Appendix B. <u>Compliance Procedure and Compliance List</u>

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 and supported Function Blocks, in combination with the applicable inputs and outputs. The supplier is required to 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 B 2 Supported Data types and Appendix B 3 Overview of the Function Blocks as below.

In addition to this approval, the supplier is granted access and usage rights of the PLCopen Motion Control logo, as described in Appendix B 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 B 1. Statement of Supplier

Supplier name	KEBA AG
Supplier address	Gewerbepark Urfahr
City	4041 Linz
Country	Austria
Telephone	+43-732-7090-0
Fax	+43-732-7090-66630
Email address	keba@keba.com
Product Name	KeControl FlexCore
Product version	1.12
Release date	12/2017

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):   Christian Gabriel

Date of signature (dd/mm/yyyy):   18/12/2017

Signature:

Appendix B 2.   Supported Data types

Defined datatypes with MC library:	Supported	If not supported, which datatype used
BOOL	Y	
INT	Y	
WORD	N	TMCE_ErrorID (ENUM)
REAL	N	LREAL
ENUM	Y	
UINT	Y	

Table 1: Supported datatypes

Within the specification the following derived datatypes are defined. Define which of these structures are used in this system:

Derived datatypes:	Where used	Supported	Which structure
AXIS_REF	Nearly all FBs	Y	AXIS_REF
MC_DIRECTION (extended)	MC_MoveAbsolute MC_MoveVelocity MC_TorqueControl MC_MoveContinuousAbsolute	Y	TMC_DIRECTION
MC_TP_REF	MC_PositionProfile	N	
MC_TV_REF	MC_VelocityProfile	N	
MC_TA_REF	MC_AccelerationProfile	N	
MC_CAM_REF	MC_CamTableSelect	Y	TMC_CAMREF
MC_CAM_ID (extended)	MC_CamTableSelect MC_CamIn	Y	TMC_CAMID
MC_START_MODE (extended)	MC_CamIn MC_CamTableSelect	N	
MC_BUFFER_MODE	Buffered FBs	N	
MC_EXECUTION_MODE	MC_SetPosition MC_WriteParameter MC_WriteBoolParameter MC_WriteDigitalOutput MC_CamTableSelect	N	
MC_SOURCE	MC_ReadMotionState MC_CamIn MC_GearIn MC_GearInPos MC_CombineAxes MC_DigitalCamSwitch	Y	TMC_SOURCE
MC_SYNC_MODE	MC_GearInPos	Y	TMC_SYNCMODE
MC_COMBINE_MODE	MC_CombineAxes	N	
MC_TRIGGER_REF	MC_TouchProbe MC_AbortTrigger	Y	TMC_TRIGGERREF
MC_INPUT_REF	MC_ReadDigitalInput	N	
MC_OUTPUT_REF	MC_DigitalCamSwitch MC_ReadDigitalOutput MC_WriteDigitalOutput	N	
MC_CAMSWITCH_REF	MC_DigitalCamSwitch	Y	TMC_CAMSWITCHREF
MC_TRACK_REF	MC_DigitalCamSwitch	Y	TMC_TRACKREF

Table 2: Supported derived datatypes

Appendix B 3.   Overview of the Function Blocks

Single Axis Function Blocks	Supported as V1.0/ V1.1/ V2.0 or Not	Comments (<= 48 char.)
MC_Power	V2.0	
MC_Home	V2.0	
MC_Stop	V2.0	
MC_Halt	V2.0	
MC_MoveAbsolute	V2.0	
MC_MoveRelative	V2.0	
MC_MoveAdditive	V2.0	
MC_MoveSuperimposed	N	
MC_HaltSuperimposed	N	
MC_MoveVelocity	V2.0	
MC_MoveContinuousAbsolute	N	
MC_MoveContinuousRelative	N	
MC_TorqueControl	V2.0	
MC_PositionProfile	N	
MC_VelocityProfile	N	
MC_AccelerationProfile	N	
MC_SetPosition	V2.0	
MC_SetOverride	V2.0	
MC_ReadParameter & MC_ReadBoolParameter	V2.0	
MC_WriteParameter & MC_WriteBoolParameter	V2.0	
MC_ReadDigitalInput	N	
MC_ReadDigitalOutput	N	
MC_WriteDigitalOutput	N	
MC_ReadActualPosition	V2.0	
MC_ReadActualVelocity	V2.0	
MC_ReadActualTorque	V2.0	
MC_ReadStatus	V2.0	
MC_ReadMotionState	N	
MC_ReadAxisInfo	N	
MC_ReadAxisError	V2.0	
MC_Reset	V2.0	
MC_DigitalCamSwitch	V2.0	
MC_TouchProbe	V2.0	
MC_AbortTrigger	V2.0	
Multi-Axis Function Blocks	**Supported as V1.0/ V1.1/ V2.0 or Not**	**Comments (<= 48 char.)**
MC_CamTableSelect	V2.0	
MC_CamIn	V2.0	
MC_CamOut	N	
MC_GearIn	V2.0	
MC_GearOut	N	
MC_GearInPos	V2.0	
MC_PhasingAbsolute	V2.0	
MC_PhasingRelative	V2.0	
MC_CombineAxes	N	

Table 3: Short overview of the Function Blocks

Appendix B 3.1 MC_Power

If Supported	MC_Power	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Enable	Y	
V	StopCategory	Y	Drive can be switched off by 3 kinds: eMCE_StopCategory0, eMCE_StopCategory1, eMCE_StopCategory2;
E	EnablePositive	N	
E	EnableNegative	N	
VAR_OUTPUT			
B	Status	Y	
V	DriveState	Y	State of the drive
E	Valid	N	
B	Error	Y	
E	ErrorID	Y	

Appendix B 3.2 MC_Home

If Supported	MC_Home	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Execute	Y	
B	Position	Y	
E	BufferMode	N	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
E	Active	Y	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	Y	

Appendix B 3.3 MC_Stop

If Supported	MC_Stop	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Execute	Y	
E	Deceleration	Y	
E	Jerk	N	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
V	Active	Y	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	Y	

Appendix B 3.4 MC_Halt

If Supported	MC_Halt	Sup. Y/N	
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Execute	Y	
E	Deceleration	Y	
E	Jerk	Y	
E	BufferMode	N	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
E	Active	Y	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	Y	

Appendix B 3.5 MC_MoveAbsolute

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

Appendix B 3.6 MC_MoveRelative

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

Appendix B 3.7 MC_MoveAdditive

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

Appendix B 3.8 MC_MoveSuperimposed – not supported

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

Appendix B 3.9 MC_HaltSuperimposed – not supported

If Supported	MC_HaltSuperimposed	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis		
VAR_INPUT			
B	Execute		
E	Deceleration		
E	Jerk		
VAR_OUTPUT			
B	Done		
E	Busy		
E	CommandAborted		
B	Error		
E	ErrorID		

Appendix B 3.10 MC_MoveVelocity

If Supported	MC_MoveVelocity	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Execute	Y	
E	ContinuousUpdate	Y	Enables continuous update of all inputs
E	Velocity	Y	
E	Acceleration	Y	
E	Deceleration	Y	
E	Jerk	Y	
E	Direction	Y	
E	BufferMode	N	
VAR_OUTPUT			
B	InVelocity	Y	
E	Busy	Y	
E	Active	Y	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	Y	

Appendix B 3.11 MC_MoveContinuousAbsolute – not supported

If Supported	MC_MoveContinuousAbsolute	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis		
VAR_INPUT			
B	Execute		
E	ContinuousUpdate		
B	Position		
B	EndVelocity		
B	Velocity		
E	Acceleration		
E	Deceleration		
E	Jerk		
E	Direction		
E	BufferMode		
VAR_OUTPUT			
B	InEndVelocity		
E	Busy		
E	Active		
E	CommandAborted		
B	Error		
E	ErrorID		

Appendix B 3.12 MC_MoveContinuousRelative – not supported

If Supported	MC_MoveContinuousRelative	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis		
VAR_INPUT			
B	Execute		
E	ContinuousUpdate		
B	Distance		
B	EndVelocity		
B	Velocity		
E	Acceleration		
E	Deceleration		
E	Jerk		
E	BufferMode		
VAR_OUTPUT			
B	InEndVelocity		
E	Busy		
E	Active		
E	CommandAborted		
B	Error		
E	ErrorID		

Appendix B 3.13 MC_TorqueControl

If Supported	MC_TorqueControl	Sup.Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Execute	Y	
E	ContinuousUpdate	Y	Enables continuous update of inputs Torque and TorqueRamp
B	Torque	Y	
E	TorqueRamp	Y	
E	Velocity	N	
E	Acceleration	N	
E	Deceleration	N	
E	Jerk	N	
E	Direction	N	
E	BufferMode	N	
VAR_OUTPUT			
B	InTorque	Y	
E	Busy	Y	
E	Active	Y	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	Y	

Appendix B 3.14 MC_PositionProfile – not supported

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

Appendix B 3.15 MC_VelocityProfile – not supported

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

Appendix B 3.16 MC_AccelerationProfile – not supported

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

Appendix B 3.17 MC_SetPosition

If Supported	MC_SetPosition	Sup.Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Execute	Y	
B	Position	Y	
E	Relative	Y	
E	ExecutionMode	N	
VAR_OUTPUT			
B	Done	Y	
E	Busy	N	FB is Done within same cycle
B	Error	Y	
E	ErrorID	Y	

Appendix B 3.18 MC_SetOverride

If Supported	MC_SetOverride	Sup.Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Enable	Y	
B	VelFactor	Y	
E	AccFactor	Y	
E	JerkFactor	Y	
VAR_OUTPUT			
B	Enabled	Y	
E	Busy	N	Override gets active within same cycle
B	Error	Y	
E	ErrorID	Y	

Appendix B 3.19 MC_ReadParameter & MC_ReadBoolParameter

If Supported	MC_ReadParameter		Sup. Y/N	Comments
VAR_IN_OUT				
B	Axis		Y	
VAR_INPUT				
B	Enable		Y	
B	ParameterNumber		Y	
VAR_OUTPUT				
B	Valid		Y	
E	Busy		N	Value always available (within same cycle)
B	Error		Y	
E	ErrorID		Y	
B	Value		Y	

If Supported	MC_ReadBoolParameter		Sup. Y/N	Comments
VAR_IN_OUT				
B	Axis		Y	
VAR_INPUT				
B	Enable		Y	
B	ParameterNumber		Y	
VAR_OUTPUT				
B	Valid		Y	
E	Busy		N	Value always available (within same cycle)
B	Error		Y	
E	ErrorID		Y	
B	Value		Y	

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	Y	
MaxPositionLag	E	R/W	Y	
MaxVelocitySystem	E	R	Y	
MaxVelocityAppl	B	R/W	Y	
ActualVelocity	B	R	Y	
CommandedVelocity	B	R	Y	
MaxAccelerationSystem	E	R	Y	
MaxAccelerationAppl	E	R/W	Y	
MaxDecelerationSystem	E	R	Y	
MaxDecelerationAppl	E	R/W	Y	
MaxJerkSystem	E	R	Y	
MarkJerkAppl	E	R/W	Y	
DefaultStopCategory	V	R/W	Y	default stop category for axis
CycleTimeS	V	R	Y	Cycle time of the axis [s]
AxisType	V	R/W	Y	writeable when disabled; TMCE_AxisType: finite or modulo axis
PositionMin	V	R/W	Y	writeable when disabled; lower bound of modulo axis
PositionMax	V	R/W	Y	writeable when disabled; upper bound of modulo axis
AxisKind	V	R/W	Y	writeable when disabled; TMCE_AxisKind: linear or rotary axis
ForwardTorqueAtPowerOn	V	R/W	Y	Specifies the behaviour of the axis interface concerning the set value of torque, when the drive is being enabled until set values are set.

Name	B/E	R/W	Supp. Y/N	Comments
TorqueAtPowerOn	V	R/W	Y	If eMCE_ParamNrForwardTorqueAtPowerOn = eM-CE_FwdTorqueAtPowerOnParameterValue: Torque which is forwarded to drive at power on until set values are set.
MaxTorSystem	V	R/W	Y	writeable when disabled; Maximal allowed torque of the axis in the motion system
MaxTorAppl	V	R/W	Y	Maximal allowed torque of the axis in the application
VelOverrideFactor	V	R/W	Y	override factor for velocity
AccOverrideFactor	V	R/W	Y	override factor for acceleration
JerkOverrideFactor	V	R/W	Y	override factor for jerk
EnableHWLimitPos	V	R/W	Y	enables supervision of positive hardware limit switch
EnableHWLimitNeg	V	R/W	Y	enables supervision of negative hardware limit switch
EncoderResolution	V	R/W	Y	DINT; writeable when disabled; increments per revolution of the encoder
GearRatioNumerator	V	R/W	Y	writeable when disabled; numerator of the gear ratio
GearRatioDenominator	V	R/W	Y	writeable when disabled; denominator of the gear ratio
FeedConstantNumerator	V	R/W	Y	writeable when disabled; numerator of the feed constant
FeedConstantDenomina-tor	V	R/W	Y	writeable when disabled; denominator of the feed constant
InvertDirection	V	R/W	Y	writeable when disabled; inverts the direction of the position scaling factor
PositionScalingFactor	V	R	Y	position scaling factor: converts position-units of drive to posi-tion-units of control
VelocityScalingFactor	V	R	Y	velocity scaling factor: converts position-units of drive to posi-tion-units of control
TorqueScalingFactor	V	R	Y	torque scaling factor: converts position-units of drive to posi-tion-units of control
AccelerationScalingFac-tor	V	R	Y	acceleration scaling factor: converts position-units of drive to position-units of control
PositonUnit	V	R	Y	writeable when disabled; position units of axis
VelocityUnit	V	R	Y	writeable when disabled; velocity unit of axis
TorqueUnit	V	R	Y	torque/force unit of axis
PositonUnitName	V	R	Y	position unit of axis
VelocityUnitName	V	R	Y	velocity unit of axis
TorqueUnitName	V	R	Y	torque/force unit of axis
ActualPositionTurn	V	R	Y	turn of actual position; turns may only be interpreted relative to a second turn, never absolute
SetPositionTurn	V	R	Y	turn of set position; turns may only be interpreted relative to a second turn, never absolute
NewSetPositionTurn	V	R	Y	turn of new set position; turns may only be interpreted relative to a second turn, never absolute
PositionOffset	V	R	Y	Actual position offset between position of drive and position of axis. Offset is added to actual position of drive resp. subtracted from set position of axis.
CommandedPosi-tionTurn	V	R/W	Y	turn of commanded position; turns may only be interpreted rela-tive to a second turn, never absolute
CommandedDirection	V	R/W	Y	direction of last command
IsSimulated	V	R/W	Y	writeable when disabled; Axis is simulated (or a virtual axis)
Connected	V	R	Y	Connection Ok
DriveInitComplete	V	R	Y	Drive initialised
DriveStateInfo	V	R	Y	More detailed information to the state of the drive
HomingState	V	R/W	Y	homing state of the axis
DisableHomingParame-ters	V	R/W	Y	specifies if homing parameters (Homing Method, Position, Dy-namic) are set on drive when executing the homing sequence
HomingMode	V	R/W	Y	specifies the homing sequence that should be performed
HomingPosition	V	R/W	Y	homing position of the axis
Homing-SpeedSearchSwitch	V	R/W	Y	Homing: speed for searching the homing switch

Name	B/E	R/W	Supp. Y/N	Comments
Homing-SpeedSearchZero	V	R/W	Y	Homing: speed for searching the zero position
HomingAcceleration	V	R/W	Y	maximum acceleration of the axis for the homing sequence
HomingDeceleration	V	R/W	Y	maximum deceleration of the axis for the homing sequence
HomingJerk	V	R/W	Y	maximum jerk of the axis for the homing sequence
HomingMaxTorque	V	R/W	Y	maximum torque of the axis for the homing sequence
HomingTimeOut	V	R/W	Y	If the homing sequence has not terminated after timeOut, it is aborted with an error. [s]
ControllerType	V	R/W	Y	Description of controller type
MotorType	V	R/W	Y	Description of motor type
DCLinkVoltage	V	R/W	Y	DC link voltage

Table 4: Parameters for MC_Read(Bool)Parameter and MC_Write(Bool)Parameter

Appendix B 3.20 MC_WriteParameter & MC_WriteBoolParameter

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	
E	ExecutionMode	N	
VAR_OUTPUT			
B	Done	Y	
E	Busy	N	FB is Done within same cycle
B	Error	Y	
E	ErrorID	Y	

If Supported	MC_WriteBoolParameter	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Execute	Y	
B	ParameterNumber	Y	
B	Value	Y	
E	ExecutionMode	N	
VAR_OUTPUT			
B	Done	Y	
E	Busy	N	FB is Done within same cycle
B	Error	Y	
E	ErrorID	Y	

Appendix B 3.21 MC_ReadDigitalInput – not supported

If Supported	MC_ReadDigitalInput	Sup.Y/N	Comments
VAR_IN_OUT			
B	Input		
VAR_INPUT			
B	Enable		
E	InputNumber		
VAR_OUTPUT			
B	Valid		
E	Busy		
B	Error		
E	ErrorID		
B	Value		

Appendix B 3.22 MC_ReadDigitalOutput – not supported

If Supported	**MC_ReadDigitalOutput**	Sup.Y/N	Comments
VAR_IN_OUT			
B	Output		
VAR_INPUT			
B	Enable		
E	OutputNumber		
VAR_OUTPUT			
B	Valid		
E	Busy		
B	Error		
E	ErrorID		
B	Value		

Appendix B 3.23 MC_WriteDigitalOutput – not supported

If Supported	**MC_WriteDigitalOutput**	Sup.Y/N	Comments
VAR_IN_OUT			
B	Output		
VAR_INPUT			
B	Execute		
E	OutputNumber		
B	Value		
E	ExecutionMode		
VAR_OUTPUT			
B	Done		
E	Busy		
B	Error		
E	ErrorID		

Appendix B 3.24 MC_ReadActualPosition

If Supported	**MC_ReadActualPosition**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Enable	Y	
VAR_OUTPUT			
B	Valid	Y	
E	Busy	N	Value always available (within same cycle)
B	Error	Y	
E	ErrorID	Y	
B	Position	Y	

Appendix B 3.25 MC_ReadActualVelocity

If Supported	MC_ReadActualVelocity	Sup.Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Enable	Y	
VAR_OUTPUT			
B	Valid	Y	
E	Busy	N	Value always available (within same cycle)
B	Error	Y	
E	ErrorID	Y	
B	Velocity	Y	

Appendix B 3.26 MC_ReadActualTorque

If Supported	MC_ReadActualTorque	Sup.Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Enable	Y	
VAR_OUTPUT			
B	Valid	Y	
E	Busy	N	Value always available (within same cycle)
B	Error	Y	
E	ErrorID	Y	
B	Torque	Y	

Appendix B 3.27 MC_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	N	Values always available (within same cycle)
B	Error	Y	
E	ErrorID	Y	
B	ErrorStop	Y	
B	Disabled	Y	
B	Stopping	Y	
E	Homing	Y	
B	Standstill	Y	
E	DiscreteMotion	Y	
E	ContinuousMotion	Y	
E	SynchronizedMotion	Y	
V	IsHomed	Y	Axis is homed. The absolute reference position is known for the axis.
V	ConstantVelocity	Y	Axis is moving at constant velocity
V	Accelerating	Y	Axis is accelerating (increasing energy)
V	Decelerating	Y	Axis is decelerating (decreasing energy)

Appendix B 3.28 MC_ReadMotionState – not supported

If Supported	MC_ReadMotionState	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis		
VAR_INPUT			
B	Enable		
E	Source		
VAR_OUTPUT			
B	Valid		
E	Busy		
B	Error		
E	ErrorID		
E	ConstantVelocity		
E	Accelerating		
E	Decelerating		
E	DirectionPositive		
E	DirectionNegative		

Appendix B 3.29 MC_ReadAxisInfo – not supported

If Supported	MC_ReadAxisInfo	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis		
VAR_INPUT			
B	Enable		
VAR_OUTPUT			
B	Valid		
E	Busy		
B	Error		
E	ErrorID		
E	HomeAbsSwitch		
E	LimitSwitchPos		
E	LimitSwitchNeg		
E	Simulation		
E	CommunicationReady		
E	ReadyForPowerOn		
E	PowerOn		
E	IsHomed		
E	AxisWarning		

Appendix B 3.30 MC_ReadAxisError

If Supported	MC_ReadAxisError	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
VAR_INPUT			
B	Enable	Y	
VAR_OUTPUT			
B	Valid	Y	
E	Busy	N	Value always available (within same cycle)
B	Error	Y	
B	ErrorID	Y	
E	AxisErrorID	Y	

Appendix B 3.31 MC_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	
E	ErrorID	Y	

Appendix B 3.32 MC_DigitalCamSwitch

If Supported	MC_DigitalCamSwitch	Sup.Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
B	Switches	Y	
E	Outputs	N	See VAR_OUTPUT 'Output. Digital Cam Switch only has one track (output).
E	TrackOptions	Y	
VAR_INPUT			
B	Enable	Y	
E	EnableMask	N	
E	ValueSource	Y	
VAR_OUTPUT			
V	Output	Y	Output of the Digital Cam Switch.
B	InOperation	Y	
E	Busy	N	Digital Cam Switch is enabled/disabled within same cycle
B	Error	Y	
E	ErrorID	Y	

Basic elements within the array structure of MC_CAMSWITCH_REF

B/E	Parameter	Sup.Y/N	Comments
B	TrackNumber	N	Not needed, constantly 1. Digital Cam Switch only has one output (track)
B	FirstOnPosition [u]	Y	Shortened to 'x1'; Window is also used for different signals, not only positions;
B	LastOnPosition [u]	Y	Shortened to 'x2'; Window is also used for different signals, not only positions;
E	AxisDirection	N	
V	Direction	Y	Specifies, if Digital Cam switches at ascending, descending signal or in both (default) cases
E	CamSwitchMode	Y	
E	Duration	Y	
V	Retrigger	Y	Specifies if 'Duration' starts from 0 in case the Digital Cam is switched on again, before a previous switch event has terminated (only relevant if 'CamSwitchMode' is set to 'time')

Basic elements within the array structure of MC_TRACK_REF

B/E	Parameter	Sup.Y/N	Comments
E	OnCompensation	Y	
E	OffCompensation	Y	
E	Hysteresis [u]	Y	
V	Invert	Y	Inverts the output of the digital cam track.

Appendix B 3.33 MC_TouchProbe

If Supported	MC_TouchProbe	Sup.Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
E	TriggerInput	Y	
VAR_INPUT			
B	Execute	Y	
V	ContinuousTrigger	Y	Activates continuous measurement of the touch probe. Output Done won't be set. Recorded positions are marked valid only for one PLC cycle.
V	EdgeDetection	Y	Specifies if rising (default), falling or both edges shall be evaluated
E	WindowOnly	Y	
E	FirstPosition	Y	
E	LastPosition	Y	
V	MarkerSupervision	Y	Activates the supervision of marker failures: Counts transits of window where no trigger event occurs.
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	Y	
B	RecordedPosition	Y	
V	MarkerFailures	Y	Number of marker failures since last trigger event in window. Output is reset when a trigger event is detected within the window.

Appendix B 3.34 MC_AbortTrigger

If Supported	MC_AbortTrigger	Sup.Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	
E	TriggerInput	Y	
VAR_INPUT			
B	Execute	Y	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
V	CommandAborted	Y	FB has been aborted by another FB (MC_TouchProbe)
B	Error	Y	
E	ErrorID	Y	

Appendix B 3.35 MC_CamTableSelect

If Supported	MC_CamTableSelect	Sup. Y/N	Comments
VAR_IN_OUT			
E	Master	Y	
E	Slave	Y	
B	CamTable	Y	
VAR_INPUT			
B	Execute	Y	
E	Periodic	N	
E	MasterAbsolute	N	
E	SlaveAbsolute	N	
E	ExecutionMode	N	

VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
B	Error	Y	
E	ErrorID	Y	
E	CamTableID	Y	

Appendix B 3.36 MC_CamIn

If Supported	MC_CamIn	Sup. Y/N	Comments
VAR_IN_OUT			
B	Master	Y	
B	Slave	Y	
VAR_INPUT			
B	Execute	Y	
E	ContinuousUpdate	N	
V	Periodic	Y	Activates periodic (repetitive) execution of the cam table
E	MasterOffset	Y	
E	SlaveOffset	Y	
E	MasterScaling	Y	
E	SlaveScaling	Y	
E	MasterStartDistance	Y	
E	MasterSyncPosition	Y	
E	StartMode	N	
E	MasterValueSource	Y	
E	CamTableID	Y	
E	BufferMode	N	
V	SyncTrigger	Y	Defines when slave starts to sync in (immediately or depending on position of Master)
V	SyncMode	Y	If Slave is a modulo axis: specifies direction in which slave ramps in (positive, negative, ...)
V	SyncMethod	Y	Specifies gear in procedure: time dependant or dependant on position of Master
V	Velocity	Y	Maximum velocity for gearing in
V	Acceleration	Y	Maximum acceleration for gearing in
V	Deceleration	Y	Maximum deceleration for gearing in
V	Jerk	Y	Maximum jerk for gearing in
VAR_OUTPUT			
V	StartSync	Y	Slave has started to synchronize
B	InSync	Y	
E	Busy	Y	
E	Active	Y	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	Y	
E	EndOfProfile	Y	

Appendix B 3.37 MC_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 B 3.38 MC_GearIn

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

Appendix B 3.39 MC_GearOut – not supported

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

Appendix B 3.40 MC_GearInPos

If Supported	MC_GearInPos	Sup.Y/N	Comments
VAR_IN_OUT			
B	Master	Y	
B	Slave	Y	
VAR_INPUT			
B	Execute	Y	
B	RatioNumerator	Y	
B	RatioDenominator	Y	
E	MasterValueSource	Y	
B	MasterSyncPosition	Y	
B	SlaveSyncPosition	Y	
E	MasterStartDistance	Y	
V	SyncTrigger	Y	Defines when slave starts to sync in (immediately or depending on position of Master)
E	SyncMode	Y	
V	SyncMethod	Y	Specifies gear in procedure: time dependant or dependant on position of Master
E	Velocity	Y	
E	Acceleration	Y	
E	Deceleration	Y	
E	Jerk	Y	
E	BufferMode	N	
VAR_OUTPUT			
E	StartSync	Y	
B	InSync	Y	
E	Busy	Y	
E	Active	Y	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	Y	

Appendix B 3.41 MC_PhasingAbsolute

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

Appendix B 3.42 MC_PhasingRelative

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

Appendix B 3.43 CombineAxes – not supported

If Supported	MC_CombineAxes	Sup. Y/N	Comments
VAR_IN_OUT			
B	Master1		
B	Master2		
B	Slave		
VAR_INPUT			
B	Execute		
E	ContinuousUpdate		
E	CombineMode		
E	GearRationNumeratorM1		
E	GearRatioDenominatorM1		
E	GearRatioNumeratorM2		
E	GearRatioDenominatorM2		
E	MasterValueSourceM1		
E	MasterValueSourceM2		
E	BufferMode		
VAR_OUTPUT			
B	InSync		
E	Busy		
E	Active		
E	CommandAborted		
B	Error		
E	ErrorID		

Appendix B 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.