



Technical Specification
PLCopen - Technical Committee 2 – Task Force
Function blocks for motion control

Version 1.1

DISCLAIMER OF WARRANTIES

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April 9, 2005.

Appendix A. Compliance Procedure and Compliance List

Listed in this Appendix are the requirements for the compliance statement from the supplier of the Motion Control Function Blocks. The compliance statement consists of two main groups: supported data types (see Appendix A 2 Supported Data types) and supported Function Blocks, in combination with the applicable inputs and outputs (see Appendix A 3 Overview of the Function Blocks and its paragraphs). The supplier is required fill out the tables for the used data types and Function Blocks, according to their product, committing their support to the specification.

By submitting these tables to PLCopen, and after approval by PLCopen, the list will be published on the PLCopen website, www.plcopen.org , as well as a shortform overview, as specified in Appendix A 2 Supported Data types and Appendix A 3 Overview of the Function Blocks.

In addition to this approval, the supplier is granted access and usage rights of the PLCopen Motion Control logo, as described in chapter Appendix A 4 The PLCopen Motion Control Logo and Its Usage.

Data types

The data type REAL listed in the Function Blocks and parameters (e.g. for velocity, acceleration, distance, etc.) may be exchanged to SINT, INT, DINT or LREAL without to be seen as incompliant to this standard, as long as they are consistent for the whole set of Function Blocks and parameters.

Implementation allows the extension of data types as long as the basic data type is kept. For example: WORD may be changed to DWORD, but not to REAL.

Function Blocks and Inputs and Outputs

An implementation which claims compliance with this PLCopen specification shall offer a set of Function Blocks for motion control, meaning one or more Function Blocks, with at least the **basic** input and output variables, marked as “**B**” in the tables. These inputs and outputs have to be supported to be compliant.

For higher-level systems and future extensions any subset of the **extended** input and output variables, marked as “**E**” in the tables can be implemented.

Vendor specific additions are marked with “**V**”, and can be listed as such in the supplier documentation.

- Basic input/output variables are mandatory	Marked in the tables with the letter “ B ”
- Extended input /output variables are optional	Marked in the tables with the letter “ E ”
- Vendor Specific additions	Marked in the vendor’s compliance documentation with “ V ”

All the vendor specific items will not be listed in the comparison table on the PLCopen website, but in the detailed vendor specific list, which also is published.

All vendor specific in- and outputs of all FBs must be listed in the certification list of the supplier. With this, the certification listing from a supplier describes all the I/Os of the relevant FBs, including vendor-specific extensions, and thus showing the complete FBs as used by the supplier.

Appendix A 1. Statement of Supplier

Supplier name	Schneider Electric Motion Deutschland GmbH
Supplier address	Breslauer Str. 7
City	D-77933 Lahr
Country	Germany
Telephone	+49 7821 946 01
Fax	+49 7821 946 313
Email address	info@schneider-electric-motion.com
Product Name	Lexium library for motion drives
Product version	1.1.0.0
Release date	23.10.2009

I hereby state that the following tables as filled out and submitted do match our product as well as the accompanying user manual, as stated above.

Name of representation (person):
Jürgen Fiess

Date of signature (dd/mm/yyyy):
17/11/2009



Signature:

Appendix A 2. Supported Data types

Defined datatypes with MC library:	Supported	If not supported, which datatype used
BOOL	Yes	
INT	Yes	
WORD	Yes	
REAL	No	DINT
ENUM	No	

Table 1: Supported datatypes

Within the specification the following derived datatypes are defined. Which structure is used in this system:

Derived datatypes:	Where used	Supported	Which structure
Axis_Ref	Nearly all FBs	Yes	Axis_Ref_LXM
MC_Direction (extended)	MC_MoveAbsolute MC_MoveVelocity	No	
MC_TP_REF	MC_PositionProfile	No	
MC_TV_REF	MC_VelocityProfile	No	
MC_TA_REF	MC_AccelerationProfile	No	
MC_CAM_REF	MC_CamTableSelect	No	
MC_CAM_ID (extended)	MC_CamTableSelect MC_CamIn	No	
MC_StartMode (extended)	MC_CamIn	No	
MC_BufferMode	Buffered FBs	No	

Table 2: Supported derived datatypes

Appendix A 3. Overview of the Function Blocks

Single Axis Function Blocks	Supported Yes / No	Comments (<= 48 char.)
MC_MoveAbsolute	Yes	
MC_MoveRelative	Yes	
MC_MoveAdditive	Yes	
MC_MoveSuperimposed	No	
MC_MoveVelocity	Yes	
MC_Home	Yes	
MC_Stop	Yes	
MC_Power	Yes	
MC_ReadStatus	Yes	
MC_ReadAxisError	Yes	
MC_Reset	Yes	
MC_ReadParameter	Yes	
MC_ReadBoolParameter	No	
MC_WriteParameter	Yes	
MC_WriteBoolParameter	No	
MC_ReadActualPosition	Yes	
MC_PositionProfile	No	
MC_VelocityProfile	No	
MC_AccelerationProfile	No	
Multi-Axis Function Blocks	Supported Yes / No	Comments (<= 48 char.)
MC_CamTableSelect	No	
MC_CamIn	No	
MC_CamOut	No	
MC_GearIn	Yes	
MC_GearOut	Yes	
MC_Phasing	No	

Table 3: Short overview of the Function Blocks

Appendix A 6.1 MoveAbsolute

If Supported	MC_MoveAbsolute	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Execute	Y	
B	Position	Y	
E	Velocity	Y	
E	Acceleration	N	Supported by vendor specific function block
E	Deceleration	N	Supported by vendor specific function block
E	Jerk	N	
E	Direction	N	
E	BufferMode	N	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
E	Active	N	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	N	

Appendix A 6.2 MoveRelative

If Supported	MC_MoveRelative	Supported Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Execute	Y	
B	Distance	Y	
E	Velocity	Y	
E	Acceleration	N	Supported by vendor specific function block
E	Deceleration	N	Supported by vendor specific function block
E	Jerk	N	
E	BufferMode	N	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
E	Active	N	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	N	

Appendix A 6.3 MoveAdditive

If Supported	MC_MoveAdditive	Supported Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Execute	Y	
B	Distance	Y	
E	Velocity	Y	
E	Acceleration	N	Supported by vendor specific function block
E	Deceleration	N	Supported by vendor specific function block
E	Jerk	N	
E	BufferMode	N	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
E	Active	N	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	N	

Appendix A 6.4 MoveSuperimposed - Not supported

If Supported	MC_MoveSuperimposed	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis		
VAR_INPUT			
B	Execute		
B	Distance		
E	VelocityDiff		
E	Acceleration		
E	Deceleration		
E	Jerk		
VAR_OUTPUT			
B	Done		
E	Busy		
E	Active		
E	CommandAborted		
B	Error		
E	ErrorID		

Appendix A 6.5 MoveVelocity

If Supported	MC_MoveVelocity	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Execute	Y	
E	Velocity	Y	
E	Acceleration	N	Supported by vendor specific function block
E	Deceleration	N	Supported by vendor specific function block
E	Jerk	N	
E	Direction	N	
E	BufferMode	N	
VAR_OUTPUT			
B	InVelocity	Y	
E	Busy	Y	
E	Active	N	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	N	

Appendix A 6.6 Home

If Supported	MC_Home	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Execute	Y	
B	Position	Y	
E	HomingMode	Y	
E	BufferMode	N	
V	VHome (DINT)	Y	Velocity for searching reference switch
V	VOutHome (DINT)	Y	Velocity for moving back to edge of reference switch
V	POutHome (DINT)	Y	Max. distance for moving back to edge of reference switch
V	PDisHome (DINT)	Y	Distance from edge of reference switch
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
E	Active	N	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	N	

Appendix A 6.7 Stop

If Supported	MC_Stop	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Execute	Y	
E	Deceleration	N	Supported by vendor specific function block
E	Jerk	N	
E	BufferMode	N	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
E	Active	N	
E	CommandAborted	N	
B	Error	Y	
E	ErrorID	N	

Appendix A 6.8 Power

If Supported	MC_Power	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Enable	Y	
E	Enable_Positive	N	
E	Enable_Negative	N	
E	BufferMode	N	
VAR_OUTPUT			
B	Status	Y	
E	Busy	N	
E	Active	N	
B	Error	Y	
E	ErrorID	N	

Appendix A 6.9 ReadStatus

If Supported	MC_ReadStatus	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Enable	Y	
VAR_OUTPUT			
B	Valid	Y	
E	Busy	Y	
B	Error	Y	
E	ErrorID	N	
B	Disabled	Y	
B	Errorstop	Y	
B	Stopping	Y	
B	StandStill	Y	
B	DiscreteMotion	Y	
B	ContinuousMotion	Y	
E	SynchronizedMotion	Y	
E	Homing	Y	
E	ConstantVelocity	Y	
E	Accelerating	Y	
E	Decelerating	Y	

Appendix A 6.10 ReadAxisError

If Supported	MC_ReadAxisError	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
	Enable	Y	
VAR_OUTPUT			
B	Valid	Y	
E	Busy	Y	
B	Error	Y	
B	ErrorID	Y	
B	AxisErrorID	Y	

Appendix A 6.11 Reset

If Supported	MC_Reset	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Execute	Y	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
B	Error	Y	
B	ErrorID	N	

Appendix A 6.12 ReadParameter

If Supported	MC_ReadParameter	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Enable	Y	
B	ParameterNumber	Y	
V	Index (UINT)	Y	Index for access to CANopen objects
V	Subindex (UINT)	Y	Subindex for access to CANopen objects
VAR_OUTPUT			
B	Valid	Y	
E	Busy	Y	
B	Error	Y	
E	ErrorID	N	
B	Value	Y	
V	Length (UINT)	Y	Datalength for access to CANopen objects

Appendix A 6.13 ReadBoolParameter - Not supported

If Supported	MC_ReadBoolParameter	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis		
VAR_INPUT			
B	Valid		
B	ParameterNumber		
VAR_OUTPUT			
B	Done		
E	Busy		
B	Error		
E	ErrorID		
B	Value		

Name	B/E	R/W	Supp. Y/N	Comments
CommandedPosition	B	R	Y	
SWLimitPos	E	R/W	Y	
SWLimitNeg	E	R/W	Y	
EnableLimitPos	E	R/W	Y	
EnableLimitNeg	E	R/W	Y	
EnablePosLagMonitoring	E	R/W	N	
MaxPositionLag	E	R/W	N	
MaxVelocitySystem	E	R	N	
MaxVelocityAppl	B	R/W	N	
ActualVelocity	B	R	Y	
CommandedVelocity	B	R	Y	
MaxAccelerationSystem	E	R	N	
MaxAccelerationAppl	E	R/W	N	
MaxDecelerationSystem	E	R	N	
MaxDecelerationAppl	E	R/W	N	
MaxJerk	E	R/W	N	

Table 4: Parameters for ReadParameter and WriteParameter

Appendix A 6.14 WriteParameter

If Supported	MC_WriteParameter	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Execute	Y	
B	ParameterNumber	Y	
B	Value	Y	
V	Index (UINT)	Y	Index for access to CANopen objects
V	Subindex (UINT)	Y	Subindex for access to CANopen objects
V	Length (UINT)	Y	Datalength for access to CANopen objects
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
E	Buffered	N	
B	Error	Y	
E	ErrorID	N	

Appendix A 6.15 WriteBoolParameter - Not supported

If Supported	MC_WriteBoolParameter	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis		
VAR_INPUT			
B	Execute		
B	ParameterNumber		
B	Value		
VAR_OUTPUT			
B	Done		
E	Busy		
E	Buffered		
B	Error		
E	ErrorID		

Appendix A 6.16 ReadActualPosition

If Supported	MC_ReadActualPosition	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Enable	Y	
V	PositionType (INT)	Y	Selection for different positions
VAR_OUTPUT			
B	Valid	Y	
E	Busy	Y	
B	Error	Y	
E	ErrorID	N	
B	Position	Y	

Appendix A 6.17 PositionProfile - Not supported

If Supported	MC_PositionProfile	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis		
B	TimePosition		
VAR_INPUT			
B	Execute		
B	TimeScale		
E	PositionScale		
E	Offset		
E	BufferMode		
VAR_OUTPUT			
B	Done		
E	Busy		
E	Active		
E	CommandAborted		
B	Error		
E	ErrorID		

Appendix A 6.18 VelocityProfile - Not supported

If Supported	MC_VelocityProfile	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis		
B	TimeVelocity		
VAR_INPUT			
B	Execute		
B	TimeScale		
E	VelocityScale		
E	Offset		
E	BufferMode		
VAR_OUTPUT			
B	Done		
E	Busy		
E	Active		
E	CommandAborted		
B	Error		
E	ErrorID		

Appendix A 6.19 AccelerationProfile - Not supported

If Supported	MC_AccelerationProfile	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis		
B	TimeAcceleration		
VAR_INPUT			
B	Execute		
B	TimeScale		
E	AccelerationScale		
E	Offset		
E	BufferMode		
VAR_OUTPUT			
B	Done		
E	Busy		
E	Active		
E	CommandAborted		
B	Error		
E	ErrorID		

Appendix A 6.20 CamTableSelect - Not supported

If Supported	MC_CamTableSelect	Sup. Y/N	Comments
VAR_IN_OUT			
B	Master		
B	Slave		
B	CamTable		
VAR_INPUT			
B	Execute		
E	Periodic		
E	MasterAbsolute		
E	SlaveAbsolute		
VAR_OUTPUT			
B	Done		
E	Busy		
B	Error		
E	ErrorID		
E	CamTableID		

Appendix A 6.21 CamIn - Not supported

If Supported	MC_CamIn	Sup. Y/N	Comments
VAR_IN_OUT			
B	Master		
B	Slave		
VAR_INPUT			
B	Execute		
E	MasterOffset		
E	SlaveOffset		
E	MasterScaling		
E	SlaveScaling		
E	StartMode		
E	CamTableID		
E	BufferMode		
VAR_OUTPUT			
B	InSync		
E	Busy		
E	Active		
E	CommandAborted		
B	Error		
E	ErrorID		
E	EndOfProfile		

Appendix A 6.22 CamOut - Not supported

If Supported	MC_CamOut	Sup. Y/N	Comments
VAR_IN_OUT			
B	Slave		
VAR_INPUT			
B	Execute		
VAR_OUTPUT			
B	Done		
E	Busy		
B	Error		
E	ErrorID		

Appendix A 6.23 GearIn

If Supported	MC_GearIn	Sup. Y/N	Comments
VAR_IN_OUT			
B	Master	N	Master system is unknown
B	Slave	Y	
VAR_INPUT			
B	Execute	Y	
B	RatioNumerator	Y	
B	RatioDenominator	Y	
E	Acceleration	N	Supported by vendor specific function block
E	Deceleration	N	Supported by vendor specific function block
E	Jerk	N	
E	BufferMode	N	
VAR_OUTPUT			
B	InGear	Y	
E	Busy	Y	
E	Active	N	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	N	

Appendix A 6.24 GearOut

If Supported	MC_GearOut	Sup. Y/N	Comments
VAR_IN_OUT			
B	Slave	Y	
VAR_INPUT			
B	Execute	Y	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
B	Error	Y	
E	ErrorID	N	

Appendix A 6.25 Phasing - Not supported

If Supported	MC_Phasing	Sup. Y/N	Comments
VAR_IN_OUT			
B	Master		
B	Slave		
VAR_INPUT			
B	Execute		
B	PhaseShift		
E	Velocity		
E	Acceleration		
E	Deceleration		
E	Jerk		
E	BufferMode		
VAR_OUTPUT			
B	Done		
E	Busy		
E	Active		
E	CommandAborted		
B	Error		
E	ErrorID		

Appendix A 4. The PLCopen Motion Control Logo and Its Usage

For quick identification of compliant products, PLCopen has developed a logo for the motion control Function Blocks:

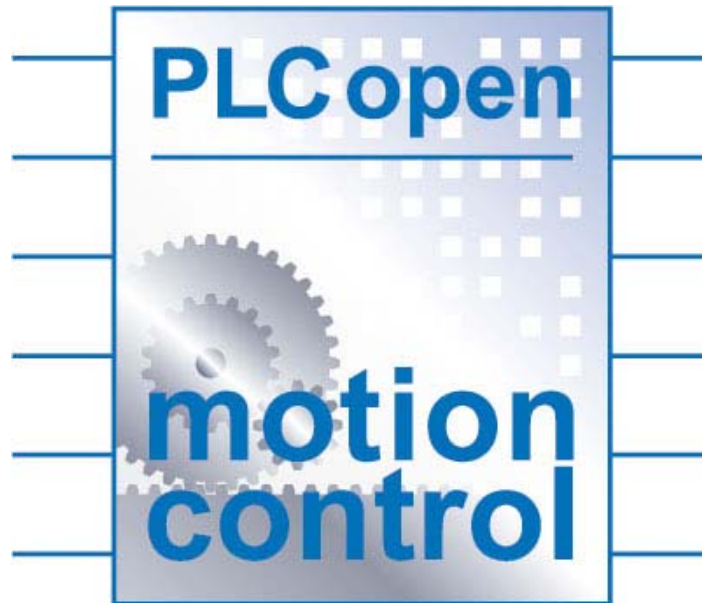


Figure 1: The PLCopen Motion Control Logo

This motion control logo is owned and trademarked by PLCopen.

In order to use this logo free-of-charge, the relevant company has to fulfill all the following requirements:

1. the company has to be a voting member of PLCopen;
2. the company has to comply with the existing specification, as specified by the PLCopen Task Force Motion Control, and as published by PLCopen, and of which this statement is a part;
3. this compliance application is provided in written form by the company to PLCopen, clearly stating the applicable software package and the supporting elements of all the specified tables, as specified in the document itself;
4. in case of non-fulfillment, which has to be decided by PLCopen, the company will receive a written statement concerning this from PLCopen. The company will have a one month period to either adopt their software package in such a way that it complies, represented by the issuing of a new compliance statement, or remove all reference to the specification, including the use of the logo, from all their specification, be it technical or promotional material;
5. the logo has to be used as is - meaning the full logo. It may be altered in size providing the original scale and color setting is kept.
6. the logo has to be used in the context of Motion Control.