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Motion Control and Automation Group  
Manual for standard Function Block FB\_DriveVirtual

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## DOCUMENT REVISION HISTORY

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## **1. INTRODUCTION**

The ESS Motion Control and Automation Group (MCAG) works with motion control and Automation of mainly Instruments but also have responsibility for motion control at accelerator and Target. The MCAG evaluates motion control hardware and one interesting supplier is Beckhoff Automation GmbH. Some standard function blocks have been developed in order to standardise interfaces and reduce coding efforts for the individual projects. One of the standard function blocks is called FB\_DriveVirtual. FB\_DriveVirtual handles most common motion tasks.

## **2. FUNCTIONALLITY OF FB\_DRIVEVIRTUAL**

The function block FB\_DriveVirtual handles the following motion tasks:

- Jogging
- Absolut positioning
- Relative positioning
- Modulo positioning
- Constant speed
- Homing
- Soft limit switches
- Hard limit switches
- Homing switch

The Epics interface to the motor record relies on use of one FB\_DriveVirtual for each motion axis.

## 2.1. Declaration of variables

For each axis certain variables needs to be declared, see Table 1 and Figure 1.

Table 1: Declared variables for one axis

Index	Variable	Type	Description
1	sVersion	String	Version number (for the users version control)
2	M1	FB_DriveVirtual	Motion standard function block
3	M1Link	FB_NcAxis	Connection point in PLC of motion axis (Linked to NC)
4	bLimitFwd	Bool	Forward hard limit switch (linked to I/O)
5	bLimitBwd	Bool	Backward hard limit switch (linked to I/O)
6	bHomeSensor	Bool	Homing sensor (linked to I/O)

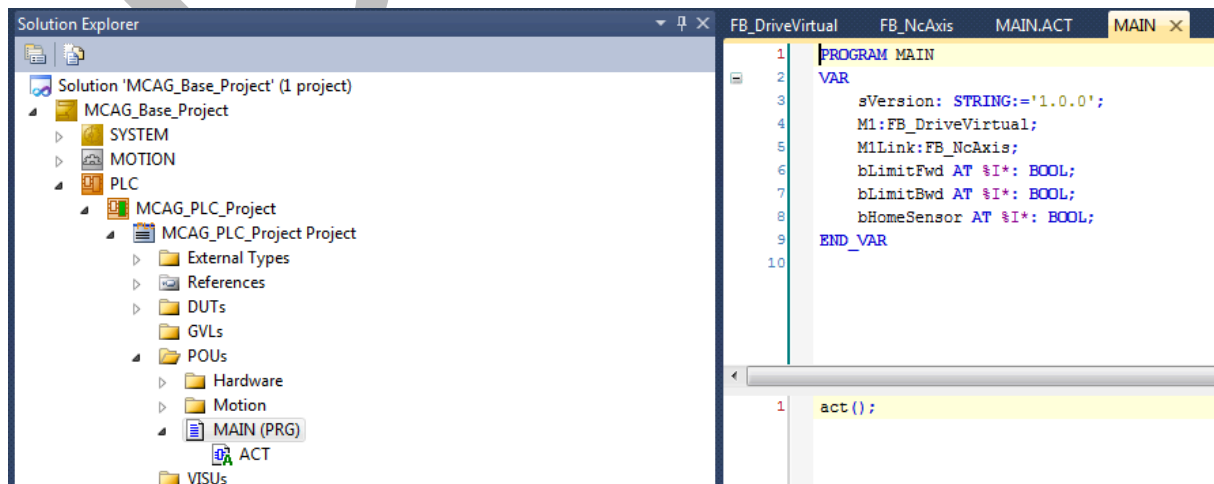


Figure 1: Declared variables for one axis

## 2.2. Execution

The call for the two FB:s are normally made in an Action that is called from the Main POU, see Figure 2.

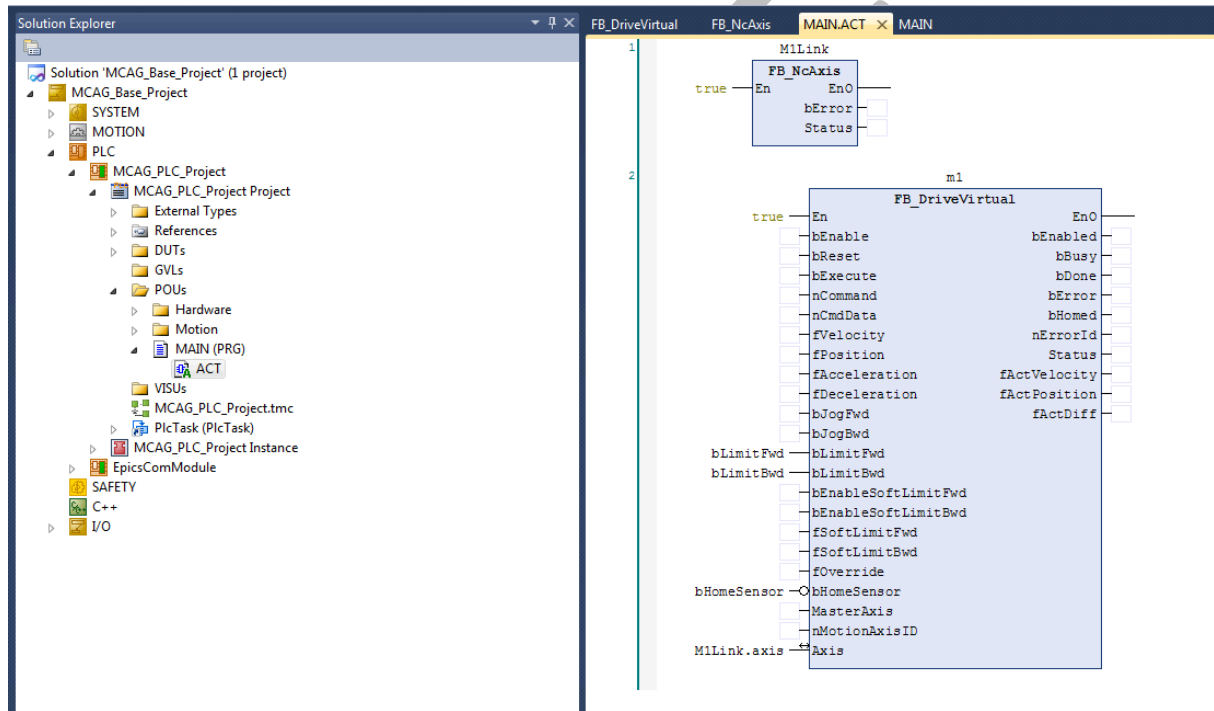


Figure 2: Call of function blocks

The variables that link to hardware need to be added as input parameters to FB\_DriveVirtual, like shown in Figure 2.

## 2.3. Input Parameters

Table 2: FB\_DriveVirtual input parameters

Index	Variable	Type	Description
1	En	BOOL	Variable needed for coding standard (always true)
2	bEnable	BOOL	Enables amplifier
3	bExecute	BOOL	Executes a command
4	nCommand	UINT	Defining the functionality of the block (see Table 3)
5	nCmdData	UINT	Parameters needed for a certain functionality (see Table 3)
6	fVelocity	LREAL	Speed setpoint
7	fPosition	LREAL	Position setpoint
8	fAcceleration	LREAL	Maximum acceleration
9	fDeceleration	LREAL	Maximum deceleration
10	bJogFwd	BOOL	Jog forward input (from software or hardware)
11	bJogBwd	BOOL	Jog backward input (from software or hardware)
12	bEnableSoftLimitFwd	BOOL	Enable forward soft limit
13	bEnableSoftLimitBwd	BOOL	Enable backward soft limit
14	fSoftLimitFwd	LREAL	Forward soft limit
15	fSoftLimitBwd	BOOL	Backward soft limit
16	fOverride	LREAL	Time scale factor for axis [%]
17	bHomeSensor	BOOL	Homing sensor input
18	MasterAxis	AXIS_REF	Link to Master Motion axis (synchronized movement)
19	Axis	AXIS_REF	Link to Motion axis in FB_NCAxis

Table 3: nCommand and corresponding available options for nCmdData

nCommand	nCmdData	Description
Jog = 0	0	Jog with slow speed (default)
	1	Jog with fast speed
	2	Jog with parameter speed
	3	Jog stepping
	4	Modulo stepping
MoveModulo = 4	0	Not allowed (default)
	1	Positive direction
	2	Shortest way
	3	Negative direction
	4	Current direction
Homing = 10	0	Default homing (default)
	4	Direct homing
	7	Set reference flag
	8	Reset reference flag
Gearing = 30	0	GearRatio Numerator/Denominator is 1:1
	1	1 = GearRatio is fVelocity



## LIST OF ABBREVIATIONS

Abbreviation	Definition
MCAG	Motion Control and Automation Group
EPICS	Experimental Physics and Industrial Control System