

maxon motor

maxon motor control EPOS2 Positioning Controller
IEC 61131 Beckhoff Library Edition July 2010

EPOS2

Positioning Controller

Documentation

**IEC 61131 Beckhoff
Library**

1 Table of contents

1	Table of contents.....	2
2	Table of figures	3
3	Introduction	4
4	Third party products	4
5	How to use this guide	4
6	Virtual Command Set	5
6.1	Configuration.....	5
6.1.1	Get Current Regulator Gain	5
6.1.2	Get Encoder Parameter	6
6.1.3	Get Motor Parameter	7
6.1.4	Get Position Regulator Gain	8
6.1.5	Get Velocity Regulator Gain	9
6.1.6	Set Current Regulator Gain	10
6.1.7	Set Encoder Parameter	11
6.1.8	Set Motor Parameter	12
6.1.9	Set Position Regulator Gain.....	13
6.1.10	Set Velocity Regulator Gain.....	14
6.2	Current Mode	15
6.2.1	Get Current Must	15
6.2.2	Set Current Must.....	16
6.3	Homing Mode.....	17
6.3.1	Find Home	17
6.3.2	Get Homing Parameter	18
6.3.3	Set Homing Parameter	19
6.3.4	Stop Homing	20
6.4	Inputs Outputs.....	21
6.4.1	Get All Digital Inputs	21
6.4.2	Get All Digital Outputs.....	22
6.4.3	Get Analog Input.....	23
6.4.4	Set All Digital Outputs	24
6.5	Motion Info	25
6.5.1	Get Current Is	25
6.5.2	Get Movement State.....	26
6.5.3	Get Position Is	27
6.5.4	Get Velocity Is.....	28
6.6	Position Mode	29
6.6.1	Get Position Must	29
6.6.2	Set Position Must.....	30
6.7	Profile Position Mode	31
6.7.1	Get Position Profile	31
6.7.2	Get Target Position.....	32
6.7.3	Halt Position Movement.....	33
6.7.4	Move To Position	34
6.7.5	Set Position Profile	35
6.8	Profile Velocity Mode	36
6.8.1	Get Target Velocity	36
6.8.2	Get Velocity Profile	37
6.8.3	Halt Velocity Movement	38
6.8.4	Move With Velocity	39
6.8.5	Set Velocity Profile.....	40
6.9	State Machine	41
6.9.1	Clear Fault	41
6.9.2	Get Disable State.....	42
6.9.3	Get Enable State	43
6.9.4	Get Fault State.....	44
6.9.5	Get Operation Mode	45
6.9.6	Get Quick Stop State	46
6.9.7	Set Disable State	47
6.9.8	Set Enable State.....	48
6.9.9	Set Operation Mode.....	49
6.9.10	Set Quick Stop State	50
6.10	Utilities	51
6.10.1	Get Object.....	51
6.10.2	Get Version.....	52
6.10.3	Restore	53

6.10.4 Set Object	54
6.10.5 Store	55
6.11 Velocity Mode	56
6.11.1 Get Velocity Must.....	56
6.11.2 Set Velocity Must.....	57
7 History	58

2 Table of figures

Figure 1: EPOS documentation hierarchy	4
Figure 2: FB_GetCurrentRegulatorGain	5
Figure 3: FB_GetEncoderParameter	6
Figure 4: FB_GetMotorParameter	7
Figure 5: FB_GetPositionRegulatorGain	8
Figure 6: FB_GetVelocityRegulatorGain	9
Figure 7: FB_SetCurrentRegulatorGain	10
Figure 8: FB_SetEncoderParameter	11
Figure 9: FB_SetMotorParameter.....	12
Figure 10: FB_SetPositionRegulatorGain.....	13
Figure 11: FB_GetVelocityRegulatorGain	14
Figure 12: FB_GetCurrentMust	15
Figure 13: FB_SetCurrentMust.....	16
Figure 14: FB_FindHome	17
Figure 15: FB_GetHomingParameter	18
Figure 16: FB_SetHomingParameter	19
Figure 17: FB_StopHoming	20
Figure 18: FB_GetAllDigitalInputs	21
Figure 19: FB_GetAllDigitalOutputs.....	22
Figure 20: FB_GetAnalogInput.....	23
Figure 21: FB_SetAllDigitalOutputs	24
Figure 22: FB_GetCurrentIs	25
Figure 23: FB_GetMovementState	26
Figure 24: FB_GetPositionIs.....	27
Figure 25: FB_GetVelocityIs.....	28
Figure 26: FB_GetPositionMust.....	29
Figure 27: FB_SetPositionMust	30
Figure 28: FB_GetPositionProfile	31
Figure 29: FB_GetTargetPosition	32
Figure 30: FB_HaltPositionMovement	33
Figure 31: FB_MoveToPosition	34
Figure 32: FB_SetPositionProfile.....	35
Figure 33: FB_GetTargetVelocity	36
Figure 34: FB_GetVelocityProfile	37
Figure 35: FB_HaltVelocityMovement	38
Figure 36: FB_MoveWithVelocity	39
Figure 37: FB_SetVelocityProfile.....	40
Figure 38: FB_ClearFault	41
Figure 39: FB_GetDisableState.....	42
Figure 40: FB_GetEnableState.....	43
Figure 41: FB_GetFaultState.....	44
Figure 42: FB_GetOperationMode	45
Figure 43: FB_GetQuickStopState	46
Figure 44: FB_SetDisableState	47
Figure 45: FB_SetEnableState	48
Figure 46: FB_SetOperationMode.....	49
Figure 47: FB_SetQuickStopState.....	50
Figure 48: FB_GetObject.....	51
Figure 49: FB_GetVersion	52
Figure 50: FB_Restore	53
Figure 51: FB_SetObject	54
Figure 52: FB_Store	55
Figure 53: FB_GetVelocityMust.....	56
Figure 54: FB_SetVelocityMust	57

3 Introduction

This "IEC 61131 Beckhoff 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 Beckhoff PLCs.

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 Beckhoff Library", additional documentation and software to the EPOS2 positioning controller may also be found on the internet under <http://shop.maxonmotor.com> category <Service & Downloads>

4 Third party products

BECKHOFF (PLC)

www.beckhoff.de

5 How to use this guide

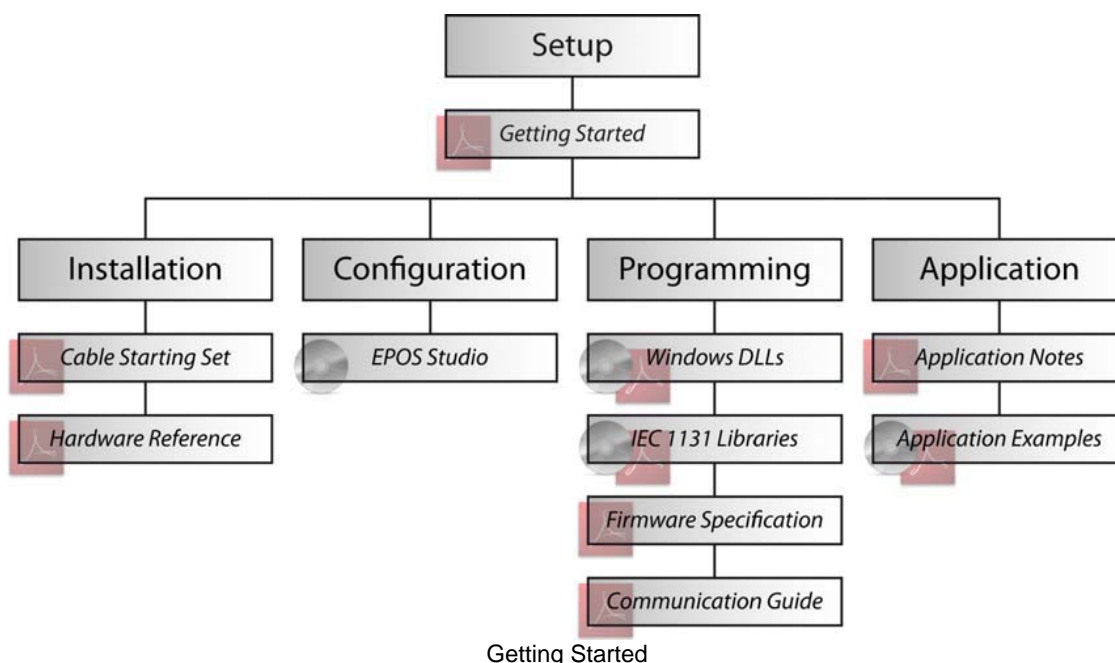


Figure 1: EPOS2 documentation hierarchy

6 Virtual Command Set

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

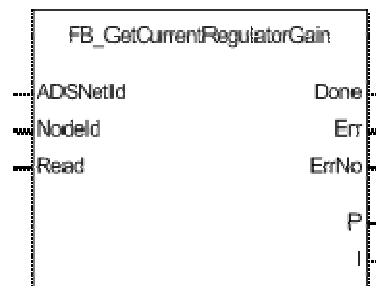


Figure 2: FB_GetCurrentRegulatorGain

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information	
P	UINT	Current Regulator P-Gain	Object: 0x60F6-01
I	UINT	Current Regulator I-Gain	Object: 0x60F6-02

Related Functions

[Set Current Regulator Gain](#)

6.1.2 Get Encoder Parameter

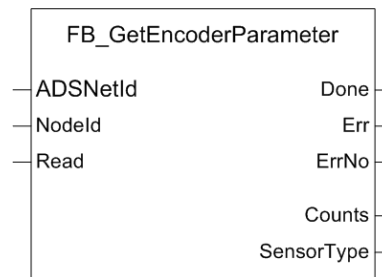


Figure 3: FB_GetEncoderParameter

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information	
Counts	UDINT	Incremental Encoder Counts	Object: 0x2210-01
SensorType	UINT	Position Sensor Type	Object: 0x2210-02

Related Functions

[Set Encoder Parameter](#)

6.1.3 Get Motor Parameter

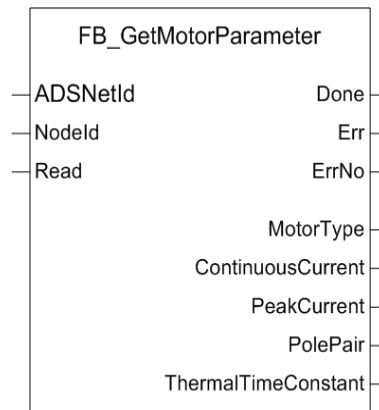


Figure 4: FB_GetMotorParameter

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network Id
NodeId	USINT	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	UDINT	Error information	
MotorType	UINT	Kind of Motor	Object: 0x6402-00
ContinuousCurrent	UINT	Maximal Continuous Current	Object: 0x6410-01
PeakCurrent	UINT	Maximal Peak Current	Object: 0x6410-02
PolePair	USINT	Number of Pole Pairs	Object: 0x6410-03
ThermalTime-Constant	UINT	Thermal Time Constant	Object: 0x6410-05

Related Functions

[Set Motor Parameter](#)

6.1.4 Get Position Regulator Gain

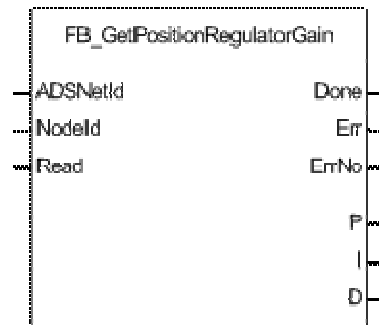


Figure 5: FB_GetPositionRegulatorGain

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network Id
NodeId	USINT	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	UDINT	Error information	
P	UINT	Position Regulator P-Gain	Object: 0x60FB-01
I	UINT	Position Regulator I-Gain	Object: 0x60FB-02
D	UINT	Position Regulator D-Gain	Object: 0x60FB-03

Related Functions

[Set Position Regulator Gain](#)

6.1.5 Get Velocity Regulator Gain

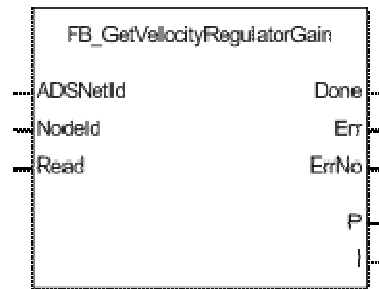


Figure 6: FB_GetVelocityRegulatorGain

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network Id
NodeId	USINT	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	UDINT	Error information	
P	UINT	Velocity Regulator P-Gain	Object: 0x60F9-01
I	UINT	Velocity Regulator I-Gain	Object: 0x60F9-02

Related Functions

[Set Velocity Regulator Gain](#)

6.1.6 Set Current Regulator Gain

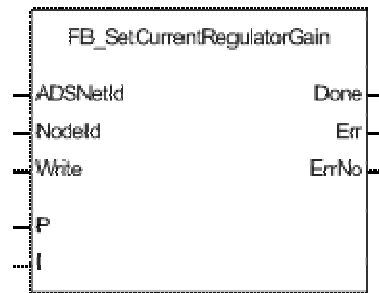


Figure 7: FB_SetCurrentRegulatorGain

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network Id	
NodeId	USINT	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
P	UINT	Current Regulator P-Gain	Object: 0x60F6-01
I	UINT	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	UDINT	Error information

Related Functions

[Get Current Regulator Gain](#)

6.1.7 Set Encoder Parameter

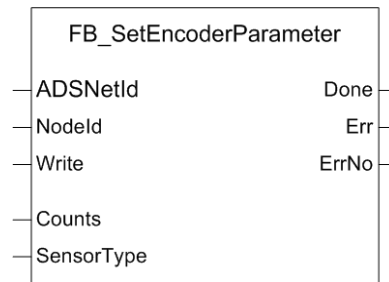


Figure 8: FB_SetEncoderParameter

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network Id	
NodeId	USINT	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
Counts	UDINT	Incremental Encoder Counts	Object: 0x2210-01
SensorType	UINT	Position Sensor Type	Object: 0x2210-02

Return Values

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

Related Functions

[Get Encoder Parameter](#)

6.1.8 Set Motor Parameter

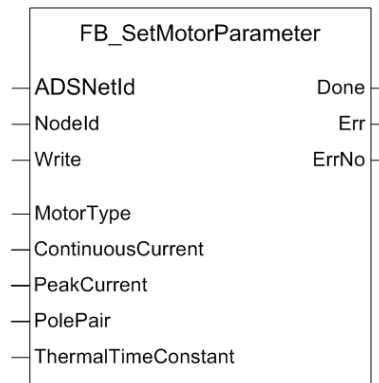


Figure 9: FB_SetMotorParameter

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network Id	
NodeId	USINT	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
MotorType	UINT	Kind of Motor	Object: 0x6402-00
ContinuousCurrent	UINT	Maximal Continuous Current	Object: 0x6410-01
PeakCurrent	UINT	Maximal Peak Current	Object: 0x6410-02
PolePair	USINT	Number of Pole Pairs	Object: 0x6410-03
ThermalTimeConstant	UINT	Thermal Time Constant	Object: 0x6410-05

Return Values

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

Related Functions

[Get Motor Parameter](#)

6.1.9 Set Position Regulator Gain

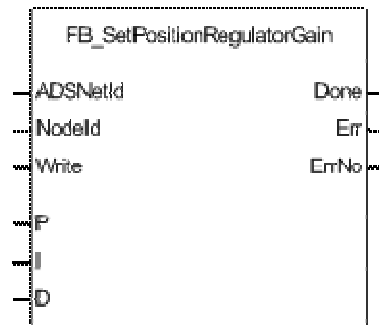


Figure 10: FB_SetPositionRegulatorGain

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID	
NodeId	USINT	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
P	UINT	Position Regulator P-Gain	Object: 0x60FB-01
I	UINT	Position Regulator I-Gain	Object: 0x60FB-02
D	UINT	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	UDINT	Error information

Related Functions

[Get Position Regulator Gain](#)

6.1.10 Set Velocity Regulator Gain

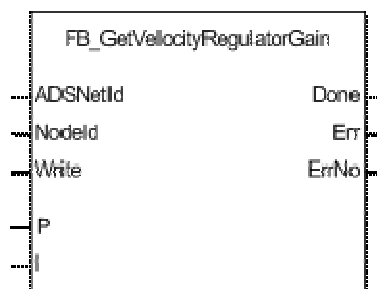


Figure 11: FB_GetVelocityRegulatorGain

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID	
NodeId	USINT	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
P	UINT	Velocity Regulator P-Gain	Object: 0x60F9-01
I	UINT	Velocity Regulator I-Gain	Object: 0x60F9-02

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	UDINT	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

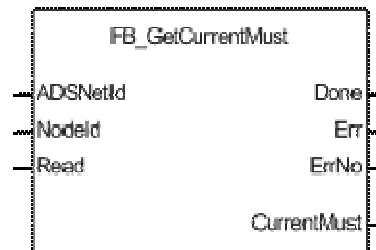


Figure 12: FB_GetCurrentMust

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information	
CurrentMust	INT	Current mode demand value	Object: 0x2030-00

Related Functions

[Set Current Must](#)

6.2.2 Set Current Must

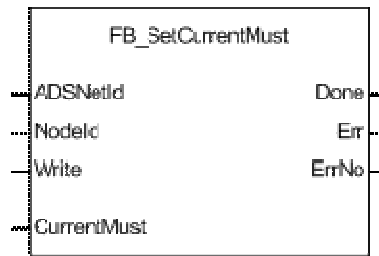


Figure 13: FB_SetCurrentMust

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID	
NodeId	USINT	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
CurrentMust	INT	Current mode demand value	Object: 0x2030-00

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	UDINT	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

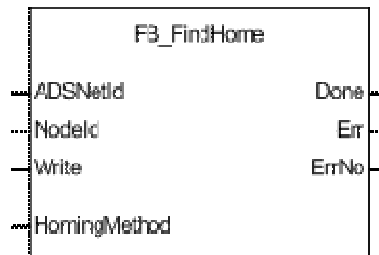


Figure 14: FB_FindHome

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID	
NodeId	USINT	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
HomingMethod	SINT	Homing Method	Object: 0x6098-00

Return Values

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

Related Functions

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

6.3.2 Get Homing Parameter

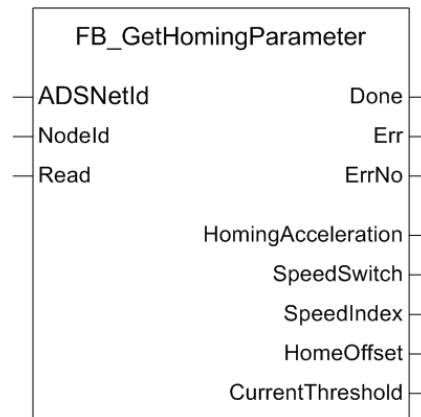


Figure 15: FB_GetHomingParameter

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information	
HomingAcceleration	UDINT	Acceleration for Homing Profile	Object: 0x609A-00
SpeedSwitch	UDINT	Speed during search for switch	Object: 0x6099-01
SpeedIndex	UDINT	Speed during search for index signal	Object: 0x6099-02
HomeOffset	DINT	Home Offset after Homing	Object: 0x607C-00
CurrentThreshold	UINT	Current Threshold for Homing Method -3 and -4	Object: 0x2080-00

Related Functions

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

6.3.3 Set Homing Parameter

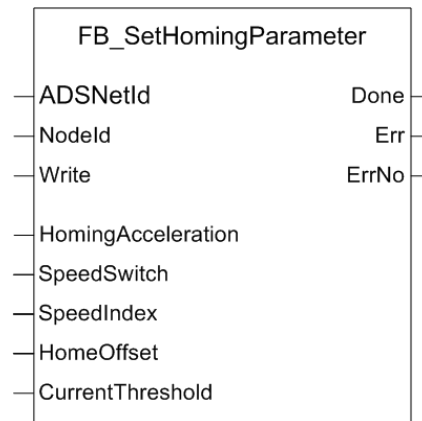


Figure 16: FB_SetHomingParameter

Description

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

Parameters

ADSNNetId	T_AmsNetId	Beckhoff specific Ams Network ID	
NodeId	USINT	Identification ID of the addressed device (is given from hardware switches)	
Read	BOOL	A positive edge at input Read starts writing	
HomingAcceleration	UDINT	Acceleration for Homing Profile	Object: 0x609A-00
SpeedSwitch	UDINT	Speed during search for switch	Object: 0x6099-01
SpeedIndex	UDINT	Speed during search for index signal	Object: 0x6099-02
HomeOffset	DINT	Home Offset after Homing	Object: 0x607C-00
CurrentThreshold	UINT	Current Threshold for Homing Method - 3 and -4	Object: 0x2080-00

Return Values

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

Related Functions

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

6.3.4 Stop Homing



Figure 17: FB_StopHoming

Description

“FB_StopHoming” interrupts homing.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information

Related Functions

[Find Home](#)

[Set Homing Parameter](#)

6.4 Inputs Outputs

6.4.1 Get All Digital Inputs



Figure 18: FB_GetAllDigitalInputs

Description

“FB_GetAllDigitalInputs“ reads all digital inputs.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information	
Inputs	UINT	Digital Inputs	Object: 0x2071-01

Related Functions

[Get All Digital Outputs](#)

[Get Analog Inputs](#)

[Set All Digital Outputs](#)

6.4.2 Get All Digital Outputs



Figure 19: FB_GetAllDigitalOutputs

Description

“FB_GetAllDigitalOutputs“ reads all digital outputs.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information
Outputs	UINT	Digital Outputs Object: 0x2078-01

Related Functions

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

6.4.3 Get Analog Input

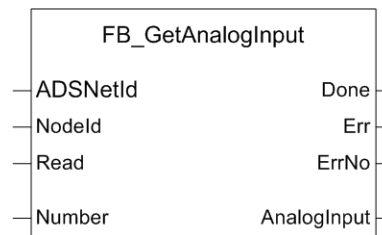


Figure 20: FB_GetAnalogInput

Description

“FB_GetAnalogInput“ reads an analog input.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading
Number	UINT	Analog Input Number

Return Values

Return Values			
Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	UDINT	Error information	
AnalogInput	UINT	Analog Input	Object: 0x207C-01 Object: 0x207C-02

Related Functions

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

6.4.4 Set All Digital Outputs

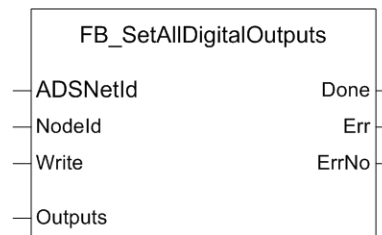


Figure 21: FB_SetAllDigitalOutputs

Description

“FB_SetAllDigitalOutputs“ writes all digital outputs.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID	
NodeId	USINT	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
Outputs	UINT	Digital Outputs	Object: 0x2078-01

Return Values

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

Related Functions

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

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

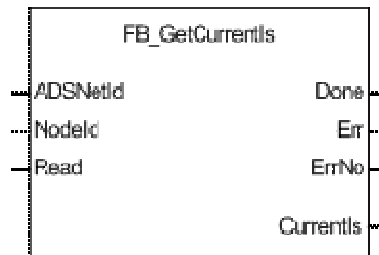


Figure 22: FB_GetCurrentIs

Description

“FB_GetCurrentIs” returns the current actual value.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information
CurrentIs	INT	Current actual value Object: 0x6078-00

Related Functions

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

6.5.2 Get Movement State

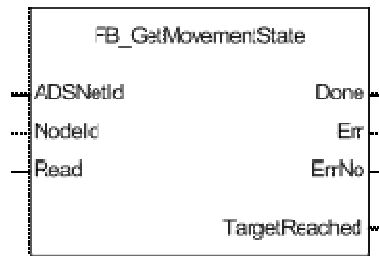


Figure 23: FB_GetMovementState

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	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

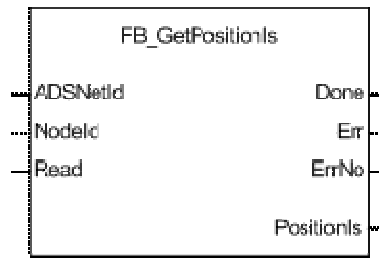


Figure 24: FB_GetPositionIs

Description

“FB_GetPositionIs” returns the position actual value.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information
PositionIs	DINT	Position actual value

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

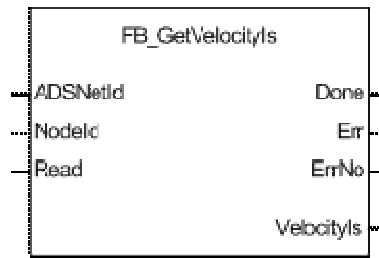


Figure 25: FB_GetVelocityIs

Description

“FB_GetVelocityIs” reads the velocity actual value.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	Identification ID of the addressed device (is given from hardware switches)
Read	BOOL	A positive edge at input Read starts reading

Return Values

Return Value			
Done	BOOL	True if reading is done	
Err	BOOL	True if a error has occurred	
ErrNo	UDINT	Error information	
VelocityIs	DINT	Velocity actual value	Object: 0x606C-00

Related Functions

[Get Current Is](#)

[Get Movement State](#)

[Get Position Is](#)

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

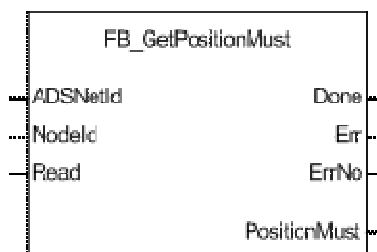


Figure 26: FB_GetPositionMust

Description

“FB_GetPositionMust” returns the position demand value.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information	
PositionMust	DINT	Position demand value	Object: 0x2062-00

Related Functions

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

6.6.2 Set Position Must

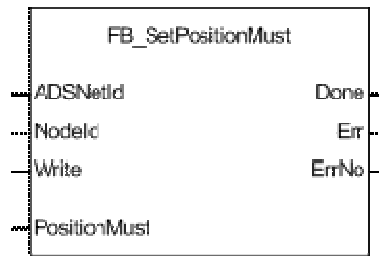


Figure 27: FB_SetPositionMust

Description

“FB_SetPositionMust” sets the position demand value.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID	
NodeId	USINT	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	Object: 0x2062-00

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	UDINT	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

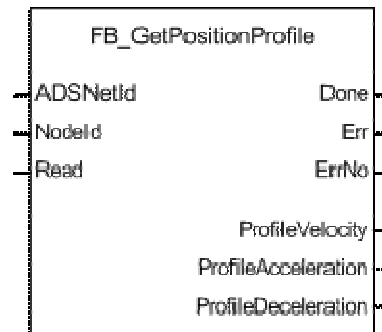


Figure 28: FB_GetPositionProfile

Description

“FB_GetPositionProfile” returns the position profile mode parameters.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information	
Profile-Velocity	UDINT	Position Profile Velocity	Object: 0x6081-00
Profile-Acceleration	UDINT	Position Profile Acceleration	Object: 0x6083-00
Profile-Deceleration	UDINT	Position Profile Deceleration	Object: 0x6084-00

Related Functions

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

6.7.2 Get Target Position

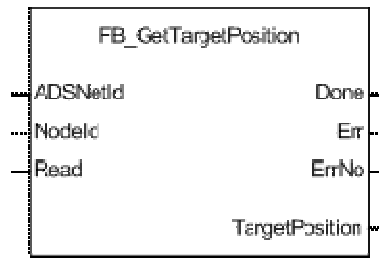


Figure 29: FB_GetTargetPosition

Description

“FB_GetTargetPosition” returns the profile position mode target value.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information	
TargetPosition	DINT	Target Position	Object: 0x607A-00

Related Functions

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

6.7.3 Halt Position Movement

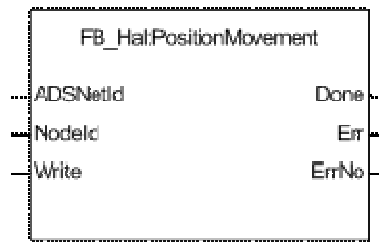


Figure 30: FB_HaltPositionMovement

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information

Related Functions

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

6.7.4 Move To Position

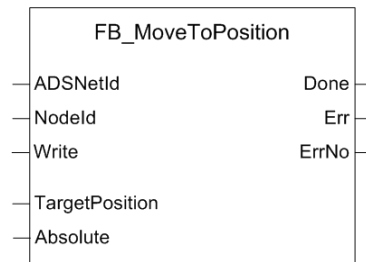


Figure 31: FB_MoveToPosition

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID	
NodeId	USINT	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
Target Position	DINT	Target Position	Object: 0x607A-00
Absolute	BOOL	TRUE starts an absolute, FALSE a relative movement	

Return Values

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

Related Functions

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

6.7.5 Set Position Profile

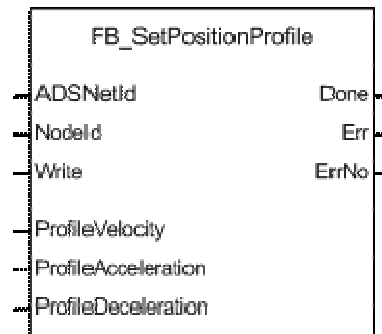


Figure 32: FB_SetPositionProfile

Description

“FB_SetPositionProfile” sets the position profile parameters.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID	
NodeId	USINT	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
Profile-Velocity	UDINT	Position Profile Velocity	Object: 0x6081-00
Profile-Acceleration	UDINT	Position Profile Acceleration	Object: 0x6083-00
Profile-Deceleration	UDINT	Position Profile Deceleration	Object: 0x6084-00

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	UDINT	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

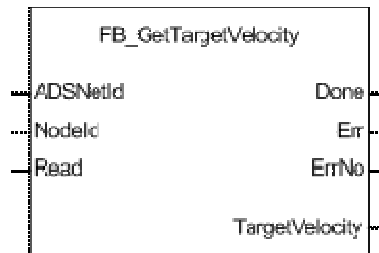


Figure 33: FB_GetTargetVelocity

Description

“FB_GetTargetVelocity” returns the profile velocity mode target value.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information	
TargetVelocity	DINT	Target Velocity	Object: 0x60FF-00

Related Functions

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

6.8.2 Get Velocity Profile

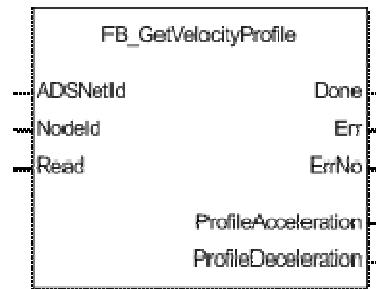


Figure 34: FB_GetVelocityProfile

Description

“FB_GetVelocityProfile” returns the velocity profile parameters.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information	
ProfileAcceleration	UDINT	Velocity Profile Acceleration	Object: 0x6083-00
ProfileDeceleration	UDINT	Velocity Profile Deceleration	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: FB_HaltVelocityMovement

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information

Related Functions

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

6.8.4 Move With Velocity

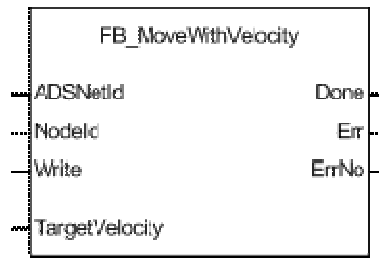


Figure 36: FB_MoveWithVelocity

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID	
NodeId	USINT	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	Object: 0x60FF-00

Return Values

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

Related Functions

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

6.8.5 Set Velocity Profile

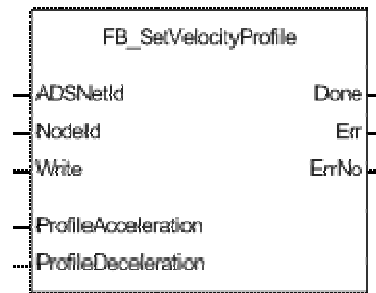


Figure 37: FB_SetVelocityProfile

Description

“FB_SetVelocityProfile” sets the velocity profile parameters.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID	
NodeId	USINT	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
Profile-Acceleration	UDINT	Velocity Profile Acceleration	Object: 0x6083-00
Profile-Deceleration	UDINT	Velocity Profile Deceleration	Object: 0x6084-00

Return Values

Done	BOOL	True if writing is done
Err	BOOL	True if a error has occurred
ErrNo	UDINT	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 Quick Stop State](#)
[Set Operation Mode](#)

6.9.1 Clear Fault



Figure 38: FB_ClearFault

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information

Related Functions

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

6.9.2 Get Disable State

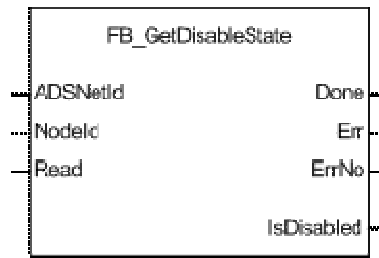


Figure 39: FB_GetDisableState

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information	
IsDisabled	BOOL	Device disable state	-

Related Functions

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

6.9.3 Get Enable State

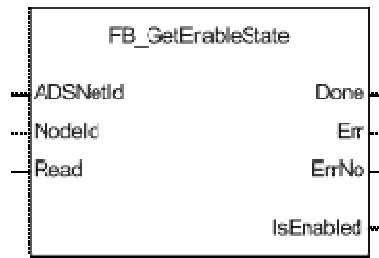


Figure 40: FB_GetEnableState

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information	
IsEnabled	BOOL	Device enable state	-

Related Functions

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

6.9.4 Get Fault State

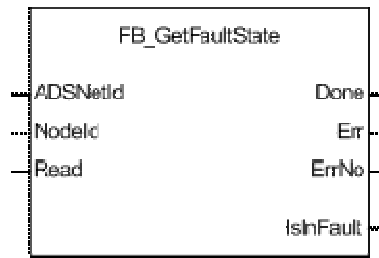


Figure 41: FB_GetFaultState

Description

The function block “FB_GetFaultState” returns the device state fault (IsInFault = TRUE).

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information	
IsInFault	BOOL	Device fault state	-

Related Functions

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

6.9.5 Get Operation Mode

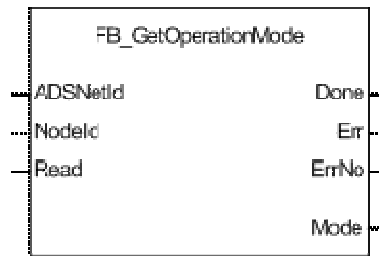


Figure 42: FB_GetOperationMode

Description

“FB_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

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information
Mode	SINT	Operation Mode

Related Functions

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

6.9.6 Get Quick Stop State

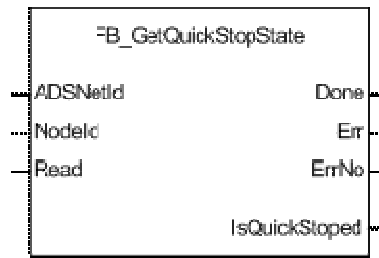


Figure 43: FB_GetQuickStopState

Description

“FB_GetQuickStopState” returns the device state quick stop (IsQuickStoped = TRUE).

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information
IsQuickStoped	BOOL	Device quick stop state

Related Functions

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

6.9.7 Set Disable State



Figure 44: FB_SetDisableState

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information

Related Functions

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

6.9.8 Set Enable State



Figure 45: FB_SetEnableState

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information

Related Functions

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

6.9.9 Set Operation Mode

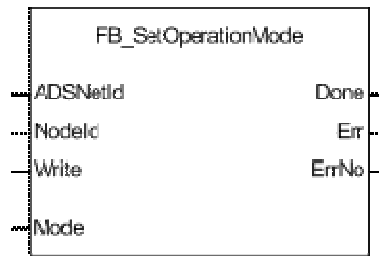


Figure 46: FB_SetOperationMode

Description

“FB_SetOperationMode” sets the operation mode. 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			
ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID	
NodeId	USINT	Identification ID of the addressed device (is given from hardware switches)	
Read	BOOL	A positive edge at input Write starts writing	
Mode	SINT	Operation Mode	-

Return Values

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

Related Functions

[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 Quick Stop State](#)

6.9.10 Set Quick Stop State



Figure 47: FB_SetQuickStopState

Description

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

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information

Related Functions

[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](#)

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

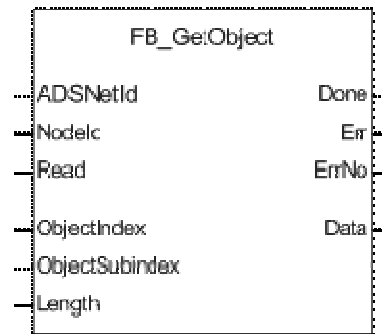


Figure 48: FB_GetObject

Description

“FB_GetObject” returns the object Data field.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID	
NodeId	USINT	Identification ID of the addressed device (is given from hardware switches)	
Read	BOOL	A positive edge at input Read starts reading	
ObjectIndex	UINT	Object Index	-
ObjectSubindex	USINT	Object SubIndex	-
Length	USINT	Object Length	-

Return Values

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

Related Functions

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

6.10.2 Get Version

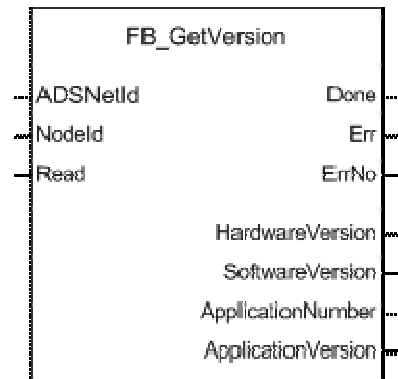


Figure 49: FB_GetVersion

Description

“FB_GetVersion” returns the Firmware Version.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information	
HardwareVersion	UINT	Hardware Version	Object: 0x2003-01
SoftwareVersion	UINT	Software Version	Object: 0x2003-02
ApplicationNumber	UINT	Application Number	Object: 0x2003-03
ApplicationVersion	UINT	Application Version	Object: 0x2003-04

Related Functions

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

6.10.3 Restore



Figure 50: FB_Restore

Description

“FB_Restore” restores all default parameters.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information

Related Functions

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

6.10.4 Set Object

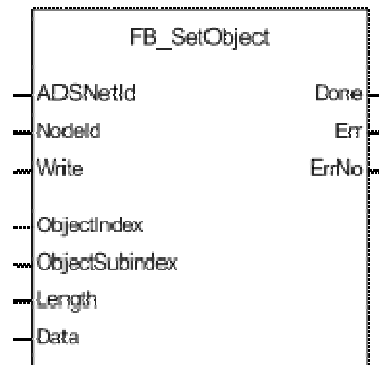


Figure 51: FB_SetObject

Description

“FB_SetObject” writes to an object Data field.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID	
NodeId	USINT	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
ObjectIndex	UINT	Object Index	-
ObjectSubindex	USINT	Object SubIndex	-
Length	USINT	Object Length	-
Data	UDINT	Object Data	-

Return Values

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

Related Functions

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

6.10.5 Store



Figure 52: FB_Store

Description

“FB_Store” stores all parameter.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	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

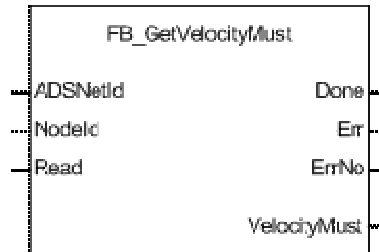


Figure 53: FB_GetVelocityMust

Description

“FB_GetVelocityMust” returns the position demand value.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID
NodeId	USINT	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	UDINT	Error information	
VelocityMust	DINT	Velocity demand value	Object: 0x206B-00

Related Functions

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

6.11.2 Set Velocity Must

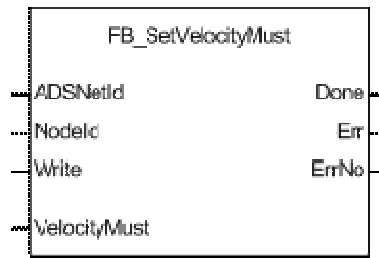


Figure 54: FB_SetVelocityMust

Description

“FB_SetVelocityMust” sets the velocity demand value.

Parameters

ADSNetId	T_AmsNetId	Beckhoff specific Ams Network ID	
NodeId	USINT	Identification ID of the addressed device (is given from hardware switches)	
Write	BOOL	A positive edge at input Write starts writing	
Velocity Must	DINT	Velocity demand value	Object: 0x206B-00

Return Values

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

Related Functions

[Get Velocity Is](#)

[Get Velocity Must](#)

7 History

Date	Version	Documentation	Description
17.11.2003	0.10	Edition November 2003	<ul style="list-style-type: none"> First Library Version
16.12.2003	0.20	Edition December 2003	FB_GetEncoderParameter new Variable SensorType FB_SetEncoderParameter new Variable SensorType FB_GetMotorParameter Changes depend on Firmware FB_SetMotorParameter Changes depend on Firmware FB_GetAllDigitalInputs Changes depend on Firmware FB_GetAllDigitalOutputs Changes depend on Firmware FB_SetAllDigitalOutputs Changes depend on Firmware FB_GetAnalogInput Changes depend on Firmware FB_FindHome Bugfix
05.02.2004	1.00	Edition February 2004	FB_GetAllDigitalInputs new FB_GetAllDigitalOutputs new FB_GetAnalogInput new FB_SetAllDigitalOutputs new
17.06.2004	1.00	Edition June 2004	correction of different spelling mistakes
22.07.2004	1.00	Edition July 2004	Bugfixes:-FB_FindHome set Done flag at the end of function block -FB_GetOperationMode/FB_SetOperationMode type of Mode changed from USINT to SINT -FB_SetEnableState Shutdown only if Status = Switch on Disable -FB_SetObject/FBGetObject ODIdx and ODSubIdx renamed with ObjectIndex and ObjectSubindex
10.12.2009	1.00	Edition December 2009	Library dependency changed from PlcSystem.lib to TcSystem.lib
08.07.2010	1.10	Edition July 2010	Support for EPOS2 Objects Bug fix Get and Set Encoder Parameter