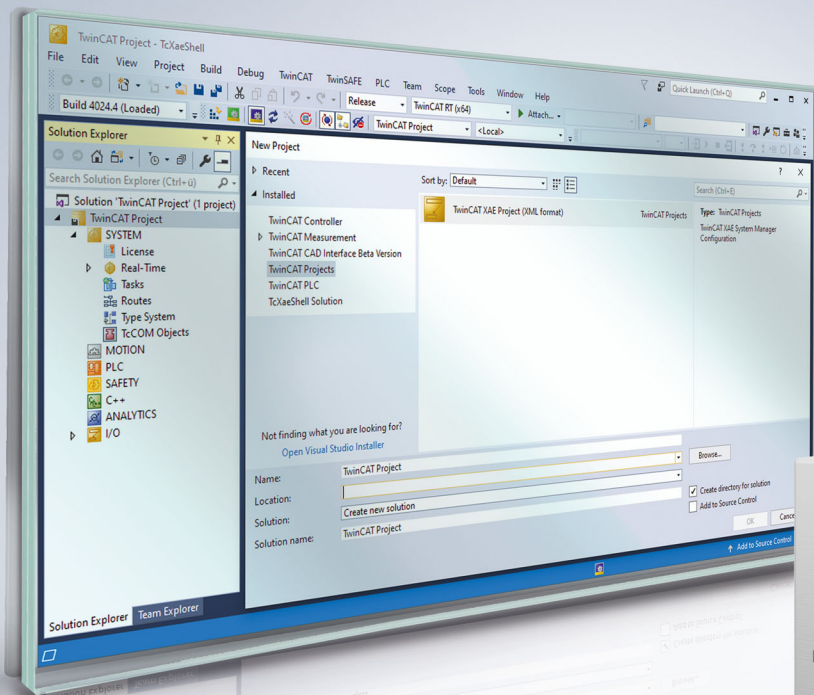


# BECKHOFF New Automation Technology

Manual | EN

# TE1000

TwinCAT 3 | PLC Library: Tc3\_MC2\_AdvancedHoming





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# 1 Foreword

## 1.1 Notes on the documentation

This description is intended exclusively for trained specialists in control and automation technology who are familiar with the applicable national standards.

For installation and commissioning of the components, it is absolutely necessary to observe the documentation and the following notes and explanations.

The qualified personnel is obliged to always use the currently valid documentation.

The responsible staff must ensure that the application or use of the products described satisfies all requirements for safety, including all the relevant laws, regulations, guidelines, and standards.

### Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development.

We reserve the right to revise and change the documentation at any time and without notice.

No claims to modify products that have already been supplied may be made on the basis of the data, diagrams, and descriptions in this documentation.

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## 1.2 For your safety

### Safety regulations

Read the following explanations for your safety.

Always observe and follow product-specific safety instructions, which you may find at the appropriate places in this document.

**Exclusion of liability**

All the components are supplied in particular hardware and software configurations which are appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH & Co. KG.

**Personnel qualification**

This description is only intended for trained specialists in control, automation, and drive technology who are familiar with the applicable national standards.

**Signal words**

The signal words used in the documentation are classified below. In order to prevent injury and damage to persons and property, read and follow the safety and warning notices.

**Personal injury warnings****⚠ DANGER**

Hazard with high risk of death or serious injury.

**⚠ WARNING**

Hazard with medium risk of death or serious injury.

**⚠ CAUTION**

There is a low-risk hazard that could result in medium or minor injury.

**Warning of damage to property or environment****NOTICE**

The environment, equipment, or data may be damaged.

**Information on handling the product**

This information includes, for example:  
recommendations for action, assistance or further information on the product.

## 1.3 Notes on information security

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Beckhoff products and solutions undergo continuous further development. This also applies to security functions. In light of this continuous further development, Beckhoff expressly recommends that the products are kept up to date at all times and that updates are installed for the products once they have been made available. Using outdated or unsupported product versions can increase the risk of cyber threats.

To stay informed about information security for Beckhoff products, subscribe to the [RSS feed](#).

## 2 Overview

The TwinCAT Motion Control PLC library Tc3\_MC2\_AdvancedHoming includes function blocks for programming machine applications. The Tc3\_MC2\_AdvancedHoming is based on the similarly revised PLCopen specification for Motion Control function blocks V2.0. This library contains function blocks of Part 5 – Homing Procedures ([www.PLCopen.org](http://www.PLCopen.org)).



### TwinCAT Version

The Tc3\_MC2\_AdvancedHoming library can be used with TwinCAT version 3.1 Build 4020 or higher. With remote programmed controllers care must be taken that an appropriate version is installed on both the programmer PC and the control PC. In the case of control systems with the operating system Windows CE, the version of the installed image is decisive.

## 2.1 Requirements

In order to use referencing sequences that limit the torque or use the current torque as detection variable, it is necessary to ensure that the current torque is present and linked in the process image of the drive controller. In addition, in the dialog of the Nc drive on the parameter page under **Torque and Acceleration Scaling**, the **Input Scaling Factor (Actual Torque)** must be  $\geq 0.0$  and set to the correct value (0.1 scales the value for the AX5000 in %):

General NC-Drive Parameter Time Compensation		
	Parameter	Offline Value
-	Output Settings:	
	Invert Motor Polarity	FALSE
	Reference Velocity	2200.0
	at Output Ratio [0.0 ... 1.0]	1.0
+	Position and Velocity Scaling:	
-	Torque and Acceleration Scaling:	
	Input Scaling Factor (Actual Torque)	0.1
	Input P-T1 Filter Time (Actual Torque)	0.0
	Input P-T1 Filter (Actual Torque Derivative)	0.0
	Output Scaling Factor (Torque)	0.0
	Output Delay (Torque)	0.0
	Output Scaling Factor (Acceleration)	0.0
	Output Delay (Acceleration)	0.0
+	Optional Position Command Output Smoothing Filter:	
+	Other Settings:	

## 2.2 Homing procedures

Until now referencing procedures have been treated as separate sequences during the start phase of a machine or axis. The actual sequence was not visible to the user. In order to gain more control on the referencing sequence itself, user-specific referencing procedures can now be programmed:



- **HomeAbsoluteSwitch** – homing to a sensor with movement range limit position sensors
- **HomeLimitSwitch** – homing to a movement range limit position sensor
- **HomeBlock** – homing to a mechanical fixed stop
- **HomeReferencePulse** – homing to the zero track of an encoder
- **HomeDirect** – static homing, position is set to the user position
- **HomeAbsolute** - static homing, position is set to the position of a reference encoder

## 2.3 Function blocks

In order to give the user control over the various referencing procedures, a number of additional function blocks (FBs) is defined. It is possible to describe complex referencing procedures by concatenating these FBs.

### "Step" function blocks

The following FBs are suitable for the homing procedures and are executed in the axis state "Homing" or place the axis in this state. The axis state is not changed after completion, i.e. the axis remains in the "Homing" state afterwards.

- MC\_StepAbsoluteSwitch / MC\_StepAbsoluteSwitchDetection
- MC\_StepLimitSwitch / MC\_StepLimitSwitchDetection
- MC\_StepBlock / MC\_StepBlockDetection / MC\_StepBlockLagBased / MC\_StepBlockLagBasedDetection
- MC\_StepReferencePulse / MC\_StepReferencePulseDetection

### Finalizing function blocks

These FBs lead to the final position and change the axis state from "Homing" to "Standstill".

- MC\_HomeDirect
- MC\_HomeAbsolute
- MC\_FinishHoming
- MC\_AbortHoming

### Function blocks for flying homing

In addition, FBs are required that can be executed while the machine is running. The axis state is not "Homing", nor is it changed to this state. These FBs therefore have no effect on the state diagram (cf. PLCopen). Like administrative FBs they can be called in any movement states.

- MC\_StepReferenceFlyingSwitch
- MC\_StepReferenceFlyingRefPulse
- MC\_AbortPassiveHoming

## 2.4 Structure of custom homing sequences

User-specific homing sequences can be created in a simple manner from the available function blocks. Note that when doing so every sequence must always be ended by a finalizing FB so that, if necessary, modified parameters of the TwinCAT NC or the drive controller can be reconstructed and the "HomingState" is also changed correspondingly.

### Example: structure of a "Home-on-block" sequence

A "Home-on-block" sequence can be built very easily by using the function blocks MC\_StepBlock and depending on the result of the function block MC\_FinishHoming or MC\_AbortHoming.

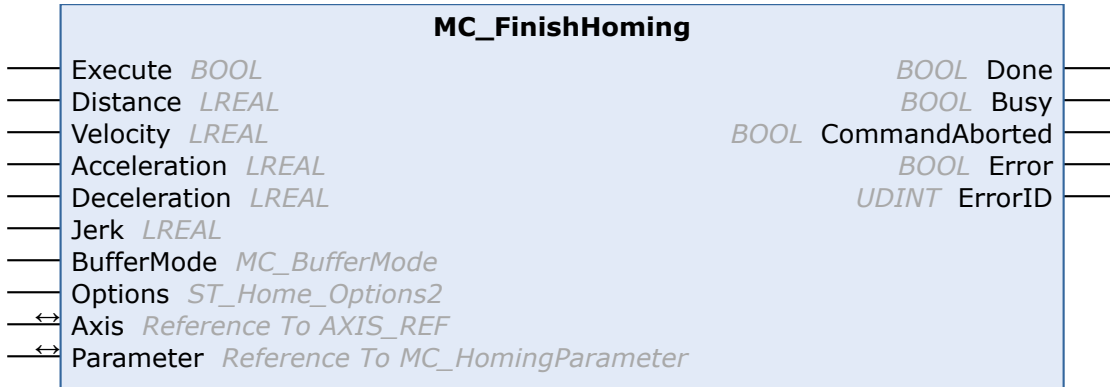
The MC\_StepBlock is parameterized and triggered accordingly. If the sequence contained therein is run through without errors (Done = TRUE), the function block MC\_FinishHoming is called at the end. In the other case (Error = TRUE or CommandAborted = TRUE) a MC\_AbortHoming is called to terminate the sequence.

Also see [Samples](#) [▶ [51](#)].

### 3 Function blocks

#### 3.1 Finalizing functions

##### 3.1.1 MC\_FinishHoming



The MC\_FinishHoming function block completes a successful homing sequence and ensures that modified parameters are reset to their original values. The axis leaves the homing state.



To complete a homing sequence (not when using passive homing functions [►\_15] exclusively) it is necessary to call a finalizing FB.

#### Inputs

```
VAR_INPUT
  Execute      : BOOL;
  Distance     : LREAL;
  Velocity     : LREAL;
  Acceleration : LREAL;
  Deceleration : LREAL;
  Jerk        : LREAL;
  BufferMode   : MC_BufferMode;
  Options     : ST_Home_Options2;
END_VAR
```

Name	Type	Description
Execute	BOOL	The command is executed with a rising edge.
Distance	LREAL	Distance by which the axis moves away from the current position.
Velocity	LREAL	Maximum travel velocity (>0).
Acceleration	LREAL	Acceleration (≥0); if the value is 0, the standard acceleration from the axis configuration for the XAE TwinCAT Engineering environment is used.
Deceleration	LREAL	Deceleration (≥0). If the value is 0, the standard deceleration from the axis configuration for the XAE TwinCAT Engineering environment is used.
Jerk	LREAL	Jerk (≥0). If the value is 0, the standard jerk from the axis configuration for the XAE TwinCAT Engineering environment is used.
BufferMode	MC_BufferMode	Currently not implemented
Options	ST_Home_Options2 [►_47]	<b>DisableDriveAccess:</b> Set to FALSE for Beckhoff drives, usually to TRUE for third-party drives (see info).



If `DisableDriveAccess = TRUE`, the user is responsible for modifying and reconstructing required drive parameters. The parameters required for the intended homing sequence must be agreed with the manufacturer of the third-party drive.

### Inputs/Outputs

```
VAR_IN_OUT
  Axis      : AXIS_REF;
  Parameter : MC_HomingParameter;
END_VAR
```

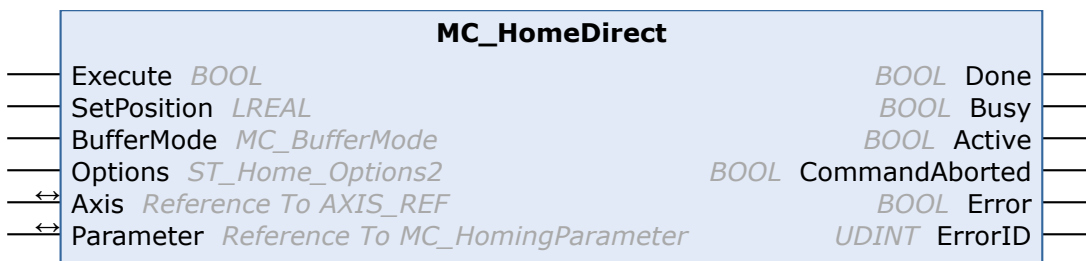
Name	Type	Description
Axis	<u>AXIS_REF</u>	Axis data structure of the type <code>AXIS_REF</code> , which uniquely addresses an axis in the system. Among other parameters it contains the current axis status, including position, velocity or error state.
Parameter	<code>MC_HomingParameter</code>	Data structure of the type <code>MC_HomingParameter</code> , which must be transferred from function block to function block over the entire homing sequence.

### Outputs

```
VAR_OUTPUT
  Done      : BOOL;
  Busy      : BOOL;
  CommandAborted : BOOL;
  Error     : BOOL;
  ErrorID   : UDINT;
END_VAR
```

Name	Type	Description
Done	BOOL	Becomes TRUE if the command was completed successfully.
Busy	BOOL	The Busy output becomes TRUE when the command is started with Execute and remains TRUE for as long as the command is processed. If Busy becomes FALSE again, the function block is ready for a new order. At the same time one of the outputs, Done, CommandAborted, or Error, is set.
CommandAborted	BOOL	Becomes TRUE, if the command could not be fully executed.
Error	BOOL	Becomes TRUE as soon as an error occurs.
ErrorID	UDINT	If the error output is set, this parameter supplies the <u>error number</u> .

## 3.1.2 MC\_HomeDirect



The `MC_HomeDirect` function block completes a successful homing sequence, resets the axis to a defined value and ensures that modified parameters are reset to their original values. The axis leaves the homing state.



To complete a homing sequence (not when using passive homing functions exclusively) it is necessary to call a finalizing FB.

 **Inputs**

```
VAR_INPUT
  Execute      : BOOL;
  SetPosition  : LREAL;
  BufferMode   : MC_BufferMode;
  Options      : ST_Home_Options2;
END_VAR
```

Name	Type	Description
Execute	BOOL	The command is executed with a rising edge.
SetPosition	LREAL	Position value to which the axis position is set to.
BufferMode	MC_BufferMode	Currently not implemented
Options	<a href="#">ST_Home_Options2</a>  ▶ 47	<b>DisableDriveAccess:</b> Set to FALSE for Beckhoff drives, usually to TRUE for third-party drives (see info).



If DisableDriveAccess = TRUE, the user is responsible for modifying and reconstructing required drive parameters. The parameters required for the intended homing sequence must be agreed with the manufacturer of the third-party drive.

 **Inputs/Outputs**

```
VAR_IN_OUT
  Axis      : AXIS_REF;
  Parameter : MC_HomingParameter;
END_VAR
```

Name	Type	Description
Axis	<a href="#">AXIS_REF</a>	Axis data structure of the type <a href="#">AXIS_REF</a> , which uniquely addresses an axis in the system. Among other parameters it contains the current axis status, including position, velocity or error state.
Parameter	<a href="#">MC_HomingParameter</a>	Data structure of the type <a href="#">MC_HomingParameter</a> , which must be transferred from function block to function block over the entire homing sequence.

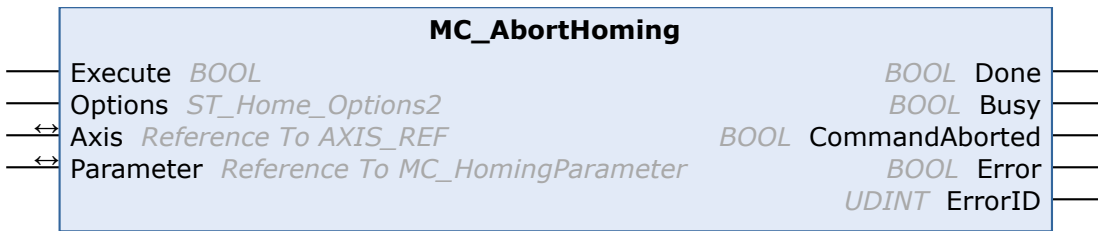
 **Outputs**

```
VAR_OUTPUT
  Done      : BOOL;
  Busy      : BOOL;
  Active    : BOOL;
  CommandAborted : BOOL;
  Error     : BOOL;
  ErrorID   : UDINT;
END_VAR
```

Name	Type	Description
Done	BOOL	Becomes TRUE, if the command was completed successfully.
Busy	BOOL	The Busy output becomes TRUE when the command is started with Execute and remains TRUE as long as the command is processed. If Busy becomes FALSE again, the function block is ready for a new order. At the same time one of the outputs, Done, CommandAborted or Error, is set.

Name	Type	Description
Active	BOOL	Indicates that the command is executed.
CommandAborted	BOOL	Becomes TRUE, if the command could not be fully executed.
Error	BOOL	Becomes TRUE, as soon as an error occurs.
ErrorID	UDINT	If the error output is set, this parameter supplies the <u>error number</u> .

### 3.1.3 MC\_AbortHoming



The MC\_AbortHoming function block aborts a homing sequence and ensures that modified parameters are reset to their original values. The axis leaves the homing state.



To complete a homing sequence (not when using passive homing functions exclusively) it is necessary to call a finalizing FB.

#### Inputs

```
VAR_INPUT
    Execute : BOOL;
    Options : ST_Home_Options2;
END_VAR
```

Name	Type	Description
Execute	BOOL	The command is executed with a rising edge.
Options	<u>ST_Home_Options2</u> ▶ 471	<b>DisableDriveAccess:</b> Set to FALSE for Beckhoff drives, usually to TRUE for third-party drives (see info).



If DisableDriveAccess = TRUE, the user is responsible for modifying and reconstructing required drive parameters. The parameters required for the intended homing sequence must be agreed with the manufacturer of the third-party drive.

#### Inputs/Outputs

```
VAR_IN_OUT
    Axis : AXIS_REF;
    Parameter : MC_HomingParameter;
END_VAR
```

Name	Type	Description
Axis	<u>AXIS_REF</u>	Axis data structure of the type <u>AXIS_REF</u> , which uniquely addresses an axis in the system. Among other parameters it contains the current axis status, including position, velocity or error state.
Parameter	MC_HomingParameter	Data structure of the type <u>MC_HomingParameter</u> , which must be transferred from function block to function block over the entire homing sequence.

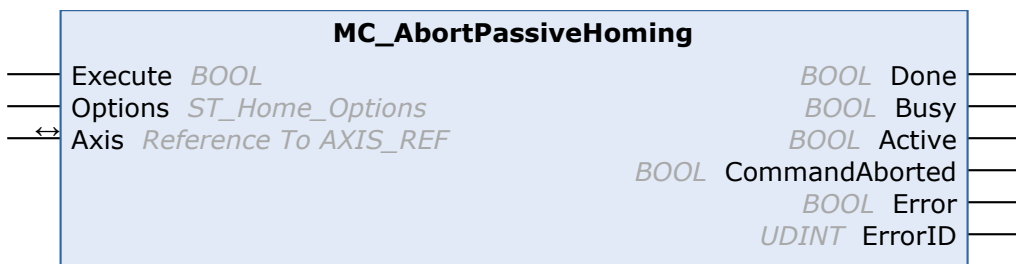
**🔌 Outputs**

```
VAR_OUTPUT
  Done          : BOOL;
  Busy          : BOOL;
  CommandAborted : BOOL;
  Error        : BOOL;
  ErrorID      : UDINT;
END_VAR
```

Name	Type	Description
Done	BOOL	Becomes TRUE if the command was completed successfully.
Busy	BOOL	The Busy output becomes TRUE when the command is started with Execute and remains TRUE for as long as the command is processed. If Busy becomes FALSE again, the function block is ready for a new order. At the same time one of the outputs, Done, CommandAborted, or Error, is set.
CommandAborted	BOOL	Becomes TRUE, if the command could not be fully executed.
Error	BOOL	Becomes TRUE as soon as an error occurs.
ErrorID	UDINT	If the error output is set, this parameter supplies the <u>error number</u> .

### 3.2 Referencing functions (passive)

#### 3.2.1 MC\_AbortPassiveHoming



**🔌 Inputs**

```
VAR_INPUT
  Execute : BOOL;
  Options : ST_Home_Options;
END_VAR
```

Name	Type	Description
Execute	BOOL	The command is executed with a rising edge at Execute input.
Options	ST_Home_Options	Currently not used.

**🔌 Inputs/Outputs**

```
VAR_IN_OUT
  Axis : AXIS_REF;
END_VAR
```

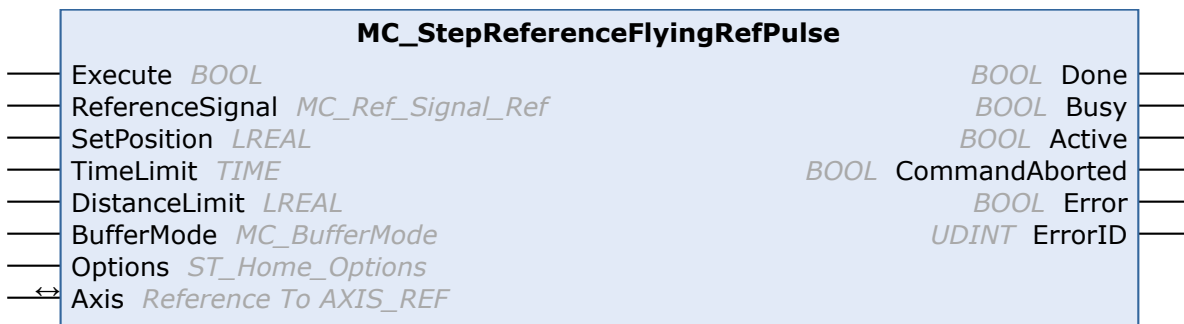
Name	Type	Description
Axis	<u>AXIS_REF</u>	Axis data structure of the type AXIS_REF, which uniquely addresses an axis in the system. Among other parameters it contains the current axis status, including position, velocity or error state.

**🚩 Outputs**

```
VAR_OUTPUT
  Done          : BOOL;
  Busy          : BOOL;
  Active        : BOOL;
  CommandAborted : BOOL;
  Error         : BOOL;
  ErrorID       : UDINT;
END_VAR
```

Name	Type	Description
Done	BOOL	Becomes TRUE, if the command was completed successfully.
Busy	BOOL	The Busy output becomes TRUE when the command is started with Execute and remains TRUE as long as the command is processed. If Busy becomes FALSE again, the function block is ready for a new order. At the same time one of the outputs, Done, CommandAborted or Error, is set.
Active	BOOL	Indicates that the command is executed.
CommandAborted	BOOL	Becomes TRUE, if the command could not be fully executed.
Error	BOOL	Becomes TRUE, as soon as an error occurs.
ErrorID	UDINT	If the error output is set, this parameter supplies the <u>error number</u> .

### 3.2.2 MC\_StepReferenceFlyingRefPulse



The function block MC\_StepReferenceFlyingRefPulse performs referencing during a running movement to the zero pulse of an encoder.

The execution does not start or modify any movement itself.

**🚩 Inputs**

```
VAR_INPUT
  Execute          : BOOL;
  ReferenceSignal  : MC_Ref_Signal_Ref;
  SetPosition      : LREAL;
  TimeLimit        : TIME;
  DistanceLimit    : LREAL;
  BufferMode        : MC_BufferMode;
  Options          : ST_Home_Options;
END_VAR
```



Name	Type	Description
Execute	BOOL	The command is executed with a rising edge at the Execute input.
ReferenceSignal	MC_Ref_Signal_Ref ▶ 46	Configuration of the reference signal source.
SetPosition	LREAL	Position value that the axis position is set to.
TimeLimit	TIME	Exceeding this time leads to the search procedure being aborted.
DistanceLimit	LREAL	Exceeding this distance in relation to the start position leads to the search procedure being aborted.
BufferMode	MC_BufferMode	Currently not implemented.
Options	ST_Home_Options	Currently not used.

 **Inputs/Outputs**

```
VAR_IN_OUT
  Axis : AXIS_REF;
END_VAR
```

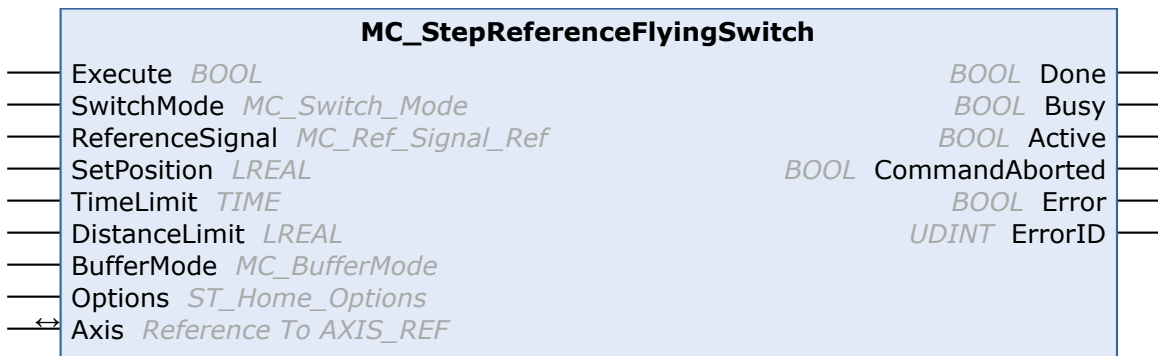
Name	Type	Description
Axis	<u>AXIS_REF</u>	Axis data structure of the type AXIS_REF, which uniquely addresses an axis in the system. Among other parameters it contains the current axis status, including position, velocity or error state.

 **Outputs**

```
VAR_OUTPUT
  Done          : BOOL;
  Busy          : BOOL;
  Active        : BOOL;
  CommandAborted : BOOL;
  Error         : BOOL;
  ErrorID       : UDINT;
END_VAR
```

Name	Type	Description
Done	BOOL	Becomes TRUE, if the command was completed successfully.
Busy	BOOL	The Busy output becomes TRUE when the command is started with Execute and remains TRUE as long as the command is processed. If Busy becomes FALSE again, the function block is ready for a new order. At the same time one of the outputs, Done, CommandAborted or Error, is set.
Active	BOOL	Indicates that the command is executed.
CommandAborted	BOOL	Becomes TRUE, if the command could not be fully executed.
Error	BOOL	Becomes TRUE, as soon as an error occurs.
ErrorID	UDINT	If the error output is set, this parameter supplies the <u>error number</u> .

### 3.2.3 MC\_StepReferenceFlyingSwitch



The function block MC\_StepReferenceFlyingSwitch performs referencing during a running movement via an absolutely positioned external physical switch.

The execution does not start or modify any movement itself.

#### Inputs

```
VAR_INPUT
    Execute      : BOOL;
    SwitchMode   : BOOL;
    ReferenceSignal : MC_Ref_Signal_Ref;
    SetPosition  : LREAL;
    TimeLimit    : TIME;
    DistanceLimit : LREAL;
    BufferMode    : MC_BufferMode;
    Options      : ST_Home_Options;
END_VAR
```

Name	Type	Description
Execute	BOOL	The command is executed with a rising edge at the Execute input.
SwitchMode	BOOL	Enumeration that defines the final condition for the search procedure.
ReferenceSignal	MC_Ref_Signal_Ref [ <a href="#">▶ 46</a> ]	Configuration of the reference signal source.
SetPosition	LREAL	Position value that the axis position is set to.
TimeLimit	TIME	Exceeding this time leads to the search procedure being aborted.
DistanceLimit	LREAL	Exceeding this distance in relation to the start position leads to the search procedure being aborted.
BufferMode	MC_BufferMode	Currently not implemented.
Options	ST_Home_Options	Currently not used.

#### Inputs/Outputs

```
VAR_IN_OUT
    Axis : AXIS_REF;
END_VAR
```

Name	Type	Description
Axis	AXIS_REF	Axis data structure of the type AXIS_REF, which uniquely addresses an axis in the system. Among other parameters it contains the current axis status, including position, velocity or error state.

#### Outputs

```
VAR_OUTPUT
    Done      : BOOL;
    Busy      : BOOL;
    Active    : BOOL;
```

```

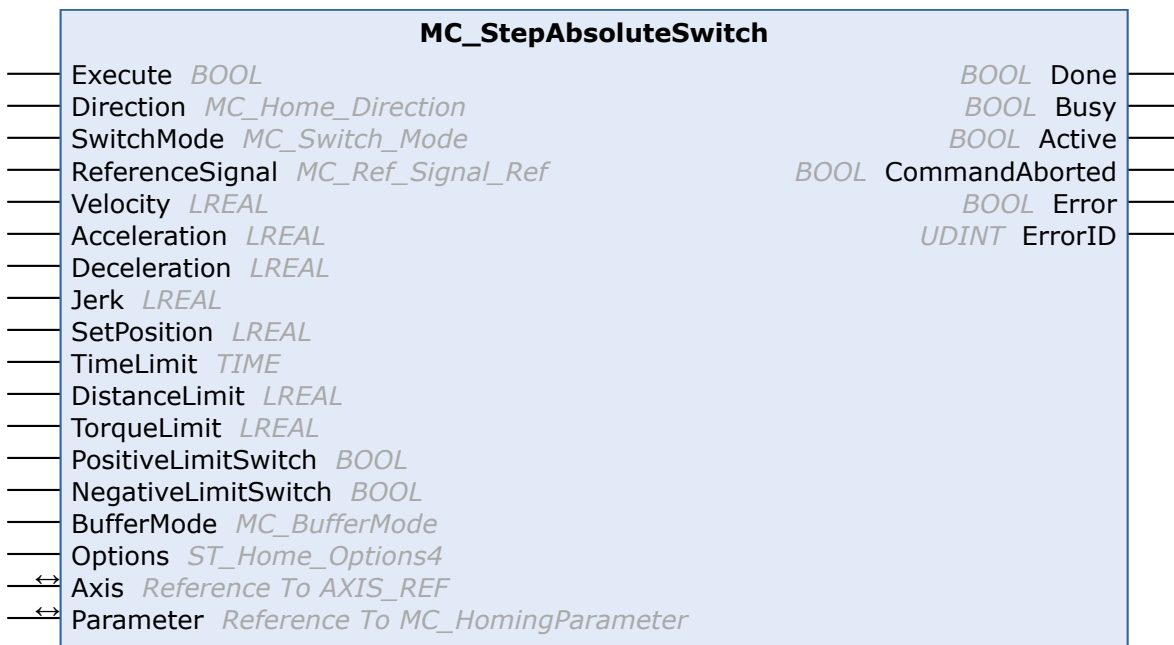
CommandAborted : BOOL;
Error           : BOOL;
ErrorID        : UDINT;
END_VAR

```

Name	Type	Description
Done	BOOL	Becomes TRUE, if the command was completed successfully.
Busy	BOOL	The Busy output becomes TRUE when the command is started with Execute and remains TRUE as long as the command is processed. If Busy becomes FALSE again, the function block is ready for a new order. At the same time one of the outputs, Done, CommandAborted or Error, is set.
Active	BOOL	Indicates that the command is executed.
CommandAborted	BOOL	Becomes TRUE, if the command could not be fully executed.
Error	BOOL	Becomes TRUE, as soon as an error occurs.
ErrorID	UDINT	If the error output is set, this parameter supplies the <u>error number</u> .

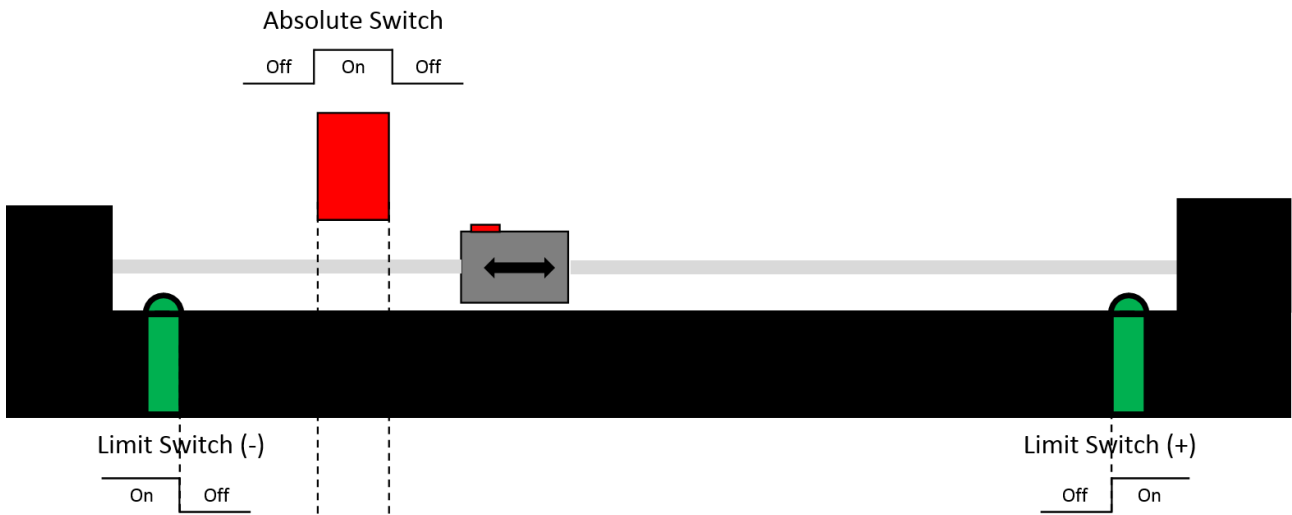
### 3.3 Step functions

#### 3.3.1 MC\_StepAbsoluteSwitch

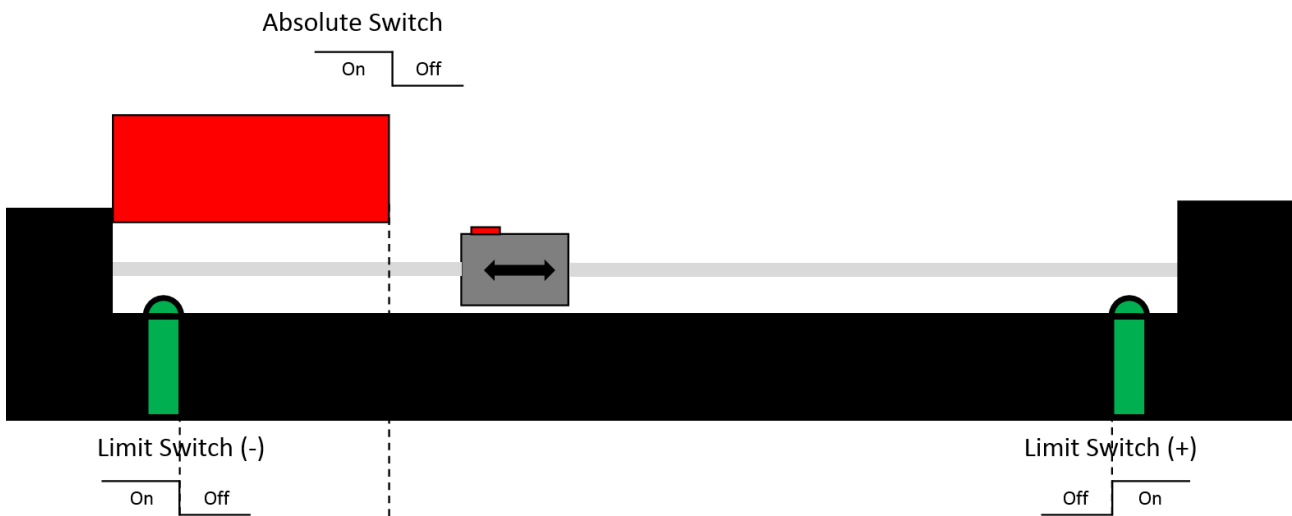


This function block searches for an absolutely positioned, external physical switch.

In general, an absolute switch has two "off" areas and one "on" area.



If the absolute switch cannot be overcrossed, then it has only one "off" area and one "on" area.



**Inputs**

```

VAR_INPUT
  Execute          : BOOL;
  Direction        : MC_Home_Direction;
  SwitchMode       : MC_Switch_Mode;
  ReferenceSignal  : MC_Ref_Signal_Ref;
  Velocity         : LREAL;
  Acceleration     : LREAL;
  Deceleration     : LREAL;
  Jerk            : LREAL;
  SetPosition      : LREAL;
  TimeLimit        : TIME;
  DistanceLimit    : LREAL;
  TorqueLimit      : LREAL;
  PositiveLimitSwitch : BOOL;
  NegativeLimitSwitch : BOOL;
  BufferMode        : MC_BufferMode;
  Options          : ST_Home_Options4;
END_VAR
    
```

Name	Type	Description
Execute	BOOL	The command is executed with a rising edge at the Execute input.
Direction	<a href="#">MC Home Direction</a> [▶ 45]	Enumeration that defines the initial direction of movement for the search procedure.
SwitchMode	<a href="#">MC Switch Mode</a> [▶ 46]	Enumeration that defines the final condition for the search procedure.

Name	Type	Description
ReferenceSignal	MC_Ref_Signal_Ref [▶ 46]	This structure defines the source of the reference cam signal.
Velocity	LREAL	Maximum travel velocity (>0).
Acceleration	LREAL	Acceleration (≥0). If the value is 0, the standard acceleration from the axis configuration in the System Manager is used.
Deceleration	LREAL	Deceleration (≥0). If the value is 0, the standard deceleration from the axis configuration in the System Manager is used.
Jerk	LREAL	Jerk (≥0). If the value is 0, the standard jerk from the axis configuration in the System Manager is used.
SetPosition	LREAL	Position value that the axis position is set to.
TimeLimit	TIME	Exceeding this time leads to the search procedure being aborted.
DistanceLimit	LREAL	Exceeding this distance in relation to the start position leads to the search procedure being aborted.
TorqueLimit	LREAL	The motor torque is limited to this value in order to avoid mechanical damage.
PositiveLimitSwitch	BOOL	Signal of the hardware limit switch in the logically positive direction of movement (PositiveLimitSwitch = FALSE within the permissible travel range).
NegativeLimitSwitch	BOOL	Signal of the hardware limit switch in the logically negative direction of movement (NegativeLimitSwitch = FALSE within the permissible travel range).
BufferMode	MC_BufferMode	Currently not implemented
Options	ST_Home_Options4 [▶ 48]	<b>DisableDriveAccess:</b> Set to FALSE for Beckhoff drives, usually to TRUE for third-party drives (see info).  <b>EnableLagErrorDetection:</b> In the step functions, the lag error detection is switched off in order to ensure a smooth referencing process. If it would be useful to keep the lag error detection active in an application, this can be achieved by setting this flag.



If DisableDriveAccess = TRUE, the user is responsible for modifying and reconstructing required drive parameters. The parameters required for the intended homing sequence must be agreed with the manufacturer of the third-party drive.

Inputs/Outputs

```
VAR_IN_OUT
  Axis      : AXIS_REF;
  Parameter : MC_HomingParameter;
END_VAR
```

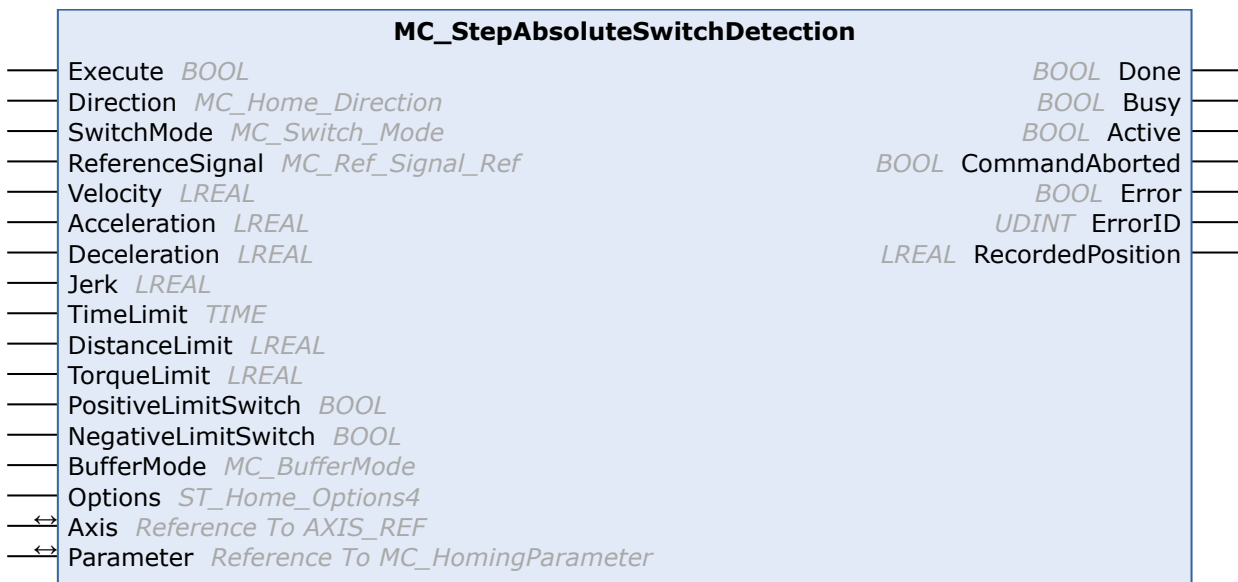
Name	Type	Description
Axis	AXIS_REF	Axis data structure of the type AXIS_REF, which uniquely addresses an axis in the system. Among other parameters it contains the current axis status, including position, velocity or error state.
Parameter	MC_HomingParameter	Data structure of the type MC_HomingParameter, which must be transferred from function block to function block over the entire homing sequence.

**🚩 Outputs**

```
VAR_OUTPUT
  Done      : BOOL;
  Busy      : BOOL;
  Active    : BOOL;
  CommandAborted : BOOL;
  Error     : BOOL;
  ErrorID   : UDINT;
END_VAR
```

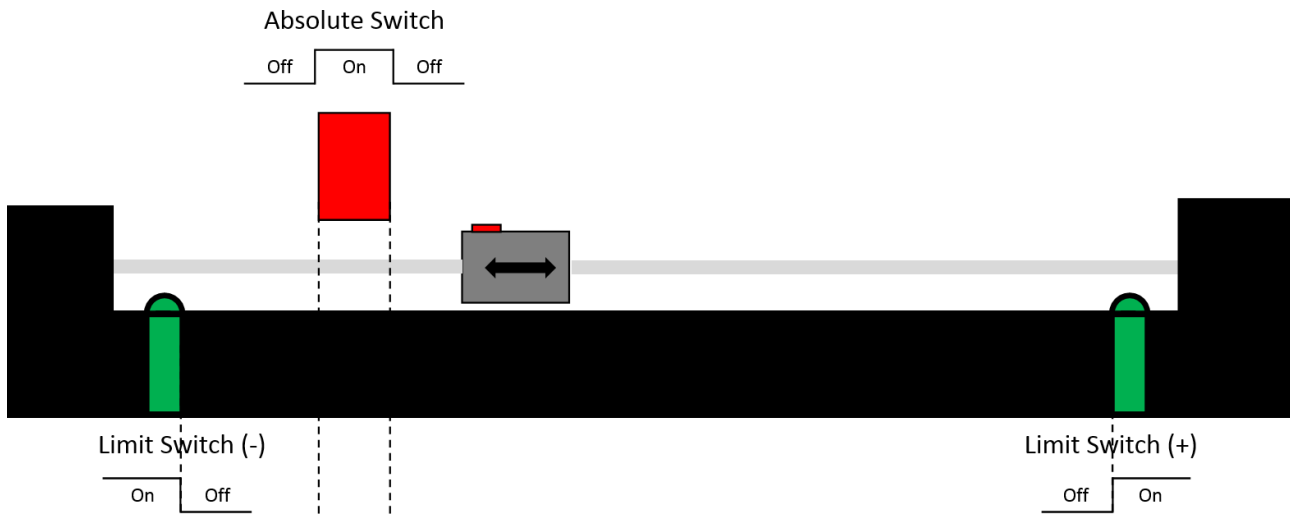
Name	Type	Description
Done	BOOL	Becomes TRUE, if the command was completed successfully.
Busy	BOOL	The Busy output becomes TRUE when the command is started with Execute and remains TRUE as long as the command is processed. If Busy becomes FALSE again, the function block is ready for a new order. At the same time one of the outputs, Done, CommandAborted or Error, is set.
Active	BOOL	Indicates that the command is executed.
CommandAborted	BOOL	Becomes TRUE, if the command could not be fully executed.
Error	BOOL	Becomes TRUE, as soon as an error occurs.
ErrorID	UDINT	If the error output is set, this parameter supplies the <u>error number</u> .

### 3.3.2 MC\_StepAbsoluteSwitchDetection

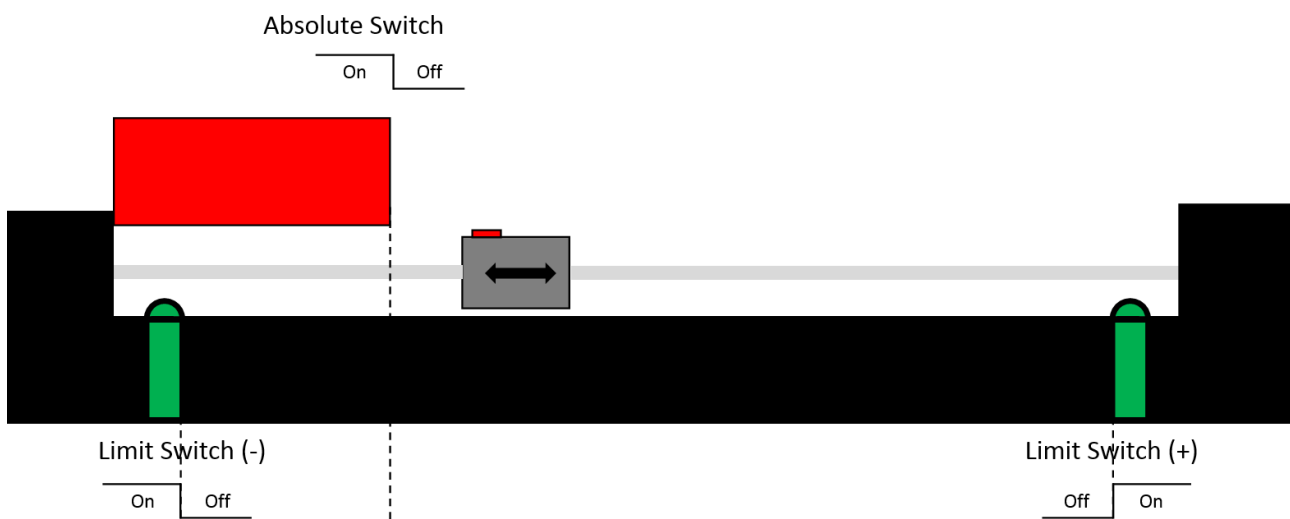


This function block searches for an absolutely positioned, external physical switch.

In general, an absolute switch has two "off" areas and one "on" area.



If the absolute switch cannot be overcrossed, then it has only one "off" area and one "on" area.



The "..Detection" version of this function block does not manipulate the current position of the axis at the end of the sequence, but instead returns the detected position to the user as "RecordedPosition".

**Inputs**

```

VAR_INPUT
    Execute           : BOOL;
    Direction         : MC_Home_Direction;
    SwitchMode        : MC_Switch_Mode;
    ReferenceSignal   : MC_Ref_Signal_Ref;
    Velocity          : LREAL;
    Acceleration      : LREAL;
    Deceleration      : LREAL;
    Jerk              : LREAL;
    TimeLimit         : TIME;
    DistanceLimit     : LREAL;
    TorqueLimit       : LREAL;
    PositiveLimitSwitch : BOOL;
    NegativeLimitSwitch : BOOL;
    BufferMode         : MC_BufferMode;
    Options           : ST_Home_Options4;
END_VAR
    
```

Name	Type	Description
Execute	BOOL	The command is executed with a rising edge at the Execute input.
Direction	MC_Home_Direction [▶ 45]	Enumeration that defines the initial direction of movement for the search procedure.

Name	Type	Description
SwitchMode	MC_Switch_Mode [▶ 46]	Enumeration that defines the final condition for the search procedure.
ReferenceSignal	MC_Ref_Signal_Ref [▶ 46]	This structure defines the source of the reference cam signal.
Velocity	LREAL	Maximum travel velocity (>0).
Acceleration	LREAL	Acceleration (≥0). If the value is 0, the standard acceleration from the axis configuration in the System Manager is used.
Deceleration	LREAL	Deceleration (≥0). If the value is 0, the standard deceleration from the axis configuration in the System Manager is used.
Jerk	LREAL	Jerk (≥0). If the value is 0, the standard jerk from the axis configuration in the System Manager is used.
TimeLimit	TIME	Exceeding this time leads to the search procedure being aborted.
DistanceLimit	LREAL	Exceeding this distance in relation to the start position leads to the search procedure being aborted.
TorqueLimit	LREAL	The motor torque is limited to this value in order to avoid mechanical damage.
PositiveLimitSwitch	BOOL	Signal of the hardware limit switch in the logically positive direction of movement (PositiveLimitSwitch = FALSE within the permissible travel range).
NegativeLimitSwitch	BOOL	Signal of the hardware limit switch in the logically negative direction of movement (NegativeLimitSwitch = FALSE within the permissible travel range).
BufferMode	MC_BufferMode	Currently not implemented
Options	ST_Home_Options4 [▶ 48]	<b>DisableDriveAccess:</b> Set to FALSE for Beckhoff drives, usually to TRUE for third-party drives (see info). <b>EnableLagErrorDetection:</b> In the step functions, the lag error detection is switched off in order to ensure a smooth referencing process. If it would be useful to keep the lag error detection active in an application, this can be achieved by setting this flag.



If DisableDriveAccess = TRUE, the user is responsible for modifying and reconstructing required drive parameters. The parameters required for the intended homing sequence must be agreed with the manufacturer of the third-party drive.

### Inputs/Outputs

```
VAR_IN_OUT
  Axis      : AXIS_REF;
  Parameter : MC_HomingParameter;
END_VAR
```

Name	Type	Description
Axis	AXIS_REF	Axis data structure of the type AXIS_REF, which uniquely addresses an axis in the system. Among other parameters it contains the current axis status, including position, velocity or error state.
Parameter	MC_HomingParameter	Data structure of the type MC_HomingParameter, which must be transferred from function block to function block over the entire homing sequence.

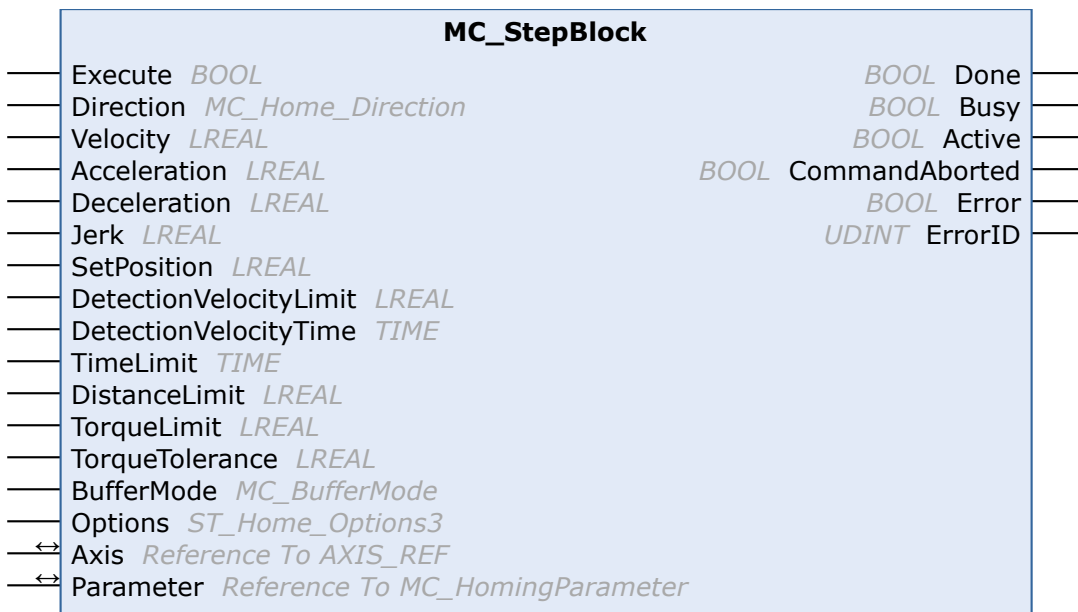


**🔌 Outputs**

```
VAR_OUTPUT
  Done          : BOOL;
  Busy          : BOOL;
  Active        : BOOL;
  CommandAborted : BOOL;
  Error         : BOOL;
  ErrorID       : UDINT;
  RecordedPosition : LREAL;
END_VAR
```

Name	Type	Description
Done	BOOL	Becomes TRUE, if the command was completed successfully.
Busy	BOOL	The Busy output becomes TRUE when the command is started with Execute and remains TRUE as long as the command is processed. When Busy becomes FALSE again, the function block is ready for a new order. At the same time one of the outputs, Done, CommandAborted or Error, is set.
Active	BOOL	Indicates that the command is executed.
CommandAborted	BOOL	Becomes TRUE, if the command could not be fully executed.
Error	BOOL	Becomes TRUE, as soon as an error occurs.
ErrorID	UDINT	If the error output is set, this parameter supplies the <u>error number</u> .
RecordedPosition	LREAL	Axis position at which the event was recorded.

**3.3.3 MC\_StepBlock**



This function block performs the search for a physical object that mechanically blocks the movement.

To avoid mechanical damage, the movement is usually performed with reduced torque ("TorqueLimit"). Since the actual value is subject to fluctuations, a tolerance must also be specified ("TorqueTolerance").

The condition for successful completion of the sequence consists of two parts.

Firstly, the torque within the specified "TorqueTolerance" must correspond to the "TorqueLimit" and secondly, the actual velocity for the time "DetectionVelocityTime" must be below the "DetectionVelocityLimit".

**🔌 Inputs**

```
VAR_INPUT
  Execute          : BOOL;
  Direction        : MC_Home_Direction;
  Velocity         : LREAL;
```

```

Acceleration      : LREAL;
Deceleration      : LREAL;
Jerk              : LREAL;
SetPosition       : LREAL;
DetectionVelocityLimit : LREAL;
DetectionVelocityTime : TIME;
TimeLimit         : TIME;
DistanceLimit     : LREAL;
TorqueLimit       : LREAL;
TorqueTolerance   : LREAL;
BufferMode        : MC_BufferMode;
Options           : ST_Home_Options3;

```

```
END_VAR
```

Name	Type	Description
Execute	BOOL	The command is executed with a rising edge at the Execute input.
Direction	MC_Home_Direction [► 45]	Enumeration that defines the initial direction of movement for the search procedure.
Velocity	LREAL	Maximum travel velocity (>0).
Acceleration	LREAL	Acceleration ( $\geq 0$ ). If the value is 0, the standard acceleration from the axis configuration in the System Manager is used.
Deceleration	LREAL	Deceleration ( $\geq 0$ ). If the value is 0, the standard deceleration from the axis configuration in the System Manager is used.
Jerk	LREAL	Jerk ( $\geq 0$ ). If the value is 0, the standard jerk from the axis configuration in the System Manager is used.
SetPosition	LREAL	Position value that the axis position is set to.
DetectionVelocityLimit	LREAL	Limit velocity that must be adhered to (value must be below this) for the time DetectionVelocityTime in order to detect driving against the fixed stop.
DetectionVelocityTime	TIME	Time for detecting the velocity undershoot when driving against the fixed stop.
TimeLimit	TIME	Exceeding this time leads to the search procedure being aborted.
DistanceLimit	LREAL	Exceeding this distance in relation to the start position leads to the search procedure being aborted.
TorqueLimit	LREAL	The motor torque is limited to this value, in relation to the weight counterbalance that is potentially parameterized in the drive, in order to avoid mechanical damage.
TorqueTolerance	LREAL	Tolerance based on the TorqueLimit within which driving against the fixed stop is detected within this TorqueLimit.
BufferMode	MC_BufferMode	Currently not implemented.
Options	ST_Home_Options3 [► 47]	<p><b>DisableDriveAccess:</b> Set to FALSE for Beckhoff drives, usually to TRUE for third-party drives (see info).</p> <p><b>InstantLagReduction:</b> When referencing to a mechanical fixed stop, the sudden stop produces a lag error in the NC axis, which is dissipated with the parameterized dynamic values in the further course. This can lead to an assumed delay when observing the sequence, but it is useful with "soft" fixed stops in particular. The lag error is dissipated abruptly by setting this flag.</p>



If DisableDriveAccess = TRUE, the user is responsible for modifying and reconstructing required drive parameters. The parameters required for the intended homing sequence must be agreed with the manufacturer of the third-party drive.

Inputs/Outputs

```
VAR_IN_OUT
  Axis      : AXIS_REF;
  Parameter : MC_HomingParameter;
END_VAR
```

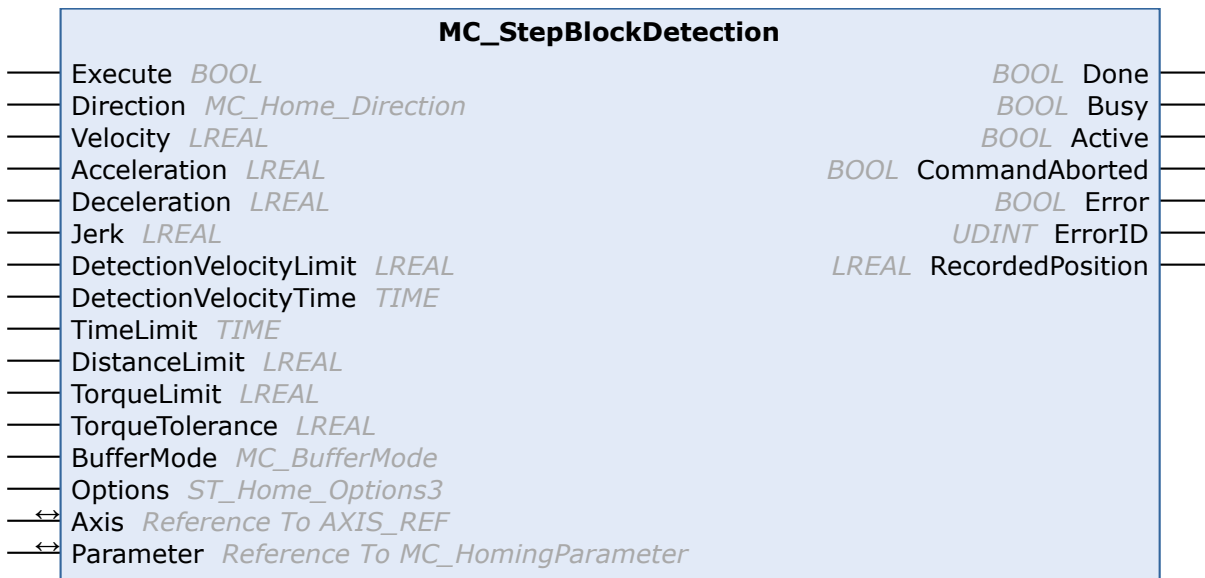
Name	Type	Description
Axis	AXIS_REF	Axis data structure of the type AXIS_REF, which uniquely addresses an axis in the system. Among other parameters it contains the current axis status, including position, velocity or error state.
Parameter	MC_HomingParameter	Data structure of the type MC_HomingParameter, which must be transferred from function block to function block over the entire homing sequence.

Outputs

```
VAR_OUTPUT
  Done      : BOOL;
  Busy      : BOOL;
  Active    : BOOL;
  CommandAborted : BOOL;
  Error     : BOOL;
  ErrorID   : UDINT;
END_VAR
```

Name	Type	Description
Done	BOOL	Becomes TRUE, if the command was completed successfully.
Busy	BOOL	The Busy output becomes TRUE when the command is started with Execute and remains TRUE as long as the command is processed. If Busy becomes FALSE again, the function block is ready for a new order. At the same time one of the outputs, Done, CommandAborted or Error, is set.
Active	BOOL	Indicates that the command is executed.
CommandAborted	BOOL	Becomes TRUE, if the command could not be fully executed.
Error	BOOL	Becomes TRUE, as soon as an error occurs.
ErrorID	UDINT	If the error output is set, this parameter supplies the <u>error number</u> .

### 3.3.4 MC\_StepBlockDetection



This function block performs the search for a physical object that mechanically blocks the movement.

To avoid mechanical damage, the movement is usually performed with reduced torque ("TorqueLimit"). Since the actual value is subject to fluctuations, a tolerance must also be specified ("TorqueTolerance").

The condition for successful completion of the sequence consists of two parts.

Firstly, the torque within the specified "TorqueTolerance" must correspond to the "TorqueLimit" and secondly, the actual velocity for the time "DetectionVelocityTime" must be below the "DetectionVelocityLimit".

The "..Detection" version of this function block does not manipulate the current position of the axis at the end of the sequence, but instead returns the detected position to the user as "RecordedPosition".

#### Inputs

```

VAR_INPUT
    Execute           : BOOL;
    Direction         : MC_Home_Direction;
    Velocity          : LREAL;
    Acceleration      : LREAL;
    Deceleration      : LREAL;
    Jerk              : LREAL;
    DetectionVelocityLimit : LREAL;
    DetectionVelocityTime : TIME;
    TimeLimit         : TIME;
    DistanceLimit     : LREAL;
    TorqueLimit       : LREAL;
    TorqueTolerance   : LREAL;
    BufferMode         : MC_BufferMode;
    Options           : ST_Home_Options3;
END_VAR

```

Name	Type	Description
Execute	BOOL	The command is executed with a rising edge at the Execute input.
Direction	<u>MC Home Direction</u> [► 45]	Enumeration that defines the initial direction of movement for the search procedure.
Velocity	LREAL	Maximum travel velocity (>0).
Acceleration	LREAL	Acceleration (≥0). If the value is 0, the standard acceleration from the axis configuration in the System Manager is used.
Deceleration	LREAL	Deceleration (≥0). If the value is 0, the standard deceleration from the axis configuration in the System Manager is used.

Name	Type	Description
Jerk	LREAL	Jerk ( $\geq 0$ ). If the value is 0, the standard jerk from the axis configuration in the System Manager is used.
DetectionVelocityLimit	LREAL	Limit velocity that must be adhered to (value must be below this) for the time DetectionVelocityTime in order to detect driving against the fixed stop.
DetectionVelocityTime	TIME	Time for detecting the velocity undershoot when driving against the fixed stop.
TimeLimit	TIME	Exceeding this time leads to the search procedure being aborted.
DistanceLimit	LREAL	Exceeding this distance in relation to the start position leads to the search procedure being aborted.
TorqueLimit	LREAL	The motor torque is limited to this value, in relation to the weight counterbalance that is potentially parameterized in the drive, in order to avoid mechanical damage.
TorqueTolerance	LREAL	Tolerance based on the TorqueLimit, driving against the fixed stop is detected within this TorqueLimit.
BufferMode	MC_BufferMode	Currently not implemented.
Options	ST_Home_Options3 [▶ 47]	<p><b>DisableDriveAccess:</b> Set to FALSE for Beckhoff drives, usually to TRUE for third-party drives (see info).</p> <p><b>InstantLagReduction:</b> When referencing to a mechanical fixed stop, the sudden stop produces a lag error in the NC axis, which is dissipated with the parameterized dynamic values in the further course. This can lead to an assumed delay when observing the sequence, but it is useful with "soft" fixed stops in particular. The lag error is dissipated abruptly by setting this flag.</p>



If DisableDriveAccess = TRUE, the user is responsible for modifying and reconstructing required drive parameters. The parameters required for the intended homing sequence must be agreed with the manufacturer of the third-party drive.

Inputs/Outputs

```
VAR_IN_OUT
  Axis      : AXIS_REF;
  Parameter : MC_HomingParameter;
END_VAR
```

Name	Type	Description
Axis	<u>AXIS_REF</u>	Axis data structure of the type AXIS_REF, which uniquely addresses an axis in the system. Among other parameters it contains the current axis status, including position, velocity or error state.
Parameter	MC_HomingParameter	Data structure of the type <u>MC_HomingParameter</u> , which must be transferred from function block to function block over the entire homing sequence.

Outputs

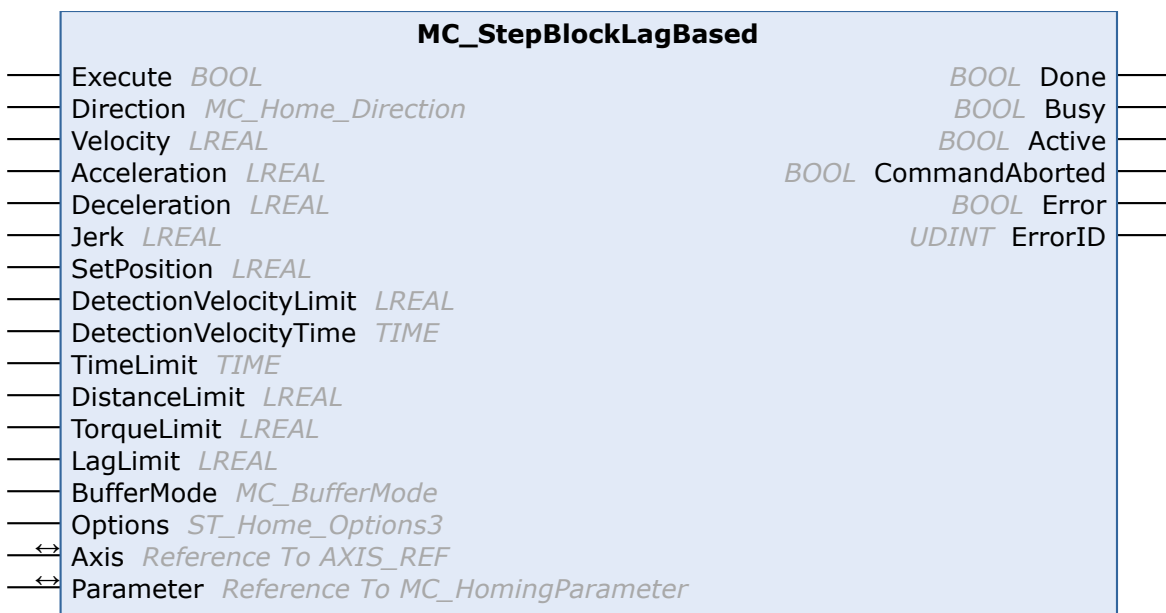
```
VAR_OUTPUT
  Done      : BOOL;
  Busy      : BOOL;
  Active    : BOOL;
```

```

CommandAborted : BOOL;
Error           : BOOL;
ErrorID        : UDINT;
RecordedPosition : LREAL;
END_VAR
    
```

Name	Type	Description
Done	BOOL	Becomes TRUE, if the command was completed successfully.
Busy	BOOL	The Busy output becomes TRUE when the command is started with Execute and remains TRUE as long as the command is processed. When Busy becomes FALSE again, the function block is ready for a new order. At the same time one of the outputs, Done, CommandAborted or Error, is set.
Active	BOOL	Indicates that the command is executed.
CommandAborted	BOOL	Becomes TRUE, if the command could not be fully executed.
Error	BOOL	Becomes TRUE, as soon as an error occurs.
ErrorID	UDINT	If the error output is set, this parameter supplies the <u>error number</u> .
RecordedPosition	LREAL	Axis position at which the event was recorded.

### 3.3.5 MC\_StepBlockLagBased



This function block performs the search for a physical object that mechanically blocks the movement. To avoid mechanical damage, the movement is usually performed with reduced torque ("TorqueLimit"). The condition for successful completion of the sequence consists of two parts.

First, the lag error must be above the specified "LagLimit" and second, the actual velocity for the time "DetectionVelocityTime" must be below the "DetectionVelocityLimit".

#### Inputs

```

VAR_INPUT
Execute           : BOOL;
Direction        : MC_Home_Direction;
Velocity         : LREAL;
Acceleration     : LREAL;
Deceleration     : LREAL;
Jerk            : LREAL;
SetPosition      : LREAL;
DetectionVelocityLimit : LREAL;
DetectionVelocityTime : TIME;
TimeLimit       : TIME;
DistanceLimit   : LREAL;
    
```

```
TorqueLimit      : LREAL;
LagLimit         : LREAL;
BufferMode       : MC_BufferMode;
Options          : ST_Home_Options3;
END_VAR
```

Name	Type	Description
Execute	BOOL	The command is executed with a rising edge at the Execute input.
Direction	MC_Home_Direction [▶ 45]	Enumeration that defines the initial direction of movement for the search procedure.
Velocity	LREAL	Maximum travel velocity (>0).
Acceleration	LREAL	Acceleration (≥0). If the value is 0, the standard acceleration from the axis configuration in the System Manager is used.
Deceleration	LREAL	Deceleration (≥0). If the value is 0, the standard deceleration from the axis configuration in the System Manager is used.
Jerk	LREAL	Jerk (≥0). If the value is 0, the standard jerk from the axis configuration in the System Manager is used.
SetPosition	LREAL	Position value that the axis position is set to.
DetectionVelocityLimit	LREAL	Limit velocity that must be adhered to (value must be below this) for the time DetectionVelocityTime in order to detect driving against the fixed stop.
DetectionVelocityTime	TIME	Time for detecting the velocity undershoot when driving against the fixed stop.
TimeLimit	TIME	Exceeding this time leads to the search procedure being aborted.
DistanceLimit	LREAL	Exceeding this distance in relation to the start position leads to the search procedure being aborted.
TorqueLimit	LREAL	The motor torque is limited to this value, in relation to the weight counterbalance that is potentially parameterized in the drive, in order to avoid mechanical damage.
LagLimit	LREAL	Position lag value which, if exceeded, leads to detection of driving against the fixed stop.
BufferMode	MC_BufferMode	Currently not implemented.
Options	ST_Home_Options3 [▶ 47]	<p><b>DisableDriveAccess:</b> Set to FALSE for Beckhoff drives, usually to TRUE for third-party drives (see info).</p> <p><b>InstantLagReduction:</b> When referencing to a mechanical fixed stop, the sudden stop produces a lag error in the NC axis, which is dissipated with the parameterized dynamic values in the further course. This can lead to an assumed delay when observing the sequence, but it is useful with "soft" fixed stops in particular. The lag error is dissipated abruptly by setting this flag.</p>



If DisableDriveAccess = TRUE, the user is responsible for modifying and reconstructing required drive parameters. The parameters required for the intended homing sequence must be agreed with the manufacturer of the third-party drive.

 **Inputs/Outputs**

```
VAR_IN_OUT
  Axis      : AXIS_REF;
  Parameter : MC_HomingParameter;
END_VAR
```

Name	Type	Description
Axis	<u>AXIS_REF</u>	Axis data structure of the type <u>AXIS_REF</u> , which uniquely addresses an axis in the system. Among other parameters it contains the current axis status, including position, velocity or error state.
Parameter	MC_HomingParameter	Data structure of the type <u>MC_HomingParameter</u> , which must be transferred from function block to function block over the entire homing sequence.

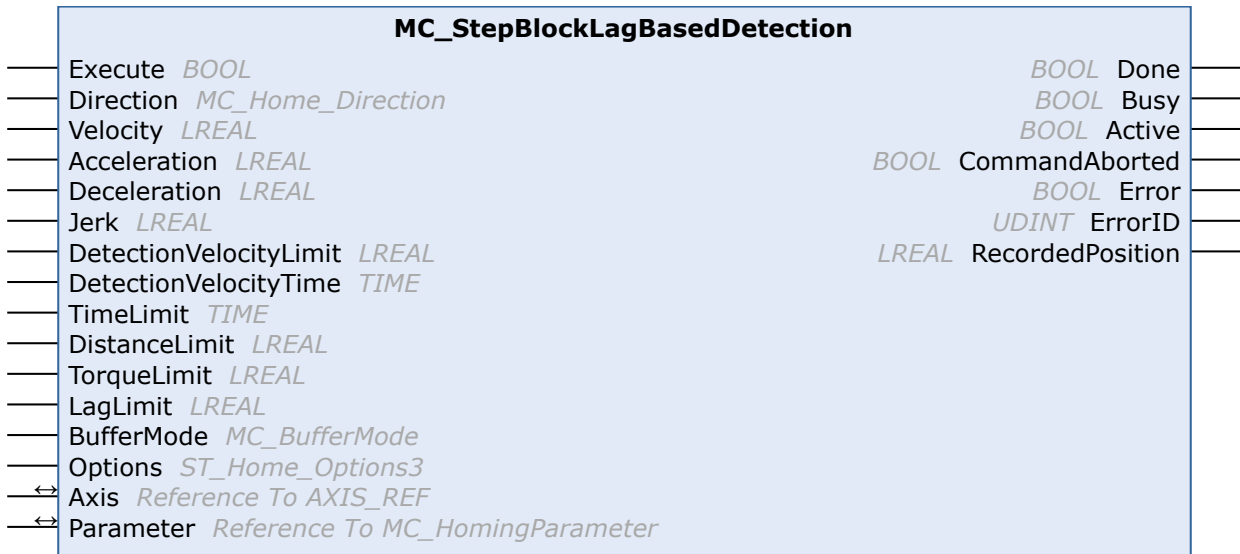
 **Outputs**

```
VAR_OUTPUT
  Done      : BOOL;
  Busy      : BOOL;
  Active    : BOOL;
  CommandAborted : BOOL;
  Error     : BOOL;
  ErrorID   : UDINT;
END_VAR
```

Name	Type	Description
Done	BOOL	Becomes TRUE, if the command was completed successfully.
Busy	BOOL	The Busy output becomes TRUE when the command is started with Execute and remains TRUE as long as the command is processed. If Busy becomes FALSE again, the function block is ready for a new order. At the same time one of the outputs, Done, CommandAborted or Error, is set.
Active	BOOL	Indicates that the command is executed.
CommandAborted	BOOL	Becomes TRUE, if the command could not be fully executed.
Error	BOOL	Becomes TRUE, as soon as an error occurs.
ErrorID	UDINT	If the error output is set, this parameter supplies the <u>error number</u> .



### 3.3.6 MC\_StepBlockLagBasedDetection



This function block performs a search for a physical object that mechanically blocks the movement.

To avoid mechanical damage, the movement is usually performed with reduced torque ("TorqueLimit").

The condition for successful completion of the flow consists of 2 parts.

First, the lag error must be above the specified "LagLimit" and second, the actual velocity for the time "DetectionVelocityTime" must be below the "DetectionVelocityLimit".

The "...Detection" version of this function block does not manipulate the current position of the axis at the end of the sequence, but instead returns the detected position to the user as "RecordedPosition".

#### Inputs

```

VAR_INPUT
Execute          : BOOL;
Direction        : MC_Home_Direction;
Velocity         : LREAL;
Acceleration     : LREAL;
Deceleration     : LREAL;
Jerk             : LREAL;
SetPosition      : LREAL;
DetectionVelocityLimit : LREAL;
DetectionVelocityTime : TIME;
TimeLimit        : TIME;
DistanceLimit    : LREAL;
TorqueLimit      : LREAL;
LagLimit         : LREAL;
BufferMode       : MC_BufferMode;
Options          : ST_Home_Options3;
END_VAR
    
```

Name	Type	Description
Execute	BOOL	The command is executed with a rising edge at the Execute input.
Direction	<u>MC Home Direction</u> [▶ 45]	Enumeration that defines the initial direction of movement for the search procedure.
Velocity	LREAL	Maximum travel velocity (>0).
Acceleration	LREAL	Acceleration (≥0). If the value is 0, the standard acceleration from the axis configuration in the System Manager is used.
Deceleration	LREAL	Deceleration (≥0). If the value is 0, the standard deceleration from the axis configuration in the System Manager is used.

Name	Type	Description
Jerk	LREAL	Jerk ( $\geq 0$ ). If the value is 0, the standard jerk from the axis configuration in the System Manager is used.
SetPosition	LREAL	Position value that the axis position is set to.
DetectionVelocityLimit	LREAL	Limit velocity that must be adhered to (value must be below this) for the time DetectionVelocityTime in order to detect driving against the fixed stop.
DetectionVelocityTime	TIME	Time for detecting the velocity undershoot when driving against the fixed stop.
TimeLimit	TIME	Exceeding this time leads to the search procedure being aborted.
DistanceLimit	LREAL	Exceeding this distance in relation to the start position leads to the search procedure being aborted.
TorqueLimit	LREAL	The motor torque is limited to this value, in relation to the weight counterbalance that is potentially parameterized in the drive, in order to avoid mechanical damage.
LagLimit	LREAL	Position lag value which, if exceeded, leads to detection of driving against the fixed stop.
BufferMode	MC_BufferMode	Currently not implemented.
Options	<a href="#">ST_Home_Options3</a> [► 47]	<p><b>DisableDriveAccess:</b> Set to FALSE for Beckhoff drives, usually to TRUE for third-party drives (see info).</p> <p><b>InstantLagReduction:</b> When referencing to a mechanical fixed stop, the sudden stop produces a lag error in the NC axis, which is dissipated with the parameterized dynamic values in the further course. This can lead to an assumed delay when observing the sequence, but it is useful with "soft" fixed stops in particular. The lag error is dissipated abruptly by setting this flag.</p>



If DisableDriveAccess = TRUE, the user is responsible for modifying and reconstructing required drive parameters. The parameters required for the intended homing sequence must be agreed with the manufacturer of the third-party drive.

### Inputs/Outputs

```
VAR_IN_OUT
  Axis      : AXIS_REF;
  Parameter : MC_HomingParameter;
END_VAR
```

Name	Type	Description
Axis	<a href="#">AXIS_REF</a>	Axis data structure of the type <a href="#">AXIS_REF</a> , which uniquely addresses an axis in the system. Among other parameters it contains the current axis status, including position, velocity or error state.
Parameter	<a href="#">MC_HomingParameter</a>	Data structure of the type <a href="#">MC_HomingParameter</a> , which must be transferred from function block to function block over the entire homing sequence.

### Outputs

```
VAR_OUTPUT
  Done      : BOOL;
  Busy      : BOOL;
```

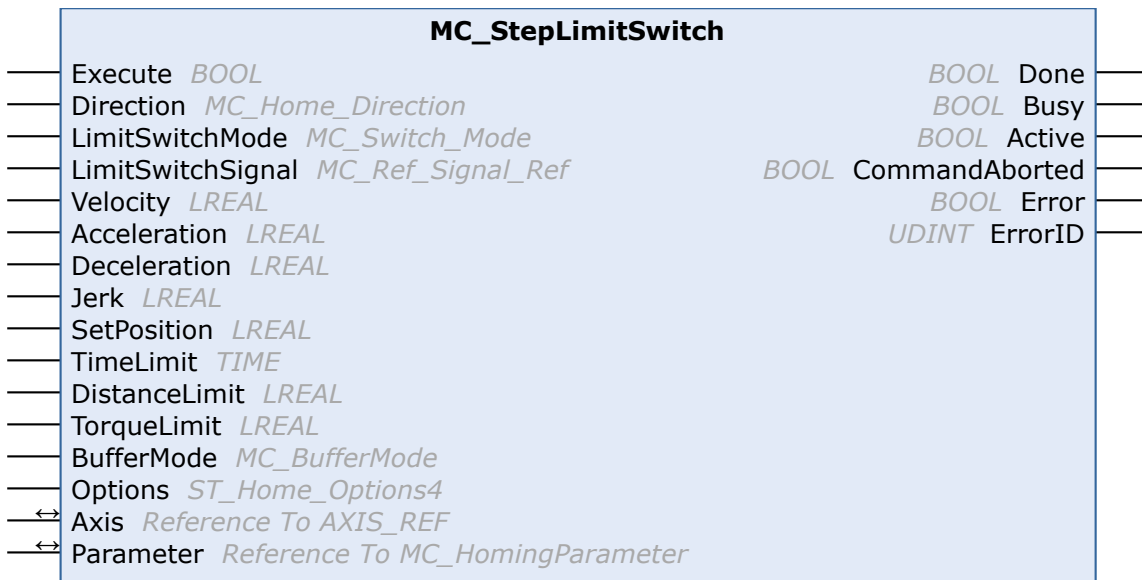
```

Active          : BOOL;
CommandAborted : BOOL;
Error           : BOOL;
ErrorID        : UDINT;
RecordedPosition : LREAL;
END_VAR

```

Name	Type	Description
Done	BOOL	Becomes TRUE, if the command was completed successfully.
Busy	BOOL	The Busy output becomes TRUE when the command is started with Execute and remains TRUE as long as the command is processed. When Busy becomes FALSE again, the function block is ready for a new order. At the same time one of the outputs, Done, CommandAborted or Error, is set.
Active	BOOL	Indicates that the command is executed.
CommandAborted	BOOL	Becomes TRUE, if the command could not be fully executed.
Error	BOOL	Becomes TRUE, as soon as an error occurs.
ErrorID	UDINT	If the error output is set, this parameter supplies the <u>error number</u> .
RecordedPosition	LREAL	Axis position at which the event was recorded.

### 3.3.7 MC\_StepLimitSwitch



The function block MC\_StepLimitSwitch performs the search for a hardware limit switch.

#### Inputs

```

VAR_INPUT
Execute          : BOOL;
Direction        : MC_Home_Direction;
LimitSwitchMode  : MC_Switch_Mode;
LimitSwitchSignal : MC_Ref_Signal_Ref;
Velocity         : LREAL;
Acceleration     : LREAL;
Deceleration     : LREAL;
Jerk            : LREAL;
SetPosition      : LREAL;
TimeLimit        : TIME;
DistanceLimit    : LREAL;
TorqueLimit      : LREAL;
BufferMode       : MC_BufferMode;
Options          : ST_Home_Options4;
END_VAR

```

Name	Type	Description
Execute	BOOL	The command is executed with a rising edge at the Execute input.
Direction	MC Home Direction [► 45]	Enumeration that defines the initial direction of movement for the search procedure.
LimitSwitchMode	MC Switch Mode [► 46]	Enumeration that defines the final condition for the search procedure.
LimitSwitchSignal	MC Ref Signal Ref [► 46]	This structure defines the source of the reference cam signal.
Velocity	LREAL	Maximum travel velocity (>0).
Acceleration	LREAL	Acceleration ( $\geq 0$ ). If the value is 0, the standard acceleration from the axis configuration in the System Manager is used.
Deceleration	LREAL	Deceleration ( $\geq 0$ ). If the value is 0, the standard deceleration from the axis configuration in the System Manager is used.
Jerk	LREAL	Jerk ( $\geq 0$ ). If the value is 0, the standard jerk from the axis configuration in the System Manager is used.
SetPosition	LREAL	Position value that the axis position is set to.
TimeLimit	TIME	Exceeding this time leads to the search procedure being aborted.
DistanceLimit	LREAL	Exceeding this distance in relation to the start position leads to the search procedure being aborted.
TorqueLimit	LREAL	The motor torque is limited to this value in order to avoid mechanical damage.
BufferMode	ST_Home_Options4	Currently not implemented.
Options		<p><b>DisableDriveAccess:</b> Set to FALSE for Beckhoff drives, usually to TRUE for third-party drives (see info).</p> <p><b>EnableLagErrorDetection:</b> In the step functions, the lag error detection is switched off in order to ensure a smooth referencing process. If it would be useful to keep the lag error detection active in an application, this can be achieved by setting this flag.</p>



If DisableDriveAccess = TRUE, the user is responsible for modifying and reconstructing required drive parameters. The parameters required for the intended homing sequence must be agreed with the manufacturer of the third-party drive.

#### / Inputs/Outputs

```
VAR_IN_OUT
  Axis      : AXIS_REF;
  Parameter : MC_HomingParameter;
END_VAR
```

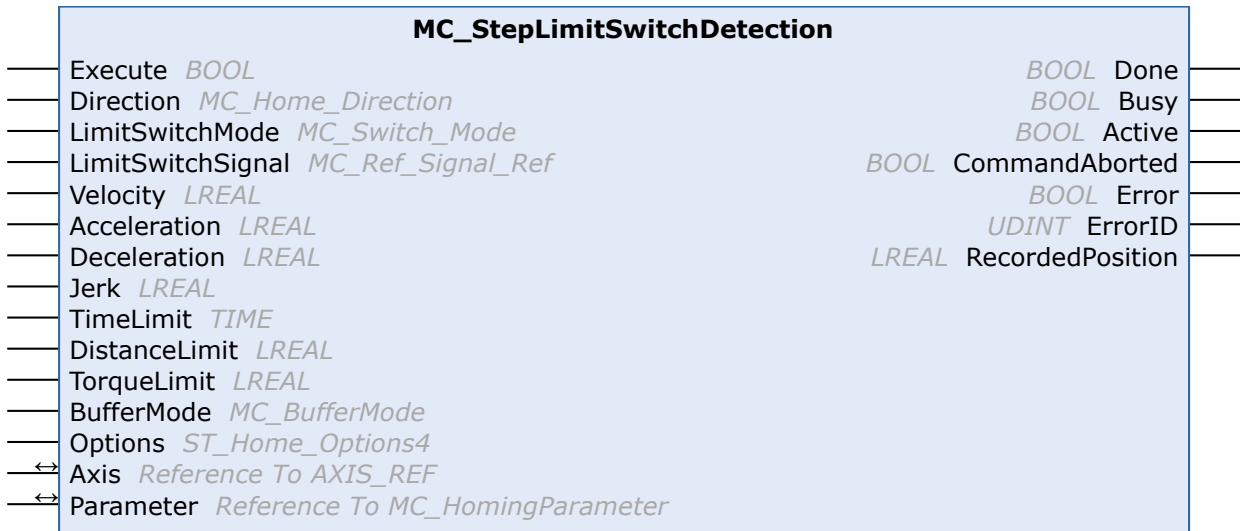
Name	Type	Description
Axis	<u>AXIS_REF</u>	Axis data structure of the type <u>AXIS_REF</u> , which uniquely addresses an axis in the system. Among other parameters it contains the current axis status, including position, velocity or error state.
Parameter	<u>MC_HomingParameter</u>	Data structure of the type <u>MC_HomingParameter</u> , which must be transferred from function block to function block over the entire homing sequence.

 **Outputs**

```
VAR_OUTPUT
  Done           : BOOL;
  Busy           : BOOL;
  Active         : BOOL;
  CommandAborted : BOOL;
  Error         : BOOL;
  ErrorID       : UDINT;
END_VAR
```

Name	Type	Description
Done	BOOL	Becomes TRUE, if the command was completed successfully.
Busy	BOOL	The Busy output becomes TRUE when the command is started with Execute and remains TRUE as long as the command is processed. If Busy becomes FALSE again, the function block is ready for a new order. At the same time one of the outputs, Done, CommandAborted or Error, is set.
Active	BOOL	Indicates that the command is executed.
CommandAborted	BOOL	Becomes TRUE, if the command could not be fully executed.
Error	BOOL	Becomes TRUE, as soon as an error occurs.
ErrorID	UDINT	If the error output is set, this parameter supplies the <u>error number</u> .

### 3.3.8 MC\_StepLimitSwitchDetection



The function block MC\_StepLimitSwitchDetection performs the search for a hardware limit switch.

The "...Detection" version of this function block does not manipulate the current position of the axis at the end of the sequence, but instead returns the detected position to the user as "RecordedPosition".

#### Inputs

```

VAR_INPUT
  Execute          : BOOL;
  Direction        : MC_Home_Direction;
  LimitSwitchMode : MC_Switch_Mode;
  LimitSwitchSignal : MC_Ref_Signal_Ref;
  Velocity        : LREAL;
  Acceleration    : LREAL;
  Deceleration    : LREAL;
  Jerk            : LREAL;
  TimeLimit       : TIME;
  DistanceLimit   : LREAL;
  TorqueLimit     : LREAL;
  BufferMode       : MC_BufferMode;
  Options         : ST_Home_Options4;
END_VAR

```

Name	Type	Description
Execute	BOOL	The command is executed with a rising edge at the Execute input.
Direction	<a href="#">MC Home Direction</a> [▶ 45]	Enumeration that defines the initial direction of movement for the search procedure.
LimitSwitchMode	<a href="#">MC Switch Mode</a> [▶ 46]	Enumeration that defines the final condition for the search procedure.
LimitSwitchSignal	<a href="#">MC Ref Signal Ref</a> [▶ 46]	This structure defines the source of the reference cam signal.
Velocity	LREAL	Maximum travel velocity (>0).
Acceleration	LREAL	Acceleration (≥0). If the value is 0, the standard acceleration from the axis configuration in the System Manager is used.
Deceleration	LREAL	Deceleration (≥0). If the value is 0, the standard deceleration from the axis configuration in the System Manager is used.
Jerk	LREAL	Jerk (≥0). If the value is 0, the standard jerk from the axis configuration in the System Manager is used.
TimeLimit	TIME	Exceeding this time leads to the search procedure being aborted.

Name	Type	Description
DistanceLimit	LREAL	Exceeding this distance in relation to the start position leads to the search procedure being aborted.
TorqueLimit	LREAL	The motor torque is limited to this value in order to avoid mechanical damage.
BufferMode	MC_BufferMode	Currently not implemented.
Options	ST_Home_Options4 [▶ 48]	<b>DisableDriveAccess:</b> Set to FALSE for Beckhoff drives, usually to TRUE for third-party drives (see info). <b>EnableLagErrorDetection:</b> In the step functions, the lag error detection is switched off in order to ensure a smooth referencing process. If it would be useful to keep the lag error detection active in an application, this can be achieved by setting this flag.



If DisableDriveAccess = TRUE, the user is responsible for modifying and reconstructing required drive parameters. The parameters required for the intended homing sequence must be agreed with the manufacturer of the third-party drive.

Inputs/Outputs

```
VAR_IN_OUT
  Axis      : AXIS_REF;
  Parameter : MC_HomingParameter;
END_VAR
```

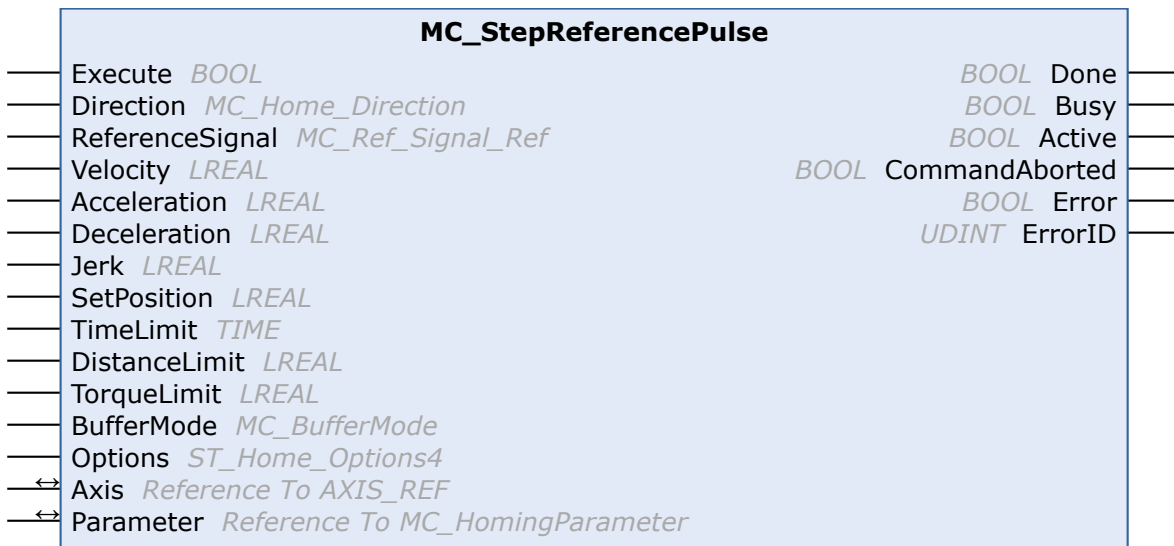
Name	Type	Description
Axis	AXIS_REF	Axis data structure of the type AXIS_REF, which uniquely addresses an axis in the system. Among other parameters it contains the current axis status, including position, velocity or error state.
Parameter	MC_HomingParameter	Data structure of the type MC_HomingParameter, which must be transferred from function block to function block over the entire homing sequence.

Outputs

```
VAR_OUTPUT
  Done           : BOOL;
  Busy           : BOOL;
  Active         : BOOL;
  CommandAborted : BOOL;
  Error          : BOOL;
  ErrorID        : UDINT;
  RecordedPosition : LREAL;
END_VAR
```

Name	Type	Description
Done	BOOL	Becomes TRUE, if the command was completed successfully.
Busy	BOOL	The Busy output becomes TRUE when the command is started with Execute and remains TRUE as long as the command is processed. When Busy becomes FALSE again, the function block is ready for a new order. At the same time one of the outputs, Done, CommandAborted or Error, is set.
Active	BOOL	Indicates that the command is executed.
CommandAborted	BOOL	Becomes TRUE, if the command could not be fully executed.
Error	BOOL	Becomes TRUE, as soon as an error occurs.
ErrorID	UDINT	If the error output is set, this parameter supplies the <u>error number</u> .
RecordedPosition	LREAL	Axis position at which the event was recorded.

### 3.3.9 MC\_StepReferencePulse



This function block performs the search for a zero pulse of an encoder.

A zero pulse is not present in all encoders and occurs only once per encoder revolution. The advantage of using a zero pulse for referencing is the high accuracy of this signal compared to that of a standard sensor.

#### Inputs

```

VAR_INPUT
    Execute          : BOOL;
    Direction        : MC_Home_Direction;
    SwitchMode       : MC_Switch_Mode;
    ReferenceSignal  : MC_Ref_Signal_Ref;
    Velocity         : LREAL;
    Acceleration     : LREAL;
    Deceleration     : LREAL;
    Jerk             : LREAL;
    SetPosition      : LREAL;
    TimeLimit        : TIME;
    DistanceLimit    : LREAL;
    TorqueLimit      : LREAL;
    BufferMode        : MC_BufferMode;
    Options          : ST_Home_Options4;
END_VAR
    
```

Name	Type	Description
Execute	BOOL	The command is executed with a rising edge at the Execute input.
Direction	<a href="#">MC_Home_Direction</a> [▶ 45]	Enumeration that defines the initial direction of movement for the search procedure.
SwitchMode	<a href="#">MC_Switch_Mode</a> [▶ 46]	Enumeration that defines the final condition for the search procedure.
ReferenceSignal	<a href="#">MC_Ref_Signal_Ref</a> [▶ 46]	This structure defines the source of the reference cam signal.
Velocity	LREAL	Maximum travel velocity (>0).
Acceleration	LREAL	Acceleration (≥0). If the value is 0, the standard acceleration from the axis configuration in the System Manager is used.
Deceleration	LREAL	Deceleration (≥0). If the value is 0, the standard deceleration from the axis configuration in the System Manager is used.
Jerk	LREAL	Jerk (≥0). If the value is 0, the standard jerk from the axis configuration in the System Manager is used.
SetPosition	LREAL	Position value that the axis position is set to.



Name	Type	Description
TimeLimit	TIME	Exceeding this time leads to the search procedure being aborted.
DistanceLimit	LREAL	Exceeding this distance in relation to the start position leads to the search procedure being aborted.
TorqueLimit	LREAL	The motor torque is limited to this value in order to avoid mechanical damage.
BufferMode	MC_BufferMode	Currently not implemented.
Options	ST_Home_Options4 [▶ 48]	<b>DisableDriveAccess:</b> Set to FALSE for Beckhoff drives, usually to TRUE for third-party drives (see info). <b>EnableLagErrorDetection:</b> In the step functions, the lag error detection is switched off in order to ensure a smooth referencing process. If it would be useful to keep the lag error detection active in an application, this can be achieved by setting this flag.



If DisableDriveAccess = TRUE, the user is responsible for modifying and reconstructing required drive parameters. The parameters required for the intended homing sequence must be agreed with the manufacturer of the third-party drive.

Inputs/Outputs

```
VAR_IN_OUT
  Axis      : AXIS_REF;
  Parameter : MC_HomingParameter;
END_VAR
```

Name	Type	Description
Axis	AXIS_REF	Axis data structure of the type AXIS_REF, which uniquely addresses an axis in the system. Among other parameters it contains the current axis status, including position, velocity or error state.
Parameter	MC_HomingParameter	Data structure of the type MC_HomingParameter, which must be transferred from function block to function block over the entire homing sequence.

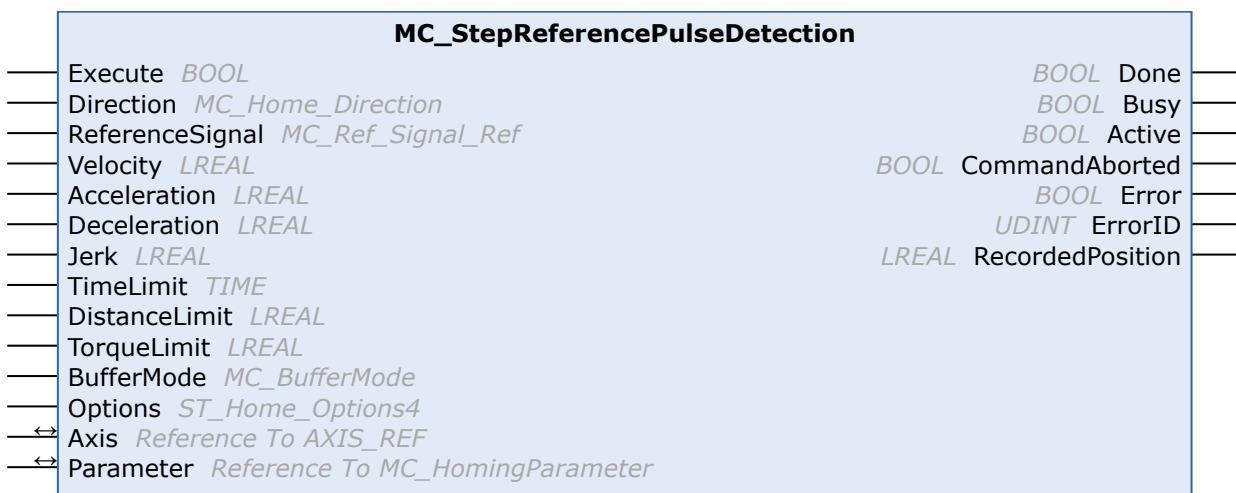
Outputs

```
VAR_OUTPUT
  Done      : BOOL;
  Busy      : BOOL;
  Active    : BOOL;
  CommandAborted : BOOL;
  Error     : BOOL;
  ErrorID   : UDINT;
END_VAR
```

Name	Type	Description
Done	BOOL	Becomes TRUE, if the command was completed successfully.
Busy	BOOL	The Busy output becomes TRUE when the command is started with Execute and remains TRUE as long as the command is processed. If Busy becomes FALSE again, the function block is ready for a new order. At the same time one of the outputs, Done, CommandAborted or Error, is set.
Active	BOOL	Indicates that the command is executed.

Name	Type	Description
CommandAborted	BOOL	Becomes TRUE, if the command could not be fully executed.
Error	BOOL	Becomes TRUE, as soon as an error occurs.
ErrorID	UDINT	If the error output is set, this parameter supplies the <u>error number</u> .

### 3.3.10 MC\_StepReferencePulseDetection



This function block performs the search for a zero pulse of an encoder.

A zero pulse is not present in all encoders and occurs only once per encoder revolution. The advantage of using a zero pulse for referencing is the high accuracy of this signal compared to that of a standard sensor.

The "...Detection" version of this function block does not manipulate the current position of the axis at the end of the sequence, but instead returns the detected position to the user as "RecordedPosition".

#### Inputs

```

VAR_INPUT
    Execute      : BOOL;
    Direction    : MC_Home_Direction;
    SwitchMode   : MC_Switch_Mode;
    ReferenceSignal : MC_Ref_Signal_Ref;
    Velocity     : LREAL;
    Acceleration : LREAL;
    Deceleration : LREAL;
    Jerk        : LREAL;
    TimeLimit    : TIME;
    DistanceLimit : LREAL;
    TorqueLimit  : LREAL;
    BufferMode    : MC_BufferMode;
    Options      : ST_Home_Options4;
END_VAR
    
```

Name	Type	Description
Execute	BOOL	The command is executed with a rising edge at the Execute input.
Direction	<u>MC_Home_Direction</u> [▶ 45]	Enumeration that defines the initial direction of movement for the search procedure.
SwitchMode	<u>MC_Switch_Mode</u> [▶ 46]	Enumeration that defines the final condition for the search procedure.
ReferenceSignal	<u>MC_Ref_Signal_Ref</u> [▶ 46]	This structure defines the source of the reference cam signal.

Name	Type	Description
Velocity	LREAL	Maximum travel velocity (>0).
Acceleration	LREAL	Acceleration (≥0). If the value is 0, the standard acceleration from the axis configuration in the System Manager is used.
Deceleration	LREAL	Deceleration (≥0). If the value is 0, the standard deceleration from the axis configuration in the System Manager is used.
Jerk	LREAL	Jerk (≥0). If the value is 0, the standard jerk from the axis configuration in the System Manager is used.
TimeLimit	TIME	Exceeding this time leads to the search procedure being aborted.
DistanceLimit	LREAL	Exceeding this distance in relation to the start position leads to the search procedure being aborted.
TorqueLimit	LREAL	The motor torque is limited to this value in order to avoid mechanical damage.
BufferMode	MC_BufferMode	Currently not implemented.
Options	<a href="#">ST_Home_Options4</a>   <a href="#">48</a>	<p><b>DisableDriveAccess:</b> Set to FALSE for Beckhoff drives, usually to TRUE for third-party drives (see info).</p> <p><b>EnableLagErrorDetection:</b> In the step functions, the lag error detection is switched off in order to ensure a smooth referencing process. If it would be useful to keep the lag error detection active in an application, this can be achieved by setting this flag.</p>



If DisableDriveAccess = TRUE, the user is responsible for modifying and reconstructing required drive parameters. The parameters required for the intended homing sequence must be agreed with the manufacturer of the third-party drive.

Inputs/Outputs

```
VAR_IN_OUT
  Axis      : AXIS_REF;
  Parameter : MC_HomingParameter;
END_VAR
```

Name	Type	Description
Axis	<a href="#">AXIS_REF</a>	Axis data structure of the type <a href="#">AXIS_REF</a> , which uniquely addresses an axis in the system. Among other parameters it contains the current axis status, including position, velocity or error state.
Parameter	<a href="#">MC_HomingParameter</a>	Data structure of the type <a href="#">MC_HomingParameter</a> , which must be transferred from function block to function block over the entire homing sequence.

Outputs

```
VAR_OUTPUT
  Done           : BOOL;
  Busy           : BOOL;
  Active         : BOOL;
  CommandAborted : BOOL;
  Error          : BOOL;
  ErrorID        : UDINT;
  RecordedPosition : LREAL;
END_VAR
```

Name	Type	Description
Done	BOOL	Becomes TRUE, if the command was completed successfully.

<b>Name</b>	<b>Type</b>	<b>Description</b>
Busy	BOOL	The Busy output becomes TRUE when the command is started with Execute and remains TRUE as long as the command is processed. When Busy becomes FALSE again, the function block is ready for a new order. At the same time one of the outputs, Done, CommandAborted or Error, is set.
Active	BOOL	Indicates that the command is executed.
CommandAborted	BOOL	Becomes TRUE, if the command could not be fully executed.
Error	BOOL	Becomes TRUE, as soon as an error occurs.
ErrorID	UDINT	If the error output is set, this parameter supplies the <u>error number</u> .
RecordedPosition	LREAL	Axis position at which the event was recorded.

## 4 Data types

### 4.1 General

#### 4.1.1 E\_HomingErrorCodes

```

TYPE MC_Switch_Mode :
(
  MC_HOMINGERROR_DRIVETYPE           := 16#4B90,
  MC_HOMINGERROR_DIRECTION           := 16#4B91,
  MC_HOMINGERROR_SWITCHMODE          := 16#4B92,
  MC_HOMINGERROR_MODE                 := 16#4B93,
  MC_HOMINGERROR_TORQUEPARAMETER      := 16#4B94,
  MC_HOMINGERROR_LAGPARAMETER         := 16#4B95,
  MC_HOMINGERROR_DISTANCELIMIT        := 16#4B96,
  MC_HOMINGERROR_PARAMETER_ALREADYSTORED := 16#4B97,
  MC_HOMINGERROR_PARAMETER_NOTSTORED  := 16#4B98
) UDINT;
END_TYPE

```

Name	Description
MC_HOMINGERROR_DRIVETYPE	The following drives are supported: <ul style="list-style-type: none"> <li>AX5xxx-xxxx-02xx (FW&gt;=2.05)</li> <li>EL7201-0000 /-0001 / -0010 / 0011</li> <li>AX8xxx-xxxx-xxxx (FW&gt;=???)</li> </ul>
MC_HOMINGERROR_DIRECTION	Parameterized direction is not permissible for this function block.
MC_HOMINGERROR_SWITCHMODE	Parameterized mode is not permissible for this function block.
MC_HOMINGERROR_MODE	
MC_HOMINGERROR_TORQUEPARAMETER	Parameterized torque presets are not permissible.
MC_HOMINGERROR_LAGPARAMETER	Parameterized lag error is not permissible (<0).
MC_HOMINGERROR_DISTANCELIMIT	Parameterized maximum distance is not permissible (<0).
MC_HOMINGERROR_PARAMETER_ALREADYSTORED	The MC_StepHomingParameter function block has been called again with the HOMINGPARAMETERCTRLMODE_READ mode, although parameters have already been backed up.
MC_HOMINGERROR_PARAMETER_NOTSTORED	The MC_StepHomingParameter function block has been called again with the HOMINGPARAMETERCTRLMODE_RESTORE mode, although no parameters have been backed up.

#### 4.1.2 MC\_Home\_Direction

```

TYPE MC_Home_Direction :
(
  mcPositiveDirection := 1,
  mcNegativeDirection := 3,
  mcSwitchPositive    := 5,
  mcSwitchNegative    := 7
);
END_TYPE

```

Name	Description
mcPositiveDirection	Movement always starts in the logically positive direction of movement. The movement direction can be reversed on reaching a movement range limit sensor or on reaching the precondition and when using mcRisingEdgeInverse or mcFallingEdgeInverse for the input of the type MC_Switch_Mode existing in some function blocks.

Name	Description
mcNegativeDirection	Movement always starts in the logically negative direction of movement. The movement direction can be reversed on reaching a movement range limit sensor or on reaching the precondition and when using mcRisingEdgeInverse or mcFallingEdgeInverse for the input of the type MC_Switch_Mode existing in some function blocks.
mcSwitchPositive	<p>The direction of movement at the start depends on the current switching state of the sensor.</p> <ul style="list-style-type: none"> <li>If the switching state of the sensor is OFF, the movement starts in logical positive direction of movement</li> <li>If the switching state of the sensor is ON, the movement starts in the logically negative direction.</li> </ul> <p>The movement direction can be reversed on reaching a movement range limit sensor or when the sensor switching state changes.</p>
mcSwitchNegative	<p>The direction of movement at the start depends on the current switching state of the sensor.</p> <ul style="list-style-type: none"> <li>If the switching state of the sensor is OFF, the movement starts in logical negative direction of movement.</li> <li>If the switching state of the sensor is ON, the movement starts in the logically positive direction.</li> </ul> <p>The movement direction can be reversed on reaching a movement range limit sensor or when the sensor switching state changes.</p>

### 4.1.3 MC\_Ref\_Signal\_Ref

```

TYPE MC_Ref_Signal_Ref :
STRUCT
    SignalSource : E_SignalSource := SignalSource_Default;
    TouchProbe   : E_TouchProbe   := PlcEvent;
    Level        : BOOL;
END_STRUCT
END_TYPE

```

Name	Type	Description
SignalSource	<u>E_SignalSource</u>	Optionally defines the signal source, if it can be selected via the controller. In many cases the signal source is permanently configured in the drive and should then be set to the default value <i>SignalSource_Default</i> . (Cf. E_SignalSource <b>Tc2_MC2</b> library documentation)
TouchProbe	<u>E_TouchProbe</u>	Defines the latch unit (probe unit) within the encoder hardware used. (Cf. E_TouchProbe <b>Tc2_MC2</b> library documentation)
Level	BOOL	The current signal state of the sensor must be transferred here.

### 4.1.4 MC\_Switch\_Mode

```

TYPE MC_Switch_Mode :
(
    mcOn           := 1,
    mcOff          := 2,
    mcRisingEdge   := 3,
    mcFallingEdge  := 4,
    mcEdgeSwitchPositive := 5,
    mcEdgeSwitchNegative := 6,
    mcRisingEdgeInverse := 11,
    mcFallingEdgeInverse := 12
) UDINT;
END_TYPE

```

Condition for the sensor signal to stop the step function.

Name	Description
mcOn	Sensor is ON.
mcOff	Sensor is OFF.
mcRisingEdge	Rising edge in resulting direction for sensor signal OFF.
mcFallingEdge	Falling edge in resulting direction for sensor signal OFF.
mcEdgeSwitchPositive	Edge depends on moving direction. Rising edge in positive moving direction. Falling edge in negative direction.
mcEdgeSwitchNegative	Edge depends on moving direction. Falling edge in positive moving direction. Rising edge in negative direction.
mcRisingEdgeInverse	Rising edge of sensor signal (OFF -> ON) in opposite resulting direction for sensor signal OFF.
mcFallingEdgeInverse	Falling edge of sensor signal (ON -> OFF) in opposite resulting direction for sensor signal OFF.

### 4.1.5 ST\_Home\_Options

```
TYPE MC_Home_Options :
STRUCT
END_STRUCT
END_TYPE
```

### 4.1.6 ST\_Home\_Options2

```
TYPE MC_Home_Options2 :
STRUCT
    DisableDriveAccess : BOOL;
END_STRUCT
END_TYPE
```

Name	Type	Description
DisableDriveAccess	BOOL	Set to FALSE for Beckhoff drives, usually TRUE for third-party drives (see info).



If DisableDriveAccess = TRUE, the user is responsible for modifying and reconstructing required drive parameters. The parameters required for the intended homing sequence must be agreed with the manufacturer of the third-party drive.

### 4.1.7 ST\_Home\_Options3

```
TYPE MC_Home_Options3 :
STRUCT
    DisableDriveAccess : BOOL;
    InstantLagReduction : BOOL;
END_STRUCT
END_TYPE
```

Name	Type	Description
DisableDriveAccess	BOOL	Set to FALSE for Beckhoff drives, usually TRUE for third-party drives (see info).
InstantLagReduction	BOOL	When referencing to a mechanical fixed stop, the sudden stop produces a lag error in the NC axis, which is dissipated with the parameterized dynamic values in the further course. This can lead to an assumed delay when observing the sequence, but it is purposeful in particular with "soft" fixed stops. The lag error is dissipated abruptly by setting this flag.



If DisableDriveAccess = TRUE, the user is responsible for modifying and reconstructing required drive parameters. The parameters required for the intended homing sequence must be agreed with the manufacturer of the third-party drive.

## 4.1.8 ST\_Home\_Options4

```

TYPE MC_Home_Options4 :
STRUCT
  DisableDriveAccess      : BOOL;
  EnableLagErrorDetection : BOOL;
END_STRUCT
END_TYPE

```

Name	Type	Description
DisableDriveAccess	BOOL	Set to FALSE for Beckhoff drives, usually TRUE for third-party drives (see info).
EnableLagErrorDetection	BOOL	In the step functions the lag error detection is switched off in order to ensure a smooth referencing process. If it would be purposeful to keep the lag error detection active in an application, this can be achieved by setting this flag.



If DisableDriveAccess = TRUE, the user is responsible for modifying and reconstructing required drive parameters. The parameters required for the intended homing sequence must be agreed with the manufacturer of the third-party drive.

## 4.2 Parameter

### 4.2.1 MC\_HomingParameter

```

TYPE MC_HomingParameter :
STRUCT
  Stored : BOOL;
  Nc      : MC_HomingParameterNcGeneral;
  Drive   : MC_HomingParameterDriveGeneral;
END_STRUCT
END_TYPE

```

Name	Type	Description
Stored	BOOL	This flag signals that the required parameters that are to be modified have been successfully read and are available for reconstruction at the end of the procedure.
Nc	MC_HomingParameterNcGeneral	Structure that contains the stored and modified parameter values of the NC axis
Drive	MC_HomingParameterDriveGeneral	Structure that contains the stored and modified parameter values of the hardware axis controller.  This structure must be made available to and passed through all homing function blocks when programming your own homing sequence. Parameters are backed up in advance, modified by the function blocks and restored upon completion of the procedure.

### 4.2.2 MC\_HomingParameterCtrlMode

```

TYPE MC_HomingParameterCtrlMode :
(
  HOMINGPARAMETERCTRLMODE_READ,
  HOMINGPARAMETERCTRLMODE_PREPARE,
  HOMINGPARAMETERCTRLMODE_RESTORE
) UDINT;
END_TYPE

```



Name	Description
HOMINGPARAMETERCTRLMO DE_READ	This function block reads all relevant parameters of the NC axis and the hardware axis controller.
HOMINGPARAMETERCTRLMO DE_PREPARE	This function block modifies all relevant parameters of the NC axis and the hardware axis controller.  The parameters to be modified must be written to the parameter structure beforehand.
HOMINGPARAMETERCTRLMO DE_RESTORE	This function block restores the backed-up parameters of the NC axis and the hardware axis controller.  The requirement is that the parameters have been successfully read beforehand.

### 4.2.3 MC\_HomingParameterDrive

```

TYPE MC_HomingParameterDrive :
STRUCT
    TorqueMaxBipolar : LREAL;
    TorqueMaxPositive : LREAL;
    TorqueMaxNegative : LREAL;
END_STRUCT
END_TYPE
    
```

Name	Type	Description
TorqueMaxBipolar	LREAL	Bipolar torque limit value
TorqueMaxPositive	LREAL	Torque limit value in the logically positive direction of movement
TorqueMaxNegative	LREAL	Torque limit value in the logically negative direction of movement

### 4.2.4 MC\_HomingParameterDriveGeneral

```

STRUCT
    Stored : MC_HomingParameterDrive;
    Actual : MC_HomingParameterDrive;
END_STRUCT
END_TYPE
    
```

Name	Type	Description
Stored	MC_HomingParameterDrive	Stored parameters for the start of the homing procedure.
Actual	MC_HomingParameterDrive	Modified values that vary during the procedure.

### 4.2.5 MC\_HomingParameterNc

```

TYPE MC_HomingParameterNc :
STRUCT
    EnableSoftEndMinControl : BOOL;
    EnableSoftEndMaxControl : BOOL;
    EnablePosDiffControl : BOOL;
    EnableVeloDiffControl : BOOL;
END_STRUCT
END_TYPE
    
```

Name	Type	Description
EnableSoftEndMinControl	BOOL	Activation of the software limit position monitoring in the logically positive direction
EnableSoftEndMaxControl	BOOL	Activation of the software limit position monitoring in the logically negative direction
EnablePosDiffControl	BOOL	Activation of the lag error detection
EnableVeloDiffControl	BOOL	Activation of the motion monitoring

## 4.2.6 MC\_HomingParameterNcGeneral

```
STRUCT
  Stored : MC_HomingParameterNc;
  Actual : MC_HomingParameterNc;
END_STRUCT
END_TYPE
```

Name	Type	Description
Stored	MC_HomingParameterNc	Stored NC parameters for the start of the homing procedure
Actual	MC_HomingParameterNc	Modified NC parameters that vary during the procedure

## 5 Appendix

### 5.1 Samples

#### "Home-On-Block"

The sample performs a homing of an AX5000 axis against a fixed stop and can be modified very easily for other drive hardware.

Download: [https://infosys.beckhoff.com/content/1033/TcPlcLib\\_Tc3\\_MC2\\_AdvancedHoming/Resources/12593057419/.zip](https://infosys.beckhoff.com/content/1033/TcPlcLib_Tc3_MC2_AdvancedHoming/Resources/12593057419/.zip)



More Information:  
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