</tbody>
</table>

Pin assignment

1. DIP switch for process data length, module ID and baud rate
2. Display and diagnostic LEDs
3. DIP switch for switching the bus terminating resistor on and off
4. 9-pin sub D plug: bus connection

Fig. 19: Assignment of 9-pin sub D socket of the bus cable

(1) 9-pin sub D socket
(2) Twist the signal wires together!
(3) Conductive connection is necessary between plug housing and shield!
**DeviceNet (DFD11A)**

The DeviceNet documentation package contains detailed information. This package can be ordered from SEW.

**Technical data**

<table>
<thead>
<tr>
<th>Option</th>
<th>DeviceNet fieldbus interface type DFD11A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part number</td>
<td>822 887 6</td>
</tr>
<tr>
<td>Resources for startup/diagnostics</td>
<td>MOVITOOLS software and DBG11A keypad</td>
</tr>
</tbody>
</table>
| Supported baud rates | Can be selected via DIP switch:  
  - 125 kbaud  
  - 250 kbaud  
  - 500 kbaud |
| Connection | 5-pin Phoenix terminal  
Assignment to DeviceNet specification  
(Volume I, Appendix B) |
| Permitted line cross section | According to DeviceNet specification |
| Bus termination | Use of bus connectors with integrated bus terminating resistor (120 Ω) at the start and finish of the bus segment. |
| Address range which can be set (MAC-ID) | 0...63 can be selected using DIP switch |
| Weight | 0.2 kg (0.44 lb) |

**Terminal assignment**

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

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Meaning</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>X30:1</td>
<td>V- (0V24)</td>
<td>Black (BK)</td>
</tr>
<tr>
<td>X30:2</td>
<td>CAN_L</td>
<td>Blue (BU)</td>
</tr>
<tr>
<td>X30:3</td>
<td>DRAIN</td>
<td>Bright</td>
</tr>
<tr>
<td>X30:4</td>
<td>CAN_H</td>
<td>White (WH)</td>
</tr>
<tr>
<td>X30:5</td>
<td>V+ (+24 V)</td>
<td>Red (RD)</td>
</tr>
</tbody>
</table>
MOVIDRIVE® MDV/MDS60A bus installation

**System bus (SBus) MDV/MDS**
The "System bus (SBus)" manual contains detailed information. This manual can be ordered from SEW. Max. 64 CAN bus stations can be interconnected using the system bus (SBus). The SBus supports transmission systems compliant with ISO 11898.

**SBus wiring diagram**

**Cable specification**
- Use a 2-core twisted and shielded copper cable (data transmission cable with shield comprising copper braiding). The cable must meet the following specifications:
  - Conductor cross section 0.75 mm² (AWG 18)
  - Cable resistance 120 Ω at 1 MHz
  - Capacitance per unit length ≤ 40 pF/m (12 pF/ft) at 1 kHz
Suitable cables are CAN bus or DeviceNet cables.

**Shield contact**
- Connect the shield at either end to the electronics shield clamp of the inverter or the master control and ensure the shield is connected over a large area. Also connect the ends of the shield to DGND.

**Line length**
- The permitted total cable length depends on the baud rate setting of the SBus (P816):
  - 125 kBaud → 320 m (1056 ft)
  - 250 kBaud → 160 m (528 ft)
  - 500 kBaud → 80 m (264 ft)
  - 1000 kBaud → 40 m (132 ft)

**Terminating resistor**
- Switch on the system bus terminating resistor (S12 = ON) at the start and finish of the system bus connection. Switch off the terminating resistor on the other units (S12 = OFF).
- There must not be any potential displacement between the units connected via SBus. Take suitable measures to avoid a potential displacement, e.g. by connecting the unit ground connectors using a separate lead.
4.4 MOVIDRIVE® compact MCV/MCS4_A

**PROFIBUS-DP pin assignment**

Refer to the instructions in the MOVIDRIVE® compact MC_41A operating instructions.

**Fig. 21:** Wiring diagram for MOVIDRIVE® compact MCV/MCS4_A

**Fig. 22:** Assignment of 9-pin sub D plug to EN 50170 V2

1. X30: 9-pin sub D plug
2. Twist the signal wires together!
3. Conductive connection is necessary between plug housing and shield!
The "System bus (SBus)" manual contains detailed information. This manual can be ordered from SEW.

Max. 64 CAN bus stations can be interconnected using the system bus (SBus). The SBus supports transmission systems compliant with ISO 11898.

**SBus wiring diagram**

**Cable specification**
- Use a 2-core twisted and shielded copper cable (data transmission cable with shield comprising copper braiding). The cable must meet the following specifications:
  - Conductor cross section 0.75 mm² (AWG 18)
  - Cable resistance 120 Ω at 1 MHz
  - Capacitance per unit length ≤ 40 pF/m (12 pF/ft) at 1 kHz

Suitable cables are CAN bus or DeviceNet cables.

**Shield contact**
- Connect the shield at either end to the electronics shield clamp of the inverter or the master control and ensure the shield is connected over a large area. Also connect the ends of the shield to DGND.

**Line length**
- The permitted total cable length depends on the baud rate setting of the SBus (P816):
  - 125 kbaud → 320 m (1056 ft)
  - 250 kbaud → 160 m (528 ft)
  - 500 kbaud → 80 m (264 ft)
  - 1000 kbaud → 40 m (132 ft)

**Terminating resistor**
- Switch on the system bus terminating resistor (S12 = ON) at the start and finish of the system bus connection. Switch off the terminating resistor on the other units (S12 = OFF).

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

5.1 General information

Correct project planning and installation are the prerequisites for successful startup. Refer to the MOVIDRIVE® MD_60A and MOVIDRIVE® compact system manuals for detailed project planning instructions. These system manuals form part of the MOVIDRIVE® MD_60A and MOVIDRIVE® compact documentation packages which you can order from SEW.

Check the installation, including the encoder connection, by following the installation instructions in the MOVIDRIVE® operating instructions and in this manual (→ Sec. Installation).

5.2 Preliminary work

Perform the following steps before startup:

• Connect the inverter to the PC using the serial port (RS-232, USS21A on PC-COM).
• Install the SEW MOVITOOLS software (version 2.60 or higher).
• Start-up the inverter with "MOVITOOLS/Shell".

Fig. 24: Inverter startup

- Set the following operating modes:

<table>
<thead>
<tr>
<th>Inverter</th>
<th>DR/DT/DV/D</th>
<th>CT/CV</th>
<th>DS/DY</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOVIDRIVE® MDV60A or MOVIDRIVE® compact MCV4_A</td>
<td>CFC</td>
<td>CFC</td>
<td>-</td>
</tr>
<tr>
<td>MOVIDRIVE® MDS60A or MOVIDRIVE® compact MCS4_A</td>
<td>-</td>
<td>-</td>
<td>SERVO</td>
</tr>
</tbody>
</table>

• "0" signal at terminal DIØØ "/CONTROLLER INHIBIT/"
5.3 Starting the "Constant tension center winder" program

**General information**

- Start "MOVITOOLS/Shell".
- Select "Startup/Constant tension center winder."

**Initial startup**

The startup window appears as soon as the "Constant tension center winder" is started for the first time.

Fig. 25: Starting the "Constant tension center winder" program
Starting the "Constant tension center winder" program

Setpoints

Fig. 26: Setting setpoints

- Control source and setpoint source
  Control source and setpoint source: "FIELDBUS" or "SBUS" is set automatically with bus control. "TERMINALS" and "BIPOL./FIX.SETPT" are set automatically with terminal control. The setting cannot be changed here.
  - Speed jog mode
  Set the motor speed for jog mode.
Starting the "Constant tension center winder" program

**Fieldbus parameters and process data assignment**

Only with control via fieldbus/system bus:

- Set the fieldbus parameters. Fixed parameters are blocked and cannot be changed.
- Set the value of process input data word PI3. You can set one of the following values:
  - Actual diameter [mm]
  - Actual web speed [m/min]
  - Actual material length [m]
Starting the "Constant tension center winder" program

Parameters for calculation of the diameter

- **Diameter or pull-off roller master drive**: Enter the diameter of the pull-off roller. If you are using a master encoder, enter the diameter of the measuring wheel or reversing roller where the master encoder is mounted.
- **Total ratio master drive**: Enter the total ratio (gear unit × additional gear) between motor shaft and pull-off roller. If you are using a master encoder, enter the total ratio between the master encoder and the measuring wheel or reversing roller.
- **Total ratio winder**: Enter the total ratio (additional gear × gear unit) between motor shaft and take-up roller.
- **Resolution master drive**: Enter the value given on the nameplate for the resolution of the motor encoder of the master drive or for the resolution of the master encoder. Make sure that parameter P955 "Encoder scaling" is set to 1.
- "**Diameter winding tube [mm]**" and "**Max. diameter winder [mm]**": You can select if you want to specify the minimum and maximum diameters for 1, 2, 3 or 4 winding tubes. In this way, you can use up to 4 different winders without having to set new program parameters. The diameter values of the next data record must be greater than or equal to the values of the previous data record. You can select one of the 4 data records using 2 binary inputs.
Starting the "Constant tension center winder" program

Parameters for
torque calculation

- **Maximum speed**: Enter the maximum web speed permitted for your application in the unit [m/min].
- **Minimum tensile force**: Enter the smallest possible tensile force in the unit [N].
- **Maximum tensile force**: Enter the largest permitted tensile force in the unit [N].
- **Friction compensation**: During startup, "Read-in friction table" mode is used to determine the friction losses within the mechanical components. The data are saved in a table and are used with reference to the current motor speed.
  - No compensation for friction takes place if 0 % is entered. The web tension deviates from the setpoint at high winder speeds.
  - Friction is fully compensated if 100 % is entered.
- **Rated motor current**, **rated motor torque** and **maximum speed of the speed controller** are set automatically during startup and these values cannot be altered here.
Starting the "Constant tension center winder" program

Setting the winding characteristics

Only effective, if $D_{\text{max}} - D_{\text{min}} \geq 100 \text{ mm}$.

With many materials, it is necessary to reduce the tensile stress as the winding diameter increases. You can set these winding characteristics in two ways:

1. **Formula:** You can set the winding characteristics using a hyperbolic function.
2. **Import:** You can import any table values for the winding characteristics.

The result of the hyperbolic function or the table values is shown in the illustration.

**Fig. 30: Setting the winding characteristics**

The program prompts you to save the entries you have made.

**Fig. 31: Saving changes**
5 Starting the "Constant tension center winder" program

**Download**

By pressing "Download," all necessary settings will automatically made in the inverter and the "Constant tension center winder" IPOS program is started.

![Download window](image)

*Fig. 32: Download window*

**Switching to the monitor**

After the download, the program asks if you want to switch to the monitor.

![Monitor Yes/No](image)

*Fig. 33: Monitor Yes/No*

Select "Yes" to switch to the monitor and start in the desired operating mode. Select "No" to switch to MOVITOOLS/Shell.
Starting the "Constant tension center winder" program

**Monitor**

The monitor appears immediately if the "Constant tension center winder" is restarted after initial startup has already been performed.

- Only the status is displayed in operation without a bus.
- If operating with the fieldbus/system bus, you can select whether to display the status, fieldbus process data 1 or fieldbus process data 2.

**Status**

![Monitor display](image)

**Repeating startup**

Press "Startup" if you want to repeat the startup. The startup windows will appear (→ Initial startup).
Starting the "Constant tension center winder" program

Operation with fieldbus/system bus

If operating with the fieldbus/system bus, you can also have the fieldbus process data displayed in addition to the status display.

Fieldbus process data 1

Only for operation with fieldbus/system bus:

Fig. 35: "Constant tension center winder" monitor, fieldbus process data 1
Starting the "Constant tension center winder" program

Only for operation with fieldbus/system bus:

Fieldbus process data 2

Fig. 36: "Constant tension center winder" monitor, fieldbus process data 2
Starting the "Constant tension center winder" program

You can also simulate a control in the "Fieldbus process data 2" display in addition to pure monitor operation.

- "0" signal at terminal DIØØ "/CONTROLLER INHIBIT/.
- To do this, activate "Control" for "PO1: Control word."
- You can now activate and deactivate the individual bits of the control word (PO1) and specify values for the process output data words PO2 (= tensile stress setpoint) and PO3 (= material length to be wound).
- Press "Send PO" to submit these control words to the inverter.

The inverter now performs the travel command in accordance with these specifications.

- You can only change from "Control" to "Monitor" with DIØØ "/CONTROLLER INHIBIT" = "0".
- "Monitor" must be active to exit the "Constant tension center winder" program.
### 5.4 Parameters

Startup automatically sets the following parameters:

<table>
<thead>
<tr>
<th>Parameter number</th>
<th>Parameter</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>P100</td>
<td>Setpoint source</td>
<td>BIPOL./FIX.SETPT, FIELDBUS or SBUS</td>
</tr>
<tr>
<td>P101</td>
<td>Control word source</td>
<td>TERMINALS, FIELDBUS or SBUS</td>
</tr>
<tr>
<td>P136</td>
<td>Stop ramp</td>
<td>0 s</td>
</tr>
<tr>
<td>P137</td>
<td>Emergency ramp</td>
<td>0 s</td>
</tr>
<tr>
<td>P600</td>
<td>Binary input DIØ1</td>
<td>IPOS input</td>
</tr>
<tr>
<td>P601</td>
<td>Binary input DIØ2</td>
<td>IPOS input</td>
</tr>
<tr>
<td>P602</td>
<td>Binary input DIØ3</td>
<td>Enable/stop</td>
</tr>
<tr>
<td>P603</td>
<td>Binary input DIØ4</td>
<td>Error reset</td>
</tr>
<tr>
<td>P604</td>
<td>Binary input DIØ5</td>
<td>IPOS input</td>
</tr>
<tr>
<td>P610 – P617</td>
<td>Binary inputs DI1Ø – DI17</td>
<td>IPOS input</td>
</tr>
<tr>
<td>P819</td>
<td>Fieldbus timeout delay</td>
<td>0.5 s</td>
</tr>
<tr>
<td>P815</td>
<td>SBus timeout delay</td>
<td></td>
</tr>
<tr>
<td>P831</td>
<td>Response FIELDBUS TIMEOUT</td>
<td>No response, Display error, Imm. stop/Fault, Emerg. stop/Fault, Rapid stop/Fault, Imm. stop/Warning, Emerg. stop/Warning, Rapid stop/Warning</td>
</tr>
<tr>
<td>P870</td>
<td>Setpoint description PO1</td>
<td>Control word 2</td>
</tr>
<tr>
<td>P871</td>
<td>Setpoint description PO2</td>
<td>IPOS PO-DATA</td>
</tr>
<tr>
<td>P872</td>
<td>Setpoint description PO3</td>
<td>IPOS PO-DATA</td>
</tr>
<tr>
<td>P873</td>
<td>Actual value description PI1</td>
<td>Status word 2</td>
</tr>
<tr>
<td>P874</td>
<td>Actual value description PI2</td>
<td>IPOS PI-DATA</td>
</tr>
<tr>
<td>P875</td>
<td>Actual value description PI3</td>
<td>IPOS PI-DATA</td>
</tr>
<tr>
<td>P876</td>
<td>PO data enable</td>
<td>On</td>
</tr>
<tr>
<td>P300</td>
<td>Start/stop speed 1</td>
<td>0 rpm</td>
</tr>
<tr>
<td>P301</td>
<td>Minimum speed 1</td>
<td>0 rpm</td>
</tr>
<tr>
<td>P302</td>
<td>Maximum speed 1</td>
<td>0...5500 rpm</td>
</tr>
<tr>
<td>P730</td>
<td>Brake function 1</td>
<td>On</td>
</tr>
</tbody>
</table>

These parameters must not be altered after startup!
5.5 Starting the drive

Following the download, switch to the "Constant tension center winder" monitor by selecting "Yes." You can set the operating mode using terminals DI1Ø and DI11 in terminal control or bits 8 and 9 of "PO1: Control word" in bus control.

Note the following points to start the drive. This applies to all operating modes:

- Binary inputs DI1Ø "/CONTROLLER INHIBIT/" and DI11 "ENABLE/RAPID STOP" must get a "1" signal.
- Only with control via fieldbus/system bus: Set the control bit PO1:0 "CONTROLLER INHIBIT/ENABLE" = "0" and the control bits PO1:1 "ENABLE/RAPID STOP" and PO1:2 "ENABLE/STOP" = "1".

Operating mode

<table>
<thead>
<tr>
<th>Operating mode</th>
<th>Terminal (in bus mode, virtual terminal in control word PO1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DI1Ø (PO1:8)</td>
</tr>
<tr>
<td>Jog mode</td>
<td>&quot;0&quot;</td>
</tr>
<tr>
<td>Teach-in run, determining friction curve</td>
<td>&quot;1&quot;</td>
</tr>
<tr>
<td>Automatic mode, constant torque</td>
<td>&quot;0&quot;</td>
</tr>
<tr>
<td>Automatic mode, constant web tension</td>
<td>&quot;1&quot;</td>
</tr>
</tbody>
</table>

- Jog mode: Direction of rotation as seen onto the drive side of the motor.
  - DI1Ø = "1": The drive winds clockwise (= winding to the right).
  - DI11 = "1": The drive winds counterclockwise (= winding to the left).
  - The speed for jog mode is fixed during startup.
  - The maximum possible torque is always available in jog mode (= 150% Iₙ).

With regard to the direction of rotation, bear in mind if you are using a 2 or 3-stage gear unit.

- Teach-in run, determining friction curve:
  - Start the teach-in run with DI1Ø = "1."
  - In this teach-in run, the drive automatically determines the speed-dependent friction coefficients of the gear unit and the mechanical components.
  - The teach-in run always takes place with the "winding to the right" direction of rotation.

- Automatic mode, constant torque:
  - DI1Ø = "1": Start automatic mode, winding to the right.
  - DI11 = "1": Start automatic mode, winding to the left.
  - The torque is kept constant regardless of the current diameter. Consequently, the web tension reduces reciprocally to the winding diameter.

- Automatic mode, constant web tension:
  - DI1Ø = "1": Start automatic mode, winding to the right.
  - DI11 = "1": Start automatic mode, winding to the left.
  - The torque is set in relation to the winding diameter, the friction coefficients and the winding characteristics. Consequently, the web tension – i.e. the tensile stress in the material – is kept constant.
5.6 Jog mode

- DI1Ø (PO1:8) = "0" and DI11 (PO1:9) = "0"
- DIØ1 = "1" = winding to the right (CW) and DIØ2 = "1" = winding to the left (CCW).

The speed is fixed during startup.

The maximum possible torque is always available in jog mode (= 150% I_N).
5.7 Teach-in run, determining friction curve

**Important:** The drive turns automatically at various speeds during the teach-in run. Consequently, decouple the driven machine so that only the motor and the gear unit are turning.

- DI1Ø (PO1:8) = "1" and DI11 (PO1:9) = "0"
- DIØ1 = "1" starts the teach-in run.

The drive automatically determines all speed-dependent friction values.

---

**Fig. 40: Teach-in run**
### 5.8 Automatic mode, constant torque

- DIØ1 (PO1:8) = "0" and DI11 (PO1:9) = "1"
- DIØ1 = "1" = Start automatic mode, winding to the right.
- DIØ2 = "1" = Start automatic mode, winding to the left.

The torque is kept constant regardless of the current diameter. Consequently, the web tension reduces reciprocally to the winding diameter.

The winding characteristics are not evaluated in this operating mode.

---

**Table: Automatic - constant torque**

<table>
<thead>
<tr>
<th>Op. mode</th>
<th>Diameter winder case [mm]</th>
<th>Max. diameter winder [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set1</td>
<td>100</td>
<td>1000</td>
</tr>
<tr>
<td>Set2</td>
<td>150</td>
<td>1500</td>
</tr>
<tr>
<td>Set3</td>
<td>200</td>
<td>2000</td>
</tr>
<tr>
<td>Set4</td>
<td>250</td>
<td>2500</td>
</tr>
</tbody>
</table>

**Fig. 41: Automatic mode, constant torque**
5.9 Automatic mode, constant web tension

- DI1Ω (PO1:8) = "1" and DI11 (PO1:9) = "1"
- DIØ1 = "1" = Start automatic mode, winding to the right.
- DIØ2 = "1" = Start automatic mode, winding to the left.

The torque is set in relation to the winding diameter, the friction coefficients and the winding characteristics. Consequently, the web tension – i.e. the tensile stress in the material – is kept constant.

The winding characteristics are evaluated in this operating mode.

![Diagram of automatic mode, constant web tension](image)

**Fig. 42: Automatic mode, constant web tension**
6 Operation and Service

6.1 Timing diagrams

The following prerequisites apply to the timing diagrams:

- Startup performed correctly
- DIØØ "CONTROLLER INHIBIT" = "1" (no inhibit)
- DIØ3 "ENABLE/RAPID STOP" = "1"

The following bits have to be set in control word PO1 for control via fieldbus/system bus:

- PO1:0 = "0" (CONTROLLER INHIBIT/ENABLE)
- PO1:1 = "1" (ENABLE/RAPID STOP)
- PO1:2 = "1" (ENABLE/STOP)

Jog mode

Fig. 43: Timing diagram of jog mode

DIØØ = /Controller inhibit
DIØ3 = Enable/rapid stop
DI1Ø = Mode selection
DI11 = Mode selection
DIØ1 = Winding to the right
DIØ2 = Winding to the left
DBØØ = /Brake

(1) = Start jog mode, winding to the right
(2) = Start jog mode, winding to the left
n1 = Fixed speed for jog mode
n = Fixed speed for jog mode
Set during startup
Teach-in run, determining friction curve

Important: The drive turns automatically at various speeds.

![Timing diagram of referencing mode](image-url)

**Fig. 44: Timing diagram of referencing mode**

- \( DI\bar{0}\bar{0} \) = /Controller inhibit
- \( DI\bar{0}\bar{3} \) = Enable/rapid stop
- \( DI1\bar{0} \) = Mode selection
- \( DI1\bar{1} \) = Mode selection
- \( DI\bar{0}\bar{1} \) = Winding to the right
- \( DI\bar{0}\bar{2} \) = Winding to the left
- \( DB\bar{0}\bar{0} \) = /Brake

(1) = Start teach-in run
(2) = Teach-in run finished
Automatic mode, constant torque

Fig. 45: Automatic mode timing diagram, constant torque

DIØØ = /Controller inhibit
DIØ3 = Enable/rapid stop
DI1Ø = Mode selection |T| = Torque value
DI11 = Mode selection |F| = Web tension value
DIØ1 = Winding to the right d = Winding diameter
DIØ2 = Winding to the left
DBØØ = /Brake

(1) = Start winding to the right = unwinding
(2) = Start winding to the left = winding
|T| = Torque value
|F| = Web tension value
d = Winding diameter

* = unwind
* = wind up
Fig. 46: Automatic mode timing diagram, constant web tension

- DI00 = /Controller inhibit
- DI03 = Enable/rapid stop
- DI10 = Mode selection
- DI11 = Mode selection
- DI01 = Winding to the right
- DI02 = Winding to the left
- DB00 = /Brake

<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start winding to the right = unwinding</td>
<td>Start winding to the left = winding</td>
</tr>
<tr>
<td>[T] = Torque value</td>
<td>[F] = Web tension value</td>
</tr>
<tr>
<td>d = Winding diameter</td>
<td>unwind</td>
</tr>
</tbody>
</table>

n [1/min]
6.2 Fault information

The error memory (P080) saves the last five error messages (errors t-0 – t-4). The error message of longest standing is deleted whenever more than five fault messages have occurred. The following information is saved in case of a malfunction:

- Error that occurred
- Status of the binary inputs/outputs
- Operating status of the inverter
- Inverter status
- Heat sink temperature
- Speed
- Output current
- Active current
- Unit utilization
- DC link circuit voltage
- ON hours
- Enable hours
- Parameter set
- Motor utilization.

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

- Immediate switch-off:
The unit can no longer brake the drive; the output stage goes to high resistance in the event of an error and the brake is applied immediately (DB00 ”/Brake” = "0").

- Rapid stop:
The drive is braked with the stop ramp t13/t23. Once the stop speed is reached, the brake is applied (DB00 ”/Brake” = "0"). The output stage goes to high-resistance after the brake reaction time has elapsed (P732 / P735).

- Emergency stop:
The drive is braked with the emergency ramp t14/t24. Once the stop speed is reached, the brake is applied (DB00 ”/Brake” = "0"). The output stage goes to high-resistance after the brake reaction time has elapsed (P732 / P735).

Reset

An error message can be acknowledged by:

- Switching the power supply off and on again.
  Recommendation: Observe a minimum switch-off time of 10 s for the mains contactor K11.
- Reset by binary input DI04. Startup of the "Constant tension center winder" causes this binary input to be assigned the "Reset" function.
- Only with control via fieldbus/system bus: "0" → "1" → "1" signal at bit PO1:6 in control word PO1.
- Press the reset button in the MOVITOOLS manager.
- Manual reset in MOVITOOLS/Shell (P840 = "YES" or [Parameter] / [Manual reset]).
- Manual reset using the DBG11A (pressing the <E> key in the event of an error gives direct access to parameter P840).

Timeout active

If the inverter is controlled via a communications interface (fieldbus, RS-485 or SBus) and the power was switched off and back on again or an error reset was performed, then the enable remains ineffective until the inverter once again receives valid data via the interface which is monitored with a timeout.
6 Error messages

6.3 Error messages

Display
The error or warning code is displayed in BCD format. The following display sequence is adhered to:

- Flashes, approx. 1 s
- Display off, approx. 0.2 s
- Tens, approx. 1 s
- Display off, approx. 0.2 s
- Ones, approx. 1 s
- Display off, approx. 0.2 s

The display switches over to the operating display following a reset or if the error or warning code resumes the value "0" once again.

List of errors

The following table shows a selection from the complete list of errors (→ MOVIDRIVE® MD_60A operating instructions). It lists only those errors which can occur specifically with this application.

A dot in the "P" column means that the response is programmable (P83_ Error response). The factory-set error response is listed in the "Response" column.

<table>
<thead>
<tr>
<th>Fault code</th>
<th>Name</th>
<th>Response</th>
<th>P</th>
<th>Possible cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>No error</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>07</td>
<td>DC link overvoltage</td>
<td>Immediate switch-off</td>
<td></td>
<td>DC link voltage too high</td>
<td>Extend deceleration ramps</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Check connecting harness for braking resistor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Check technical data of braking resistor</td>
</tr>
<tr>
<td>10</td>
<td>IPOS-ILLOP</td>
<td>Emergency stop</td>
<td></td>
<td>Incorrect command detected during running of IPOS program</td>
<td>Check program memory content and correct if necessary</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Incorrect conditions during running of program</td>
<td>Load correct program into program memory</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Check program sequence (→ IPOS manual)</td>
</tr>
</tbody>
</table>
## Error messages

<table>
<thead>
<tr>
<th>Fault code</th>
<th>Name</th>
<th>Response / Immediate switch-off</th>
<th>Possible cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 Encoder</td>
<td>Immediate</td>
<td>Encoder cable or shield not</td>
<td>- Encoder cable or shield not connected correctly</td>
<td>Check encoder cable and shield for correct connection, short circuit and open circuit.</td>
</tr>
<tr>
<td></td>
<td>switch-off</td>
<td>connected correctly</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Short circuit/open circuit in</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>encoder cable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Encoder defective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28 Fieldbus timeout</td>
<td>Rapid stop</td>
<td>No master-slave communication took place within the configured response monitoring period.</td>
<td></td>
<td>Check master communication routine Extend fieldbus timeout time (P819) or switch off monitoring</td>
</tr>
<tr>
<td>31 TF sensor</td>
<td>No response</td>
<td>Motor too hot, TF sensor has tripped</td>
<td></td>
<td>Let motor cool down and reset fault Check connections/link between MOVIDRIVE® and TF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TF sensor of motor not connected or not connected properly</td>
<td></td>
<td>If no TF is connected: Jumper X10:1 to X10:2. With MDS: Jumper X15:9 to X15:5. Set P834 to “No response”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MOVIDRIVE® connection and TF connection on motor interrupted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36 No option</td>
<td>Immediate</td>
<td>Type of option card not allowed</td>
<td></td>
<td>Use correct option card Set correct setpoint source (P100) Set correct control signal source (P101) Set correct operating mode (P700 or P701) Set the correct encoder type</td>
</tr>
<tr>
<td></td>
<td>switch-off</td>
<td>Setpoint source, control source or operating mode not approved for this option card</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Incorrect encoder type set for DIP11A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>99 IPOS ramp calculation error</td>
<td>Immediate</td>
<td>In IPOS operating mode only: Attempt made to alter ramp times and traveling velocities when the inverter is enabled, with a sine or squared positioning ramp.</td>
<td>Rewrite the IPOS program so that ramp times and traveling velocities can only be altered when the inverter is inhibited.</td>
<td></td>
</tr>
</tbody>
</table>