SEW EURODRIVE

Manual

MOVIKIT® MultiMotion AuxiliaryAxes

Edition 11/2018

25876333/EN

Table of contents

25876333/EN – 11/2018

25876333/EN – 11/2018

1 General information

1.1 About this documentation

The documentation is part of the product and contains important information. The documentation is for everyone who works with this product.

The documentation must be accessible and legible. Make sure that persons responsible for the system and its operation as well as persons who work independently with the software and the connected units of SEW-EURODRIVE have read through the manual carefully and understood it. If you are unclear about any of the information in this documentation or if you require further information, please contact SEW-EURODRIVE.

1.2 Content of the documentation

The descriptions in this documentation apply to the current software/firmware version at the time of publication. When new versions of software/firmware are installed, the descriptions may differ. 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.

25876333/EN – 11/2018

Meaning of the hazard symbols

Hazard symbol	Meaning
	General hazard

Hazard symbol	Meaning
	Warning of hot surfaces

Hazard symbol	Meaning
	Warning of automatic restart

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 Right to claim under warranty

A requirement of fault-free operation and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the documentation at hand. Therefore, read the documentation before you start working with the software and the connected devices from SEW-EURODRIVE.

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

1.5 Terms and conditions of use

SEW-EURODRIVE grants the temporarily unrestricted right to use a copy of the software including the corresponding documentation and media (together called "material") according to the detailed terms of use and other contractual agreements.

Updates or extensions to the applicable material that are provided as part of an agreement of transfer of possession or other contract (such as maintenance contract) are also part of the material provided.

25876333/EN – 11/2018

The complete material belongs to SEW-EURODRIVE and is protected by copyright. If no legal exceptions apply, it is expressly forbidden to:

- Reproduce the material temporarily or permanently, in whole or in part, except for the purpose of designated and contractual uses, or for the creation of a legally permitted backup to ensure future use.
- Translate or modify the software, or to reproduce the results achieved.

You are obliged to prevent unauthorized access of third parties to the provided material. SEW-EURODRIVE remains the proprietor of all rights, even if you modify the material or combine it with your own or third party programs.

If detailed terms of use are displayed during the software installation and must be accepted before the software can be used, these also apply in addition to the terms of use described here.

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

Refer to the following other applicable documentation:

- MOVI-C® CONTROLLER manual
- MOVIDRIVE® frequency inverter manual
- Manuals for additional connected devices
- MOVISUITE® engineering software manual
- IEC Editor manual

Always use the latest edition of the documentation and software.

Our documentation is available in various languages for download from the website (www.sew-eurodrive.com). If you are unclear about any of the information in this documentation or if you require further information, consult SEW-EURODRIVE.

25876333/EN – 11/2018

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 Use

Make sure that the basic safety notes are read and observed. Make sure that persons responsible for the machinery and its operation as well as persons who work on the device 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.

The following safety notes refer to the use of the software.

This document does not replace the detailed documentation for the connected devices. This documentation assumes that the user has access to and is familiar with the documentation for all connected products.

Do not perform installation or startup if the product is damaged.

Removing required covers without authorization, improper use or incorrect installation and operation may result in severe injury to persons, or damage to machinery.

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

2.3 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.

2.4 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.

25876333/EN – 11/2018

2.5 Designated use

MOVIKIT® MultiMotion Auxiliary Velocity and MOVIKIT® MultiMotion Auxiliary Positioning are software modules for the MOVI-C® CONTROLLER that provide the user access to simple functions, such as speed control and positioning via an interface in the IEC program. The software modules allow for controlling non-synchronized auxiliary axes, for example for driving conveyor belts or variable-speed gear units.

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

2.6 Short designation

The following short designations are used in this documentation.

Type designation	Short designation
MOVIKIT® MultiMotion Auxiliary Velocity	Software module
MOVIKIT® MultiMotion Auxiliary Positioning	Software module

25876333/EN – 11/2018

3 Project planning information

3.1 Requirements

Correct project planning and proper installation of the units are required for successfully starting up and operating the software module.

For detailed project planning information, refer to the documentation of the respective devices. Observe the information in chapter "Other applicable documentation".

3.2 Hardware

The following hardware is required for operating the software module:

- MOVI-C® CONTROLLER

3.2.1 Compatibility

The following table illustrates the hardware compatibility of the software modules:

MOVI-C® CONTROLLER

Type designation	MOVIKIT® MultiMotion Auxiliary Velocity	MOVIKIT® MultiMotion Auxiliary Positioning
standard UHX25A	✓	✓
advanced UHX45A	✓	✓
progressive UHX65A	✓	✓
power UHX85A	✓	✓

Refer to the relevant MOVI-C® CONTROLLER manual for memory cards compatible with the controllers.

3.3 Software

The following software is required for operating the software module:

- MOVISUITE® engineering software
- MOVIRUN® flexible software platform
- MOVISUITE® RobotMonitor
- MOVIKIT® MultiMotion / MultiMotionCamming
- IEC-Editor

For more detailed information on the hardware requirements of the individual software components, see the documentation for the respective software. Observe the information in chapter "Other applicable documentation".

25876333/EN – 11/2018

3.4 Licensing

The following license is required for operating the software module:

- MOVIRUN® flexible

  License for the software platform MOVIRUN® flexible

The licenses are known as "performance licenses". They only need to be purchased once per MOVI-C® CONTROLLER and can then be used for any number of axes.

25876333/EN – 11/2018

4 System description

4.1 Functions

MOVIKIT® MultiMotion Auxiliary Axes comprises:

- MultiMotion Auxiliary Velocity
- MultiMotion Auxiliary Positioning

MOVIKIT® MultiMotion Auxiliary Velocity and MOVIKIT® MultiMotion Auxiliary Positioning provide the user with an interface in the IEC program similar to MOVIKIT® MultiMotion / MultiMotion Camming. This interface provides simple motion functions. The software modules are configured graphically in the MOVISUITE® engineering tool, and can be monitored and controlled using a monitor.

4.1.1 MOVIKIT® MultiMotion Auxiliary Velocity

MOVIKIT® MultiMotion Auxiliary Velocity offers the following functions:

- "Speed control operating mode": Speed, acceleration and deceleration are specified.
- "Torque control operating mode": Torque and maximum/minimum speed are specified.

INFORMATION

A jerk time can be specified optionally. An extended process data profile is necessary for this purpose. For further information, refer to chapter "Generating an IEC Editor project".

4.1.2 MOVIKIT® MultiMotion Auxiliary Positioning

MOVIKIT® MultiMotion Auxiliary Positioning includes the range of functions offered by MOVIKIT® Auxiliary Velocity as well as the following additional functions:

- "Reference travel" operating mode: Reference travel can be configured.
- "Position control" operating mode: Position, speed, acceleration, deceleration, and jerk time are specified.

4.2 Areas of application

The software modules are used for controlling simple non-synchronized motion sequences of auxiliary axes. Examples of simple speed control are conveyor belts or roller conveyors for simple positioning tasks, and drives for format adjustments.

4.3 Advantages

The software module offers the following advantages:

- Starting up the software module by graphical configuration.
- Controlling and monitoring the software module by means of a monitor integrated in the tool.
- The interface of the software module in the IEC program is similar to the interface of MOVIKIT® MultiMotion / MultiMotion Camming.

25876333/EN – 11/2018

- Drive-based functions are used.
- Lean, scalable EtherCAT® telegrams are used.

25876333/EN – 11/2018

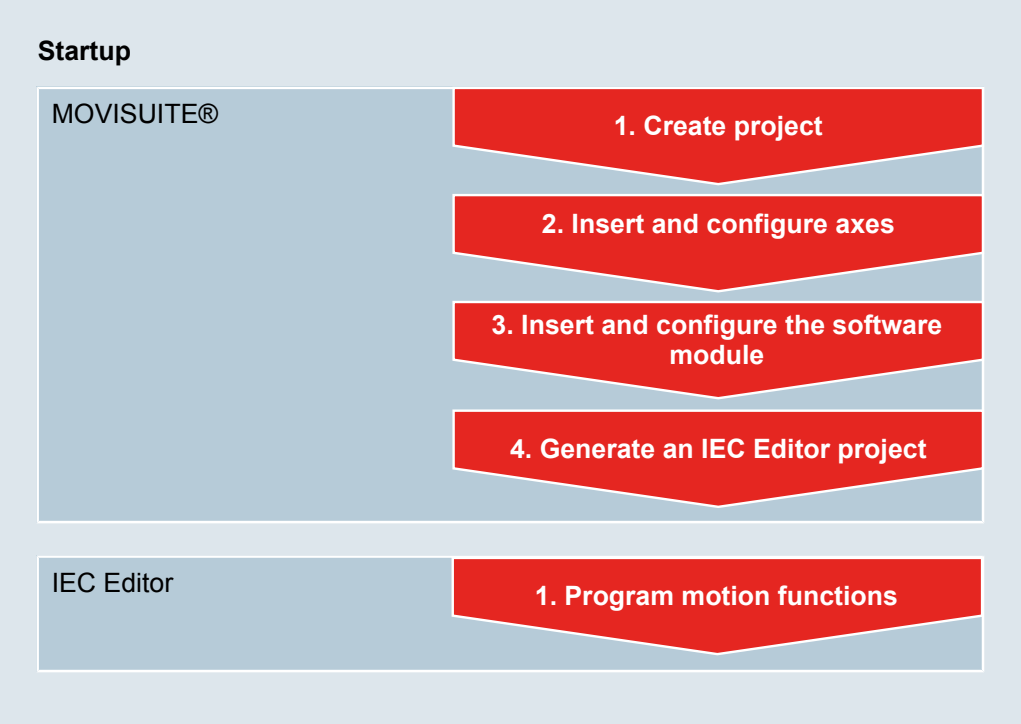
5 Startup

5.1 Requirements

- Check the installation of the MOVI-C® CONTROLLER as well as the installation of the inverters and the connection of the encoders.
- Observe the installation notes in the documentation of the respective device and software components.
- The devices to be started up are shown in MOVISUITE®.
- The latest firmware is installed on MOVI-C® CONTROLLER.
- The MOVI-C® CONTROLLER is supplied with voltage and started.
- The MOVI-C® CONTROLLER is connected to the engineering PC and can be scanned in MOVISUITE®.

5.2 Startup procedure

The schematic diagram below shows the startup procedure of the software module:



23289417483

Only the startup procedures specific to this software module are explained in detail in the following chapters of this manual. For this reason, also refer to the documents listed in chapter "Other applicable documentation" (→ 🗎 7) during startup.

25876333/EN – 11/2018

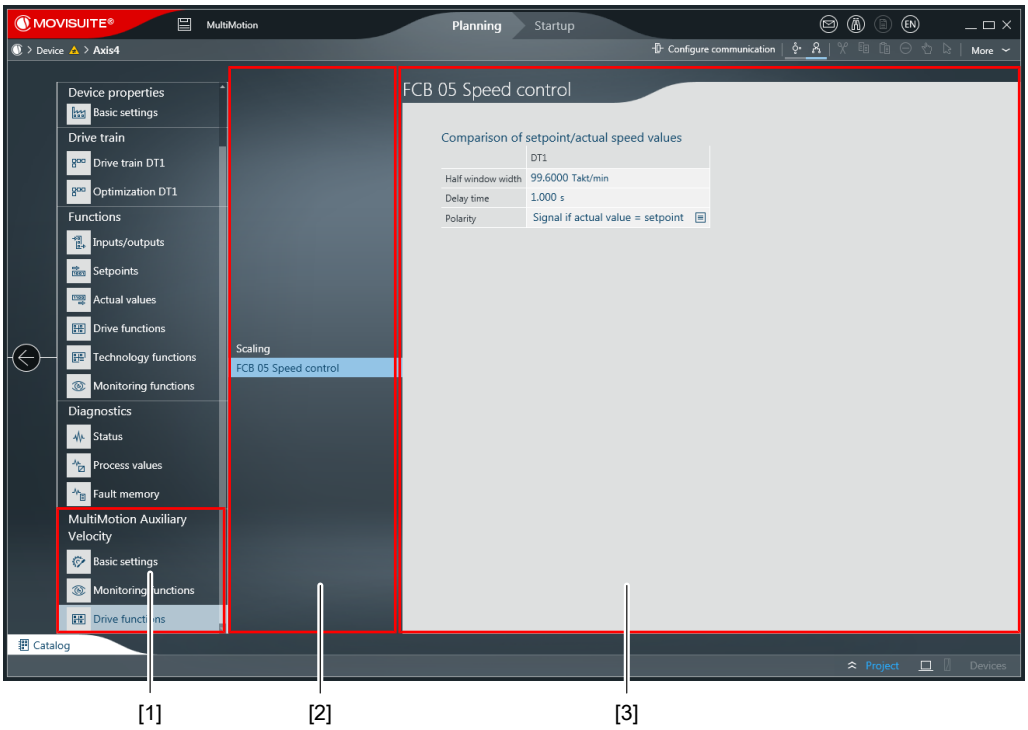
5.3 Inserting the software module

✓ An IEC project with the node structure of your unit structure has been created and is open.

1. Click the empty software module section of the node of the desired axis. If this axis already contains a software module, open the context menu of the software module section of the node and select [Add from catalog].
2. In the catalog section, click on the desired software module.
3. Select the version of the software module from the context menu that opens, and confirm your selection using [Apply].

5.4 Configuring the software module

1. In MOVISUITE®, click the software module.
   ⇨ The configuration menus of the software module are displayed.



25337209867

[1] Main menu of the configuration
[2] Submenus of the configuration
[3] Configuration options for the respective submenus

INFORMATION

The setting fields in the configuration menus represent the variables of the IEC project on the MOVISUITE® user interface. The corresponding IEC path and the index number are included in the following table listing the field descriptions, if applicable. The IEC path specified is to be understood as a relative path within the selected axis or axis group.

5.4.1 Basic settings

MOVIKIT® MultiMotion Auxiliary Velocity

Parameter name	Description
Initialization	
Initialize settings	Initialize the device for operation with the software module.
Select process data profile	
Process data profile	• AuxVelocity Process data profile for speed-controlled auxiliary axes. Setpoint speed, acceleration and deceleration are sent to the profile generator of the inverter. The process data profile occupies 4 process data words on the EtherCAT®/SBus^{PLUS} system bus. • AuxVelocity Variable4PD Process data profile for speed-controlled auxiliary axes with 4 additional process data that can be configured by the user as required. Setpoint speed, acceleration and deceleration are sent to the profile generator of the inverter. The process data profile occupies 8 process data words on the EtherCAT®/SBus^{PLUS} system bus.
	Index: 50000.10
	IEC name: -

25876333/EN – 11/2018

MOVIKIT® MultiMotion Auxiliary Positioning

Parameter name	Description
Initialization	
Initialize settings	Initialize the device for operation with the software module.
Select process data profile	
Process data profile	• AuxPositioning Process data profile for position-controlled auxiliary axes. Target position, setpoint speed, acceleration and deceleration are sent to the profile generator of the inverter. The process data profile occupies 8 process data words on the EtherCAT®/SBus^{PLUS} system bus. • AuxPositioning Variable4PD Process data profile for position-controlled auxiliary axes with 4 additional process data that can be configured by the user as required. Target position, setpoint speed, acceleration and deceleration are sent to the profile generator of the inverter. The process data profile occupies 12 process data words on the EtherCAT®/SBus^{PLUS} system bus. • AuxPositioning Variable8PD Process data profile for position-controlled auxiliary axes with 8 additional process data that can be configured by the user as required. Target position, setpoint speed, acceleration and deceleration are sent to the profile generator of the inverter. The process data profile occupies 16 process data words on the EtherCAT®/SBus^{PLUS} system bus.
	Index: 50000.10
	IEC name: -

25876333/EN – 11/2018

5.4.2 Monitoring functions

Software limit switches

Parameter name	Value
Software limit switches	
Monitoring SW limit switch negative	• ON: Activate monitoring for negative software limit switch(es) • OFF: Deactivate monitoring for negative software limit switch(es)
	Index: 8572.3
	IEC name: SoftwareLimitSwitch.In.xActivateMonitoringNegative
SW limit switch negative	Position of the negative software limit switch
	Index: 8572.4
	IEC name: SoftwareLimitSwitch.In.lrLimitNegative
Monitoring SW limit switch positive	• ON: Activate monitoring for positive software limit switch(es) • OFF: Deactivate monitoring for positive software limit switch(es)
	Index: 8572.5
	IEC name: SoftwareLimitSwitch.In.xActivateMonitoringPositive
SW limit switch positive	Position of the positive software limit switch
	Index: 8572.6
	IEC name: SoftwareLimitSwitch.In.lrLimitPositive

Limit values

Parameter name	Value
Application limits	
Application limit – negative speed	Maximum negative speed permitted for moving the system. Limits the maximum speed to this value.
	Index: 8357.11
	IEC name: ConfigHandling.stAxisConfig.lrAppLimitVelocityNegative
Application limit – positive speed	Maximum positive speed permitted for moving the system. Limits the maximum speed to this value.
	Index: 8357.10
	IEC name: ConfigHandling.stAxisConfig.lrAppLimitVelocityPositive

25876333/EN – 11/2018

Parameter name	Value
Application limit – acceleration	Maximum permitted acceleration for accelerating the system. Limits the maximum acceleration to this value.
	Index: 8357.12
	IEC name: ConfigHandling.stAxisConfig.lrAppLimit-Acceleration
Application limit – deceleration	Maximum permitted deceleration for braking and decelerating the system. Limits the maximum deceleration to this value.
	Index: 8357.13
	IEC name: ConfigHandling.stAxisConfig.lrAppLimit-Deceleration
Application limit – jerk time	The jerk time indicates the duration for producing and reducing torque or acceleration for reaching the actual setpoint. The jerk time takes effect in torque control (FCB 07), speed control (FCB 05), and positioning control (FCB 09), as well as in manual mode. The positioning process extends to twice the set jerk time.
	Index: 8357.14
	IEC name: ConfigHandling.stAxisConfig.lrAppLimitJerkTime
Limits	
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.
	Index: 8357.20
	IEC name: ConfigHandling.stAxisConfig.lrRapidStop-Deceleration
Cycle limit	
Modulo minimum	Lower modulo limits for handling process data. This limit is required for handling process data with a limited range of values.
	Index: 8357.30
	IEC name: ConfigHandling.stAxisConfig.lrModuloMin
Modulo maximum	Upper modulo limits for handling process data. This limit is required for handling process data with a limited range of values.
	Index: 8357.31
	IEC name: ConfigHandling.stAxisConfig.lrModulo-Max
Lag error	

25876333/EN – 11/2018

Parameter name	Value
Lag error window DT1	Lag error as of which the drive reports a fault (drive train 1).
	Index: 8510.4
	IEC name: –

25876333/EN – 11/2018

5.4.3 Drive functions

Scaling

Parameter name	Value
Encoder	
Actual position source	Encoder that acts as a source for generating the actual position.
	Index: 8565.3
	IEC name: -
Inverter scaling	
For setting the scaling of the inverter using the position, speed, and acceleration parameters.	
Index: 8554.1-4 (position), 8557.1-4 (speed), 8560.1-4 (acceleration)	
IEC name: -	

FCB 05 Speed control

Parameter name	Value
Comparison of setpoint/actual speed values	
Half window width DT1	Speed setpoint hysteresis (drive train 1).
	Index: 8324.3
	IEC name: -
Delay time DT1	Delay time for the comparison of setpoint and actual value. To have the signal issued, the condition for the signal must be fulfilled for at least the duration of the signal (drive train 1).
	Index: 8324.4
	IEC name: -
Polarity DT1	Specifies when the signal is issued (drive train 1) • Signal if actual value = setpoint • Signal if actual value <> setpoint
	Index: 8324.5
	IEC name: -

25876333/EN – 11/2018

FCB 07 Torque control

Parameter name	Value
Setpoint/actual torque comparison	
Half window width DT1	Torque setpoint hysteresis of FCB 07 in drive train 1.
	Index: 8339.3
	IEC name: -
Delay time DT1	Delay time for comparison of setpoint and actual value in drive train 1. To have the signal issued, the condition for the signal must be fulfilled for at least the duration of the signal.
	Index: 8339.4
	IEC name: -
Polarity DT1	Specifies when the signal is issued in drive train 1: • Signal if actual value = setpoint • Signal if actual value <> setpoint
	Index: 8339.5
	IEC name: -

25876333/EN – 11/2018

FCB 09 Position control

Parameter name	Value
In position	
Window width	The "In position" signal is set when the difference between actual position and setpoint position is smaller than half this value. The signal is only issued when FCB 09 is active, but the signal is deleted independently of the device status.
	Index: 8331.1
	IEC name: -
Hysteresis	Target position hysteresis. When the position window is left, the "In position" signal is maintained until this value is exceeded (drive train 1).
	Index: 8331.2
	IEC name: -
Actual target position in user units	Actual target position in user units
	Index: 8331.3
	IEC name: -
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.
	Index: 8509.4
	IEC name: -
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
	IEC name: -

25876333/EN – 11/2018

FCB 12 reference travel

Parameter name	Value
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
	IEC name: –
Reference offset	For setting the reference offset. This offset is required when the cam is not located at machine zero.
	Index: 8552.5
	IEC name: –
Search speed	Search speed for reference travel
	Index: 8552.8
	IEC name: –
Retraction speed	Retraction speed for reference travel
	Index: 8552.9
	IEC name: –
Start position	
Go to home position	• Yes • No
	Index: 8552.3
	IEC name: –
Home position	Default position that is approached automatically after reference travel is complete.
	Index: 8552.7
	IEC name: –
Homing speed	Speed for approaching the home position after referencing.
	Index: 8552.10
	IEC name: –
Advanced settings	

25876333/EN – 11/2018

Parameter name	Value
Acceleration	Homing acceleration
	Index: 8552.11
	IEC name: –
Deceleration	Homing deceleration
	Index: 8552.12
	IEC name: –
Jerk time	Homing jerk time
	Index: 8552.13
	IEC name: –
Reference to zero pulse	• Yes – reference to zero pulse • No – does not reference to zero pulse
	Index: 8552.2
	IEC name: –
HW limit switch for changing the speed	Setting to specify at which event the system switches from search speed to retraction speed. • Without – the search speed is used up to the fixed stop. • Hardware limit switch – the speed is changed when the hardware limit switch is detected. • Reference cam – the speed is changed when the reference cam is detected.
	Index: 8552.4
	IEC name: –
Dwell time at fixed stop	Dwell time at fixed stop in ms.
	Index: 8552.15
	IEC name: –
Torque limit fixed stop	Limits the torque when referencing to the fixed stop.
	Index: 8552.14
	IEC name: –

25876333/EN – 11/2018

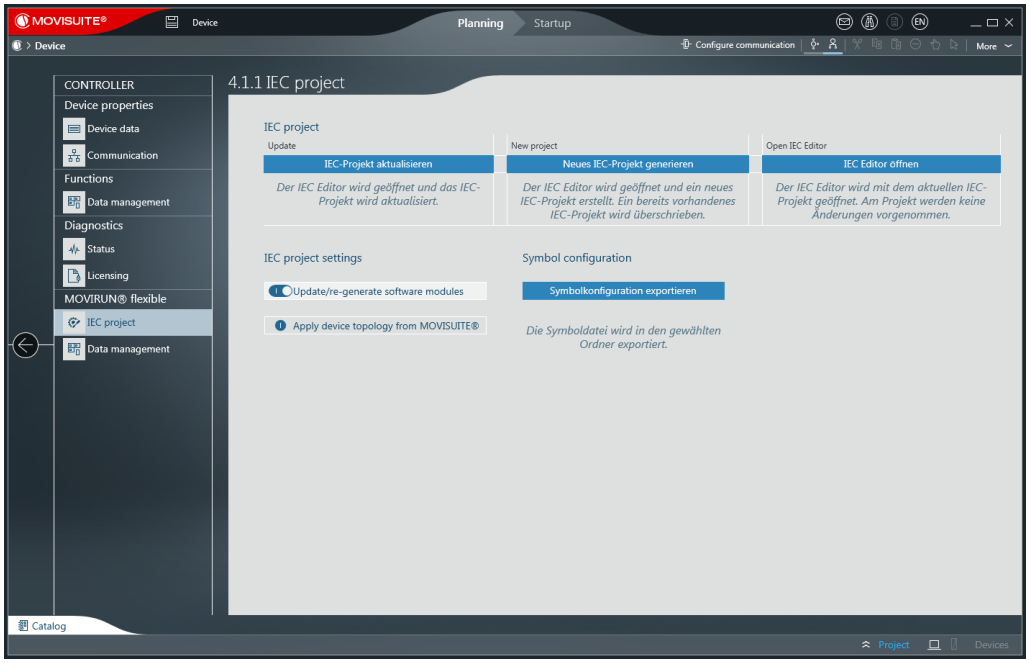
5.5 Generating an IEC project

Using automatic code generation, carry out the following steps to create an IEC project based on the configurations made in MOVISUITE®.

✓ Configuration of the software module in MOVISUITE® is complete.

1. In your device structure in MOVISUITE®, click the software module section of the MOVI-C® CONTROLLER node.

   ⇨ The "IEC project" menu opens.



9007219939155083

INFORMATION

If you have carried out the configuration in MOVISUITE® using the "Startup" mode and the message "Device cannot be reached" appears, proceed as follows:

- If the MOVI-C® CONTROLLER is not available, switch over to "Planning" mode.
- If the MOVI-C® CONTROLLER is available, carry out a scan and connect the MOVI-C® CONTROLLER in the network view with the MOVI-C® CONTROLLER in the function view.

2. Click [Create new IEC project] or [Update IEC project].

   ⇨ Create new IEC project: The IEC Editor opens and a new IEC project is created. An existing IEC project is overwritten in full.

   ⇨ Update IEC project: The IEC Editor opens and the IEC project is updated. The update only affects the objects contained in the "SEW_Generated" folder, the task configuration, and the devices by SEW-EURODRIVE. All other objects remain unaffected (own POU, DUT, tasks, and devices).

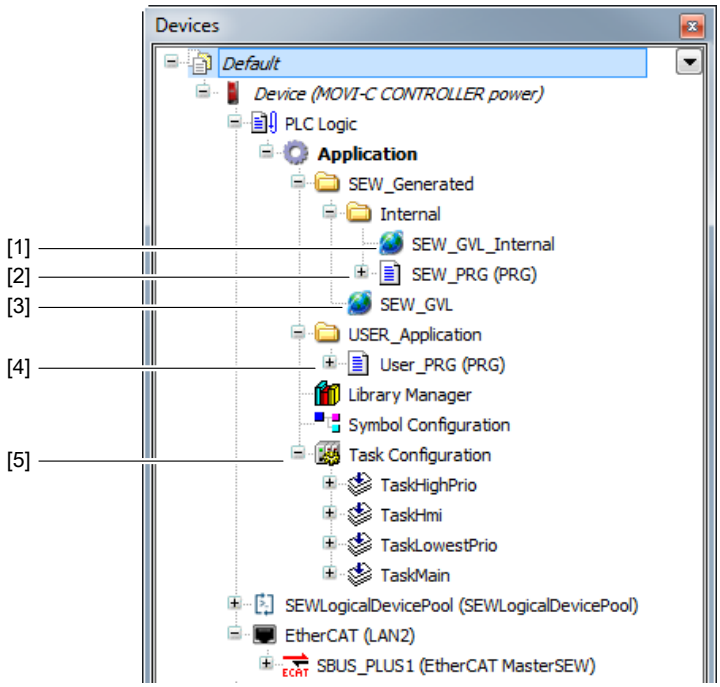
INFORMATION

If changes are made to the project structure, to inverter data sets, or to a software module configuration, a notification symbol is displayed on the MOVI-C® CONTROLLER node. To obtain more detailed information on the change and to perform the update, click the notification symbol.

25876333/EN – 11/2018

5.5.1 IEC project structure

The IEC project created has the following basic structure:



9007223748344331

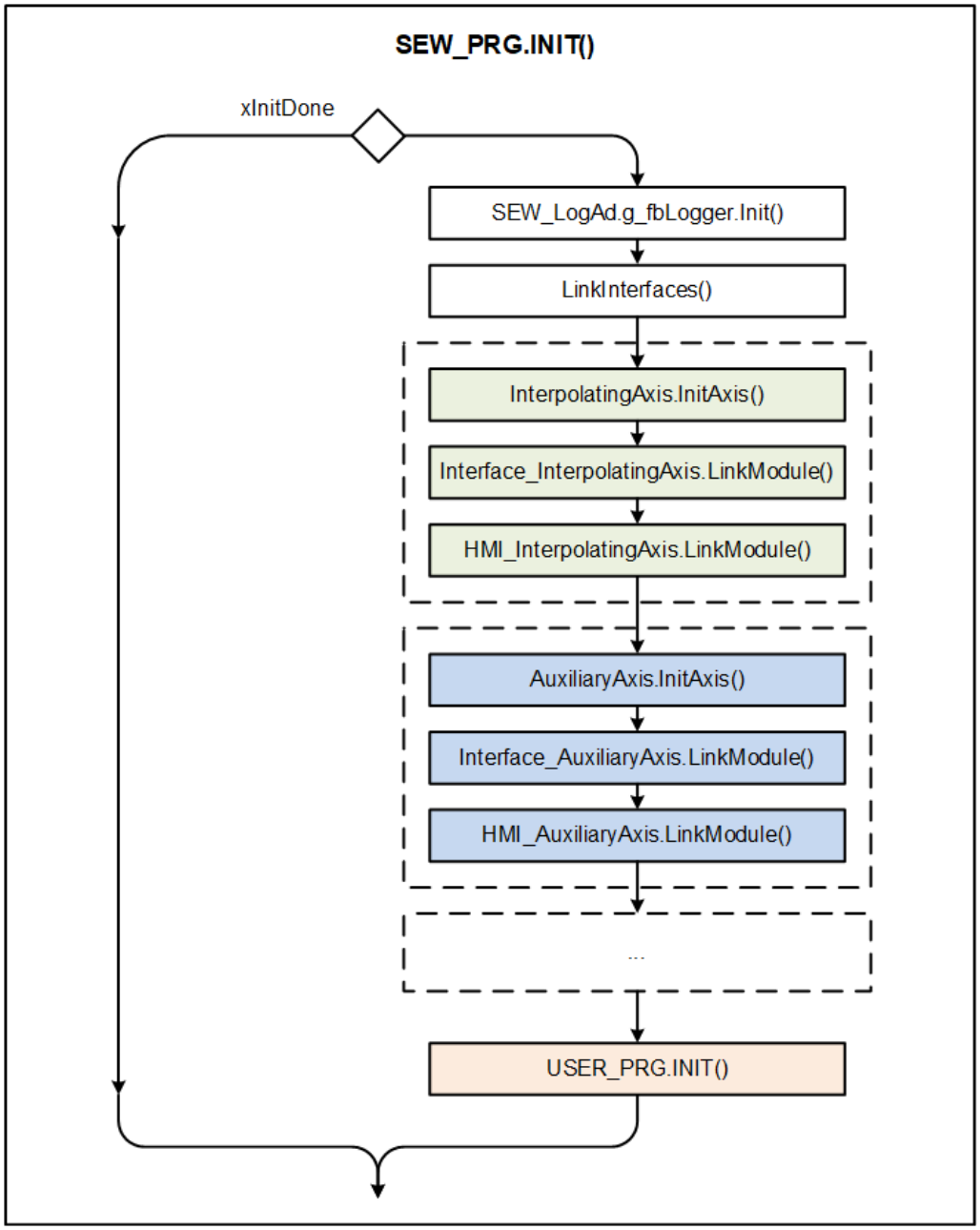
No.	Name	Description
[1]	SEW_GVL_Internal	The SEW_GVL_Internal global list of variables contains the instances that correspond to the software module used. These variables may not be written to from the user program. In addition, the structure contains an instance as a communication buffer for controlling or monitoring the software module by means of a monitor.
[2]	SEW_PRG	The program in which all the important instance calls are compiled. Automatic code generation recreates this program in accordance with the configuration made in MOVISUITE® each time the IEC project is created, thereby overwriting the previous version. Therefore, you should not make any changes to this program.
[3]	SEW_GVL	The SEW_GVL global list of variables is the interface for accessing the software module features.
[4]	User_PRG	The program that is created once, initially, by automatic code generation. Since the program is not overwritten with each subsequent creation, this is the appropriate place for integrating user programs. The program is divided into five actions. These actions differ in the time at which they are called during the program sequence.

No.	Name	Description
[5]	Task configuration	The list of tasks created in the project. Automatic code generation initially adds tasks that differ in how they are prioritized. The user can add additional programs to existing tasks or create new tasks. It is the responsibility of the user to design the capacity utilization of the tasks to enable the tasks to be processed within the required cycle time. Moving beyond the cyclical tasks, in particular, prevents setpoints for the interpolating axes being generated in time; this means that these axes cannot be operated properly.

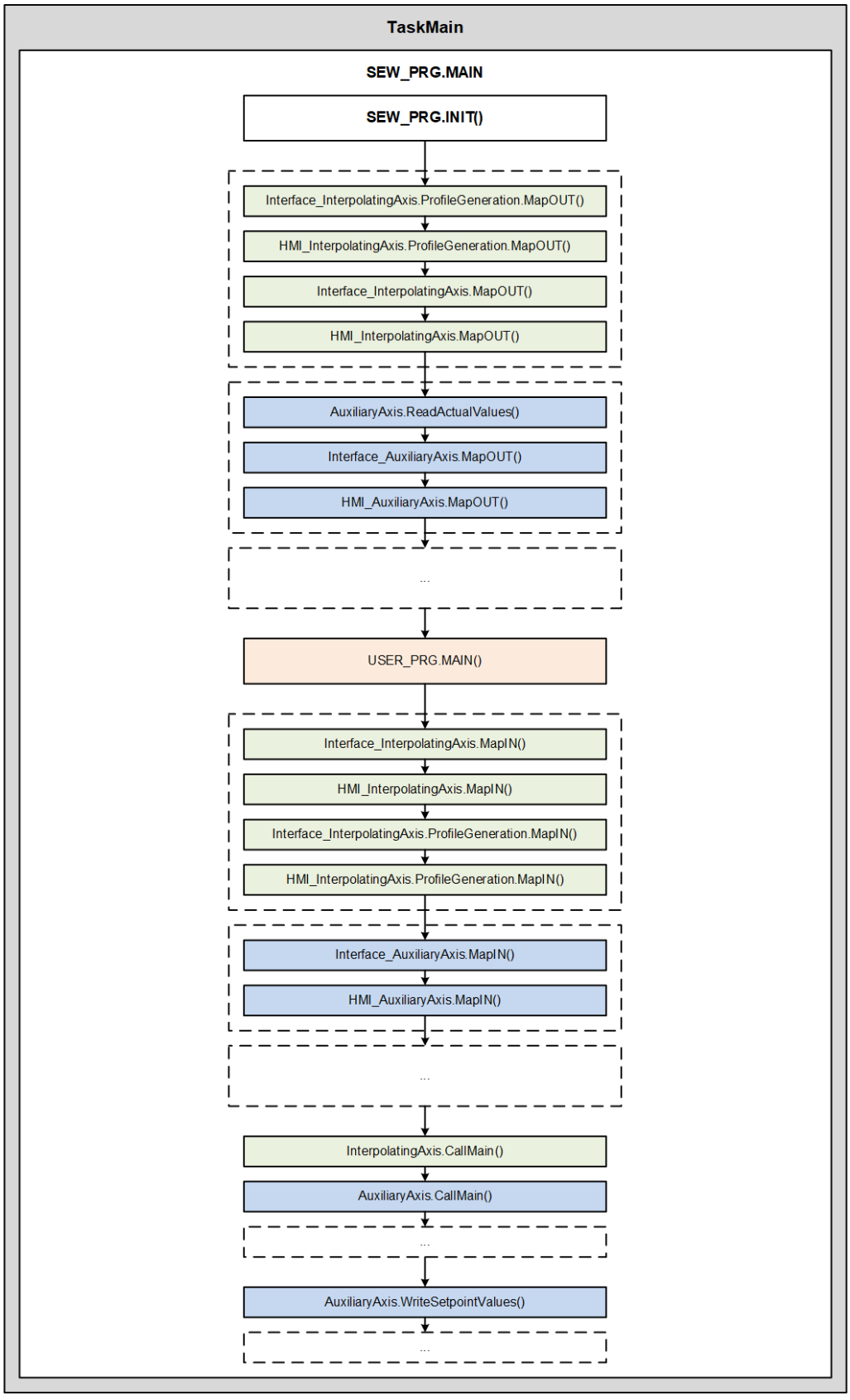
25876333/EN – 11/2018

5.6 Integrating a user program

There are various ways to integrate a user program into the IEC project created. The figure below shows the basic structure of the software. In addition, you can see where the actions and methods are processed during program execution. The actions or methods highlighted in red are available for executing the user program. Program calls of an auxiliary axis are indicated in blue. Program calls of an interpolating axis are indicated in green.

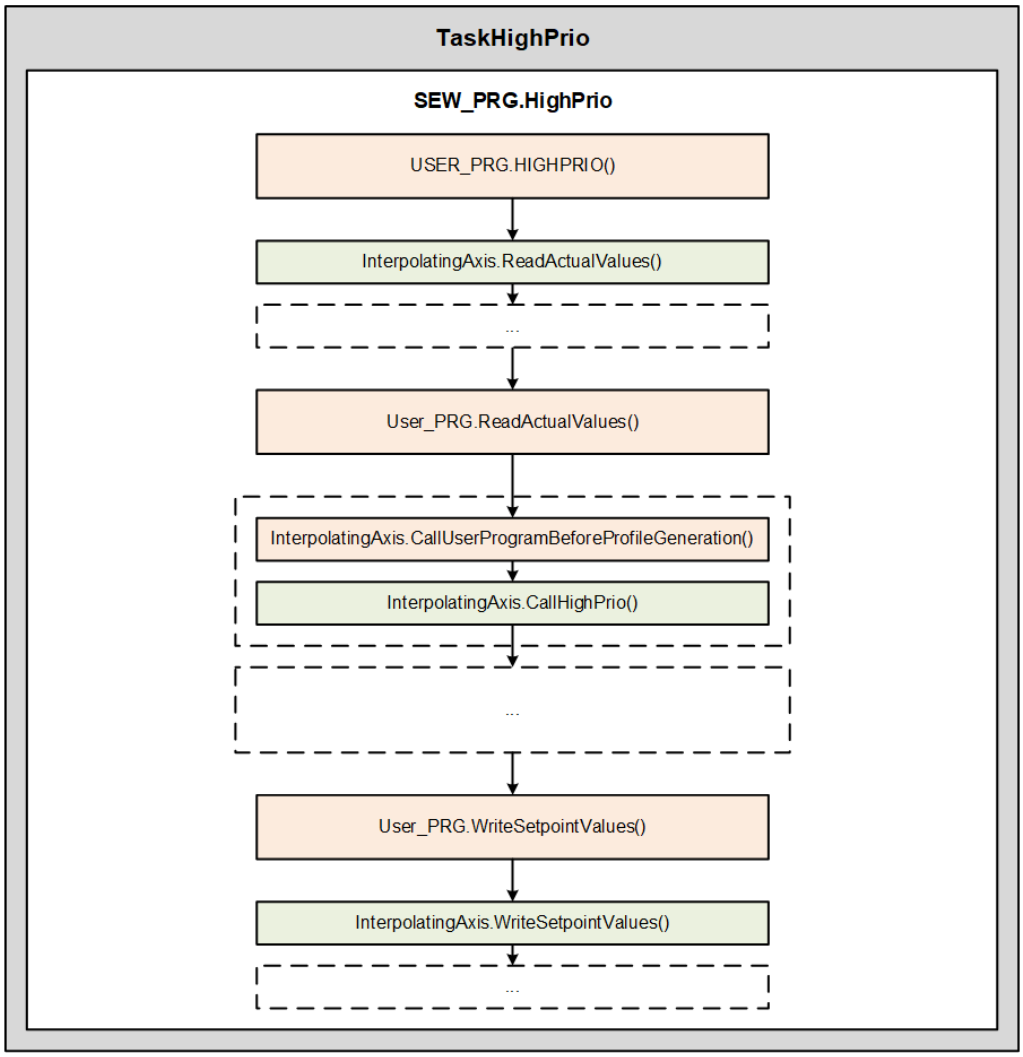


25291027851



25291030411

25876333/EN – 11/2018



25291032971

5.6.1 Tasks of the mapping functions

Code generation places the mapping to the interfaces in the free-wheeling task because in most cases, the user program is also processed within the free-wheeling task (e.g. in the *User_PRG.MAIN* action). Keep in mind that for cyclical tasks (e.g. in profile generation) all information written from the free-wheeling task to the interfaces (e.g. *Interface_AuxiliaryAxis*) is processed asynchronously and, as a result, in a potentially inconsistent manner.

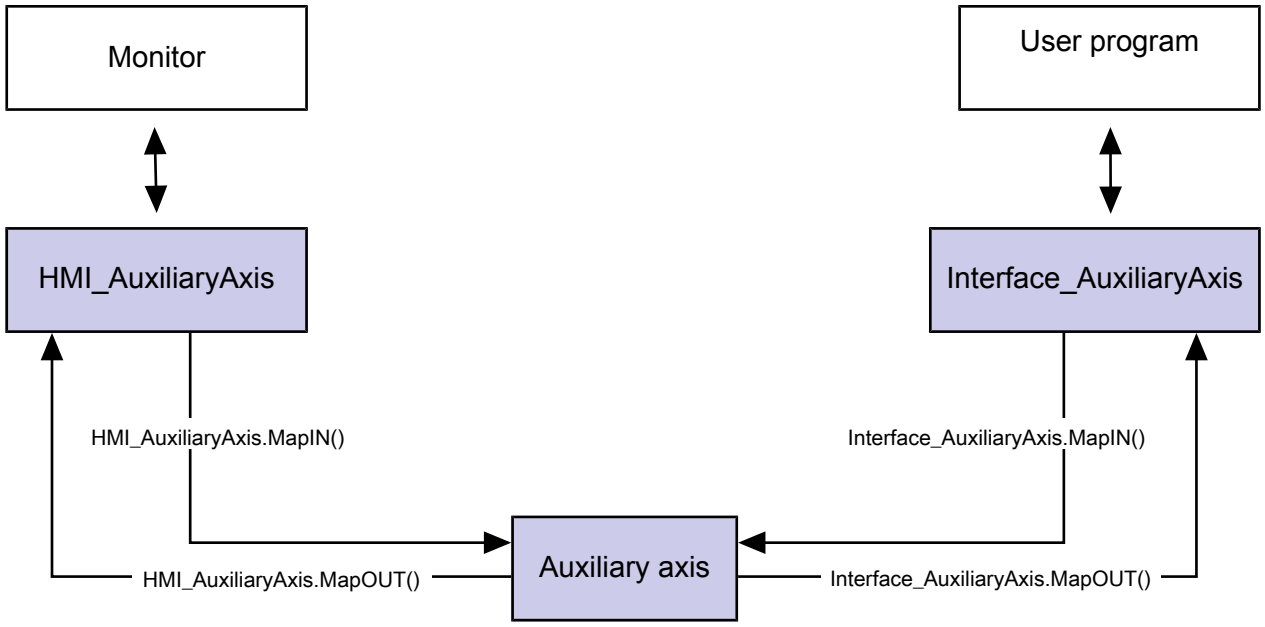
In certain cases, however, it may be important to control the system synchronously to the cyclical task from the user program (e.g. during an on-the-fly changeover). The corresponding control actions of the user program must then be processed in the cyclical task (e.g. in the *User_PRG.HIGHPRIO* action). Furthermore, the mapping functions of the status signals or control signals processed within the cyclical task must also be called from within the cyclical task, i.e. the corresponding calls must be shifted from the *SEW_PRG.MAIN* action to the *SEW_PRG.HIGHPRIO* action.

INFORMATION

It is the responsibility of the user to ensure consistency by taking the appropriate measures if necessary.

AuxiliaryAxes mapping functions

The diagram below presents an overview of the mapping functions and their tasks. If necessary, you can use these tasks to decide which calls are to be modified.



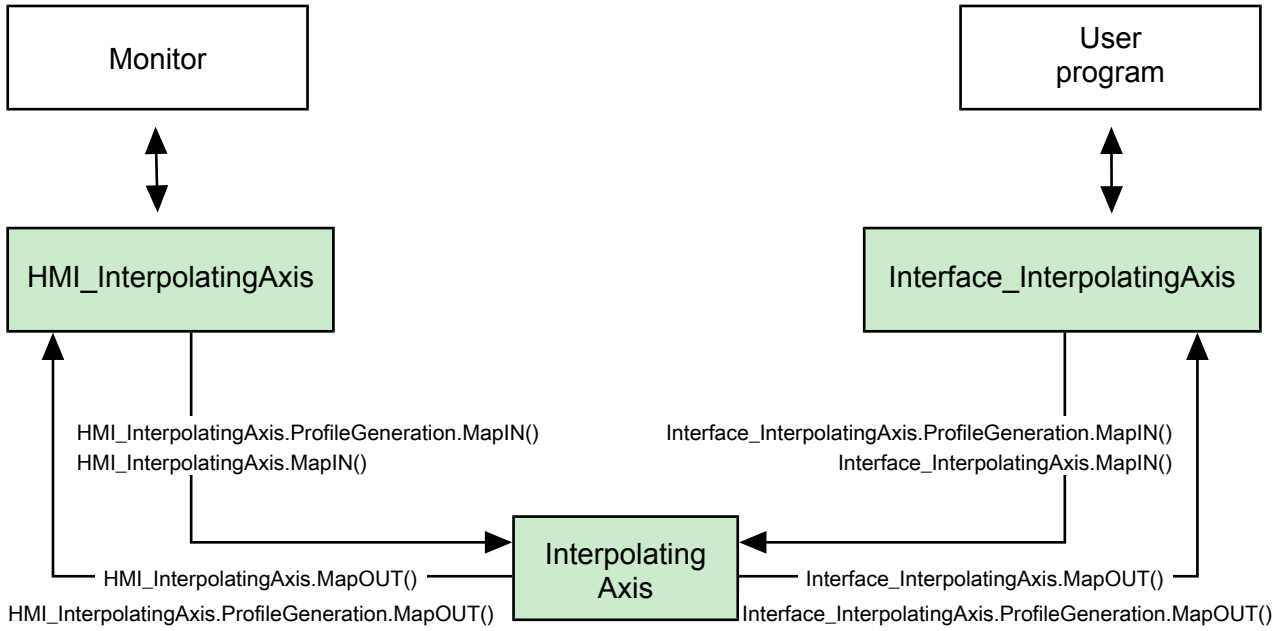
25291114891

- *Interface_AuxiliaryAxis.MapOUT()* copies the status information from *AuxiliaryAxis* to *Interface_AuxiliaryAxis*.
- *Interface_AuxiliaryAxis.MapIN()* copies the status information from *Interface_AuxiliaryAxis* to *AuxiliaryAxis*.
- *HMI_AuxiliaryAxis.MapOUT()* copies the status information from *AuxiliaryAxis* to *HMI_Auxiliary*.
- *HMI_AuxiliaryAxis.MapIN()* copies the control information from *HMI_AuxiliaryAxis* to *AuxiliaryAxis*.

25876333/EN – 11/2018

InterpolatingAxes mapping functions

The diagram below presents an overview of the mapping functions and their tasks. If necessary, you can use these tasks to decide which calls are to be modified.



25291130123

- *Interface_InterpolatingAxis.MapOUT()* copies that status information from *InterpolatingAxis* to *Interface_InterpolatingAxis*.
- *Interface_InterpolatingAxis.ProfileGeneration.MapOUT()* copies the status information of profile generation from *InterpolatingAxis* to *Interface_InterpolatingAxis*.
- *Interface_InterpolatingAxis.MapIN()* copies the control information from *Interface_InterpolatingAxis* to *InterpolatingAxis*.
- *Interface_InterpolatingAxis.ProfileGeneration.MapIN()* copies the control information of profile generation from *Interface_InterpolatingAxis* to *InterpolatingAxis*.
- *HMI_InterpolatingAxis.MapOUT()* copies the status information from *InterpolatingAxis* to *HMI_InterpolatingAxis*.
- *HMI_InterpolatingAxis.ProfileGeneration.MapOUT()* copies the status information of profile generation from *InterpolatingAxis* to *HMI_InterpolatingAxis*.
- *HMI_InterpolatingAxis.MapIN()* copies the status information from *HMI_InterpolatingAxis* to *InterpolatingAxis*.
- *HMI_InterpolatingAxis.ProfileGeneration.MapIN()* copies the control information of profile generation from *HMI_InterpolatingAxis* to *InterpolatingAxis*.

25876333/EN – 11/2018

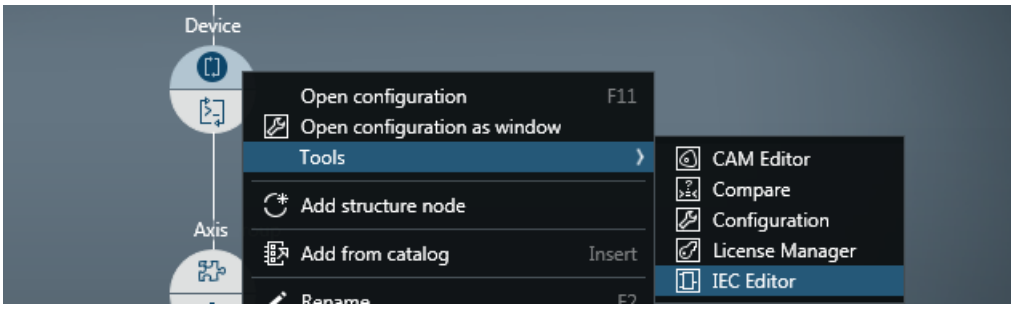
6 IEC programming

6.1 User interface

The user interface for the software module represents a global instance in the *SEW_GVL* variable structure in the IEC project.

The global instance consists of variables for error handling and access management, as well as substructures that contain control variables ("IN"), configuration variables ("CONFIG"), status variables ("OUT"), and other structures of the function modules.

To open the IEC project in the IEC Editor, select the entry [IEC Editor] under "Tools" from the context menu of the MOVI-C® CONTROLLER node in MOVISUITE®.



9007223167675659

25876333/EN – 11/2018

6.2 Interface in the IEC Editor

The following variable structures are available in the IEC project for configuring the software modules:

6.2.1 MOVIKIT® MultiMotion AuxiliaryAxes Velocity

Interface_AuxVelocity	SEW_MK_MultiMotionAux.MultiMotionVelocityAxis_UI	
xError	BOOL	FALSE
xWarning	BOOL	FALSE
udiMessageID	UDINT	16#00000000
sAdditionalText	STRING(Constants.gc_udiLengthAdditionalText)	''
xReset	BOOL	FALSE
xGetAccessControl	BOOL	TRUE
xControlActive	BOOL	FALSE
xInitDone	BOOL	FALSE
Basic	SEW_IAx.ST_Basic	
Inverter	SEW_IAx.ST_Inverter	
EnergySaving	SEW_IAx.ST_EnergySaving2	
Brake	SEW_IAx.ST_Brake	
SoftwareLimitSwitch	SEW_SWLS.SoftwareLimitSwitch_UI	
Velocity	SEW_UIDM.ModeVelocity_UI	
Torque	SEW_UIDM.ModeTorque_UI	

25291403147

6.2.2 MOVIKIT® MultiMotion AuxiliaryAxes Positioning

Interface_AuxPositioning	SEW_MK_MultiMotionAux.MultiMotionPositioningAxis_UI	
xError	BOOL	FALSE
xWarning	BOOL	FALSE
udiMessageID	UDINT	16#00000000
sAdditionalText	STRING(Constants.gc_udiLengthAdditionalText)	''
xReset	BOOL	FALSE
xGetAccessControl	BOOL	TRUE
xControlActive	BOOL	FALSE
xInitDone	BOOL	FALSE
Basic	SEW_IAx.ST_Basic	
Inverter	SEW_IAx.ST_Inverter	
EnergySaving	SEW_IAx.ST_EnergySaving2	
Brake	SEW_IAx.ST_Brake	
SoftwareLimitSwitch	SEW_SWLS.SoftwareLimitSwitch_UI	
Velocity	SEW_UIDM.ModeVelocity_UI	
Torque	SEW_UIDM.ModeTorque_UI	
Homing	SEW_UIDM.ModeHoming_UI	
Positioning	SEW_UIDM.ModePositioning_UI	

25291405707

25876333/EN – 11/2018

6.3 Variables

6.3.1 Diagnostics

Variable name	Description
xError	Data type: BOOL
	• TRUE – Software module has a fault status. • FALSE – Software module does not have a fault status.
xWarning	Data type: BOOL
	• TRUE – Software module signals a problem. • FALSE – Software module does not signal a problem.
xReset	Data type: BOOL
	• TRUE – Reset messages. • FALSE – Do not reset messages.
udiMessageID	Data type: UDINT
	Message ID number
sAdditionalText	Data type: STRING
	Additional message text

6.3.2 Access management

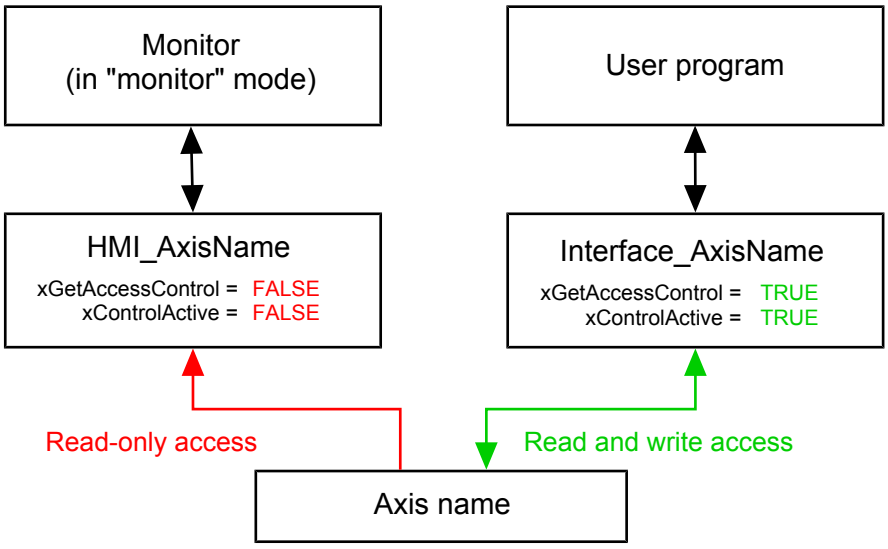
The access management system controls access to the user interface and ensures that no collisions occur during concurrent access to the axis functions.

Variable name	Description
xGetAccessControl	Data type: BOOL
	• TRUE – Requests access to the software module. • FALSE – Does not request access to the software module.
xControlActive	Data type: BOOL
	• TRUE – Access to the software module is granted. • FALSE – Access to the software module is not granted.

25876333/EN – 11/2018

User program access

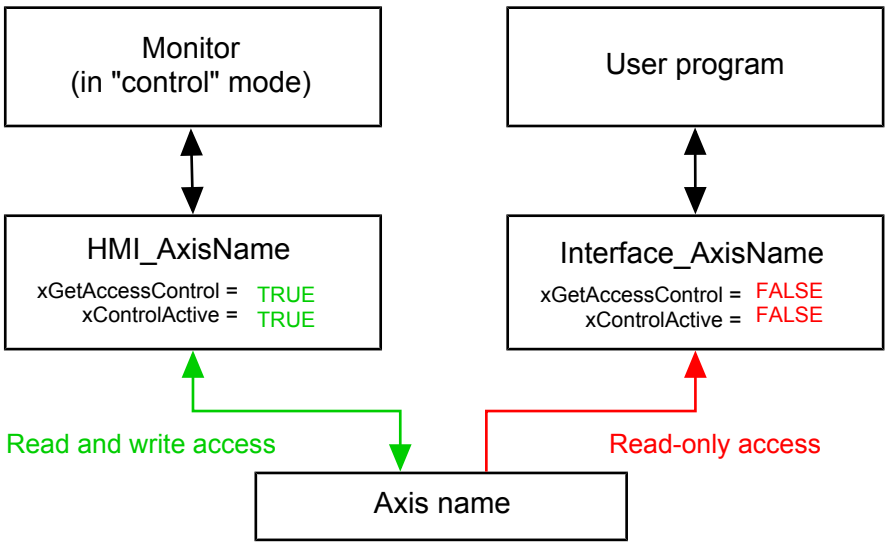
One instance requests access by setting *xGetAccessControl* to "TRUE". If *xControlActive* reports back a value "TRUE", access has been granted and is now permitted.



9007223236955019

Monitor access

If the axis function is accessed at the same time as the user program using a monitor in control mode, the *Interface_AxisName* user interface loses its access permissions. *xControlActive* reports back "FALSE". Instead, access is realized using the *HMI_AxisName* interface to the monitor. In this case, *xControlActive* reports back "TRUE".



9007223237090699

25876333/EN – 11/2018

6.3.3 Basic

The *Basic* structure contains the basic functions of the axis. This part of the user interface is identical for all axis types.

The following control and status variables are available:

Interface in the IEC Editor

9007219940779147

IN

Variable name	Description
xEnable_EmergencyStop	Data type: BOOL
	• TRUE – The software module does not execute an emergency stop using the set emergency stop ramp. (Requirement for enabling the axis) • FALSE – The software module executes an emergency stop using the set emergency stop ramp.
xEnable_ApplicationStop	Data type: BOOL
	• TRUE – The software module does not execute an application stop using the deceleration set to below the application limits. (Requirement for enabling the axis) • FALSE – The software module executes an application stop using the deceleration set under the application limits.

Comment:

To enable the axis, set *xEnable_EmergencyStop* and *xEnable_ApplicationStop* to "TRUE".

OUT

The dynamic parameters are scaled in user units.

Variable name	Description
lrActualPosition	Data type: LREAL – floating-point number
	Actual position
lrActualVelocity	Data type: LREAL – floating-point number
	Actual speed
xStandstill	Data type: BOOL
	• TRUE – Axis is at a standstill • FALSE – Axis is not at a standstill

25876333/EN – 11/2018

6.3.4 Inverter

The *Inverter* structure contains control and status variables for the inverter. This part of the user interface represents a hardware device and, as a result, only exists with real axes.

The following control and status variables are available:

Interface in the IEC Editor

Inverter	SEW_IAx.ST_Inverter	
In	ST_Inverter_In	
xInhibit	BOOL	FALSE
wDigitalOutputs	WORD	0
xSimulation	BOOL	FALSE
lrTorqueLimit	LREAL	32.767
Out	ST_Inverter_Out	
xConnected	BOOL	FALSE
xPowered	BOOL	FALSE
xReady	BOOL	FALSE
xReferenced	BOOL	FALSE
xSetpointActive	BOOL	FALSE
xSafeStop	BOOL	FALSE
xPositionValid	BOOL	FALSE
wDigitalInputs	WORD	0
lrActualTorque	LREAL	0
eActualInverterMode	E_INVERTERMODE	Unknown
usiErrorID	USINT	8
usiErrorSubID	USINT	0

9007219940783883

IN

Variable name	Description
xInhibit	Data type: BOOL
	• TRUE – Inhibit the output stage of the device. When this signal is activated, the brake might engage; otherwise, the axis coasts to a halt. • FALSE – Enable the output stage of the device.
wDigitalOutputs	Data type: WORD
	Control of the digital outputs of the device
xSimulation (function not yet available)	Data type – BOOL
	• TRUE – Simulate the frequency inverter of the software module (e.g. when testing without hardware). • FALSE – Do not simulate the frequency inverter.
lrTorqueLimit	Data type: LREAL – floating-point number
	Torque limit (1.0 = 100% M_N)

OUT

Variable name	Description
xConnected	Data type: BOOL
	• TRUE – A communication link exists between the controller and all frequency inverters. • FALSE – No communication link

Variable name	Description
xPowered	Data type: BOOL
	• TRUE – All frequency inverter output stages are enabled and are supplying output voltage. • FALSE – The frequency inverter output stages are not enabled
xReady	Data type: BOOL
	• TRUE – All frequency inverters are ready to be controlled by the controller • FALSE – Frequency inverters are not ready.
xReferenced	Data type: BOOL
	• TRUE – Referenced • FALSE – Not referenced
xSetpointActive	Data type: BOOL
	• TRUE – Setpoints are processed. • FALSE – Setpoints are not processed.
xSafeStop	Data type: BOOL
	• TRUE – Axis is at a standstill (STO is active for all frequency inverters). • FALSE – Axis is not at a standstill (STO is not active).
xPositionValid	Data type: BOOL
	• TRUE – The position of the encoder is valid. • FALSE – There is an encoder fault or error. (E.g. due to a bird strike)
wDigitalInputs	Data type: WORD
	State of the digital inputs of the device
lrActualTorque	Data type: LREAL – floating-point number
	Actual torque (1.0 = 100% M_N)

25876333/EN – 11/2018

Variable name	Description
eActualInverterMode	Data type: E_INVERTERMODE
	Operating mode of the inverter (FCB of the inverter): • Unknown • Default • OutputDisabled (FCB 01) • ManualMode (FCB 04) • Stop (FCB 02) • Homing (FCB 12) • JogMode (FCB 20) • BrakeTest (FCB 21) • Positioning (FCB 09) • PositioningInterpolated (FCB10) • Velocity (FCB 05) • VelocityInterpolated (FCB 06) • Torque (FCB 07) • TorqueInterpolated (FCB 08) • MotorParamMeasurement (FCB 25) • PosHoldCtrl (FCB 19) • RotorPosIdentification (FCB 18) • ApplicationStop (FCB 13) • EmergencyStop (FCB 14) • UserStop (FCB 26) *Library: SEW DeviceHandler Interfaces*
usiErrorID	Data type: USINT
	Error ID
usiErrorSubID	Data type: USINT
	Suberror ID

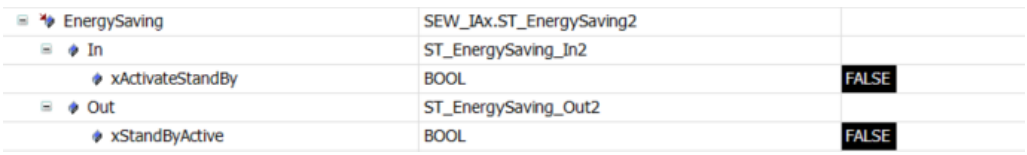
6.3.5 EnergySaving

The *EnergySaving* structure contains the control and status variables of the energy-saving function.

The energy-saving function can only be activated when the axis is not enabled. When using a double axis, both axes must not be enabled. In this case, the control signal always sets both axes to energy-saving mode.

The following control and status variables are available:

Interface in the IEC Editor



9007219941252491

IN

Variable name	Description
xActivateStandBy	Data type: BOOL
	• TRUE – Switch the device to energy-saving mode. • FALSE – Leave the device in non-energy-saving mode.

OUT

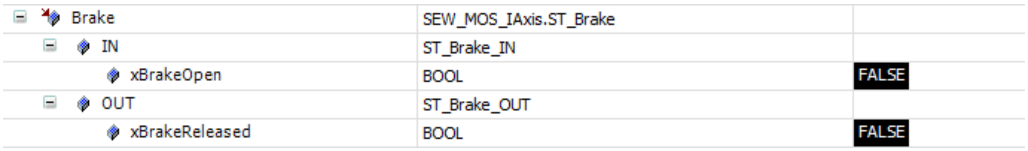
Variable name	Description
xStandByActive	Data type: BOOL
	• TRUE – The device is in energy-saving mode. • FALSE – The device is not in energy-saving mode

6.3.6 Brake

The *Brake* structure contains the control and status variables for the brake control. When the device is enabled, the brake releases automatically.

The following control and status variables are available:

Interface in the IEC Editor



20686516235

Make sure to set the *Release brake with inhibited output stage – enable?* parameter in MOVISUITE® (FCB 01 Output stage inhibit) to *Yes*.

IN

Variable name	Description
xBrakeOpen	Data type – BOOL
	• TRUE – Release the brake. If the output stage of the device is inhibited (e.g. via *xInhibit* = "TRUE"), the user can use this variable to accurately control the release (opening) of the brake. • FALSE – Apply the brake.

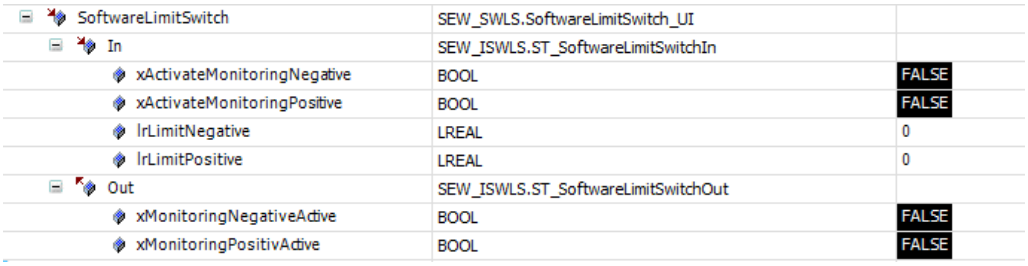
OUT

Variable name	Description
xBrakeReleased	Data type: BOOL
	• TRUE – The brake is released. • FALSE – The brake is applied.

25876333/EN – 11/2018

6.3.7 SoftwareLimitSwitch

Interface in the IEC Editor



9007223531035915

IN

Variable name	Description
xActivateMonitoring-Negative	Data type: BOOL
	• TRUE – Activate monitoring for software limit switch in a negative direction. • FALSE – Deactivate monitoring for software limit switch in a negative direction.
xActivateMonitoring-Positive	Data type: BOOL
	• TRUE – Activate monitoring for a software limit switch in a positive direction. • FALSE – Deactivate monitoring for a software limit switch in a positive direction.
lrLimitNegative	Data type: LREAL – floating-point number
	Position of the software limit switch in a negative direction (in position user units)
lrLimitPositive	Data type: LREAL – floating-point number
	Position of the software limit switch in a positive direction (in position user units)

OUT

Variable name	Description
xMonitoringNegat-iveActive	Data type: BOOL
	• TRUE – Monitoring for software limit switch in a negative direction is active. • FALSE – Monitoring for software limit switch in a negative direction is not active.
xMonitoringPositive-Active	Data type: BOOL
	• TRUE – Monitoring for software limit switch in a positive direction is active. • FALSE – Monitoring for software limit switch in a positive direction is not active.

25876333/EN – 11/2018

6.3.8 Velocity

The *Velocity* structure contains control and status variables for the "Speed control" operating mode. It is used to control the FCB 05 of the connected inverter. This operating mode is used to move drives at a specified speed. If no other operating mode is active when setting *xActivate* to *FALSE*, the inverter switches to FCB 26.

The following control and status variables are available:

Interface in the IEC Editor

Velocity	SEW_UIDM.ModeVelocity_UI	
In	SEW_IDM.ST_ModeVelocityIn2	
xActivate	BOOL	FALSE
xStart	BOOL	FALSE
lrVelocity	LREAL	0
lrAcceleration	LREAL	0
lrDeceleration	LREAL	0
uiJerkTime	UINT	0
Out	SEW_IDM.ST_ModeVelocityOut	
xActive	BOOL	FALSE
lrActualVelocity	LREAL	0
xInVelocity	BOOL	FALSE

25294005515

IN

Changes to these variables are applied immediately.

The dynamic parameters are scaled in user units.

Variable name	Description
xActivate	Data type – BOOL
	• TRUE – Activate • FALSE – Stop If *xActivate* is set to "FALSE", the operating mode stops at the last setpoint position, and speed and acceleration skip to zero.
xStart	Data type: BOOL
	• TRUE – Start • FALSE – Stop
lrVelocity	Data type: LREAL – floating-point number
	Speed (velocity) When the specified target speed has been reached, any change to *lrVelocity* takes immediate effect. The specified acceleration *lrAcceleration* or deceleration *lrDeceleration* is used to reach the newly specified speed.
lrAcceleration	Data type: LREAL – floating-point number
	Acceleration
lrDeceleration	Data type: LREAL – floating-point number
	Deceleration

25876333/EN – 11/2018

Variable name	Description
uiJerkTime	Data type: UINT
	Jerk time in ms No jerk time is transmitted in the "AuxVelocity" and "AuxPositioning" process data profiles. The matching configuration is required if a jerk time is to be processed. See chapter "Processing jerk" (→ 🗎 69).

OUT

The dynamic parameters are scaled in user units.

Variable name	Description
xActive	Data type: BOOL
	• TRUE – Activated • FALSE – Not activated
lrActualVelocity	Data type: LREAL – floating-point number
	Actual speed
xInVelocity	Data type: BOOL
	• TRUE – Profile generation has reached the specified speed. • FALSE – Profile generation has not reached the specified speed.

Comment:

The feedback *xInVelocity* is controlled by the setting of the parameters in the "Comparison of setpoint/actual speed values" section in the "FCB 05 Speed control" (→ 🗎 21) menu of the configuration.

6.3.9 Torque

The *Torque* structure contains control and status variables for the "Torque control" operating mode. It is used to control the FCB 07 of the connected inverter. This operating mode is used to set the drives to a specified torque. If no other operating mode is active when setting *xActivate* to *FALSE*, the inverter switches to FCB 26.

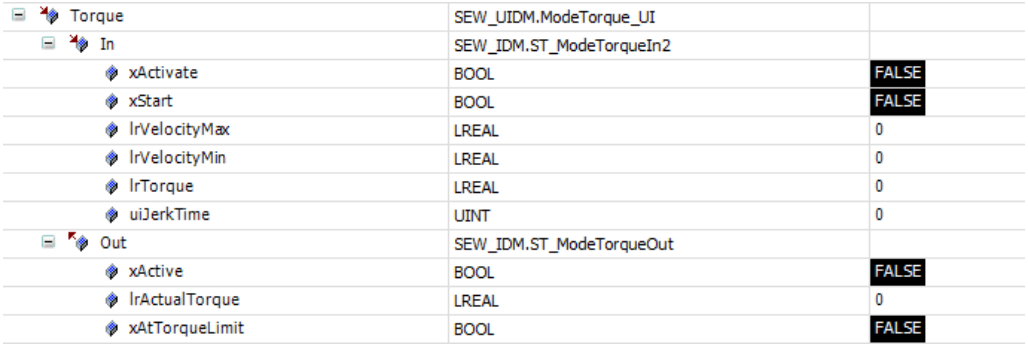
The resulting behavior depends on the load. Without load, the drive accelerates to the specified maximum or minimum speed. When doing so, the effective torque is reduced to such a degree that the specified speed limits are not exceeded.

The specified torque is only reached when the load is accordingly large.

The following control and status variables are available:

25876333/EN – 11/2018

Interface in the IEC Editor



25294022539

IN

Changes to these variables are applied immediately.

The dynamic parameters are scaled in user units.

Variable name	Description
xActivate	Data type – BOOL
	• TRUE – Activate • FALSE – Stop If *xActivate* is set to "FALSE", the operating mode stops at the last setpoint position, and speed and acceleration skip to zero.
xStart	Data type – BOOL
	• TRUE – The specified torque takes effect. If the load of the drive is too low and the drive reaches the specified speed limit, the effective torque will be reduced accordingly. • FALSE – The torque is withdrawn.
lrVelocityMax	Data type: LREAL – floating-point number
	Maximum speed in user units. This limit takes effect when the drive moves in positive direction when a positive torque is specified. The actual speed of the drive is always smaller than "lrMaxVelocity".
lrVelocityMin	Data type: LREAL – floating-point number
	Minimum speed in user units. This limit takes effect when the drive moves in negative direction when a negative torque is specified. The actual speed of the drive is always greater than "– lrMinVelocity".
lrTorque	Data type: LREAL – floating-point number
	Torque ($1/M_n$)
uiJerkTime	Data type: UINT
	Jerk time in ms No jerk time is transmitted in the "AuxVelocity" and "AuxPositioning" process data profiles. The matching configuration is required if a jerk time is to be processed. See chapter "Processing jerk" (→ 🗎 69).

25876333/EN – 11/2018

OUT

The dynamic parameters are scaled in user units.

Variable name	Description
xActive	Data type: BOOL
	• TRUE – Activated • FALSE – Not activated
lrActualTorque	Data type: LREAL – floating-point number
	Current torque of the nominal motor torque in percent (1.0 = 100% M_N)
xAtTorqueLimit	Data type – BOOL
	• TRUE – The specified torque is reached. • FALSE – The specified torque is not reached.

Comment:

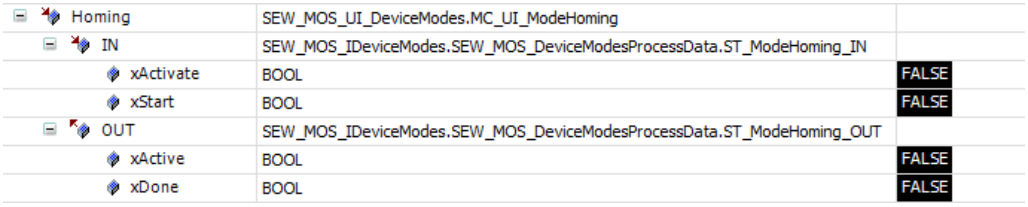
The feedback *xAtTorqueLimit* is controlled by the setting of the parameters in the "Set-point/actual torque comparison" section in the "FCB 07 Torque control" (→ 🗎 22) menu of the configuration.

6.3.10 Homing

The *Homing* structure contains control and status variables for the reference travels. It is used to control the FCB12 of the connected inverter. The parameters for *FCB 12 Reference travel* set on the inverter apply (e.g. reference travel type, etc.).

The following control and status variables are available:

Interface in the IEC Editor



20686538507

IN

Variable name	Description
xActivate	Data type – BOOL
	• TRUE – Activate • FALSE – Stop If *xActivate* is set to "FALSE", the operating mode stops at the last setpoint position, and speed and acceleration skip to zero.
xStart	Data type: BOOL
	• TRUE – Start • FALSE – Stop

Comment:

To start a reference travel, set both signals to "TRUE".

To stop an ongoing reference travel, set one of the two signals to "FALSE".

OUT

Variable name	Description
xActive	Data type: BOOL
	• TRUE – Activated • FALSE – Not activated
xDone	Data type: BOOL
	• TRUE – Process is complete. • FALSE – Process is not complete.

Comment:

Unlike the operating modes of MultiMotion axis functions, the *xActive* feedback message does not become "TRUE" until both input signals, *xActivate* and *xStart*, are "TRUE".

6.3.11 Positioning

The *Positioning* structure contains control and status variables for the "Position control" operating mode. It is used to control the FCB 09 of the connected inverter. This operating mode is used to move drives to specified positions. If no other operating mode is active when setting *xActivate* to *FALSE*, the inverter switches to FCB 26.

The following control and status variables are available:

Interface in the IEC Editor

Positioning	SEW_UIDM.ModePositioning_UI	
In	SEW_IDM.ST_ModePositioningIn2	
xActivate	BOOL	FALSE
xStart	BOOL	FALSE
lrPosition	LREAL	0
lrVelocity	LREAL	0
lrAcceleration	LREAL	0
lrDeceleration	LREAL	0
uiJerkTime	UINT	0
Config	SEW_IDM.ST_ModePositioningConfig	
eMode	E_POSITIONINGMODE	eAbsolute
Out	SEW_IDM.ST_ModePositioningOut	
xActive	BOOL	FALSE
lrActualPosition	LREAL	0
xInPosition	BOOL	FALSE

25294026763

IN

Changes to these variables are applied immediately.

The dynamic parameters are scaled in user units.

Variable name	Description
xActivate	Data type – BOOL
	• TRUE – Activate • FALSE – Stop If *xActivate* is set to "FALSE", the operating mode stops at the last setpoint position, and speed and acceleration skip to zero.

Variable name	Description
xStart	Data type: BOOL
	• TRUE – Start • FALSE – Stop
lrPosition	Data type: LREAL – floating-point number
	Position
lrVelocity	Data type: LREAL – floating-point number
	Speed (velocity) When the specified target speed has been reached, any change to *lrVelocity* takes immediate effect. The specified acceleration *lrAcceleration* or deceleration *lrDeceleration* is used to reach the newly specified speed.
lrAcceleration	Data type: LREAL – floating-point number
	Acceleration
lrDeceleration	Data type: LREAL – floating-point number
	Deceleration
uiJerkTime	Data type: UINT
	Jerk time in ms No jerk time is transmitted in the "AuxVelocity" and "AuxPositioning" process data profiles. The matching configuration is required if a jerk time is to be processed. See chapter "Processing jerk" (→ 🗎 69).

Comment:

When activating this operating mode, make sure that speed, acceleration and deceleration are specified greater than zero, else the inverter signals a fault.

Config

Variable name	Description
eMode	Data type – E_POSITIONINGMODE
	• eAbsolute: absolute positioning • eRelative: relative positioning • eModuloAbsolutePositive: absolute modulo positioning in positive direction • eModuloAbsoluteNegative: absolute modulo positioning in negative direction • eModuloAbsoluteShortestWay: absolute modulo positioning at shortest distance • eModuloAbsoluteWithoutRef: absolute positioning without referencing

OUT

The dynamic parameters are scaled in user units.

25876333/EN – 11/2018

Variable name	Description
xActive	Data type: BOOL
	• TRUE – Activated • FALSE – Not activated
lrActualPosition	Data type: LREAL – floating-point number
	Actual position
xInPosition	Data type: BOOL
	• TRUE – Specified position is reached. • FALSE – Specified position is not reached.

Comment:

The feedback *xInPosition* is controlled by setting the "In position" parameters in the "FCB 09 Position control" (→ 🗎 23) menu of the configuration.

25876333/EN – 11/2018

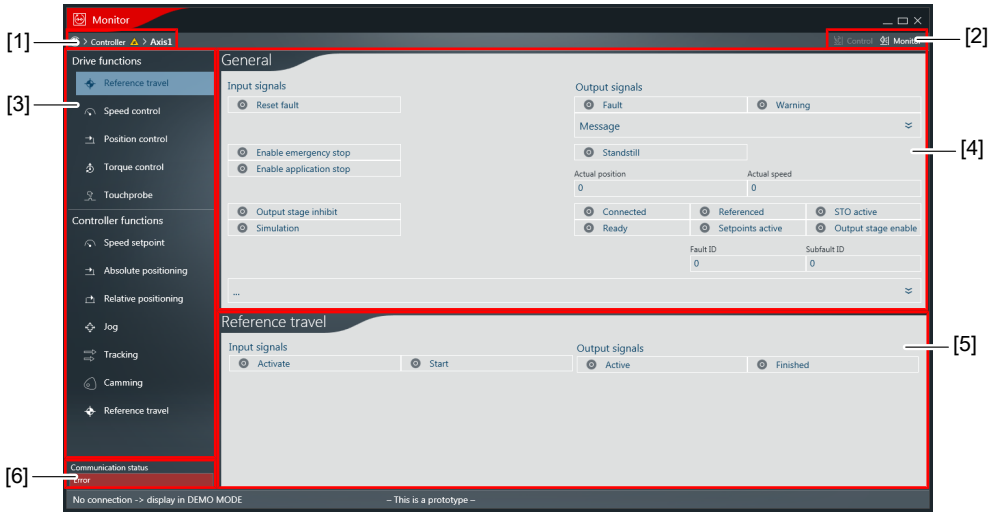
7 Diagnostics

7.1 Monitor

The MultiMotion monitor is a tool in the MOVISUITE® engineering software for monitoring and controlling axes or axis groups.

In MOVISUITE®, click [Monitor] in the Tools menu to open the tool from the context menu of a specific node.

The user interface of the MultiMotion monitor includes the following areas:



9007223554947083

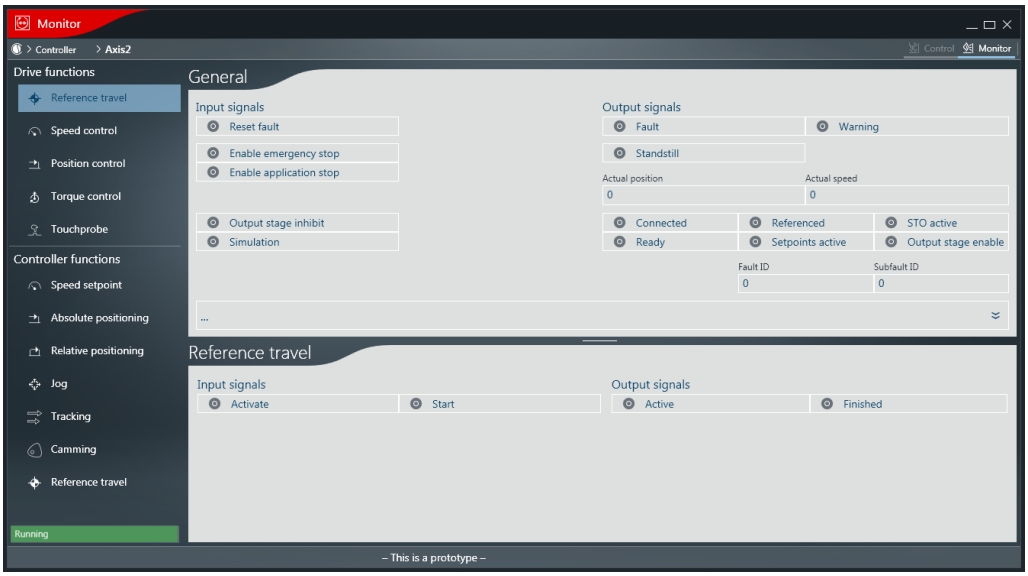
No.	Range	Description
[1]	Device path and name	Path and name of the axis/axis group
[2]	Mode switching	• "Control" mode: Operating mode in which the user can manually set all control bits and setpoints. Control via the IEC program is ignored. • "Monitor" mode: Operating mode for monitoring the input and output values. In this mode, the monitor only has read-only rights and displays the values set by the controller.
[3]	Main menu	Main menu for opening the configuration menus of the functions available in each case, such as drive functions, controller functions, or functions of software modules.
[4]	General	Input and output signals for basic settings.
[5]	Functions	Depending on the function selected from the main menu, this area displays the corresponding input and output signals.
[6]	Communication status	Status of the communication link.

7.1.1 Controlling the "Reference travel" operating mode

Do the following to control the "Reference travel" operating mode:

1. In the "General" section, activate the "Enable emergency stop" input signal.

2. In the "General" section, activate the "Enable application stop" input signal.
   ⇨ The "Output stage enable" output signal in the "General" section is active.
3. In the "Reference travel" section, activate the "Activate" input signal.
4. In the "Reference travel" section, activate the "Start" input signal.
   ⇨ The output signals "Active" and "Finished" in the "Reference travel" section are activated.
   ⇨ The "Referenced" output signal in the "General" section is activated.

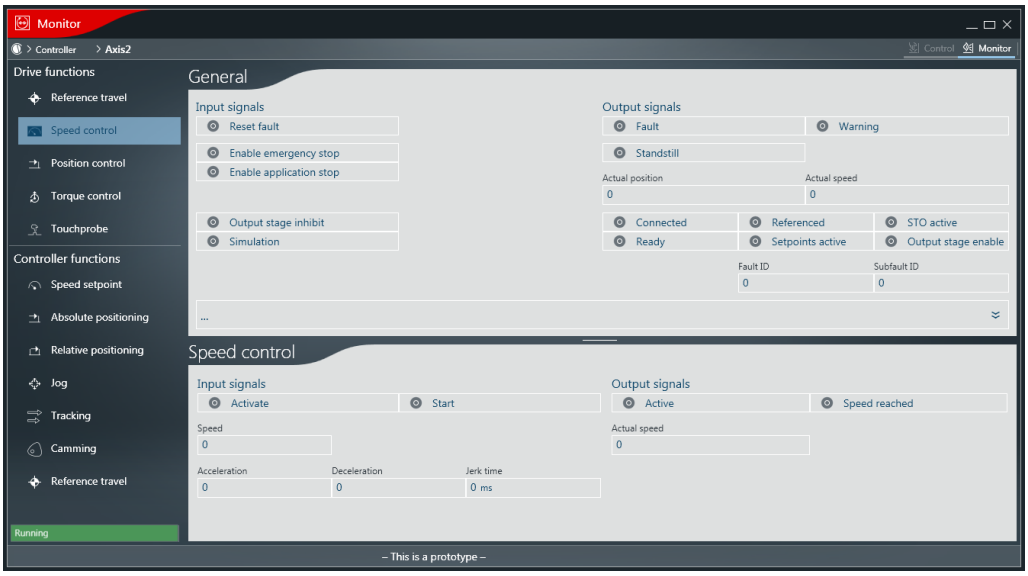


25295431691

7.1.2 Controlling the "Speed control" operating mode

Do the following to control the "Speed control" operating mode via the monitor:

1. In the "General" section, activate the "Enable emergency stop" input signal.
2. In the "General" section, activate the "Enable application stop" input signal.
   ⇨ The "Output stage enable" output signal in the "General" section is active.
3. Specify values for the input signals "Speed", "Acceleration", "Deceleration", and "Jerk time" in the "Speed control" section.
4. In the "Speed control" section, activate the "Activate" input signal.
5. In the "Speed control" section, activate the "Start" input signal.
   ⇨ The "Active" output signal in the "Speed control" section is active.
   ⇨ When the specified speed is reached, the "Speed reached" output signal is activated in the "Speed control" section.

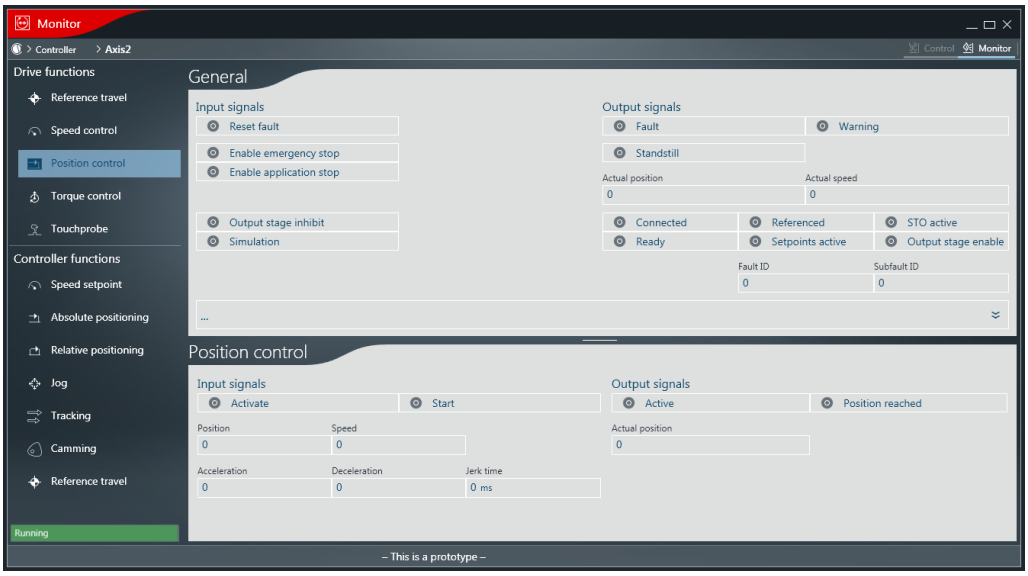


25295488779

7.1.3 Controlling the "Position control" operating mode

Do the following to control the "Position control" operating mode via the monitor:

1. In the "General" section, activate the "Enable emergency stop" input signal.
2. In the "General" section, activate the "Enable application stop" input signal.
   ⇨ The "Output stage enable" output signal in the "General" section is active.
3. Specify values for the input signals "Position", "Speed", "Acceleration", "Deceleration", and "Jerk time" in the "Position control" section.
4. In the "Position control" section, activate the "Activate" input signal.
5. In the "Position control" section, activate the "Start" input signal.
   ⇨ The "Active" output signal in the "Position control" section is active.
   ⇨ When the specified position is reached, the "Position reached" output signal is activated in the "Position control" section.

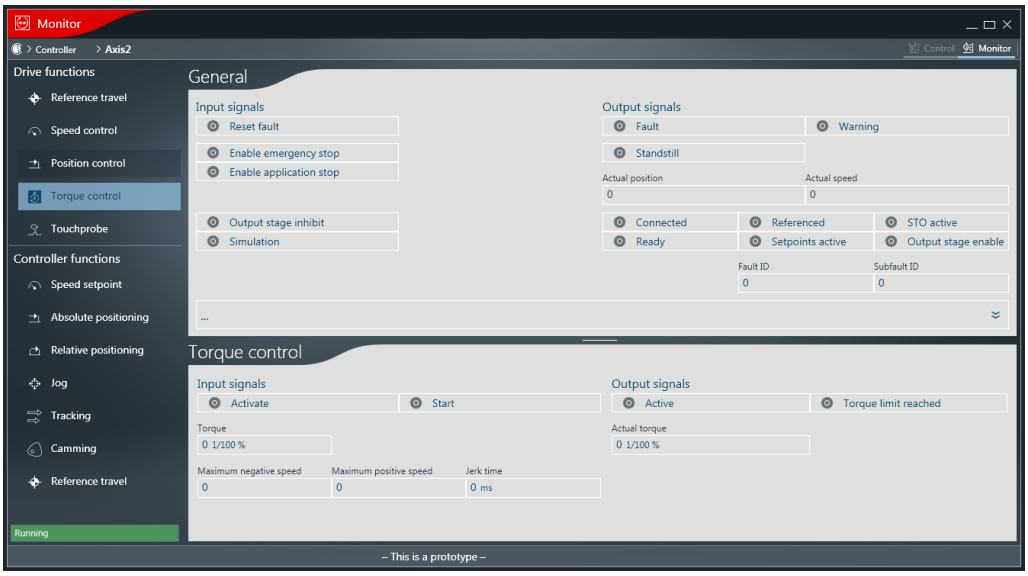


25295569803

7.1.4 Controlling the "Torque control" operating mode

Do the following to control the "Torque control" operating mode via the monitor:

1. In the "General" section, activate the "Enable emergency stop" input signal.
2. In the "General" section, activate the "Enable application stop" input signal.
   ⇨ The "Output stage enable" output signal in the "General" section is active.
3. Specify values for the input signals "Torque", "Maximum negative speed", "Maximum positive speed", and "Jerk time" in the "Torque control" section.
4. In the "Torque control" section, activate the "Activate" input signal.
5. In the "Torque control" section, activate the "Start" input signal.
   ⇨ The "Active" output signal in the "Position control" section is active.
   ⇨ When the specified torque is reached, the "Torque reached" output signal is activated in the "Torque control" section.



25295574539

8 Application examples

8.1 General requirements for moving an axis

The following requirements must be met for moving an axis and consequently for all the examples described in the following sections:

- The *xError* variable reports back "FALSE". There is no error.
- The *usiErrorID* and *usiErrorSubID* variables report back the value "0".
- The *xInitDone* variable reports back "TRUE". The axis is now initialized.
- The *xConnected* variable reports back "TRUE". The inverter communicates with the MOVI-C® CONTROLLER.

Interface in the IEC Editor

xError	BOOL	FALSE
xWarning	BOOL	FALSE
udiMessageID	UDINT	16#00000000
sInstancePath	STRING(Constants.gc_udiLengthPathName)	'Controller.Application.SEW_GVL.Interface_Axis2'
_stLocalVar_ErrorBasic	ST_LocalVariables_Basic	
sAdditionalText	STRING(Constants.gc_udiLengthAdditionalText)	''
_stLocalVar_ControlSource	ST_LocalVariables_ControlSource	
eControlSource	E_CONTROLSOURCE	USERINTERFACE
itfAccessControl	SEW_IAccCtrl.IAccessControl	16#00A47BA0
xReset	BOOL	FALSE
xGetAccessControl	BOOL	TRUE
xControlActive	BOOL	TRUE
xInitDone	BOOL	TRUE
Basic	SEW_IAx.ST_Basic	
Inverter	SEW_IAx.ST_Inverter	
In	ST_Inverter_In	
Out	ST_Inverter_Out	
xConnected	BOOL	TRUE
xPowered	BOOL	FALSE
xReady	BOOL	TRUE
xReferenced	BOOL	TRUE
xSetpointActive	BOOL	FALSE
xSafeStop	BOOL	FALSE
xPositionValid	BOOL	FALSE
wDigitalInputs	WORD	1
lrActualTorque	LREAL	0
eActualInverterMode	E_INVERTERMODE	EmergencyStop
usiErrorID	USINT	0
usiErrorSubID	USINT	0

25299799691

25876333/EN – 11/2018

8.1.1 Enable axis

The axis must be enabled before it can move. To enable the axis, set the following variables in the *Basic.In* structure:

- Set *xEnable_EmergencyStop* to "TRUE".
- Set *xEnable_ApplicationStop* to "TRUE".

The *xPowered* variable reports back "TRUE" in the *Inverter.Out* structure.

Interface in the IEC Editor

xError	BOOL	FALSE
xWarning	BOOL	FALSE
udiMessageID	UDINT	16#00000000
sInstancePath	STRING(Constants.gc_udiLengthPathName)	'Controller.Application.SEW_GVL.Interface_Axis2'
_stLocalVar_ErrorBasic	ST_LocalVariables_Basic	
sAdditionalText	STRING(Constants.gc_udiLengthAdditionalText)	''
_stLocalVar_ControlSource	ST_LocalVariables_ControlSource	
eControlSource	E_CONTROLSOURCE	USERINTERFACE
itfAccessControl	SEW_IAccCtrl.IAccessControl	16#00A47BA0
xReset	BOOL	FALSE
xGetAccessControl	BOOL	TRUE
xControlActive	BOOL	TRUE
xInitDone	BOOL	TRUE
Basic	SEW_IAx.ST_Basic	
Inverter	SEW_IAx.ST_Inverter	
In	ST_Inverter_In	
Out	ST_Inverter_Out	
xConnected	BOOL	TRUE
xPowered	BOOL	FALSE
xReady	BOOL	TRUE
xReferenced	BOOL	TRUE
xSetpointActive	BOOL	FALSE
xSafeStop	BOOL	FALSE
xPositionValid	BOOL	FALSE
wDigitalInputs	WORD	1
lrActualTorque	LREAL	0
eActualInverterMode	E_INVERTERMODE	EmergencyStop
usiErrorID	USINT	0
usiErrorSubID	USINT	0

25299799691

8.2 Controlling the "Speed control" operating mode

The following application example shows how to control "Velocity" mode.

Control

Control the axis in the *Velocity* structure as follows:

- To activate the operating mode, set *xActivate* to "TRUE".
- Define the setpoints for *lrVelocity*, *lrAcceleration*, *lrDeceleration*.
- To start the operating mode, set *xStart* to "TRUE".

Interface in the IEC Editor

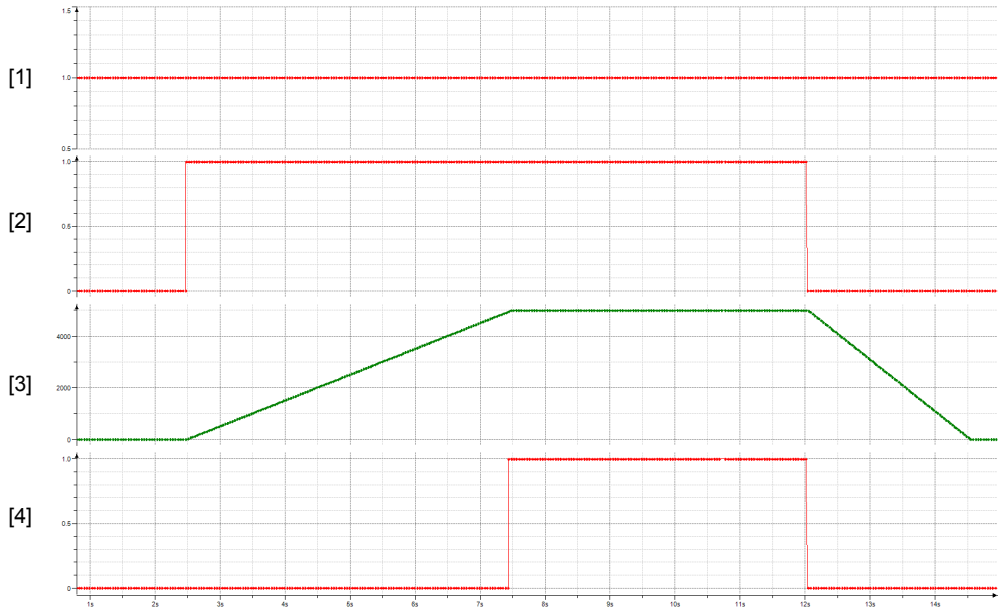
Velocity	SEW_UIDM.ModeVelocity_UI	
In	SEW_IDM.ST_ModeVelocityIn2	
xActivate	BOOL	TRUE
xStart	BOOL	TRUE
lrVelocity	LREAL	5000
lrAcceleration	LREAL	1000
lrDeceleration	LREAL	2000
uiJerkTime	UINT	0
Out	SEW_IDM.ST_ModeVelocityOut	
xActive	BOOL	TRUE
lrActualVelocity	LREAL	5000
xInVelocity	BOOL	TRUE

25300190603

Comment:

When *xStart* has a value of "TRUE", the system accelerates with *lrAcceleration*. When the target speed is reached, you will receive the feedback *xInVelocity* = "TRUE" in the *OUT* structure. When *xStart* has a value of "FALSE", the system stops with *lrDeceleration*.

Trace recording



25346435467

[1] Velocity.In.xActivate
[2] Velocity.In.xStart
[3] Velocity.In.lrVelocity
[4] Velocity.Out.xInVelocity

Comment:

The speed curve is trapezoidal as the drive was moved without jerk time.

8.3 Controlling the "Position control" operating mode

The following application example shows how to control "Positioning" mode.

Control

Control the axis in the *Positioning* structure as follows:

- To activate the operating mode, set *xActivate* to "TRUE".
- Define the setpoints for*lrPosition*, *lrVelocity*, *lrAcceleration*, and *lrDeceleration*.
- To start the operating mode, set *xStart* to "TRUE".

25876333/EN – 11/2018

Interface in the IEC Editor

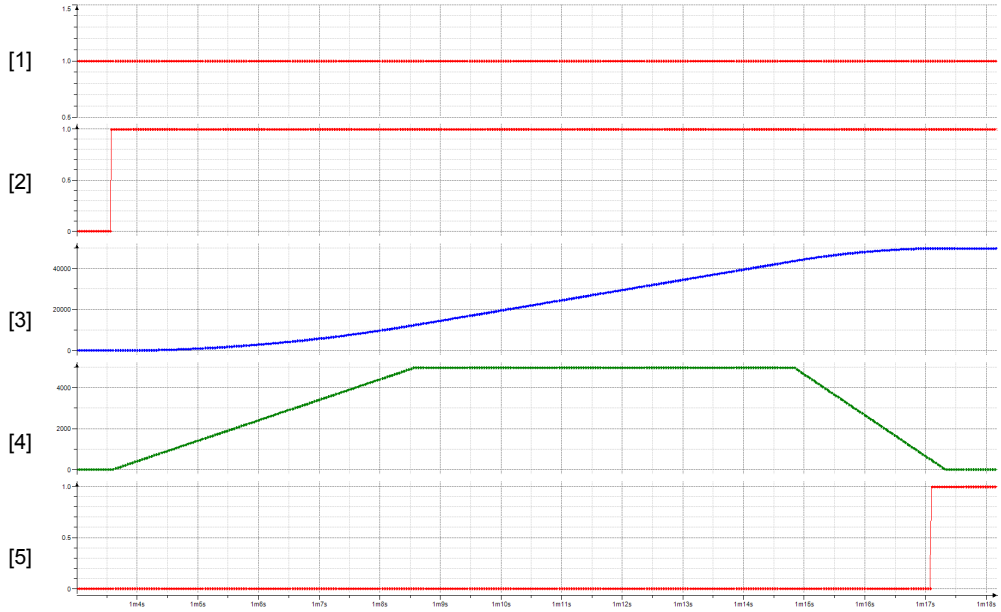
Positioning	SEW_UIDM.ModePositioning_UI	
In	SEW_IDM.ST_ModePositioningIn2	
xActivate	BOOL	TRUE
xStart	BOOL	TRUE
lrPosition	LREAL	50000
lrVelocity	LREAL	5000
lrAcceleration	LREAL	1000
lrDeceleration	LREAL	2000
uiJerkTime	UINT	0
Config	SEW_IDM.ST_ModePositioningConfig	
eMode	E_POSITIONINGMODE	eAbsolute
Out	SEW_IDM.ST_ModePositioningOut	
xActive	BOOL	TRUE
lrActualPosition	LREAL	50000
xInPosition	BOOL	TRUE

25300779787

Comment:

When *xStart* has a value of "TRUE", the system accelerates with *lrAcceleration*. When the target position is reached, you will receive the feedback *xInPosition* = "TRUE" in the *OUT* structure. When *xStart* has a value of "FALSE", the system stops with *lrDeceleration*.

Trace recording



25345085451

[1] Positioning.In.xActivate
[2] Positioning.In.xStart
[3] Positioning.In.lrPosition
[4] Positioning.In.lrVelocity
[5] Positioning.Out.xInPosition

Comment:

The speed curve is trapezoidal as the drive was moved without jerk time.

8.4 Controlling the "Torque control" operating mode

8.4.1 Torque > 0

The following application example shows how to control the "Torque control" operating mode in the IEC program.

Control

Control the axis in the *Torque* structure as follows:

- To activate the operating mode, set *xActivate* to "TRUE".
- Define the setpoints for *lrVelocityMax*, *lrVelocityMin*, and *lrTorque*.
- To start the operating mode, set *xStart* to "TRUE".

Interface in the IEC Editor

Torque	SEW_UIDM.ModeTorque_UI	
In	SEW_IDM.ST_ModeTorqueIn2	
xActivate	BOOL	TRUE
xStart	BOOL	TRUE
lrVelocityMax	LREAL	1000
lrVelocityMin	LREAL	1000
lrTorque	LREAL	0.2
uiJerkTime	UINT	0
Out	SEW_IDM.ST_ModeTorqueOut	
xActive	BOOL	TRUE
lrActualTorque	LREAL	0.2
xAtTorqueLimit	BOOL	TRUE

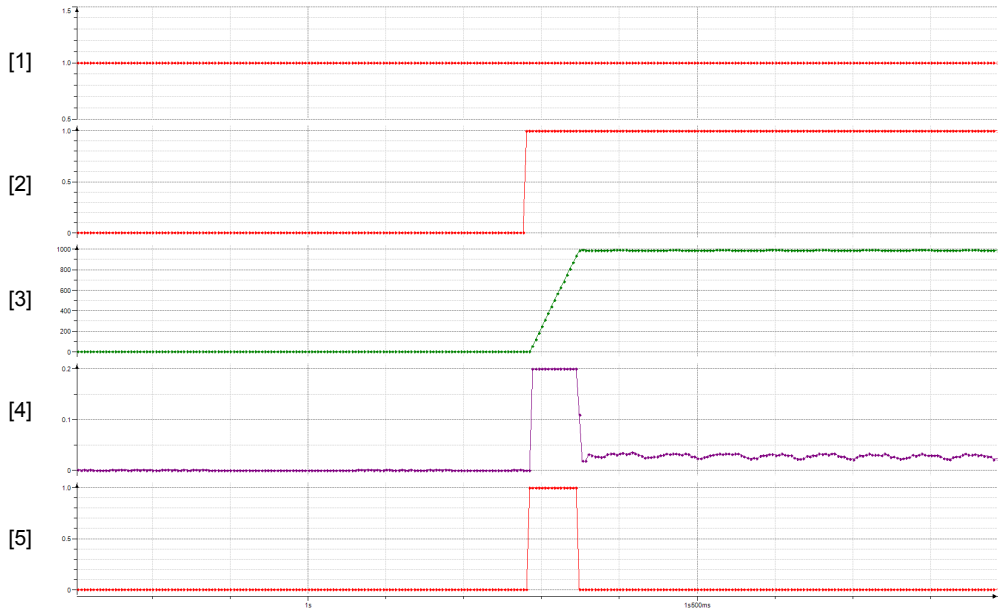
25300827915

Comment:

When the setpoint torque is reached, you will receive the feedback *xAtTorqueLimit* = "TRUE" in the *OUT* structure.

Trace recording

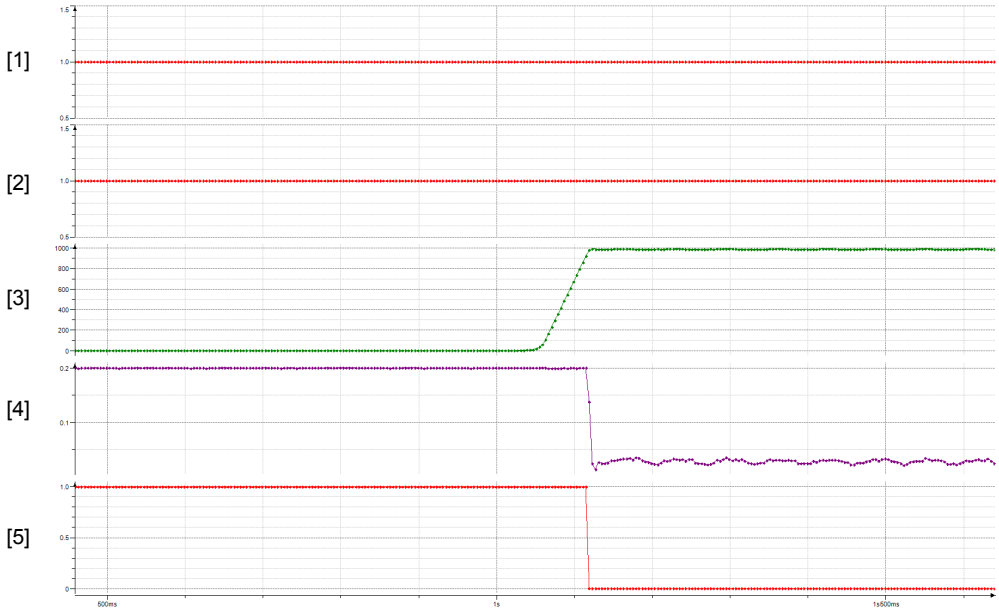
The following trace recording shows the profile of the current speed and the current torque with the values set at start as described above. The current torque is set immediately to the required torque when starting. The *xAtTorqueLimit* feedback is "TRUE". The axis accelerates with the torque in positive direction. When the maximum speed is reached, the current torque is reduced and the *xAtTorqueLimit* feedback is set to "FALSE".



25346425867

[1] Torque.In.xActivate
[2] Torque.In.xStart
[3] Torque.In.lrVelocityMax
[4] Torque.In.lrTorque
[5] Torque.In.xAtTorqueLimit

In the following trace recording, the axis is first held at standstill by the load; the current speed is zero and the *xAtTorqueLimit* feedback is "TRUE". Then the load suddenly disappears and the axis accelerates in positive direction. The current torque is reduced as soon as the maximum speed is reached. The *xAtTorqueLimit* feedback is accordingly set to "FALSE".



25346417035

[1] Torque.In.xActivate
[2] Torque.In.xStart
[3] Torque.In.lrVelocityMax
[4] Torque.In.lrTorque
[5] Torque.In.xAtTorqueLimit

Comment:

This scenario might occur, for example, in the event of tearing material when using a winder operated with torque control. It is important that the axis speed does not exceed the *lrVelocityMax* limit.

8.4.2 Torque < 0

The following application example shows how to control the "Torque control" operating mode in the IEC program.

Control

Control the axis in the *Torque* structure as follows:

- To activate the operating mode, set *xActivate* to "TRUE".
- Define the setpoints for *lrVelocityMax*, *lrVelocityMin*, and *lrTorque*.
- To start the operating mode, set *xStart* to "TRUE".

25876333/EN – 11/2018

Interface in the IEC Editor

Torque	SEW_UIDM.ModeTorque_UI	
In	SEW_IDM.ST_ModeTorqueIn2	
xActivate	BOOL	TRUE
xStart	BOOL	TRUE
lrVelocityMax	LREAL	1000
lrVelocityMin	LREAL	1000
lrTorque	LREAL	-0.2
uiJerkTime	UINT	0
Out	SEW_IDM.ST_ModeTorqueOut	
xActive	BOOL	TRUE
lrActualTorque	LREAL	-0.2
xAtTorqueLimit	BOOL	TRUE

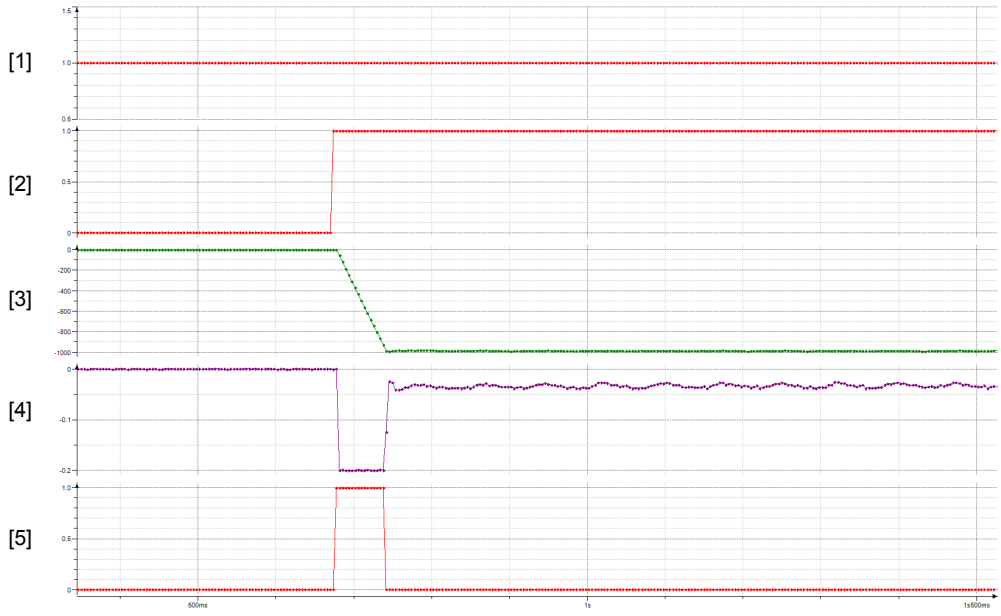
25300879243

Comment:

When the setpoint torque is reached, you will receive the feedback *xAtTorqueLimit* = "TRUE" in the *OUT* structure.

Trace recording

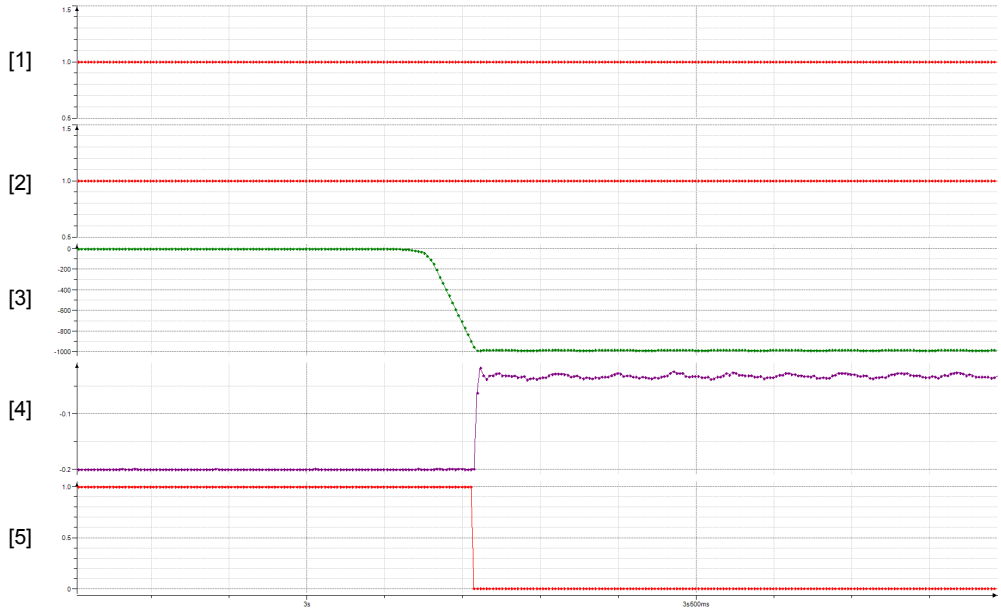
The following trace recording shows the profile of current speed and current torque when starting the operating mode with the values set as described above. The current torque is set immediately to the required torque when starting. The *xAtTorqueLimit* feedback is "TRUE". The axis accelerates with the torque in negative direction. When the maximum speed is reached, the current torque is reduced and the *xAtTorqueLimit* status variable is set to "FALSE".



25346396171

[1] Torque.In.xActivate
[2] Torque.In.xStart
[3] Torque.In.lrVelocityMax
[4] Torque.In.lrTorque
[5] Torque.In.xAtTorqueLimit

In the following trace recording, the axis is first held at standstill by the load. The current speed is zero and the *xAtTorqueLimit* status variable is set to "TRUE". Then the load suddenly disappears and the axis accelerates in negative direction. The current torque is reduced as soon as the maximum speed is reached. The *xAtTorqueLimit* status variable is accordingly set to "FALSE".



25346388875

[1] Torque.In.xActivate
[2] Torque.In.xStart
[3] Torque.In.lrVelocityMax
[4] Torque.In.lrTorque
[5] Torque.In.xAtTorqueLimit

Comment:

This scenario might occur, for example, in the event of tearing material when using a winder operated with torque control. It is important that the axis speed does not exceed the *lrVelocityMin* limit.

25876333/EN – 11/2018

8.5 Extended function

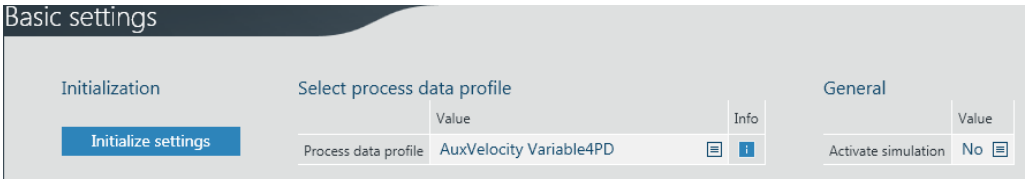
8.5.1 Extending the process data profile

Auxiliary axes use process data profiles that are as lean as possible and that contain all data required for the supported operating modes.

Control information and status information, for example a touchprobe function or jerk time processing are not included in the process data profile. The process data profile must be extended to obtain these functions.

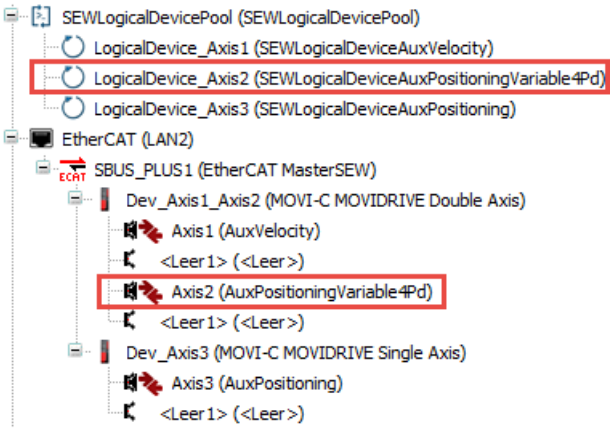
Do the following to extend the process data profile:

1. In MOVISUITE®, click the software module.
   ⇨ The configuration menus of the software module are displayed.
2. Choose the matching option as the value for the process data profile in the "Basic settings" menu under "Process data profile". For 4 additional process data words for exchanging data between MOVI-C® CONTROLLER and inverter, select "AuxVelocity Variable4PD" or "AuxPositioning Variable4PD". For 8 additional process data words for the MultiMotion Auxiliary Positioning software module "AuxPositioning Variable 8PD".



25301420171

3. Click the [Initialize settings] button.
4. Update the IEC project to set the new process data profile for the axis.



25301833739

5. Connect the additionally available process data words accordingly in the inverter. For a detailed description of applications, refer to the chapters "Processing jerk" (→ 🖹 69) and "Processing touchprobe" (→ 🖹 72).

8.5.2 Processing digital inputs and outputs of the inverter

The state of the digital inputs of the inverter is sent to the MOVI-C® CONTROLLER via status word 3 (bits 0 to 5). The state of the digital outputs of the inverter is controlled via control word 2 (bits 0 to 3). Both control words are not included in the "AuxVelocity" process data profile. All process data profiles with 8 or more process data words transmit this information by default.

Connection of process data

Proceed as follows:

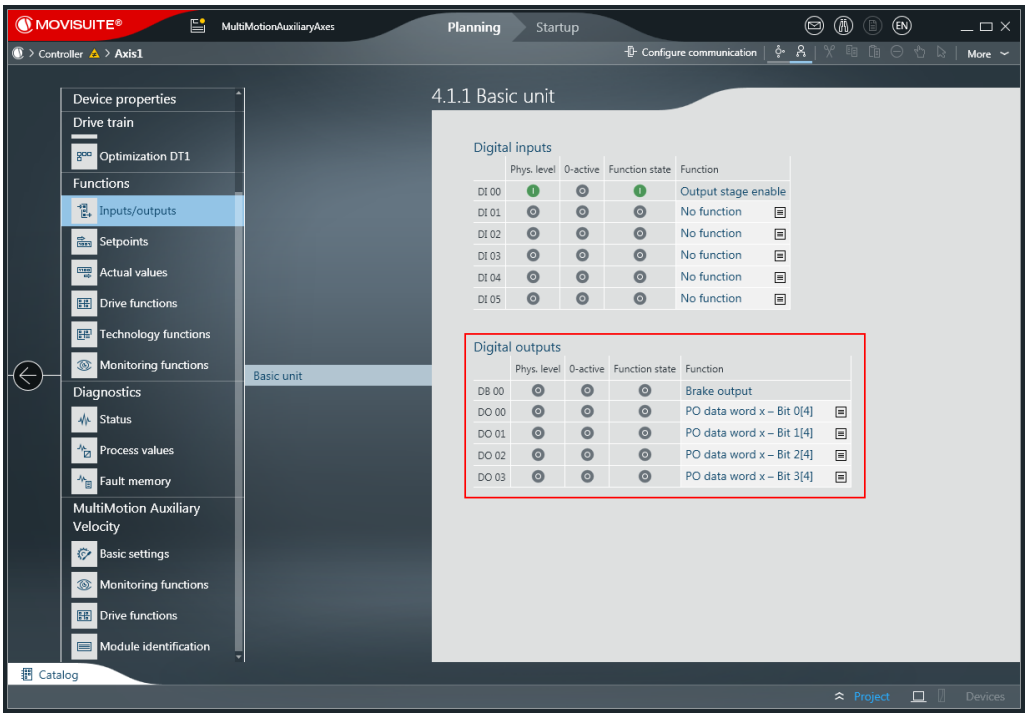
✓ The process data profile is extended to include additional process data words. For instructions, refer to the chapter "Extending the process data profile" (→ 🗎 65).

1. In MOVISUITE®, click the software module.

   ⇨ The configuration menus of the software module are displayed.

2. Under "Functions" in the main menu, open the "Inputs/outputs" menu and its submenu "Basic unit".

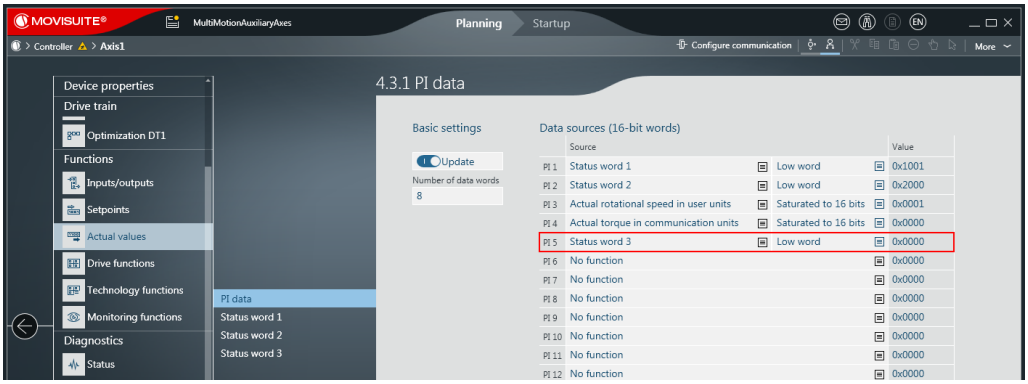
3. To connect the digital outputs with PO data word 5, define the function "PO data word x – bits 0-3[4]" for DO 00-03 (see screenshot). As the process data in the inverter are numbered beginning from 0, the word [4] is accessed during connection.



25327061259

4. Under "Functions" in the main menu, open the "Actual values" menu and its submenu "PI data".

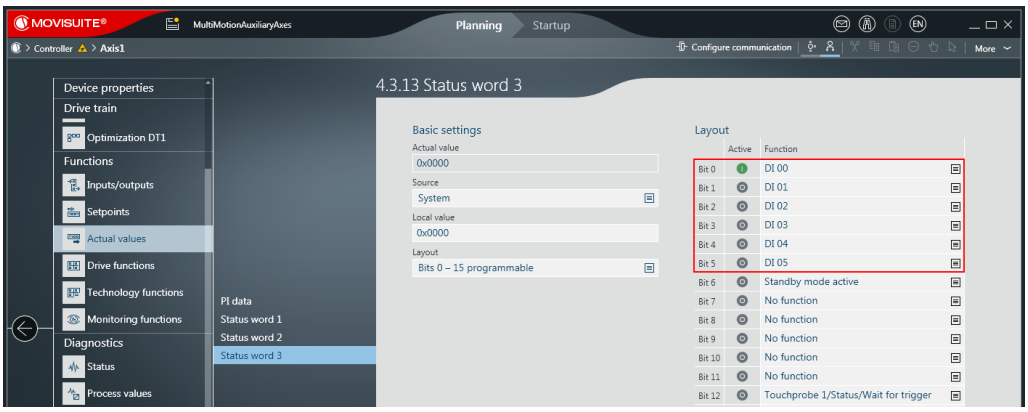
5. To connect "Status word 3" with "PE data word 5", define "Status word 3" as "Low word" as the source for "PI 5".



25327064331

25876333/EN – 11/2018

6. Now open submenu "Status word 3" of the "Actual values" menu.
7. To connect the digital inputs with "Status word 3", define the functions DI 00-05 for bits 0 to 5 in the "Layout" section.



25327067403

Programming in the IEC program

1. Exit the configuration menu and open the IEC project in the IEC Editor.
2. In the IEC project in action *User_PRG.ReadActualValues*, transfer process data word 5 (byte offset = 8; see screenshot) using the method *GetPdIn* of the logic device assigned to the axis.
   ⇨ The lower 6 bits in the *wReadBuffer* variable in the *User_PRG* program represent the state of the digital inputs.
3. In the IEC project in action *User_PRG.WriteSetpointValues*, transfer process data word 5 using the method *SetPdOut* of the logic device assigned to the axis to the value defined in the *wWriteBuffer* variable.
   ⇨ The lower 4 bits in the *wWriteBuffer* variable in the *User_PRG* program represent the state of the digital outputs.

User_PRG

```
1  PROGRAM User_PRG
2  VAR_OUTPUT
3      xInitDone : BOOL;
4  END_VAR
5  VAR
6
7      eError:         SEW_IDH.E_Error;
8
9      wReadBuffer:    WORD;
10     dwByteToRead:   DWORD := 2;
11
12     wWriteBuffer:   WORD;
13     dwByteToWrite:  DWORD := 2;
14
15 END_VAR
```

User_PRG.ReadActualValues

```
1  eError := LogicalDevice_Axis1.GetPdIn   (
2                                          pbBuffer := ADR(wReadBuffer),
3                                          dwBufferLen := SIZEOF(wReadBuffer),
4                                          dwOffset := 8,
5                                          pdwBytesToRead := ADR(dwByteToRead)
6                                          );
```

User_PRG.WriteSetpointValues

```
1  eError := LogicalDevice_Axis1.SetPdOut  (
2                                          pbBuffer := ADR(wWriteBuffer),
3                                          dwBufferLen := SIZEOF(wWriteBuffer),
4                                          dwOffset := 8,
5                                          pdwBytesToWrite := ADR(dwByteToWrite),
6                                          bMask := 0
7                                          );
```

25327070859

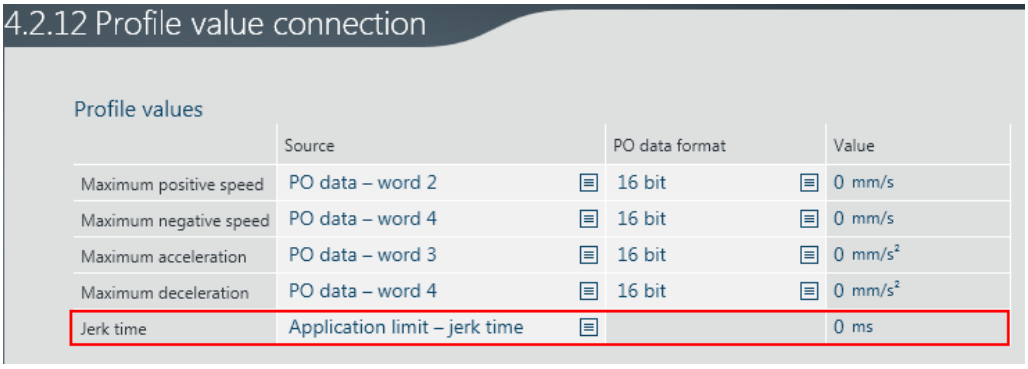
25876333/EN – 11/2018

8.5.3 Processing jerk

For processing a jerk time, the jerk time must be mapped to one of the free process data words in the inverter. Proceed as follows:

✓ The process data profile was extended to include additional process data words. For instructions, refer to the chapter "Extending the process data profile" (→ 🗎 65).

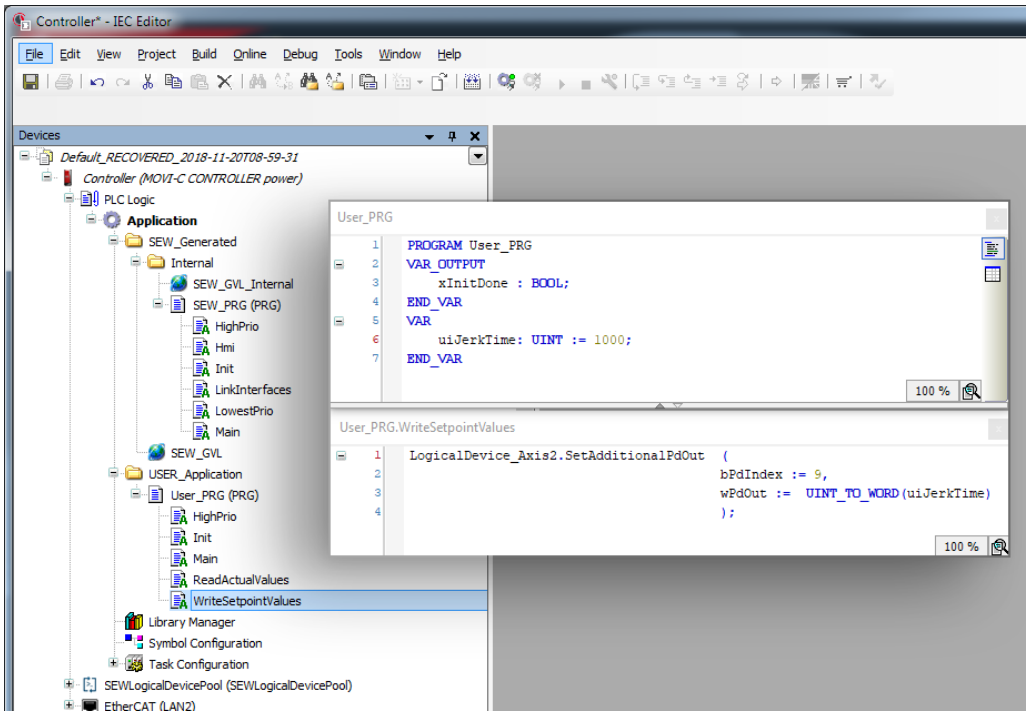
1. In MOVISUITE®, click the software module.
   ⇨ The configuration menus of the software module are displayed.
2. Under "Functions" in the main menu, open the "Setpoints" menu and its submenu "Profile value connection".
3. Select the required additional process data word for the "Jerk time".



25301837195

4. Exit the configuration menu and open the IEC project in the IEC Editor.

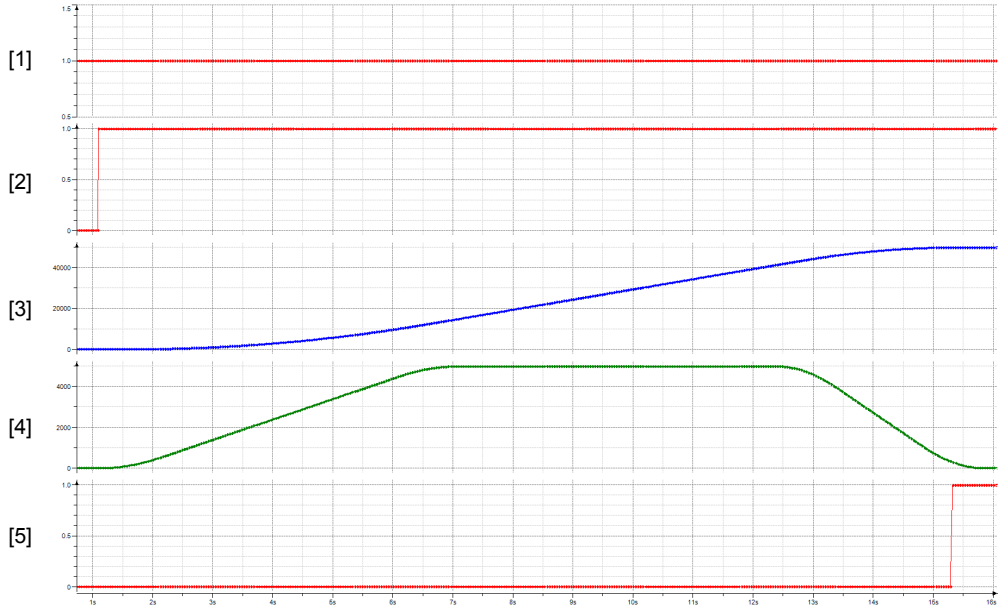
5. In the IEC project, transfer the jerk time to the set process data word using the method *SetAdditionalPdOut* of the logic device assigned to the axis. To do so, first declare a variable *uiJerkTime* in the *User_PRG (PRG)* program and then set the required jerk time in this variable.
6. Write the variable to the required process data word using the action *User_PRG.WriteSetpointValues*.



25301839755

Trace recording

The following trace recording shows an example of the position and speed profiles as described in chapter "Controlling the "Position control" operating mode" (→ 🗎 58) with a jerk time of 1000 ms:



25345089547

[1] Velocity.In.xActivate
[2] Velocity.In.xStart
[3] Velocity.In.lrPosition
[4] Velocity.In.lrVelocity
[5] Velocity.Out.xInPosition

Comment:

The speed profile is no longer trapezoidal. The edges are rounded, which means the acceleration does not "jump" to the set value but gradually reaches the set value via the jerk time. Positioning takes accordingly longer. In this case, it takes twice the jerk time.

8.5.4 Processing touchprobe

Connection of process data

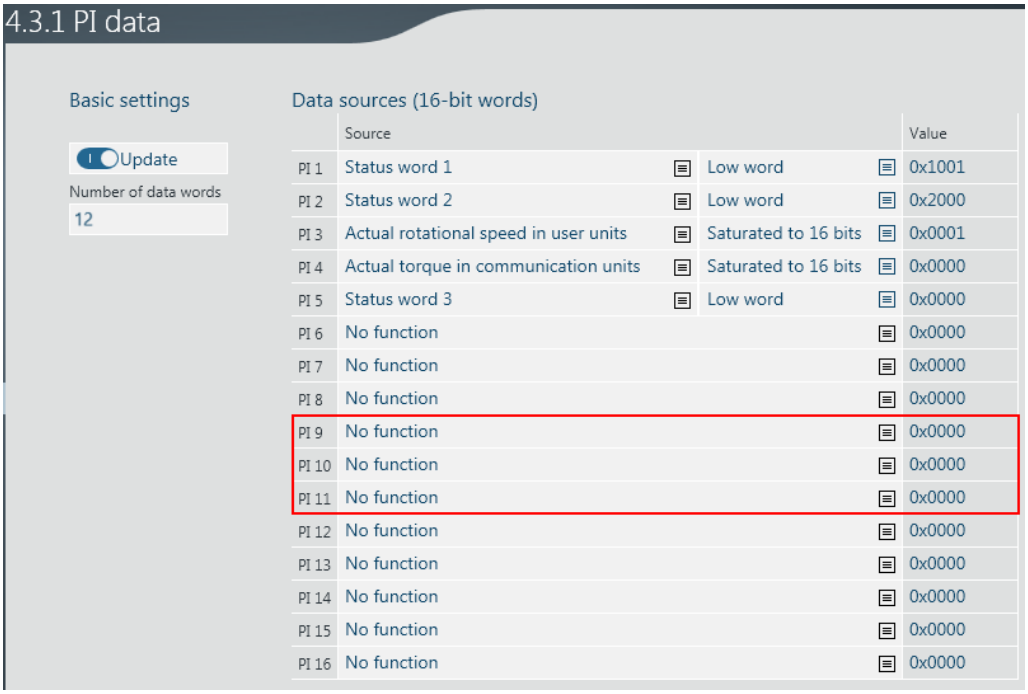
For processing the touchprobe function, the following control and status information must be mapped to the free process data words in the inverter:

- Touchprobe position
- Touchprobe counter
- "Activate" control bit
- "Active" status bit

Proceed as follows:

✓ The process data profile was extended to include additional process data words. For instructions, refer to the chapter "Extending the process data profile" (→ 🗎 65).

1. In MOVISUITE®, click the software module.
   ⇨ The configuration menus of the software module are displayed.
2. Under "Functions" in the main menu, open the "Actual values" menu and its submenu "PI data".
3. To connect the touchprobe position, define "Low word" of the position for "Touchprobe 1/detected value" as the source for "PI 9".
4. To connect the touchprobe position, define "High word" of the position for "Touchprobe 1/detected value" as the source for "PI 10".
5. To connect the touchprobe counter, define "Saturated to 16 bits" for "Touchprobe 1/trigger – counter" as the source for "PI 11".

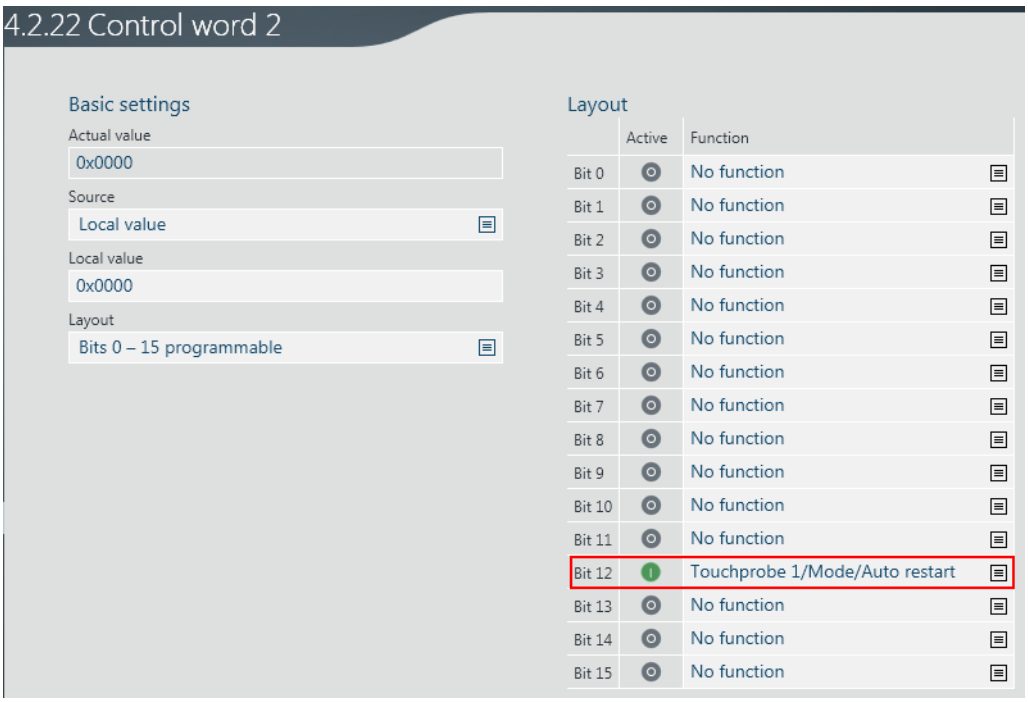


25302233995

6. Under "Functions" in the main menu, open the "Setpoints" menu and its submenu "Control word 2".

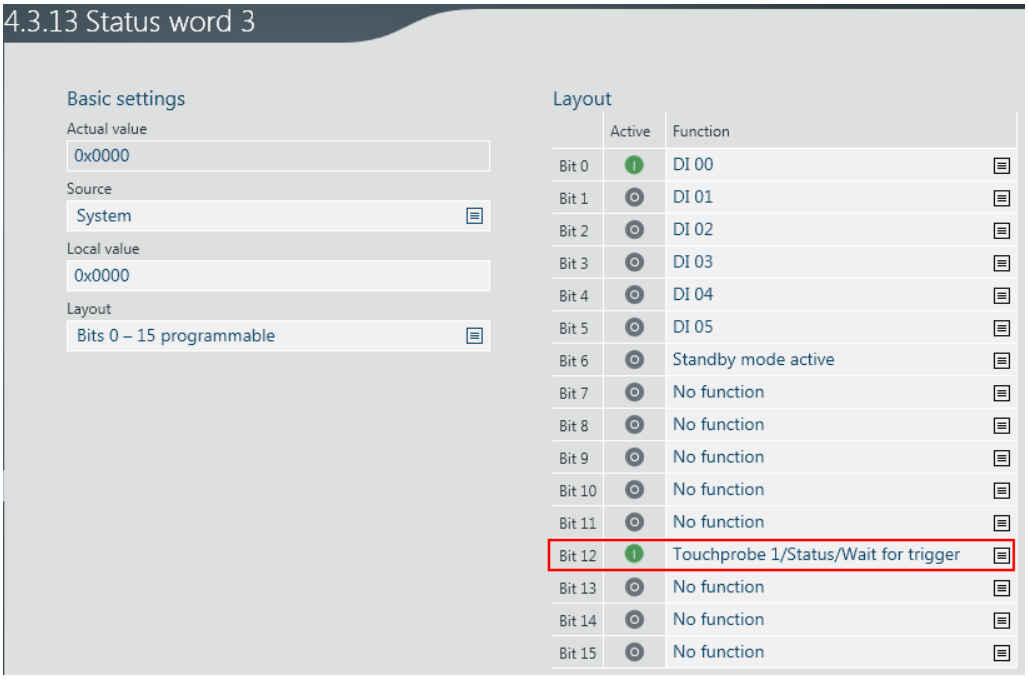
25876333/EN – 11/2018

7. To connect "Activate touchprobe" control, define the function "Touchprobe 1/Mode/Auto restart" for "Bit 12".



25302236555

8. Under "Functions" in the main menu, open the "Setpoints" menu and its submenu "Control word 3".
9. To connect the "Touchprobe active" feedback, define the function "Touchprobe 1/Status/Wait for trigger" for "Bit 12".



25302239115

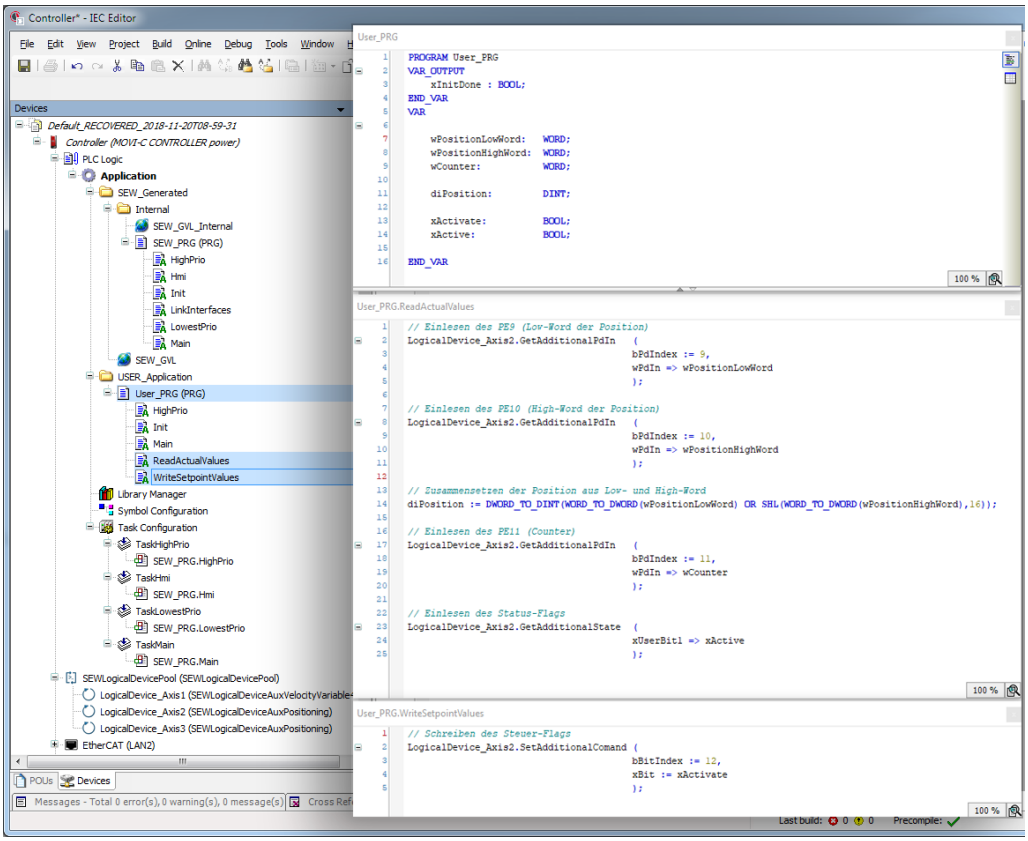
25876333/EN – 11/2018

Programming example in the IEC program

INFORMATION

Access to the additionally configured process data can only be programmed using the methods of the logic device assigned to the axis.

1. Exit the configuration menu and open the IEC project in the IEC Editor.
2. Declare the required local variables as shown.
3. In the action *User_PRG.ReadActualValues*, read process data words 9 to 10 using the *GetAdditionalPdIn()* method. These process data words contain the position value of the touchprobe function, which is generated accordingly.
4. In the action *User_PRG.ReadActualValues*, read the process data word 11 using the *GetAdditionalPdIn()* method. This process data word contains the counter value of the touchprobe function.
5. In the action *User_PRG.ReadActualValues*, read the additionally configured status bit using the *GetAdditionalState()* method. This status bit contains the *xActive* feedback of the touchprobe function.
6. In the action *User_PRG.WriteSetpointValues*, write the additionally configured status bit using the *SetAdditionalCommand()* method. This status bit contains the *xActivate* control signal of the touchprobe function.



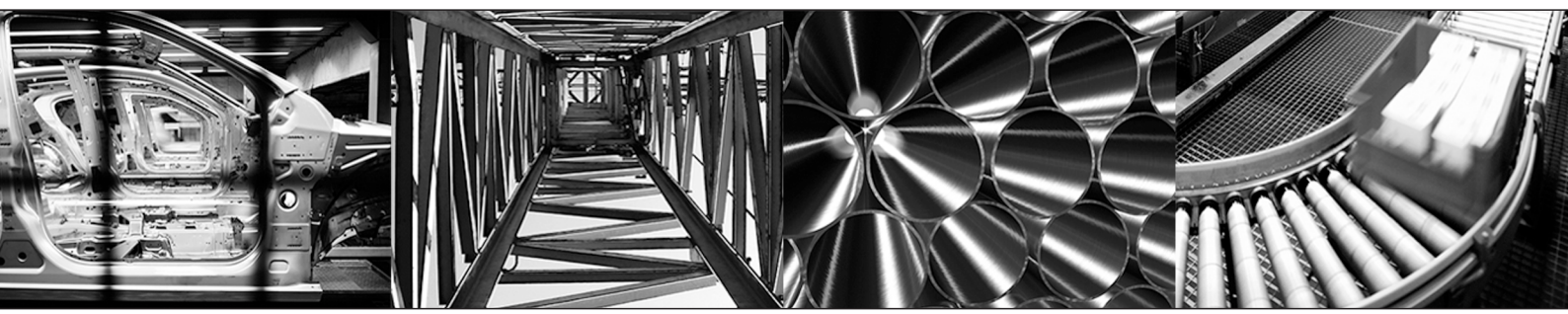
25311918859

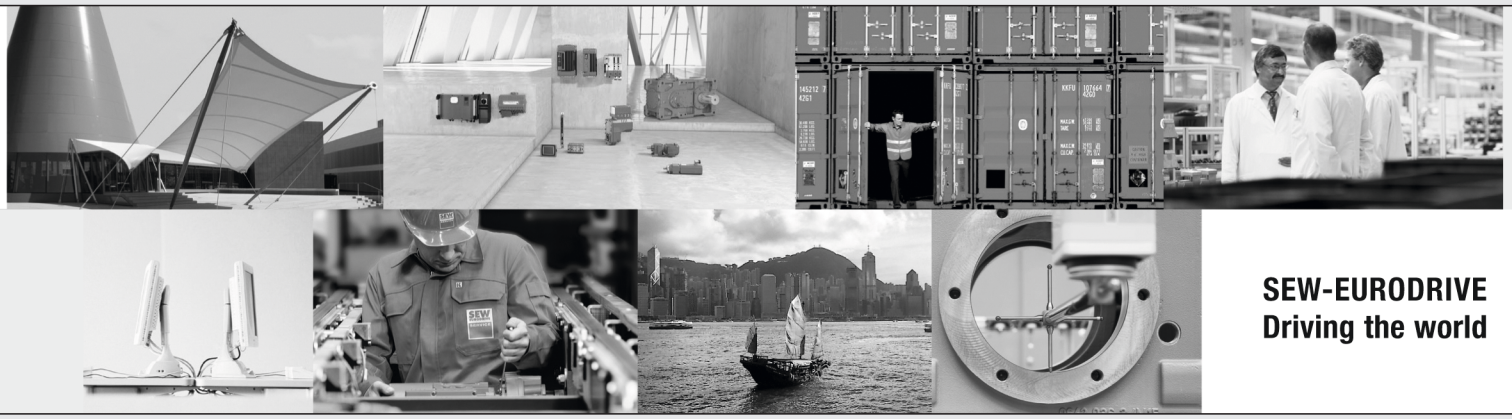
⇨ You can activate the touchprobe function using the *xActivate* bit. *xActive* is reported back once the touchprobe function has been activated. The touchprobe counter increments with each touchprobe event. The position value allocated to the event is stored in the local variable *diPosition*.

25876333/EN – 11/2018

Index

25876333/EN – 11/18





SEW-EURODRIVE
Driving the world

SEW-EURODRIVE GmbH & Co KG
Ernst-Blickle-Str. 42
76646 BRUCHSAL
GERMANY
Tel. +49 7251 75-0
Fax +49 7251 75-1970
sew@sew-eurodrive.com
➞ **www.sew-eurodrive.com**