



# DOCUMENTATION ISG-kernel

## PLC library McpPLCopen Part 1 Extension

Short Description:  
MCP-P1 Ext

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# Preface

## Legal information

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No claims may be made for products which have already been delivered if such claims are based on the specifications, figures and descriptions contained in this documentation.

## Personnel qualifications

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This description is solely intended for skilled technicians who were trained in control, automation and drive systems and who are familiar with the applicable standards, the relevant documentation and the machining application.

It is absolutely vital to refer to this documentation, the instructions below and the explanations to carry out installation and commissioning work. Skilled technicians are under the obligation to use the documentation duly published for every installation and commissioning operation.

Skilled technicians must ensure that the application or use of the products described fulfil all safety requirements including all applicable laws, regulations, provisions and standards.

## Further information

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Links below (DE)

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or (EN)

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contains further information on messages generated in the NC kernel, online help, PLC libraries, tools, etc. in addition to the current documentation.

## Disclaimer

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It is forbidden to make any changes to the software configuration which are not contained in the options described in this documentation.

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# General and safety instructions

## Icons used and their meanings

This documentation uses the following icons next to the safety instruction and the associated text. Please read the (safety) instructions carefully and comply with them at all times.

## Icons in explanatory text

- Indicates an action.
- ⇒ Indicates an action statement.



### **DANGER**

#### **Acute danger to life!**

If you fail to comply with the safety instruction next to this icon, there is immediate danger to human life and health.



### **CAUTION**

#### **Personal injury and damage to machines!**

If you fail to comply with the safety instruction next to this icon, it may result in personal injury or damage to machines.



### **Attention**

#### **Restriction or error**

This icon describes restrictions or warns of errors.



### **Notice**

#### **Tips and other notes**

This icon indicates information to assist in general understanding or to provide additional information.



### **Example**

#### **General example**

Example that clarifies the text.



### **Programming Example**

#### **NC programming example**

Programming example (complete NC program or program sequence) of the described function or NC command.



### **Release Note**

#### **Specific version information**

Optional or restricted function. The availability of this function depends on the configuration and the scope of the version.

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# 1 Overview of the FBs

The table below provides an overview of the available function blocks

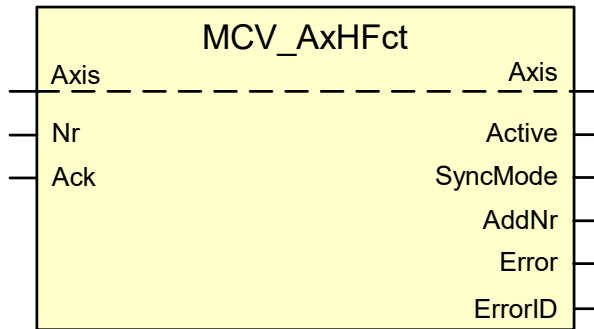
Function block	PLC systems		
	KW	3S	TwinCAT
MCV_AxHFct [▶ 6]	-	X	-
MCV_AxMFct [▶ 8]	-	X	-
MCV_AxSFct [▶ 10]	-	X	-
MCV_AddCmdValues [▶ 12]	-	X	-
MCV_DynPosLimitLow [▶ 13]	-	X	-
MCV_DynPosLimitHigh [▶ 14]	-	X	-
MCV_ReadActualTorque [▶ 15]	-	X	-
MCV_SpindleControl [▶ 16]	-	X	-

## 2 Function blocks for technology functions

### 2.1 MCV\_AxHFct

This FB signals the output of an H technology function. It is acknowledged by the PLC provided it is a technology function that was parameterised in the channel parameter list as an axis-specific output function.

#### Block diagram



#### FB parameters

VAR_IN_OUT		
Variable name	Data type	Description
Axis	AXIS_REF	Axis reference

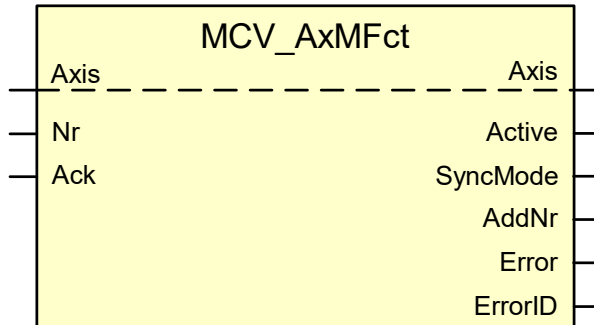
VAR_INPUT		
Variable name	Data type	Description
Nr	UINT	The number of the H technology function handled by the function block is defined via the input.
Ack	BOOL	The H technology function is acknowledged on the rising edge.

<b>VAR_OUTPUT</b>		
<b>Variable name</b>	<b>Data type</b>	<b>Description</b>
Active	BOOL	The output indicates the value TRUE when the technology function was output to the PLC. The output remains TRUE until a rising edge is applied to the "Ack" input.
SyncMode	DWORD	Synchronisation type of an H technology function. This is the value used to define the synchronisation type of the H technology functions in the channel parameter list in the P-CHAN-00027 parameter.
AddNr	DINT	A number assigned to an H technology function by programming in the NC program and output when the H technology function is output to the axis-specific interface in addition to the technology function number. See [PROG//M/H functions with additional information].
Error	BOOL	Is TRUE if an error occurs in the FB.
ErrorID	WORD	Error code

## 2.2 MCV\_AxMFct

This FB signals the output of an M technology function. It is acknowledged by the PLC provided it is a technology function that was parameterised in the channel parameter list as an axis-specific output function.

### Block diagram



### FB parameters

VAR_IN_OUT		
Variable name	Data type	Description
Axis	AXIS_REF	Axis reference

VAR_INPUT		
Variable name	Data type	Description
Nr	UINT	The number of the spindle technology function handled by the function block is defined via the input.
Ack	BOOL	The spindle technology function is acknowledged on the rising edge.

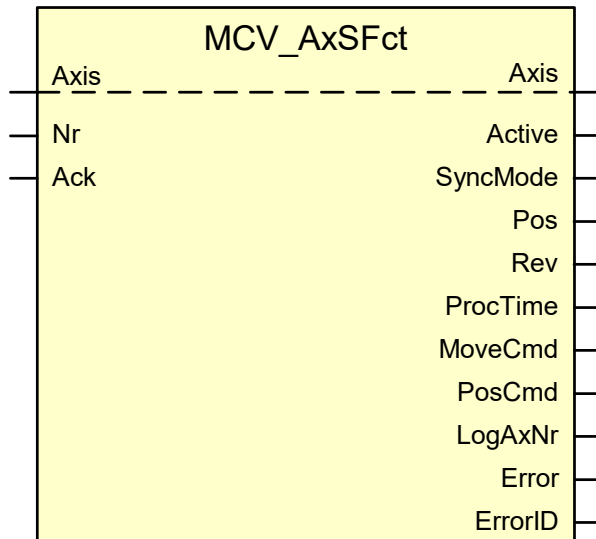


<b>VAR_OUTPUT</b>		
<b>Variable name</b>	<b>Data type</b>	<b>Description</b>
Active	BOOL	The output indicates the value TRUE when the technology function was output to the PLC. The output remains TRUE until a rising edge is applied to the "Ack" input.
SyncMode	DWORD	Synchronisation type of an M technology function. This is the value used to define the synchronisation type of the M technology functions in the channel parameter list in the P-CHAN-00041 parameter.
AddNr	DINT	A number assigned to an M technology function by programming in the NC program and output when the M technology function is output to the axis-specific interface in addition to the technology function number. See [PROG//M/H- functions with additional information].
Error	BOOL	Is TRUE if an error occurs in the FB.
ErrorID	WORD	Error code

## 2.3 MCV\_AxSFct

This FB signals the output of a spindle technology function. It is acknowledged by the PLC provided it is a technology function that was parameterised in the channel parameter list as an axis-specific output function.

### Block diagram



### FB parameters

VAR_IN_OUT		
Variable name	Data type	Description
Axis	AXIS_REF	Axis reference

VAR_INPUT		
Variable name	Data type	Description
Nr	UINT	The number of the spindle technology function handled by the function block is defined via the input.
Ack	BOOL	The spindle technology function is acknowledged on the rising edge.

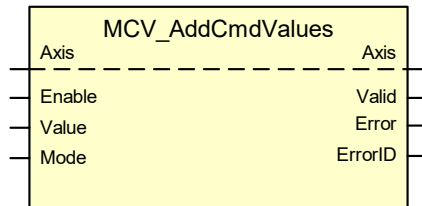
<b>VAR_OUTPUT</b>		
<b>Variable name</b>	<b>Data type</b>	<b>Description</b>
Active	BOOL	The output indicates the value TRUE when the technology function was output to the PLC. The output remains TRUE until a rising edge is applied to the "Ack" input.
SyncMode	DWORD	Synchronisation type of a spindle technology function. This is the value used to define the synchronisation type of the S technology function in the channel parameter list in the parameter P-CHAN-00081.
Pos	DINT	The target position for a position-controlled spindle commanded by the NC command POS when M19 is programmed. See [PROG//Positioning a spindle]. Default unit [0.1 µm]
Rev	DINT	The speed of a spindle commanded by the NC command REV when M3/M4/M5/M19 are programmed. See [PROG//Moving a spindle] and [PROG//Positioning a spindle]. Default unit [ $10^{-3}$ °/s]
ProcTime	UDINT	Time specifying the duration of a spindle S or spindle M technology function. These specifications are used in conjunction with production time calculations. The user specified the value for each technology function in the channel parameter lists (see P-CHAN-00042, P-CHAN-00044, P-CHAN-00046, P-CHAN-00048, P-CHAN-00080). Default unit [1 µs]
MoveCmd	UINT	Number of the M technology function when M3/M4/M5 was commanded in conjunction with a spindle.
PosCmd	UINT	The number 19 when M19 was commanded to position a spindle in an NC block.
LogAxNr	UINT	Logical axis number of the spindle. This corresponds to the axis parameter P-AXIS-00016,
Error	BOOL	Is TRUE if an error occurs in the FB.
ErrorID	WORD	Error code

## 3 General function blocks

### 3.1 MCV\_AddCmdValues

This FB specifies cyclical position or velocity set values for an axis. The specified values are added to the current interpolator command position or command velocity. Set value changes are always considered on the PLC interface, i.e. the axis is not additionally moved with a constant set-point specification.

#### Block diagram



#### FB parameters

VAR_IN_OUT		
Variable name	Data type	Description
Axis	AXIS_REF	Axis reference

VAR_INPUT			
Variable name	Data type	Description	
Enable	BOOL	If TRUE, the specified set values are written to the PLC interface (HLI).	
Value	DINT	Specified set value	
Mode	INT	Select specified set value mode	
		1	Specify position set values
		2	Specify velocity set values <sup>1)</sup>

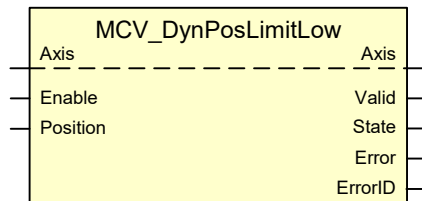
<sup>1)</sup> Note: The specification of velocity set values is currently not supported.

VAR_OUTPUT		
Variable name	Data type	Description
Valid	BOOL	Is TRUE when specified set value is activated.
Error	BOOL	Indicates whether an error has occurred in an FB.
ErrorID	WORD	Error code

## 3.2 MCV\_DynPosLimitLow

If an axis position should be prevented from undershooting a specific value, this function block specifies the limit that may not be undershot. If the axis moves towards the limit, the motion is controlled so that the axis stops within the limit range. The position limit may be crossed by the distance which is travelled in one controller cycle.

### Block diagram



### FB parameters

VAR_IN_OUT		
Variable name	Data type	Description
Axis	AXIS_REF	Axis reference

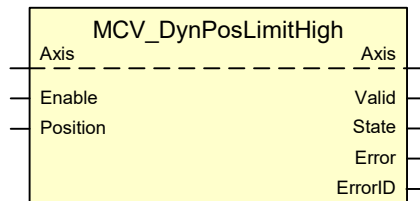
VAR_INPUT		
Variable name	Data type	Description
Enable	BOOL	If TRUE, the position limit is written to the PLC interface (HLI).
Position	DINT	Position limit specification

VAR_OUTPUT		
Variable name	Data type	Description
Valid	BOOL	Is TRUE when specified set value is activated.
State	DINT	Current position limit
Error	BOOL	Indicates whether an error has occurred in an FB.
ErrorID	WORD	Error identifier

### 3.3 MCV\_DynPosLimitHigh

If an axis position should be prevented from overshooting a specific value, this function block specifies the limit that may not be overshoot. If the axis moves towards the limit, the motion is controlled so that the axis stops within the limit range. The position limit may be crossed by the distance which is travelled in one controller cycle.

#### Block diagram



#### FB parameters

VAR_IN_OUT		
Variable name	Data type	Description
Axis	AXIS_REF	Axis reference

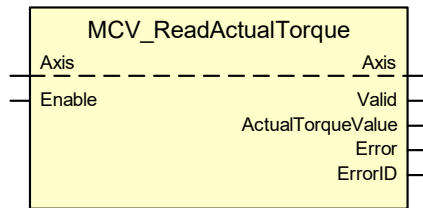
VAR_INPUT		
Variable name	Data type	Description
Enable	BOOL	If TRUE, the position limit is written to the PLC interface (HLI).
Position	DINT	Position limit specification

VAR_OUTPUT		
Variable name	Data type	Description
Valid	BOOL	Is TRUE when specified set value is activated.
State	DINT	Current position limit
Error	BOOL	Indicates whether an error has occurred in an FB.
ErrorID	WORD	Error identifier

### 3.4 MCV\_ReadActualTorque

This FB can determine the torque value of an axis. Specify the torque in units of 0.01%.

#### Block diagram



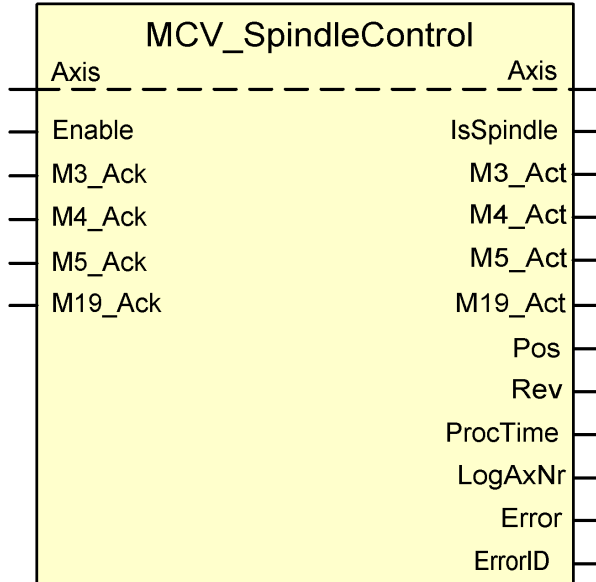
#### FB parameters

VAR_IN_OUT		
Variable name	Data type	Description
Axis	AXIS_REF	Axis reference
VAR_INPUT		
Variable name	Data type	Description
Enable	BOOL	When TRUE, the current active drive torque is read.
VAR_OUTPUT		
Variable name	Data type	Description
Valid	BOOL	Is TRUE when the drive torque is read.
ActualTorqueValue	DINT	Current active drive torque. Unit [0.01%]
Error	BOOL	Indicates whether an error has occurred in an FB.
ErrorID	WORD	Error code

### 3.5 MCV\_SpindleControl

The FB supplies to its outputs all the information on technology functions which are of interest to the PLC when a spindle is programmed by NC blocks.

#### Block diagram



#### FB parameters



<b>VAR_IN_OUT</b>		
<b>Variable name</b>	<b>Data type</b>	<b>Description</b>
Axis	AXIS_REF	Axis reference of spindles
<b>VAR_INPUT</b>		
<b>Variable name</b>	<b>Data type</b>	<b>Description</b>
Enable	BOOL	
M3_Ack	BOOL	Input to acknowledge an M3 technology function output for a specific spindle.
M4_Ack	BOOL	Input to acknowledge an M4 technology function output for a specific spindle.
M5_Ack	BOOL	Input to acknowledge an M5 technology function output for a specific spindle.
M19_Ack	BOOL	Input to acknowledge an M19 technology function output for a specific spindle.
<b>VAR_OUTPUT</b>		
<b>Variable name</b>	<b>Data type</b>	<b>Description</b>
IsSpindle	BOOL	TRUE indicates that the axis applied to the axis reference is identified as a spindle in the NC channel.
M3_Act	BOOL	Becomes TRUE when the NC kernel outputs an M3 technology function for the spindle and remains TRUE until a rising edge is detected at "M3_Ack".
M4_Act	BOOL	Becomes TRUE when the NC kernel outputs an M4 technology function for the spindle and remains TRUE until a rising edge is detected at "M4_Ack".
M5_Act	BOOL	Becomes TRUE when the NC kernel outputs an M5 technology function for the spindle and remains TRUE until a rising edge is detected at "M5_Ack".
M19_Act	BOOL	Becomes TRUE when the NC kernel outputs an M19 technology function for the spindle and remains TRUE until a rising edge is detected at "M19_Ack".
Pos	DINT	Commanded spindle position when programming M19 and <i>[Spindelname].POS</i>
Rev	DINT	Commanded spindle speed when programming <i>[Spindelname]&lt;Drehzahl&gt;</i>
ProcTime	UDINT	
LogAxNr	UINT	Logical axis number of the spindle
Error	BOOL	Indicates TRUE when an error occurs.
ErrorID	UDINT	Error code

## 4 Appendix

### 4.1 Suggestions, corrections and the latest documentation

Did you find any errors? Do you have any suggestions or constructive criticism? Then please contact us at [documentation@isg-stuttgart.de](mailto:documentation@isg-stuttgart.de). The latest documentation is posted in our Online Help (DE/EN):



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