SEW
EURODRIVE

Manual

MOVIKIT®

Positioning Drive, Velocity 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

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® Positioning Drive	Software module
MOVIKIT® Velocity 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

The software modules are used for implementing positioning applications (MOVIKIT® Positioning Drive) and for applications with speed control (MOVIKIT® Velocity Drive).

Use the device-independent MOVISUITE® engineering software to start up and configure the axes and to download the complete configuration to a MOVI-C® CONTROLLER.

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

3 System description

3.1 Module description

The MOVIKIT® Velocity Drive software module is used for implementing applications with speed control and predefined fieldbus interface.

The MOVIKIT® Positioning Drive software module provides the scope of functions of the MOVIKIT® Velocity Drive software module and furthermore allows to implement positioning applications.

The software modules mainly use the basic functions of the application inverters in use by activating the respective function blocks (such as FCB 09 Position control) depending on the application. This means the scope of functions that can be used depends on the application inverter in use (for example encoder feedback available).

The software modules can be used, for example, in material handling applications (travel drives, lifting drives, rail vehicles) or in various logistics applications (storage/retrieval systems, pallet transfer shuttles or rotary tables).

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

3.2 Functions

Overview of functions:

All software modules

- Startup using a graphical user interface
- Own parameter tree with all parameters required for operation
- Diagnostic monitor for monitoring and controlling the axis
- Standardized process data interface

MOVIKIT® Velocity Drive

- Operating modes: Speed control

MOVIKIT® Positioning Drive

- Operating modes: Speed control, positioning mode (relative/absolute) referencing mode, jog mode

3.2.1 Additional functions

Overview of additional functions:

MOVIKIT® Velocity Drive

- Variable jerk time via process data
- Parameter channel via process data

MOVIKIT® Positioning Drive

- Additional function of MOVIKIT® Velocity Drive
- Touchprobe function

3.3 Scope of functions of the process data profiles

Profile	Range of functions
5 PD	MOVIKIT® Velocity – 5 process data words for speed-variable applications. Encoder feedback is not necessarily required.
8 PD	MOVIKIT® Positioning – 8 process data words for the operating modes listed below. Encoder feedback is necessary to being able to use the entire scope of functions. • Jog in position control (FCB 20) or speed controlled (FCB 05) **Note:** Encoder feedback not absolutely necessary with FCB 05. • Speed control (encoder feedback not necessarily required) • Referencing • Positioning (linear and modulo) For further information, refer to chapter "Operating modes" (→ 🗎 27).
+1 PD	Additional function – variable jerk time This additional function extends the range of functions by providing the ability to specify the jerk time. The additional function extends the process data length by one process data word. For further information, refer to chapter "Variable jerk time" (→ 🗎 51).
+5 PD	Additional function – parameter channel This additional function extends the range of functions by the option of reading inverter parameters and writing them in a volatile manner. The additional function extends the process data length by 5 process data words. For further information, refer to chapter "Parameter channel via process data" (→ 🗎 51).
+4 PD	Additional function – touchprobe 1 (only available with MOVIKIT® Positioning Drive) This additional function extends the range of functions by providing the ability to read the acquired position and the trigger counter during a trigger event. Together with the "Touchprobe Positioning Absolute" operating mode, it is also possible to position to a specified position relative to the touchprobe position during a trigger event. The additional function extends the process data length by four process data words. For further information, refer to chapter "Touchprobe 1" (→ 🗎 52).

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3.4 Version overview

Version		Change
1.1.200.1	MOVISUITE® V2.0 (system package 9)	First series version. For detailed information on the functions included, refer to the respective MOVISUITE® manual.
2.0.0.200	MOVISUITE® V2.1 (system package 10)	**New functions:** • MOVIKIT® handshake: PO 1:15 is mapped to PI 1:15. • Timeout monitoring between Dataflex and basic unit via HeartBeatIn (control word 2, bit 15) and HeartBeatOut (status word 2, bit 15) **Revisions to the previous version:** • In version 1.1, bit PI 1:13 InSpeed" did not provide a valid signal in FCB 05 at negative speed.
3.0.0.200	MOVISUITE® V2.10 **INFORMATION:** Due to the implementation of Dataflex "Runtime Slicing", this version can only be run with device firmware 6.0 or higher.	**New functions:** • Variable jerk time (1 PD) • Parameter channel via process data (5 PD) • Touchprobe function (4 PD) **Change:** • Conversion to MultiMotion interface to the axis for compatibility with IEC-based MOVIKIT® software modules – Selection of stop FCBs binary coded via control word 1 • Assignment of inputs/outputs in delivery state: – All DIs = "No function" – All DIOs = Input – "no function" – After delivery state, InitialParameter.xml is used to parameterize the inputs/outputs to "No function" when assigning MOVIKIT® Velocity Drive.

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 (in preparation)

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® Velocity Drive: Application level 0 (standard)
- MOVIKIT® Positioning 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
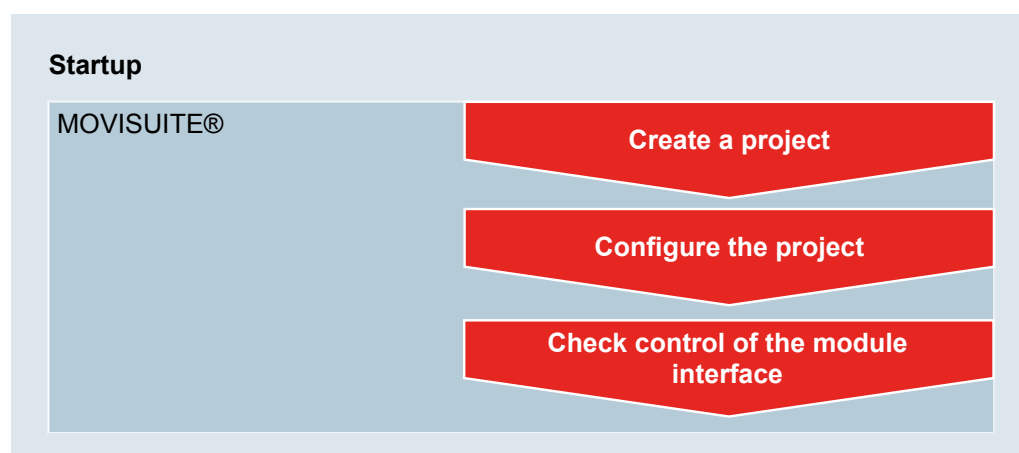
18014426711624843

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

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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® Positioning Drive, Velocity 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:

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5.3.2   Adding MOVIKIT® Positioning Drive, Velocity Drive

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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® Positioning Drive, Velocity 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® Positioning Drive, Velocity Drive is assigned to the node, the configuration is created, and the basic settings are performed.

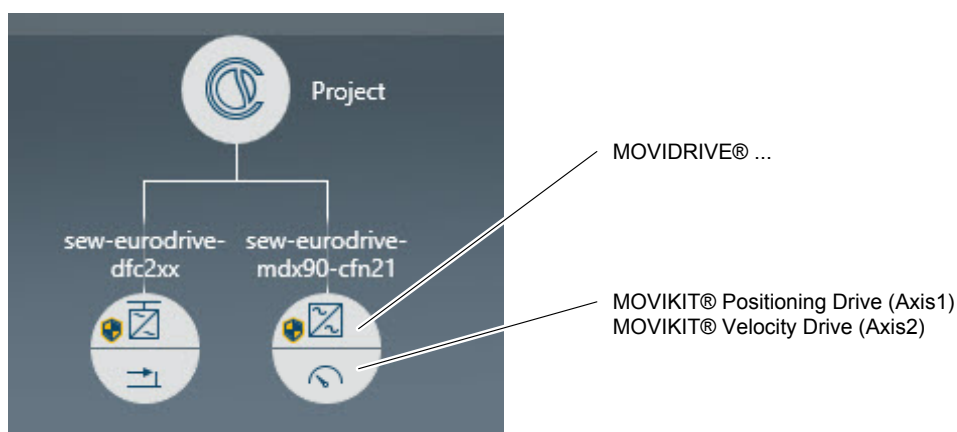### 5.3.3 Configuring MOVIKIT® Positioning Drive, Velocity Drive

i **INFORMATION**

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

1. In MOVISUITE®, click onMOVIKIT® Positioning Drive, Velocity Drive.
   ⇨ The configuration menus of the software module are displayed. The configuration menus are explained in the following subchapters.
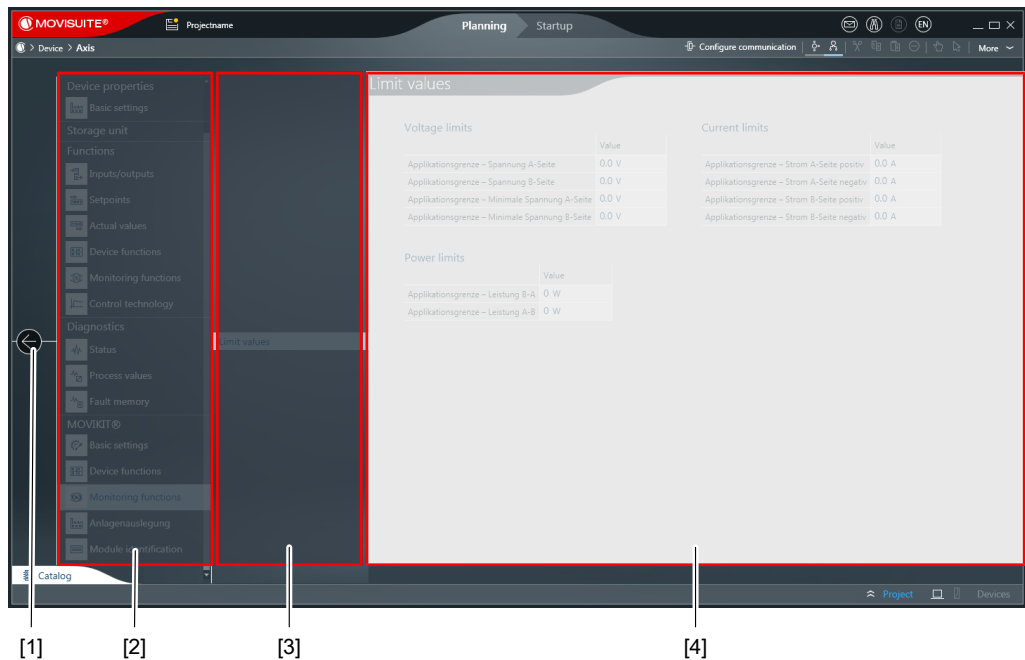
9007228165413771

[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.

i **INFORMATION**

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

Basic settings

Parameter group	Description
Control signal source	
Source	Selection of the control source
	(e.g. fieldbus or EtherCAT®/SBus^PLUS)
	Index: 8366.4
Drive train	
Show drive train 2	Setting whether only drive train 1 or drive trains 1 and 2 are to be processed.
	NOTICE! Drive train 2 is only available with single-axis modules and can be used, for example, to implement emergency mode without encoder feedback. The user units and the speed window for the "Setpoint/ actual speed comparison active" signal must be set identical with those of drive train 1.
	Index: 8347.6 Offset 0, bit 7
Functions used	
Variable jerk time (1 PD)	• **Off** • On This additional function extends the range of functions by providing the ability to specify the jerk time. The additional function extends the process data length by one process data word. **INFORMATION:** When using the additional function, please refer to the more detailed information in chapter"Variable jerk time" (→ 📄 51).
	Index: 8347.6 Offset 0, bit 13
Parameter channel via process data (5 PD) **Information:** The writing of data is volatile and is therefore not power-failure proof.	• **Off** • On This additional function extends the range of functions by the option of reading and writing inverter parameters. The additional function extends the process data length by 5 process data words. For further information, refer to chapter "Parameter channel via process data" (→ 📄 51).
	Index: 8347.6 Offset 0, bit 15

Parameter group	Description
Touchprobe function (4 PD) **Information:** "Configuration menu" (→ 🖺 24) becomes visible when activated.	• **Off** • On This additional function extends the range of functions by providing the ability to read the acquired position and the trigger counter during a trigger event. Together with the "Touchprobe Positioning Absolute" operating mode, it is also possible to position to a specified position relative to the touchprobe position during a trigger event. The additional function extends the process data length by four process data words. For further information, refer to chapter "Touchprobe 1" (→ 🖺 52).
	Index: 8347.6 Offset 0, bit 17
Module identification	
Module identification	Module names and version ID

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

Parameter name	Value
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
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 [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

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"Software limit switches" are only available when using MOVIKIT® Positioning Drive.

Parameter group	Description
Speed monitoring	
Activation	Activation of speed monitoring
	• Off
	• Motor mode
	• Generator mode
	• Motor/generator mode
	Index: 8550.1
Delay time	The set current limit can be reached briefly during acceleration, deceleration, or load peaks. You can prevent speed monitoring from responding too sensitively by setting the delay time accordingly. The current limit must be reached permanently for the duration of the delay time before the monitoring function trips.
	Index: 8550.2
Reset time factor	When the control output limit of the speed controller is reached, a counter for the delay time is incremented every millisecond. If the speed controller leaves its control limit before the delay time expires, the counter is decremented until "0" is reached. You can use this parameter to set a factor that specifies how fast the counter decrements when leaving the control output limit compared to the delay time. This factor is usually set to "1", which means the counter is decremented every millisecond. If the factor is set to "2", the counter is decremented by 2 every millisecond, etc.
	Index: 8550.3
Stop function	
Behavior at standstill	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. For drives without encoder, this setting is ignored, which means the brake function is always active.
	Index: 8563.1
SW negative limit switch	Position of the negative software limit switch
	(in user units)
	Index: 8572.4

Parameter group	Description
SW positive limit switch	Position of the positive software limit switch (in user units)
	Index: 8572.6
HW limit switch hit response	• No response
	• **Emergency stop + output stage inhibit**
	• Emergency stop + output stage inhibit with self-reset
	Index: 8572.1
SW limit switch hit response	• No response
	• **Emergency stop + output stage inhibit**
	• Emergency stop + output stage inhibit with self-reset
	Index: 8572.2
Use HW limit switches DT1 also in DT2	For monitoring the hardware limit switches, the hardware limit switches of drive train 1 are also used for drive train 2. The setting is useful when the same drive is used with different control odes or encoder configurations in both drive trains.
	Index: 8573.7

Drive functions

FCB 05 Speed control

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For axes without encoder, the stop by setpoint function must be enabled and both the stop setpoint and the start offset must be set. The brake will then only release when "speed control" mode is selected and the specified setpoint speed is greater than the stop setpoint + start offset.

Parameter name	Description
Stop by setpoint function	
Activation	Activation of the stop by setpoint function
	Index: 8570.1
Stop setpoint	Setpoint of the stop by setpoint function
	The drive is stopped when the speed setpoint drops below the stop setpoint.
	Index: 8570.2
Start offset	Start offset of the stop by setpoint function
	The drive is only enabled when the setpoint exceeds the enable setpoint (stop setpoint + start offset).
	Index: 8570.3

FCB 09 Position control

INFORMATION

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The configuration is only available when using MOVIKIT® Positioning Drive.

Parameter group	Description
Cycle limit	
Modulo minimum	Lower modulo limit (in user units).
	Index: 8357.30
Modulo maximum	Upper modulo limit (in user units).
	Index: 8357.31
In position	
Window width	The "In position" signal is set when the difference between the actual position and setpoint position is smaller than half this value.
	Index: 8331.1
Hysteresis	Target position hysteresis. When the position window is left, the "In position" signal is maintained until this value is exceeded.
	Index: 8331.2
Lag error	
Lag error window	Specifies from which lag error the drive signals a fault (drive train 1).
	The "Lag error window" parameter takes effect for FCB 09 and FCB 26.
	Information: The setting applies to FCB 09 and FCB 26. For FCB 20 Jog mode, for example, a separate lag error window is available.
	Index: 8509.4
Response to positioning lag error	Specifies how the device responds to a lag error (lag error window exceeded, Index 8509.4).
	The "Response to positioning lag error" parameter takes effect for FCB 09, FCB 10, and FCB 26.
	Index: 8622.3

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FCB 12 reference travel

Parameter name	Value
FCB 12 Reference travel	
Type	• Deactivated
	• Zero pulse – negative direction
	• Reference cam – negative end
	• Reference cam – positive end
	• Positive limit switch
	• Negative limit switch
	• Reference cam flush – positive limit switch
	• Reference cam flush – negative limit switch
	• Referencing without reference travel
	• Positive fixed stop
	• Negative fixed stop
	Index: 8552.1
Reference to zero pulse	Activates or deactivates referencing to zero pulse
	Index: 8552.2
Reference offset	Deviation of the cam from the machine zero
	Index: 8552.5
Search speed	Search speed for reference travel
	Index: 8552.8
Retraction speed	Retraction speed for reference travel
	Index: 8552.9
Acceleration	Acceleration of reference travel
	Index: 8552.11
Deceleration	Deceleration of reference travel
	Index: 8552.12
Advanced settings	
Go to home position	Activates or deactivates homing
	Index: 8552.3
Home position	Home position that is approached automatically after reference travel is complete.
	Index: 8552.7
Homing speed	Speed for approaching the home position after referencing.
	Index: 8552.10
Jerk time	Homing jerk time
	Index: 8552.13

Parameter name	Value
Speed changeover before fixed stop	For setting whether search speed changes over to retraction speed.
	Index: 8552.4
Dwell time at fixed stop	Dwell time at fixed stop
	Index: 8552.15
Torque limit fixed stop	Limits the torque when referencing to the fixed stop.
	Index: 8552.14

Touchprobe 1

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Only included if the function is activated in the "Basic settings" configuration menu under "Functions used".

Parameter name	Value
Status	
Wait for trigger	Activated, if waiting for a trigger event.
	Index: 8352.2
Trigger activated	Activated, if a trigger event has taken place.
	Index: 8352.2
Detected value	Position at the time of the trigger event
	Index: 8352.3
Trigger	
Source	Source for activating the trigger for recording a signal
	Index: 8352.10
Event	Selects the type of edge that triggers the system:
	• Rising edge
	• Falling edge
	• Rising and falling edge
	Index: 8352.11
Sensor delay rising edge	Delay of the sensor used for the rising edge at the trigger input. This time will be included in the calculation of the touchprobe event value.
	Index: 8352.12
Sensor delay falling edge	Delay of the sensor used for the falling edge at the trigger input. This time will be included in the calculation of the touchprobe event value.
	Index: 8352.13
Counter	Counter of trigger events. This value is incremented by the value 1 with each trigger event.
	Index: 8352.14

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Parameter name	Value
Data source	
Data source	Selects the data source for recording
	Information: If modulo limits have been configured, set "Actual position in user units – Modulo" here.
	Index: 8352.30
PO data format	Selects the format of the process data:
	• 16 bits
	• 32 bits – big-endian
	• 32 bits – little-endian
	The data format is specified when accessing the PO data words. The PO data has a word width of 16 bits and can be compiled as a 32-bit value using the PO data format. This parameter has no effect for data sources with a word width of 32 bits.
	Index: 8352.31
Process data – modulo minimum	Modulo minimum of the source. Is required only if the data source is to be recorded at the time of the modulo change.
	Index: 8352.32
Process data – modulo maximum	Modulo maximum of the source. Is required only if the data source is to be recorded at the time of the modulo change.
	Index: 8352.33
Process data – delay	Delay of the process data. In the case of touchprobe, the value of the data source is recorded. Using this setting, the runtime of the process data can be compensated.
	Index: 8352.34
Process data – cycle time	Cycle time of the process data. In the case of touchprobe, the value of the data source is recorded. Using this setting, the runtime of the process data can be compensated.
	Index: 8352.35

Inputs/outputs

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For more information on this topic, refer to chapter "Digital inputs/outputs" (→ 🖹 63).

Parameter group	Description
Digital inputs	Configuration of digital inputs.
	We recommend that you use the default assignment with or without HW limit switches.
Digital outputs	Configuration of digital outputs

Fieldbus interface

Parameter group	Description
Fieldbus interface	
Process data input PI 4:	Selection of the assignment of PI 4 (torque, relative apparent current or absolute apparent current)
	Index: 8347.6, offset 0, bits 8, 9
Fieldbus interface	Representation of the process data profile
	Index: -

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

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" (→ 🖹 66).

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6 Operation

6.1 Operating modes

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The MOVIKIT® Velocity Drive software module uses the speed control operating mode (200). The operating mode cannot be selected manually when using MOVIKIT® Velocity Drive.

6.1.1 Overview of operating modes

Operating modes of MOVIKIT® Positioning Drive and their areas of application:

Operating mode	Decimal	Description
Jog mode	100	Position-controlled jogging (FCB 20)
		Encoder feedback required
	101	Speed-controlled jogging (FCB 05)
		Encoder feedback not required
Velocity control	200	Speed control (FCB 05)
		Encoder feedback not required
Referencing mode	300	Reference travel – offset via parameter (FCB 12)
	301	Reference travel – offset via fieldbus (FCB 12)
Positioning mode	400	Absolute position control (FCB 09)
	401	Relative position control (FCB 09)
	402	Modulo position control – positive (FCB 09)
	403	Modulo position control – negative (FCB 09)
	404	Modulo position control – shortest distance (FCB 09)
	420	Absolute positioning touchprobe (FCB 09)

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For operating function blocks, the configuration settings made in the MOVISUITE® configuration apply. Modulo operating modes can only be used if a cycle limit was set in the "Drive functions" configuration menu in the "FCB 09 Position control" submenu when configuring the software module.

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When selecting the operating modes positioning mode relative" (401), positioning mode modulo positive (402), positioning mode modulo negative (403), and positioning mode modulo-optimized direction (404) for the first time, a brief change is made to the FCB 26 to set the reference point of relative positioning correctly.

If the drive is still moving at the time when relative positioning mode is activated (401), it will be decelerated up to standstill using FCB 26. The stop point is the reference point for relative positioning. No deceleration is performed when changing to the other above mentioned operating modes.

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 and of the signal states.

6.1.2 Requirements for cycle diagrams

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
Positioning mode: Axis is referenced	PI 1:5	"1": Axis referenced
Startup has been performed correctly		
Output stage enabled (DI00 = 1)		

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6.1.3 Jog mode

An axis is moved position controlled (100) or speed controlled (101) with activation of the direction of rotation. Selecting both directions of rotation or not selecting a direction of rotation at all will stop an ongoing movement.

Cycle diagram
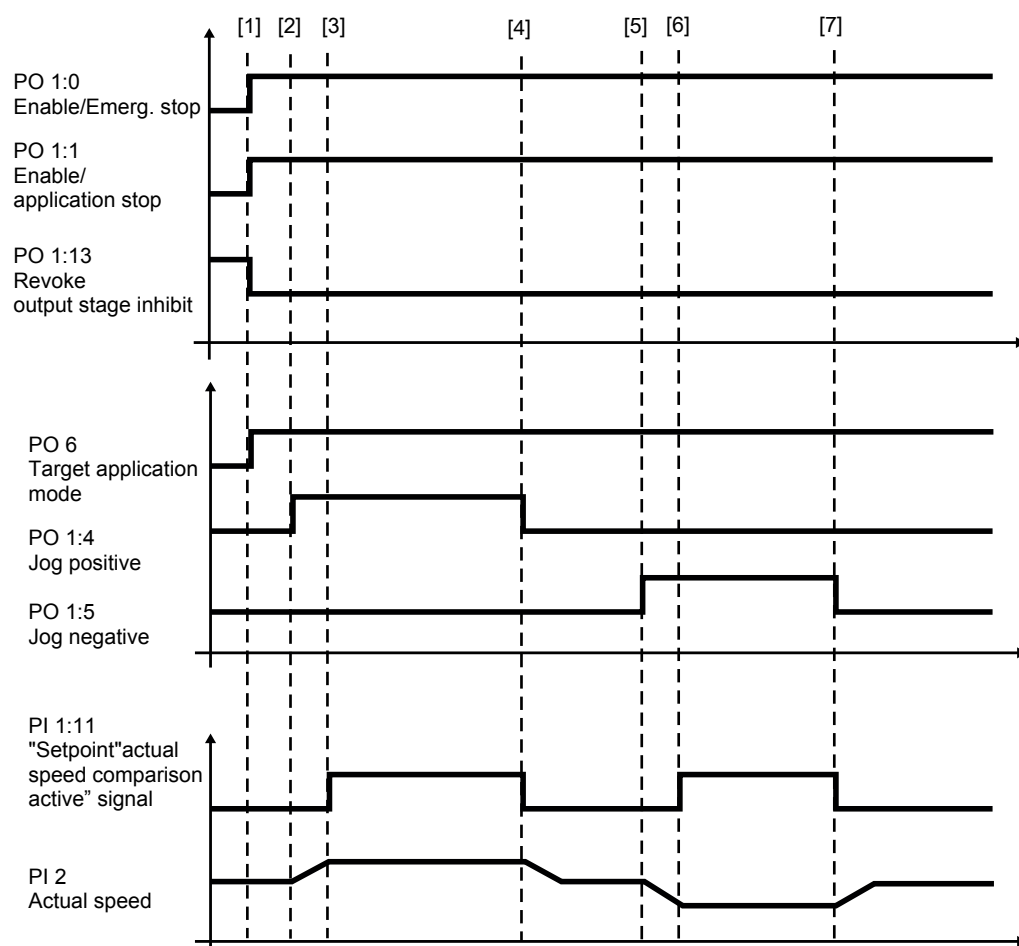
9007227573018507

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" (→ 🗎 19) 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 enabled • "1": Output stage inhibited (the drive coasts to a stop or the brake is applied)
[1]	"Jog mode" activated	PO 6	100/101 (decimal)
	Dynamics parameters are accepted (also during ongoing movement)	PO 2 PO 3 PO 4	Setpoint speed Acceleration Deceleration
[2] to [4]	Positive jog direction selected	PO 1:4	• "1": The drive accelerates to the setpoint speed specified by means of PO 2 using the value specified by means of PO 3. • "0": Deceleration with the value specified by PO 4. Operating mode 100: The motor is held at speed 0 subject to position control. Operating mode 101: The motor is held at speed 0 subject to speed control. For motors without encoder, the "Stop by setpoint function" (→ 🗎 21) must be used.

No.	Sequence	PD	Signal states
[5] to [7]	Negative jog direction selected	PO 1:5	• "1": The drive accelerates to the setpoint speed specified by means of PO 2 using the value specified by means of PO 3. • "0": Deceleration with the value specified by PO 4. Operating mode 100: The motor is held at speed 0 subject to position control. Operating mode 101: The motor is held at speed 0 subject to speed control. For motors without encoder, the "Stop by setpoint function" (→ 🖹 21) must be used.
[3] to [4] and [6] to [7]	If the actual speed lies within the configured window width, the feedback "Setpoint/actual speed comparison active" is issued.	PI 1:11	• "1": "Setpoint/actual speed comparison active"

6.1.4 Speed control

An axis is moved in a speed-controlled manner with or without encoder feedback. The direction depends on the sign of the speed setpoint. A positive setpoint corresponds to a positive motor direction of rotation.

INFORMATION

ℹ️

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

Use hardware limit switches to monitor the travel range.

Cycle diagram
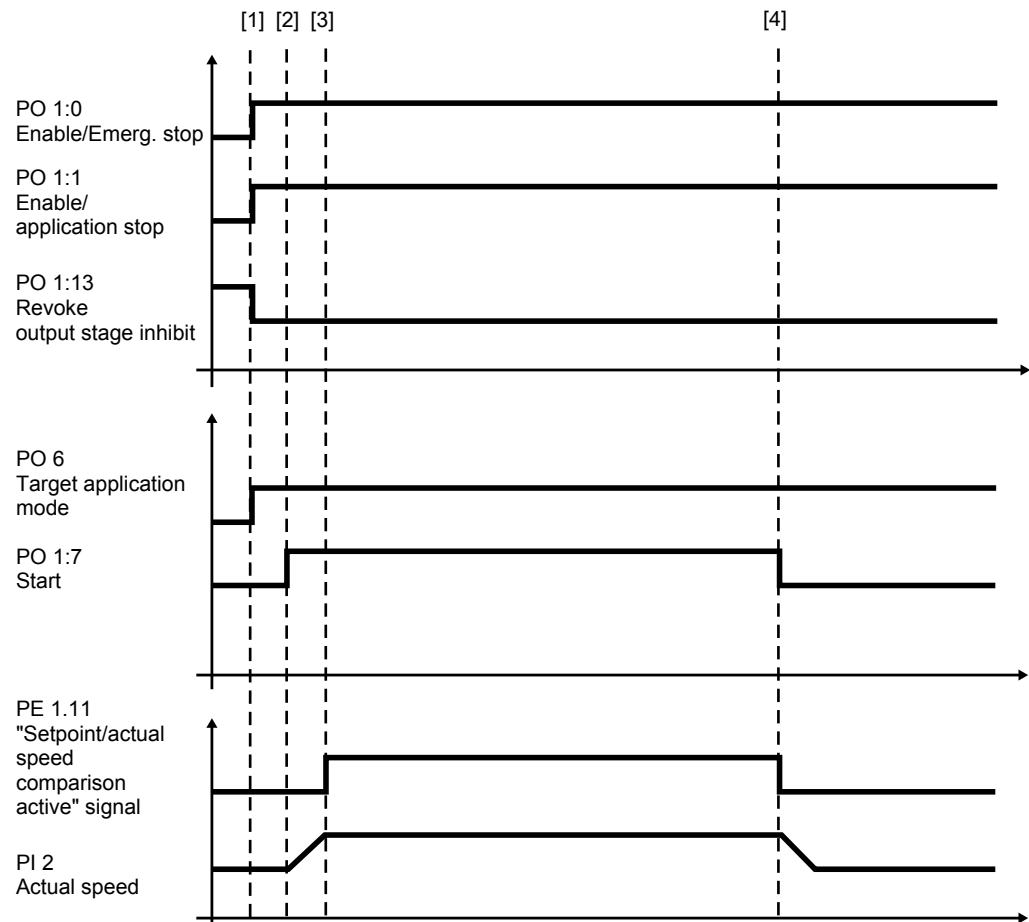
28317944843

Process sequence and signal states
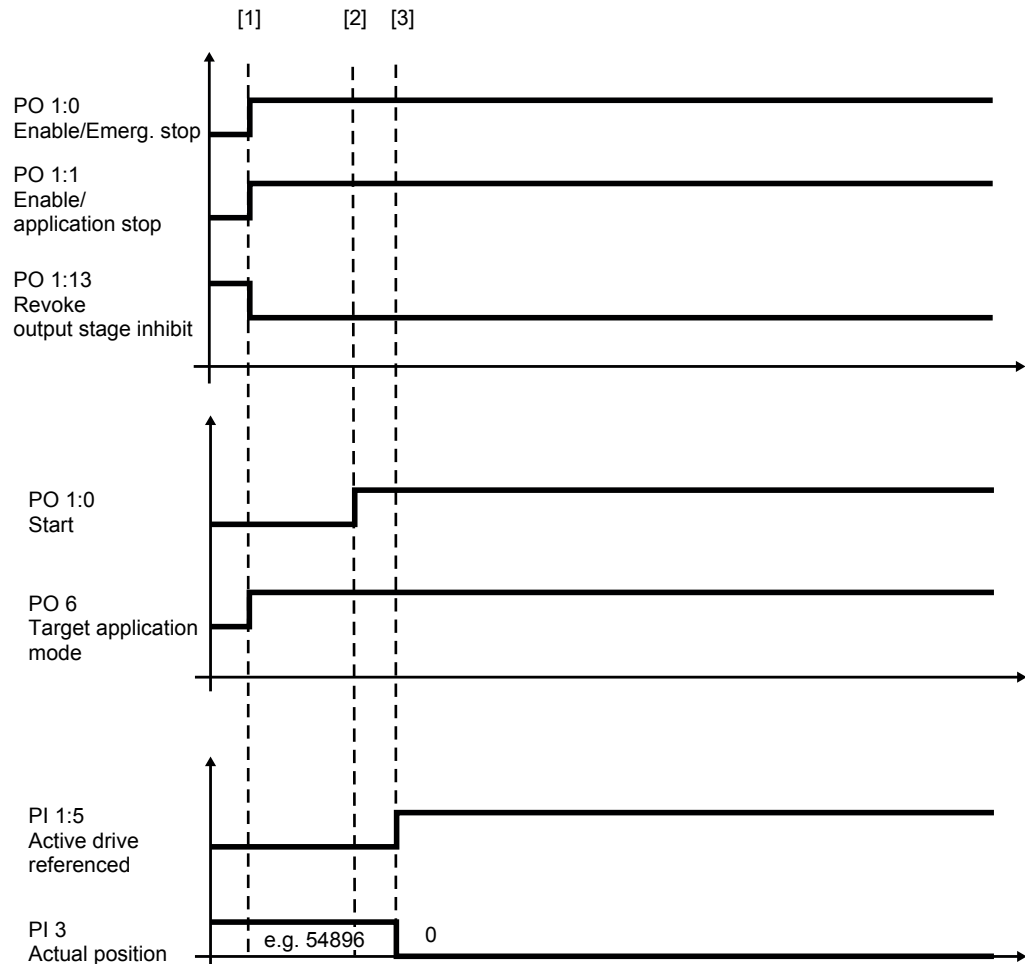
INFORMATION

For the behavior of the drive at an idle state, refer to the information in the chapter "Control functions" (→ 🖹 19) 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 enabled • "1": Output stage inhibited (the drive coasts to a stop or the brake is applied)
[1]	Dynamics parameters are accepted (also during ongoing movement)	PO 2 PO 3 PO 4	Setpoint speed (signed) Acceleration Deceleration
[2] to [4]	Start/stop of the axis	PO 1:7	• "1": The drive accelerates to the setpoint speed specified by means of PO 2 using the value specified by means of PO 3. • "0": Deceleration with the value specified by PO 4. Standstill behavior: The motor is held at speed 0 subject to speed control. For motors without encoder, the "Stop by setpoint function" (→ 🖹 21) must be used.
[3] to [4]	If the actual speed lies within the configured window width, the feedback "Setpoint/actual speed comparison active" is issued.	PI 1:11	• "1": "Setpoint/actual speed comparison active"

6.1.5 Referencing mode

Setting of the actual position dependent on the selected reference travel type (300 – Offset via parameter, 301 – Offset via fieldbus) to the specified reference offset. In referencing mode with offset via fieldbus, the reference offset is specified via PO7/PO8.

Cycle diagram (type – referencing without reference travel)

28318269963

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" (→ 🗎 19) 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 enabled • "1": Output stage inhibited (the drive coasts to a stop or the brake is applied)
[1]	"Referencing mode" is activated	PO 6	300/301 (decimal)
[2]	Start/stop of reference travel	PO 1:7	• "1": Reference travel start • "0": Stop with drive function FCB 14 Emergency stop. Deceleration with the value specified by PO 4.
[3]	Message "Active drive referenced"	PI 1:5	• "1": "Active drive referenced"

6.1.6 Absolute positioning mode

Absolute positioning (400) of an axis with reference to machine zero (reference point). The setpoint position is processed with sign.

- "Linear" axis type: Setpoint position with processing of signs
- "Modulo" axis type: Setpoint position = modulo min. ≤ target position < modulo max.

  NOTICE!
  The specified setpoint position should be smaller than modulo max.

Cycle diagram (type of application – linear axis)

28317949195

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" (→ 🖹 19) under "Stop functions".

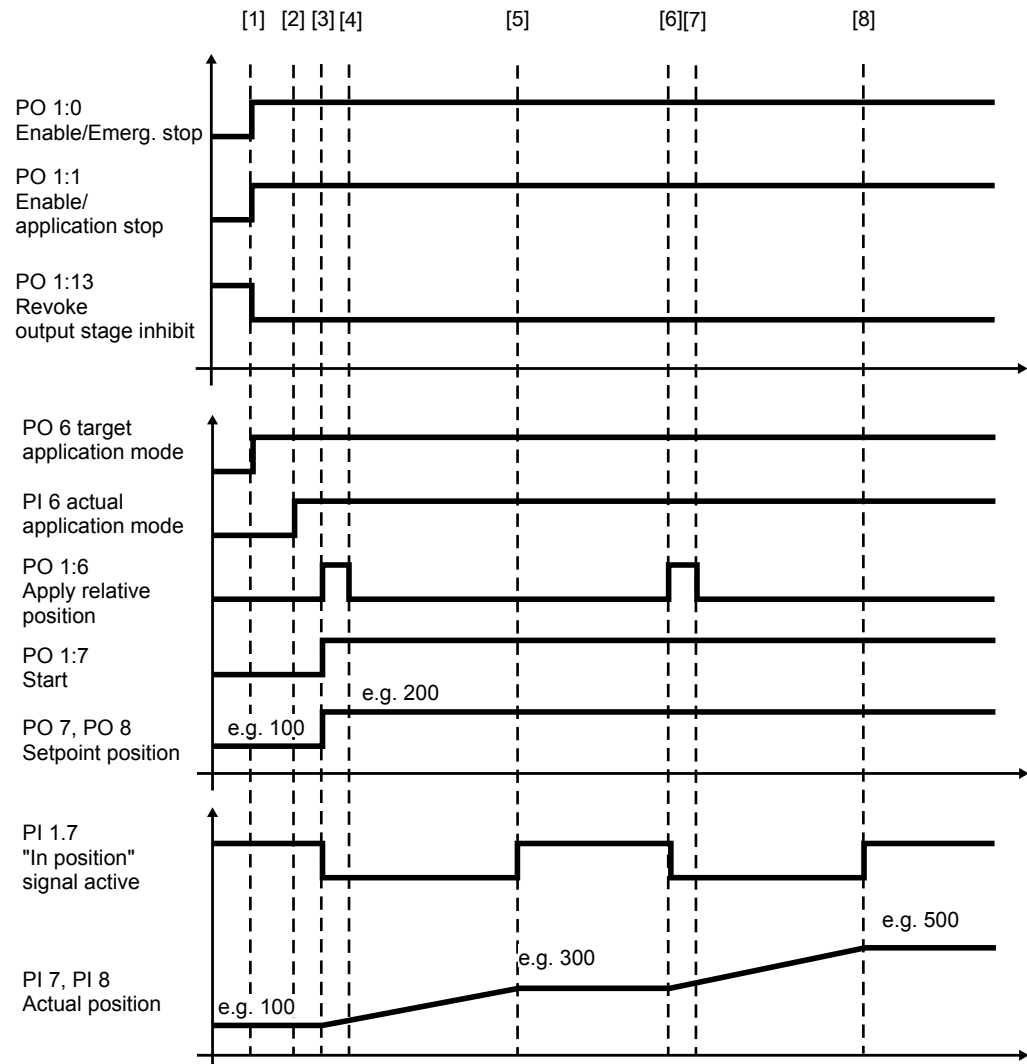| No.	Sequence	PD	Signal states
[1] General enable	• PO 1:0 = "1" Enable/emergency stop	PO 1:0	• "1": Enable • "0": Deceleration with emergency stop ramp
	• PO 1:1 = "1" Enable/application stop	PO 1:1	• "1": Enable • "0": Deceleration according to application limit
	• PO 1:13 = "0" Output stage inhibit (signal with highest priority)	PO 1:13	• "0": Output stage enabled • "1": Output stage inhibited (the drive coasts to a stop or the brake is applied).
[1]	"Absolute positioning mode" is activated	PO 6	400 (decimal)
	Dynamics parameters are accepted (also during ongoing movement)	PO 2 PO 3 PO 4	Setpoint speed Acceleration Deceleration
[1] to [3] and from [4]	Start/stop of the axis	PO 1:7	• "1": The drive accelerates to the setpoint speed specified by means of PO 2 using the value specified by means of PO 3. • "0": The motor is held at speed 0 subject to position control.
[2]	Specification of the setpoint position (a new setpoint position is also adopted during ongoing movement)	PO 7 PO 8	"Setpoint position" (high word) "Setpoint position" (low word)
Up to [2] and from [5]	If the actual position lies within the configured window width, the feedback "In position" is issued. The drive stops subject to position control.	PI 1:7	• "1": "In position" signal active.

6.1.7 Relative positioning mode

Positioning of a drive relative to the current position (401).

Example: Cycle mode at a conveyor belt.

- "Linear" axis type: Setpoint position with processing of signs
- "Modulo" axis type: Setpoint position = modulo min. ≤ target position < modulo max.

Cycle diagram (type of application – linear axis)

32423499275

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" (→ 📄 19) under "Stop functions".

No.	Procedure	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 enabled • "1": Output stage inhibited (the drive coasts to a stop or the brake is applied).
[1]	"Relative positioning mode" is activated	PO 6	401 (decimal)
[2]	Feedback: Operating mode "active"	PI 6	401 (decimal)
[3]	Dynamics parameters are accepted (also during ongoing movement)	PO 2 PO 3 PO 4	Setpoint speed Acceleration Deceleration
[3]	Start/stop of the axis. If the "Start" signal is revoked during movement to the first target, the drive is stopped and continues to move to the original target if this signal is set again.	PI 1:7	• "1": Acceleration to the setpoint speed specified via PO 2 using the value specified via PO 3. • "0": The drive is held at speed 0 subject to position control.
[3]	Specification of the distance (relative position)	PO 7 PO 8	"Setpoint position" (high word) "Setpoint position" (low word)
[3] to [4] and [6] to [7]	Apply relative position **Information:** The relative position is calculated once with the rising edge of the signal, and is saved. With the next positive edge (also during movement to the first target), the travel section can be extended or shortened by the specified relative position.	PO 1:6	• "1": Apply relative position

No.	Procedure	PD	Signal states
Up to [3], [5] to [6] and from [8]	If the actual position lies within the configured window width, the feedback "In position" is issued. The drive stops subject to position control.	PI 1:7	• "1": "In position" signal active

INFORMATION

If the motion sequence is interrupted by revoking the enable signals PO1:0, PO1:1 or PO1:13, the movement must be restarted by setting "Accept relative position". The target position is recalculated and saved, i.e. the drive moves to a different target position than originally desired. If the movement is not to be aborted but only interrupted (while retaining the original target position), the drive can be stopped by removing the PO 1:7 "Start/Stop" signal.

6.1.8 Modulo positive positioning mode

Absolute positioning (402) of a drive with reference to the modulo travel range. The modulo travel strategy is "positive".

"Modulo" axis type: Setpoint position = modulo min. ≤ target position < modulo max.

NOTICE!
The specified setpoint position should be smaller than modulo max.

Cycle diagram
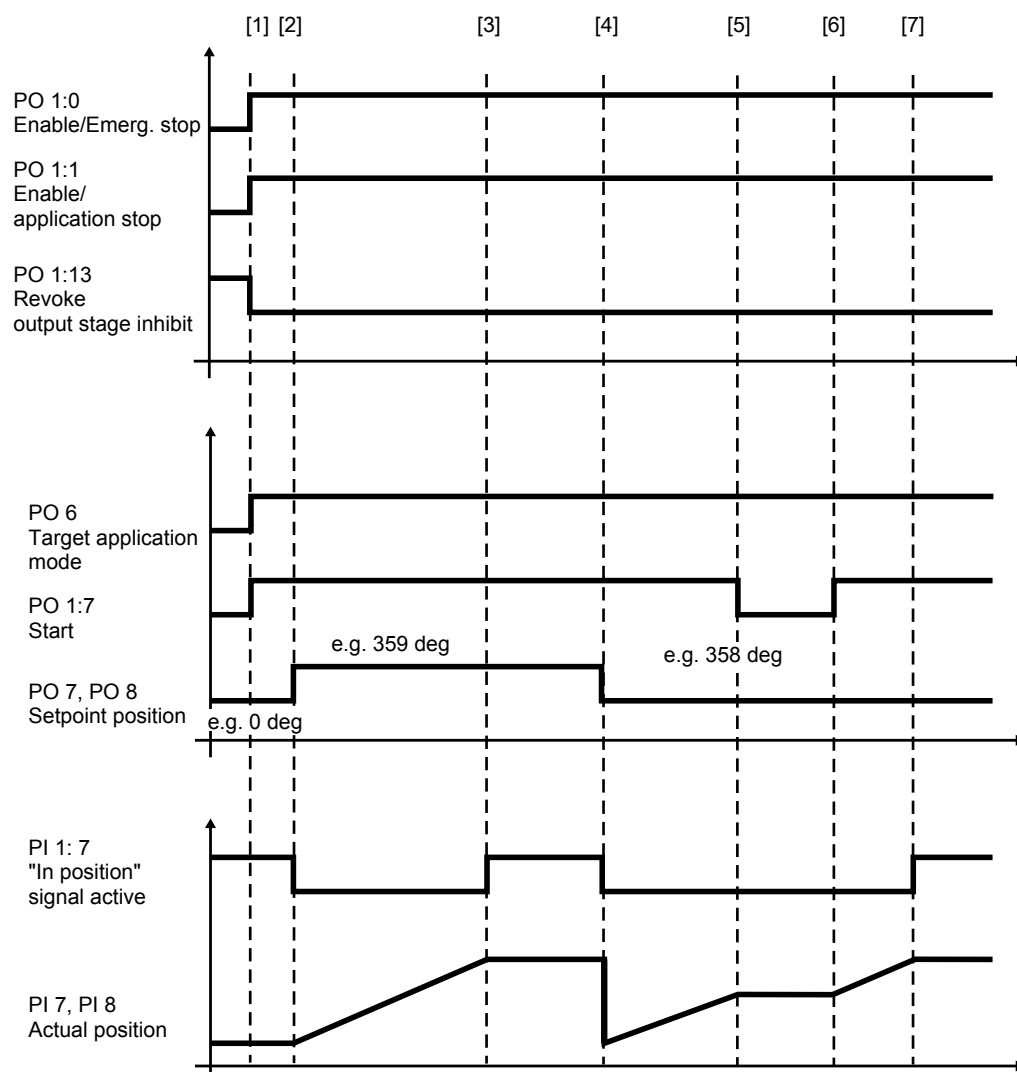
28318262795

Process sequence and signal states

INFORMATION

ℹ️ For the behavior of the drive at an idle state, refer to the information in the chapter "Control functions" (→ 📄 19) 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 enabled • "1": Output stage inhibited (the drive coasts to a stop or the brake is applied).
[1]	"Modulo positive positioning mode" is activated.	PO 6	402 (decimal)
	Dynamics parameters are accepted (also during ongoing movement)	PO 2 PO 3 PO 4	Setpoint speed Acceleration Deceleration
[1] to [5] and from [6]	Start/stop of the axis	PO 1:7	• "1": The drive accelerates to the setpoint speed specified by means of PO 2 using the value specified by means of PO 3. • "0": The motor is held at speed 0 subject to position control.
[2], [4]	Specification of the setpoint position (a new setpoint position is also adopted during ongoing movement)	PO 7 PO 8	"Setpoint position" (high word) "Setpoint position" (low word)
Up to [2], [3] to [4] and from [7]	If the actual position lies within the configured window width, the feedback "In position" is issued. The drive stops subject to position control.	PI 1:7	• "1": "In position" signal active

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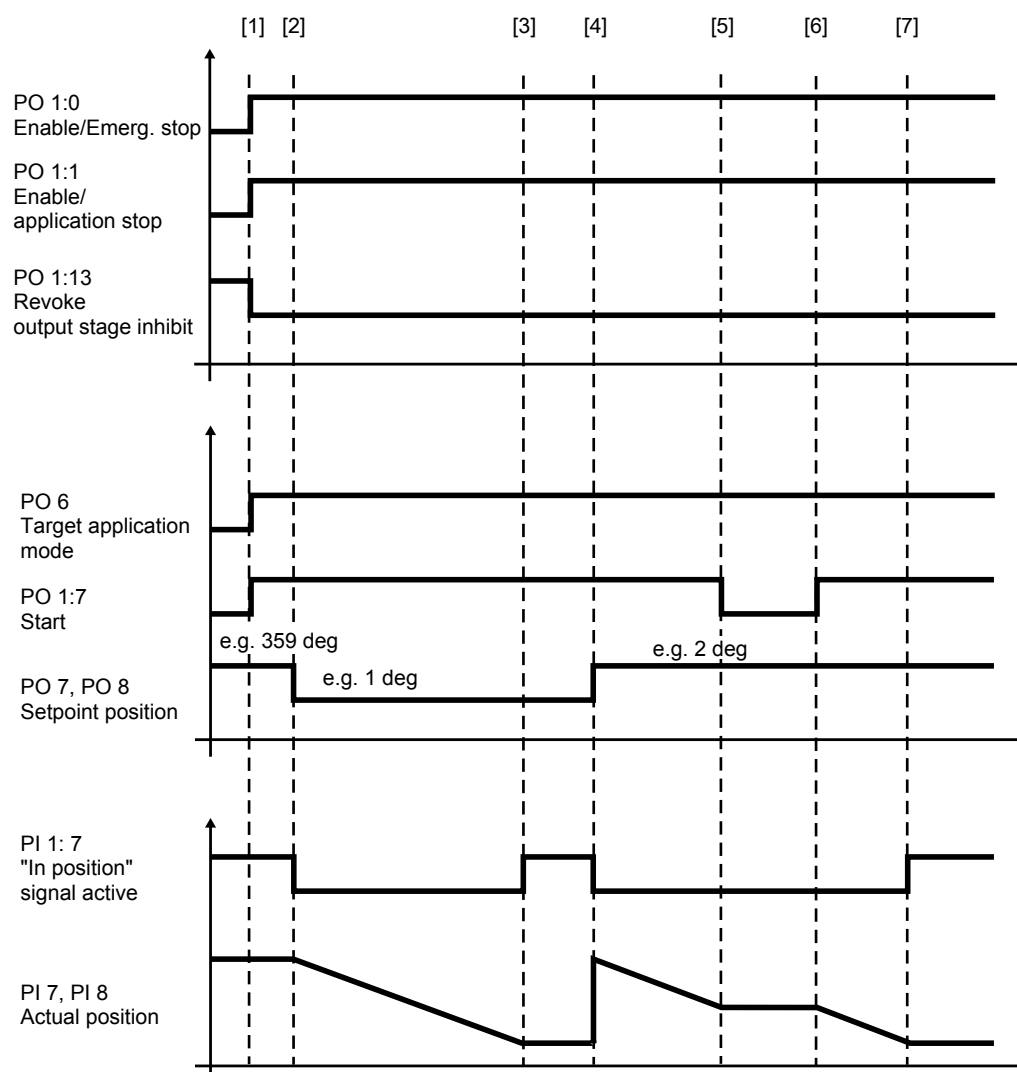### 6.1.9 Modulo negative positioning mode

Absolute positioning (403) of a drive with reference to the modulo travel range. The modulo travel strategy is "negative".

"Modulo" axis type: Setpoint position = modulo min. ≤ target position < modulo max.

NOTICE!
The specified setpoint position should be smaller than modulo max.

Cycle diagram

28318291979

Process sequence and signal states

INFORMATION

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For the behavior of the drive at an idle state, refer to the information in the chapter "Control functions" (→ 🖹 19) 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 enabled • "1": Output stage inhibited (the drive coasts to a stop or the brake is applied).
[1]	"Modulo negative positioning mode" is activated.	PO 6	403 (decimal)
	Dynamics parameters are accepted (also during ongoing movement)	PO 2 PO 3 PO 4	Setpoint speed Acceleration Deceleration
[1] to [5] and from [6]	Start/stop of the axis	PO 1:7	• "1": The drive accelerates to the setpoint speed specified by means of PO 2 using the value specified by means of PO 3. • "0": The motor is held at speed 0 subject to position control.
[2] and [4]	Specification of the setpoint position (a new setpoint position is also adopted during ongoing movement)	PO 7 PO 8	"Setpoint position" (high word) "Setpoint position" (low word)
Up to [2], [3] to [4] and from [7]	If the actual position lies within the configured window width, the feedback "In position" is issued. The drive stops subject to position control.	PI 1:7	• "1": "In position" signal active

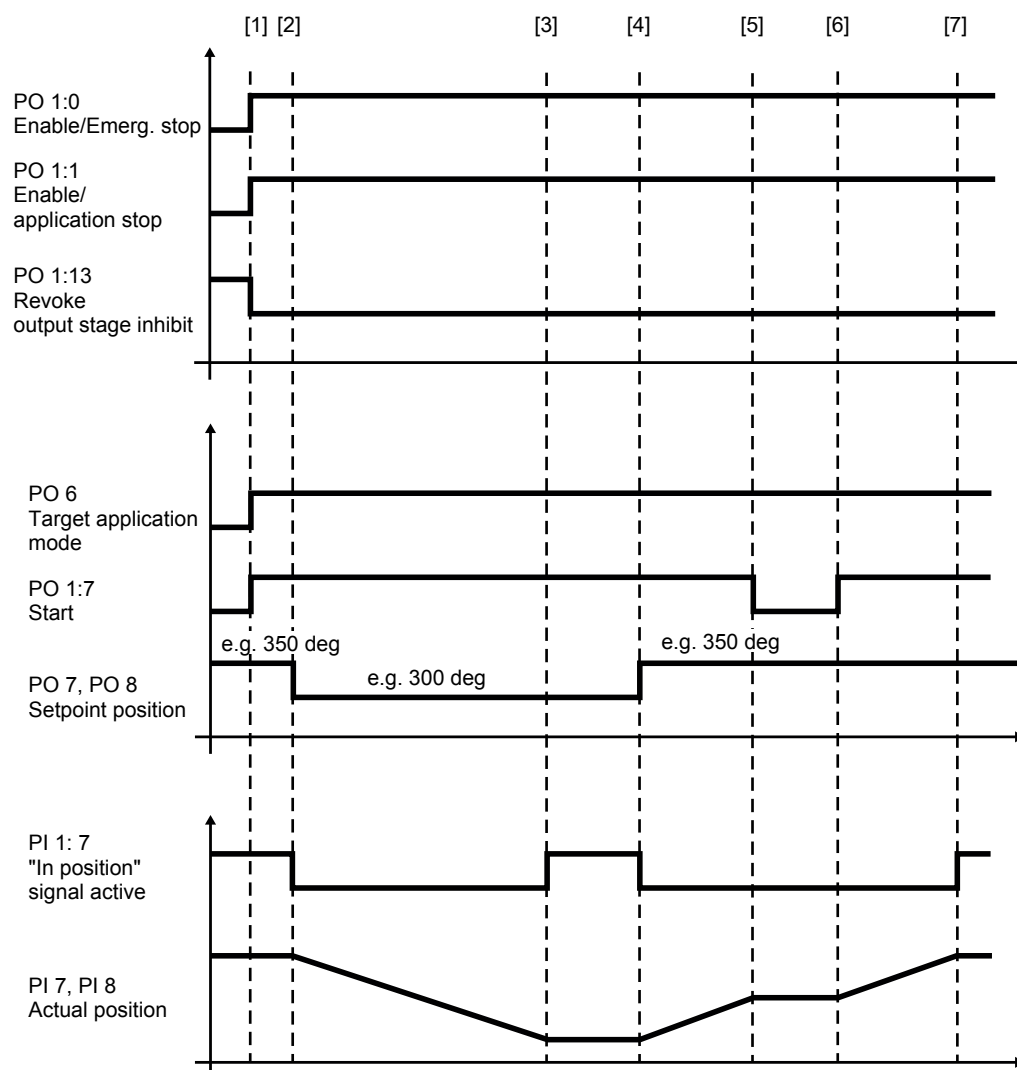### 6.1.10 Modulo positioning mode – optimized direction

Absolute positioning (404) of a drive with reference to the modulo travel range. The modulo travel strategy is "shortest distance".

"Modulo" axis type: Setpoint position = modulo min. ≤ target position < modulo max.

NOTICE!
The specified setpoint position should be smaller than modulo max.

Cycle diagram

28318403467

Process sequence and signal states

INFORMATION

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For the behavior of the drive at an idle state, refer to the information in the chapter "Control functions" (→ 🖹 19) under "Stop functions".

INFORMATION

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The direction of rotation in this operating mode results from the distance to the target position.

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 enabled • "1": Output stage inhibited (the drive coasts to a stop or the brake is applied).
[1]	"Modulo positioning shortest distance" is activated.	PO 6	404 (decimal)
	Dynamics parameters are accepted (also during ongoing movement)	PO 2 PO 3 PO 4	Setpoint speed Acceleration Deceleration
[1] to [5] and from [6]	Start/stop of the axis	PO 1:7	• "1": The drive accelerates to the setpoint speed specified by means of PO 2 using the value specified by means of PO 3. • "0": The motor is held at speed 0 subject to position control.
[2] and [4]	Specification of the setpoint position (a new setpoint position is also adopted during ongoing movement)	PO 7 PO 8	"Setpoint position" (high word) "Setpoint position" (low word)
Up to [2], [3] to [4] and from [7]	If the actual position lies within the configured window width, the feedback "In position" is issued. The drive stops subject to position control.	PI 1:7	• "1": "In position" signal active

6.1.11 Absolute positioning touchprobe

INFORMATION

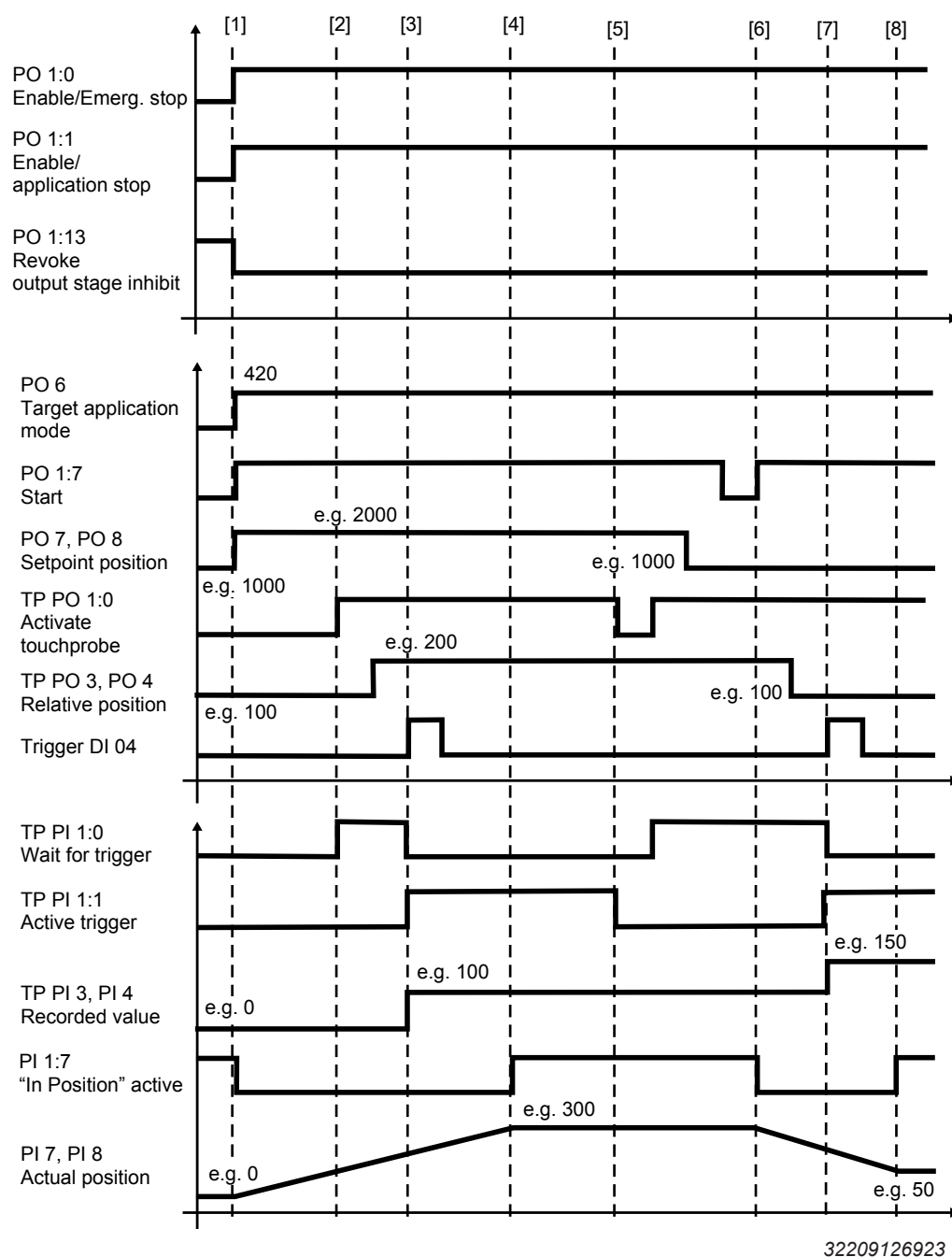ℹ️ Only included if the function is activated in the "Basic settings" configuration menu under "Functions used".

Absolute positioning of an axis to machine zero or relative positioning of an axis to the actual position (420). The relative position is processed as an amount and accepted when the additional function "Touchprobe 1" (→ 🖺 52) and a trigger event are activated.

Cycle diagram

32209126923

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" (→ 🖹 19) under "Stop functions".

No.	Procedure	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 enabled • "1": Output stage inhibited (the drive coasts to a stop or the brake is applied).
[1]	"Positioning mode Touchprobe" operating mode is activated	PO 6	420 (decimal)
	Dynamics parameters are accepted (also during ongoing movement)	PO 2 PO 3 PO 4	Setpoint speed Acceleration Deceleration
[1]	Start/stop of the axis Depending on whether the additional function "Touchprobe" is activated and whether a trigger is recognized, there are different case distinctions. See also "Case distinction" (→ 🖹 50).	PO 1:7	• "1": The drive accelerates to the setpoint speed specified via PO 2 using the value specified via PO 3. • "0": The motor is held at speed "0" subject to position control.
[2]	Activate touchprobe Upon activation, the acknowledgment "Wait for trigger" (TP PI 0:0) is set.	TP PO 1:0	• "0": No trigger event is evaluated • "1": The system waits for a trigger event.
[2] to [3]	Setpoint relative position Acceptance also during travel and after reaching the target position	TP PO 3 PO 4	"Relative position" (high word) "Relative position" (low word)

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No.	Procedure	PD	Signal states
[3] to [4] and from [7]	Trigger When the trigger has occurred, the new target position results from the actual position at the trigger time (recorded value) and the relative position specified via TP PO 3, PO 4. The amount of the relative position is added if the direction of travel is positive and subtracted if the direction of travel is negative. The feedback "Trigger active" (TP PI 1:1) is set, and the trigger counter is increased by 1 (TP PI 2). The detected relative position is output via TP PI 3, PI 4.		The acquisition of the trigger signal is set in the configuration.
[5] to [6]	To move to a new setpoint position after a trigger event has occurred, "Activate Touchprobe" must first be set to "0" and then back to "1" and then "Start" must have a rising edge.		
Up to [1], [4] to [6] and from [8]	If the actual position lies within the configured window width, the feedback "In position" is issued. The drive stops subject to position control.	PI 1:7	• "1": "In position" signal active

Case distinction

Prerequisite: "Absolute positioning touchprobe (420)" operating mode is selected.

Case 1: Touchprobe not activated (TP PO 0:0)

If the "Start" signal (PO 1:7) is canceled during travel to the destination, the drive is stopped and continues to travel to the setpoint position (PO 7, PO8) when this signal is set again.

Case 2: Touchprobe activated (TP PO 1:0), no trigger detected (TP PI 1:2)

If the "Start" signal (PO 1:7) is canceled during travel to the destination, the drive is stopped and continues to travel to the setpoint position (PO 7, PO8) when this signal is set again. When the setpoint position is reached, the feedback "No trigger detected" (TP PI 1:2) is set.

Case 3: Touchprobe activated (TP PO 1:0), trigger active (TP PI 1:1)

If the "Start" signal (PO 1:7) is canceled during travel to the destination, the drive is stopped and continues to travel to the setpoint position (PO 7, PO8) when this signal is set again. When the trigger has occurred, the new target position results from the actual position at the trigger time (recorded value) and the relative position specified (TP PO 3, PO 4). The amount of the relative position (TP PO 3, PO 4) is added if the direction of travel is positive and subtracted if the direction of travel is negative. The acknowledgment "Trigger active" (TP PI 1:1) is set.

6.2 Additional functions

The additional functions are activated in the "Basic settings" (→ 🕮 17) configuration menu in the "Functions used" section.

6.2.1 Variable jerk time

The additional function allows you to set the jerk time. For fieldbus operation, the process data length is extended by one process data word.

> **⚠ WARNING**
>
> Unexpected system behavior by changing the jerk time during deceleration. If the jerk is reduced (increase jerk time) during deceleration, the target position might be overrun.
>
> Death, severe injuries or damage to property can occur.
>
> • Change the jerk or jerk time only when the machine is at a standstill.

For the states listed below, the preset jerk time has no effect. In these cases, the **"Jerk time" of the inverter** configured under "Application limits" in the "Limit values" (→ 🕮 18) submenu of the "Monitoring functions" configuration menu is effective.

• When selecting the default mode (value "0")
• When the "Enable/application stop" signal is removed (FCB 13)
• When the "Enable/emergency stop" signal is removed (FCB 14)
• With an active fault response (FCB 13 or FCB 14)

6.2.2 Parameter channel via process data

Additional function for reading or writing device parameters. The writing of device parameters is volatile, i.e. the data are not stored in a power-failure-proof manner.

6.2.3 Touchprobe 1

The additional function "Touchprobe 1" enables the evaluation of a trigger event independent of the operating mode. If the additional function is activated, it is possible in the "Absolute positioning touchprobe" (→ 🗎 47) operating mode to position a target relative to the actual position during a trigger event. For fieldbus operation, the process data length is extended by four process data words.

Cycle diagram
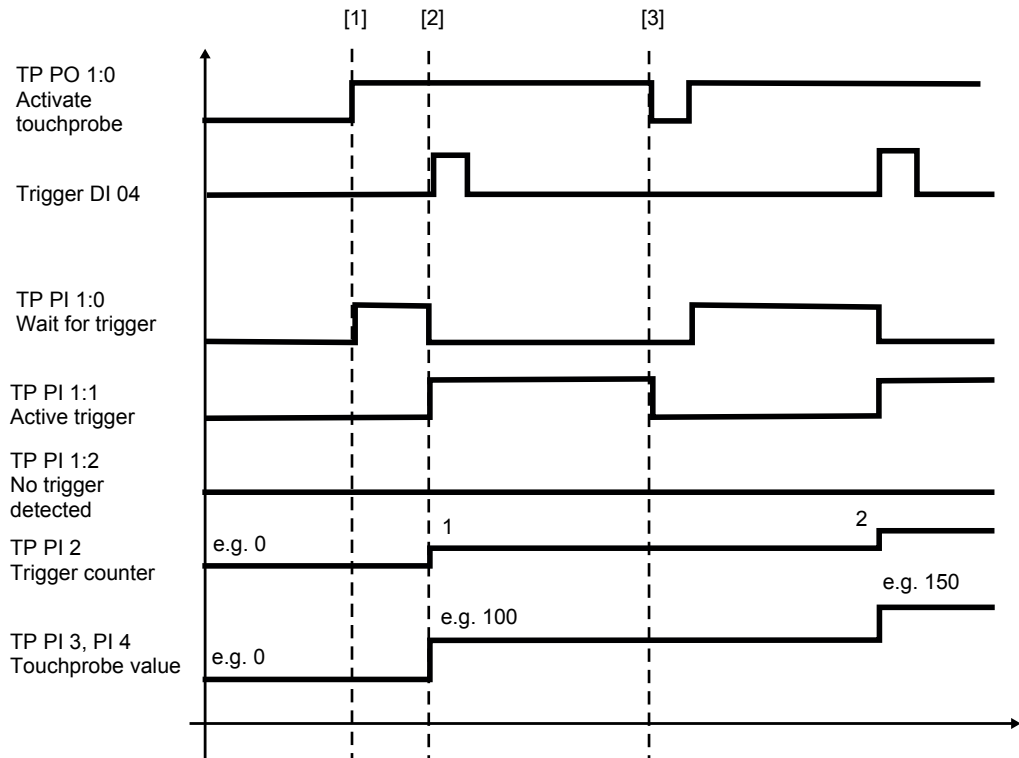
32209366027

Process sequence and signal states

No.	Procedure	PD	Signal states
[1]	Activate touchprobe Upon activation, the acknowledgment "Wait for trigger" (TP PI 1:0) is set.	TP PO 1:0	"0": No trigger event is evaluated "1": The system waits for a trigger event.
[2]	Trigger The feedback "Trigger active" (TP PI 1:1) is set and the trigger counter is increased by one (TP PI 2). The detected relative position is output via TP PI 3 and PI 4.		The acquisition of the trigger signal is set in the configuration.
[3]	With a positive edge at "Activate Touchprobe" TP PO 1:0, the Touchprobe function is prepared for a new trigger event.	TP PO 1:0	

6.3 Other functions

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

6.3.1 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).
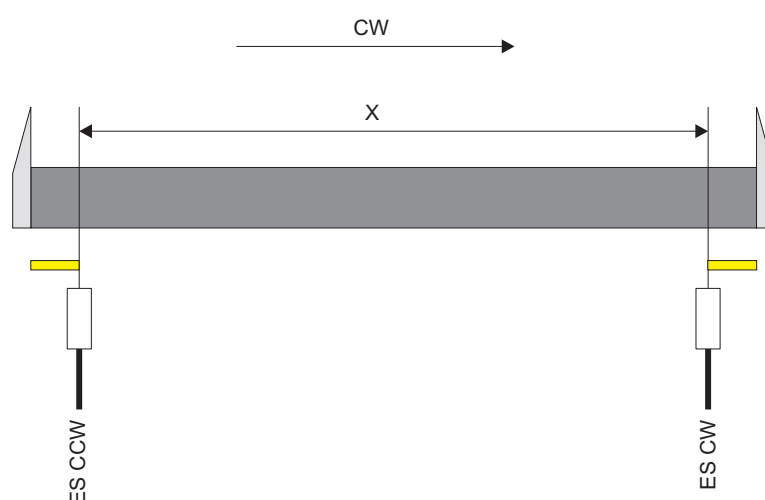
28303016587

[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).

6.3.2   Software limit switches

i

INFORMATION

This function is only available when using MOVIKIT® Positioning Drive.

Software limit switches are used to limit the travel range of an axis. Monitoring of the software limit switches can be activated and configured in the configuration menu of the software module during startup. See the chapter "Monitoring functions" (→ 🖺 18). The drive must be referenced to allow for monitoring the software limit switches.

If software limit switch monitoring is enabled, the following response will be triggered depending on the active operating mode as soon as the configured negative or positive limit switch is exceeded:

- Jog mode, position controlled (100)

  The drive stops at the software limit switch position using the deceleration specified via PO 4. If "Limit switch fault response" is enabled, the fault message E30.01/02 "Positive/negative limit switch hit" is issued.

- Jog mode, speed controlled (101) and with speed setpoint (200)

  The drive stops along the configured emergency stop ramp if the respective "Limit switch fault response" is activated. The fault message E30.01/02 "Positive/negative limit switch hit" is issued.

- Positioning mode (400-404)

  If a target position is specified that lies beyond the position of a limit switch, no travel job will be performed when the motor is at standstill. Else the drive stops with the deceleration set for the application limits. The fault message E19.02 "Position setpoint violation" is issued.

Fault messages can be reset using PO 1.8 "Fault reset". First specify a direction of rotation or a target position in the direction of the valid range of the software limit switches. If you want to move the drive outside the range limited by the software limit switches, you have to disable the software limit switches using the PO 1:12 signal.

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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.

INFORMATION

The "V/P" column indicates whether the respective process data word or bit is only available when using MOVIKIT® Positioning Drive (P) or whether it is also available when using MOVIKIT® Velocity Drive (V/P).

Word		Bit	V/P	Function
PO 1	Control word	0	V/P	Enable/emergency stop
		1	V/P	Enable/application stop
		2	V/P	Reserved
		3	V/P	Brake release (without enable)
		4	P	Jog positive
		5	P	Jog negative
		6	P	Accept relative position
		7	V/P	Start/stop with fieldbus ramp
		8	V/P	Fault reset
		9	V/P	Reserved
		10	V/P	Activate drive train 2
		11	V/P	Reserved
		12	P	Disable software limit switches
		13	V/P	Activate output stage enable
		14	V/P	Activate standby mode
		15	V/P	MOVIKIT® handshake in
PO 2	Setpoint speed	0 – 15	V/P	User unit
PO 3	Setpoint acceleration	0 – 15	V/P	User unit
PO 4	Setpoint deceleration	0 – 15	V/P	User unit
PO 5	Digital outputs	0	V/P	DO 00 / DIO 01 (output)
	For control via process data, see chapter "Digital inputs/out-puts" (→ 🗎 63)	1	V/P	DO 01 / DIO 02 (output)
		...	V/P	...
		3	V/P	DO 03
		...	V/P	...
PO 6	Target application mode	0 – 15	P	Operating mode. See chapter "Overview of operating modes" (→ 🗎 27).
PO 7	Target position high word	0 – 15	P	User unit
PO 8	Target position low word	0 – 15	P	User unit

7.1.1 Control word

INFORMATION

ℹ️ For the behavior of the drive at an idle state, refer to the information in the chapter "Control functions" (→ 📄 19).

Bit	Function	PD	V/P	Description
0	Enable/emergency stop	PO 1.0	V/P	• "1": Enable • "0": Stop with drive function FCB 14 (emergency stop).
1	Enable/application stop	PO 1.1	V/P	• "1": Enable • "0": Stop with drive function FCB 13 (stop at application limits).
2	Reserved	PO 1.2	V/P	-
3	Release brake (without enable)	PO 1.3	V/P	If required, activate this function using parameter 8501.2 (Release brake/DynaStop® with FCB 01 – enable).
4	Jog positive	PO 1.4	P	Signal for moving the drive in positive direction in jog mode.
5	Jog negative	PO 1.5	P	Signal for moving the drive in negative direction in jog mode.
6	Apply relative position	PO 1.6	P	Apply relative target position in relative positioning mode (401). This signal is ineffective for all the other operating modes.
7	Start/stop with fieldbus ramp	PO 1.7	V/P	• "1": Start – movement enabled in all operating modes except for jog mode. In referencing mode, "Start" is also needed for referencing without reference travel. • "0": Referencing mode Stop with FCB 14 (emergency stop) "0": Other operating modes Deceleration to speed 0 using the value specified via PO 4. Standstill behavior: The motor is held at speed 0 subject to speed control or position control depending on the operating mode. For motors without encoder, the "Stop by setpoint function" (→ 📄 21) must be used.
8	Fault reset	PO 1.8	V/P	Reset of fault messages with the positive edge of the signal.
9	Reserved	PO 1.9	V/P	-

Bit	Function	PD	V/P	Description
10	Activate drive train 2	PO 1.10	V/P	• "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	V/P	-
12	Disable SW limit switches	PO 1.12	P	If software limit switches are activated and configured in the configuration ... • "0": Monitoring of software limit switches enabled. • "1": Monitoring of software limit switches disabled.
13	Activate output stage inhibit	PO 1.13	V/P	• "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	V/P	• "1" Standby mode activated. • "0" Standby mode not activated. Standby mode can be activated only when the output stage is inhibited.
15	MOVIKIT® Handshake In	PO 1.15	V/P	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.

7.1.2 Additional functions

i

INFORMATION

The number of previously configured process data must be added to the specified process data word number.

Variable jerk time

⚠ WARNING

Unexpected system behavior by changing the jerk time during deceleration. If the jerk is reduced (increase jerk time) during deceleration, the target position might be overrun.

Death, severe injuries or damage to property can occur.

- Change the jerk or jerk time only when the machine is at a standstill.

Word		Bit	Function
PO 1	Setpoint jerk time		Specified jerk time in [ms]

Parameter channel via process data

Word		Bit	Function
PO 1	Control word	8	Select "write" service
		9	Select "read" service
		14	Execute function (rising edge)
PO 2	Index		Index of the parameter to be read or write
PO 3	Offset	0-7	Offset of the parameter to be read or write
	Subindex	8-15	Subindex of the parameter to be read or write
PO 4/5	Value		Value to be written

Touchprobe 1

Word		Bit	Function
PO 1	Control word	0	Activates the function
PO 2	Reserved	0-15	
PO 3	High-word relative position	0-15	User unit
PO 4	Low-word relative position	0-15	User unit

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7.2 Process input data

The following table shows the process input data from the inverter to the PLC for control via fieldbus with 8 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
		4	"1": Motor running (motor standstill active)
		5	"1": Active drive referenced
		6	"1": New relative position applied
		7	"1": "In position" signal active
		8	"1": Fault
		9	"1": Warning

"Warning" can be defined as a response for certain faults. If a warning is signaled, both bit PI 1.9 and the associated fault code are indicated in PI 3. If a warning and a fault are active at the same time, only bit PI 1.8 is set and the respective fault code is indicated in PI 3. |
		10	"1": Drive train 2 active
		11	"1": "Setpoint/actual speed comparison active" signal
		12	"1": Software limit switches inactive
		13	"1": Reserved
		14	"1": Standby mode active
		15	MOVIKIT® Handshake Out (for details, see MOVIKIT® Handshake In)
PI 2	Actual speed	0 – 15	User unit
PI 3	Status

Fault subfault | 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

(High byte: fault; Low byte: subfault)

For more information, refer to the product manual of the respective device. |
| PI 4 | 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: 0.01 A) |

Word		Bit	Function
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" (→ 🖹 27).
PI 7	Actual position (high word)	0 – 15	User unit
PI 8	Actual position (low word)	0 – 15	User unit

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 parameterized 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.
...	...	...	...
12	SW limit switches Inactive	PI 1:12	This signal is active if software limit switches are activated and configured in the configuration and one of the following conditions is fulfilled: • PO 1:12 is active • Both software limit switches were set to the value "0".

7.2.2 Additional functions

INFORMATION

i

The number of previously configured process data must be added to the specified process data word number.

Variable jerk time

Word		Bit	Function
PI 1	Active jerk time	0-15	Active jerk time in [ms]

Parameter channel via process data

Word		Bit	Function
PI 1	Status word	8	"Write" service selected
		9	"Read" service selected
		13	Service active
		14	Service completed
		15	Service failed
PI 2	Actual index		Selected index
PI 3	Offset	0-7	Selected offset
	Actual subindex	8-15	Selected subindex
PI 4/5	Value		Value read/"Fault code" (→ 🗎 70)

Touchprobe 1

Word		Bit	Function
PI 1	Status word	0	Function activated Waiting for trigger event
		1	Trigger event detected
		2	Maximum position detected
PI 2	Trigger counter	0-15	Increase by 1 for each trigger event
PI 3	High-word detected value	0-15	User unit
PI 4	Low-word detected value	0-15	User unit

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8 Digital inputs/outputs

The digital inputs/digital outputs are assigned in the configuration of the software module in the "Inputs/outputs" (→ 📄 26) menu. The assignment can be configured as required or the predefined default assignment can be used. The fields for making the settings are described in the chapter "Configuring digital inputs/digital outputs" (→ 📄 65).

⚠ 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 Standard assignment of digital inputs

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

MOVIKIT® Velocity Drive

Digital input	Function
DI 00	No function
DI 01	No function
DI 02	No function
DI 03	No function
DI 04	No function
DI 05	No function
DI 06 (with DFC)	No function
DI 07 (with DFC)	No function
DI 08	Maintenance switch
DIO 01	Configured as input, no function
DIO 02	Configured as input, no function

MOVIKIT® Positioning Drive

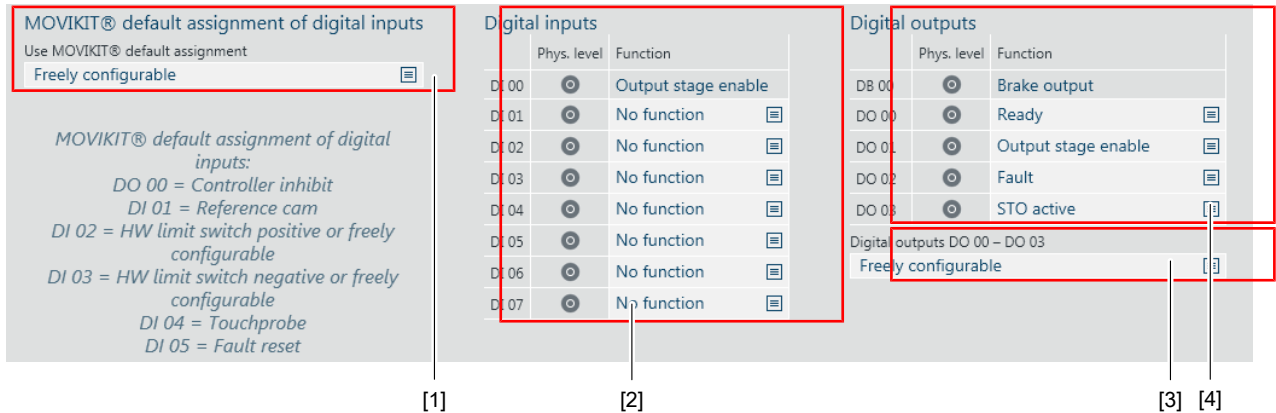| Digital input	Function
DI 00	Output stage enable
DI 01	FCB 12 Reference travel – reference cam
DI 02	No function
DI 03	No function
DI 04	Touchprobe input
DI 05	Fault reset

8.2 Delivery state of digital outputs

In the delivery state, the digital outputs 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

8.3 Configuring digital inputs/digital outputs

For configuring the digital inputs/digital outputs, the following fields are available in the "Inputs/outputs" (→ 🖺 26) menu of the configuration for the software module.

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No.	Description
[1]	Selection of a default assignment for the digital inputs.
	The digital inputs are the image of the input terminals of the connected inverter and are provided by process data word PI 5.
	• Freely configurable – Configure digital inputs 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.
	• Yes, without HW limit switches – Use default assignment for applications without HW limit switches
	• Yes, with HW limit switches – Use default assignment for applications with HW limit switches
	• No function – Do not assign any function to the digital inputs (DI 01 through DI 07)
[2]	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.
[3]	Selection of a default assignment for the digital outputs.
	• Freely configurable – Configure digital outputs as required using the drop-down lists under [4].
	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 "Delivery state of digital outputs" (→ 🖺 64).
[4]	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.

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:

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[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

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™

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.

11.2 Fault codes

11.2.1 Parameter channel via process data

ErrorCode		Designation	Description
High word	**Low word**		
01	00	Illegal Type	The data type in the data block header is unknown or is not supported.
02		Illegal Service	Service not supported.
	01		The service code in the service header is unknown or is not supported.
	02		Filter in sequence header not supported.
03	00	Illegal Service Destination	Service destination not available for combination of service and ID.
04	00	Illegal ID	Unknown combination of ID/Sub-ID/Off-set
05	00	Sequence Error	Error while executing the sequence
06		Illegal Device State	The value in the data block is not within the permitted value set
	01		Hardware missing
	02		Parameter lock active
	03		Configuration state required
	04		Initialization in progress
	05		Dataflex in progress
	06		Auto setup active
	07		PLC state
	08		Hash value calculation running
	09		Data download in progress
	0A		Startup state required
	0B		Energy-saving mode active
	0C		Parameter cannot be set when the function is active
	0D		Invalid device state
07		Illegal Value	No permission to execute the requested service
	01		Value too great
	02		Value too small
	03		Invalid value
	04		Maximum value length exceeded

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ErrorCode		Designation	Description
High word	**Low word**		
08		No Permission	Resource not available on server
	01		Read Only
	02		Access denied
	03		Access not possible using this interface
	04		Incompatible parameter set
	05		Incompatible option cards
	06		Inconsistent parameter set
09	01	Ressource Error	Maximum buffer length exceeded
	02		The specified granularity is not supported
	03		Maximum number of error info items exceeded
FF	FF	Internal Error	Internal software error

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