

maxon motor

maxon motor control	EPOS Positioning Controller
IEC 1131 VIPA Library	Edition January 2005

EPOS

Positioning Controller

Documentation

IEC 1131 VIPA Library

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3 Introduction

The CAN CPU module "VIPA 214-2CM02" from VIPA permits connection of CAN stations with the programmable controller.

This "IEC 1131 VIPA Library" documentation provides the instructions for the implemented function blocks. The library is arranged in groups of function blocks.

This library should simplify the programming of the control software based on Siemens STEP7. This library is intended to cover most applications in automation. It is based on the experience of maxon motor control. Maxon motor control certifies that to the best of their knowledge, the content of this library is correct.

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The latest edition of the "IEC 1131 VIPA Library", additional documentation and software to the EPOS positioning controller may also be found in the internet under <http://www.maxonmotor.com> category <Service>, subdirectory <Downloads>.

4 Third party products

VIPA® GmbH
Ohmstrasse 4
D-91074 Herzogenaurach
Phone: +49-9132-744-0
Fax: +49-9132-744-174

www.vipa.de

Siemens AG (PLC)

www.siemens.com

5 How to use this guide

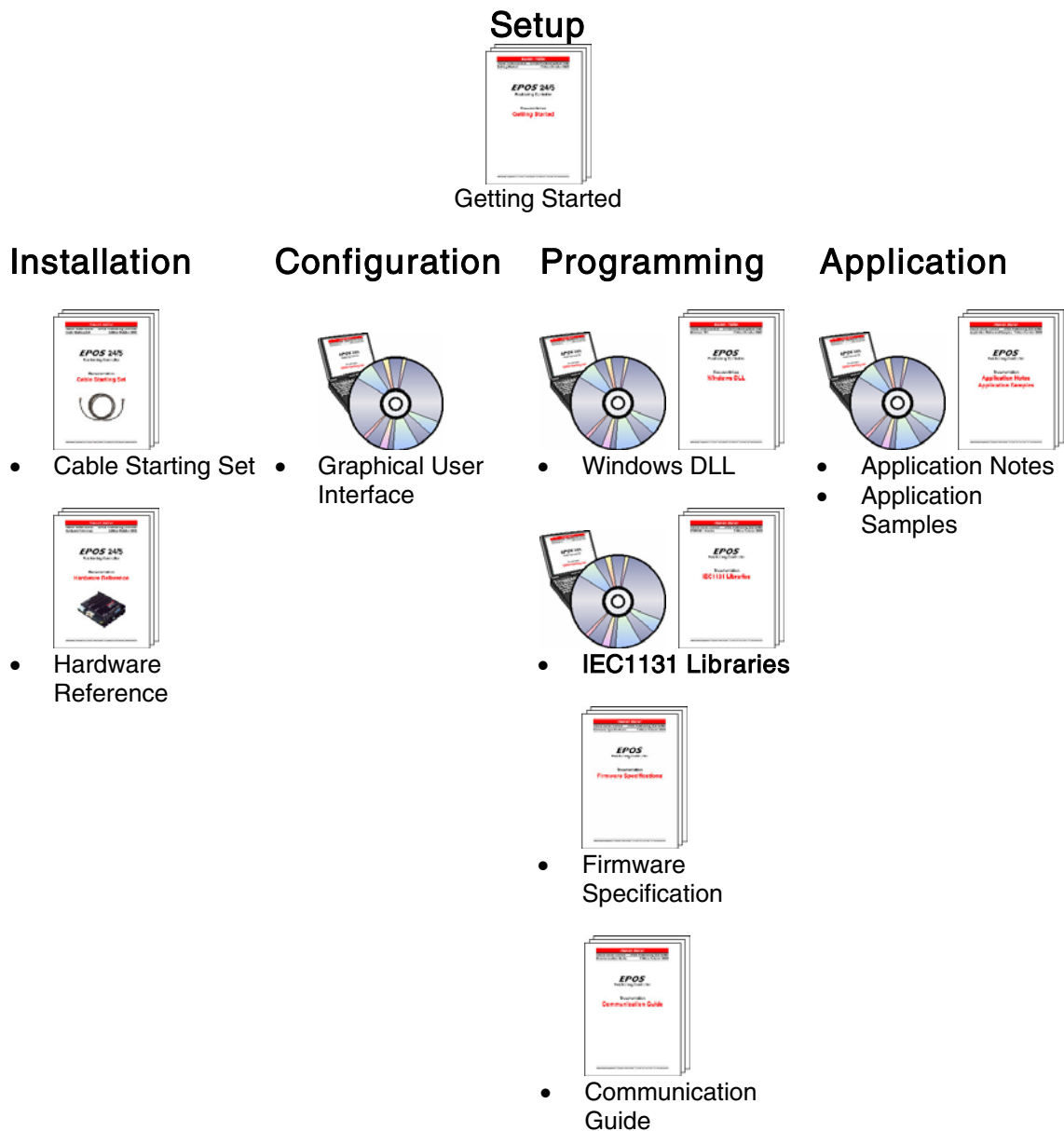


Figure 1: EPOS documentation hierarchy

6 Virtual Command Set EPOS

The Virtual Command Set defines following groups:

[Configuration](#)
[Current Mode](#)
[Homing Mode](#)
[Inputs Outputs](#)
[Motion Info](#)
[Position Mode](#)
[Profile Position Mode](#)
[Profile Velocity Mode](#)
[State Machine](#)
[Utilities](#)
[Velocity Mode](#)

6.1 Configuration

This group defines all required function blocks for device configuration:

[Get Current Regulator Gain](#)
[Get Encoder Parameter](#)
[Get Motor Parameter](#)
[Get Position Regulator Gain](#)
[Get Velocity Regulator Gain](#)
[Set Current Regulator Gain](#)
[Set Encoder Parameter](#)
[Set Motor Parameter](#)
[Set Position Regulator Gain](#)
[Set Velocity Regulator Gain](#)

6.1.1 Get Current Regulator Gain

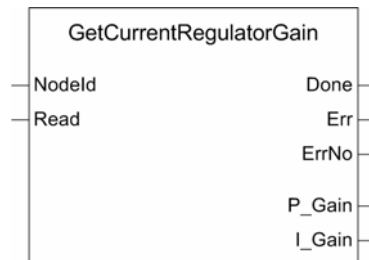


Figure 2: *GetCurrentRegulatorGain*

Description

With function block “GetCurrentRegulatorGain” it is possible to read all current regulator gains.

Parameters

NodeId	Byte	Identification ID of the addressed device (Is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
P_Gain	WORD	Current regulator P-Gain	Object: 0x60F6-01
I_Gain	WORD	Current regulator I-Gain	Object: 0x60F6-02

Related Functions

[Set Current Regulator Gain](#)

6.1.2 Get Encoder Parameter

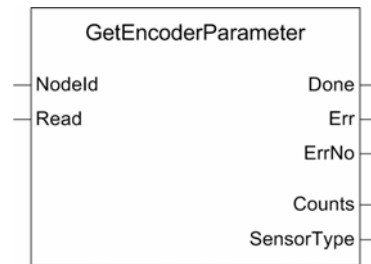


Figure 3: GetEncoderParameter

Description

With function block “GetEncoderParameter” it is possible to read all encoder parameters.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Return Values			
Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
Counts	WORD	Incremental encoder counts [pulse per turn]	Object: 0x2210-01
SensorType	WORD	Position sensor type	Object: 0x2210-02

Related Functions

[Set Encoder Parameter](#)

6.1.3 Get Motor Parameter

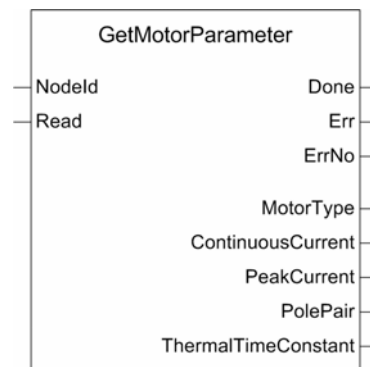


Figure 4: GetMotorParameter

Description

With function block “GetMotorParameter” it is possible to read all motor parameters.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
MotorType	WORD	Kind of motor	Object: 0x6402-00
Continuous-Current	WORD	Maximal continuous current [mA]	Object: 0x6410-01
PeakCurrent	WORD	Maximal peak current [mA]	Object: 0x6410-02
PolePair	BYTE	Number of pole pairs	Object: 0x6410-03
ThermalTime-Constant	WORD	Thermal time constant [s]	Object: 0x6410-05

Related Functions

[Set Motor Parameter](#)

6.1.4 Get Position Regulator Gain

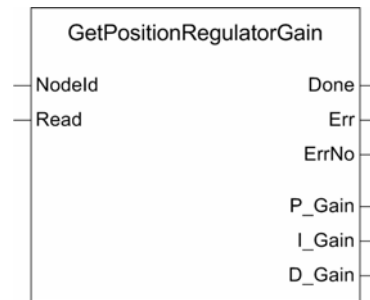


Figure 5: *GetPositionRegulatorGain*

Description

With function block “GetPositionRegulatorGain” it is possible to read all position regulator gains.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
P_Gain	WORD	Position regulator P-Gain	Object: 0x60FB-01
I_Gain	WORD	Position regulator I-Gain	Object: 0x60FB-02
D_Gain	WORD	Position regulator D-Gain	Object: 0x60FB-03

Related Functions

[Set Position Regulator Gain](#)

6.1.5 Get Velocity Regulator Gain

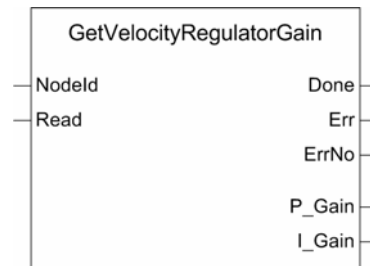


Figure 6: GetVelocityRegulatorGain

Description

With function block “GetVelocityRegulatorGain” it is possible to read all velocity regulator gains.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
P_Gain	WORD	Velocity regulator P-Gain	Object: 0x60F6-01
I_Gain	WORD	Velocity regulator I-Gain	Object: 0x60F6-02

Related Functions

[Set Velocity Regulator Gain](#)

6.1.6 Set Current Regulator Gain



Figure 7: SetCurrentRegulatorGain

Description

With function block “SetCurrentRegulatorGain” it is possible to write all current regulator gains.

Parameters

Parameters			
NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
P_Gain	WORD	Current regulator P-Gain	Object: 0x60F6-01
I_Gain	WORD	Current regulator I-Gain	Object: 0x60F6-02

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get Current Regulator Gain](#)

6.1.7 Set Encoder Parameter

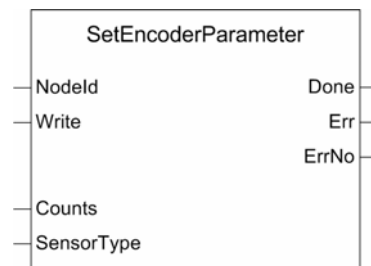


Figure 8: SetEncoderParameter

Description

With function block “SetEncoderParameter” it is possible to write all encoder parameters.

Parameters

Parameters			
NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
Counts	WORD	Incremental encoder counts [pulse per turn]	Object: 0x2210-01
SensorType	WORD	Position sensor type	Object: 0x2210-02

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get Encoder Parameter](#)

6.1.8 Set Motor Parameter

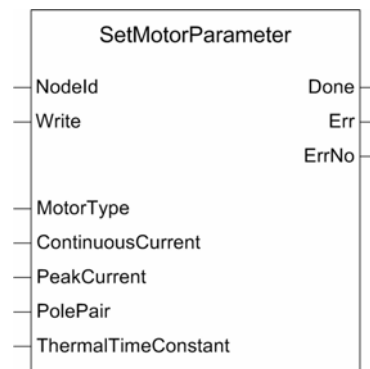


Figure 9: SetMotorParameter

Description

With function block “SetMotorParameter” it is possible to write all motor parameters.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
MotorType	WORD	Kind of motor	Object: 0x6402-00
Continuous-Current	WORD	Maximal continuous current [mA]	Object: 0x6410-01
PeakCurrent	WORD	Maximal peak current [mA]	Object: 0x6410-02
PolePair	BYTE	Number of pole pairs	Object: 0x6410-03
ThermalTime-Constant	WORD	Thermal time constant [s]	Object: 0x6410-05

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get Motor Parameter](#)

6.1.9 Set Position Regulator Gain

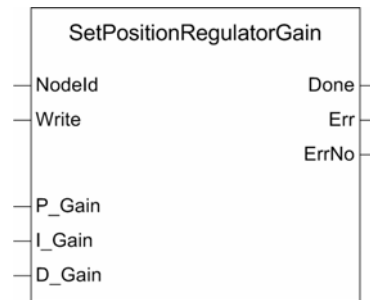


Figure 10: SetPositionRegulatorGain

Description

With function block “SetPositionRegulatorGain” it is possible to write all position regulator gains.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
P_Gain	WORD	Position regulator P-Gain	Object: 0x60FB-01
I_Gain	WORD	Position regulator I-Gain	Object: 0x60FB-02
D_Gain	WORD	Position regulator D-Gain	Object: 0x60FB-03

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get Position Regulator Gain](#)

6.1.10 Set Velocity Regulator Gain



Figure 11: SetVelocityRegulatorGain

Description

With function block “SetVelocityRegulatorGain” it is possible to write all velocity regulator gains.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
P_Gain	WORD	Velocity regulator P-Gain	Object: 0x60F6-01
I_Gain	WORD	Velocity Regulator I-Gain	Object: 0x60F6-02

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get Velocity Regulator Gain](#)

6.2 Current Mode

This group defines all required function blocks for Current Mode:

[Get Current Must](#)
[Set Current Must](#)

6.2.1 Get Current Must

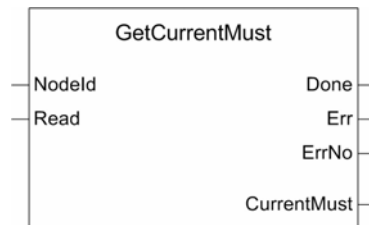


Figure 12: GetCurrentMust

Description

With function block “GetCurrentMust” it is possible to read the current mode demand value.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Return Values			
Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
CurrentMust	WORD	Current mode demand value [mA]	Object: 0x2030-00

Related Functions

[Set Current Must](#)

6.2.2 Set Current Must

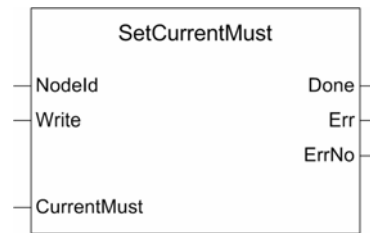


Figure 13: SetCurrentMust

Description

With function block “SetCurrentMust” it is possible to write current mode demand value.

Parameters

Parameters			
NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
CurrentMust	WORD	Current mode demand value [mA]	Object: 0x2030-00

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get Current Must](#)

6.3 Homing Mode

This group defines all required function blocks for Homing Mode:

[Find Home](#)
[Get Homing Parameter](#)
[Set Homing Parameter](#)
[Stop Homing](#)

6.3.1 Find Home

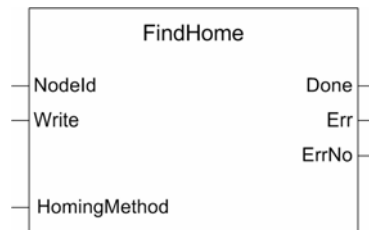


Figure 14: FindHome

Description

With function block “FindHome” and the parameter “HomingMethod” it is possible to find the system home. For example limit switch.

Parameters

Parameters			
NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
HomingMethod	INT	Homing method	Object: 0x6098-00

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Set Homing Parameter](#)
[Stop Homing](#)

6.3.2 Get Homing Parameter

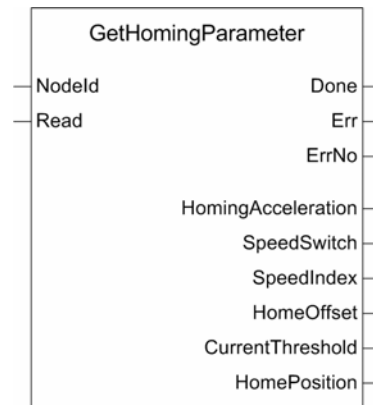


Figure 15: GetHomingParameter

Description

With function block “GetHomingParameter” it is possible to read all homing parameters.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Return Values			
Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
Homing-Acceleration	DWORD	Acceleration for homing profile [rpm/s]	Object: 0x609A-00
SpeedSwitch	DWORD	Speed during search for switch [rpm]	Object: 0x6099-01
SpeedIndex	DWORD	Speed during search for index signal [rpm]	Object: 0x6099-02
HomeOffset	DINT	Home offset after homing [qc]	Object: 0x607C-00
Current-Threshold	WORD	Current threshold for homing method -3 and -4 [mA]	Object: 0x2080-00
HomePosition	DINT	Home position value [qc]	Object: 0x2081-00

Related Functions

[Find Home](#)
[Stop Homing](#)
[Set Homing Parameter](#)

6.3.3 Set Homing Parameter

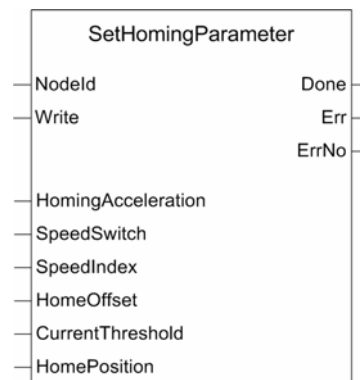


Figure 16: SetHomingParameter

Description

With function block “SetHomingParameter” it is possible to write all homing parameters.

Parameters

Parameters			
NoId	Byte	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
Homing- Acceleration	DWORD	Acceleration for homing profile [rpm/s]	Object: 0x609A-00
SpeedSwitch	DWORD	Speed during search for switch [rpm]	Object: 0x6099-01
SpeedIndex	DWORD	Speed during search for index signal [rpm]	Object: 0x6099-02
HomeOffset	DINT	Home offset after homing [qc]	Object: 0x607C-00
Current- Threshold	WORD	Current threshold for homing method -3 and -4 [mA]	Object: 0x2080-00
HomePosition	DINT	Assign the current Homing position with this value [qc]	Object: 0x2081-00

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Find Home](#)
[Stop Homing](#)
[Get Homing Parameter](#)

6.3.4 Stop Homing



Figure 17: StopHoming

Description

“StopHoming” interrupts homing.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Write	BOOL	A positive edge at input Write starts writing

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Find Home](#)

[Set Homing Parameter](#)

6.4 Inputs Outputs

This group defines all required function blocks for inputs and outputs:

[Get All Digital Inputs](#)
[Get All Digital Outputs](#)
[Get Analog Input](#)
[Set All Digital Outputs](#)

6.4.1 Get All Digital Inputs

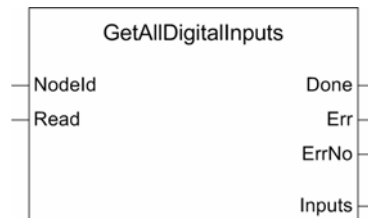


Figure 18: GetAllDigitalInputs

Description

“GetAllDigitalInputs” returns the state of the digital inputs.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
Inputs	WORD	State of all digital inputs	Object: 0x2071-01

6.4.2 Get All Digital Outputs

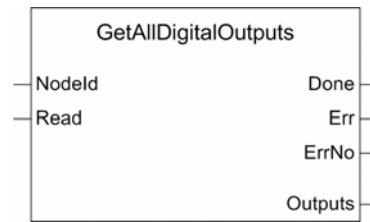


Figure 19: GetAllDigitalOutputs

Description

“GetAllDigitalOutputs” returns the state of all digital outputs.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
Output	WORD	State of all digital outputs	Object: 0x2078-01

Related Functions

[Set All Digital Outputs](#)

[Set Homing Parameter](#)

6.4.3 Get Analog Input

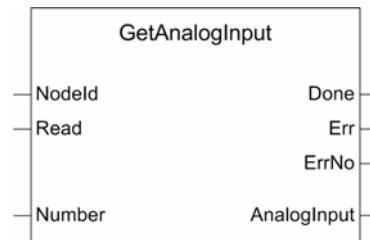


Figure 20: GetAnalogInput

Description

“GetAnalogInput” returns the state of the analog input.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading
Number	DWORD	Number of the analog input

Return Values

Return Values			
Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
AnalogInput	WORD	Value of the analog input [mV]	Object: 0x207C-01 or 0x207C-02

[Set Homing Parameter](#)

6.4.4 Set All Digital Outputs

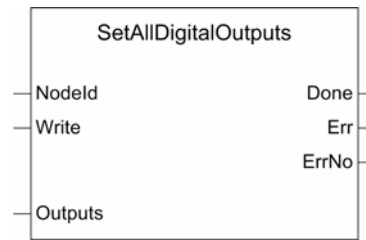


Figure 21: SetAllDigitalOutputs

Description

“SetAllDigitalOutputs” sets the state of all digital outputs.

Parameters

Parameters			
NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
Outputs	WORD	Sets all digital outputs	Object: 0x2078-01

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get All Digital Outputs](#)

[Set Homing Parameter](#)

6.5 Motion Info

This group defines all required function blocks for motion information:

[Get Current Is](#)
[Get Movement State](#)
[Get Position Is](#)
[Get Velocity Is](#)

6.5.1 Get Current Is

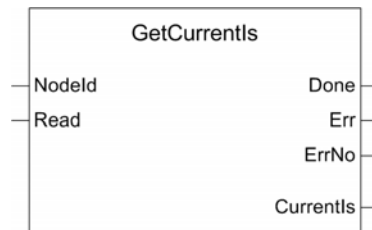


Figure 22: GetCurrentIs

Description

“GetCurrentIs” returns the current actual value.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
CurrentIs	INT	Current actual value [mA]	Object: 0x6078-00

Related Functions

[Get Movement State](#)
[Get Position Is](#)
[Get Velocity Is](#)
[Get Current Must](#)
[Set Current Must](#)

6.5.2 Get Movement State

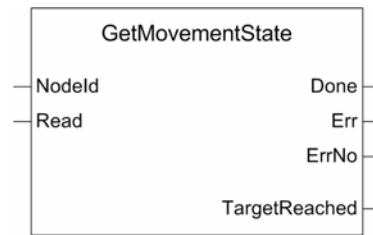


Figure 23: GetMovementState

Description

With “GetMovementState” it is possible to check, if drive has reached the target.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Done	BOOL	True if reading is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information
TargetReached	BOOL	The drive has reached the target

Related Functions

[Get Current Is](#)
[Get Position Is](#)
[Get Velocity Is](#)

6.5.3 Get Position Is

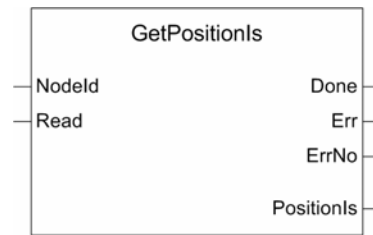


Figure 24: *GetPositionIs*

Description

“GetPositionIs” returns the position actual value.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
PositionIs	DINT	Position actual value [qc]	Object: 0x6064-00

Related Functions

[Get Current Is](#)
[Get Movement State](#)
[Get Velocity Is](#)
[Get Position Must](#)
[Set Position Must](#)

6.5.4 Get Velocity Is

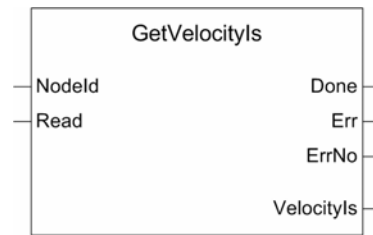


Figure 25: GetVelocityIs

Description

“GetVelocityIs” reads the velocity actual value.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Done	BOOL	True if reading is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information
VelocityIs	DINT	Velocity actual value averaged [rpm]
		Object: 0x2028-00

Related Functions

[Get Current Is](#)
[Get Movement State](#)
[Get Position Is](#)
[Get Velocity Must](#)
[Set Velocity Must](#)

6.6 Position Mode

This group defines all required function blocks for position mode:

[Get Position Must](#)
[Set Position Must](#)

6.6.1 Get Position Must



Figure 26: *GetPositionMust*

Description

“GetPositionMust” returns the position demand value.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
PositionMust	DINT	Position demand value [qc]	Object: 0x2062-00

Related Functions

[Get Position Is](#)
[Set Position Must](#)

6.6.2 Set Position Must

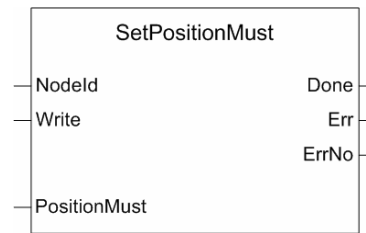


Figure 27: SetPositionMust

Description

“SetPositionMust” sets the position demand value.

Parameters

Parameters			
NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
PositionMust	DINT	Position demand value [qc]	Object: 0x2062-00

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get Position Is](#)
[Get Position Must](#)

6.7 Profile Position Mode

This group defines all required function blocks for profile position mode:

[Get Position Profile](#)
[Get Target Position](#)
[Halt Position Movement](#)
[Move To Position](#)
[Set Position Profile](#)

6.7.1 Get Position Profile

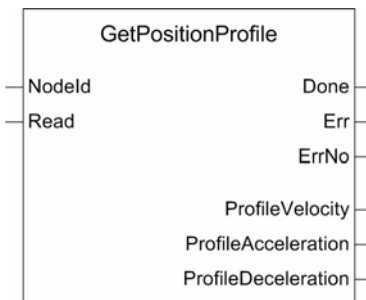


Figure 28: GetPositionProfile

Description

“GetPositionProfile” returns the position profile mode parameters.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Return Values			
Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
Profile-Velocity	DWORD	Position profile velocity [rpm]	Object: 0x6081-00
Profile-Acceleration	DWORD	Position profile acceleration [rpm/s]	Object: 0x6083-00
Profile-Deceleration	DWORD	Position profile deceleration [rpm/s]	Object: 0x6084-00

Related Functions

[Get Target Position](#)
[Halt Position Movement](#)
[Move To Position](#)
[Set Position Profile](#)

6.7.2 Get Target Position



Figure 29: GetTargetPosition

Description

“GetTargetPosition” returns the profile position mode target value.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
TargetPosition	DINT	Target position [qc]	Object: 0x607A-00

Related Functions

[Get Position Profile](#)
[Halt Position Movement](#)
[Move To Position](#)
[Set Position Profile](#)

6.7.3 Halt Position Movement



Figure 30: HaltPositionMovement

Description

With function block “HaltPositionMovement” movement stops with profile deceleration.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Write	BOOL	A positive edge at input Write starts writing

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get Position Profile](#)
[Get Target Position](#)
[Move To Position](#)
[Set Position Profile](#)

6.7.4 Move To Position

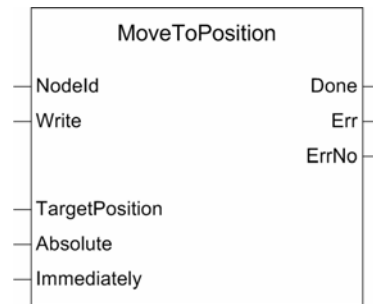


Figure 31: MoveToPosition

Description

With function block “MoveToPosition” device movement starts with position profile to target position.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
TargetPosition	DINT	Target Position [qc]	Object: 0x607A-00
Absolute	BOOL	TRUE starts an absolute, FALSE a relative movement	
Immediately	BOOL	TRUE starts immediately FALSE waits to end of last positioning	

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get Position Profile](#)
[Get Target Position](#)
[Halt Position Movement](#)
[Set Position Profile](#)

6.7.5 Set Position Profile

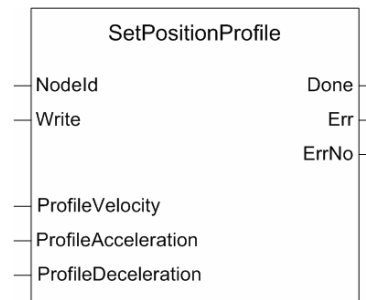


Figure 32: SetPositionProfile

Description

“SetPositionProfile” sets the position profile parameters.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
Profile- Velocity	DWORD	Position profile velocity [rpm]	Object: 0x6081-00
Profile- Acceleration	DWORD	Position profile acceleration [rpm/s]	Object: 0x6083-00
Profile- Deceleration	DWORD	Position profile deceleration [rpm/s]	Object: 0x6084-00

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get Position Profile](#)
[Get Target Position](#)
[Halt Position Movement](#)
[Move To Position](#)

6.8 Profile Velocity Mode

This group defines all required function blocks for profile velocity mode:

[Get Target Velocity](#)
[Get Velocity Profile](#)
[Halt Velocity Movement](#)
[Move With Velocity](#)
[Set Velocity Profile](#)

6.8.1 Get Target Velocity

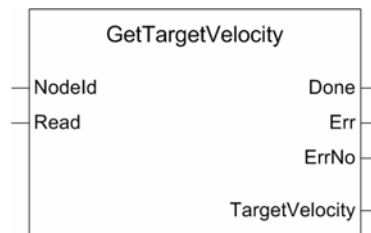


Figure 33: GetTargetVelocity

Description

“GetTargetVelocity” returns the profile velocity mode target value.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Return Values			
Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
TargetVelocity	DINT	Target velocity [rpm]	Object: 0x60FF-00

Related Functions

[Get Velocity Profile](#)
[Halt Velocity Movement](#)
[Move With Velocity](#)
[Set Velocity Profile](#)

6.8.2 Get Velocity Profile

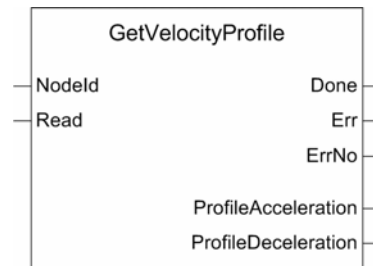


Figure 34: GetVelocityProfile

Description

“GetVelocityProfile” returns the velocity profile parameters.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
Profile-Acceleration	DWORD	Velocity profile acceleration [rpm/s]	Object: 0x6083-00
Profile-Deceleration	DWORD	Velocity profile deceleration [rpm/s]	Object: 0x6084-00

Related Functions

[Get Target Velocity](#)
[Halt Velocity Movement](#)
[Move With Velocity](#)
[Set Velocity Profile](#)

6.8.3 Halt Velocity Movement

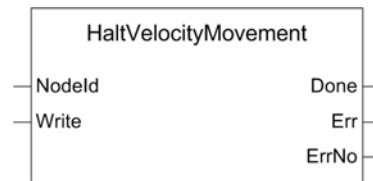


Figure 35: HaltVelocityMovement

Description

With function block “HaltVelocityMovement” movement stops with profile deceleration.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Write	BOOL	A positive edge at input Write starts writing

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get Target Velocity](#)
[Get Velocity Profile](#)
[Move With Velocity](#)
[Set Velocity Profile](#)

6.8.4 Move With Velocity

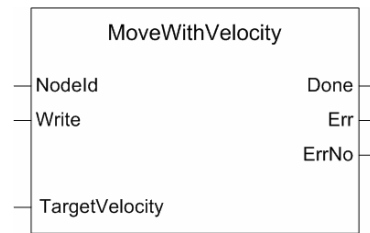


Figure 36: MoveWithVelocity

Description

With function block “MoveWithVelocity” device movement starts with velocity profile to target velocity.

Parameters

Parameters			
NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
Target-Velocity	DINT	Target velocity [rpm]	Object: 0x60FF-00

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get Target Velocity](#)
[Get Velocity Profile](#)
[Halt Velocity Movement](#)
[Set Velocity Profile](#)

6.8.5 Set Velocity Profile

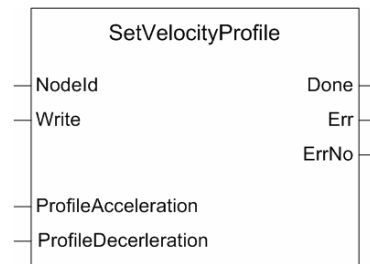


Figure 37: SetVelocityProfile

Description

“SetVelocityProfile” sets the velocity profile parameters.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
Profile- Acceleration	DWORD	Velocity profile acceleration [rpm/s]	Object: 0x6083-00
Profile- Deceleration	DWORD	Velocity profile deceleration [rpm/s]	Object: 0x6084-00

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get Target Velocity](#)
[Get Velocity Profile](#)
[Halt Velocity Movement](#)
[Move With Velocity](#)

6.9 State Machine

For detailed information how the state machine functions refer to document "Firmware Specification".

This group defines all required function blocks for device state machine:

[Clear Fault](#)
[Get Disable State](#)
[Get Enable State](#)
[Get Fault State](#)
[Get Operation Mode](#)
[Get Quick Stop State](#)
[Set Disable State](#)
[Set Enable State](#)
[Set Operation Mode](#)
[Set Quick Stop State](#)

6.9.1 Clear Fault

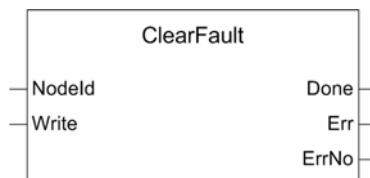


Figure 38: ClearFault

Description

With function block "ClearFault" the device changes from fault state to disable state.

Parameters

NodeId	Byte	Identification ID of the addressed device (Is given from hardware switches)
Write	BOOL	A positive edge at input Write starts writing

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get Disable State](#)
[Get Enable State](#)
[Get Fault State](#)
[Get Quick Stop State](#)
[Set Disable State](#)
[Set Enable State](#)
[Set Quick Stop State](#)

6.9.2 Get Disable State



Figure 39: GetDisableState

Description

The function block “GetDisableState” returns the device state disable (IsDisabled = TRUE).

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Done	BOOL	True if reading is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information
IsDisabled	BOOL	Device disable state

Related Functions

[Clear Fault](#)
[Get Enable State](#)
[Get Fault State](#)
[Get Quick Stop State](#)
[Set Disable State](#)
[Set Enable State](#)
[Set Quick Stop State](#)

6.9.3 Get Enable State



Figure 40: GetEnableState

Description

The function block “GetEnableState” returns the device state enable (IsEnabled = TRUE).

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Done	BOOL	True if reading is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information
IsEnabled	BOOL	Device enable state

Related Functions

[Clear Fault](#)
[Get Disable State](#)
[Get Fault State](#)
[Get Quick Stop State](#)
[Set Disable State](#)
[Set Enable State](#)
[Set Quick Stop State](#)

6.9.4 Get Fault State

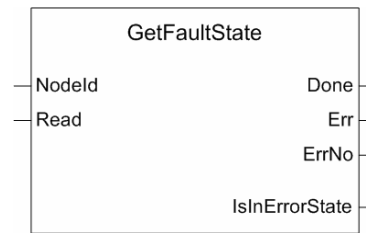


Figure 41: GetFaultState

Description

The function block “GetFaultState” returns the device state fault (IsInErrorState = TRUE).

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Done	BOOL	True if reading is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information
IsInErrorState	BOOL	Device fault state

Related Functions

[Clear Fault](#)
[Get Disable State](#)
[Get Enable State](#)
[Get Quick Stop State](#)
[Set Disable State](#)
[Set Enable State](#)
[Set Quick Stop State](#)

6.9.5 Get Operation Mode

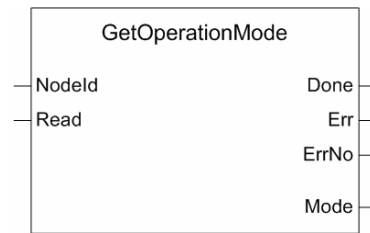


Figure 42: GetOperationMode

Description

“GetOperationMode” returns the operation mode.

Value	Mode
6 (06h)	Homing Mode
3 (03h)	Profile Velocity Mode
1 (01h)	Profile Position Mode
-1 (FFh)	Position Mode
-2 (FEh)	Velocity Mode
-3 (FDh)	Current Mode
-5 (FBh)	Master Encoder Mode
-6 (FAh)	Step/Direction Mode

Table 1: Operation modes

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Done	BOOL	True if reading is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information
Mode	BYTE	Operation Mode
		Object: 0x6061-00

Related Functions

[Set Operation Mode](#)

6.9.6 Get Quick Stop State

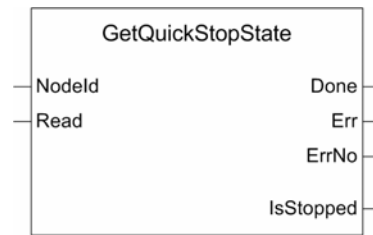


Figure 43: GetQuickStopState

Description

“GetQuickStopState” returns the device state quick stop (IsStopped = TRUE).

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Done	BOOL	True if reading is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information
IsStopped	BOOL	Device quick stop state

Related Functions

[Clear Fault](#)
[Get Disable State](#)
[Get Enable State](#)
[Get Fault State](#)
[Set Disable State](#)
[Set Enable State](#)
[Set Quick Stop State](#)

6.9.7 Set Disable State



Figure 44: SetDisableState

Description

With function block “SetDisableState” changes the device to disable state.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Write	BOOL	A positive edge at input Write starts writing

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Clear Fault](#)
[Get Disable State](#)
[Get Enable State](#)
[Get Fault State](#)
[Get Quick Stop State](#)
[Set Enable State](#)
[Set Quick Stop State](#)

6.9.8 Set Enable State

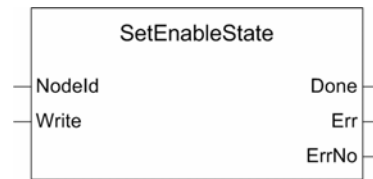


Figure 45: SetEnableState

Description

With function block “SetEnableState” the device changes to enable state.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Write	BOOL	A positive edge at input Write starts writing

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Clear Fault](#)
[Get Disable State](#)
[Get Enable State](#)
[Get Fault State](#)
[Get Quick Stop State](#)
[Set Disable State](#)
[Set Quick Stop State](#)

6.9.9 Set Operation Mode

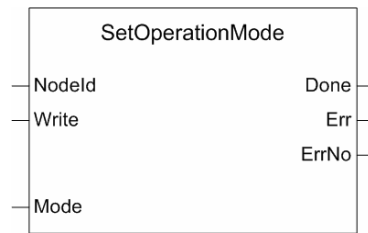


Figure 46: SetOperationMode

Description

“SetOperationMode” sets the operation mode. Variable ‘Mode’ can have the following values:

Value	Mode
6 (06h)	Homing Mode
3 (03h)	Profile Velocity Mode
1 (01h)	Profile Position Mode
-1 (FFh)	Position Mode
-2 (FEh)	Velocity Mode
-3 (FDh)	Current Mode
-5 (FBh)	Master Encoder Mode
-6 (FAh)	Step/Direction Mode

Table 2: Operation modes

Parameters

Parameters			
NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
Mode	BYTE	Operation Mode	Object: 0x6060-00

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get Operation Mode](#)

6.9.10 Set Quick Stop State



Figure 47: SetQuickStopState

Description

With function block “SetQuickStopState” the device changes to quick stop state.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Write	BOOL	A positive edge at input Write starts writing

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Clear Fault](#)
[Get Disable State](#)
[Get Enable State](#)
[Get Fault State](#)
[Get Quick Stop State](#)
[Set Disable State](#)
[Set Enable State](#)

6.10 Utilities

This group defines all function blocks which do not fall in the other groups:

[Get Object](#)
[Get Version](#)
[Restore](#)
[Set Object](#)
[Store](#)

6.10.1 Get Object

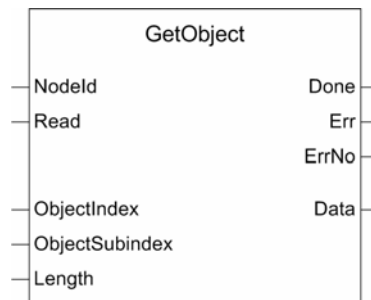


Figure 48: *GetObject*

Description

“GetObject” returns the object Data field. Function only for a maximum data length of four bytes!

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading
ObjectIndex	WORD	Object index
ObjectSubindex	BYTE	Object sub index
Length	BYTE	Object length to read (1, 2 or 4 bytes)

Return Values

Done	BOOL	True if reading is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information
Data	DINT	Object Data

Related Functions

[Get Version](#)
[Restore](#)
[Set Object](#)
[Store](#)

6.10.2 Get Version

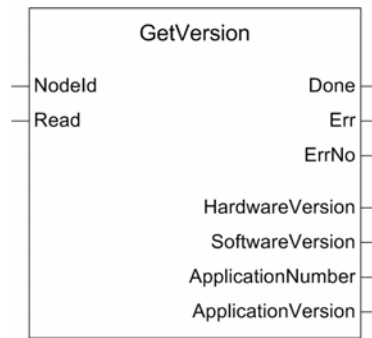


Figure 49: GetVersion

Description

“GetVersion” returns the Firmware Version.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
Hardware-Version	WORD	Hardware version	Object: 0x2003-01
Software-Version	WORD	Software version	Object: 0x2003-02
Application-Number	WORD	Application number	Object: 0x2003-03
Application-Version	WORD	Application version	Object: 0x2003-04

Related Functions

[Get Object](#)

[Restore](#)

[Set Object](#)

[Store](#)

6.10.3 Restore



Figure 50: Restore

Description

“Restore” restores all default parameters.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Write	BOOL	A positive edge at input Write starts writing

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get Object](#)
[Get Version](#)
[Set Object](#)
[Store](#)

6.10.4 Set Object

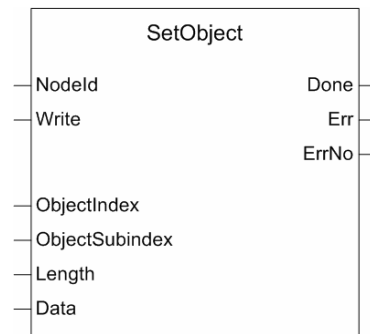


Figure 51: SetObject

Description

“SetObject” writes to an object Data field. Function only for a maximum data length of four bytes!

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Write	BOOL	A positive edge at input Write starts writing
ObjectIndex	WORD	Object index
ObjectSubindex	BYTE	Object sub index
Length	BYTE	Object length (1, 2 or 4 bytes)
Data	DINT	Object data

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get Object](#)
[Get Version](#)
[Restore](#)
[Store](#)

6.10.5 Store



Figure 52: Store

Description

“Store” saves all parameters.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Write	BOOL	A positive edge at input Write starts writing

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get Object](#)
[Get Version](#)
[Restore](#)
[Set Object](#)

6.11 Velocity Mode

This group defines all required function blocks for velocity mode:

[Get Velocity Must](#)
[Set Velocity Must](#)

6.11.1 Get Velocity Must

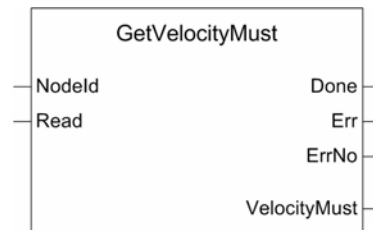


Figure 53: GetVelocityMust

Description

“GetVelocityMust” returns the position demand value.

Parameters

NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Return Values			
Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
VelocityMust	DINT	Velocity demand value [rpm]	Object: 0x206B-00

Related Functions

[Get Velocity Is](#)
[Set Velocity Must](#)

6.11.2 Set Velocity Must

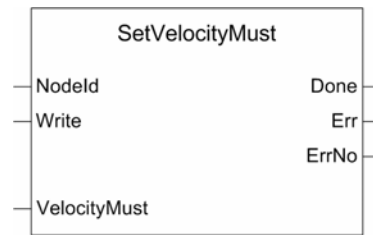


Figure 54: SetVelocityMust

Description

“SetVelocityMust” sets the velocity demand value.

Parameters

Parameters			
NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
VelocityMust	DINT	Velocity demand value [rpm]	Object: 0x206B-00

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

Related Functions

[Get Velocity Is](#)

[Get Velocity Must](#)

7 Appendix

7.1 Table of function blocks

Configuration

FB11: Get Current Regulator Gain
 FB12: Get Encoder Parameter
 FB13: Get Motor Parameter
 FB14: Get Position Regulator Gain
 FB15: Get Velocity Regulator Gain
 FB16: Set Current Regulator Gain
 FB17: Set Encoder Parameter
 FB18: Set Motor Parameter
 FB19: Set Position Regulator Gain
 FB20: Set Velocity Regulator Gain

Current Mode

FB21: Get Current Must
 FB22: Set Current Must

Homing Mode

FB31: Find Home
 FB32: Get Homing Parameter
 FB33: Set Homing Parameter
 FB34: Stop Homing

I/O Mode

FB41: Get All Digital Inputs
 FB42: Get All Digital Outputs
 FB43: Get Analog Input
 FB44: Set All Digital Outputs

Motion Info

FB51: Get Current Is
 FB52: Get Movement State
 FB53: Get Position Is
 FB54: Get Velocity Is

Position Mode

FB61: Get Position Must
 FB62: Set Position Must

Profile Position Mode

FB71: Get Position Profile
 FB72: Get Target Position
 FB73: Halt Position Movement
 FB74: Move To Position
 FB75: Set Position Profile

Profile Velocity Mode

FB81: Get Target Velocity
 FB82: Get Velocity Profile
 FB83: Halt Velocity Movement
 FB84: Move With Velocity
 FB85: Set Velocity Profile

State Machine

FB91: Clear Fault
 FB92: Get Disable State
 FB93: Get Enable State
 FB94: Get Fault State
 FB95: Get Operation Mode
 FB96: Get Quick Stop State
 FB97: Set Disable State
 FB98: Set Enable State
 FB99: Set Operation Mode
 FB100: Set Quick Stop State

Utilities

FB101: Get Object
 FB102: Get Version
 FB103: Restore
 FB104: Set Object
 FB105: Store

Velocity Mode

FB111: Get Velocity Must
 FB112: Set Velocity Must

7.2 Version History

Date	Version	Documentation	Description
02.06.2004	0.10	Edition June 2004	• Documentation to first Library Version
18.01.2005	0.10	Edition January 05	• Bug fix documentation