



**Subset of the**

**Technical Specification**

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

**Function blocks for motion control**

**(Formerly Part 1 and Part 2)**

**Version 2.0**

**Appendix B**

**Compliance Procedure and Compliance List**

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March 17, 2011.

## Appendix B. 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 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](http://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.

- |  |   |
|--|---|
| - <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 B 1. Statement of Supplier**

|                  |   |
|------------------|---|
| Supplier name    | MITSUBISHI ELECTRIC EUROPE B.V.                         |
| Supplier address | Gothaer Str. 8, 40880 Ratingen                          |
| City             | Ratingen  |
| Country          | Germany   |
| Telephone        | +49 (0) 2102 486 – 0                                    |
| Fax              | +49 (0) 2102 486 - 4050                                 |
| Email address    | Kazuaki.Miyabe@meg.mee.com                              |
| Product Name     | iQ-F Series FX5-40SSC-S Simple Motion Module, GX Works3 |
| Product version  | 1.00  |
| Release date     | 18/06/2015  |

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):  
Kazuaki Miyabe,  
Division Manager of FA-European Development Center

Date of signature (dd/mm/yyyy):  
18/06/2015

Signature:

## Appendix B 2. Supported Data types

| Defined datatypes with MC library: | Supported | If not supported, which datatype used         |
|------------------------------------|-----------|---|
| BOOL                               | Y         | Also called Bit                               |
| INT                                | Y         | Also called Word[Signed]                      |
| WORD                               | Y         | Also called Word[Unsigned]/Bit String[16-bit] |
| REAL                               | Y         | Also called FLOAT                             |
| ENUM                               | N         |   |
| UINT                               | N         |   |

**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                          | Structured Data Types  |
| MC_DIRECTION<br>(extended)  | MC_MoveAbsolute<br>MC_MoveVelocity<br>MC_TorqueControl<br>MC_MoveContinuousAbsolute                        | Y<br>Y<br>Y<br>N           | VAR_GLOBAL_CONSTANT<br>VAR_GLOBAL_CONSTANT   |
| MC_TP_REF                   | MC_PositionProfile   | N                          |  |
| MC_TV_REF                   | MC_VelocityProfile   | N                          |  |
| MC_TA_REF                   | MC_AccelerationProfile   | N                          |  |
| MC_CAM_REF                  | MC_CamTableSelect  | Y                          |  |
| MC_CAM_ID<br>(extended)     | MC_CamTableSelect<br>MC_CamIn  | N<br>N                     |  |
| MC_START_MODE<br>(extended) | MC_CamIn<br>MC_CamTableSelect  | N<br>N                     |  |
| MC_BUFFER_MODE              | Buffered FBs   | N                          |  |
| MC_EXECUTION_MODE           | MC_SetPosition<br>MC_WriteParameter<br>MC_WriteBoolParameter<br>MC_WriteDigitalOutput<br>MC_CamTableSelect | N<br>N<br>N<br>N<br>N      |  |
| MC_SOURCE                   | MC_ReadMotionState<br>MC_CamIn<br>MC_GearIn<br>MC_GearInPos<br>MC_CombineAxes<br>MC_DigitalCamSwitch       | Y<br>Y<br>Y<br>N<br>Y<br>N | VAR_GLOBAL_CONSTANT<br>VAR_GLOBAL_CONSTANT<br>VAR_GLOBAL_CONSTANT<br>VAR_GLOBAL_CONSTANT |
| MC_SYNC_MODE                | MC_GearInPos   | N                          |  |
| MC_COMBINE_MODE             | MC_CombineAxes   | Y                          | VAR_GLOBAL_CONSTANT  |
| MC_TRIGGER_REF              | MC_TouchProbe<br>MC_AbortTrigger   | Y<br>Y                     |  |
| MC_INPUT_REF                | MC_ReadDigitalInput  | Y                          |  |
| MC_OUTPUT_REF               | MC_DigitalCamSwitch<br>MC_ReadDigitalOutput<br>MC_WriteDigitalOutput                                       | N<br>Y<br>Y                |  |
| MC_CAMSWITCH_REF            | MC_DigitalCamSwitch  | N                          |  |
| MC_TRACK_REF                | MC_DigitalCamSwitch  | N                          |  |

**Table 2: Supported derived datatypes**

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

| <b>Single Axis Function Blocks</b>        | <b>Supported as V1.0/ V1.1/ V2.0 or Not</b> | <b>Comments (&lt;= 48 char.)</b> |
|---|---|----------------------------------|
| 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                       | Not   |                                  |
| MC_HaltSuperimposed                       | Not   |                                  |
| MC_MoveVelocity                           | V2.0  |                                  |
| MC_MoveContinuousAbsolute                 | Not   |                                  |
| MC_MoveContinuousRelative                 | Not   |                                  |
| MC_TorqueControl                          | V2.0  |                                  |
| MC_PositionProfile                        | Not   |                                  |
| MC_VelocityProfile                        | Not   |                                  |
| MC_AccelerationProfile                    | Not   |                                  |
| MC_SetPosition                            | V2.0  |                                  |
| MC_SetOverride                            | V2.0  |                                  |
| MC_ReadParameter & MC_ReadBoolParameter   | V2.0<br>V2.0                                |                                  |
| MC_WriteParameter & MC_WriteBoolParameter | V2.0<br>V2.0                                |                                  |
| MC_ReadDigitalInput                       | V2.0  |                                  |
| MC_ReadDigitalOutput                      | V2.0  |                                  |
| MC_WriteDigitalOutput                     | V2.0  |                                  |
| MC_ReadActualPosition                     | V2.0  |                                  |
| MC_ReadActualVelocity                     | V2.0  |                                  |
| MC_ReadActualTorque                       | V2.0  |                                  |
| MC_ReadStatus                             | V2.0  |                                  |
| MC_ReadMotionState                        | V2.0  |                                  |
| MC_ReadAxisInfo                           | V2.0  |                                  |
| MC_ReadAxisError                          | V2.0  |                                  |
| MC_Reset                                  | V2.0  |                                  |
| MC_DigitalCamSwitch                       | Not   |                                  |
| MC_TouchProbe                             | V2.0  |                                  |
| MC_AbortTrigger                           | V2.0  |                                  |
| <b>Multi-Axis Function Blocks</b>         | <b>Supported as V1.0/ V1.1/ V2.0 or Not</b> | <b>Comments (&lt;= 48 char.)</b> |
| MC_CamTableSelect                         | V2.0  |                                  |
| MC_CamIn                                  | V2.0  |                                  |
| MC_CamOut                                 | V2.0  |                                  |
| MC_GearIn                                 | V2.0  |                                  |
| MC_GearOut                                | V2.0  |                                  |
| MC_GearInPos                              | Not   |                                  |
| MC_PhasingAbsolute                        | Not   |                                  |
| MC_PhasingRelative                        | Not   |                                  |
| MC_CombineAxes                            | V2.0  |                                  |

**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        | Reference to the axis. |
| VAR_INPUT    |                |          |                        |
| B            | Enable         | Y        |                        |
| E            | EnablePositive | N        |                        |
| E            | EnableNegative | N        |                        |
| VAR_OUTPUT   |                |          |                        |
| B            | Status         | Y        |                        |
| 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        | Reference to the axis.   |
| VAR_INPUT    |                |          |  |
| B            | Execute        | Y        |  |
| V            | HomingMethod   | INT      | Select the used OPR method (homing method) for carrying out machine OPR (homing).  |
| B            | Position       | Y        | The value must be specified and is interpreted according to the unit setting of the Simple Motion Module ( $10^{-1}$ $\mu$ m, $10^{-5}$ inch, $10^{-5}$ degree, 1 Pulse).  |
| V            | Velocity       | REAL     | Set the velocity at which homing is performed. The value must be specified and is interpreted according to the unit setting of the Simple Motion Module ( $10^{-2}$ mm/min, $10^{-3}$ inch/min, $10^{-3}$ degree/min, 1 Pulse/second).   |
| V            | CreepVelocity  | REAL     | Set the creep speed after near-point dog ON (low speed just before stopping after decelerating from the OPR speed. The value must be specified and is interpreted according to the unit setting of the Simple Motion Module ( $10^{-2}$ mm/min, $10^{-3}$ inch/min, $10^{-3}$ degree/min, 1 Pulse/second). |
| E            | BufferMode     | N        |  |
| VAR_OUTPUT   |                |          |  |
| B            | Done           | Y        |  |
| E            | Busy           | Y        |  |
| E            | Active         | N        |  |
| 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        | Reference to the axis.   |
| VAR_INPUT    |              |          |  |
| B            | Execute      | Y        |  |
| E            | Deceleration | Y        | The value specifies the time needed for the speed to decrease from the <b>system set speed limit value</b> (Pr. 8 using ReadParameter / WriteParameter FBs) to <b>zero</b> . The value is specified in ms units (>1 ms). |

|            |                |   |  |
|------------|----------------|---|--|
| E          | Jerk           | N |  |
| VAR_OUTPUT |                |   |  |
| B          | Done           | Y |  |
| E          | Busy           | Y |  |
| E          | CommandAborted | N |  |
| 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        | Reference to the axis.   |
| VAR_INPUT    |                |          |  |
| B            | Execute        | Y        |  |
| E            | Deceleration   | Y        | The value specifies the time needed for the speed to decrease from the <b>system set speed limit value</b> (Pr. 8 using ReadParameter / WriteParameter FBs) to <b>zero</b> . The value is specified in ms units (>1 ms). |
| 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        | Y        |  |

### Appendix B 3.5 MC\_MoveAbsolute

| If Supported | MC_MoveAbsolute  | Sup. Y/N | Comments   |
|--------------|------------------|----------|--|
| VAR_IN_OUT   |                  |          |  |
| B            | Axis             | Y        | Reference to the axis.   |
| VAR_INPUT    |                  |          |  |
| B            | Execute          | Y        |  |
| E            | ContinuousUpdate | N        |  |
| B            | Position         | Y        | The value must be specified and is interpreted according to the unit setting of the Simple Motion Module ( $10^{-1}$ $\mu$ m, $10^{-5}$ inch, $10^{-5}$ degree, 1 Pulse).  |
| B            | Velocity         | Y        | The value must be specified and is interpreted according to the unit setting of the Simple Motion Module ( $10^{-2}$ mm/min, $10^{-3}$ inch/min, $10^{-3}$ degree/min, 1 Pulse/second).<br>The value must be <b>positive</b> . |
| E            | Acceleration     | Y        | The value specifies the time needed for the speed to increase from <b>zero</b> to the <b>system set speed limit value</b> (Pr. 8 using ReadParameter / WriteParameter FBs). The value is specified in ms units (>1 ms).        |
| E            | Deceleration     | Y        | The value specifies the time needed for the speed to decrease from the <b>system set speed limit value</b> (Pr. 8 using ReadParameter / WriteParameter FBs) to <b>zero</b> . The value is specified in ms units (>1 ms).       |
| E            | Jerk             | N        |  |

|            |                |   |  |
|------------|----------------|---|--|
| B          | Direction      | Y | (Values: 1 to 4): mcPositiveDirection, mcNegativeDirection, mcCurrentDirection, mcShortestWay) VAR_GLOBAL_CONSTANT data MC_DIRECTION |
| E          | BufferMode     | N |  |
| VAR_OUTPUT |                |   |  |
| B          | Done           | Y |  |
| E          | Busy           | Y |  |
| E          | Active         | N |  |
| 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        | Reference to the axis.   |
| VAR_INPUT    |                  |          |  |
| B            | Execute          | Y        |  |
| E            | ContinuousUpdate | N        |  |
| B            | Distance         | Y        | The value must be specified and is interpreted according to the unit setting of the Simple Motion Module ( $10^{-1}$ $\mu$ m, $10^{-5}$ inch, $10^{-5}$ degree, 1 Pulse).  |
| B            | Velocity         | Y        | The value must be specified and is interpreted according to the unit setting of the Simple Motion Module ( $10^{-2}$ mm/min, $10^{-3}$ inch/min, $10^{-3}$ degree/min, 1 Pulse/second).<br>The value must be <b>positive</b> . |
| E            | Acceleration     | Y        | The value specifies the time needed for the speed to increase from <b>zero</b> to the <b>system set speed limit value</b> (Pr. 8 using ReadParameter / WriteParameter FBs). The value is specified in ms units (>1 ms).        |
| E            | Deceleration     | Y        | The value specifies the time needed for the speed to decrease from the <b>system set speed limit value</b> (Pr. 8 using ReadParameter / WriteParameter FBs) to <b>zero</b> . The value is specified in ms units (>1 ms).       |
| 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          | Y        |  |



### Appendix B 3.7 MC\_MoveAdditive

| If Supported | MC_MoveAdditive  | Sup. Y/N | Comments   |
|--------------|------------------|----------|--|
| VAR_IN_OUT   |                  |          |  |
| B            | Axis             | Y        | Reference to the axis.   |
| VAR_INPUT    |                  |          |  |
| B            | Execute          | Y        |  |
| E            | ContinuousUpdate | N        |  |
| B            | Distance         | Y        | The value must be specified and is interpreted according to the unit setting of the Simple Motion Module ( $10^{-1}$ $\mu$ m, $10^{-5}$ inch, $10^{-5}$ degree, 1 Pulse).  |
| B            | Velocity         | Y        | The value must be specified and is interpreted according to the unit setting of the Simple Motion Module ( $10^{-2}$ mm/min, $10^{-3}$ inch/min, $10^{-3}$ degree/min, 1 Pulse/second).<br>The value must be <b>positive</b> . |
| E            | Acceleration     | Y        | The value specifies the time needed for the speed to increase from <b>zero</b> to the <b>system set speed limit value</b> (Pr. 8 using ReadParameter / WriteParameter FBs). The value is specified in ms units (>1 ms).        |
| E            | Deceleration     | Y        | The value specifies the time needed for the speed to decrease from the <b>system set speed limit value</b> (Pr. 8 using ReadParameter / WriteParameter FBs) to <b>zero</b> . The value is specified in ms units (>1 ms).       |
| 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          | Y        |  |

### Appendix B 3.8 MC\_MoveSuperimposed

| 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

| 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        | Reference to the axis.  |
| VAR_INPUT    |                  |          |   |
| B            | Execute          | Y        |   |
| E            | ContinuousUpdate | N        |   |
| E            | Velocity         | Y        | The value must be specified and is interpreted according to the unit setting of the Simple Motion Module ( $10^{-2}$ mm/min, $10^{-3}$ inch/min, $10^{-3}$ degree/min, 1 Pulse/second).<br>The value can be <b>positive</b> or <b>negative</b> (affects direction). |
| E            | Acceleration     | Y        | The value specifies the time needed for the speed to increase from <b>zero</b> to the <b>system set speed limit value</b> (Pr. 8 using ReadParameter / WriteParameter FBs). The value is specified in ms units (Range: 0 to 65535 ms).                              |
| E            | Deceleration     | Y        | The value specifies the time needed for the speed to decrease from the <b>system set speed limit value</b> (Pr. 8 using ReadParameter / WriteParameter FBs) to <b>zero</b> . The value is specified in ms units (Range: 0 to 65535 ms).                             |
| E            | Jerk             | N        |   |
| E            | Direction        | Y        | (Values: 1 to 4): mcPositiveDirection, mcNegativeDirection, mcCurrentDirection, mcShortestWay) VAR_GLOBAL_CONSTANT data MC_DIRECTION  |
| 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

| 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

| 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        | Reference to the axis.   |
| VAR_INPUT    |                  |          |  |
| B            | Execute          | Y        |  |
| E            | ContinuousUpdate | N        |  |
| B            | Torque           | Y        | The value is specified in 0.1 % units and has a range of (-10000 units to 10000 units).  |
| E            | TorqueRamp       | N        |  |
| V            | TorqueRampFwd    | REAL     | The value specifies the time needed for the torque to increase from <b>zero</b> to the <b>system set torque limit value</b> . The value is specified in ms units (Range: 0 to 65535 ms).   |
| V            | TorqueRampRev    | REAL     | The value specifies the time needed for the torque to decrease from the <b>system set torque limit value</b> to <b>zero</b> . The value is specified in ms units (Range: 0 to 65535 ms).   |
| E            | Velocity         | Y        | The value must be specified and is interpreted according to the unit setting of the Simple Motion Module (10 <sup>-2</sup> mm/min, 10 <sup>-3</sup> inch/min, 10 <sup>-3</sup> degree/min, 1 Pulse/second).<br>The value must be <b>positive</b> . |
| E            | Acceleration     | N        |  |
| E            | Deceleration     | N        |  |
| E            | Jerk             | N        |  |

|            |                |   |   |
|------------|----------------|---|---|
| E          | Direction      | Y | (Values: 1 to 4): mcPositiveDirection, mcNegativeDirection, mcCurrentDirection, mcShortestWay) VAR_GLOBAL_CONSTANT data<br>MC_DIRECTION |
| 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

| 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

| 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

| 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        | Reference to the axis.  |
| VAR_INPUT    |                |          |   |
| B            | Execute        | Y        |   |
| B            | Position       | Y        | The value must be specified and is interpreted according to the unit setting of the Simple Motion Module ( $10^{-1}$ $\mu$ m, $10^{-5}$ inch, $10^{-5}$ degree, 1 Pulse). |
| E            | Relative       | Y        |   |
| E            | ExecutionMode  | N        |   |
| VAR_OUTPUT   |                |          |   |
| B            | Done           | Y        |   |
| E            | Busy           | Y        |   |
| 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        | Reference to the axis. |
| VAR_INPUT    |                |          |                        |
| B            | Enable         | Y        |                        |
| B            | VelFactor      | Y        |                        |
| E            | AccFactor      | Y        |                        |
| E            | JerkFactor     | N        |                        |
| VAR_OUTPUT   |                |          |                        |
| B            | Enabled        | Y        |                        |
| E            | Busy           | N        |                        |
| 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        | Reference to the axis. |
| VAR_INPUT    |                  |          |                        |
| B            | Enable           | Y        |                        |
| B            | ParameterNumber  | Y        |                        |
| VAR_OUTPUT   |                  |          |                        |
| B            | Valid            | Y        |                        |
| E            | Busy             | N        |                        |
| B            | Error            | Y        |                        |
| E            | ErrorID          | Y        |                        |
| B            | Value            | Y        |                        |

| If Supported | MC_ReadBoolParameter | Sup. Y/N | Comments               |
|--------------|----------------------|----------|------------------------|
| VAR_IN_OUT   |                      |          |                        |
| B            | Axis                 | Y        | Reference to the axis. |
| VAR_INPUT    |                      |          |                        |
| B            | Enable               | Y        |                        |
| B            | ParameterNumber      | Y        |                        |
| VAR_OUTPUT   |                      |          |                        |
| B            | Valid                | Y        |                        |
| E            | Busy                 | N        |                        |
| B            | Error                | Y        |                        |
| E            | ErrorID              | Y        |                        |
| B            | Value                | Y        |                        |

| Name                   | B/E | R/W | Sup. Y/N | Comments  |
|------------------------|-----|-----|----------|---|
| CommandedPosition      | B   | R   | Y        |   |
| SWLimitPos             | E   | R/W | Y        | Can be written only before Simple Motion Module initialization (first MC_Power execution after Power ON).   |
| SWLimitNeg             | E   | R/W | Y        | Can be written only before Simple Motion Module initialization (first MC_Power execution after Power ON).   |
| EnableLimitPos         | E   | R/W | N        |   |
| EnableLimitNeg         | E   | R/W | N        |   |
| EnablePosLagMonitoring | E   | R/W | N        |   |
| MaxPositionLag         | E   | R/W | N        |   |
| MaxVelocitySystem      | E   | R   | Y        | (R/W) - Can be written during operation.  |
| MaxVelocityAppl        | B   | R/W | Y        |   |
| ActualVelocity         | B   | R   | Y        |   |
| CommandedVelocity      | B   | R   | Y        |   |
| MaxAccelerationSystem  | E   | R   | N        |   |
| MaxAccelerationAppl    | E   | R/W | Y        |   |
| MaxDecelerationSystem  | E   | R   | N        |   |
| MaxDecelerationAppl    | E   | R/W | Y        |   |
| MaxJerkSystem          | E   | R   | N        |   |
| MarkJerkAppl           | E   | R/W | N        |   |
| SWLimitValid           | V   | R/W | Y        | Pr. 1000 - Software stroke limit valid/invalid. Can be written only before Simple Motion Module initialization (first MC_Power execution after Power ON). |

**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        | Reference to the axis. |
| VAR_INPUT    |                   |          |                        |
| B            | Execute           | Y        |                        |
| B            | ParameterNumber   | Y        |                        |
| B            | Value             | Y        |                        |
| E            | ExecutionMode     | N        |                        |
| VAR_OUTPUT   |                   |          |                        |
| B            | Done              | Y        |                        |
| E            | Busy              | N        |                        |
| B            | Error             | Y        |                        |
| E            | ErrorID           | Y        |                        |

| If Supported | MC_WriteBoolParameter | Sup. Y/N | Comments               |
|--------------|-----------------------|----------|------------------------|
| VAR_IN_OUT   |                       |          |                        |
| B            | Axis                  | Y        | Reference to the axis. |
| VAR_INPUT    |                       |          |                        |
| B            | Execute               | Y        |                        |
| B            | ParameterNumber       | Y        |                        |
| B            | Value                 | Y        |                        |
| E            | ExecutionMode         | N        |                        |
| VAR_OUTPUT   |                       |          |                        |
| B            | Done                  | Y        |                        |
| E            | Busy                  | N        |                        |
| B            | Error                 | Y        |                        |
| E            | ErrorID               | Y        |                        |

### Appendix B 3.21 MC\_ReadDigitalInput

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



### Appendix B 3.22 MC\_ReadDigitalOutput

| If Supported | MC_ReadDigitalOutput | Sup.Y/N | Comments               |
|--------------|----------------------|---------|------------------------|
| VAR_IN_OUT   |                      |         |                        |
| B            | Output               | Y       | Reference to the axis. |
| VAR_INPUT    |                      |         |                        |
| B            | Enable               | Y       |                        |
| E            | OutputNumber         | Y       |                        |
| VAR_OUTPUT   |                      |         |                        |
| B            | Valid                | Y       |                        |
| E            | Busy                 | N       |                        |
| B            | Error                | Y       |                        |
| E            | ErrorID              | Y       |                        |
| B            | Value                | Y       |                        |

### Appendix B 3.23 MC\_WriteDigitalOutput

| If Supported | MC_WriteDigitalOutput | Sup.Y/N | Comments               |
|--------------|-----------------------|---------|------------------------|
| VAR_IN_OUT   |                       |         |                        |
| B            | Output                | Y       | Reference to the axis. |
| VAR_INPUT    |                       |         |                        |
| B            | Execute               | Y       |                        |
| E            | OutputNumber          | Y       |                        |
| B            | Value                 | Y       |                        |
| E            | ExecutionMode         | N       |                        |
| VAR_OUTPUT   |                       |         |                        |
| B            | Done                  | Y       |                        |
| E            | Busy                  | N       |                        |
| B            | Error                 | Y       |                        |
| E            | ErrorID               | Y       |                        |

### Appendix B 3.24 MC\_ReadActualPosition

| If Supported | MC_ReadActualPosition | Sup. Y/N | Comments  |
|--------------|-----------------------|----------|---|
| VAR_IN_OUT   |                       |          |   |
| B            | Axis                  | Y        | Reference to the axis.  |
| VAR_INPUT    |                       |          |   |
| B            | Enable                | Y        |   |
| VAR_OUTPUT   |                       |          |   |
| B            | Valid                 | Y        |   |
| E            | Busy                  | N        |   |
| B            | Error                 | Y        |   |
| E            | ErrorID               | Y        |   |
| B            | Position              | Y        | Stores the current feed value (actual position) of the axis. <u>Note:</u> The value can be changed using the current value changing function.<br>The value is stored according to the unit setting of the Simple Motion Module (10 <sup>-1</sup> μm, 10 <sup>-5</sup> inch, 10 <sup>-5</sup> degree, 1 Pulse).                                      |
| V            | MachinePosition       | REAL     | Stores the machine feed value (actual position according to machine coordinates) of the axis. <u>Note:</u> The value can NOT be changed using the current value changing function.<br>The value is stored according to the unit setting of the Simple Motion Module (10 <sup>-1</sup> μm, 10 <sup>-5</sup> inch, 10 <sup>-5</sup> degree, 1 Pulse). |

### Appendix B 3.25 MC\_ReadActualVelocity

| If Supported | MC_ReadActualVelocity | Sup.Y/N | Comments   |
|--------------|-----------------------|---------|--|
| VAR_IN_OUT   |                       |         |  |
| B            | Axis                  | Y       | Reference to the axis.   |
| VAR_INPUT    |                       |         |  |
| B            | Enable                | Y       |  |
| VAR_OUTPUT   |                       |         |  |
| B            | Valid                 | Y       |  |
| E            | Busy                  | N       |  |
| B            | Error                 | Y       |  |
| E            | ErrorID               | Y       |  |
| B            | Velocity              | Y       | The value is stored according to the unit setting of the Simple Motion Module (10 <sup>-2</sup> mm/min, 10 <sup>-3</sup> inch/min, 10 <sup>-3</sup> degree/min, 1 Pulse/second). |

### Appendix B 3.26 MC\_ReadActualTorque

| If Supported | MC_ReadActualTorque | Sup.Y/N | Comments                            |
|--------------|---------------------|---------|-------------------------------------|
| VAR_IN_OUT   |                     |         |                                     |
| B            | Axis                | Y       | Reference to the axis.              |
| VAR_INPUT    |                     |         |                                     |
| B            | Enable              | Y       |                                     |
| VAR_OUTPUT   |                     |         |                                     |
| B            | Valid               | Y       |                                     |
| E            | Busy                | N       |                                     |
| B            | Error               | Y       |                                     |
| E            | ErrorID             | Y       |                                     |
| B            | Torque              | Y       | The value is stored in 0.1 % units. |

### Appendix B 3.27 MC\_ReadStatus

| If Supported | MC_ReadStatus      | Sup. Y/N | Comments               |
|--------------|--------------------|----------|------------------------|
| VAR_IN_OUT   |                    |          |                        |
| B            | Axis               | Y        | Reference to the axis. |
| VAR_INPUT    |                    |          |                        |
| B            | Enable             | Y        |                        |
| VAR_OUTPUT   |                    |          |                        |
| B            | Valid              | Y        |                        |
| E            | Busy               | N        |                        |
| 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        |                        |

### Appendix B 3.28 MC\_ReadMotionState

| If Supported | MC_ReadMotionState | Sup. Y/N | Comments  |
|--------------|--------------------|----------|---|
| VAR_IN_OUT   |                    |          |   |
| B            | Axis               | Y        | Reference to the axis.  |
| VAR_INPUT    |                    |          |   |
| B            | Enable             | Y        |   |
| E            | Source             | Y        | (Values: 1 to 2): mcSetValue, mcActualValue)<br>VAR_GLOBAL_CONSTANT data<br>MC_SOURCE |
| VAR_OUTPUT   |                    |          |   |
| B            | Valid              | Y        |   |
| E            | Busy               | N        |   |
| B            | Error              | Y        |   |
| E            | ErrorID            | Y        |   |
| E            | ConstantVelocity   | Y        |   |
| E            | Accelerating       | Y        |   |
| E            | Decelerating       | Y        |   |
| E            | DirectionPositive  | Y        |   |
| E            | DirectionNegative  | Y        |   |

### Appendix B 3.29 MC\_ReadAxisInfo

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

### Appendix B 3.30 MC\_ReadAxisError

| If Supported | MC_ReadAxisError | Sup. Y/N | Comments                                       |
|--------------|------------------|----------|--|
| VAR_IN_OUT   |                  |          |  |
| B            | Axis             | Y        | Reference to the axis.                         |
| VAR_INPUT    |                  |          |  |
| B            | Enable           | Y        |  |
| VAR_OUTPUT   |                  |          |  |
| B            | Valid            | Y        |  |
| E            | Busy             | N        |  |
| B            | Error            | Y        |  |
| B            | ErrorID          | Y        |  |
| E            | AxisErrorID      | Y        | Code (Error No.) of the error on the axis.     |
| V            | AxisWarningID    | Y        | Code (Warning No.) of the warning on the axis. |

### Appendix B 3.31 MC\_Reset

| If Supported | MC_Reset | Sup. Y/N | Comments               |
|--------------|----------|----------|------------------------|
| VAR_IN_OUT   |          |          |                        |
| B            | Axis     | Y        | Reference to the axis. |
| 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                |         |          |
| B            | Switches            |         |          |
| E            | Outputs             |         |          |
| E            | TrackOptions        |         |          |
| VAR_INPUT    |                     |         |          |
| B            | Enable              |         |          |
| E            | EnableMask          |         |          |
| E            | ValueSource         |         |          |
| VAR_OUTPUT   |                     |         |          |
| B            | InOperation         |         |          |
| E            | Busy                |         |          |
| B            | Error               |         |          |
| E            | ErrorID             |         |          |

Basic elements within the array structure of MC\_CAMSWITCH\_REF

| B/E | Parameter           | Sup.Y/N | Comments |
|-----|---------------------|---------|----------|
| B   | TrackNumber         |         |          |
| B   | FirstOnPosition [u] |         |          |
| B   | LastOnPosition [u]  |         |          |
| E   | AxisDirection       |         |          |
| E   | CamSwitchMode       |         |          |
| E   | Duration            |         |          |

Basic elements within the array structure of MC\_TRACK\_REF

| B/E | Parameter       | Sup.Y/N | Comments |
|-----|-----------------|---------|----------|
| E   | OnCompensation  |         |          |
| E   | OffCompensation |         |          |
| E   | Hysteresis [u]  |         |          |

### Appendix B 3.33 MC\_TouchProbe

| If Supported | MC_TouchProbe    | Sup.Y/N | Comments                  |
|--------------|------------------|---------|---------------------------|
| VAR_IN_OUT   |                  |         |                           |
| B            | Axis             | Y       | Reference to the axis.    |
| E            | TriggerInput     | Y       | Reference to the trigger. |
| VAR_INPUT    |                  |         |                           |
| B            | Execute          | Y       |                           |
| E            | WindowOnly       | Y       |                           |
| E            | FirstPosition    | Y       |                           |
| E            | LastPosition     | Y       |                           |
| VAR_OUTPUT   |                  |         |                           |
| B            | Done             | Y       |                           |
| E            | Busy             | Y       |                           |
| E            | CommandAborted   | Y       |                           |
| B            | Error            | Y       |                           |
| E            | ErrorID          | Y       |                           |
| B            | RecordedPosition | Y       |                           |

### Appendix B 3.34 MC\_AbortTrigger

| If Supported | MC_AbortTrigger | Sup.Y/N | Comments                  |
|--------------|-----------------|---------|---------------------------|
| VAR_IN_OUT   |                 |         |                           |
| B            | Axis            | Y       | Reference to the axis.    |
| E            | TriggerInput    | Y       | Reference to the trigger. |
| VAR_INPUT    |                 |         |                           |
| B            | Execute         | Y       |                           |
| VAR_OUTPUT   |                 |         |                           |
| B            | Done            | Y       |                           |
| E            | Busy            | Y       |                           |
| 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        | Reference to the axis.   |
| E            | Slave             | Y        | Reference to the axis.   |
| B            | CamTable          | Y        | Reference to the CAM table.                                      |
| 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        | CAM Table ID is stored as a simple base type INT - Word[Signed]. |

### Appendix B 3.36 MC\_CamIn

| If Supported | MC_CamIn             | Sup. Y/N | Comments  |
|--------------|----------------------|----------|---|
| VAR_IN_OUT   |                      |          |   |
| B            | Master               | Y        | Reference to the axis.  |
| B            | Slave                | Y        | Reference to the axis.  |
| VAR_INPUT    |                      |          |   |
| B            | Execute              | Y        |   |
| E            | ContinuousUpdate     | N        |   |
| E            | MasterOffset         | N        |   |
| E            | SlaveOffset          | N        |   |
| E            | MasterScaling        | N        |   |
| E            | SlaveScaling         | N        |   |
| E            | MasterStartDistance  | N        |   |
| E            | MasterSyncPosition   | N        |   |
| E            | StartMode            | N        |   |
| V            | GearRatioNumerator   | DINT     | Set the numerator for the main shaft gear to convert the input value (travel).        |
| V            | GearRatioDenominator | DINT     | Set the denominator for the main shaft gear to convert the input value (travel).      |
| E            | MasterValueSource    | Y        | (Values: 1 to 2): mcSetValue, mcActualValue)<br>VAR_GLOBAL_CONSTANT data<br>MC_SOURCE |
| E            | CamTableID           | Y        |   |
| E            | BufferMode           | N        |   |
| VAR_OUTPUT   |                      |          |   |
| B            | InSync               | Y        |   |
| E            | Busy                 | Y        |   |
| E            | Active               | Y        |   |
| E            | CommandAborted       | Y        |   |
| B            | Error                | Y        |   |
| E            | ErrorID              | Y        |   |
| E            | EndOfProfile         | N        |   |

### Appendix B 3.37 MC\_CamOut

| If Supported | MC_CamOut | Sup. Y/N | Comments               |
|--------------|-----------|----------|------------------------|
| VAR_IN_OUT   |           |          |                        |
| B            | Slave     | Y        | Reference to the axis. |
| VAR_INPUT    |           |          |                        |
| B            | Execute   | Y        |                        |
| VAR_OUTPUT   |           |          |                        |
| B            | Done      | Y        |                        |
| E            | Busy      | Y        |                        |
| B            | Error     | Y        |                        |
| E            | ErrorID   | Y        |                        |

### Appendix B 3.38 MC\_GearIn

| If Supported | MC_GearIn         | Sup. Y/N | Comments  |
|--------------|-------------------|----------|---|
| VAR_IN_OUT   |                   |          |   |
| B            | Master            | Y        | Reference to the axis.  |
| B            | Slave             | Y        | Reference to the axis.  |
| VAR_INPUT    |                   |          |   |
| B            | Execute           | Y        |   |
| E            | ContinuousUpdate  | N        |   |
| B            | RatioNumerator    | Y        |   |
| B            | RatioDenominator  | Y        |   |
| E            | MasterValueSource | Y        | (Values: 1 to 2): mcSetValue, mcActualValue)<br>VAR_GLOBAL_CONSTANT data<br>MC_SOURCE |
| E            | Acceleration      | N        |   |
| E            | Deceleration      | N        |   |
| E            | Jerk              | N        |   |
| 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

| If Supported | MC_GearOut | Sup. Y/N | Comments               |
|--------------|------------|----------|------------------------|
| VAR_IN_OUT   |            |          |                        |
| B            | Slave      | Y        | Reference to the axis. |
| VAR_INPUT    |            |          |                        |
| B            | Execute    | Y        |                        |
| VAR_OUTPUT   |            |          |                        |
| B            | Done       | Y        |                        |
| E            | Busy       | Y        |                        |
| B            | Error      | Y        |                        |
| E            | ErrorID    | Y        |                        |

### Appendix B 3.40 MC\_GearInPos

| If Supported | MC_GearInPos        | Sup.Y/N | Comments |
|--------------|---------------------|---------|----------|
| VAR_IN_OUT   |                     |         |          |
| B            | Master              |         |          |
| B            | Slave               |         |          |
| VAR_INPUT    |                     |         |          |
| B            | Execute             |         |          |
| B            | RatioNumerator      |         |          |
| B            | RatioDenominator    |         |          |
| E            | MasterValueSource   |         |          |
| B            | MasterSyncPosition  |         |          |
| B            | SlaveSyncPosition   |         |          |
| E            | SyncMode            |         |          |
| E            | MasterStartDistance |         |          |
| E            | Velocity            |         |          |
| E            | Acceleration        |         |          |
| E            | Deceleration        |         |          |
| E            | Jerk                |         |          |
| E            | BufferMode          |         |          |
| VAR_OUTPUT   |                     |         |          |
| E            | StartSync           |         |          |
| B            | InSync              |         |          |
| E            | Busy                |         |          |
| E            | Active              |         |          |
| E            | CommandAborted      |         |          |
| B            | Error               |         |          |
| E            | ErrorID             |         |          |

### Appendix B 3.41 MC\_PhasingAbsolute

| If Supported | MC_PhasingAbsolute | 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            |          |          |
| E            | AbsolutePhaseShift |          |          |



## Appendix B 3.42 MC\_PhasingRelative

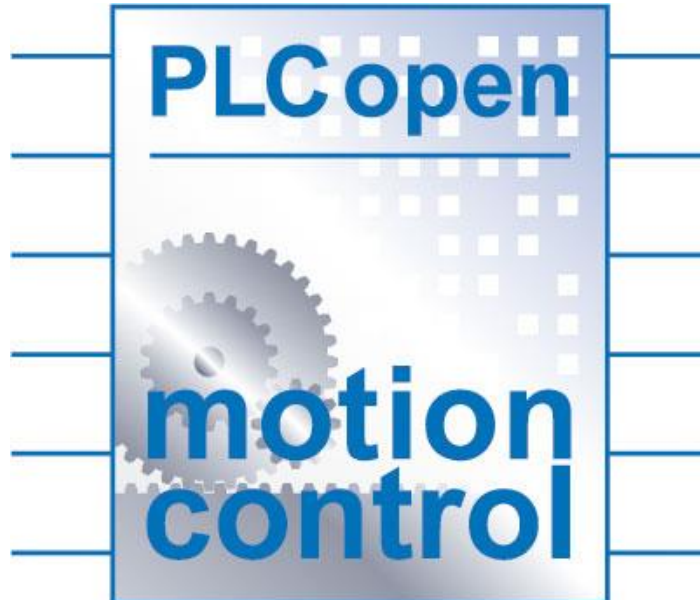
| If Supported | MC_PhasingRelative | Sup. Y/N | Comments |
|--------------|--------------------|----------|----------|
| VAR_IN_OUT   |                    |          |          |
| B            | Master             |          |          |
| B            | Slave              |          |          |
| 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            |          |          |
| E            | CoveredPhaseShift  |          |          |

## Appendix B 3.43 CombineAxes

| If Supported | MC_CombineAxes         | Sup. Y/N | Comments  |
|--------------|------------------------|----------|---|
| VAR_IN_OUT   |                        |          |   |
| B            | Master1                | Y        | Reference to the axis.  |
| B            | Master2                | Y        | Reference to the axis.  |
| B            | Slave                  | Y        | Reference to the axis.  |
| VAR_INPUT    |                        |          |   |
| B            | Execute                | Y        |   |
| E            | ContinuousUpdate       | N        |   |
| E            | CombineMode            | Y        |   |
| E            | GearRationNumeratorM1  | Y        |   |
| E            | GearRatioDenominatorM1 | Y        |   |
| E            | GearRatioNumeratorM2   | Y        |   |
| E            | GearRatioDenominatorM2 | Y        |   |
| E            | MasterValueSourceM1    | Y        | (Values: 1 to 2): mcSetValue, mcActualValue)<br>VAR_GLOBAL_CONSTANT data<br>MC_SOURCE |
| E            | MasterValueSourceM2    | N        |   |
| E            | BufferMode             | N        |   |
| VAR_OUTPUT   |                        |          |   |
| B            | InSync                 | Y        |   |
| E            | Busy                   | Y        |   |
| E            | Active                 | Y        |   |
| E            | CommandAborted         | Y        |   |
| B            | Error                  | Y        |   |
| E            | ErrorID                | Y        |   |

## 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.