



Subset of the

**Technical Specification**

**PLCopen - Technical Committee 2 – Task Force**

**Function blocks for motion control**

**Version 1.1**

**Appendix A :**

**Compliance Procedure and Compliance List**

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July 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](http://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.

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

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	Eckelmann AG
Supplier address	Berliner Straße 161
City	Wiesbaden
Country	Germany
Telephone	+49 (0)611-7103-0
Fax	+49 (0)611-7103-133
Email address	info@eckelmann.de
Product Name	EMC55
Product version	V1.17
Release date	

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): Roland Simon

Date of signature (dd/mm/yyyy): 12.10.2006

Signature: ppa. Roland Simon

## 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	LREAL
ENUM	Yes	

**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	TYPE AXIS_REF : WORD; END_TYPE
MC_Direction (extended)	MC_MoveAbsolute MC_MoveVelocity	Yes	TYPE MC_Direction : ( MD_NEGATIV_E := -1, MD_POSITIV_E := 1, MD_SHORTEST_WAY_E := 2 ); END_TYPE
MC_TP_REF	MC_PositionProfile	Yes	TYPE MC_TP_REF : STRUCT NoOfRows: DWORD; TP_TablePtr: DWORD; END_STRUCT END_TYPE  TP_TablePtr is a pointer to the table of the following type:  ARRAY{0..NoOfRows-1} OF MC_TP_TR  TYPE MC_TP_TR : STRUCT delta_time: LREAL; position: LREAL; interpolation: MC_PROFILE_INT_ART; END_STRUCT END_TYPE  TYPE MC_PROFILE_INT_ART : ( PROFILE_INT_ART_LINEAR_E:=0, PROFILE_INT_ART_KUB_SPLINE_E:=1, PROFILE_INT_ART_QUINTIC_SPLINE_E:=2 ); END_TYPE
MC_TV_REF	MC_VelocityProfile	Yes	TYPE MC_TV_REF : STRUCT NoOfRows: DWORD; TV_TablePtr: DWORD; END_STRUCT END_TYPE  TV_TablePtr is a pointer to the table of the following type:  ARRAY{0..NoOfRows-1} OF MC_TV_TR

			<pre> TYPE MC_TV_TR : STRUCT   delta_time:  LREAL;   position:    LREAL;   interpolation: MC_PROFILE_INT_ART; END_STRUCT END_TYPE  TYPE MC_PROFILE_INT_ART : (   PROFILE_INT_ART_LINEAR_E:=0,   PROFILE_INT_ART_KUB_SPLINE_E:=1,   PROFILE_INT_ART_QUINTIC_SPLINE_E:=2 ); END_TYPE </pre>
MC_TA_REF	MC_AccelerationProfile	Yes	<pre> TYPE MC_TA_REF : STRUCT   NoOfRows:    DWORD;   TA_TablePtr: DWORD; END_STRUCT END_TYPE  TA_TablePtr is a pointer to the table of the following type:  ARRAY{0..NoOfRows-1} OF MC_TA_TR  TYPE MC_TA_TR : STRUCT   delta_time:  LREAL;   position:    LREAL;   interpolation: MC_PROFILE_INT_ART; END_STRUCT END_TYPE  TYPE MC_PROFILE_INT_ART : (   PROFILE_INT_ART_LINEAR_E:=0,   PROFILE_INT_ART_KUB_SPLINE_E:=1,   PROFILE_INT_ART_QUINTIC_SPLINE_E:=2 ); END_TYPE </pre>
MC_CAM_REF	MC_CamTableSelect	Yes	<pre> TYPE MC_CAM_REF : STRUCT   NoOfRows:    DWORD;   CamPosPtr:   DWORD; END_STRUCT END_TYPE  CamPosPtr is a pointer to the table of the following type:  ARRAY[0..NoOfRows-1] OF MC_POS_TR  TYPE MC_POS_TR : STRUCT   master:      LREAL;   slave:       LREAL;   interpol:    MC_CAM_INT_ART; END_STRUCT END_TYPE </pre>

			<pre> TYPE MC_CAM_ART . (   CAM_INT_ART_LINEAR_E:=0,   CAM_INT_ART_KUB_SPLINE_E:=1,   CAM_INT_ART_QUINTIC_SPLINE_E:=2,   CAM_INT_ART_BEZIER_E:= 3 ); END_TYPE </pre>
MC_CAM_ID (extended)	MC_CamTableSelect MC_CamIn	Yes	<pre> TYPE MC_CAM_ID : WORD; END_TYPE </pre>
MC_StartMode (extended)	MC_CamIn	Yes	<pre> TYPE MC_StartMode : (   STARTMODE_ABSOLUTE_E :=0,   STARTMODE_RELATIVE_E :=1,   STARTMODE_RAMP_IN_E :=2 ); END_TYPE </pre>
MC_BufferMode	Buffered FBs	Yes	<pre> TYPE MC_BufferMode : (   BM_ABORTING_E :=0,   BM_BUFFERED_E :=1,   BM_BLENDED_LOW_E :=2,   BM_BLENDED_PREVIOUS_E :=3,   BM_BLENDED_NEXT_E :=4,   BM_BLENDED_HIGH_E :=5,   BM_MASTER_POSITION_E :=6 ); END_TYPE </pre>

**Table 2: Supported derived datatypes**

**Appendix A 3. Overview of the Function Blocks**

<b>Single Axis Function Blocks</b>	<b>Supported Yes / No</b>	<b>Comments (&lt;= 48 char.)</b>
MC_MoveAbsolute	Yes	
MC_MoveRelative	Yes	
MC_MoveAdditive	Yes	
MC_MoveSuperimposed	Yes	
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	Yes	
MC_WriteParameter	Yes	
MC_WriteBoolParameter	Yes	
MC_ReadActualPosition	Yes	
MC_PositionProfile	Yes	
MC_VelocityProfile	Yes	
MC_AccelerationProfile	Yes	
<b>Multi-Axis Function Blocks</b>	<b>Supported Yes / No</b>	<b>Comments (&lt;= 48 char.)</b>
MC_CamTableSelect	Yes	
MC_CamIn	Yes	
MC_CamOut	Yes	
MC_GearIn	Yes	
MC_GearOut	Yes	
MC_Phasing	Yes	

**Table 3: Short overview of the Function Blocks**

### Appendix A 3.1 MoveAbsolute

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

### Appendix A 3.2 MoveRelative

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



### Appendix A 3.3 MoveAdditive

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

### Appendix A 3.4 MoveSuperimposed

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

### Appendix A 3.5 MoveVelocity

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

### Appendix A 3.6 Home

If Supported	MC_Home	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Yes	
VAR_INPUT			
B	Execute	Yes	
B	Position	Yes	
E	HomingMode	Yes	
E	BufferMode	No	
VAR_OUTPUT			
B	Done	Yes	
E	Busy	No	
E	Active	No	
E	CommandAborted	Yes	
B	Error	Yes	
E	ErrorID	Yes	

### Appendix A 3.7 Stop

If Supported	MC_Stop	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Yes	
VAR_INPUT			
B	Execute	Yes	
E	Deceleration	Yes	
E	Jerk	Yes	
E	BufferMode	No	
VAR_OUTPUT			
B	Done	Yes	
E	Busy	No	
E	Active	No	
E	CommandAborted	No	
B	Error	Yes	
E	ErrorID	Yes	

### Appendix A 3.8 Power

If Supported	MC_Power	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Yes	
VAR_INPUT			
B	Enable	Yes	
E	Enable_Positive	No	
E	Enable_Negative	No	
E	BufferMode	No	
VAR_OUTPUT			
B	Status	Yes	
E	Busy	No	
E	Active	No	
B	Error	Yes	
E	ErrorID	Yes	

### Appendix A 3.9 ReadStatus

If Supported	MC_ReadStatus	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Yes	
VAR_INPUT			
B	Enable	Yes	
VAR_OUTPUT			
B	Valid	Yes	
E	Busy	No	
B	Error	Yes	
E	ErrorID	Yes	
B	Disabled	Yes	
B	Errorstop	Yes	
B	Stopping	Yes	
B	StandStill	Yes	
B	DiscreteMotion	Yes	
B	ContinuousMotion	Yes	
E	SynchronizedMotion	Yes	
E	Homing	Yes	
E	ConstantVelocity	Yes	
E	Accelerating	Yes	
E	Decelerating	Yes	

### Appendix A 3.10 ReadAxisError

If Supported	MC_ReadAxisError	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Yes	
VAR_INPUT			
	Enable	Yes	
VAR_OUTPUT			
B	Valid	Yes	
E	Busy	No	
B	Error	Yes	
B	ErrorID	Yes	

### Appendix A 3.11 Reset

If Supported	MC_Reset	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Yes	
VAR_INPUT			
B	Execute	Yes	
VAR_OUTPUT			
B	Done	Yes	
E	Busy	No	
B	Error	Yes	
B	ErrorID	Yes	

**Appendix A 3.12 ReadParameter**

If Supported	MC_ReadParameter	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Yes	
VAR_INPUT			
B	Enable	Yes	
B	ParameterNumber	Yes	
VAR_OUTPUT			
B	Valid	Yes	
E	Busy	No	
B	Error	Yes	
E	ErrorID	Yes	
B	Value	Yes	

**Appendix A 3.13 ReadBoolParameter**

If Supported	MC_ReadBoolParameter	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Yes	
VAR_INPUT			
B	Enable	Yes	
B	ParameterNumber	Yes	
VAR_OUTPUT			
B	Valid	Yes	
E	Busy	No	
B	Error	Yes	
E	ErrorID	Yes	
B	Value	Yes	

Name	B/E	R/W	Sup. Y/N	Comments
CommandedPosition	B	R	Yes	
SWLimitPos	E	R/W	Yes	
SWLimitNeg	E	R/W	Yes	
EnableLimitPos	E	R/W	Yes	
EnableLimitNeg	E	R/W	Yes	
EnablePosLagMonitoring	E	R/W	No	
MaxPositionLag	E	R/W	No	
MaxVelocitySystem	E	R	Yes	
MaxVelocityAppl	B	R/W	Yes	
ActualVelocity	B	R	Yes	
CommandedVelocity	B	R	Yes	
MaxAccelerationSystem	E	R	Yes	
MaxAccelerationAppl	E	R/W	Yes	
MaxDecelerationSystem	E	R	Yes	
MaxDecelerationAppl	E	R/W	Yes	
MaxJerk	E	R/W	Yes	

**Table 4: Parameters for ReadParameter and WriteParameter**

### Appendix A 3.14 WriteParameter

If Supported	MC_WriteParameter	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Yes	
VAR_INPUT			
B	Execute	Yes	
B	ParameterNumber	Yes	
B	Value	Yes	
VAR_OUTPUT			
B	Done	Yes	
E	Busy	No	
E	Buffered	No	
B	Error	Yes	
E	ErrorID	Yes	

### Appendix A 3.15 WriteBoolParameter

If Supported	MC_WriteBoolParameter	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Yes	
VAR_INPUT			
B	Execute	Yes	
B	ParameterNumber	Yes	
B	Value	Yes	
VAR_OUTPUT			
B	Done	Yes	
E	Busy	No	
E	Buffered	No	
B	Error	Yes	
E	ErrorID	Yes	

### Appendix A 3.16 ReadActualPosition

If Supported	MC_ReadActualPosition	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Yes	
VAR_INPUT			
B	Enable	Yes	
VAR_OUTPUT			
B	Valid	Yes	
E	Busy	No	
B	Error	Yes	
E	ErrorID	Yes	
B	Position	Yes	

### Appendix A 3.17 PositionProfile

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

### Appendix A 3.18 VelocityProfile

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

### Appendix A 3.19 AccelerationProfile

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

### Appendix A 3.20 CamTableSelect

If Supported	MC_CamTableSelect	Sup. Y/N	Comments
VAR_IN_OUT			
B	Master	Yes	
B	Slave	Yes	
B	CamTable	Yes	
VAR_INPUT			
B	Execute	Yes	
E	Periodic	Yes	
E	MasterAbsolute	Yes	
E	SlaveAbsolute	Yes	
VAR_OUTPUT			
B	Done	Yes	
E	Busy	No	
B	Error	Yes	
E	ErrorID	Yes	
E	CamTableID	Yes	



### Appendix A 3.21 CamIn

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

### Appendix A 3.22 CamOut

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

**Appendix A 3.23 GearIn**

If Supported	MC_GearIn	Sup. Y/N	Comments
VAR_IN_OUT			
B	Master	Yes	
B	Slave	Yes	
VAR_INPUT			
B	Execute	Yes	
B	RatioNumerator	Yes	
B	RatioDenominator	Yes	
E	Acceleration	Yes	
E	Deceleration	Yes	
E	Jerk	Yes	
E	BufferMode	Yes	
VAR_OUTPUT			
B	InGear	Yes	
E	Busy	Yes	
E	Active	Yes	
E	CommandAborted	Yes	
B	Error	Yes	
E	ErrorID	Yes	

**Appendix A 3.24 GearOut**

If Supported	MC_GearOut	Sup. Y/N	Comments
VAR_IN_OUT			
B	Slave	Yes	
VAR_INPUT			
B	Execute	Yes	
VAR_OUTPUT			
B	Done	Yes	
E	Busy	No	
B	Error	Yes	
E	ErrorID	Yes	

**Appendix A 3.25 Phasing**

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

## 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.