EPOS2

Positioning Controller

Documentation

IEC 61131 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 61131 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 61131 VIPA Library", additional documentation and software to the EPOS2 positioning controller may also be found on the internet under http://shop.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
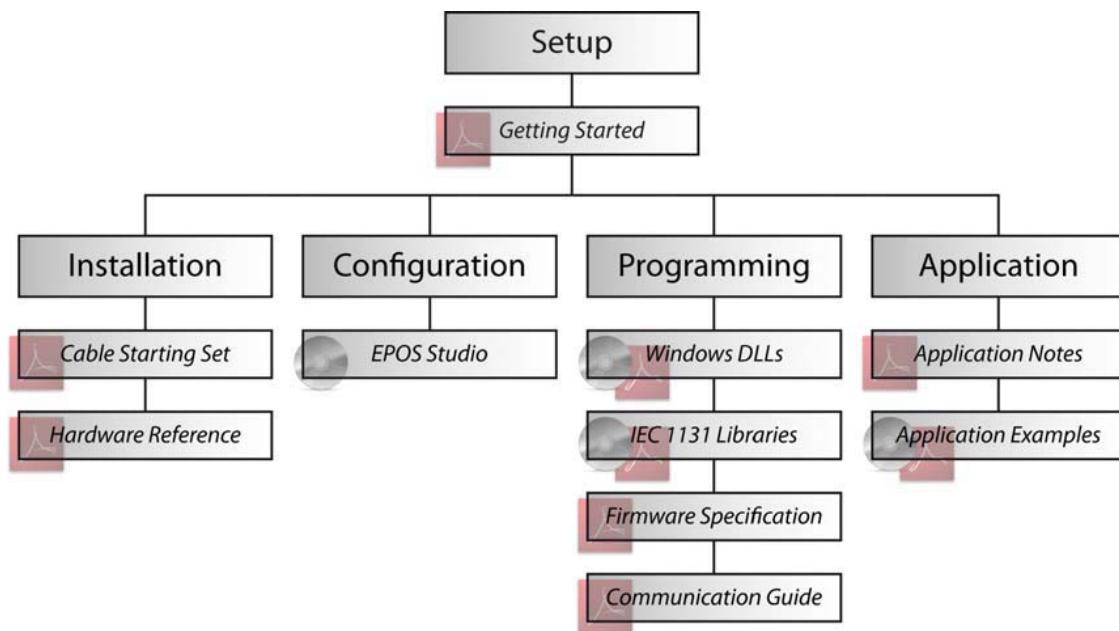
Figure 1: EPOS2 documentation hierarchy

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
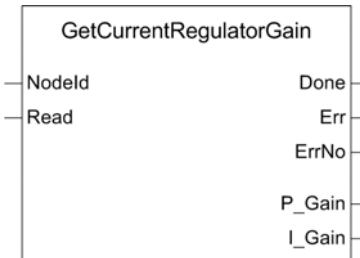
Figure 2: GetCurrentRegulatorGain

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
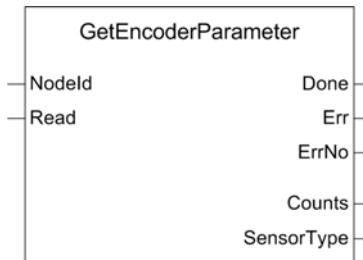
Return Values

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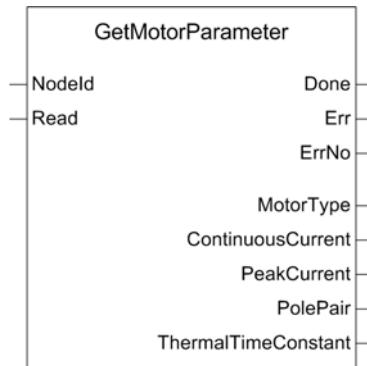
Return Values
Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
Counts	DWORD	Incremental encoder counts [pulse per turn]	Object: 0x2210-01
SensorType	WORD	Position sensor type	Object: 0x2210-02

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
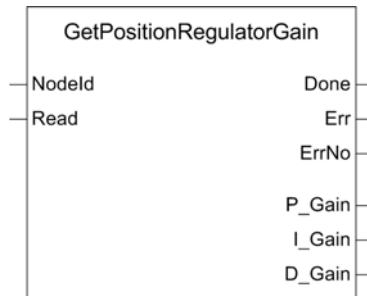
Figure 5: GetPositionRegulatorGain

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
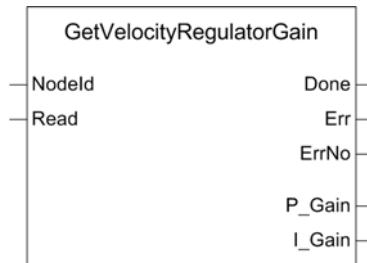
Return Values

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

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
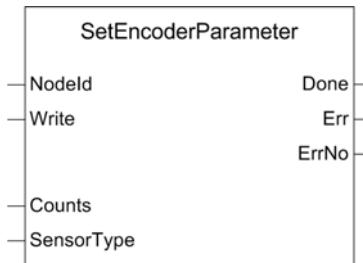
Return Values

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

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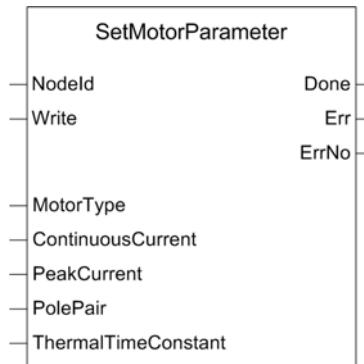
Return Values

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

```
        SetVelocityRegulatorGain

 — NodeId                      Done —
 — Write                         Err —
                               ErrNo —

 — P_Gain
 — I_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
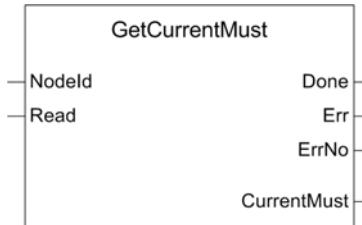
Figure 12: GetCurrentMust

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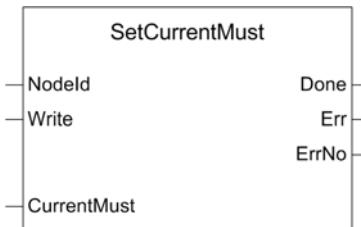
Return Values
Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
CurrentMust	WORD	Current mode demand value [mA]	Object: 0x2030-00

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

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
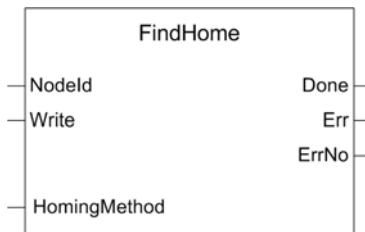
Figure 14: FindHome

Description

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

Parameters

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
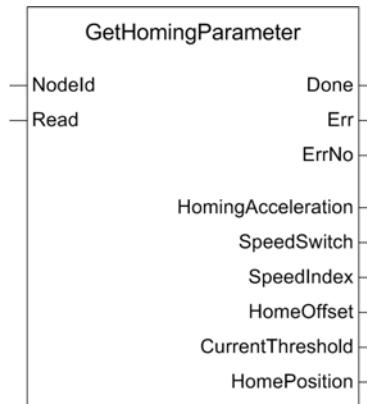
Return Values

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
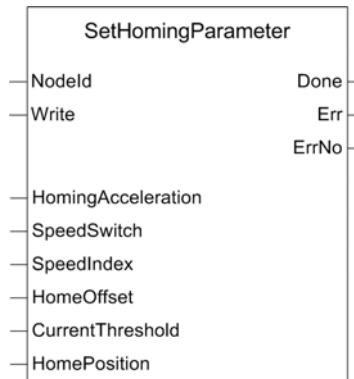
Return Values

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

NodeId	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
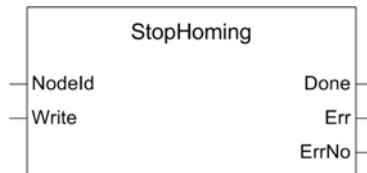
Figure 17: StopHoming

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
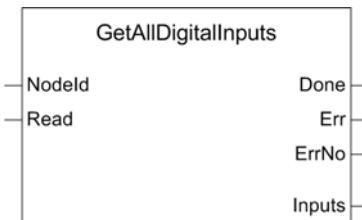
Figure 18: GetAllDigitalInputs

Description

"GetAllDigitalInputs" returns the state of the digital inputs.
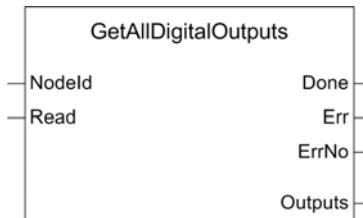
Parameters

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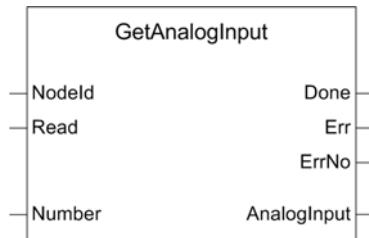
Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
Output	WORD	State of all digital outputs	Object: 0x2078-01

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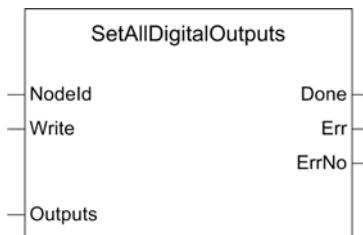
NodeId	Byte	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading
Number	DWORD	Number of the analog input

Return Values

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

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
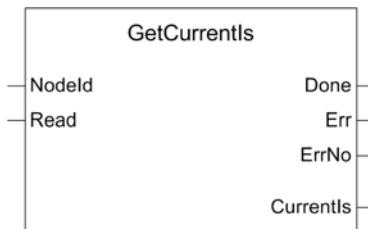
Figure 22: GetCurrentIs

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
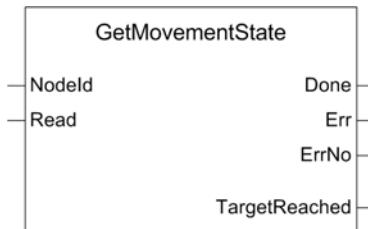
Return Values

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
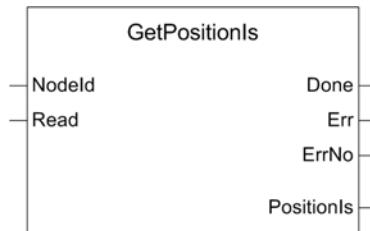
Related Functions
Get Current Is
Get Position Is
Get Velocity Is

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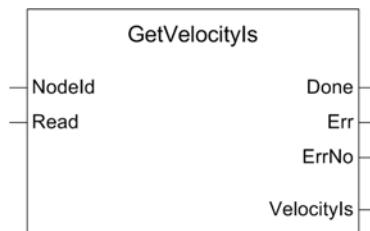
Return Values
Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
PositionIs	DINT	Position actual value [qc]	Object: 0x6064-00

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:

6.6.1 Get Position Must


```
         GetPositionMust

    NodeId                    Done
    Read                       Err
                             ErrNo

                        PositionMust
```

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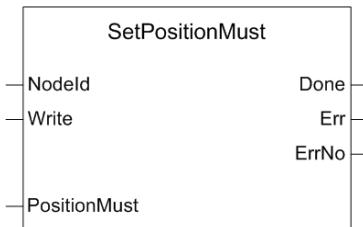
Return Values
Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	DINT	Error information	
PositionMust	DINT	Position demand value [qc]	Object: 0x2062-00

Related Functions

6.6.2 Set Position Must

Figure 27: SetPositionMust

Description
"SetPositionMust" sets the position demand value.

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
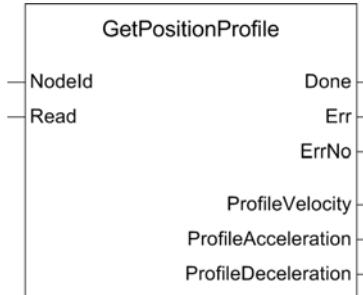
Figure 28: GetPositionProfile

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
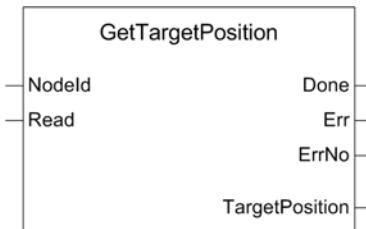
Return Values

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
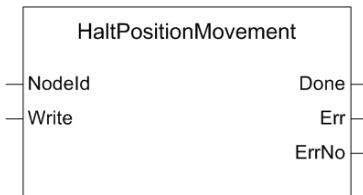
Figure 30: HaltPositionMovement

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
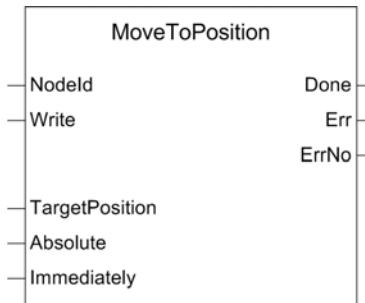
Figure 31: MoveToPosition

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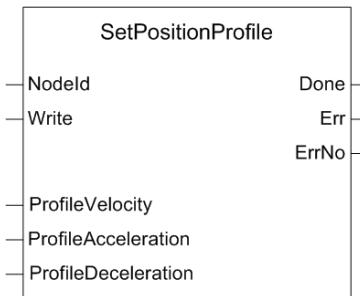
Return Values
Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information

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
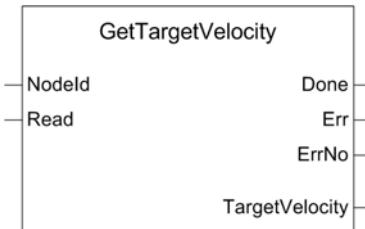
Figure 33: GetTargetVelocity

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
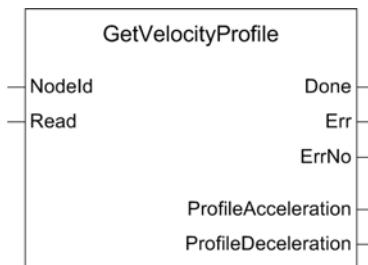
Return Values

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
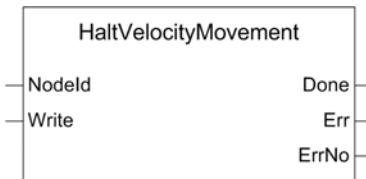
Figure 35: HaltVelocityMovement

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
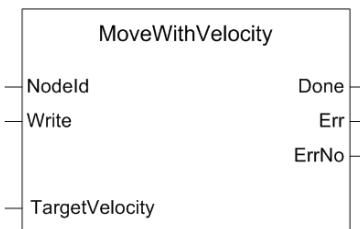
Related Functions
Get Target Velocity
Get Velocity Profile
Move With Velocity
Set Velocity Profile

6.8.4 Move With Velocity

Figure 36: MoveWithVelocity

Description
With function block "MoveWithVelocity" device movement starts with velocity profile to target velocity.

Parameters

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
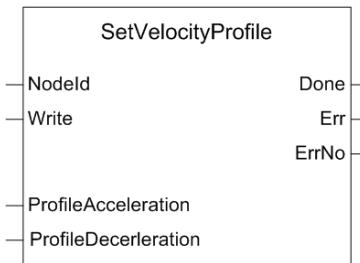
Return Values

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
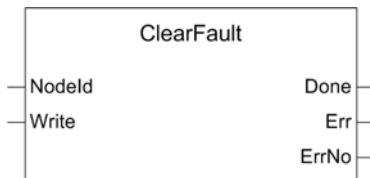
Figure 38: ClearFault

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
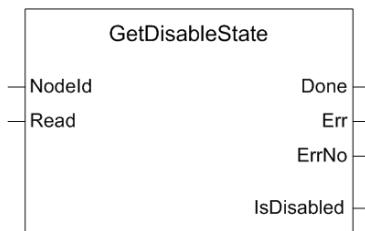
Return Values

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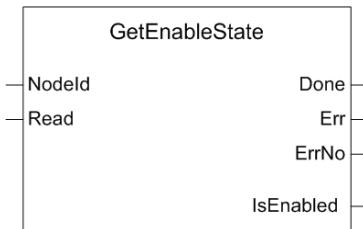
Return Values
Done	BOOL	True if reading is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information
IsDisabled	BOOL	Device disable state

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
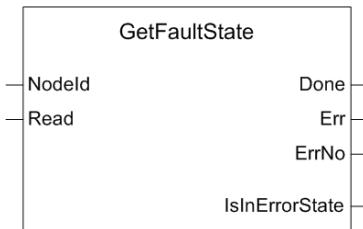
Return Values

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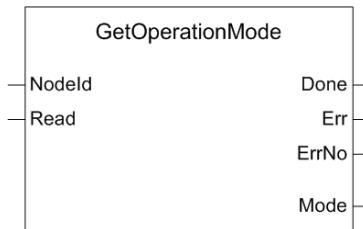
Return Values
Done	BOOL	True if reading is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information
IsInErrorState	BOOL	Device fault state

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
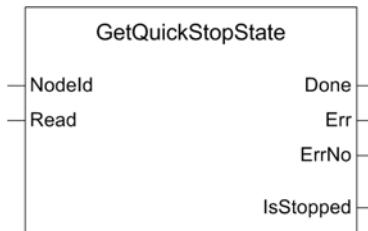
Return Values

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
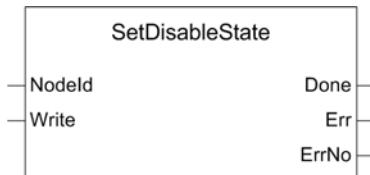
Figure 44: SetDisableState

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
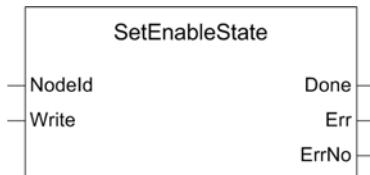
Figure 45: SetEnableState

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
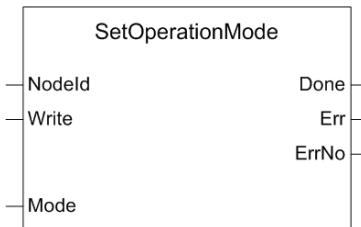
Return Values

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

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
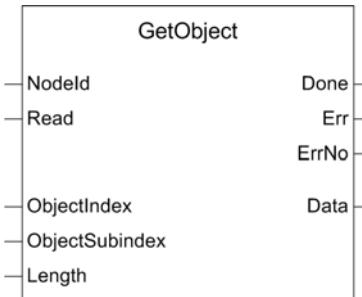
Figure 48: GetObject

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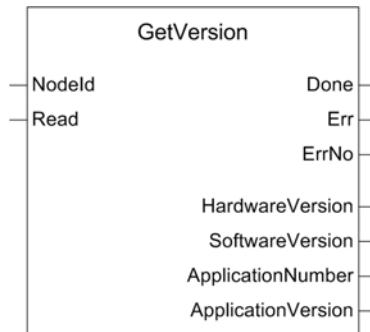
Return Values
Done	BOOL	True if reading is done
Err	BOOL	True if a error has occurred
ErrNo	DINT	Error information
Data	DINT	Object Data

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
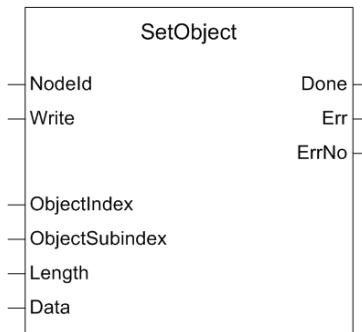
Related Functions
Get Object
Get Version
Set Object
Store

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

```
          Store
  ─ NodeId        Done ─
  ─ Write          Err ─
                 ErrNo ─
```

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
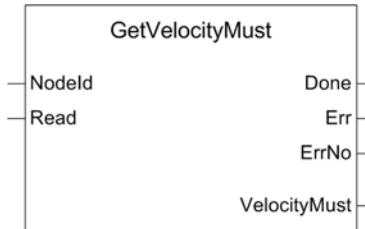
Figure 53: GetVelocityMust

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
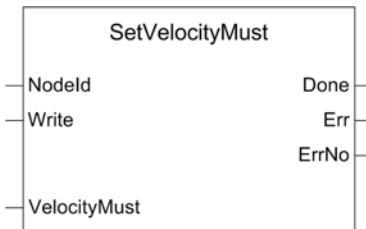
Return Values

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

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
08.07.2010	0.20	Edition July 2010	• Support for EPOS2 Objects • Bugfix Get and Set Encoder Parameter