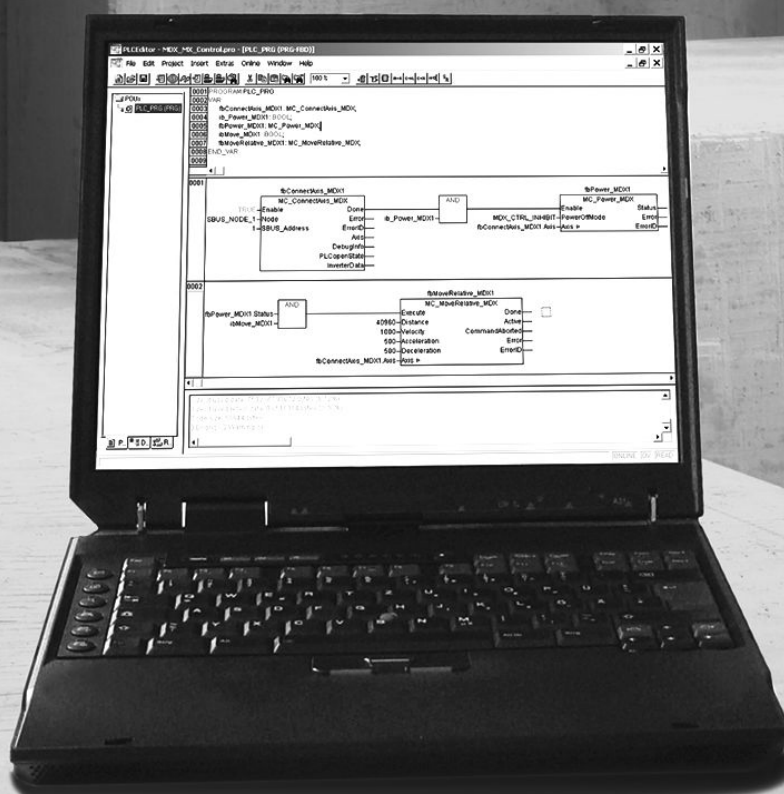




Manual



MOVIFIT® FC/MC – Application Module Cam Positioning



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1 General information

1.1 About this documentation

This documentation is an integral part of the product. The documentation is intended for all employees who perform assembly, installation, startup, and service work on the product.

Make sure this documentation is accessible and legible. Ensure that persons responsible for the system and its operation, as well as persons who work independently on the unit, have read through the entire documentation 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.

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

1.2.2 Structure of section-related safety notes

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

Section-related safety notes are structured as follows:



SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent hazard.

Meaning of the hazard symbols

The hazard symbols in the safety notes have the following meaning:

Hazard symbol	Meaning
	General hazard

Hazard symbol	Meaning
	Warning of dangerous electrical voltage
	Warning of hot surfaces
	Warning of risk of crushing
	Warning of suspended load
	Warning of automatic restart

1.2.3 Structure of embedded safety notes

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

Embedded safety notes are structured as follows:

- **▲ SIGNAL WORD** Type and source of hazard.
Possible consequence(s) if disregarded.
– Measure(s) to prevent hazard.

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 at hand. Therefore, read the documentation before you start working with the software and the connected units from SEW-EURODRIVE.

Make sure that the documentation is available to persons responsible for the machinery and its operation as well as to persons who work independently on the units. Also ensure that the documentation is legible.

1.4 Exclusion of liability

You must comply with the information contained in this documentation to ensure safe operation and to achieve the specified product characteristics and performance features. 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 Other applicable documentation

This document supplements the MOVIFIT® FC/MC operating instructions and limits the application notes according to the following information. Use this documentation only in connection with the MOVIFIT® FC/MC operating instructions.

1.6 Product names and trademarks

The brands and product names in this documentation are trademarks or registered trademarks of their respective titleholders.

1.7 Copyright

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Unauthorized reproduction, modification, distribution or any other use of the whole or any part of this documentation is strictly prohibited.

2 Safety notes

2.1 General

The following basic safety notes are intended to prevent injury to persons and damage to property. The user must ensure that the basic safety notes are read and observed.

Ensure that persons responsible for the machinery and its operation as well as persons who work independently have read through the documentation carefully and understood it. If you are unclear about any of the information in this documentation or if you require further information, please contact SEW-EURODRIVE.

The following safety notes refer to the use of the software. Also observe the supplementary safety notes in this documentation and in the documentation for the connected units from SEW-EURODRIVE.

This document does not replace the detailed documentation for the connected units. This documentation assumes that the user has access to and is familiar with the documentation for all connected units from SEW-EURODRIVE.

Never install or operate damaged products. Report any damage to the shipping company immediately.

Depending on the degree of protection, units may have live, uninsulated, and sometimes moving or rotating parts, as well as hot surfaces during operation.

Removing required covers without authorization, improper use or incorrect installation and operation may result in severe injury to persons, or damage to machinery. Consult the documentation for further information.

2.2 Target group

Work with the software in this solution may only be performed by adequately qualified personnel. Qualified personnel in this context are persons who have the following qualifications:

- Appropriate training in their relevant field.
- Knowledge of this documentation and other applicable documentation.
- SEW-EURODRIVE recommends additional product training for products that are operated using this software.

All mechanical work on connected units is to be performed exclusively by adequately qualified personnel. Qualified personnel in the context of this documentation are persons familiar with the design, mechanical installation, troubleshooting and servicing of the product, who possess the following qualifications:

- Training in mechanical engineering, e.g. as a mechanic or mechatronics technician (final examinations must have been passed).
- Knowledge of this documentation and other applicable documentation.

All electrical work on connected units is to be performed exclusively by adequately qualified electricians. Qualified electricians in the context of this documentation are persons familiar with electrical installation, startup, troubleshooting and servicing of the product, who possess the following qualifications:

- Training in electrical engineering, e.g. as an electrician or mechatronics technician (final examinations must have been passed).
- Knowledge of this documentation and other applicable documentation.

- Knowledge of the relevant safety regulations and laws.
- Knowledge of all other standards, directives and laws named in this documentation.

The above-mentioned persons must have the express authorization of the company to operate, program, configure, label and ground units, systems and circuits in accordance with the standards of safety technology.

All work in the areas of transportation, storage, operation and waste disposal must be carried out by persons who are trained appropriately.

2.3 Designated use

The application module *cam positioning* is used to control cam positioning systems with MOVIFIT®.

The *cam positioning* application module can be implemented with the following MOVIFIT® units:

- MOVIFIT® FC with "Technology" function level
- MOVIFIT® MC with "Technology" function level

2.4 Bus systems

A bus system makes it possible to adapt frequency inverters and/or motor starters to the particulars of the machinery within wide limits. This results in the risk that a change of parameters that cannot be detected externally can result in unexpected, though not uncontrolled, system behavior.

2.5 Short designation

The following short designations are used in this documentation.

Type designation	Short designation
Application module <i>cam positioning</i>	Application module

3 System description

3.1 Area of application

The application module is based on the "rapid/creep speed positioning" principle and can be used in the following applications:

- Roller and chain conveyors
- Lifting table applications
- Rotary table applications

The following operating modes are supported:

- Feed-in
- Feed-out
- Lifting/rotating
- Jog mode

3.2 Properties

This application module has the following characteristics:

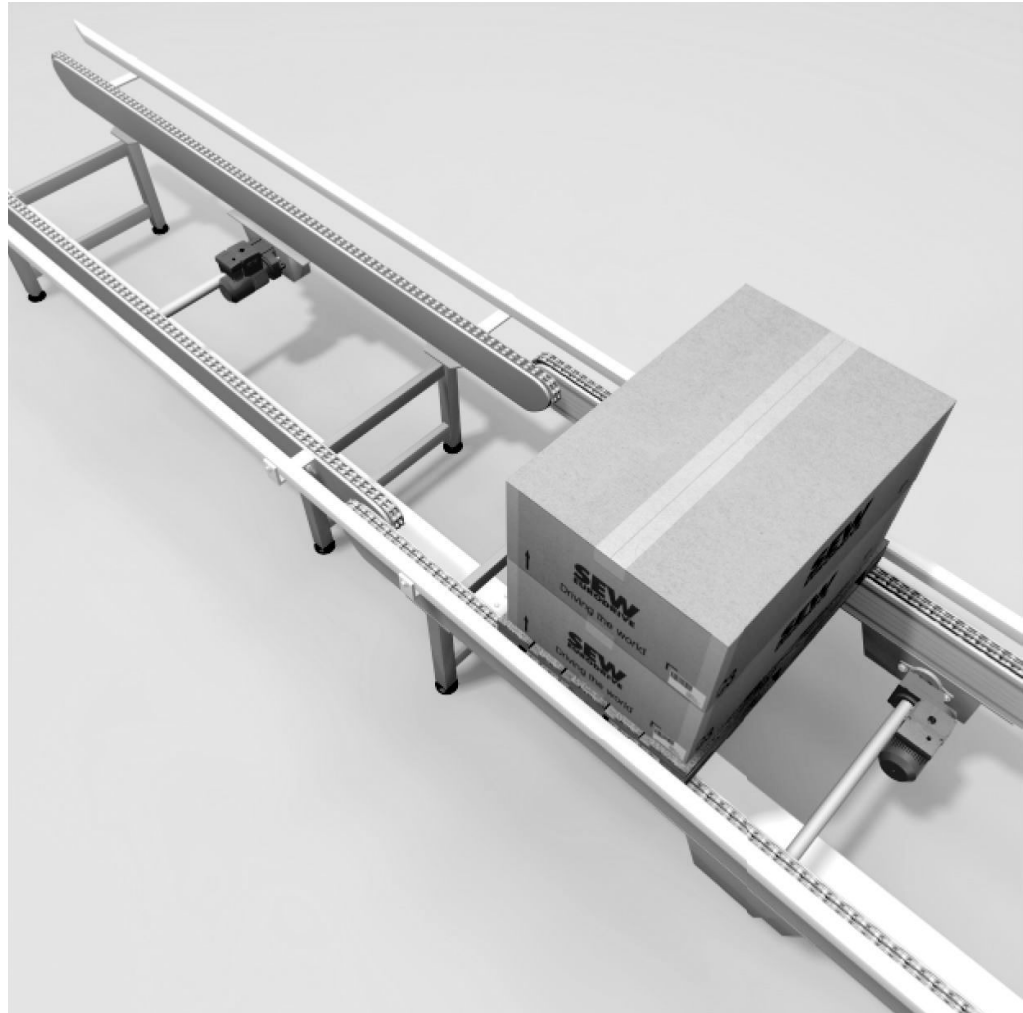
- Bidirectional rapid/creep speed positioning to one limit switch pair at each end
- Jog mode or positioning mode
- Control via fieldbus
- 3 run time monitoring functions for positioning
- Monitoring of the creep speed when the stop sensor is reached
- Data management
- Diagnostics with the S12 safety option
- User-guided startup and diagnostics

4 Operating modes

4.1 Feed-in / feed-out

4.1.1 Operating principle

The following figure shows a typical application example of the "rapid/creep speed positioning" principle.



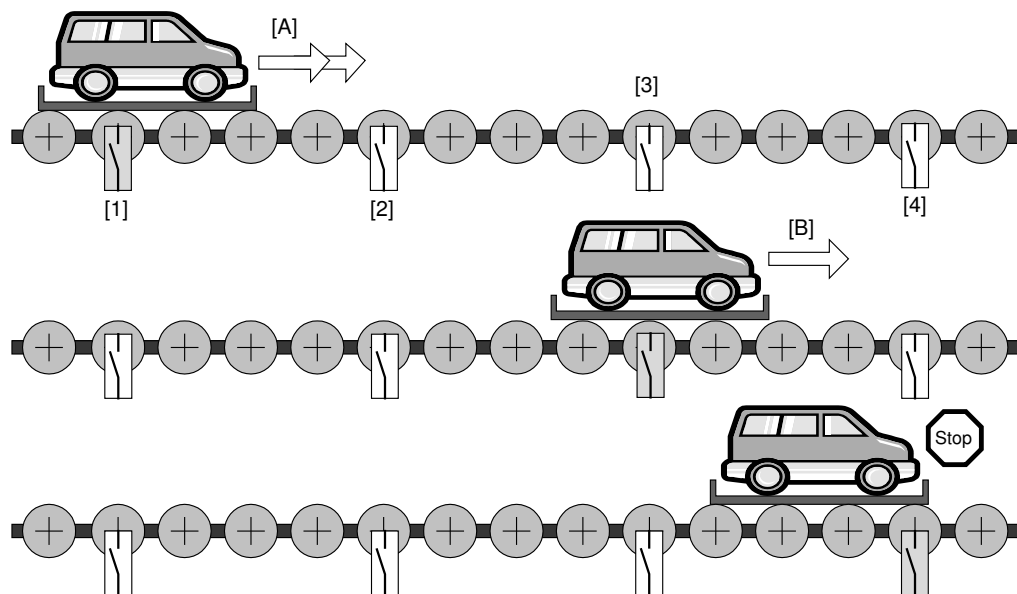
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In this roller conveyor, longer track sections are subdivided into segments.

4 Operating modes

Feed-in / feed-out

Decentralization of positioning takes load off the central controller. The independence of bus runtimes allows for a high degree of positioning accuracy. This ensures a quick, segment-wise transfer of the conveyed material.



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- [1] Sensor "Stop CCW" / item control CW
- [2] Sensor "F/S¹⁾ CCW"
- [3] Sensor "F/S¹⁾ CW"
- [4] Sensor "Stop CW" / item control CCW

- [A] Rapid movement
- [B] Slow movement

1) F/S = Rapid/creep speed

4.1.2 Operating mode "Feed-in"

Functional description	
Mode selection	Mode 2
Prerequisite	Drive enabled.
Functional description	After setting the start bit, the drive accelerates along the set acceleration ramp until it reaches rapid speed. Upon contacting the "F/S"¹⁾ sensor, the drive brakes along the deceleration ramp until it reaches creep speed. After the "Stop" sensor trips, the drive brakes along the stop ramp to a standstill.

1) F/S = rapid/creep speed

The following table shows the correlation between the setpoints and their sources (see chapter "Monitor mode" and "Setting setpoints").

Setpoint selection	Setpoint source	
Rapid speed	• Fieldbus 1PD	Set during startup.
	• Fieldbus 3PD	Read from "PO2 rapid speed".
	• Fieldbus 6PD	Read from "PO2 rapid speed".

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Setpoint selection	Setpoint source	
Creep speed	• Fieldbus 1PD	Set during startup.
	• Fieldbus 3PD	Set during startup.
	• Fieldbus 6PD	Set via "PO3 creep speed".
Acceleration ramp	• Fieldbus 1PD	Set during startup.
	• Fieldbus 3PD	Read from "PO3 ramp".
	• Fieldbus 6PD	Read from "PO4 ramp".
Deceleration ramp	• Fieldbus 1PD	Set during startup.
	• Fieldbus 3PD	Read from "PO3 ramp".
	• Fieldbus 6PD	Read from "PO5 ramp down".
Stop ramp	• Fieldbus 1PD	Set during startup.
	• Fieldbus 3PD	Set during startup.
	• Fieldbus 6PD	Read from "PO6 ramp stop".

4.1.3 Operating mode "Feed-out"

Functional description	
Mode selection	Mode 3
Prerequisite	Drive enabled.
Functional description	After setting the start bit, the drive accelerates along the set acceleration ramp until it reaches rapid speed. After the start bit is reset, the drive brakes along the deceleration ramp to a standstill.

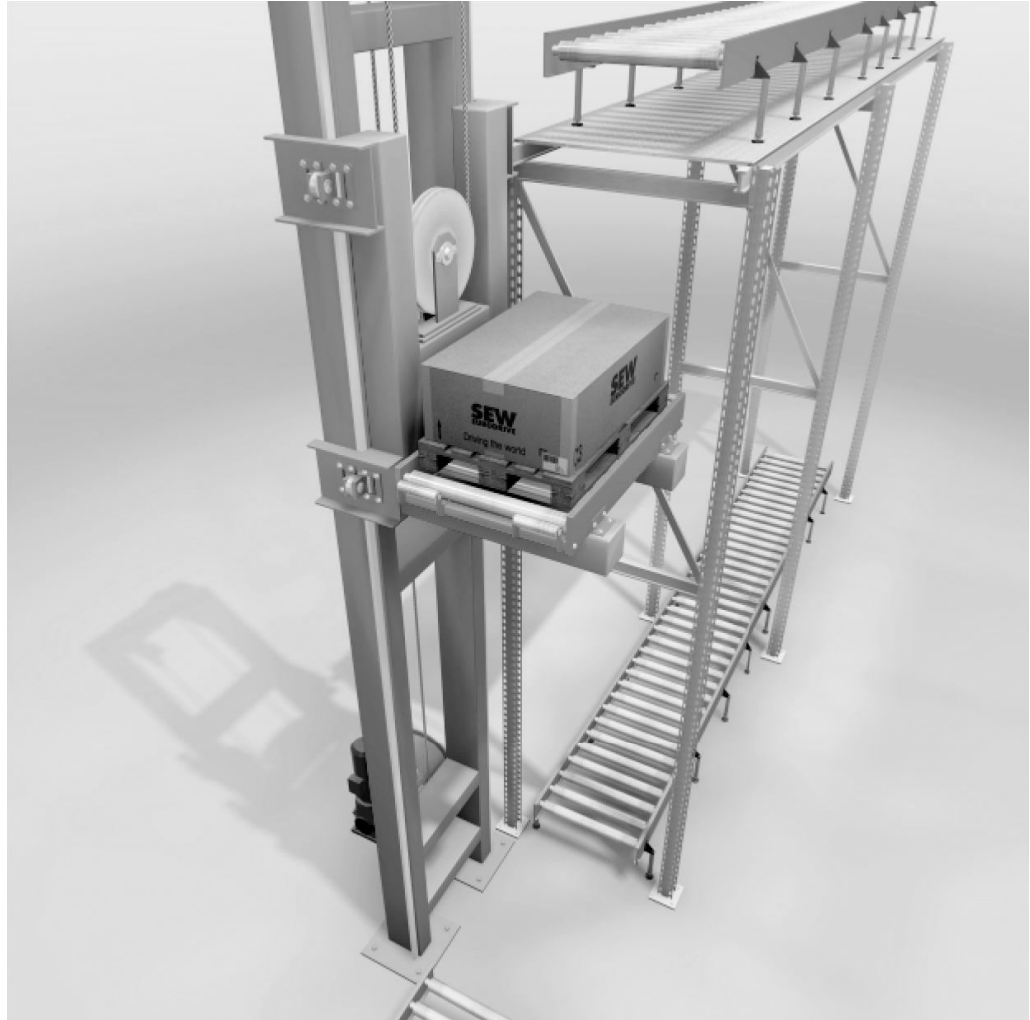
The following table shows the correlation between the setpoints and their sources (see chapter "Monitor mode" and "Setting setpoints").

Setpoint selection	Setpoint source	
Rapid speed	• Fieldbus 1PD	Set during startup.
	• Fieldbus 3PD	Read from "PO2 rapid speed".
	• Fieldbus 6PD	Read from "PO2 rapid speed".
Acceleration ramp	• Fieldbus 1PD	Set during startup.
	• Fieldbus 3PD	Read from "PO3 ramp".
	• Fieldbus 6PD	Read from "PO4 ramp".
Deceleration ramp	• Fieldbus 1PD	Set during startup.
	• Fieldbus 3PD	Read from "PO3 ramp".
	• Fieldbus 6PD	Read from "PO5 ramp down".

4.2 Lifting/rotating

4.2.1 Operating principle

The following figure shows a typical application example of a lifting station.



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For rotating and lifting, positioning is performed according to the same principle as for inward conveyance.

Once positioning in one direction has been performed, however, the drive cannot be started in the same direction again. Starting in the same direction is inhibited by the "In position" message. This prevents unintentional travel against the mechanical stop.

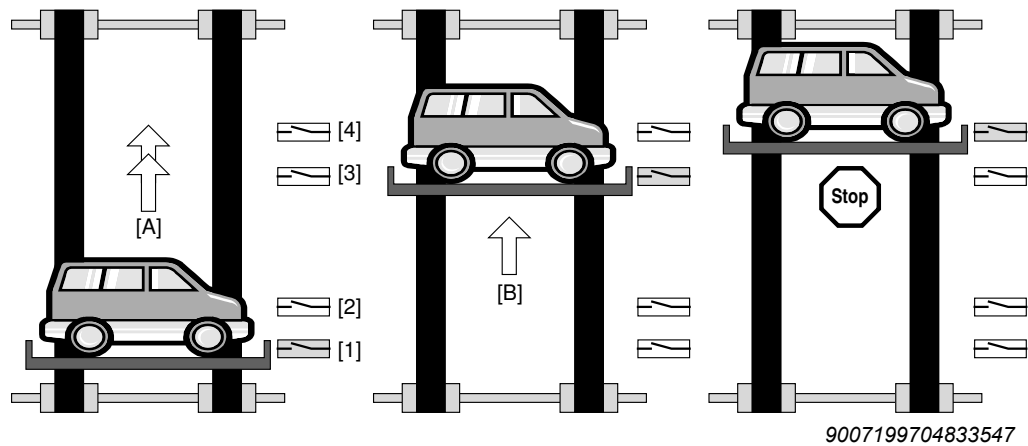
⚠ DANGER



Risk of crushing if the load falls.

Severe or fatal injuries.

- Do not stand under the load.
- Secure the danger zone.



- [1] Sensor "Stop CCW" / item control CW
- [2] Sensor "F/S¹⁾ CCW"
- [3] Sensor "F/S¹⁾ CW"
- [4] Sensor "Stop CW" / item control CCW

- [A] Rapid movement
- [B] Slow movement

1) F/S = Rapid/creep speed

4.2.2 Functional description

Functional description	
Mode selection	Mode 4
Prerequisite	Drive enabled.
Functional description	After setting the start bit, the drive accelerates along the set acceleration ramp until it reaches rapid speed. Upon contacting the "F/S"¹⁾ sensor, the drive brakes along the set deceleration ramp until it reaches creep speed. After the "Stop" sensor trips, the drive brakes along the set stop ramp to a standstill. Re-start in the same direction is blocked.

1) F/S = Rapid/creep speed

The following table shows the correlation between the setpoints and their sources (see chapter "Monitor mode" and "Setting setpoints").

Setpoint selection	Setpoint source	
Rapid speed	• Fieldbus 1PD	Set during startup.
	• Fieldbus 3PD	Read from "PO2 rapid speed".
	• Fieldbus 6PD	Read from "PO2 rapid speed".
Creep speed	• Fieldbus 1PD	Set during startup.
	• Fieldbus 3PD	Set during startup.
	• Fieldbus 6PD	Set via "PO3 creep speed".
Acceleration ramp	• Fieldbus 1PD	Set during startup.
	• Fieldbus 3PD	Read from "PO3 ramp".
	• Fieldbus 6PD	Read from "PO4 ramp".

Setpoint selection	Setpoint source	
Deceleration ramp	• Fieldbus 1PD	Set during startup.
	• Fieldbus 3PD	Read from "PO3 ramp".
	• Fieldbus 6PD	Read from "PO5 ramp down".
Stop ramp	• Fieldbus 1PD	Set during startup.
	• Fieldbus 3PD	Set during startup.
	• Fieldbus 6PD	Read from "PO6 ramp stop".

4.3 Jog mode

4.3.1 Operating principle

In jog mode, you can move the drive independently of the other operating modes of the system.

In jog mode, you can set the control bits "Jog+" or "Jog-" to move the drive clockwise or counterclockwise. It is not necessary to set the start bit.

Speed and ramps are specified dynamically via the corresponding process data words.

4.3.2 Functional description

Functional description	
Mode selection	Mode 1
Prerequisite	Drive enabled.
Functional description	As long as the "positive" (jog+) signal is set, the drive rotates clockwise. As long as the "negative" (jog-) signal is set, the drive rotates counterclockwise. The drive stops if none or both signals are set. Acceleration and deceleration depend on the set acceleration and deceleration ramp time.

The following table shows the correlation between the setpoints and their sources (see chapter "Monitor mode" and "Setting setpoints").

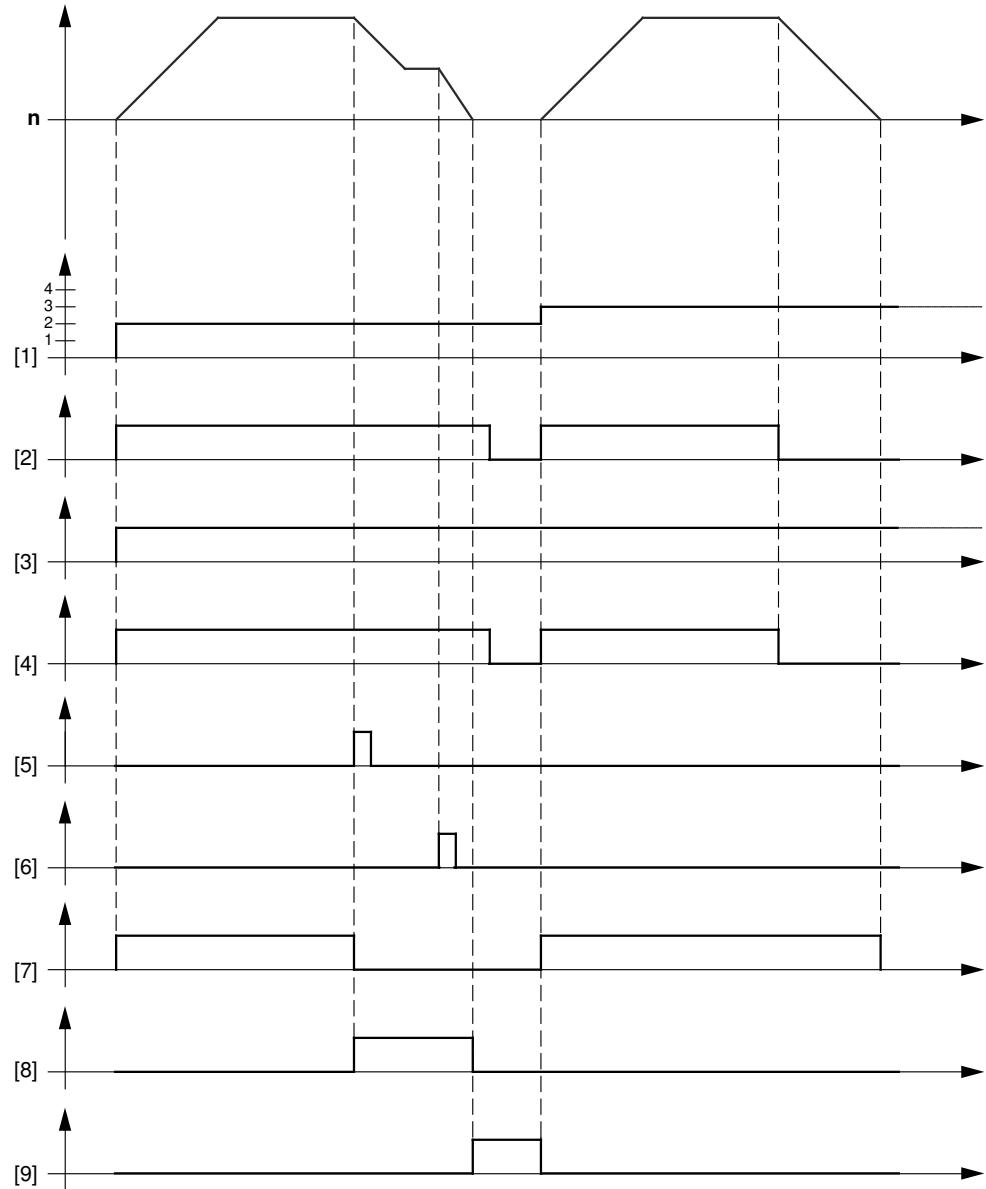
Setpoint selection	Setpoint source	
Rapid speed	• Fieldbus 1PD	Set during startup.
	• Fieldbus 3PD	Read from "PO2 rapid speed".
	• Fieldbus 6PD	Read from "PO2 rapid speed".
Acceleration ramp	• Fieldbus 1PD	Set during startup.
	• Fieldbus 3PD	Read from "PO3 ramp".
	• Fieldbus 6PD	Read from "PO4 ramp".

Setpoint selection	Setpoint source	
Deceleration ramp	• Fieldbus 1PD	Set during startup.
	• Fieldbus 3PD	Read from "PO3 ramp".
	• Fieldbus 6PD	Read from "PO5 ramp down".

5 Cycle diagrams

5.1 Feed-in/feed-out

The following figure shows the actual speed of the drive against the status of the input and output signals during feed-in or feed-out conveying.



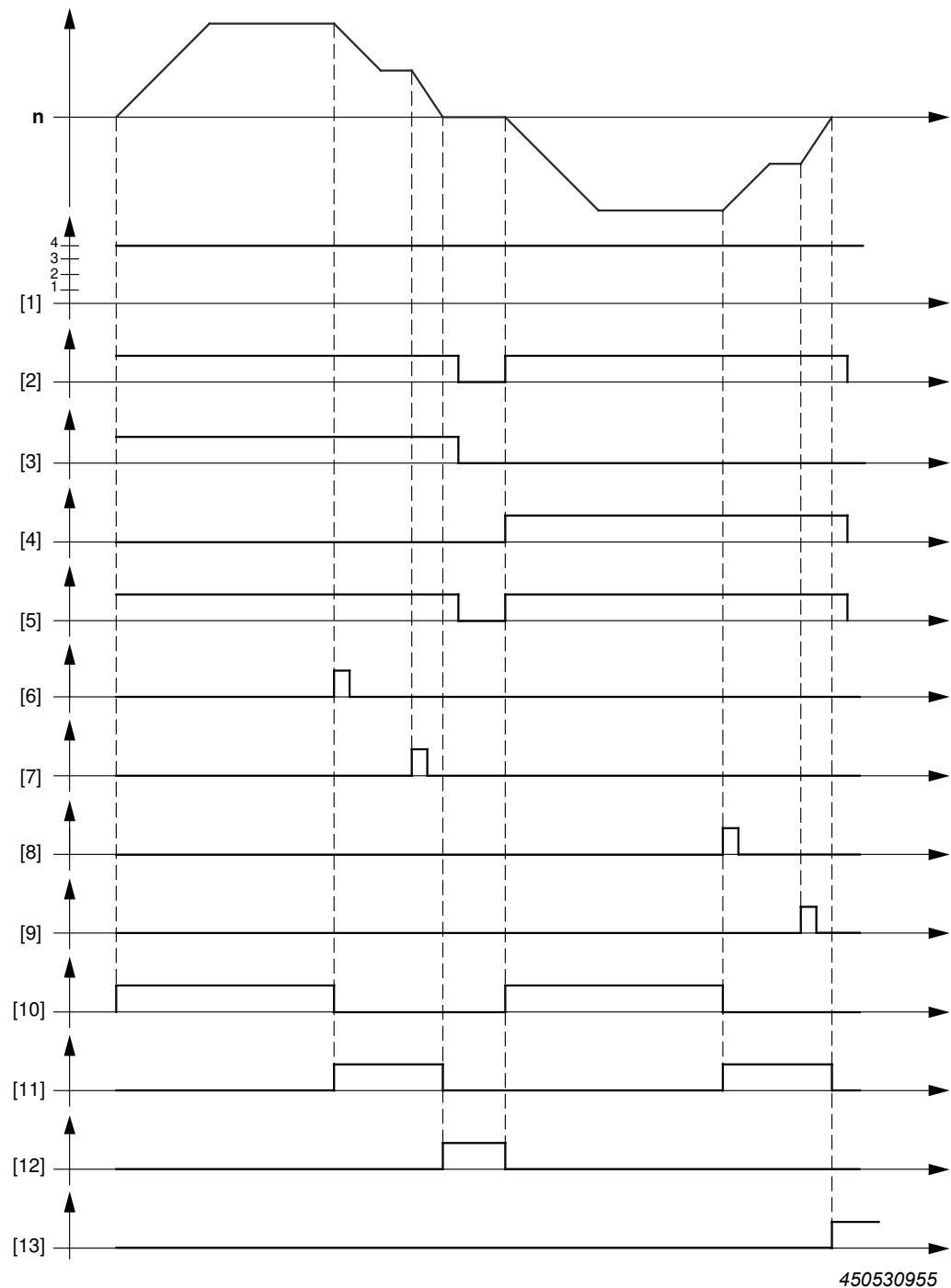
9007199704374795

- n Actual speed
- [1] "Mode" input signal
- [2] "Start" input signal
- [3] "Positive" input signal
- [4] "Start detected" output signal
- [5] "Sensor "F/S¹⁾ CW" input signal
- [6] "Sensor stop CW" input signal
- [7] "Rapid speed active" output signal
- [8] "Creep speed active" output signal
- [9] "In position CW" output signal/top

1) F/S = Rapid/creep speed

5.2 Lifting/rotating

The following figure shows the actual speed of the drive against the status of the input and output signals during lifting or rotating.

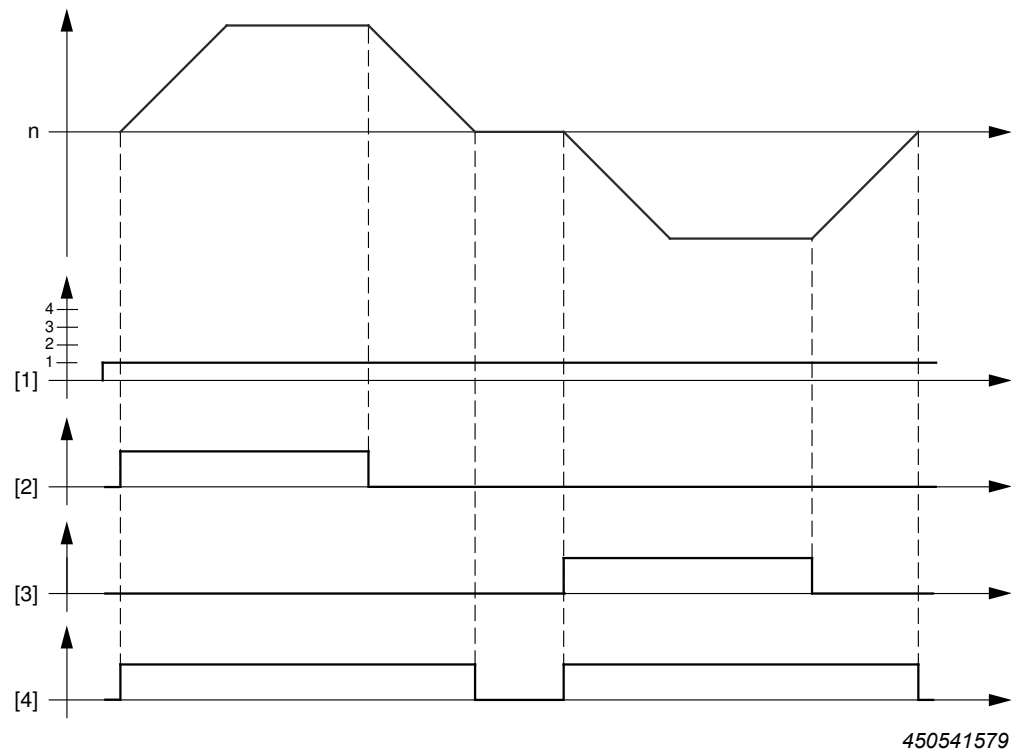


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- | | | | |
|-----|--------------------------------|------|--|
| n | Actual speed | [7] | "Sensor stop CW" input signal |
| [1] | "Mode" input signal | [8] | "Sensor F/S CCW" input signal |
| [2] | "Start" input signal | [9] | "Sensor stop CCW" input signal |
| [3] | "Positive" input signal | [10] | "Rapid speed active" output signal |
| [4] | "Negative" input signal | [11] | "Creep speed active" output signal |
| [5] | "Start detected" output signal | [12] | "In position CW" output signal/top |
| [6] | "Sensor F/S CW" input signal | [13] | "In position CCW" output signal/bottom |

5.3 Jog mode

The following figure shows the actual speed of the drive against the status of the input and output signals in jog mode.



450541579

- n Actual speed
- [1] "Mode" input signal
- [2] "Positive" input signal
- [3] "Negative" input signal
- [4] "Rapid speed active" output signal

6 Startup

6.1 Preparing startup

Perform the following steps before startup:

1. Connect MOVIFIT® FM/MC to your PC or laptop.
2. Install MOVITOOLS® MotionStudio engineering software on your PC or laptop.
3. Start MOVITOOLS® MotionStudio engineering software.

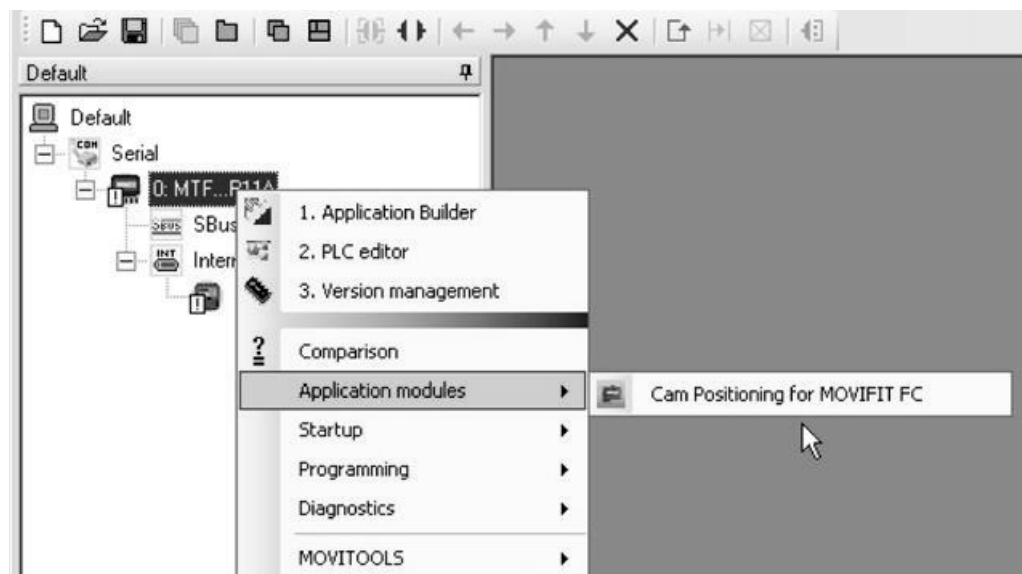
For more information on starting the MOVITOOLS® MotionStudio engineering software, please refer to the "MOVITOOLS® MotionStudio" manual.

6.2 Starting the application module

Proceed as follows:

- ✓ MOVITOOLS® Motion Studio engineering software is started.

1. Select the relevant unit nodes.
2. Right-click to open the context menu.
3. Select the following menu command [Application modules] / [Cam positioning].



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⇒ The start window of the application module is displayed.



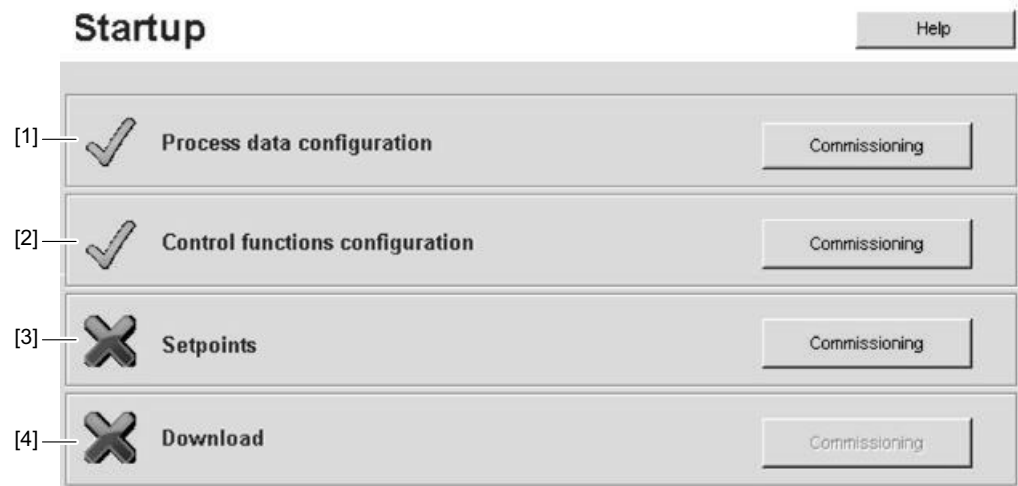
18014398960667659

No.	Description
[1]	Use this button to open the online help.
[2]	From this group, choose the motor which is to be started up.
[3]	From this group, read the following data of the loaded and new MOVIFIT® program: - Part number - Version - Release
[4]	If startup has already been performed, use this button to switch to monitor mode (see chapter "Monitor mode").
[5]	Use this button to begin startup (see chapter "Startup").
[6]	Use this button to close the window without saving.

6.3 Commencing startup

Proceed as follows:

1. Click the [Startup] button of the "Start" window (see chapter "Starting the application module").
 - ⇒ The following window is displayed. The window shows the number and order of the startup steps.



9007199705935243

No.	Description
[1]	Click on the button in this group to switch to the window for selecting the type of control of the application module.
[2]	Click on the button in this group to switch to the window for activating the run-time and creep speed monitoring functions.
[3]	Click on the button in this group to switch to the window for setting the setpoints for speed and ramps. INFORMATION This selection is not possible for fieldbus control with 6 process data words. The reason is that all setpoints are specified via fieldbus when selecting this setting.
[4]	Use this button in the group to switch to the window to download the MOVI-PLC® program and to transfer the set parameters to the MOVIFIT® FC/MC.

6.4 Process data configuration

- Proceed as follows:
- Click the [Startup] button of the "Startup" window in the "Process data configuration" group (see chapter "Commencing startup").
 - ⇒ The following window is displayed.

Motor 1 : Process data configuration

Help

Control

[1]

☐ Fieldbus: 1 process data word

☐ Fieldbus: 3 process data word

☒ Fieldbus: 6 process data word

Extended process data word

[2]

☐ No

☒ Yes

S12 Diagnostic

[3]

☐ No

☒ Yes

ONLINE

Cancel

<< Back

Initialize

Next >>

[4]

[5]

9007199705943051

No.	Description
[1]	In this group, select the control type of the application module.
[2]	In this group, you can configure an extended process data word. The extended process data word is set to the following position when the following process data words are selected: - With 1 process data word: to the second position as second process data word - With 3 process data words: to the fourth position as fourth process data word - With 6 process data words: to the seventh position as seventh process data word
[3]	In this group, you can activate the "S12 diagnostics". If "S12 diagnostics" is activated, the process data (3 PD) are transferred automatically to the existing configuration.
[4]	Use this button to go to the next step.
[5]	Use this button to set the fields to their default settings.

- Select the type of application module control in group [1].
- To go to the next step, use the button [4].

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6.5 **Configuring monitoring functions**

The following window is displayed. In this window, different monitoring functions can be activate or set.

Control functions configuration

Help

[1]

Input configuration

Sensor F/S CW: NOC (normally open contact)

Sensor stop CW: NOC (normally open contact)

Sensor F/S CCW: NOC (normally open contact)

Sensor stop CCW: NOC (normally open contact)

[2]

Stop speed

Speed hysteresis: 0 [rpm] 20..50..100 / 0 = inactiv

[3]

Watchdog

Start -> attendance: 0 [msec] 0..0..1000000 / 0 = inactiv

[4]

Start -> fast/slow: 0 [msec] 0..0..1000000 / 0 = inactiv

[5]

Start -> stop: 0 [msec] 0..0..1000000 / 0 = inactiv

ONLINE

Cancel

<< Back

Initialize

Next >>

[4]

[5]

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No.	Description
[1]	In this group, you can change the logic (NC contact/NO contact) of the following sensors: • Sensor "F/S¹⁾ CW" • Sensor "stop CW" • Sensor "F/S¹⁾ CCW" • Sensor "stop CCW"
[2]	In this group, enter the maximum deviation of the actual speed from the creep speed when the "Stop" sensor trips. Range of values: 20... 50... 100 rpm (0 = inactive).
[3]	Enter the maximum time interval between start signal and reaching the sensor "item control" in this edit box. Range of values: 0... 0... 1000000 ms (0 = inactive).
[4]	Enter the maximum time interval between start signal and the tripping of the sensor for rapid/creep speed (F/S) in this edit box. Range of values: 0... 0... 1000000 ms (0 = inactive).

No.	Description
[5]	Enter the maximum time interval between start signal and the tripping of the sensor "stop" in this edit box. Range of values: 0... 0... 1000000 ms (0 = inactive).
[6]	Use this button to set the fields to their default settings.
[7]	Use this button to go to the next step.

1) F/S = Rapid/creep speed

INFORMATION



Exceeding the limit value causes the drive to stop.

- Before re-starting the drive, you must acknowledge the error with a reset.

1. Select the required monitoring functions. Note that setting the value to 0 deactivates the monitoring function.
2. To go to the next step, use the button [7].

6.6 Setting setpoints

The following window is displayed.

Setpoints: Fieldbus X¹⁾ process data word(s)

Setpoints			
[1]	Fast speed:	1500 [rpm]	0..1500..3000
[2]	Slow speed:	750 [rpm]	0..750..3000
[3]	Ramp up:	2000 [msec]	0..2000..20000
[4]	Ramp down:	2000 [msec]	0..2000..20000
[5]	Ramp stop:	500 [msec]	0..500..20000

13196907915

ONLINE Cancel << Back Initialize Next >>

[6] [7]

¹⁾ X = 1 / 3 / 6 process data words depending on the selected type of control.

No.	Description
[1]	Enter the setpoint speed of the rapid speed in [rpm] in this edit box. Range of values: 0... 1500... 3000 rpm. INFORMATION These parameters are not available for fieldbus control with 3PD.
[2]	Enter the setpoint speed of the creep speed in [rpm] in this edit box. Range of values: 0... 750... 3000 rpm.

No.	Description
[3]	Enter the acceleration ramps for all acceleration phases in [ms] in this edit box. Range of values: 0... 2000... 20000 ms. The acceleration ramp times are based on a setpoint step change of: • 3000 rpm for 2-pole motors • 1500 rpm for 4-pole motors • 1000 rpm for 6-pole motors INFORMATION These parameters are not available for fieldbus control with 3PD.
[4]	Enter the acceleration ramps for all deceleration phases in [ms] in this edit box. Range of values: 0... 2000... 20000 ms. The acceleration ramp times are based on a setpoint step change of: • 3000 rpm for 2-pole motors • 1500 rpm for 4-pole motors • 1000 rpm for 6-pole motors INFORMATION These parameters are not available for fieldbus control with 3PD.
[5]	Enter the deceleration ramp times after passing the sensor "stop" in [ms] in this edit box. Range of values: 0... 500... 20000 ms. The deceleration ramp times are based on a setpoint step change of: • 3000 rpm for 2-pole motors • 1500 rpm for 4-pole motors • 1000 rpm for 6-pole motors
[6]	Use this button to set the fields to their default settings.
[7]	Use this button to go to the next step.

1. Select the required setpoints.
2. To go to the next step, use the button [7].

6.7 Downloading the program

The following window is displayed.

Motor 1 : Download Help

To complete the comissioning, please press the "Download" button.



Actual MOVIPLC® program:	Partnumber 28222377	Version 5	Release 0	☐ Download program	Step CST-Tool	Return code 0
New MOVIPLC® program:	28222377	5	0		0	0

[1] [2] [3] [4]

9007199706349451

No.	Description
[1]	In this group, the following data of the loaded and new MOVIPLC® program are displayed: • Part number • Version • Release
[2]	By activating this check box, the MOVIPLC® program is downloaded.
[3]	In this group, status information of the CST tool ¹⁾ are displayed.
[4]	Use this button to transfer the MOVIPLC® program to the MOVIFIT® FC/MC.

1) CST tool = CoDeSys service tool

1. Click the button [4].

⇒ The program is transferred to the MOVIFIT® FC/MC.

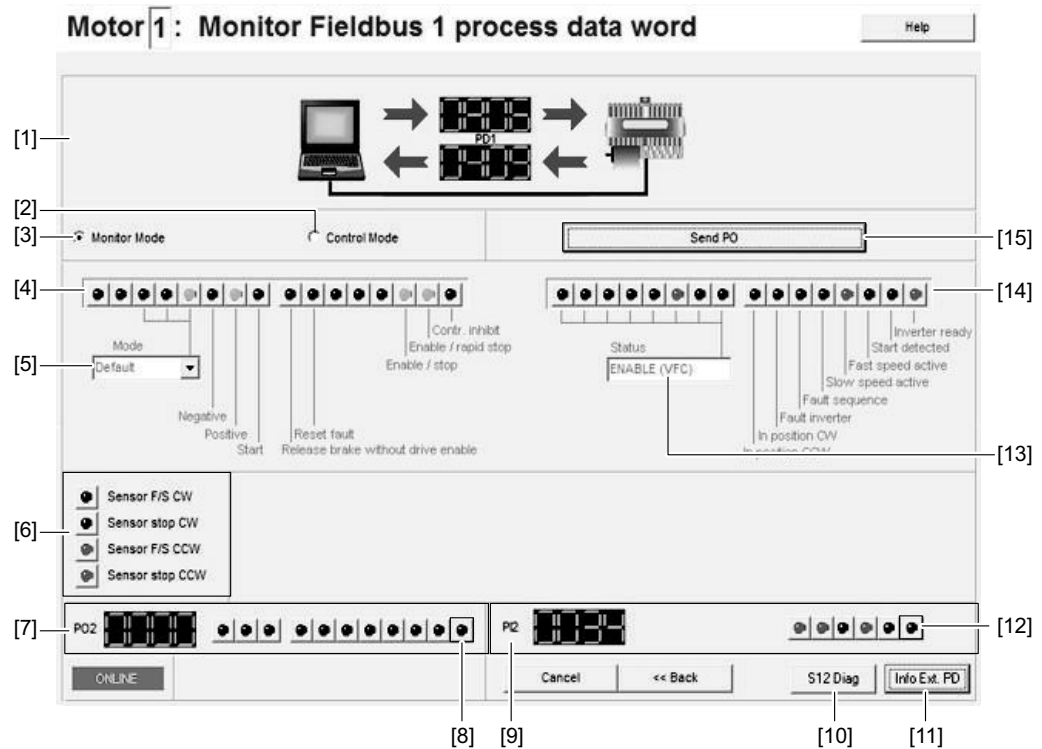
⇒ The software switches to the monitor mode of the selected control (see chapter "Operation and diagnostics").

7 Operation and diagnostics

7.1 Control via fieldbus with 1 process data word

7.1.1 Monitor mode

When selecting control via fieldbus with 1 process data word, the following window opens after the program has been transferred successfully.



9007199706494347

In monitor mode, you can monitor the functions of the application module.

No.	Description
[1]	This field shows the process input and output data in hexadecimal format.
[2]	Activate the radio button to switch to control mode.
[3]	Activate the radio button to switch to monitor mode.
[4]	This switch group shows the control word.
[5]	This display field shows the selected operating mode.
[6]	This switch group shows the status of the digital inputs of the sensors.
[7]	This switch group shows the extended control word. INFORMATION If the radio button "Extended process data word" is not checked in the process data configuration, this group is not displayed (see chapter "Process data configuration").
[8]	Bit 0 of the extended control word (download data set).
[9]	This switch group shows the extended status word. INFORMATION If the radio button "Extended process data word" is not checked in the process data configuration, this group is not displayed (see chapter "Process data configuration").

No.	Description
[10]	Use this button to switch to the diagnostics view (see chapter "S12 diagnostics"). INFORMATION If the radio button "S12 diagnostics" is not checked in the process data configuration, this button is not displayed (see chapter "Process data configuration").
[11]	Use this button to switch to the window displaying the meanings of the single bits of the extended control word and status word (see chapter "Extended process data word"). INFORMATION If the radio button "Extended process data word" is not checked in the process data configuration, this button is not displayed (see chapter "Process data configuration").
[12]	Bit 0 of the extended status word (maintenance switch).
[13]	This display field shows the operating state of the inverter.
[14]	This switch group shows the status word.
[15]	Use this button to transfer the settings to the MOVIFIT® FC/MC.

7.1.2 Control mode

In control mode, you can control the functions of the application module.

Change the input states

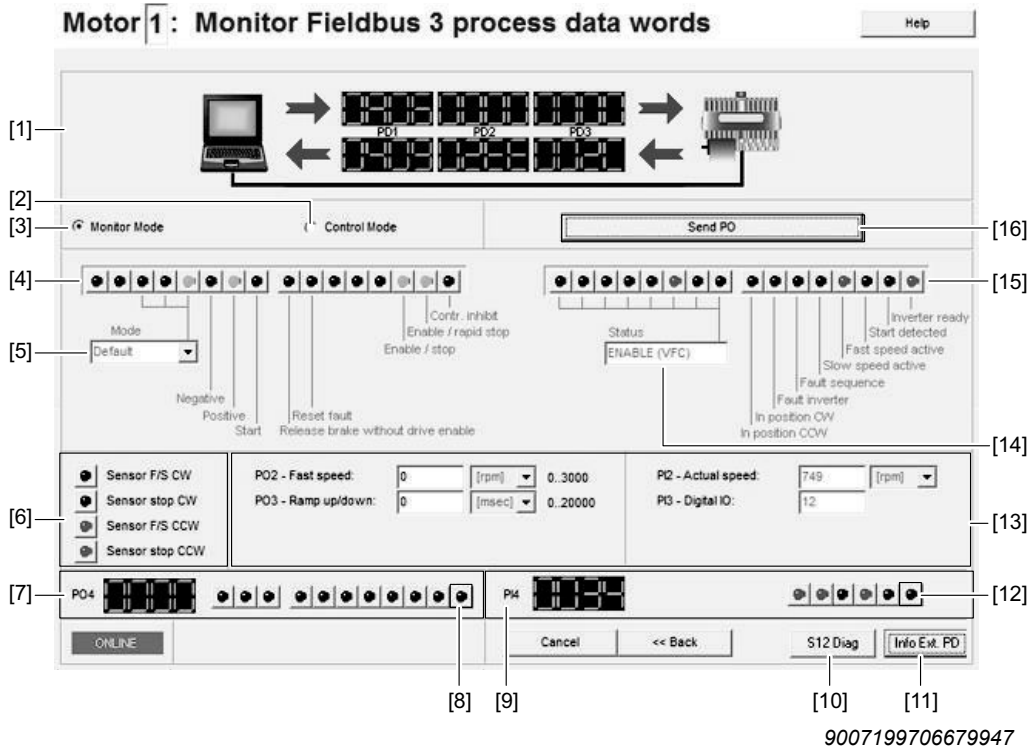
Proceed as follows:

1. Activate the control mode.
⇒ The states of the inputs that can be changed are marked in bold.
2. Select the switches of the required inputs in the switch group [4].
3. Confirm the changes by clicking on the button [15].
⇒ The states of the inputs are changed.

7.2 Control via fieldbus with 3 process data words

7.2.1 Monitor mode

When selecting control via fieldbus with 3 process data words, the following window opens after the program has been transferred successfully.



In monitor mode, you can monitor the functions of the application module.

No.	Description
[1]	This field shows the process input and output data in hexadecimal format.
[2]	Activate the radio button to switch to control mode.
[3]	Activate the radio button to switch to monitor mode.
[4]	This switch group shows the control word.
[5]	This field shows the selected operating mode.
[6]	This switch group shows the status of the digital inputs of the sensors.
[7]	This switch group shows the extended control word. INFORMATION If the radio button "Extended process data word" is not checked in the process data configuration, this group is not displayed (see chapter "Process data configuration").
[8]	Bit 0 of the extended control word (download data set).
[9]	This switch group shows the extended status word. INFORMATION If the radio button "Extended process data word" is not checked in the process data configuration, this group is not displayed (see chapter "Process data configuration").

No.	Description
[10]	Use this button to switch to the diagnostics view (see chapter "S12 diagnostics"). INFORMATION If the radio button "S12 diagnostics" is not checked in the process data configuration, this button is not displayed (see chapter "Process data configuration").
[11]	Use this button to switch to the window displaying the meanings of the single bits of the extended control word and status word (see chapter "Extended process data word"). INFORMATION If the radio button "Extended process data word" is not checked in the process data configuration, this button is not displayed (see chapter "Process data configuration").
[12]	Bit 0 of the extended status word (maintenance switch).
[13]	In this group, you can read off the following setpoint data: Process output data • Setpoint of the rapid speed • Setpoint of the acceleration and deceleration ramps Process input data • Current actual speed of the drive • Current status of the digital inputs
[14]	This display field shows the operating state of the inverter.
[15]	This switch group shows the status word.
[16]	Use this button to transfer the settings to the MOVIFIT® FC/MC.

7.2.2 Control mode

In control mode, you can control the functions of the application module.

Change the input states

Proceed as follows:

1. Activate the control mode.
 - ⇒ The states of the inputs that can be changed are marked in bold.
2. Select the switches of the required inputs in the switch group [4].
3. Confirm the changes by clicking on the button [16].
 - ⇒ The states of the inputs are changed.

Changing the setpoints of the rapid speed and the acceleration and deceleration ramps

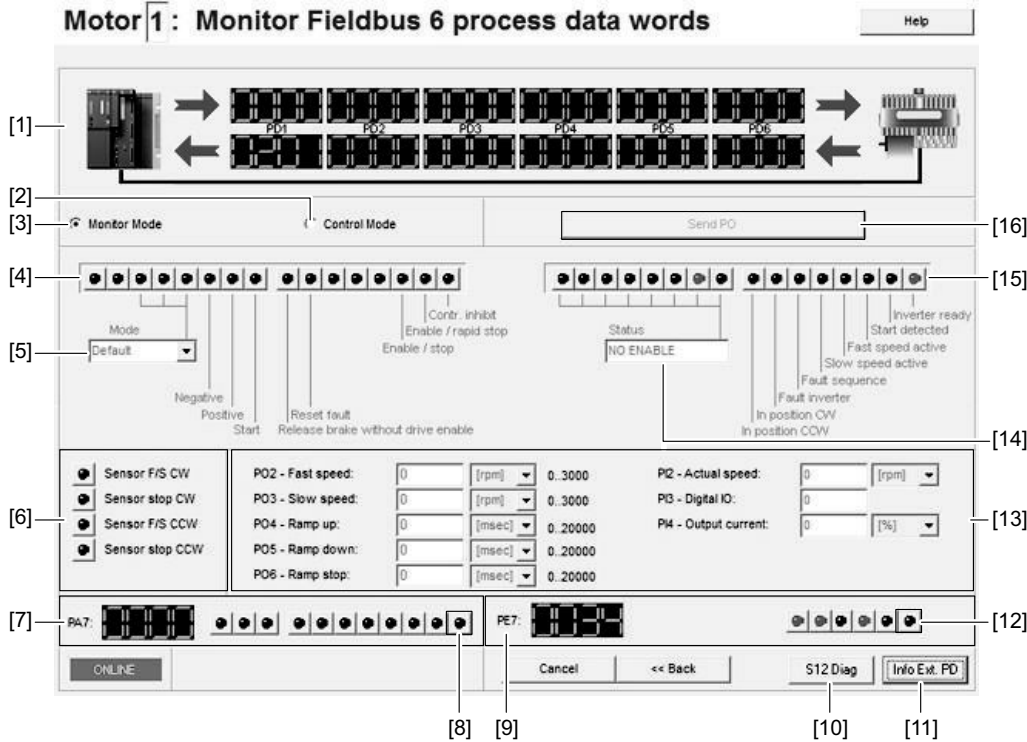
Proceed as follows:

- ✓ **INFORMATION** The stop ramp cannot be changed.
4. Activate the control mode.
 5. Select the respective edit box in this group [13].
 6. Enter the required setpoint.
 7. Confirm the changes by clicking on the button [16].
 - ⇒ The setpoints are changed.

7.3 Control via fieldbus with 6 process data words

7.3.1 Monitor mode

When selecting control via fieldbus with 6 process data words, the following window opens after the program has been transferred successfully.



13176923275

In monitor mode, you can monitor the functions of the application module.

No.	Description
[1]	This field shows the process input and output data in hexadecimal format.
[2]	Activate the radio button to switch to control mode.
[3]	Activate the radio button to switch to monitor mode.
[4]	This switch group shows the control word.
[5]	This display field shows the selected operating mode.
[6]	This switch group shows the status of the digital inputs of the sensors.
[7]	This switch group shows the extended control word. INFORMATION If the radio button "Extended process data word" is not checked in the process data configuration, this group is not displayed (see chapter "Process data configuration").
[8]	Bit 0 of the extended control word (download data set).
[9]	This switch group shows the extended status word. INFORMATION If the radio button "Extended process data word" is not checked in the process data configuration, this group is not displayed (see chapter "Process data configuration").

No.	Description
[10]	Use this button to switch to the diagnostics view (see chapter "S12 diagnostics"). INFORMATION If the radio button "S12 diagnostics" is not checked in the process data configuration, this button is not displayed (see chapter "Process data configuration").
[11]	Use this button to switch to the window displaying the meanings of the single bits of the extended control word and status word (see chapter "Extended process data word"). INFORMATION If the radio button "Extended process data word" is not checked in the process data configuration, this button is not displayed (see chapter "Process data configuration").
[12]	Bit 0 of the extended status word (maintenance switch).
[13]	In this group, you can read off the following setpoint data: Process output data • Setpoint of the rapid speed • Creep speed setpoint • Setpoint of all acceleration ramps • Setpoint of all deceleration ramps • Stop ramp setpoint Process input data • Current actual speed of the drive • Current status of the digital inputs • Current output current in relation to the maximum current
[14]	This display field shows the operating state of the inverter.
[15]	This switch group shows the status word.
[16]	Use this button to transfer the settings to the MOVIFIT® FC/MC.

7.3.2 Control mode

In control mode, you can control the functions of the application module.

Change the input states

Proceed as follows:

1. Activate the control mode.
⇒ The states of the inputs that can be changed are marked in bold.
2. Select the switches of the required inputs in the switch group [4].
3. Confirm the changes by clicking on the button [16].
⇒ The states of the inputs are changed.

Changing the setpoints of the rapid speed and the acceleration and deceleration ramps

Proceed as follows:

- ✓ **INFORMATION** The stop ramp cannot be changed.
4. Activate the control mode.

5. Select the respective edit box in this group [13].
 6. Enter the required setpoint.
 7. Confirm the changes by clicking on the button [16].
- ⇒ The setpoints are changed.

7.4 Diagnostics with the S12 safety option

7.4.1 Safety notes

The use of the S12 safety option with SLS¹⁾ is not permitted with dual-motor operation (SD30) as well as with the MOVIFIT[®] MC variants.

In single-motor operation, S12 with SLS is always possible.

S12 diagnostics is supported for the following MOVIFIT[®] units:

- MTx-P11A (PROFIBUS) → MOVIFIT[®] FC/MC
- MTx-E21A (PROFINET) → MOVIFIT[®] FC/MC
- MTx-E31A (EtherNet/IP[™]) → only MOVIFIT[®] FC

1) SLS = Safely limited speed

7.4.2 Description

S12 diagnostics provides status and diagnostics information of the S12 safety option on the "unsafe fieldbus part".

If S12 diagnostics is activated, the process data (3PD) are automatically attached to the existing configuration.

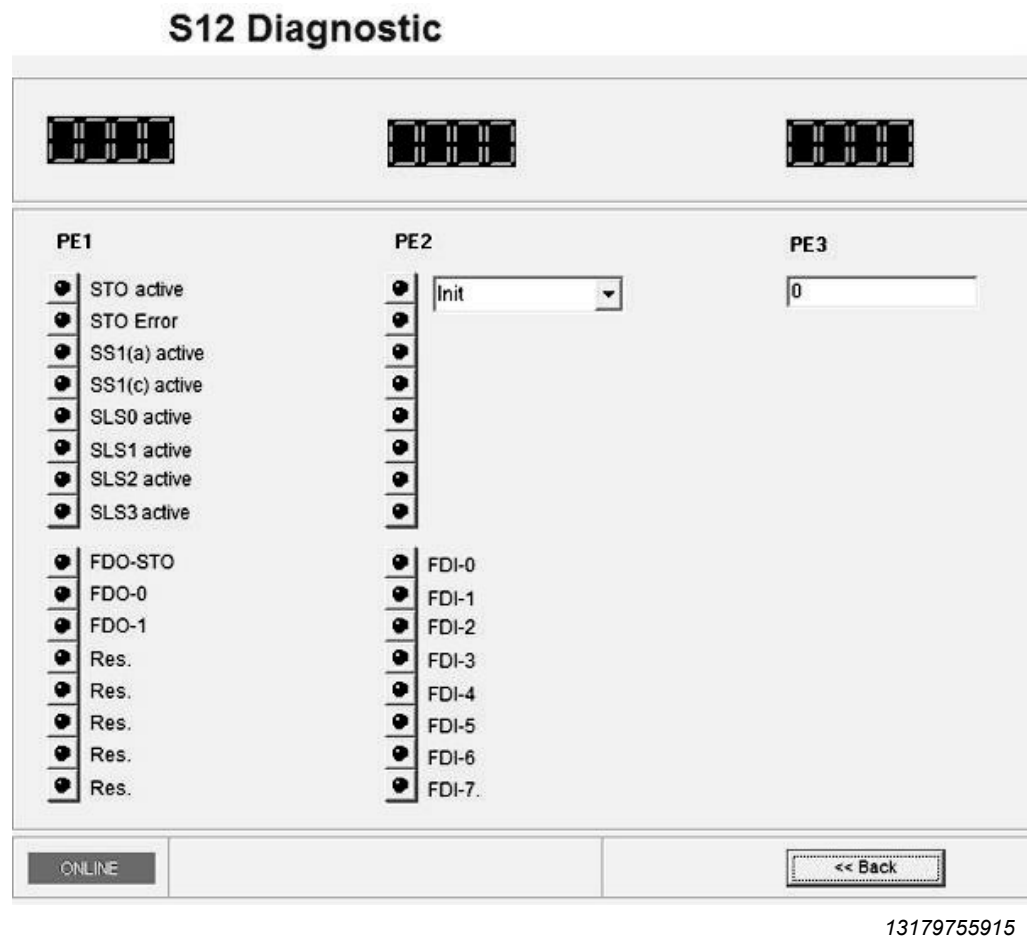
7.4.3 S12 diagnostics view

Open S12 diagnostics

Proceed as follows:

1. Activate S12 diagnostics during the process data configuration (see chapter "Process data configuration").

2. Switch to monitor mode.
3. Click the button [S12 Diag] in monitor mode (see chapter "Monitor mode" of the selected control type).
 - ⇒ The following window is displayed.



13179755915

You can read off the S12 diagnostics data in this window.

7.4.4 Structure of process data

The following tables show the structure of the process data words.

Process data	Designation
PI1	Safety functions
PI2	Safety status
PI3	Error number: 0x0000 Error number as entire data word 0: no error

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Word	Bit	Function
PI1	0	STO active
	1	STO error
	2	SS1(a) active
	3	SS1(c) active
	4	SLS0 active
	5	SLS1 active
	6	SLS2 active
	7	SLS3 active
	8	FDO-STO
	9	FDO-0
	10	FDO-1
	11	Reserved
	12	Reserved
	13	Reserved
	14	Reserved
	15	Reserved

Word	Bit	Function
PI2	0	S12 status: 0: Init 1: Parameterization 2: Verified 3: Start 4: RUN 5: STOP
	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	FDI-0
	9	FDI-1
	10	FDI-2
	11	FDI-3
	12	FDI-4
	13	FDI-5
	14	FDI-6
	15	FDI-7

7.5 Extended process data word

During process data configuration, you can configure an extended process data word. The extended process data word is set to the following position depending on the following process data words that are selected:

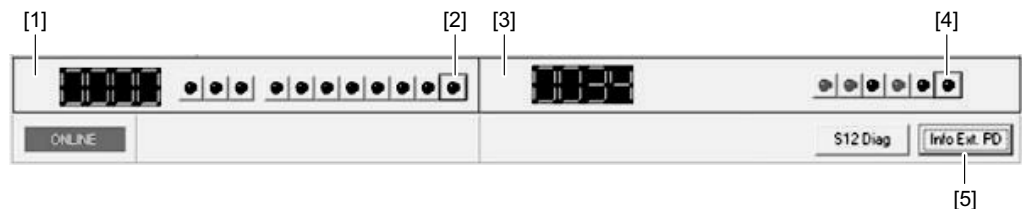
- With 1 process data word: to the second position as second process data word.
- With 3 process data words: to the fourth position as fourth process data word.
- With 6 process data words: to the seventh position as seventh process data word.

Configuring extended process data word

Proceed as follows:

1. Activate the configuration of an extended process data word during the process data configuration (see chapter "Process data configuration").
2. Switch to monitor mode.

⇒ On the bottom of the monitor mode window, the following area is displayed.

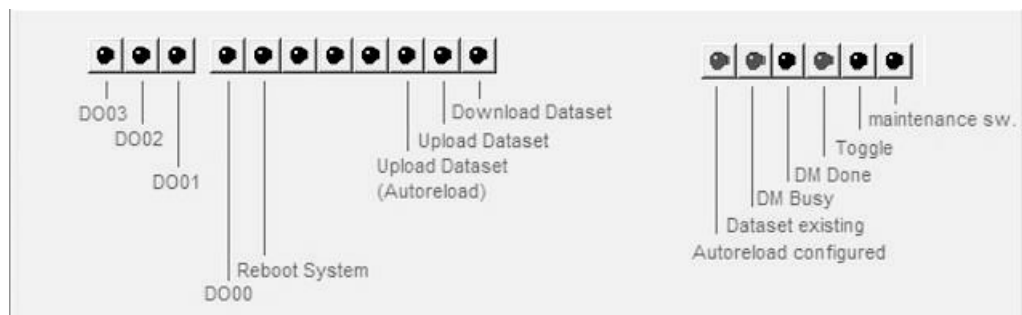


13197243019

No.	Description
[1]	This switch group shows the extended control word.
[2]	Bit 0 of the extended control word (download data set).
[3]	This switch group shows the extended status word.
[4]	Bit 0 if the extended status word (maintenance switch).
[5]	Use this button to show or hide the meanings of the single bits of the extended control word and status word.

3. To show the meanings of the single bits of the extended control word and status word, click the button [4].

⇒ The following window opens.



13197655691

8 Data management

8.1 Safety notes

MOVIFIT® FC with the following fieldbus interfaces have a data management function:

- PROFIBUS
- PROFINET
- DeviceNet™
- EtherNet/IP™

To enable data management, the application module must be installed on the EBOX¹⁾.

This has the following reasons:

- Data management can only store the application and device parameters on the ABOX²⁾, however, it cannot store the boot project there. The memory of the ABOX is too small for this.

INFORMATION



To ensure correct execution of the data management function, the MOVIFIT® units must be operated in expert mode (see MOVIFIT® FC manual). To activate data management and the control via fieldbus, an upload from the data management surface in MOVITOOLS® MotionStudio must be performed once.

1) Active electronics unit

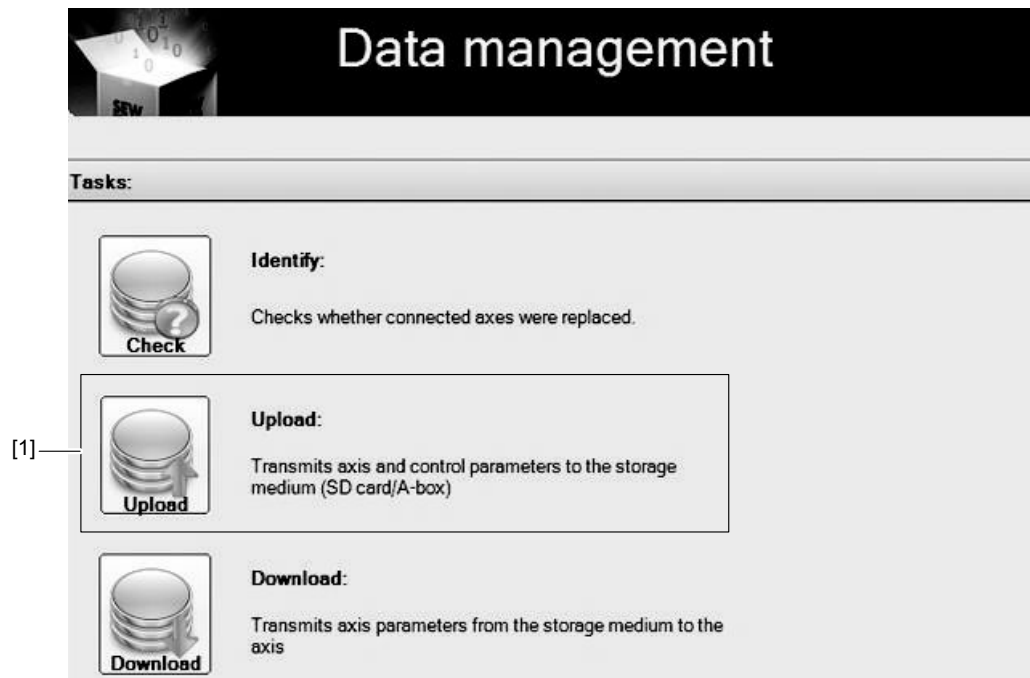
2) Passive connection unit

8.2 Activating data management

Proceed as follows:

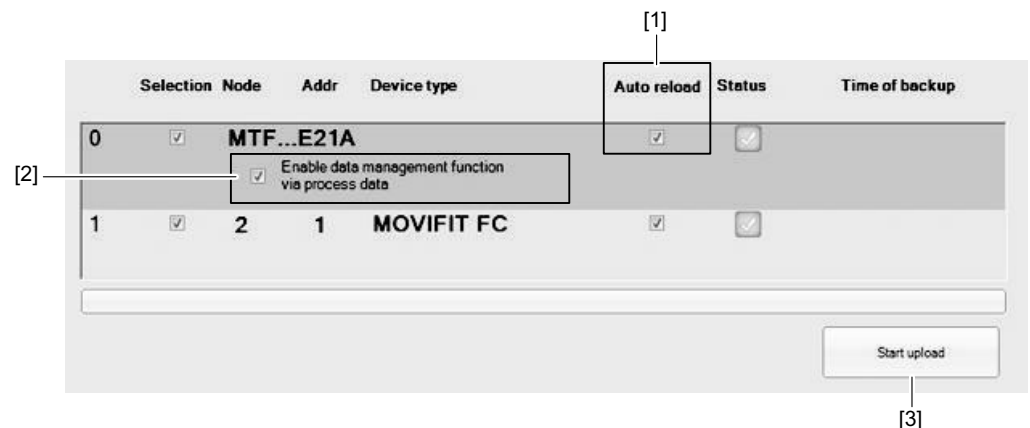
- ✓ The application module is already installed on the EBOX.
1. Start MOVITOOLS® MotionStudio engineering software.
 2. Open the data management surface.

3. To switch to the upload function, click the button [1].



13176169483

⇒ The following window is displayed.



9007212430915339

No.	Description
[1]	If the check box [Auto reload] is checked, the application and device parameters are automatically reloaded after a unit replacement.
[2]	If this check box is checked, the control of the data management via process data is enabled after successful upload. INFORMATION This is only possible if the extended process data word is configured.
[3]	Click this button to start the upload.

4. Activate the required functions.
5. Click the button [3] and perform an upload once.

8.3 Structure of process data

The following tables show the structure of the process data words.

Process data	Designation
PA	Extended control word
PE	Extended status word

Word	Bit	Function
PA	0	Download dataset
	1	Upload dataset
	2	Upload data set with auto reload
	3	Reserved
	4	Reserved
	5	Reserved
	6	Reboot system
	7	Digital output DO00
	8	Digital output DO01
	9	Digital output DO02
	10	Digital output DO03
	11 – 15	Reserved

Word	Bit	Function
PE	0	Maintenance switch (mains OFF)
	1	Toggle bit
	2	Data management done
	3	Data management busy
	4	Dataset available
	5	Auto reload configured
	6	
	7	
	8	
	9	
	10	
	11 – 15	

9 Terminal assignment

9.1 MOVIFIT® FC with "Technology" function level

The following table shows the digital inputs of the MOVIFIT® FC function level "Technology".

Input	Function
DI00	Sensor "F/S ¹⁾ CW"
DI01	Sensor "Stop CW" (item control CCW)
DI02	Sensor "F/S ¹⁾ CCW"
DI03	Sensor "Stop CCW" (item control CW)
DI04-DI15	Reserved

1) F/S = Rapid/creep speed

9.2 MOVIFIT® MC with "Technology" function level

The following table shows the digital inputs of the MOVIFIT® MC function level "Technology".

Input	Function
DI00	Motor 1: Sensor "F/S ¹⁾ CW"
DI01	Motor 1: Sensor "Stop CW" (item control CCW)
DI02	Motor 1: Sensor "F/S ¹⁾ CCW"
DI03	Motor 1: Sensor "Stop CCW" (item control CW)
DI04	Motor 2: Sensor "F/S ¹⁾ CW"
DI05	Motor 2: Sensor "Stop CW" (item control CCW)
DI06	Motor 2: Sensor "F/S ¹⁾ CCW"
DI07	Motor 2: Sensor "Stop CCW" (item control CW)
DI08	Motor 3: Sensor "F/S ¹⁾ CW"
DI09	Motor 3: Sensor "Stop CW" (item control CCW)
DI10	Motor 3: Sensor "F/S ¹⁾ CCW"
DI11	Motor 3: Sensor "Stop CCW" (item control CW)

1) F/S = Rapid/creep speed

10 Process data

10.1 Process data interface with the PLC with 1 process data word

10.1.1 Overview

The following table shows an overview of the process data words for control via fieldbus with 1 process data word.

Process data	Designation
PO1	Control word
PI1	Status word

10.1.2 Process output data

The following table shows the process output data from the PLC to the MOVIFIT® FC/MC for control via fieldbus with 1 process data word.

Word	Bit	Function		
PO1	0	1 = Controller inhibit	0 = Enable	
	1	1 = Enable	0 = Rapid stop	
	2	1 = Enable	0 = Stop	
	3	Reserved		
	4	Reserved		
	5	Reserved		
	6	Error malfunction		
	7	Reserved		
	8	Start		
	9	Positive (CW rotation)		
	10	Negative (CCW rotation)		
	11	Mode 2 ⁰	000 = operating mode 0: Reserved 001 = operating mode 1: Jog mode 010 = operating mode 2: Feed-in 011 = operating mode 3: Feed-out 100 = operating mode 4: Lifting/rotating	
	12	Mode 2 ¹		
	13	Mode 2 ²		
	14	Reserved		
15	Reserved			

10.1.3 Process input data

The following table shows the process input data from the MOVIFIT® FC/MC to the PLC for control via fieldbus with 1 process data word.

Word	Bit	Function
PI1	0	Ready for operation
	1	Start detected

Word	Bit	Function
	2	Rapid speed active
	3	Creep speed active
	4	Sequence fault
	5	Inverter fault
	6	In position CW (top)
	7	In position CCW (bottom)
	8-15	Inverter/error state

10.2 Process data interface with the PLC with 3 process data words

10.2.1 Overview

The following table shows an overview of the process data words for control via field-bus with 3 process data words.

Process data	Designation
PO1	Control word
PO2	Rapid speed [rpm]
PO3	Ramp [ms]
PI1	Status word
PI2	Actual speed [rpm]
PI3	Digital inputs

10.2.2 Process output data

The following table shows the process output data from the PLC to the MOVIFIT® FC/MC for control via fieldbus with 3 process data words.

Word	Bit	Function	
PO1	0	1 = Controller in-hibit	0 = Enable
	1	1 = Enable	0 = Rapid stop
	2	1 = Enable	0 = Stop
	3	Reserved	
	4	Reserved	
	5	Reserved	
	6	Reset fault	
	7	Reserved	
	8	Start	
	9	Positive (CW rotation)	
	10	Negative (CCW rotation)	
	11	Mode 2 ⁰	000 = operating mode 0: Reserved 001 = operating mode 1: Jog mode 010 = operating mode 2: Feed-in 011 = operating mode 3: Feed-out 100 = operating mode 4: Lifting/rotating
	12	Mode 2 ¹	
	13	Mode 2 ²	
	14	Reserved	
15	Reserved		
PO2	0-15	Rapid speed [rpm]	
PO3	15	Acceleration and deceleration ramp [ms]	

10.2.3 Process input data

The following table shows the process input data from the MOVIFIT® FC/MC to the PLC for control via fieldbus with 3 process data words.

Word	Bit	Function	
		MOVIFIT® FC Function level "Technology"	MOVIFIT® MC Function level "Technology"
PI1	00	Ready for operation	
	01	Start detected	
	02	Rapid speed active	
	03	Creep speed active	
	04	Sequence fault	
	05	Inverter fault	
	06	In position CW (top)	
	07	In position CCW (bottom)	
	8-15	Inverter/error state	
PI2	0-15	Actual speed [rpm]	No function
PI3	0	Sensor "F/S ¹⁾ CW"	
	1	Sensor "stop CW"	
	2	Sensor "F/S ¹⁾ CCW"	
	3	Sensor "stop CCW"	
	4-11	DI04 – DI11	
	12-15	DI12 – DI15	

1) F/S = Rapid/creep speed

10.3 Process data interface with the PLC with 6 process data words**10.3.1 Overview**

The following table shows an overview of the process data words for control via fieldbus with 6 process data words.

Process data	Designation
PO1	Control word
PO2	Rapid speed [rpm]
PO3	Creep speed [rpm]
PO4	Ramp up [ms]
PO5	Ramp down [ms]
PO6	Stop ramp [ms]
PI1	Status word
PI2	Actual speed [rpm]

Process data	Designation
PI3	Digital inputs
PI4	Output current [%]
PI5	Reserved
PI6	Reserved

10.3.2 Process output data

The following table shows the process output data from the PLC to the MOVIFIT® FC/MC for control via fieldbus with 6 process data words.

Word	Bit	Function		
PO1	0	1 = Controller in-hibit	0 = Enable	
	1	1 = Enable	0 = Rapid stop	
	2	1 = Enable	0 = Stop	
	3	Reserved		
	4	Reserved		
	5	Reserved		
	6	Reset fault		
	7	Reserved		
	8	Start		
	9	Positive (CW rotation)		
	10	Negative (CCW rotation)		
	11	Mode 2 ⁰	000 = operating mode 0: Reserved 001 = operating mode 1: Jog mode 010 = operating mode 2: Feed-in 011 = operating mode 3: Feed-out 100 = operating mode 4: Lifting/rotating	
	12	Mode 2 ¹		
	13	Mode 2 ²		
		14	Reserved	
		15	Reserved	
PO2	0-15	Rapid speed [rpm]		
PO3	0-15	Creep speed [rpm]		
PO4	0-15	Acceleration ramp [ms]		
PO5	0-15	Deceleration ramp [ms]		
PO6	0-15	Deceleration ramp to a standstill [ms]		

10.3.3 Process input data

The following table describes the process input data from the MOVIFIT® FC/MC to the PLC for control via fieldbus with 6 process data words.

Word	Bit	Function	
		MOVIFIT® FC Function level "Technology"	MOVIFIT® MC Function level "Technology"
PI1	00	Ready for operation	
	01	Start detected	
	02	Rapid speed active	
	03	Creep speed active	
	04	Sequence fault	
	05	Inverter fault	
	06	In position CW (top)	
	07	In position CCW (bottom)	
	8-15	Inverter/error state	
PI2	0-15	Actual speed [rpm]	No function
PI3	0	Sensor "F/S ¹⁾ CW"	
	1	Sensor "stop CW"	
	2	Sensor "F/S ¹⁾ CCW"	
	3	Sensor "stop CCW"	
	4-11	DI04 – DI11	
	12-15	DI12 – DI15	
PI4	0-15	Output current [%]	No function
PI5-6	0-15	Reserved	

1) F/S = Rapid/creep speed

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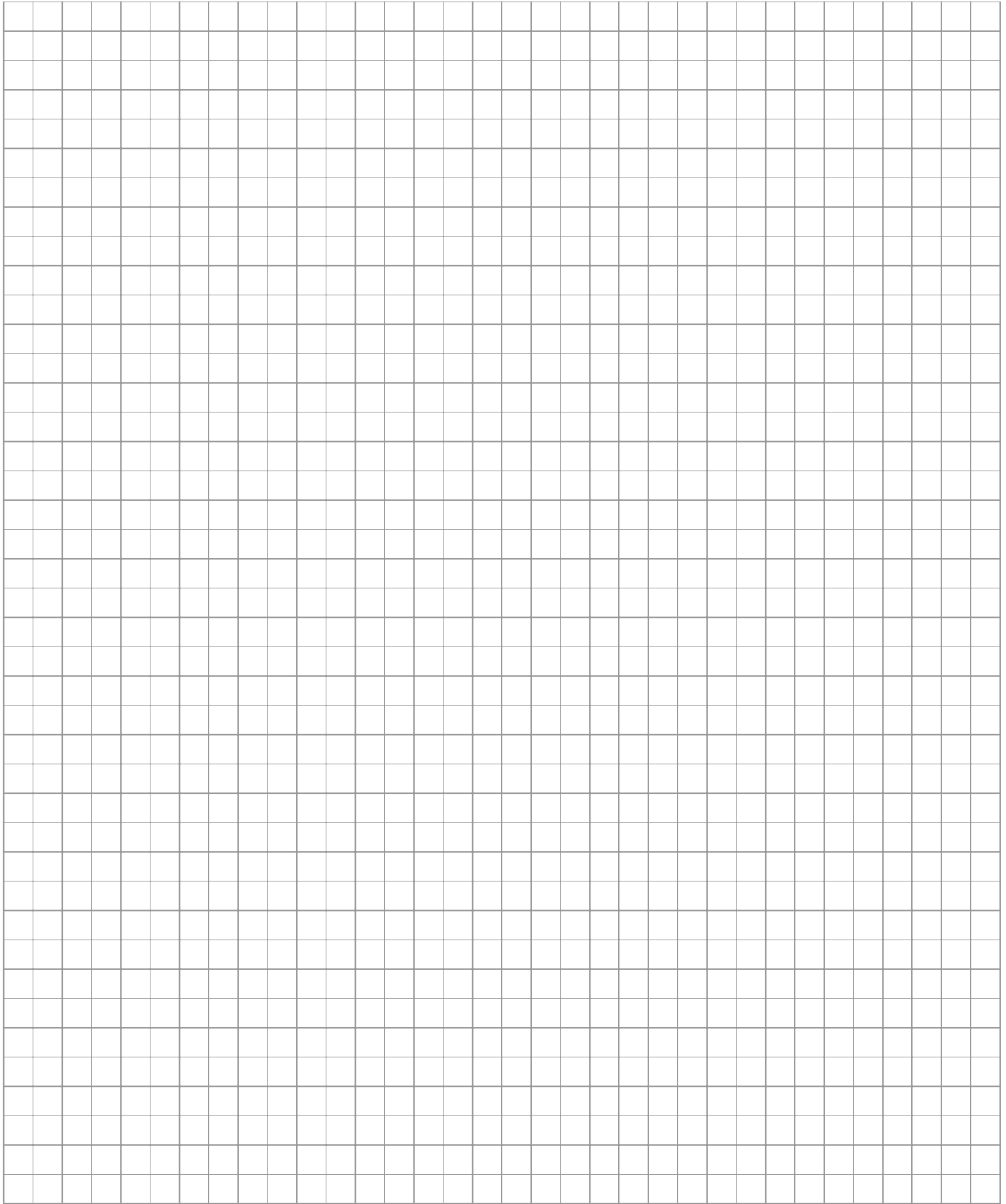
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SEW-EURODRIVE
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SEW
EURODRIVE

SEW-EURODRIVE GmbH & Co KG
P.O. Box 3023
76642 BRUCHSAL
GERMANY
Phone +49 7251 75-0
Fax +49 7251-1970
sew@sew-eurodrive.com
→ www.sew-eurodrive.com