SEW-EURODRIVE

Manual

MOVIKIT®

RapidCreepPositioning Drive

Table of contents

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 work on the product.

Make sure this documentation is accessible and legible. Ensure that persons responsible for the systems and their operation as well as persons who work with the product 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, contact SEW-EURODRIVE.

1.2 Content of the documentation

The descriptions in this documentation apply to the software and firmware versions applicable at the time of publication. These descriptions might differ if you install later software or firmware versions. In this case, contact SEW-EURODRIVE.

1.3 Structure of the warning notes

1.3.1 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 product or its environment
INFORMATION	Useful information or tip: Simplifies handling of the product.	

1.3.2 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.

This is the formal structure of a safety note for a specific section:

SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

• Measure(s) to prevent the hazard.

Meaning of the hazard symbols

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

Hazard symbol	Meaning
	General hazard
	Warning about suspended load

1.3.3 Structure of embedded safety notes

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

This is the formal structure of an embedded safety note:

⚠ **SIGNAL WORD!** Type and source of hazard. Possible consequence(s) if disregarded. Measure(s) to prevent the hazard.

1.4 Decimal separator in numerical values

In this document, a period is used to indicate the decimal separator.

Example: 30.5 kg

1.5 Rights to claim under limited warranty

Read the information in this documentation. This is essential for fault-free operation and fulfillment of any rights to claim under limited warranty. Read the documentation before you start working with the product.

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 notice

1.8   Other applicable documentation

Observe the corresponding documentation for all further components.

Always use the latest edition of the documentation and the software.

The SEW-EURODRIVE website (www.sew-eurodrive.com) provides a wide selection of documents for download in various languages. If required, you can also order printed and bound copies of the documentation from SEW-EURODRIVE.

1.9   Short designation

The following short designations are used in this documentation:

Type designation	Short designation
MOVIKIT® RapidCreepPositioning Drive	Software module

2 Safety notes

2.1 Preliminary information

The following general safety notes serve the purpose of preventing injury to persons and damage to property. They primarily apply to the use of products described in this documentation. If you use additional components, also observe the relevant warning and safety notes.

2.2 Target group

Software specialist   Any work with the software may only be performed by a specialist with suitable training. A specialist in this context is someone who has the following qualifications:

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

2.3 Network security and access protection

A bus system makes it possible to adapt electronic drive technology components to the particulars of the machinery within wide limits. There is a risk that a change of parameters that cannot be detected externally may result in unexpected but not uncontrolled system behavior and may have a negative impact on operational safety, system availability, or data security.

Ensure that unauthorized access is prevented, especially with respect to Ethernet-based networked systems and engineering interfaces.

Use IT-specific safety standards to increase access protection to the ports. For a port overview, refer to the respective technical data of the device in use.

2.4 Designated use

MOVIKIT® RapidCreepPositioning Drive is a single-axis module and is used for simple positioning applications in conveying and handling systems (such as roller conveyors or rotary tables).

Use the device-independent MOVISUITE® engineering software to start up and configure the axis.

Unintended or improper use of the product may result in severe injury to persons and damage to property.

SEW EURODRIVE

3 System description

3.1 Module description

MOVIKIT® RapidCreepPositioning Drive is a software module for implementing conventional "rapid/creep speed positioning". Positioning is carried out using 2 initiators with 2 speeds. The first initiator is used to specify the position at which the speed is changed from fast speed to slow speed. The second initiator is used to activate the stop deceleration and in this way specifies the stop position. The number of initiators to be used increases accordingly for positioning applications in two directions or when using additional optional sensors. A motor encoder is therefore not absolutely necessary.

The software modules can be used, for example, in material handling applications (travel drives, lifting drives, roller conveyor/chain conveyors) or in various logistics applications (pallet transfer shuttles or rotary tables).

No programming knowledge is required for startup and diagnostics as the software module is integrated in the MOVISUITE® engineering software.

3.2 Functions

Overview of functions:

- Startup using a graphical user interface
- Own parameter tree with all parameters required for operation
- Operating modes: Jog mode, referencing mode, various operating modes for infeed and outfeed as well as a reverse mode.
- Diagnostic monitor for monitoring and controlling the axis
- Standardized process data interface

3.3 Scope of functions of the process data profiles

Profile	Range of functions
8 PD	8 process data words for the following operating modes: • Jog • Infeed/outfeed to sensor pair A • Infeed to sensor pair B • Outfeed • Reference travel – offset via parameter • Reverse mode All travel parameters can optionally be specified as fixed setpoints. In this case, the travel parameters specified via process data will be ignored. For more information, refer to chapter "Operating modes" (→ 🗎 22).
10 PD	Transfer of the actual position to 2 additional process data **INFORMATION:** An encoder is required for this purpose.

4 Project planning information

4.1 Requirement

Correct project planning and proper installation of the devices are required for successful startup and operation.

For detailed project planning information, refer to the documentation of the respective devices.

4.2 Hardware

The following hardware is required:

- MOVIDRIVE® technology, MOVIGEAR® performance, MOVIMOT® performance, MOVIMOT® advanced, MOVIMOT® flexible **or** MOVITRAC® advanced.

4.3 Software

The following software is required:

- MOVISUITE® engineering software

For more detailed information on the hardware requirements of the individual software components, see the documentation for the respective software.

4.4 Licensing

The following licenses are available and are required:

- MOVIKIT® RapidCreepPositioning Drive: Application level 1

For further information on licensing, refer to the document "MOVI-C® Software Components". You can download the document from the SEW-EURODRIVE website (www.sew-eurodrive.com).

5 Startup

5.1 Requirements

- Check the installation of the inverters and, if installed, also check the encoder connection.
- Observe the installation notes in the documentation of the respective device and software components.
- The devices to be started up are displayed in MOVISUITE®.

5.2 Startup procedure

The schematic diagram below shows the startup procedure:

Startup

MOVISUITE®

Create a project

Configure the project

Check control of the module interface
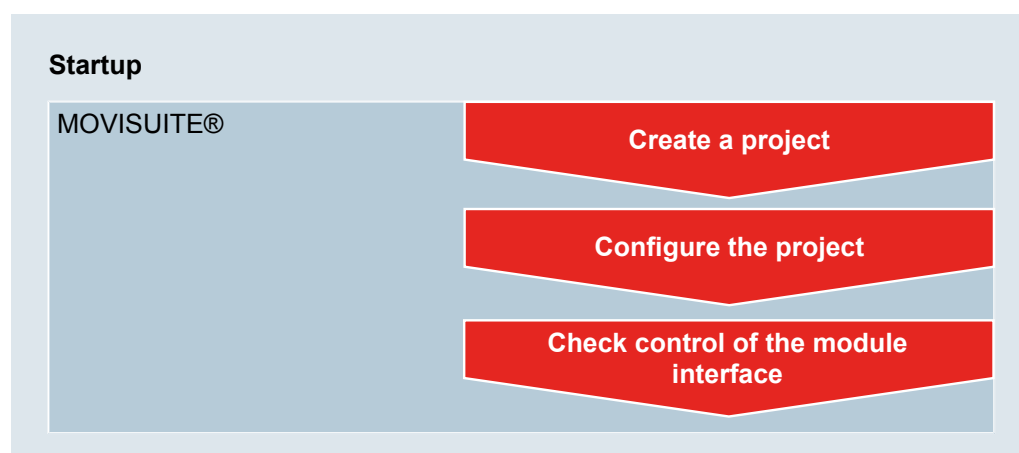
18014426711624843

The startup steps specific to these software modules are explained in detail in the following chapters of this manual. For startup, also observe the documentation of all the other components in use.

5.3   Configuring a project

i

INFORMATION

For detailed information on how to operate the MOVISUITE® engineering software, refer to the corresponding documentation.

✓   A MOVISUITE® project has been created and is open.

1. Add required device nodes, software nodes (MOVI-C® SoftwareNode) and software modules to the project.

   ⇨ See "Example project".

2. Configure the added devices or software modules. If available, observe the specific notes in the following chapters that apply to MOVIKIT® RapidCreepPositioning Drive. For detailed information on the configuration of devices or other software modules, refer to the respective documentation.

5.3.1   Example project

The following figure shows an example project:

MOVIDRIVE® ...

MOVIKIT® RapidCreepPositioning Drive

31224095883

SEW
EURODRIVE

5.3.2 Adding MOVIKIT® RapidCreepPositioning Drive

INFORMATION

i

For detailed information on how to operate the MOVISUITE® engineering software, refer to the corresponding documentation.

✓ A MOVISUITE® project has been created and is open.

1. Click on the empty software module section of the required node.

   ⇨ The catalog section opens and displays the available software modules.

2. In the catalog section, click on MOVIKIT® RapidCreepPositioning Drive.

   ⇨ A context menu opens.

3. Select the version from the respective drop-down list in the context menu and confirm your selection with [Apply].

⇨ MOVIKIT® RapidCreepPositioning Drive is assigned to the node, the configuration is created, and the basic settings are performed.

5.3.3 Configuring MOVIKIT® RapidCreepPositioning Drive

INFORMATION

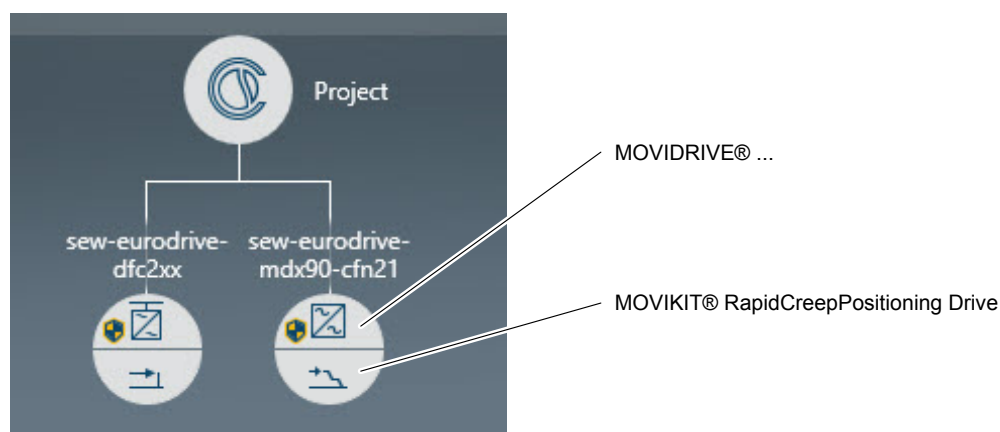| i |

For detailed information on how to operate the MOVISUITE® engineering software, refer to the corresponding documentation.

1. In MOVISUITE®, click onMOVIKIT® RapidCreepPositioning Drive.

   ⇨ The configuration menus of the software module are displayed. The configuration menus are explained in the following subchapters.
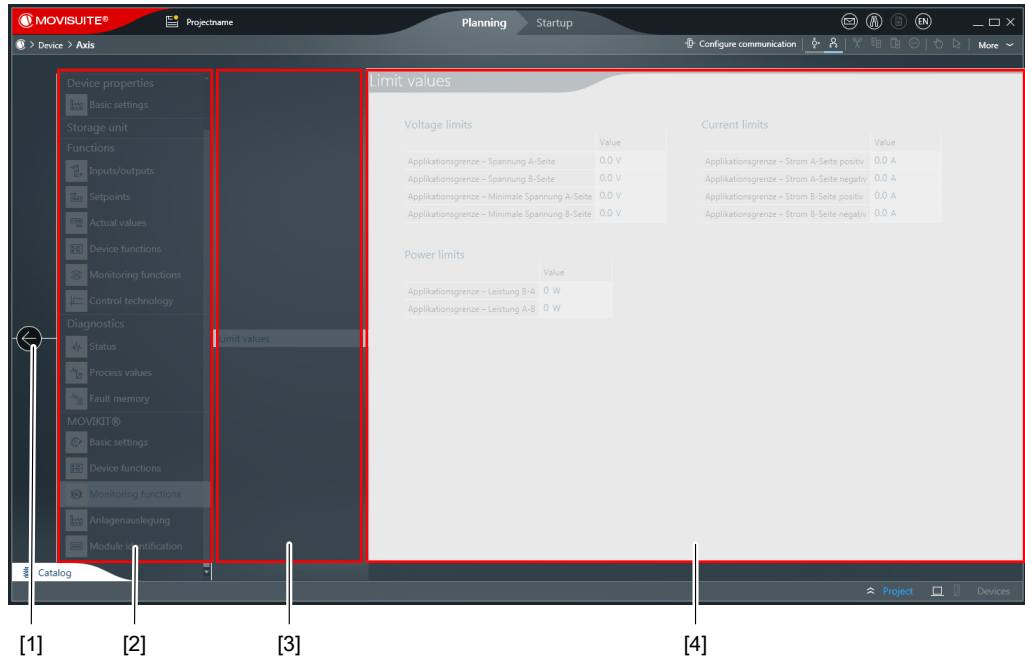
9007228165413771

[1] Button to return to the project overview
[2] Main menu of the software module configuration (MOVIKIT® section)
[3] Submenus of the configuration
[4] Setting fields of the respective submenu

2. Click button [1] after having completed the configuration.

   ⇨ The project overview is displayed.

INFORMATION

| i |

The module configuration can only be changed when the output stage is inhibited and diagnostic mode is disabled.

SEW
EURODRIVE

Basic settings

Parameter group	Description
Control signal source	Selection of the control source (e.g. fieldbus or EtherCAT®/SBus^PLUS)
Drive train	Setting whether only drive train 1 or drive trains 1 and 2 are to be processed. **INFORMATION:** Drive train 2 is only available with MOVIDRIVE® technology and MOVITRAC® advanced.

Monitoring functions

Reference signals

Parameter group	Description
Comparison of setpoint/actual speed values	
Half window width	Hysteresis around the speed setpoint
	Index: 8324.3
Delay time	Delay time for the comparison of setpoint and actual value. The condition for the signal must be fulfilled at least for this time for the signal to be set.
	Index: 8324.4
Polarity	Determines when the signal is set. • Signal if actual value = setpoint • Signal if actual value <> setpoint
	Index: 8324.5

Limit values

Parameter name	Value
Application limits	
Positive speed	Limits the maximum positive speed permitted for moving the system. (in user units)
	Index: 8357.10
Negative speed	Limits the maximum negative speed permitted for moving the system. (in user units)
	Index: 8357.11
Acceleration	Limits the maximum acceleration permitted for accelerating the system. (in user units)
	Index: 8357.12

Parameter name	Value
Deceleration	Limits the maximum deceleration permitted for braking the system.
	(in user units)
	Index: 8357.13
Jerk time	Limits the jerk time in [ms]
	The jerk time is effective for the stop FCBs and in manual mode. The positioning process extends to twice the set jerk time.
	Index: 8357.14
Torque	Limits the maximum torque that may be applied to the system in % of the nominal motor torque
	Index: 8357.15
Apparent output current	Value to which the inverter output current is limited in [A]
	Index: 8357.16
Emergency stop deceleration	Deceleration for the ramp that is activated during an emergency stop. An emergency stop can be programmed as a response to a fault (in user units).
	Index: 8357.20
Limit values from startup	
Maximum speed at motor shaft	Maximum permitted speed at the motor shaft calculated from motor and gear unit data during startup in $[\text{min}^{-1}]$.
	Index: 8360.9
Maximum torque at motor shaft	Maximum permitted torque at the motor shaft calculated from motor and gear unit data during startup in [Nm].
	Index: 8360.11

Control functions

Parameter group	Description
Speed monitoring	Setting of the behavior of speed monitoring

Parameter group	Description
Stop functions	Setting of the stop function for drives with encoder. The following settings can be made for the behavior at standstill: • Drive energized (brake released) • Drive not energized (brake applied) The stop function is active if enable is revoked (stop with FCB 13/14), if no operating mode is selected (FCB 02), and if the stop by setpoint function is enabled. The parameter is only effective in the following operating modes: VFC (with encoder), ELSM®, and CFC. At standstill in the other operating modes, the output stage is always inhibited and the brake is applied or the DynaStop® function is activated.
Limit switches	Settings for the limit switches: • HW limit switch hit response • SW limit switch hit response • Use HW limit switches DT1 also in DT2

Drive functions

FCB 05 Speed control

Parameter group	Description
Stop by setpoint function	Setting of stop by setpoint function
	For axes without encoder, the stop by setpoint function must be enabled manually and both the stop setpoint and the start offset must be set. The drive is only enabled and the brake released if an operating mode is selected and the specified setpoint speed is greater than the stop setpoint + start offset.

FCB 12 Reference travel

Parameter group	Description
FCB 12 Reference travel	Setting of the reference travel type and associated parameters. Other setting windows are available depending on the selected reference travel type.
Advanced settings	Homing can be activated and set as option.

Module configuration

Parameter group	Description
Fieldbus data/fixed setpoints	Travel parameters can be specified either via "fieldbus" or "fixed setpoint". When selecting the "fixed setpoint" option, the respective process data words are ignored and the travel parameters can be entered using the following parameters: • Rapid speed/jog speed • Creep speed • Acceleration • Deceleration • Deceleration stop
Operating mode	Operating mode selection: • Bidirectional – The drive can be moved in positive and negative direction of movement in infeed and outfeed mode. • Unidirectional positive direction of movement – In infeed and outfeed mode, the drive can only be moved in positive direction of movement. In jog mode, both directions are possible. • Unidirectional negative direction of movement – In infeed and outfeed mode, the drive can only be moved in negative direction of movement. In jog mode, both directions are possible. When selecting a unidirectional operating mode, the "Use sensor pair A/B" parameter is displayed so you can specify whether a second sensor pair is to be used. You can then position either to sensor pair A or sensor pair B. A corresponding selection is made via the target application mode.
Sensor logic	Specifies whether the sensors in use are implemented as normally closed contacts or normally open contacts.
Optional sensors	Used to specify whether the following optional sensors are to be used: • Redundant rapid/creep speed sensor(s) • "InPosition" sensor(s) When using optional sensors, you can choose whether the optional sensor is implemented as normally closed contact or normally open contact, and specify the logical operation between main sensor and associated redundant sensor.

Parameter group	Description
Timing of stop sensor evaluation and "InPosition" signal	Specifies when the "InPosition" signal is to be issued: • Edge change stop sensor and motor standstill – The "InPosition" signal on the process data word is issued after having detected the edge of the stop sensor and motor standstill. • Active stop sensor – The "InPosition" signal is issued as long as the stop sensor is active.
Resulting assignment: Digital inputs	Assignment of digital inputs according to the configuration. Inputs designated as Data Flexibility inputs can be assigned individually.
Apply configuration	Buttons for applying the configuration or for resetting the configuration to the default settings.

Inputs/outputs

INFORMATION

i

For more information on this topic, refer to chapter "Digital inputs/outputs" (→ 🗏 40).

Parameter group	Description
Digital inputs	Configuration of digital inputs Inputs designated as Data Flexibility inputs can be edited and can be assigned individually. Inputs that have been assigned a function by the module configuration must not be changed.
Digital outputs	Configuration of digital outputs The outputs can be assigned individually.

Fieldbus interface

Parameter group	Description
Fieldbus interface	Representation of the process data profile with 8 or 10 process data and selection of the assignment of PI 4 (torque, relative apparent current or absolute apparent current).

MOVIKIT® runtime control

Parameter group	Description
Data Flexibility state	
Information about the current operating state of the Date Flexibility level.	
Data Flexibility control	
Auto start	Activation of the automatic start of the program after power on
	Index: 8348.7
Ctrl	Manual stopping, resetting, and restarting the program
	Index: 8348.1

Module identification

Parameter group	Description
Module identification	Includes name and version for identifying the software module.

5.4 Checking the control of module interfaces

Use the diagnostic monitor to check the control of the module interface. For further information on the diagnostic monitor, refer to the chapter "MOVIKIT® diagnostics" (→ 🖺 44).

6 Operation

6.1 Operating modes

6.1.1 Overview of operating modes

Overview of the operating modes of the software module and its areas of application:

Operating mode	Decimal	Description
Stop/initialization	0	No operating mode The drive is stopped (FCB 01)
Jog mode	101	Jog at rapid speed (PO 2 or fixed setpoint, FCB 05)
Referencing mode	300	Reference travel – offset via parameter (FCB 12)
Rapid/creep speed positioning mode	600	Infeed (FCB 05)
	601	Outfeed (FCB 05)
	602	Reverse mode (FCB 05)
	603	Infeed to sensor pair B (FCB 05)

INFORMATION

i

For operating function block FCB 05, the configuration settings made in the "FCB 05 Speed control" (→ 🗎 18) configuration apply.

6.1.2 Requirements for cycle diagrams

The following chapters provide a cycle diagram for each operating mode to help you better understand the operating principle. They also provide a process sequence with a description of the signals to be set as well as of signal states. The following requirements apply:

Requirement	Process data	Signal state
Ready for operation	PI 1:0	"1": Ready for operation
STO inactive	PI 1:1	"1": STO inactive
No fault present	PI 1:8	"0": No fault
No warning present	PI 1:9	"0": No warning
Startup has been performed correctly		
Output stage enabled		

6.1.3 Setpoint input

The travel parameters can be transferred via fieldbus or as fixed setpoints. When selecting the "fixed setpoints" option in the "Module configuration" (→ 📄 19), the respective process data words will be ignored.

The following table shows the connection between the setpoints and their sources.

Setpoint input	Travel parameter source	Setpoint source
Rapid speed/ jog speed	Fixed setpoint	To be set in the module configuration
	Fieldbus	PO 2 rapid speed
Acceleration	Fixed setpoint	To be set in the module configuration
	Fieldbus	PO 3 acceleration
Deceleration	Fixed setpoint	To be set in the module configuration
	Fieldbus	PO 4 deceleration
Creep speed	Fixed setpoint	To be set in the module configuration
	Fieldbus	PO 7 creep speed
Deceleration stop	Fixed setpoint	To be set in the module configuration
	Fieldbus	PO 8 deceleration stop

6.1.4 Jog mode

Speed-controlled movement of a single axis with activation of the direction of rotation.

INFORMATION

ℹ️ Selecting both directions or selecting no direction at all results in stopping the current movement using the delay PO4 Fixed setpoint.

Functional principle

in jog mode, you can manually move the drive independently of the other operating modes of the system step by step.

In jog mode, you can set the control bits "Direction of movement/jog positive" and "Direction of movement/jog negative" to move the drive in clockwise or counterclockwise direction of rotation. It is not necessary to set the start bit in this case.

Functional description

Functional description	
Mode selection	101: Jog at rapid speed
Requirement	The drive is enabled.
Functional description	As long as the "jog positive" signal is set, the drive rotates clockwise. As long as the "jog negative" signal is set, the drive rotates counterclockwise. The drive stops if none or both signals are set.

Cycle diagram

The following figure shows the actual speed of the drive depending on the state of the input and output signals in jog mode.
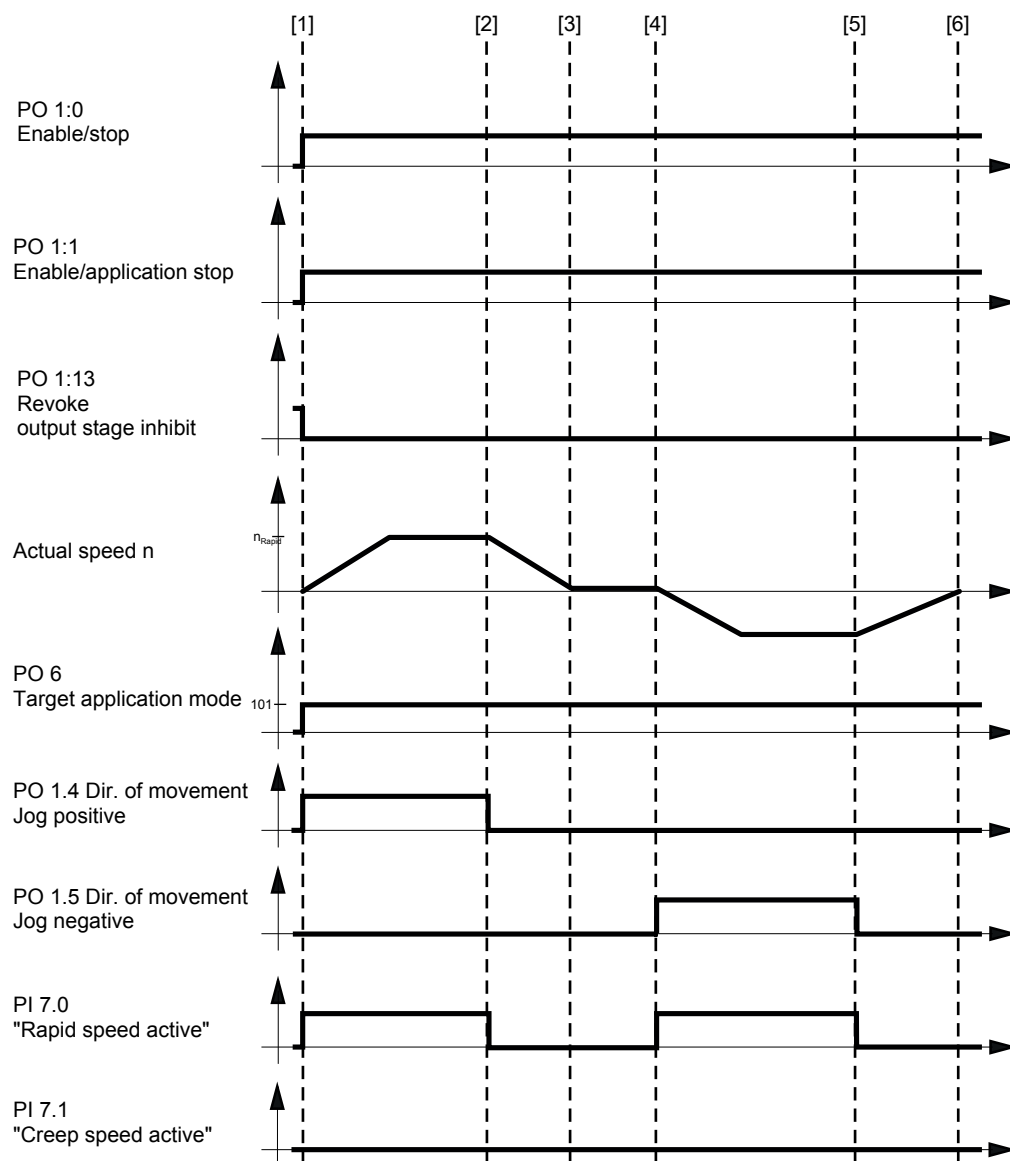
30509509899

Process sequence and signal states

INFORMATION

For the behavior of the drive at an idle state, refer to the information in the chapter "Control functions" (→ 📄 16) under "Stop functions".

| No.	Sequence	PD	Signal states
[1] General enable	• PO 1:0 = "1" Enable/emergency stop	PO 1:0	• "1": Enable • "0": Deceleration with emergency stop ramp
	• PO 1:1 = "1" Enable/application stop	PO 1:1	• "1": Enable • "0": Deceleration according to application limit
	• PO 1:13 = "0" Output stage inhibit (signal with highest priority)	PO 1:13	• "0": Output stage enable • "1": Output stage inhibited (the drive coasts to a stop or the brake is applied)
[1]	"Jog mode" activated	PO 6	101 (decimal)
[1] to [2]	Positive jog direction selected	PO 1:4	• "1": The drive accelerates to the rapid speed specified via PO 2/fixed setpoint using the value specified via PO 3/fixed setpoint.
[2] to [3]	Positive jog direction deselected	PO 1:4	• "0": Deceleration with the value specified via PO 4/fixed setpoint.
[4] to [5]	Negative jog direction selected	PO 1:5	• "1": The drive accelerates to the rapid speed specified via PO 2/fixed setpoint using the value specified via PO 3/fixed setpoint. • "0": Deceleration with the value specified via PO 4/fixed setpoint.
[5] to [6]	Negative jog direction deselected	PO 1:5	• "0": Deceleration with the value specified via PO 4/fixed setpoint.
[1] to [2] and [4] to [5]	"Rapid speed active"	PI 7:0	• "1": Setpoint speed corresponds to rapid speed specified via PO 2/fixed setpoint.

6.1.5 Infeed/outfeed

INFORMATION

Monitoring of the software limit switches is disabled in operation without encoder.

Use hardware limit switches to monitor the travel range.

Functional principle

The following figure shows a typical application example of the "rapid/creep speed positioning" principle.
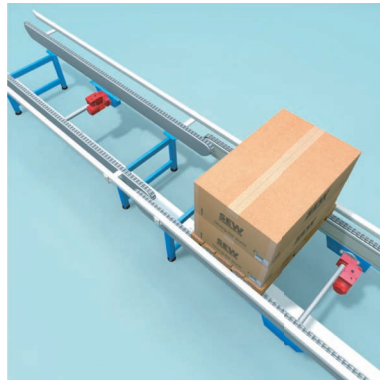
In this roller conveyor, longer track sections are subdivided into segments.

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.
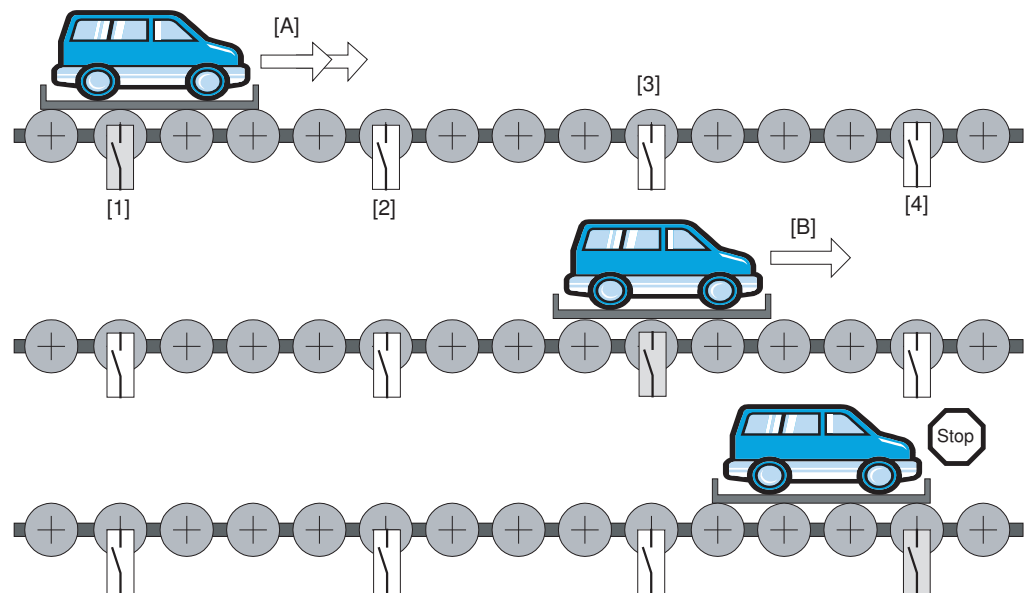
[1] Sensor "stop CCW"
[2] Sensor "F/S[1) CCW"
[3] Sensor "F/S[1) CW"
[4] Sensor "stop CW"
1) F/S = Rapid/creep speed

[A] Rapid movement
[B] Slow movement

Operating mode "Feed-in"
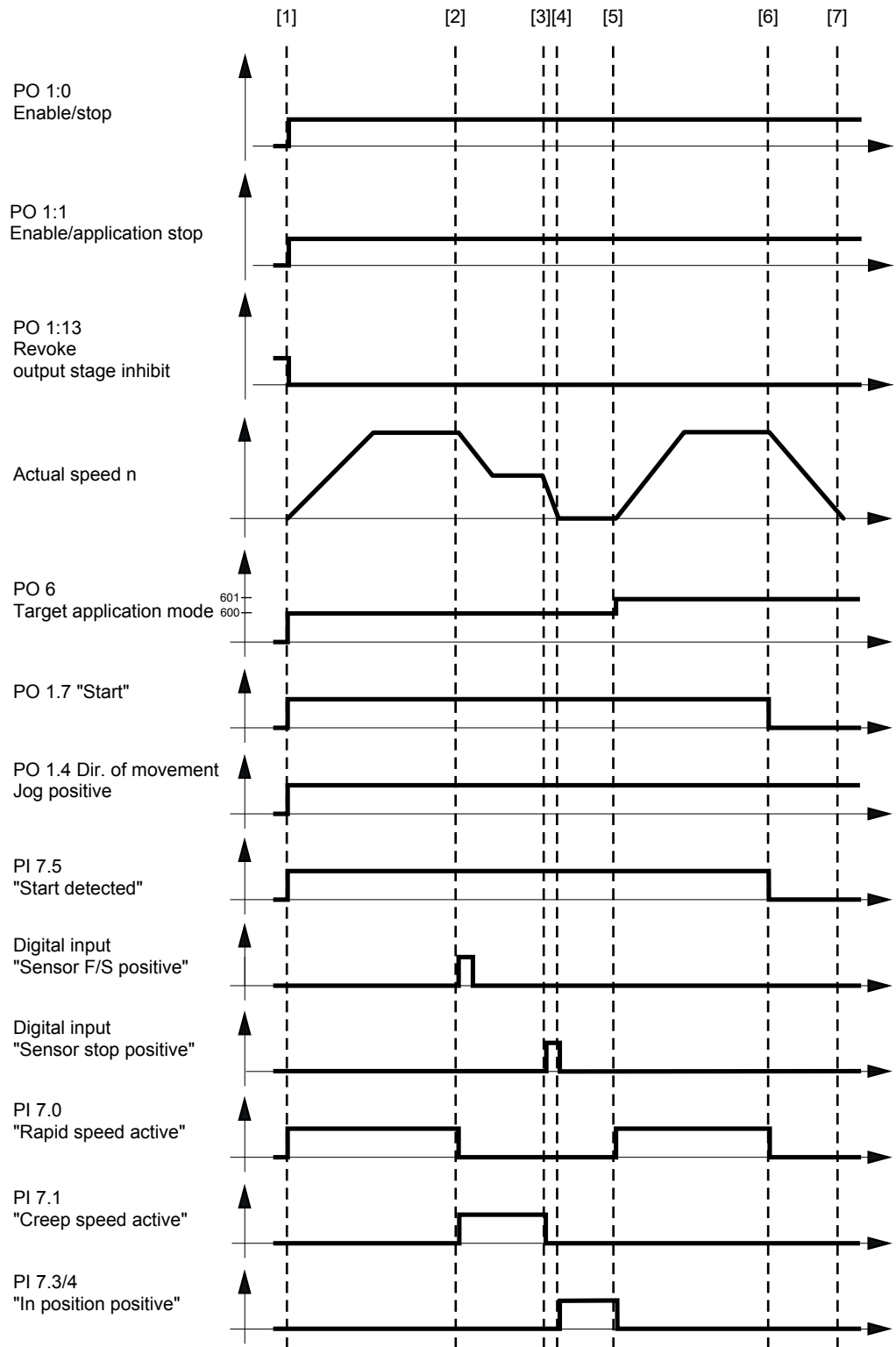
Functional description	
Mode selection	Mode 600
Requirement	The drive is enabled.
Functional description	Selection of the direction of rotation via PO 1:4 or PO 1:5
	At the positive edge of the start bit, the drive accelerates along the set acceleration ramp until it reaches rapid speed.
	Upon tripping of the "rapid/creep speed" sensor, the drive brakes along the deceleration ramp until it reaches creep speed.
	Upon tripping of the "stop" sensor, the drive brakes along the stop ramp to a standstill.
	Negative setpoint speeds are ignored. In unidirectional operating modes, the direction that is not configured is ignored, the inverter remains stopped in FCB 05, and no error message is issued.
	Changing the direction of rotation during infeed operation triggers error message "26754: Change of direction during process". After a reset and correct direction selection, the infeed process is restarted in this case.

Operating mode "Feed-out"

Functional description	
Mode selection	Mode 601
Requirement	The drive is enabled.
Description	At the positive edge of the start bit, the drive accelerates along the set acceleration ramp until it reaches rapid speed.
	Upon removing the start bit or the direction of rotation, the drive brakes along the deceleration ramp until it stops.
	Negative setpoint speeds are ignored. In unidirectional operating modes, the direction that is not configured is ignored, the inverter remains stopped in FCB 05, and no error message is issued.

Cycle diagram

The following figure shows the actual speed of the drive depending on the state of the input and output signals during infeed or outfeed processes.

30508961419

Process sequence and signal states

INFORMATION

i

For the behavior of the drive at an idle state, refer to the information in the chapter "Control functions" (→ 📄 16) under "Stop functions".

No.	Sequence	PD	Signal states
[1] General enable	• PO 1:0 = "1" Enable/emergency stop	PO 1:0	• "1": Enable • "0": Deceleration with emergency stop ramp
	• PO 1:1 = "1" Enable/application stop	PO 1:1	• "1": Enable • "0": Deceleration according to application limit
	• PO 1:13 = "0" Output stage inhibit (signal with highest priority)	PO 1:13	• "0": Output stage enable • "1": Output stage inhibited (the drive coasts to a stop or the brake is applied)
[1]	Activate "infeed" operating mode	PO 6	600 (decimal)
	Activate positive direction of movement	PO 1:4	• "1": The drive accelerates to the rapid speed specified via PO 2/fixed setpoint using the value specified via PO 3/fixed setpoint.
	Activate "Start"	PO 1:7	
[1] to [2] and [5] to [6]	"Rapid speed active"	PI 7:0	• "1": Setpoint speed corresponds to rapid speed specified via PO 2/fixed setpoint.
[2]	"Sensor F/S positive" trips	-	Edge change detected
[2] to [3]	"Creep speed active"	PI 7:1	• "1": Drive decelerates with the deceleration specified via PO 4/fixed setpoint. The setpoint speed corresponds to the creep speed specified via PO 7/fixed setpoint.
[3]	"Sensor stop positive" trips	-	Edge change detected
[3] to [4]	Deceleration stop	PI 7:1	• "1": Drive decelerates up to standstill with the stop deceleration specified via PO 8/fixed setpoint.
[5]	Activation of "outfeed" operating mode	PO 6	601 (decimal)
[6] to [7]	Deactivation of "Start"	PI 1:7	• "1": Drive decelerates up to standstill with the deceleration specified via PO 4/fixed setpoint.

6.1.6 Reverse mode

Start of rapid/creep speed positioning in the direction selected via control word. Unlike the "infeed" operating mode (600), the direction of rotation must be changed upon reaching the stop sensor. After changing the direction in "reverse mode" (602), the motor starts without a rising edge of the start bit in the selected direction of movement.

Functional principle

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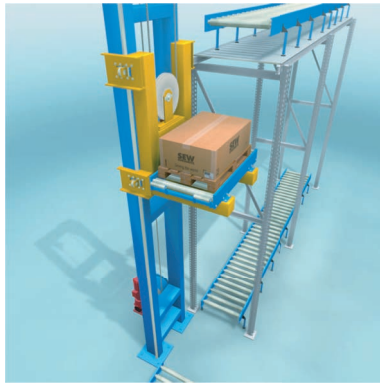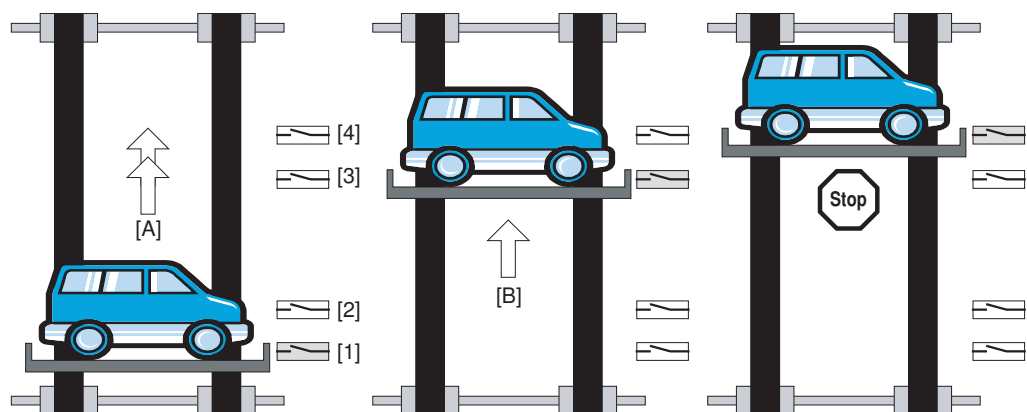

In reverse mode, positioning is performed according to the same principle as for feed-in. After positioning in one direction, however, further infeed in the same direction is not possible. Starting another infeed process in the same direction is inhibited by the "In position" signal and prevents unintentional travel to 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"	[A] Rapid movement
[2] Sensor "F/S[1] CCW"	[B] Slow movement
[3] Sensor "F/S[1] CW"	
[4] Sensor "stop CW"	

1) F/S = Rapid/creep speed

Functional description

Functional description	
Mode selection	Mode 602
Requirement	The drive is enabled.
Functional description	At the positive edge of the start bit, the drive accelerates along the set acceleration ramp until it reaches rapid speed.
	Upon tripping of the "rapid/creed speed" 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.

Cycle diagram

The following figure shows the actual speed of the drive depending on the state of the input and output signals during lifting or rotating. As requirement for operation, *PO 1:0 Enable/emergency stop* and *PO 1:1 Enable/application stop* must be set, and *PO 1:13 Activate output stage inhibit* must not be set. See "Cycle diagram for jog mode" (→ 🖺 24).

30511902731

Process sequence and signal states

INFORMATION

For the behavior of the drive at an idle state, refer to the information in the chapter "Control functions" (→ 🖺 16) under "Stop functions".

No.	Sequence	PD	Signal states
[1] General enable	• PO 1:0 = "1" Enable/emergency stop	PO 1:0	• "1": Enable • "0": Deceleration with emergency stop ramp
	• PO 1:1 = "1" Enable/application stop	PO 1:1	• "1": Enable • "0": Deceleration according to application limit
	• PO 1:13 = "0" Output stage inhibit (signal with highest priority)	PO 1:13	• "0": Output stage enable • "1": Output stage inhibited (the drive coasts to a stop or the brake is applied)
[1]	Activation of "Reverse mode"	PO 6	602 (decimal)
	Activate positive direction of movement	PO 1:4	• "1": The drive accelerates to the rapid speed specified via PO 2/fixed setpoint using the value specified via PO 3/fixed setpoint.
	Activate "Start"	PO 1:7	
[1] to [2] and [5] to [6]	"Rapid speed active"	PI 7:0	• "1": Setpoint speed corresponds to rapid speed specified via PO 2/fixed setpoint.
[2]	"Sensor F/S positive" trips	-	Edge change detected
[2] to [3] and [6] to [7]	"Creep speed active"	PI 7:1	• "1": Drive decelerates with the deceleration specified via PO 4/fixed setpoint. The setpoint speed corresponds to the creep speed specified via PO 7/fixed setpoint.
[3]	"Sensor stop positive" trips	-	Edge change detected
[3] to [4] and [7] to [8]	Deceleration stop	PI 7:1	• "1": Drive decelerates up to standstill with the stop deceleration specified via PO 8/fixed setpoint.
[5]	Activation of negative direction of movement	PO 1:5	• "1": The drive accelerates to the rapid speed specified via PO 2/fixed setpoint using the value specified via PO 3/fixed setpoint.
[6]	"Sensor F/S negative" trips	-	Edge change detected
[7]	"Sensor stop negative" trips	-	Edge change detected

6.2 Other functions

The functions described in the following complement the operating modes. The functions are activated by digital signals configured for this purpose.
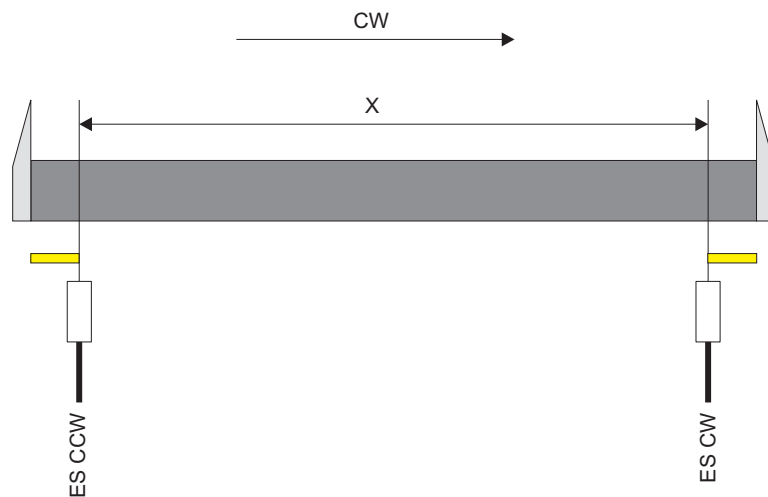
6.2.1 Hardware limit switches

The hardware limit switches are connected to the digital inputs configured for this purpose. The digital inputs are configured in the configuration of the software module in the "Inputs/outputs" menu.

The cams of the hardware limit switches must cover the travel range up to the stop.

⚠ CAUTION

Only use hardware limit switches with NC contacts (low-active).

28303016587

[CW]	Drive inverter clockwise rotation
[X]	Travel distance
[ES CW]	Right hardware limit switch
[ES CCW]	Left hardware limit switch

INFORMATION

Make sure the hardware limit switch is assigned correctly. This means clockwise rotation (CW) should be towards the clockwise hardware limit switch (LS CW) and counterclockwise rotation (CCW) should be towards the counterclockwise hardware limit switch (LS CCW).

7   Process data assignment

7.1   Process output data

The following table shows the process output data from the PLC to the inverter for control via fieldbus with 8 process data words.

Word		Bit	Function
PO 1	Control word	0	Enable/emergency stop
		1	Enable/application stop
		2	Reserved
		3	Brake release (without enable)
		4	Direction of movement/jog positive
		5	Direction of movement/jog negative
		6	Reserved
		7	Start/stop with PO2/fixed setpoint
		8	Fault reset
		9	Activate creep speed
		10	Activate drive train 2
		11	Reserved
		12	Reserved
		13	Activate output stage inhibit
		14	Activate standby mode
		15	MOVIKIT® handshake In
PO 2	Rapid speed/jog speed	0 – 15	User unit
PO 3	Acceleration	0 – 15	User unit
PO 4	Deceleration	0 – 15	User unit
PO 5	Digital outputs For control via process data, see chapter "Digital inputs/digital outputs" (→ 🗎 40).	0	DO 00 / DIO 01 (output)
		1	DO 01 / DIO 02 (output)
		...	...
		3	DO 03
		...	...
PO 6	Target application mode	0 – 15	Operating mode. See the chapter "Overview of operating modes" (→ 🗎 22).
PO 7	Creep speed	0 – 15	User unit
PO 8	Deceleration stop	0 – 15	User unit
PO 9/10		0 – 15	

7.1.1 Control word

INFORMATION

i

For the behavior of the drive at an idle state, refer to the information in the chapter "Control functions" (→ 🖹 16).

Bit	Function	PD	Description
0	Enable/emergency stop	PO 1.0	• "1": Enable • "0": Stop with drive function FCB 14 (emergency stop).
1	Enable/application stop	PO 1.1	• "1": Enable • "0": Stop with drive function FCB 13 (stop at application limits).
2	Reserved	PO 1.2	-
3	Release brake (without enable)	PO 1.3	If required, activate this function using parameter 8501.2 (Release brake/DynaStop® with FCB 01 – enable).
4	Direction of movement/jog positive	PO 1.4	Signal for moving the drive in positive direction
5	Direction of movement/jog negative	PO 1.5	Signal for moving the drive in negative direction
6	Reserved	PO 1.6	Reserved
7	Start/stop with fieldbus ramp	PO 1.7	• "1": Start – Movement enabled in all operating modes except for jog mode. • Deceleration to speed 0 with the value specified by PO 4 Fixed setpoint deceleration. Standstill behavior: The motor is held at speed 0. For motors without encoder, the "Stop by setpoint function" (→ 🖹 18) must be used.
8	Fault reset	PO 1.8	Reset of fault messages with the positive edge of the signal.
9	Activate creep speed	PO 1.9	Signal for activating creep speed. For example for startup purposes.
10	Activate drive train 2	PO 1.10	• "0": Drive train 1 selected • "1": Drive train 2 selected **NOTICE!** Drive train 2 is only available with single-axis modules and can be used, for example, to implement emergency mode without encoder feedback.
11	Reserved	PO 1.11	-
12	Reserved	PO 1.12	-

Bit	Function	PD	Description
13	Activate output stage inhibit	PO 1.13	• "1" Output stage inhibit activated – The brake is applied or (if no brake is installed) the motor coasts to a stop. • "0" Output stage inhibit inactive – Output stage can be enabled
14	Activate standby mode	PO 1.14	• "1" Standby mode activated. • "0" Standby mode not activated. Standby mode can only be activated when the output stage is inhibited.
15	MOVIKIT®- Handshake In	PO 1.15	This signal is copied internally to status word bit 15 (MOVIKIT® Handshake Out). If the copying operation fails ("Handshake Out" remains constant with changing "Handshake In" signal), the device-internal processing of the MOVIKIT® software module is disrupted.

7.2   Process input data

The following table shows the process input data from the inverter to the PLC for control via fieldbus with 10 process data words.

Word		Bit	Function
PI 1	Status word	0	"1": Ready for operation
		1	"1": STO inactive
		2	"1": Output stage enable
		3	"1": Brake released/DynyStop® disabled
		4	"1": Motor running (motor standstill active)
		5	"1": Active drive referenced
		6	Reserved
		7	Reserved
		8	• "1": Fault present
		9	• "1": Warning present
		10	"1": Drive train 2 active
		11	"1": "Setpoint/actual speed comparison active" signal
		12	Reserved
		13	Reserved
		14	"1": Standby mode active
		15	MOVIKIT® Handshake Out (for details, see MOVIKIT® Handshake In)
PI 2	Actual speed	0 – 15	User unit

Word		Bit	Function
PI 3	Status Main fault/subfault/module fault	0 – 15	• No fault: Display of current FCB (low-byte) • Device fault: Display of device fault code • Fault in option: Display of option fault code • Fault in module: Module fault display (High byte: fault; low byte: subfault) For more information, refer to the product manual of the corresponding device and to the chapter "Troubleshooting" (→ 📄 47).
PI 4	Actual torque	0 – 15	• Current torque based on the nominal motor torque (unit: 0.1%) • Relative apparent current based on the nominal inverter current (unit: 0.1%) • Absolute apparent current (unit: 0.1 A)
PI 5	Digital inputs	0	DI 00
		...	...
		7	DI 07
		...	...
		9	DI 09 / DIO 01 (input)
		10	DI 10 / DIO 02 (input)
		...	...
		13	DI 13
		...	...
PI 6	Actual application mode (operating mode)	0 – 15	Operating mode. See the chapter "Overview of operating modes" (→ 📄 22).
PI 7	Application status	0 – 15	Bit 0: Rapid speed active (setpoint speed = rapid speed) Bit 1: Creep speed active (setpoint speed = creep speed) Bit 2: Processing error (for more information, refer to chapter "Troubleshooting" (→ 📄 47)) Bit 3: InPosition negative Bit 4: InPosition positive Bit 5: Start detected
PI 8	Freely selectable	0 – 15	
PI 9[1]	Actual position (high word)	0 – 15	User units
PI 10[1]	Actual position (low word)	0 – 15	User units

1) Process data word can be activated/deactivated via "Module configuration".

7.2.1 Status word

Bit	Function	Process data	Description
8	Fault	PI 1:8	• "1": Fault present • "0": No fault present Active faults can be reset by setting the signal PI 1:8 "Fault reset".
9	Warning	PI 1:9	• "1": Warning present • "0": No warning present Warnings can be reset by setting the signal PI 1:8 "Fault reset" if the reason for the warning no longer exists. Warnings that are set as warnings with self reset will delete themselves even if the reason for the warning no longer exists. In this case, the warning need not be reset. For more information, refer to the product manual of the respective device.

8 Digital inputs/outputs

The digital inputs/digital outputs are assigned in the configuration of the software module in the "Inputs/outputs" (→ 🕮 20) menu. All inputs/outputs set to "Data Flexibility input" and that can be edited, can be freely assigned. All other inputs are already used according to the settings of the "Module configuration" (→ 🕮 19).

⚠ WARNING

Unexpected system behavior in the event of interrupted communication with the higher-level controller.

Death, severe injuries or damage to property can occur

- Make sure that the digital outputs control only those parts of the system that cannot give rise to hazardous situations.

8.1 Assignment of digital inputs

INFORMATION

Sensors can be configured in the configuration menu "Module configuration" (→ 🕮 19) under "Sensor logic" either as normally closed contact or as normally open contact.

8.1.1 When using "sensor pair A/B"

When using sensor pair A/B, the following functions are assigned to the following digital inputs:

Digital input	Function
DI 01	Sensor B: Rapid/creep speed
DI 02	Sensor B: Stop
DI 03	Sensor A: Rapid/creep speed
DI 04	Sensor A: Stop

When using additional optional sensors and sensor pair A/B, the following functions are assigned to the following digital inputs:

Digital input/output	Function
DI 05 / DIO 01	Sensor B: Optional sensor
DI 06 / DIO 02	Sensor A: Optional sensor

8.1.2 In all other operating modes

When using the software module, the following functions are assigned to the digital inputs by default:

Digital input	Function
DI 01	Sensor rapid/creep speed negative direction of movement
DI 02	Sensor stop negative direction of movement
DI 03	Sensor rapid/creep speed positive direction of movement
DI 04	Sensor stop positive direction of movement

When using additional optional sensors, the following functions are assigned to the following digital inputs:

Digital input/output	Function
DI 05 / DIO 01	Optional sensor negative direction of movement
DI 06 / DIO 02	Optional sensor positive direction of movement

8.2 Assignment of digital outputs

On delivery, the digital outputs of control cabinet devices are assigned the following functions by default:

Digital output	Function
DB 00	Brake output
DO 00	Ready for operation
DO 01	Output stage enable
DO 02	Fault
DO 03	STO active

On delivery, the digital outputs of MOVITRAC® are assigned the following functions:

Digital output	Function	Input/output
DIO 01	No function	Input
DIO 02	No function	Input

8.3 Configuring digital inputs/digital outputs

For configuring the digital inputs/digital outputs, the following fields are available in the "Inputs/outputs" (→ 📄 20) menu of the configuration for the software module.

Digital inputs	Phys. level	Function	
DI 00	◉	Output stage enable	
DI 01	◉	Sensor Eil-/Schleichgang negative Bewegungsrichtung	
DI 02	◉	Sensor Stopp negative Bewegungsrichtung	
DI 03	◉	Sensor Eil-/Schleichgang positive Bewegungsrichtung	
DI 04	◉	Sensor Stopp positive Bewegungsrichtung	
DI 05	◉	Data Flexibility input	▤
DI 06	◉	Data Flexibility input	▤
DI 07	◉	Data Flexibility input	▤

Digital outputs	Phys. level	Function	
DB 00	◉	Brake output	
DO 00	◉	Ready	▤
DO 01	◉	Output stage enable	▤
DO 02	◉	Fault	▤
DO 03	◉	STO active	▤
DO R	◉	No function	▤

Digital outputs DO 00 – DO 03
Freely configurable ▤

[1] [2] [3]

30518442635

| No.	Description
[1]	List of digital inputs with drop-down lists for assigning a function and displaying the physical level.
	Digital input DI 00 is permanently assigned the "output stage enable" function.
	All inputs set to "Data Flexibility input" and that can be edited, can be freely assigned. All other inputs are already used according to the settings of the "module configuration" (→ 📄 19).
[2]	List of digital outputs with drop-down lists for assigning a function and displaying the physical level.
	Digital output DB 00 is permanently assigned the "brake output" function.
[3]	Selection of a default assignment for the digital outputs.
	• Freely configurable – Configure digital outputs as required using the drop-down lists under [2].
	If you already selected a standard assignment before, their functions will be maintained in the respective fields and the drop-down lists will be enabled to change the function.
	• Control via fieldbus – Digital outputs are assigned in such a way that they can be controlled via process data word PO 5.
	• Digital outputs as in delivery state – Reset assignment of digital outputs to delivery state. See "Assignment of digital outputs" (→ 📄 41).

8.4 Using additional I/O option cards

INFORMATION

ℹ This option is only available with MOVIDRIVE® technology.

Inputs

If additional I/O option cards are used, control word 3 of the inverter can be assigned the additional inputs of the option card. In this case, the input state will be output at the respective bit of application status word 5.
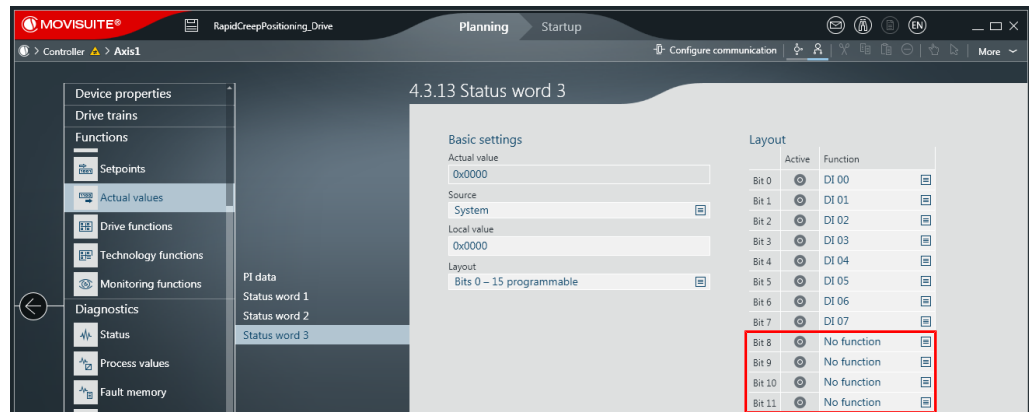
30579284747

Outputs

If the digital outputs of the I/O option card are to be controlled via application control word 5, the digital outputs must be assigned as follows:
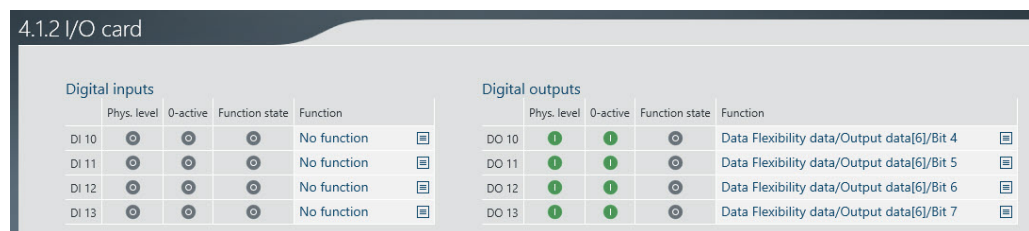
30579281163

9 Diagnostics

9.1 MOVIKIT® diagnostics

All MOVIKIT® software modules are equipped with a diagnostic monitor to allow for quick startup and checking the control as well as the application. In addition to monitor mode, the diagnostic monitor also provides a control mode that can be used to control the functions of the software module in MOVISUITE®.

⚠ WARNING

Unexpected device behavior (such as movements of the drive) in control mode or when changing the operating mode due to ineffectiveness of limits or locking specified by the PLC.

Death, severe injuries or damage to property

- Make sure that the motor cannot be started in an uncontrolled manner in control mode or when changing the operating mode. Inhibit the inverter for this purpose.

- Block access to the potential hazard zone. Use available safety equipment.

The user interface of MOVIKIT® diagnostics is structured as follows:
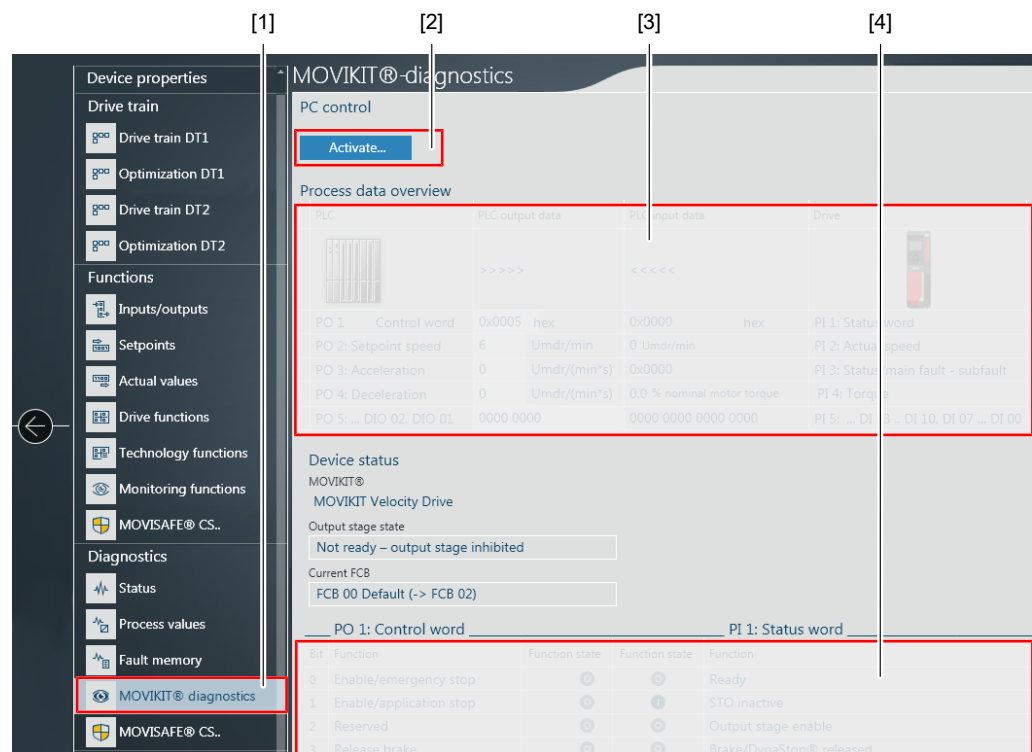
30549043339

[1] MOVIKIT® diagnostics button in the configuration menu
[2] Button for toggling between "PC control" and "Monitor mode"
[3] Overview of process input and process output data
[4] Bit-wise presentation of control word and status word

9.1.1 Checking process data

Proceed as follows:

1. In MOVISUITE®, open the configuration of the application inverter. Next open the "MOVIKIT® diagnostics" menu under "Diagnostics".

    ⇨ When starting MOVIKIT® diagnostics, monitor mode is active.

2. To toggle between PC control and monitor mode, click the [Activate] or [Deactivate] button.

    ⇨ In monitor mode, you can monitor the process data of the fieldbus interface.

    ⇨ In control mode (PC control), the process data via fieldbus interface are disabled which means the process data can be specified using the user interface of MOVIKIT® diagnostics. The data are sent to the application inverter automatically and continuously, and take effect immediately.

9.1.2 Monitor mode

In monitor mode, the setpoints of the higher-level controller are displayed in the "Overview of process data" section in the "PLC output data" column. Control word and status word are shown in bit-wise notation.

9.1.3 PC control

Activating "PC control" lets you move the drive without setpoints from the higher-level controller. In this state, you can specify the required values by means of the enabled setpoint fields.

INFORMATION

i

The active communication between PC and drive is monitored when "PC control" is enabled. If the drive does not obtain a setpoint for a period longer than set in the "PC control timeout" parameter, the drive stops automatically and generates the fault "F32.08 Communication: User-timeout timeout". In the event of a slow communication connection, you can increase the default value of 2.0 seconds.

10 Application examples

10.1 Sample projects

10.1.1 EtherNet/IP™ (in preparation)

You find a sample project for the "Studio 5000 Logix Designer" engineering tool at the homepage of SEW EURODRIVE → **www.sew-eurodrive.com**. Go to [Online Support] > [Data & Documents] > [Software] and search for "Movikit".

10.1.2 PROFINET

You find a sample project for the "TIA Portal" engineering tool at the homepage of SEW EURODRIVE → **www.sew-eurodrive.com**. Go to [Online Support] > [Data & Documents] > [Software] and search for "Movikit".

11 Fault management

11.1 Troubleshooting

11.1.1 Fault 32.08: Communication during PC control interrupted

Example

Communication is interrupted when using MOVIKIT® diagnostics in "PC control" mode.

Remedy

- Check the timeout time set for MOVIKIT® diagnostics and increase the timeout time, if required.

11.1.2 Fault 26752: Target application mode not configured

Example

Mode 603 (positioning to sensor pair B) is selected but this mode has not been configured before.

Mode 602 (reverse mode) is selected but unidirectional operating mode has been configured.

Remedy

- Configure the software module according to the required "operating mode" (→ 🖹 22).
- Fault reset via PO 1.8 "Reset".

11.1.3 Fault 26753: Module configuration missing

Example

"Module configuration" (→ 🖹 19) has not been finished.

Remedy

- Once you have finished configuring the module, click the [Apply configuration] button in the "Module configuration" (→ 🖹 19) menu.
- Fault reset via PO 1.8 "Reset".

11.1.4 Fault 26754: Change of direction during process

Problem

Unexpected change of direction during rapid/creep speed positioning.

Remedy

- After a fault reset, feeding-in takes place in the selected new direction beginning with rapid speed.

Index

SEW-EURODRIVE
Driving the world