

FIELDBUS COMMUNICATION MANUAL

# Softstarters Type PSTX Anybus CompactCom EtherCAT



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# 1. EtherCAT

EtherCAT is a Real Time Ethernet technology which aims to maximize the use of the full duplex Ethernet bandwidth. It overcomes the overhead normally associated with Ethernet by employing "on the fly" processing hardware. An EtherCAT bus consists of a master system and up to 65535 slave devices, connected with standard Ethernet cabling. The slave devices process the incoming Ethernet frames directly, extract or insert relevant data and transfer the frame to the next EtherCAT slave device. The last slave device in the bus segment sends the fully processed frame back to the master.

The EtherCAT protocol provides full control and status information of the softstarter, reading as well as writing of parameters. It is possible to start and stop the motor, read out currents and frequency, get information about protections, warnings, faults and much more.

See chapter 8 in the Installation and commissioning manual, document SFC132081M0201 for fieldbus related settings.

Before the EtherCAT communication can be taken in operation following parameters must be set in the softstarter:

- Parameter 12.02 FB interface connector set to Anybus
- Parameter 12.03 *Fieldbus control* set to **On** (if using fieldbus only to monitor, this parameter can be set to **Off**)

Optionally, the following parameter may be set to configure a Station Alias for the device:

• Parameter 12.04 Fieldbus address set to the station alias for this slave device

**Note**: Fieldbus address (parameter 12.04) should be kept at its default value of 0 if a station alias should not be set by the slave device.

**Note**: After changing any of the communication parameters it is needed to perform a power cycle of the device for the parameter values to be taken into effect. Or another way for a communication parameter value change to be taken into effect is to set parameter 12.2 FB interface connector to "None" and then set it back to "Anybus".

To do the programming of the PLC, the following files are available:

#### GSDML file

#### Type of file

EtherCAT Anybus M40 v2.1 PSTX Softstarter v1.0.xml EtherCAT slave information file

**Note**: If there is no message passed between the PSTX softstarter and the Anybus module for more than the configured fieldbus failure timeout time (parameter 19.12), the PSTX softstarter will trip on fieldbus communication failure protection (P1E00) and with the default configuration the motor will be stopped. If the communication system is setup in such a way that commands/requests are not continuously passed between the PLC and softstarter, this protection function should be disabled. The parameter 19.4 (Fieldbus failure op) can then be set to "Off".

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#### Caution!

The motor may start unexpectedly if there is a start signal present when doing any of the actions listed below.

- Switching from one type of control to another (fieldbus control/hardwire control)
- Reset all Settings



#### INFORMATION

When fastening the module into the com1 port, make sure that the module is properly aligned in the socket prior to applying any force. Rough handling and/or excessive force in combination with misalignment may cause mechanical damage to the module and/or the com1 and socket.

### **1.1. Example topology of the EtherCAT link**

A topology example is shown below.



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### 1.2. Digital Inputs

To PLC from softstarter.

Index Subindex Name Bit Data	Description
2003     1     Digital     0     Auto Mode status <sup>1</sup>	0 = Softstarter
h Input	control through
Byte1	fieldbus
	communication
	not allowed
	1 = Softstarter
	control through
	fieldbus
	communication
	allowed
1 Event status	0 = No active
	fault/warning/pr
	otection
	1 = Active
	fault/warning/pr
	otection
2 Ready To Start	0 = A start will
	probably cause a
	fault
	I = A start will not
3 FBT Response 0	See section 2
4 FBT Response 1	See Section 2
<b>5 CPT Toggle Pit</b>	
5 FBI Toggie Bit	Fieldbus Tasks
6 Programmable Digital II	pout 1 Euroction of
7 Programmable Digital II	nput 2 programmable
2 Digital 8(0) Programmable Digital I	nput 3 digital input, see
Input 9 (1) Programmable Digital I	nput 4 section 1.3
Byte2 10 (2) Programmable Digital II	nput 5
11 (3) Programmable Digital II	nput 6
12 (d) Programmable Digital II	nput 7
13 (5) Programmable Digital II	nput 8
14 (6) Programmable Digital II	nput 0

1) Auto mode reflects the control state of the Softstarter. This is affected by a combination of:

- The Auto mode input signal from the PLC (Digital output telegram).
- The state of the Local/Remote switch on the HMI.
- The parameter 'Fieldbus control'.
- The digital input 'Fieldbus disable'.

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# 1.3. Programmable Digital Inputs

The functions of the programmable Digital inputs are controlled by the parameters *Fieldbus DI 1* through *Fieldbus DI 10*. The following functions are available for selection:

Function	Data
None	Value is set to 0.
Start feedback	Status of Start signal.
Stop feedback	Status of Stop signal.
Fault reset feedback	Status of Reset signal.
Slow speed reverse feedback	Status of Slow speed reverse signal.
Slow speed forward	Status of Slow speed forward signal.
feedback	
Start 1 feedback	Status of Start 1 signal.
Start 2 feedback	Status of Start 2 signal.
Start 3 feedback	Status of Start 3 signal.
Motor heating feedback	Status Motor heating signal.
User defined feedback	Status of User defined protection signal.
Stand still brake feedback	Status of Stand still brake signal.
Emergency mode feedback	Status of Emergency mode signal.
Start reverse feedback	Status of Start reverse signal.
Run status	1 = Indicates when the softstarter gives voltage to the
	motor.
TOR status	Top of Ramp. 1 = Indicates that motor runs on full voltage.
Line	Line or Inside Delta Connection; 0 = Line, 1 = Delta.
Phase sequence	0 = L1, L2, L3; 1 = L1, L3, L2.
Event group 0 status	0 = No active events present in group 0.
Event group 1 status	0 = No active events present in group 1.
Event group 2 status	0 = No active events present in group 2.
Event group 3 status	0 = No active events present in group 3.
Event group 4 status	0 = No active events present in group 4.
Event group 5 status	0 = No active events present in group 5.
Event group 6 status	0 = No active events present in group 6.
Sequence 1 Run status	Run status of sequence connected motor 1.
Sequence 2 Run status	Run status of sequence connected motor 2.
Sequence 3 Run status	Run status of sequence connected motor 3.
Sequence 1 TOR status	Top of Ramp status of sequence connected motor 1.
Sequence 2 TOR status	Top of Ramp status of sequence connected motor 2.
Sequence 3 TOR status	Top of Ramp status of sequence connected motor 3.
Run reverse status	1 = Indicates when the softstarter gives voltage to the
	motor after a reverse start.
Enable status	Status of Enable signal.
Digital InO status	Status of internal digital input In0.
Digital In1 status	Status of internal digital input In1.
Digital In2 status	Status of internal digital input In2.
Local control status	0 = Remote control, 1 = Local control (HMI).
Cancel brake feedback	Status of Cancel brake signal.
Pump cleaning auto status	Status of automatic pump cleaning.
Pump cleaning forward	Status of forward pump cleaning.
status	

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Function	Data
Pump cleaning backward	Status of reverse pump cleaning.
status	
External digital 1DI0 status	Status of external digital input 1DI0
External digital 1DI1 status	Status of external digital input 1DI1
External digital 1DI2 status	Status of external digital input 1DI2
External digital 1DI3 status	Status of external digital input 1DI3
External digital 1DI4 status	Status of external digital input 1DI4
External digital 2DI5 status	Status of external digital input 2DI5
External digital 2DI6 status	Status of external digital input 2DI6
External digital 2DI7 status	Status of external digital input 2DI7
HW DI Start status	Status of the hard wire internal digital input Start.
HW DI Stop status	Status of the hard wire internal digital input Stop.
Ready to start (line	Same conditions as the Ready To Start bit except that the
contactor)	incoming three phase voltage condition is excluded. The bit
	can be used when a line contactor is connected.

### 1.4. Analog Inputs

To PLC from the softstarter.

All analog data is represented as 16-bit values.

A protocol for Fieldbus tasks is used to read and write parameters. It is applicable for all Fieldbuses.

Index	Subindex	Name	Data	Representati
				on
2004	1	AnalogInputWord1	FBT Return Value	See section 2
h				Fieldbus
				Tasks
	2	AnalogInputWord2	Programmable Analog Input 1	Function of
	3	AnalogInputWord3	Programmable Analog Input 2	programma
	4	AnalogInputWord4	Programmable Analog Input 3	ble analog
	5	AnalogInputWord5	Programmable Analog Input 4	input, see
6 An		AnalogInputWord6	Programmable Analog Input 5	section 1.5
	7	7 AnaloginputWord7 Programmable Analog Input 6		
	8 AnalogInputWord8 Programmable Analog Input 7			
9 AnalogInputWord9		AnalogInputWord9	Programmable Analog Input 8	
	10	AnalogInputWord10	Programmable Analog Input 9	
	11	AnalogInputWord11	Programmable Analog Input 10	

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# 1.5. Programmable Analog Inputs

The functions of the programmable analog inputs are controlled by the parameters *Fieldbus Al 1* through *Fieldbus Al 10*. The following functions are available for selection:

Function	Representation
None	Value is set to 0
Phase L1 current <sup>1</sup>	Value = $1000 \Rightarrow 100A$
Phase L2 current <sup>1</sup>	Value = $1000 \Rightarrow 100A$
Phase L3 current <sup>1</sup>	Value = $1000 \Rightarrow 100A$
Active power (hp)	Value = $1000 \Rightarrow 10hp$
Active power	Value = $1000 \Rightarrow 10kW$
Apparent power	Value = $1000 \Rightarrow 10$ kVA
Mains voltage	Value = $1000 \Rightarrow 100V$
Power factor	Value = $100 \Rightarrow 1$
	Example: $87 \Rightarrow 0.87$
Motor voltage	Value = $100 \Rightarrow 100\%$
Active energy (resettable)	Value = $1000 \Rightarrow 10$ kWh
EOL time to trip	Value = $100 \Rightarrow 100s$
	Value = $65535 \Rightarrow No \text{ overload}$
	Value = $0 \Rightarrow$ Trip already occurred
Mains frequency	Value = 1000 ⇒ 100Hz
Max phase current <sup>1</sup>	Value = 1000 ⇒ 100A
Motor current	Value = 1000 ⇒ 100A
Motor run time (resettable)	Value = 100 ⇒ 1000h
Motor temperature	Value = $100 \Rightarrow 100^{\circ}C$
Motor temperature percent	Value = 100 ⇒ 100%
Number of starts (resettable)	Value = $1 \Rightarrow 100$
Phase sequence	Value = $0 \Rightarrow L1 \rightarrow L2 \rightarrow L3$
	Value = $1 \Rightarrow L1 \rightarrow L3 \rightarrow L2$
	Value = $2 \Rightarrow$ No sequence
	detected
PT100 temperature	Value = n $\Rightarrow$ n/10 – 50°C
	Example: $750 \Rightarrow 25^{\circ}C$
PIC resistance	Value = $100 \Rightarrow 100\Omega$
Reactive energy (resettable)	Value = 1000 ⇒ 10kVArh
Reactive power	Value = 1000 ⇒ 100kVAr
Remaining time to start	Value = $100 \Rightarrow 100s$
Invristor temperature	Value = $100 \Rightarrow 100$ °C
Thyristor temperature percent	Value = $100 \Rightarrow 100\%$
EOL time to cool	Value = $100 \Rightarrow 100s$
Top event code	Value = 1000 ⇒ 1000
Motor current in percent of IE.	Value = $100 \Rightarrow 100\%$
Thyristor run time (resettable)	Value = $1 \Rightarrow 10h$
Motor connection	Value = $0 \Rightarrow auto$
	Value = $1 \Rightarrow$ In-line
	value = $2 \Rightarrow$ inside delta – UI
	value = $3 \Rightarrow$ inside delta – IU
	Value = 4 $\Rightarrow$ 2-phase L1 shorted
	value – $5 \Rightarrow 2$ -phase L2 shorted

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Function	Representation
	Value = $6 \Rightarrow 2$ -phase L3 shorted
Phase L1 current high range <sup>2</sup>	Value = $100 \Rightarrow 100A$
Phase L2 current high range <sup>2</sup>	Value = $100 \Rightarrow 100A$
Phase L3 current high range <sup>2</sup>	Value = $100 \Rightarrow 100A$
Active power (hp) high range <sup>2</sup>	Value = $100 \Rightarrow 100$ hp
Active power high range <sup>2</sup>	Value = $100 \Rightarrow 100 \text{kW}$
Apparent power high range <sup>2</sup>	Value = $100 \Rightarrow 100$ kVA
Reactive power high range <sup>2</sup>	Value = $100 \Rightarrow 100$ kVAr
Max phase current high range <sup>2</sup>	Value = $100 \Rightarrow 100A$
Max motor current high range <sup>2</sup>	Value = $100 \Rightarrow 100A$
Active energy high range <sup>2</sup>	Value = $1 \Rightarrow 10000$ kWh
Reactive energy high range <sup>2</sup>	Value = $1 \Rightarrow 10000$ kVArh
Number of starts (high precision)	Value = $1 \Rightarrow 1$

**1**) Phase current L1, L2 and L3 indicate the current through the softstarter, while the Max phase current is always the line current.

**2**) High Range alternatives are available for a few signals where there is a possibility for the values to wrap. The values are 16-bit so the maximum value for each signal is 65535. The High Range alternatives have different scaling and will never wrap around but instead have lower precision.

### 1.6. Digital Outputs

Index	Subindex	Name	Bit	Data	Description
2001h	1	DigitalOutputByte1	0	Start	Commence a start when signal is set.
			1	Stop	Commence a stop when signal is negated.
			2	Fault reset	Reset signal for possible events.
			3	Auto mode	This must be set for controlling the motor.
			4	Slow speed reverse	Perform slow speed reverse when signal is set.
			5	Slow speed forward	Perform slow speed when signal is set.
			6	Spare	
			7	Start1	Start1 if sequence start.
	2	DigitalOutputByte2	8 (0)	Start2	Start2 if sequence start.
			9 (1)	Start3	Start3 if sequence start.
			10 (2)	Motor heating	Perform motor heating when signal is set.

From PLC to the softstarter.

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		11 (3)	Stand	Perform stand still
			still	brake when signal is
			brake	set.
		12 (4)	Start	Commence a reverse
			reverse	start when signal is set.
		13 (5)	Spare	
		14 (6)	Emerge	Set to "1" to enable
			ncy	emergency mode.
			mode	
		15 (7)	FBT	See Fieldbus Tasks.
			Toggle	
			Bit	
3	DigitalOutputByte3	16 (0)	User	Set to "1" to trigger
			defined	user defined protection.
			trip	
		17 (1)	Switch	Switch to remote
			to	control when signal is
			remote	set
			control	(rising edge triggered).
		18 (2)	Pump	Perform automatic
			cleaning	pump cleaning when
			automat	signal is set.
		10 (2)	1C	Deufeure feinigen lieuwen
		19 (3)	Pump	Perform forward pump
			formulard	cleaning when signal is
		20 (4)	Dump	Sel.
		20 (4)	cleaning	cleaning when signal is
			roverse	cleaning when signal is
		21 (5)	K/ relay	Set "1" to activate the
		LI (3)	comman	internal K4 output relay
			d	Note that parameter
				10.4 K4 function has to
				be set as "Fieldbus"
		22 (6)	K5 relay	Set "1" to activate the
			comman	internal K5 output relay.
			d	Note that parameter
				10.5 K5 function has to
				be set as "Fieldbus"
		23 (7)	K6 relay	Set "1" to activate the
			comman	internal K6 output relay.
			d	Note that parameter
				10.6 K6 function has to
				be set as "Fieldbus"
4	DigitalOutputByte4	24 (0)	1DO0	Set "1" to activate the
			relay	external 1D00 output
			comman	relay. Note that
			u	parameter 11.9 1000
				as "Fieldbus"
		1	1	

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25 (1)	1DO1 relay comman d	Set "1" to activate the external 1DO1 output relay. Note that parameter 11.10 1DO1 function has to be set as "Fieldbus"
26 (2)	2DO2 relay comman d	Set "1" to activate the external 2DO2 output relay. Note that parameter 11.11 2DO2 function has to be set as "Fieldbus"
27 (3)	2DO3 relay comman d	Set "1" to activate the external 2DO3 output relay. Note that parameter 11.12 2DO3 function has to be set as "Fieldbus"
28 (4)	Spare	
29 (5)	Spare	
30 (6)	Spare	
31 (7)	Spare	

### 1.7. Analog Outputs

From PLC to the softstarter.

All analog data is represented as 16-bit values.

Index	Subindex	Name	Data	Representation	
2002h	1	AnalogOut	FBT Control Word	This register is used to read	
		putWord1		parameters (see fieldbus tasks).	
	2	AnalogOut	Fieldbus AO 1	Parameter 12.37 Fieldbus AO1	
		putWord2	(FBT Argument 2	decides the use of this register. If	
			or Internal analog	set as "FBT Argument 2", it is	
			output)	used to write parameters and set	
				time (see fieldbus tasks). If set as	
				"Internal analog output" this value	
				of this register controls the	
				internal analog output. Note that	
				parameter 10.8 AO type needs to	
				be set as "Fieldbus [%]".	
	3	AnalogOut	Fieldbus AO 2	Parameter 12.38 Fieldbus AO2	
		putWord3	(FBT Argument 3	decides the use of this register. If	
			or External	set as "FBT Argument 3", it is	
			analog output)	used to write parameters and set	
				time (see fieldbus tasks). If set as	
				"External analog output" this	
				value of this register controls the	
				external analog output. Note that	
				parameter 11.14 1AO0 type needs	
				to be set as "Fieldbus [%]".	

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# 2. Fieldbus Tasks

By using Fieldbus Tasks it is possible to read/write parameters and to set the real-time clock.

Which task to execute is selected by filling in the *FBT Control Word*. There are three signals for arguments to the task:

- FBT Argument 1 is packed together with the Task ID in the FBT Control Word.
- There are two additional 16-bit arguments in separate analog output signals, *FBT Argument 2* and *FBT Argument 3*.

To control when the task is executed, the digital output signal *FBT Toggle Bit* shall be changed. The softstarter will detect the change, execute the task, fill in the return values, and toggle the digital input signal *FBT Toggle Bit* as acknowledgement. Thus, the return values must be disregarded if the two toggle bits have different value.

### 2.1. FBT Control Word

The control word is a 16-bit analog output value sent from the PLC to the softstarter. It consists of a Task ID and an 11-bit argument packed together.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	-	Fask IE	)						Arg	ument	t1				

### 2.2. Task ID

The task identifier controls which function should be performed.

		Response ID				
Task ID	Task	Positive	Negative			
0	No task	0	-			
1	Request parameter value, lower word	1	2			
2	Change parameter value	1	2			
3	Set date and time	1	2			
4	Request parameter value, upper word	1	2			

### 2.3. Response ID

The response ID is the softstarter response to a task. It tells whether a task was executed successfully. If there was an error, an additional error code is returned in the *FBT Return Value* analog input. The Response ID is transmitted as two digital input signals, *FBT Response 0* and *FBT Response 1*.

Response ID	FBT Response 1	FBT Response 0	Explanation
0	0	0	No response
1	0	1	Task executed
2	1	0	Task cannot be executed (with error
			number)
3	1	1	Reserved.

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### 2.4. Error codes

The following error codes are sent when a task cannot be executed.

Error code	Explanation
0	Illegal parameter number
1	Parameter value cannot be changed
3	Lower or upper limit violated
4	Invalid argument
5	No error
6	Invalid task number

### 2.5. Request parameter value, lower word

This task reads the lower 16 bits of the specified parameter's value. See chapter 2.9 for parameter number and value scaling information.

#### 2.5.1. Arguments

• FBT Argument 1: parameter number.

#### 2.5.2. Return Value

- *Response ID 1* and parameter value in *FBT Return Value* on success.
- *Response ID 2* and error number in *FBT Return Value* on failure.

### 2.6. Change parameter value

This task writes a specified value to a parameter. See chapter 2.9 for parameter number and value scaling information.

#### 2.6.1. Arguments

- FBT Argument 1: parameter number.
- FBT Argument 2: parameter value (lower word)
- FBT Argument 3: parameter value (upper word)

#### 2.6.2. Return Value

- Response ID 1 on success.
- Response ID 2 and error number in FBT Return Value on failure.

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### 2.7. Set date and time

This task updates the real-time clock on the softstarter. The date and time fields have the following limits:

- Year: 0-63 (2000-2063)
- Month: 1-12
- Day: 1-31
- Hour:0-23
- Minute:0-59
- Second:0-59

#### 2.7.1. Arguments

• FBT Argument 2: year, month, day and least significant bit of seconds

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
s0			ye	ar				mo	nth				day		

• FBT Argument 3: hour, minute, seconds, bit 1-5

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
		Hour					min	ute				seco	nds, b	it 1-5	

#### 2.7.2. Return Value

- *Response ID 1* on success.
- *Response ID 2* and error number in *FBT Return Value* on failure. In case the supplied time didn't differ from the set time, error code 5 (no error) is used.

### 2.8. Request parameter value, upper word

This task reads the upper 16 bits of the specified parameter's value. See chapter 2.9 for parameter number and value scaling information.

#### 2.8.1. Arguments

• FBT Argument 1: parameter number.

#### 2.8.2. Return Value

- *Response ID 1* and parameter value in *FBT Return Value* on success.
- Response ID 2 and error number in FBT Return Value on failure.

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### 2.9. Parameter numbers and values

To access parameters from the fieldbus a unique parameter number is needed, this can be found in document 1SFC132081M0201, Chapter 7.25 Complete parameter list. Since the parameter values need to be represented as integers on the fieldbus, the parameter values with greater precision need to be scaled. In document 1SFC132081M0201, Chapter 7.25 Complete parameter list, there is a column specifying the number of decimals for each parameter.

- Parameter values that are read from the fieldbus needs to be divided by 10<sup>numbers of decimals</sup>.
- Parameter values that are written from the fieldbus needs to be multiplied by 10<sup>numbers of</sup> decimals.

#### For example:

The parameter *Kick start time* has parameter number 24 and 2 decimals. To read this parameter:

- 1. Set FBT Task ID to 1.
- 2. Set *FBT Argument 1* to 24 to specify the parameter.
- 3. Toggle FBT Toggle Bit output and wait for the FBT Toggle Bit input to update.
- 4. Response ID 1 should now contain value 1, indicating success.
- 5. *FBT Return Value* contains the value 50 (this is an example and depends on the actual value set).
- 6. The return value should be interpreted as  $50/10^2 = 0.5s$ .

#### To change the *Kick start time* parameter to 1s:

- 1. Set FBT Task ID to 2 for Change parameter value.
- 2. Set FBT Argument 1 to 24 to specify the parameter.
- 3. Set *FBT Argument 2* to  $1*10^2 = 100$ .
- 4. Set FBT Argument 3 to 0 as 100 <= 65535 which means it doesn't require more than 16 bits.
- 5. Toggle FBT Toggle Bit output and wait for the FBT Toggle Bit input to update.
- 6. *Response ID 1* should now contain value 1, indicating success.

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#### 2.9.1. Negative values

Negative values are represented internally using 32-bit two's complement numbers.

#### Example:

Setting parameter 17.5 PT100 reset temp (parameter number 249) to a value of -25°C:

The two's complement of -25 is FFFFFE7<sub>hex</sub>. The upper word is  $FFFF_{hex}$  and the lower  $FFE7_{hex}$ , in decimal notation 65535 and 65511.

- 1. Set FBT Task ID to 2 for Change parameter value.
- 2. Set *FBT Argument 1* to 249 to specify the parameter.
- 3. Set *FBT Argument 2* to 65511 to specify the lower word.
- 4. Set *FBT Argument 3* to 65535 to specify the upper word.
- 5. Toggle *FBT Toggle Bit* output and wait for the *FBT Toggle Bit* input to update.
- 6. *Response ID 1* should now contain value 1, indicating success.

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# 3. Configure ABB Automation Builder

This part of the document describes how to configure an ABB AC500 PLC using the CM579-ETHCAT module to control a PSTX Softstarter with an Anybus EtherCAT module.

### 3.1. Create a new project

- 1. Open Automation Builder
- 2. Select File->New Project->AC500 project->OK
- 3. Select the correct PLC CPU in Search object name ...-> Add PLC

Categories	<ul> <li>Search object name</li> </ul>	
■ PLC - AC500 V2 ■ PLC - AC500 V3	Name IO7KT98-ARC-AD IO7KT98-ARC-DP-AD	Short Description 07KT98-ARCNET adapter : 07KT98-ARCNET-DP adap
		07KT98-ETH-ARCNET ada 07KT98-ARCNET-ETH-DP 07KT98-ETH-DP adapter si 8DI/6DO-T, 24VDC or 115- 8DI/6DO-T, 24VDC, Ethem 8DI/6DO-T, 24VDC, Ethem
	AC500 PM564 AC500 PM564-ETH AC500 PM566-ETH AC500 PM572 AC500 PM573-ETH	6DI/6DO-T/2AI/1AO, 24VI 6DI/6DO-T/2AI/1AO, 24VI 6DI/6DO-T/2AI/1AO, 24VI AC500 CPU 128kB AC500 CPU 512kB, Ethemi Y
☑ Close this dialog after each trans	ac 🗹 Display all versions	>
Reset filter	Add Pl	_C Close

 Check that the correct device type is selected by double clicking the device name in Devices field. Check that the correct Terminal Base Type is also selected for the tag for Hardware



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5. Optional: rename the project and the Application to some more suitable names for example "pstx" and "pstx\_control"



### 3.2. Install the EtherCAT Slave Information (ESI) file

1. In the Tools menu select Device Repository

<u>File Edit View Project Online Debug</u>	Too	ls <u>W</u> indow <u>H</u> elp	
管 🖻 🔒 🕘 🗠 🖂 🖓 👘		Installation Manager	
	3	Create Device list <u>C</u> SV	
Devices		Install additonal license	TX_FB_1_1
astr.		IP-Configuration	
PLC_PSTX (PM573-ETH - TB521-ETH)		MultiOnlineChange	TH Parameters
⊨ 🗐 pstx_control		Drive Overview	TH Hardwara
О Арр		Install application parameters	
IO_Bus	1	Device <u>R</u> epository	tion
COM1 Online Access (COM		Migrate third party devices	
COM2_Online_Access (COM		Open Device Type Editor	
FBP_Online_Access (FBP - C		Device ECAD data	
Ethernet		License Manager	
Protocols (Protocols)	-	Visualization Styles Repository	
Extension_Bus		Scripting	
		Options	

#### 2. Click Install

🐮 Device F	Repository						×
Location:	System Repository					~	Edit Locations
	(C:\ProgramData\AutomationBuild	er\AB_Devic	es_2.1)				
Installed de	e <u>vi</u> ce descriptions:						
String for	a fulltext search	Vendor:	<all vendors=""></all>			~	Install
Name		Vendo	·	Version	Description	^	Uninstall
	liscellaneous						Export
F	ieldbusses						
	CANDUS						
8-6	EtherCAT						Renew device
E	🗄 🔐 🔐 Master						repository
6	🗉 🔐 🗄 Barðir Module						
	Brot Slave						
	CI511-ETHCAT	ABB Au	comation Products GmbH	2.7.0.0	CI511-ETHCAT, Bus-Module for EtherCAT with 8DI/8DO/4AI	i	
	CI511-ETHCAT	ABB Au	comation Products GmbH	2.7.1.0	CI511-ETHCAT, Bus-Module for EtherCAT with 8DI/8DO/4AI	i	
	CI511-ETHCAT	ABB Au	comation Products GmbH	3.1.0.0	CI511-ETHCAT, Bus-Module for EtherCAT with 8DI/8DO/4AI		
	CI511-ETHCAT	ABB Au	comation Products GmbH	3.1.1.0	CI511-ETHCAT, Bus-Module for EtherCAT with 8DI/8DO/4AI		
	CISTI-ETHCAT (legacy)	ABB AU	comation Products GmbH	2.7.0.0	CIS11-ETHCAT, Bus-Module for EtherCAT with SDL/SDC/4AJ		
	CIS12-ETHCAT	ADD AU	tomation Products GmbH	2710	CIS12-ETHCAT, Bus-Module for EtherCAT with 8DC/8DI/8DC		
	CI512-ETHCAT	ABB Au	comation Products GmbH	3.1.0.0	CI512-ETHCAT, Bus-Module for EtherCAT with 8DC/8DI/8DC		
	CI512-ETHCAT	ABB Au	comation Products GmbH	3.1.1.0	CI512-ETHCAT, Bus-Module for EtherCAT with 8DC/8DI/8DC	~	
<					>		
							Close

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#### 3. Select the EDS-file: EtherCAT Anybus M40 v2.1 PSTX Softstarter v1.1.xml

🐨 Device f	Repository						×
and beneer	nepository.						~
Location:	System Repository (C:\ProgramData\AutomationBuil	der\AB_Dev	vices_2.1)			$\sim$	Edit Locations
Installed de	e <u>vi</u> ce descriptions:						
String for	r a fulltext search	Vendor:	<all vendors=""></all>			$\sim$	Install
Name	_		Vendor	Version	Description	^	Uninstall
<b>-</b>	ardī EtherCAT ⊯ ardī Master						Export
	🗷 क्रिके Module 🖃 करके Slave						
	😑 📴 ABB AB, Jokab Safety -	Drives					Renew device
	PSTX Softstarter		ABB AB, Jokab Safety	Revision=16#0002000A	EtherCAT Slave imported from Slave		repository
	CI511-ETHCAT		ABB Automation Products GmbH	2.7.0.0	CI511-ETHCAT, Bus-Module for Ether		
	CI511-ETHCAT		ABB Automation Products GmbH	2.7.1.0	CI511-ETHCAT, Bus-Module for Ether	<b>v</b>	
<	i different ernient				> > >		
	C:\plc\Automation Builder\EtherCAT Device "PSTX Softstarter" install	Anybus M4 ed to device	0 v2.1 PSTX Softstarter v1.1.xml a repository.				Details
							Close

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# 3.3. Add the CM579-ETHCAT EtherCAT master module and the PSTX Slave

 Right click on the empty slot where the CM579 module is installed and select Add object. Then select CM579-ETHCAT in the Replace object window. Click "Replace object" to close the Replace object window



2. Right click on the newly installed ETHCAT\_Master and select Add object

Devices			🗕 🕁 🗙			
pstx     pstx (PM573-4     pstx_control     pstx_control     App	ETTH - "	TB521-ETH)	•	CM579-ETHCAT Parameters	CM579-ETHCAT General Information	
IO_Bus					Vendor:	ABB Automation Products GmbH
🖹 🥽 Interfaces					Type:	35770
E COM1_O	nline_	Access (COM1 - Online Access)			ID:	1020 0001
E COM2_O	nline_	Access (COM2 - Online Access)			Version:	2.7.1.0
Ethernet	ne_Ac	cess (FBP - Online Access)			Description:	CM579-ETHCAT, Communication Module EtherCAT, Full /Half Di No external power supply
🗊 ЕТН1 (	ETH 1)				Order number:	1SAP 170902R0 10 1
Protoc	ols (Pr	otocols)			Categories	
Extension_bus	THEA	(CME70-ETHCAT)			Communication modules >> EtherCAT	
	AT	Conv	1		Additional Information	
Slot_2 (T		Deebe	1		Online help:	Link
	10.0	Faste			Device type revision:	45657
	ð	Cut			Device type date:	2018-04-16 16:37:34 +0200 (Mo, 16 Apr 2018)
	X	Delete			Installation instruction:	Link
		Rename				
		Add object				Concerne and Concerne
		Update objects				A DE MARCENER
	0	Add Folder				
	Dî	Edit Object				AD 2 AD 2 AD 2 AD 2 AD 2 AD 2 AD 2 AD 2
		Compare Objects				and and Marine
		Check configuration				
		Generate EtherCAT XML				and the second se

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Add object below : ETHCAT_Master					×
Object path: PLC_PSTX\Extension_Bus\CM579_ETHC# Object name: PSTX_Softstarter	AT\ETHCAT_Master				
Categories ~	Search object name				Q
Communication interface modules     Scripting     Uncategorized	Name CI511-ETHCAT CI511-ETHCAT CI511-ETHCAT CI512-ETHCAT CI512-ETHCAT CI512-ETHCAT CI512-ETHCAT CI512-ETHCAT CI512-ETHCAT CI512-ETHCAT	Short Description 8DI/8D0/4AI/2A0 EtherCAT Slave 8DI/8D0/4AI/2A0 EtherCAT Slave 8DI/8D0/8DC EtherCAT Slave 8DI/8D0/8DC EtherCAT Slave	Version 2.7.1.0 2.7.0.0 2.7.1.0 2.7.0.0 Revision=16#0002000A	Order Number 1SAP220900R00 1SAP220900R00 1SAP221000R00 1SAP221000R00 PSTX Softstarter	01 01 01 01
Close this dialog after each transaction	Display all versions				
Reset filter			Add	object	Close

#### 3. Select PSTX Softstarter and click Add object

#### 4. The PSTX Softstarter is now added, the default setting should work

General     Address     Address     Address	Devices 👻 🖣 🗙
Autoinc Address          Autoinc Address       Autoinc Address       Image: Construction of the access of the acces of the access of the access	Devices     Image: Constraint of the second se

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General	🤊 😵 🗙 Clear ma	ppings					
Process Data	Object Name	Variable	Channel	Address	Туре	Description	Terminal
tartun Daramatara	PSTX_Softstarter	digital_output_1	DigitalOutputByte1	%QB4.0	USINT	DigitalOutputByte1	
tartup Parameters	PSTX_Softstarter	digital_output_2	DigitalOutputByte2	%QB4.1	USINT	DigitalOutputByte2	
oE Settings	PSTX_Softstarter	digital_output_3	DigitalOutputByte3	%QB4.2	USINT	DigitalOutputByte3	
EthorCAT I/O Monning	PSTX_Softstarter	digital_output_4	DigitalOutputByte4	%QB4.3	USINT	DigitalOutputByte4	
ancient to happing	PSTX_Softstarter	analog_output_1	AnalogOutputWord1	%QW4.2	UINT	AnalogOutputWord1	
'O mapping list	PSTX_Softstarter	analog_output_2	AnalogOutputWord2	%QW4.3	UINT	AnalogOutputWord2	
nformation	PSTX_Softstarter	analog_output_3	AnalogOutputWord3	%QW4.4	UINT	AnalogOutputWord3	
	PSTX_Softstarter	digital_input_1	DigitalInputByte1	%IB4.0	USINT	DigitalInputByte1	
	PSTX_Softstarter	digital_input_2	DigitalInputByte2	%IB4.1	USINT	DigitalInputByte2	
	PSTX_Softstarter	analog_input_1	AnalogInputWord1	%IW4.1	UINT	AnalogInputWord1	
	PSTX_Softstarter	analog_input_2	AnalogInputWord2	%IW4.2	UINT	AnalogInputWord2	
	PSTX_Softstarter	analog_input_3	AnalogInputWord3	%IW4.3	UINT	AnalogInputWord3	
	PSTX_Softstarter	analog_input_4	AnalogInputWord4	%IW4.4	UINT	AnalogInputWord4	
	PSTX_Softstarter	analog_input_5	AnalogInputWord5	%IW4.5	UINT	AnalogInputWord5	
	PSTX_Softstarter	analog_input_6	AnalogInputWord6	%IW4.6	UINT	AnalogInputWord6	
	PSTX_Softstarter	analog_input_7	AnalogInputWord7	%IW4.7	UINT	AnalogInputWord7	
	PSTX_Softstarter	analog_input_8	AnalogInputWord8	%IW4.8	UINT	AnalogInputWord8	
	PSTX_Softstarter	analog_input_9	AnalogInputWord9	%IW4.9	UINT	AnalogInputWord9	
	PSTX_Softstarter	analog_input_10	AnalogInputWord10	%IW4.10	UINT	AnalogInputWord10	
	PSTX_Softstarter	analog input 11	AnalogInputWord11	%IW4.11	UINT	AnalogInputWord11	

#### 5. Map the signals to variable names

### 3.4. Write a simple PLC program to control the softstarter

We perform the following steps for building our start-stop demo program in CoDeSys.

1. Open CoDeSys by double clicking your application in Devices file in Automation Builder, if it is not opened yet.



2. Open program window by double clicking the default program in POUs in CoDeSys.

CoDeSys - Application.AC500PRO File Edit Project Insert Extras Online Window Help File Edit Project Insert Extras Online Window Help File Project Insert Extras Online Window Help File Project Insert Extras Online Window Help File Edit Project Insert Extras Online Window Help

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 We choose to use LD as the language of the POU here by right click POUs -> Add Object...->Insert Name of the new POU -> Choose "LD" for "Language of the POU" -> OK

CoDeSys - Application.AC500PR	0			
File Edit Project Insert Extra	s Online Window Help	New POU		×
		Name of the new POU:	demo Language of the POU	OK Cancel
E∰ PLC_PRG (PRG)	Add Object Rename Object Edit Object Copy Object Delete Object	Program     Function Block     Function     Return Type:     BOOL	C IL C FBD C FFD C SFC C ST C CFC	

4. Select the first network, create a contact "START" (by CTRL+K and putting name at "???") and two coils "digital\_output\_1.0" and "digital\_output\_1.1" (by CTRL+L) in first network. We let data types as default by clicking OK directly in Declare Variable window. We set digital\_output\_1 bit 0 and 1 because we want to set TRUE for "Start" and "Stop", according to Section 1.6. The name digital\_output\_1 comes from end of Section 3.3 (map signals to variable names).

🍨 demo (PRG-LD)	
0001 PROGRAM demo 0002 VAR 0003 START: BOOL; 0004 END_VAR 0005	4
	digital_output_1.0
< III	4

5. Create a second network by CTRL+T

#### 6. Select the second network, add a coil for automode "digital\_output\_1.3" (by CTRL+L).

0001		
	START	digital_output_1.0
	├──┤ ├────	()
		digital_output_1.1
<u> </u>		
0002		
		digital_output_1.3
		()

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7. Now we want to create one control button for signing the value of "START" from the first network into TRUE. We do this by Visualization -> right click -> Add object -> Write name of the new Visualization as "view" -> OK

💊 CoDeSys - Application.AC500PRO	New Visualization		×
File Edit Project Insert Extras Online Window	He Name of the new Visualization:	view	OK
Visualizations  View  POUs  POUs  Visualizat  Resources			Cancel
	<u> </u>		

 We draw a shape as the button -> double click the shape -> Regular Element Configuration -> Input -> check Toggle variable -> insert "demo.START" -> OK

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9. We configure this program into task configuration by Resource -> Task configuration -> Right click Task configuration -> Append Task -> Insert t#10ms in Properties in Taskattributes. Then we need to sign our program to this task by right click NewTask-> Append Program Call-> Choose demo(PRG) by clicking the select button in Program Call -> OK.



10. Right click on the NewTask and select Append Program Call.

Task configuration     Task configuration     Task configuration     System events	<u>^</u>	Taskattribut	tes
B NewTask	Insert Task		1
	Append Program Call		i:
	Cut	Ctrl+X	
	Сору	Ctrl+C	
	Paste	Ctrl+V	heelin
	Delete	Del	red by
	Set Debug Task		red by
	Enable / disable task		es—
		Inter	rval (e.g

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11. Select the demo program call

	Fask configuration				
	I ask configuration Task configuration System events NewTask demo();		Program Call	demo();	
•	11	Ŧ	-		

### 3.5. Build and run the PLC demo program

Use the key, F11, to build the program once. Login and start project from Automation Builder by clicking Alt+F8 to login the CodeSys. Click yes to login



Click F5 to start. Switch to CoDeSys and click Alt+F8 to login demo. The program can be controlled with the view from CodeSys

🕹 demo (PRG-LD					
0001 START =	TRUE				
0003					
0004					
0006					1
STAR	т				digital_output_1.0
					digital_output_1.1
0002					
					digital_output_1.3
003					
0003					
0003					
<					2
<				_	,
<			ו		 
<					 ,
<					
<					
<		- 0 ×			
<		- 0 ×			
<	Start/Stop	-0×			
0003	Start/Stop				
<	Start/Stop				

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# 4. Additional Information

# 4.1. Listing of related documents

Ref #	Document Kind, Title	Document No.
1	PSTX – Installation and commissioning manual	1SFC132081M0201

# 5. Revisions

Rev.	Page (P) Chapt. (C)	Description	Date Dept./Init.		

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