Subset of the

Technical Specification
PLCopen - Technical Committee 2 – Task Force

Function blocks for motion control

Version 1.1

Appendix A :

Compliance Procedure and Compliance List

July 2005

Appendix A. Compliance Procedure and Compliance List

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

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

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

Data types

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

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

Function Blocks and Inputs and Outputs

An implementation which claims compliance with this PLCopen specification shall offer a set of Function Blocks for motion control, meaning one or more Function Blocks, with at least the **basic** input and output variables, marked as "**B**" in the tables. These inputs and outputs have to be supported to be compliant.
For higher-level systems and future extensions any subset of the **extended** input and output variables, marked as "**E**" in the tables can be implemented.
Vendor specific additions are marked with "**V**", and can be listed as such in the supplier documentation.

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

All the vendor specific items will not be listed in the comparison table on the PLCopen website, but in the detailed vendor specific list, which also is published.
All vendor specific in- and outputs of all FBs must be listed in the certification list of the supplier. With this, the certification listing from a supplier describes all the I/Os of the relevant FBs, including vendor-specific extensions, and thus showing the complete FBs as used by the supplier.

Appendix A 1. Statement of Supplier

Supplier name	ISAC S.r.l.
Supplier address	Viale Maestri del Lavoro, 30
City	Cascina
Country	Italy
Telephone	+39 050 711131
Fax	+39 050 711472
Email address	a.denardis@isacsrl.it
Product Name	RTPLC
Product version	2.0
Release date	10/2009

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

Name of representation (person):
Andrea De Nardis

Date of signature (dd/mm/yyyy):
31/05/2010

Signature:

Appendix A 2. Supported Data types

Defined datatypes with MC library:	Supported	If not supported, which datatype used
BOOL	Yes, as BOOL8	
INT	Yes	
WORD	Yes	
REAL	No	All REAL replaced by LREAL for higher precision
ENUM	Yes	

Table 1: Supported datatypes

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

Derived datatypes:	Where used	Supported	Which structure
Axis_Ref	Nearly all FBs	Yes	
MC_Direction (extended)	MC_MoveAbsolute MC_MoveVelocity	Yes	positive_direction, shortest_way, negative_ direction. (non standard) pass_to_zero, dont_pass_to_zero.
MC_TP_REF	MC_PositionProfile	No	
MC_TV_REF	MC_VelocityProfile	No	
MC_TA_REF	MC_AccelerationProfile	No	
MC_CAM_REF	MC_CamTableSelect	Yes	It is actually a structure with a STRING:80 in it.
MC_CAM_ID (extended)	MC_CamTableSelect MC_CamIn	Yes	It is actually a DINT
MC_StartMode (extended)	MC_CamIn	Yes	absolute, relative
MC_BufferMode	Buffered FBs	Yes	It depends on FB. All support Aborting, Buffered, most support BlendingNext when applicable (MC_MoveAbsolute, MC_MoveVelocity, MC_CammIn, MC_CammOut, MC_MoveAdditive, MC_Home, MC_GearIn, MC_GearOut,).

Table 2: Supported derived datatypes

Appendix A 3. Overview of the Function Blocks

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

Table 3: Short overview of the Function Blocks

Appendix A 3.1 MoveAbsolute

If Supported	**MC_MoveAbsolute**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	This structure is actually a reference to 4 strutures
VAR_INPUT			
B	Execute	Y	
B	Position	Y	
E	Velocity	Y	
E	Acceleration	Y	
E	Deceleration	N	
E	Jerk	Y	
E	Direction	Y	
E	BufferMode	Y	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
E	Active	Y	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	Y	

Appendix A 3.2 MoveRelative

If Supported	**MC_MoveRelative**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	This structure is actually a reference to 4 structures
VAR_INPUT			
B	Execute	Y	
B	Distance	Y	
E	Velocity	Y	
E	Acceleration	Y	
E	Deceleration	N	Acc/dec are the same
E	Jerk	Y	
E	BufferMode	Y	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
E	Active	Y	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	Y	

Appendix A 3.3 MoveAdditive

If Supported	**MC_MoveAdditive**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	This structure is actually a reference to 4 structures
VAR_INPUT			
B	Execute	Y	
B	Distance	Y	
E	Velocity	Y	
E	Acceleration	Y	
E	Deceleration	N	Acc/dec are the same
E	Jerk	Y	
E	BufferMode	Y	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
E	Active	Y	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	Y	

Appendix A 3.4 MoveSuperimposed

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

Appendix A 3.5 MoveVelocity

If Supported	**MC_MoveVelocity**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	This structure is actually a reference to 4 structures
VAR_INPUT			
B	Execute	Y	
E	Velocity	Y	
E	Acceleration	Y	
E	Deceleration	N	Acc/dec are the same
E	Jerk	Y	
E	Direction	Y	
E	BufferMode	Y	
VAR_OUTPUT			
B	InVelocity	Y	
E	Busy	Y	
E	Active	Y	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	Y	

Appendix A 3.6 Home

If Supported	**MC_Home**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	This structure is actually a reference to 4 structures
VAR_INPUT			
B	Execute	Y	
B	Position	Y	
E	HomingMode	Y	
E	BufferMode	Y	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
E	Active	Y	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	Y	

Remarks: MC_Home is very limited so we needed to implement some vendor-specific FBs. Some of the limitations has been removed in the “Homing extension” standard.

Appendix A 3.7 Stop

If Supported	**MC_Stop**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	This structure is actually a reference to 4 structures
VAR_INPUT			
B	Execute	Y	
E	Deceleration	Y	
E	Jerk	Y	
E	BufferMode	Y	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
E	Active	Y	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	Y	

Appendix A 3.8 Power

If Supported	**MC_Power**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	This structure is actually a reference to 4 structures
VAR_INPUT			
B	Enable	Y	
E	Enable_Positive	Y	While supported, it is highly recommended not to use them. MC_PositionLimits (V) is far better
E	Enable_Negative	Y	See prev.
E	BufferMode	N	
VAR_OUTPUT			
B	Status	Y	
E	Busy	Y	
E	Active	Y	
B	Error	Y	
E	ErrorID	Y	

Appendix A 3.9 ReadStatus

If Supported	**MC_ReadStatus**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	This structure is actually a reference to 4 structures
VAR_INPUT			
B	Enable	Y	
VAR_OUTPUT			
B	Valid	Y	
E	Busy	Y	
B	Error	Y	
E	ErrorID	Y	
B	Disabled	Y	
B	Errorstop	Y	
B	Stopping	Y	
B	StandStill	Y	
B	DiscreteMotion	Y	
B	ContinuousMotion	Y	
E	SynchronizedMotion	Y	
E	Homing	Y	
E	ConstantVelocity	Y	
E	Accelerating	Y	
E	Decelerating	Y	

Appendix A 3.10 ReadAxisError

If Supported	**MC_ReadAxisError**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	This structure is actually a reference to 4 structures
VAR_INPUT			
	Enable	Y	
VAR_OUTPUT			
B	Valid	Y	
E	Busy	Y	
B	Error	Y	
B	ErrorID	Y	

Appendix A 3.11 Reset

If Supported	**MC_Reset**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	This structure is actually a reference to 4 structures
VAR_INPUT			
B	Execute	Y	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
B	Error	Y	
B	ErrorID	Y	

Appendix A 3.12 ReadParameter

If Supported	**MC_ReadParameter**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	This structure is actually a reference to 4 structures
VAR_INPUT			
B	Enable	Y	
B	ParameterNumber	Y	
VAR_OUTPUT			
B	Valid	Y	
E	Busy	Y	
B	Error	Y	
E	ErrorID	Y	
B	Value	Y	

Appendix A 3.13 ReadBoolParameter

If Supported	**MC_ReadBoolParameter**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	This structure is actually a reference to 4 structures
VAR_INPUT			
B	Valid	Y	
B	ParameterNumber	Y	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
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	
SWLimitNeg	E	R/W	Y	
EnableLimitPos	E	R/W	Y	
EnableLimitNeg	E	R/W	Y	
EnablePosLagMonitoring	E	R/W	N	
MaxPositionLag	E	R/W	N	
MaxVelocitySystem	E	R	N	Undefined. Use MaxVelocityAppl
MaxVelocityAppl	B	R/W	Y	
ActualVelocity	B	R	Y	
CommandedVelocity	B	R	Y	
MaxAccelerationSystem	E	R	N	Undefined. Use MaxAccelerationAppl
MaxAccelerationAppl	E	R/W	Y	
MaxDecelerationSystem	E	R	N	Acc/dec are the same
MaxDecelerationAppl	E	R/W	N	
MaxJerk	E	R/W	Y	

Table 4: Parameters for ReadParameter and WriteParameter

Appendix A 3.14 WriteParameter

If Supported	**MC_WriteParameter**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	This structure is actually a reference to 4 structures
VAR_INPUT			
B	Execute	Y	
B	ParameterNumber	Y	
B	Value	Y	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
E	Buffered	Y	
B	Error	Y	
E	ErrorID	Y	

Appendix A 3.15 WriteBoolParameter

If Supported	**MC_WriteBoolParameter**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	This structure is actually a reference to 4 structures
VAR_INPUT			
B	Execute	Y	
B	ParameterNumber	Y	
B	Value	Y	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
E	Buffered	N	Paramss apply immediately after FB completion
B	Error	Y	
E	ErrorID	Y	

Appendix A 3.16 ReadActualPosition

If Supported	**MC_ReadActualPosition**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Axis	Y	This structure is actually a reference to 4 structures
VAR_INPUT			
B	Enable	Y	
VAR_OUTPUT			
B	Valid	Y	
E	Busy	Y	
B	Error	Y	
E	ErrorID	Y	
B	Position	Y	

Appendix A 3.17 PositionProfile

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

Appendix A 3.18 VelocityProfile

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

Appendix A 3.19 AccelerationProfile

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

Appendix A 3.20 CamTableSelect

If Supported	**MC_CamTableSelect**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Master	Y	This structure is actually a reference to 4 structures
B	Slave	Y	This structure is actually a reference to 4 structures
B	CamTable	Y	
VAR_INPUT			
B	Execute	Y	
E	Periodic	Y	
E	MasterAbsolute	Y	
E	SlaveAbsolute	Y	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
B	Error	Y	
E	ErrorID	Y	
E	CamTableID	Y	

Appendix A 3.21 CamIn

If Supported	**MC_CamIn**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Master	Y	This structure is actually a reference to 4 structures
B	Slave	Y	This structure is actually a reference to 4 structures
VAR_INPUT			
B	Execute	Y	
E	MasterOffset	Y	
E	SlaveOffset	Y	
E	MasterScaling	Y	
E	SlaveScaling	Y	
E	StartMode	Y	
E	CamTableID	Y	
E	BufferMode	Y	
VAR_OUTPUT			
B	InSync	Y	
E	Busy	Y	
E	Active	Y	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	Y	
E	EndOfProfile	Y	

Appendix A 3.22 CamOut

If Supported	**MC_CamOut**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Slave	Y	This structure is actually a reference to 4 structures
VAR_INPUT			
B	Execute	Y	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
B	Error	Y	
E	ErrorID	Y	

Appendix A 3.23 GearIn

If Supported	**MC_GearIn**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Master	Y	This structure is actually a reference to 4 structures
B	Slave	Y	This structure is actually a reference to 4 structures
VAR_INPUT			
B	Execute	Y	
B	RatioNumerator	Y	
B	RatioDenominator	Y	
E	Acceleration	N	Master/slaves must have compatible velocities
E	Deceleration	N	
E	Jerk	N	
E	BufferMode	Y	
VAR_OUTPUT			
B	InGear	Y	
E	Busy	Y	
E	Active	Y	
E	CommandAborted	Y	
B	Error	Y	
E	ErrorID	Y	

Appendix A 3.24 GearOut

If Supported	**MC_GearOut**	Sup. Y/N	Comments
VAR_IN_OUT			
B	Slave	Y	This structure is actually a reference to 4 structures
VAR_INPUT			
B	Execute	Y	
VAR_OUTPUT			
B	Done	Y	
E	Busy	Y	
B	Error	Y	
E	ErrorID	Y	

Appendix A 3.25 Phasing

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

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

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

Figure 1: The PLCopen Motion Control Logo

This motion control logo is owned and trademarked by PLCopen.

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

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