

SOFTSTARTER TYPE PSTX

Anybus CompactCom PROFINET



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Cyber Security Legal Disclaimer

This product is designed to be connected to and to communicate information and data via a network interface. It is your sole responsibility to provide and continuously ensure a secure connection between the product and your network or any other network (as the case may be). You shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intreference, intrusion, leakage and/or theft of data or information.

Risk Mitigation and Secure Deployment

The idea is to create defence-in-depth protection for each network by allocating firewall solutions to the front of internal trusted networks of each network by manage firewalls, their configurations and access rules. The softstarter must be positioned in a trusted network, strictly limited and in a hosted portion of a network or control system. Configure firewalls according to the principle of denying everything that is not needed nor used. For secure remote access, use a VPN connection with an encryption layer to create a secure channel over an insecure network. It is recommended to implement a rate limiter either at device or network level. For more information regarding cyber security and risk mitigation, download the document Cyber security for ABB drives from the ABB library.



Information

The device uses the following UDP ports, 34962 (PROFINET RT Unicast), 34963 (PROFINET RT Multicast), 34969 (PROFINET RPC Context Manager), 53247 (PROFINET RPC Client/Server). These ports must be open in the firewall to enable communication between compatible devices.

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1. **PROFINET**

Profinet (Process Field Net) is an industry technical standard for data communication over Industrial Ethernet, designed for collecting data from, and controlling, equipment in industrial systems.

The Profinet protocol is a fieldbus protocol that provides full control and status information of the softstarter, reading as well as writing of parameters. Through the fieldbus 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 Profinet communication can be taken in operation following parameters must be set in the softstarter:

- Parameter 12.2 FB interface connector set to Anybus.
- Parameter 12.3 Fieldbus control set to **On** (This parameter can be set to **Off** if the fieldbus interface is only used to monitor the softstarter).



Information

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
GSDML-V2.31-ABB Control Products-PSTX- 20150225.xml	Device profile for the Anybus M30 module
GSDML-V2.35-ABB-Control-Products-PSTX- 20210326.xml	Device profile for the Anybus M40 module

Device Access Point (DAP) selection

Use the table below to select the correct Device Access Point (DAP) version. DAP v2.1 added support for S2 Redundancy and require softstarter firmware v1.40 together with Anybus Profinet v1.56 or later.

Softstarter firmware		
version		
Profinet module		
firmware version	v1.34 - v1.39	v1.40
v1.41	2.0	2.0
v1.56	2.0	2.1

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Information

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".



Caution!

The PSTX softstarter is conformant to PROFINET Class B specification and this implies that the softstarter supports the Simple Network Management Protocol (SNMP). By sending SNMP requests to the softstarter, it is possible to retrieve information about the network setup. To prevent outsiders to get information about the internal network, it is a strong recommendation to employ a firewall with the aim to block any undesired SNMP traffic to ports 161 and 162. With the Anybus Profinet M40 module, it is also strongly recommended to change the SNMP public community strings. With the Anybus M30 module, it is not possible to change the default values of the SNMP community strings.

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.

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1.1. Anybus module

The Anybus CompactCom PROFINET module is connected to the COM 1 interface on the PSTX softstarter. It can be used to control the softstarter, get status information, and to configure softstarter parameters.



1.1.1. Front view

Description of Ports and LEDs.

#	Item

- 1 Network Status LED
- 2 Module Status LED
- 3 Link/Activity LED (port 1)
- 4 Link/Activity LED (port 2)



1.1.2. Network Status LED

LED State	Description
Off	Offline, no power and no connection with IO Controller
Green	Online, Connection with IO Controller established, IO Controller in RUN state
Green, 1 flash	Online, connection with IO Controller established, IO Controller in STOP state or IO data bad, IRT Synchronization not finished
Green, blinking	Used by engineering tools to identify the node on the network
Red	Fatal error, major internal error (this indication is combined with a red module status LED)
Red, 1 flash	Station Name not set
Red, 2 flashes	IP address not set
Red, 3 flashes	Configuration error, expected identification differs from real identi- fication

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1.1.3. Module Status LED

LED State	Description
Off	No power or module in SETUP or NW_INIT state
Green	Normal operation, module has shifted from the NW_INIT state
Green, 1 flash	Diagnostic event(s) present
Red	Case 1: Exception error, device in state EXCEPTION Case 2: Fatal event, major internal error (this indication is combined with a red network status LED)
Alternating Red/Green	Firmware update, Do NOT power off the module, turning the mod- ule off during this phase could cause permanent damage

1.1.4. Link/Activity LED

LED State	Description
Off	No link, no communication present
Green	Link established, no communication present
Green, flickering	Link established, communication present

1.2. Software compatibility

PROFINET module AB6500-B is supported from PSTX_CB v1.34.6.

PROFINET module AB6968-B and AB6968-C is supported from PSTX_CB v1.36.2.

1.3. Digital input telegram

To PLC from softstarter. The input data is updated every 20 ms.

Word in input data area	Digital in- put byte	Bit	Data	Description
0	0	0	Auto Mode status ¹	0 = Softstarter control through fieldbus communication not al- lowed 1 = Softstarter control through fieldbus communication allowed
		1	Event status	0 = No active fault/warning/pro- tection 1 = Active fault/warning/protec- tion
		2	Ready to start	0 = A start will probably cause a fault 1 = A start will not cause a fault
		3	FBT Response 0	See section 2 Fieldbus Tasks
		4	FBT Response 1	See section 2 Fieldbus Tasks
		5	FBT Toggle Bit	See section 2 Fieldbus Tasks

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Word in input data area	Digital in- put byte	Bit	Data	Description
		6	Programmable Digital Input 1	Function of programmable digital input, see section 1.2
		7	Programmable Digital Input 2	
	1	8 (0)	Programmable Digital Input 3	
		9 (1)	Programmable Digital Input 4	_
		10 (2)	Programmable Digital Input 5	_
		11 (3)	Programmable Digital Input 6	_
		12 (4)	Programmable Digital Input 7	_
		13 (5)	Programmable Digital Input 8	_
		14 (6)	Programmable Digital Input 9	_
		15 (7)	Programmable Digital Input 10	_

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".

1.4. 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 feedback	Status of Slow speed forward signal
Start 1 feedback	Status of Start 1 signal
Start 2 feedback	Status of Start 2 signal
Start 3 feedback	Status of Start 3 signal

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Function	Data
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 In0 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	Status of forward pump cleaning
Pump cleaning backward sta- tus	Status of reverse pump cleaning
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

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Function	Data
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 contactor)	Same conditions as the Ready to start bit except that the incoming three phase voltage condition is excluded. The bit can be used when a line contactor is connected.

1.5. Analog input telegram

To PLC from the softstarter.

All analog data is represented as 16-bit values. The input data is updated every 20 ms.

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

Word in input data area	Analog input word	Data	Representation
1	0	FBT Return Value	See section 2 Fieldbus Tasks
2	1	Programmable Analog Input 1	Function of programma-
3	2	Programmable Analog Input 2	ble analog input, see
4	3	Programmable Analog Input 3	section 1.4
5	4	Programmable Analog Input 4	
6	5	Programmable Analog Input 5	
7	6	Programmable Analog Input 6	
8	7	Programmable Analog Input 7	
9	8	Programmable Analog Input 8	
10	9	Programmable Analog Input 9	
11	10	Programmable Analog Input 10	

1.6. 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 ¹	Value = 1000 ⇒ 100A
Phase L2 current ¹	Value = 1000 ⇒ 100A
Phase L3 current ¹	Value = 1000 ⇒ 100A
Active power (hp)	Value = 1000 ⇒ 10hp
Active power	Value = 1000 ⇒ 10kW
Apparent power	Value = $1000 \Rightarrow 10$ kVA

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Function	Representation		
Mains voltage	Value = $1000 \Rightarrow 100V$		
Power factor	Value = $100 \Rightarrow 1$		
	Example: $87 \Rightarrow 0.87$		
Motor voltage	Value = 100 ⇒ 100%		
Active energy (resettable)	Value = $1000 \Rightarrow 10$ kWh		
EOL time to trip	Value = 100 ⇒ 100s		
	Value = $65535 \Rightarrow$ No overload		
	Value – 0 ⇒ Trip already occurred		
Mains frequency	Value = 1000 ⇒ 100Hz		
	Value = 1000 ⇒ 100A		
Motor current	Value = 1000 ⇒ 100A		
Motor run time (resettable)	Value = 100 ⇒ 1000h		
Motor temperature	Value = 100 ⇒ 100°C		
Motor temperature percent	Value = 100 ⇒ 100%		
Number of starts (resettable)	Value = 1 ⇒ 100		
Phase sequence	Value = $0 \Rightarrow L1 - > L2 - > L3$		
	Value = $1 \Rightarrow L1 -> L3 -> L2$ Value = $2 \Rightarrow No sequence detected$		
PT100 tomporature	Value = $p \rightarrow p/10$ = 50%		
	Example: $750 \Rightarrow 25^{\circ}C$		
PTC resistance	Value = $100 \Rightarrow 100\Omega$		
Reactive energy (resettable)	Value = 1000 ⇒ 10kVArh		
Reactive power	Value = 1000 ⇒ 100kVAr		
Remaining time to start	Value = 100 ⇒ 100s		
Thyristor temperature	Value = 100 ⇒ 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 = 10 Value = $4 \Rightarrow$ 2-phase I 1 shorted		
	Value = $5 \Rightarrow 2$ -phase L2 shorted		
	Value = $6 \Rightarrow 2$ -phase L3 shorted		
Phase L1 current high range ²	Value = 100 ⇒ 100A		
Phase L2 current high range ²	Value = 100 ⇒ 100A		
Phase L3 current high range ²	Value = 100 ⇒ 100A		
Active power (hp) high range ²	Value = 100 ⇒ 100hp		
Active power high range ²	Value = 100 ⇒ 100kW		
Apparent power high range ²	Value = 100 ⇒ 100kVA		

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Function	Representation		
Reactive power high range ²	Value = 100 ⇒ 100kVAr		
Max phase current high range ²	Value = 100 ⇒ 100A		
Max motor current high range ²	Value = 100 ⇒ 100A		
Active energy high range ²	Value = 1 ⇒ 10000kWh		
Reactive energy high range ²	Value = 1 ⇒ 10000kVArh		
Number of starts (high precision)	Value = 1 ⇒ 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.

1.7. Digital output telegram

From PLC to the softstarter.

Word in output data area	Digital output byte	Bit	Data	Description
0	0	0	Start	Commence a start when signal is set
		1	Stop	Commence a stop when signal is ne- gated
		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 sig- nal is set
		5	Slow speed forward	Perform slow speed when signal is set
		6	Spare	
		7	Start1	Start1 if sequence start
	1	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
		11 (3)	Stand still brake	Perform stand still brake when signal is set
		12 (4)	Start reverse	Commence a reverse start when signal is set
		13 (5)	Spare	
		14 (6)	Emergency mode	Set to "1" to enable emergency mode
		15 (7)	FBT Toggle Bit	See Fieldbus Tasks

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Word in output	Digital output	Bit	Data	Description
1	2	16 (0)	User defined trip	Set to "1" to trigger user defined pro- tection
		17 (1)	Switch to remote control	Switch to remote control when signal is set (rising edge triggered)
		18 (2)	Pump cleaning au- tomatic	Perform automatic pump cleaning when signal is set
		19 (3)	Pump cleaning for- ward	Perform forward pump cleaning when signal is set
		20 (4)	Pump cleaning re- verse	Perform reverse pump cleaning when signal is set
		21 (5)	K4 relay command	Set "1" to activate the internal K4 out- put relay. Note that parameter 10.4 K4 function has to be set as "Fieldbus"
		22 (6)	K5 relay command	Set "1" to activate the internal K5 out- put relay. Note that parameter 10.5 K5 function has to be set as "Fieldbus"
		23 (7)	K6 relay command	Set "1" to activate the internal K6 out- put relay. Note that parameter 10.6 K6 function has to be set as "Fieldbus"
	3	24 (0)	1DO0 relay com- mand	Set "1" to activate the external 1DO0 output relay. Note that parameter 11.9 1DO0 function has to be set as "Fieldbus"
		25 (1)	1DO1 relay com- mand	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 com- mand	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 com- mand	Set "1" to activate the external 2DO3 output relay. Note that parameter 11.12 2DO3 function has to be set as "Fieldbus"
		28 (4)	Refresh parameters	Restart fieldbus interface to refresh communication parameters
		29 (5)	Spare	
		30 (6)	Spare	
		31 (7)	Spare	

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1.8. Analog output telegram

From PLC to the softstarter.

All analog data is represented as 16-bit values.

Word in output data area	Analog output word	Data	Representation
2	0	FBT Control Word	This register is used to read parameters (see fieldbus tasks)
3	1	Fieldbus AO 1 (FBT Argument 2 or In- ternal analog out- put)	Parameter 12.37 Fieldbus AO1 decides the use of this register. If set as "FBT Argument 2", it is used to write parameters and set time (see fieldbus tasks). If set as "Internal analog out- put" this value of this register controls the inter- nal analog output. Note that parameter 10.8 AO type needs to be set as "Fieldbus [%]"
4	2	Fieldbus AO 2 (FBT Argument 3 or Ex- ternal analog out- put)	Parameter 12.38 Fieldbus AO2 decides the use of this register. If set as "FBT Argument 3", it is used to write parameters and set time (see fieldbus tasks). If set as "External analog out- put" this value of this register controls the ex- ternal analog output. Note that parameter 11.14 1AO0 type needs to be set as "Fieldbus [%]"

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
-	Task ID	-	Argument 1

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2.2. Task ID

The task identifier controls which function should be performed.

Task ID	Task	Response ID		
		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.

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.

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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.

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	year	month	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	minute	seconds, bit 1-5

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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.

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^{numbers of decimals}.
- Parameter values that are written from the fieldbus needs to be multiplied by 10^{numbers of} 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 $50/10^2 = 0.5s$.

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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 $1*10^2 = 100$.
- 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.

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 $FFFFFE7_{hex}$. 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.

3. Configure SNMP community strings

For the M30 version of the Anybus Profinet module, only the read-only access is supported and only the default community string "public" can be used.

For the M40 version, both read-only and read-write access is supported, and the default community strings ("public" and "private") can be changed.

The community strings are only changed if parameter 12.39 Change SNMP community string is configured to "Yes". The community string that is set has eight characters and depends on the value of parameter 12.40 SNMP community string part 1 (which consist of the first 4 characters) and parameter 12.41 SNMP community string part 2 (which consist of the remaining 4 characters). These two parameters are of the data type uint32.

Below is a description of how a community string is configured:

In this example "ABB-PSTX" is the community string that shall be configured. First separate the string into two parts "ABB-" "PSTX".

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Then use an ASCII table to convert the strings to hexadecimal format "ABB-" is equal to 0x4142422D "PSTX" is equal to 0x50535458

Next step is to convert the hexadecimal numbers to decimal format 0x4142422D is equal to 1094861357 0x50535458 is equal to 1347638360

Set parameter 12.40 SNMP community string part one to 1094861357 and set parameter 12.41 SNMP community string part two to 1347638360.

"ABB-PSTX" or whichever community string that is configured will be used for both read-only and read-write access.

4. Configure ABB Automation Builder

This part of the document describes how to configure an ABB AC500 PLC using the CM579-PNIO module to control a PSTX softstarter with an Anybus Profinet module.

4.1. Create a new project

- 1. Open Automation Builder
- 2. Select File->New Project->AC500 project->OK.
- 3. Select the correct PLC CPU in the list and click "Add PLC".

Object name: pstx					
Categories	~	PM573			_
		Name	Short Description	n	Versio
		AC500 PM573-ETI	H AC500 CPU 51	2kB, Ethernet	2.7.0.
		<			>
Close this dialog after ea	ch transac	Display all version	5		
Reset filter			Add PLC	Close	

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4. 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.

Devices 👻 🖣 🗙	PLC_PSTX X			
	PM573-ETH Parameters	PLC	AC500 V2	
e- ∰ pstx_control App	PM573-ETH Hardware	PN	15хх Туре:	PM573-ETH ~
- 🗐 IO_Bus = 👦 Interfaces	Information	Те	rminal Base Type:	TB521-ETH V
COM1_Online_Access (COM1 - Online Access) COM2_Online_Access (COM2 - Online Access) FBP_Online_Access (FBP - Online Access) FBP]		Change PM / TB type
Ethernet TH1 (ETH1) Protocols (Protocols) Extension_Bus Slot_1 (TA524) Slot_2 (TA524)			Change to AC500 V3	PLC

5. Optional: Rename the project to for example "pstx" with File->Save Project As... and the Application to for example "pstx_control" by just clicking on it and rename.



4.2. Install the Profinet GSDML-file

1. Select Device Repository in the Tools menu.



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2. Select System Repository as Location and Click Install.

cation:	System Repository			•	Edit Locations
	(C:\ProgramData\AutomationBuilder\AB_	Devices_2.1)			
stalled de <u>v</u> i	ce descriptions:				
tring for a	fulltext search	Vendor:	All vendors>	•	Install
Name		Vendor	Version	Description	Uninstall
	lodbus				Export
	rofibus				Export
₽ <i>\</i> ## P	rofinet IO			=	
÷-1	Ethernet Adapter				
€ 5	F-Submodule				Renew device
· · · · · · · · · · · · · · · · · · ·	Profinet IO Device				repository
₩-#	Profinet IO Master				
=-///	Profinet IO Slave	APP OV	2700	Drofinat IO , abua far ADD Industry anacifia dri	
	ACQ810 PROFINET IO (FENA-11)	ABB OV	2.7.0.0	Profinet IO - slave for ABB Industry specific driv	
	ACQ810 PROFINET IO (FENA-21)	ADD UV	2.7.0.0	Profinet IO - slave for ARR General machinery c	
		ABB OV	2.7.0.0	Profinet IO - slave for ABB General machinery c	Details
	ACS355 PROFINET IO (FENA-21)	ABB OV	2.7.0.0	Profinet IO - slave for ABB General machinery c	
•				•	

 Select the GSDML-file that corresponds to the Anybus Profinet module: GSDML-V2.31-ABB Control Products-PSTX-20150225.xml - for the Anybus M30 module GSDML-V2.34-ABB-Control-Products-PSTX-20181105.xml - for the Anybus M40 module.

It is important to use the correct GSDML file (otherwise the communication will not work). Check the downside of the Anybus module. There it will be shown if the module is of type M30 or M40.

ocation:	System Repository				•	Edit Locations
	(C:\ProgramData\AutomationB	uilder\AB_Devices_2.	1)			
nstalled de <u>v</u> i	ice descriptions:					
String for a	fultext search	Vendor:	<all th="" vendors<=""><th>></th><th>•</th><th>Install</th></all>	>	•	Install
Name		Vendor	Version	Description	•	Uninstall
- (Standard Telegram 1	ABB	3.5.3.40	Control/Reference and Status/Actual values		Export
- 1	Standard Telegram 2	ABB	3.5.3.40	Control/Reference and Status/Actual values		Export
- 1	Vendor specific object, PPO3	ABB Drives	3.5.3.40	Control/Reference and Status/Actual values		
(Vendor specific object, PPO4	ABB Drives	3.5.3.40	Control/Reference, Status/Actual values + 4 IN/OUT words		
[Vendor specific object, PPO6	ABB Drives	3.5.3.40	Control/Reference, Status/Actual values + 8 IN/OUT words	=	Renew device
B - M PLC	S				-	repository
•	11	1				
=-1 C:\p	olc\Automation Builder\GSDML-V2.	34-ABB-Control-Prod	ucts-PSTX-2018	81105.xml		
- O C	Device "PSTX 2-port (DAP 2.0)" in	stalled to device repo	sitory.			
- 🚯 C	Device "Output" installed to device	repository.				
- 🚯 C	Device "Output" installed to device	repository.				Details
- O C	Device "Input" installed to device re	epository.				
🚯 🛛	Device "Input" installed to device re	epository.				

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4.3. Add the CM579-PNIO PROFINET IO controller module

1. Right click on the empty slot where the CM579-PNIO module is installed and select Add object. Then select CM579-PNIO in the Replace object window.

Devices	•	4 ×	Replace object : S	lot_1				Х
	TH - TB521-ETH) Iline_Access (COM1 - Online Access) Iline_Access (COM2 - Online Access) Iline_Access (FBP - Online Access) IETH1) Ilis (Protocols) IETH1 Ilis ICopy Iline Paste Ilis Copy Iline Paste Ilis Cut Ilis Cut Ilis Ilis Ilis Ilis Ilis Ilis Ilis Ilis		Object path: psb\Extension_ Object name: Categories	Bus\Slot_1 CM579_PNIO	CM579 Name CM579-ETHCAT CM579-ETHCAT CM579-PNIO	Short Description EtherCAT Module EtherCAT Module PROFINET IO controller module	Version 2.7.1.0 2.7.0.0 2.7.0.0	Orda 15A 15A
	Add object Update objects Add Folder Edit Object Compare Objects		Close this dialo	g after each transaction	< ☑ Display all versio	ns Replace object	Close	>

4.4. Setup IP-Addresses and station name

1. Double click the controller and setup IP-addresses for the master controller and a range for slaves in the same network.

Devices 👻 🕂 🗙	stx 🖓 CM579_PNIO 🧐 PNIO_Controller 🗙	
	PROFINET IO Controller Identification Assign IO-Device name IP-Address 192 168 0 1 I/O mapping list Default gateway 0	

2. Make sure that the PLC Profinet master module is connected to the Anybus Profinet module in PSTX slave.

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3. Go online with the PLC by clicking Alt+F8, and upload the PLC-program by selecting yes in prompt up window and run.



4. Scan for slaves to find the PSTX slave and select it.

🗐 PNIO_Controller 🗙										Ŧ
Diagnostics main			<u>`</u>							^
Diagnostics live list										
Diagnostics event log	Device name	Device type	IP address	MAC address	Vendor Id	Device Id	Device role	Network mask	Gateway address	
DDOEINET IO Controller		pstx	0.0.0.0	00-30-11-16-14-9C	388	10004	1	0.0.0.0	0.0.0.0	
PROFINEL TO CONTOILE										
Assign IO-Device name										
I/O mapping list										
	-									

5. Set IO-Device name and click Assign IO-Device name.

Device name	Device type	IP address	MAC address	Vendor Id	Device Id	Device role	Network mask	Gateway address	
pst×1	pstx	192.168.1.2	00-30-11-16-14-9C	388	10004	1	255.255.255.0	192.168.1.2	
Configure IO-Devi	ce name:	pstx1		\sim					
				- /					
Selected IO-Device	e type:	pstx			Assign IC	D-Device name		tart LED signal	
MAC address of se	elected IO-Device:	00-30-11	-16-14-9C						

6. Set IP address and network mask and click Assign IP configuration.

Configure IO-Device name:	pstx1 ~		
Selected IO-Device type:	pstx	Assign IO-Device name	Start LED signal
MAC address of selected IO-Device:	00-30-11-16-14-9C		
IP address:	(192.168.1.2 V		
Network mask:	255,255,255,0		
		Assign IP configuration	Factory reset
Gateway address:	192.168.1.2		
Parameter flag:	Assign configuration temporarily \sim		

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4.5. Add the PSTX slave

1. Right click on the newly installed Profibus_Master and select Add object.

evices		- 4 ×		pstx	CM5	79_PNIO	/ M PNIO_Controller X		
<i>pstx</i> pstx (PM573-ETH - TB521-ETH)			PROF	FINET IO	Controller		Identification		
pstx_control			Assi	gn IO-Dev	vice name		IP-Address	192 . 168 . 0 . 1	<u> </u>
IO_Bus			I/O n	mapping I	list		Subnetmask	255 . 255 . 255 . 0	Chédo
COM1_Online_Access	(COM1	Online Access)					Default gateway	0.0.0.0	
COM2_Online_Access	COM2	- Online Access)					Station name	controller	
ETH1 (ETH1)		inc Accessy					- Address settings for slaves -		
Extension Bus	s)						First IP-Address	192 . 168 . 0 . 2	
E CM579_PNIO (CM579	-PNIO)						Last IP-Address	192 . 168 . 0 . 254	
PNIO_Controller (T-IO-Controller)]				Subnetmask	255 . 255 . 255 . 0	
Slot_2 (TA524)	単田 (合)。	Paste					Default gateway	0.0.0.0	
	X	Cut							
	×	Delete							
		Rename							
		Add object							
		Update objects							
		Add Folder							
	D,	Edit Object							
		Compare Objects							
		Check configuration							

2. Select PSTX 2-port (DAP 2.0) found under Uncategorized and click Add object.

Add object below : PNIO_Controller		×
Object path: pstx\Extension_Bus\CM579_PNIO\PNIO Object name: PSTX_2_port_DAP_2_	_Controller 0	
Categories ~	Search object name	Q
Communication interface modules Communication modules Bot Controllers Scripting Uncategorized	Name CI502-PNIO-Device (legacy) CI504-PNIO-Device CI506-PNIO-Device CIFX Profinet Device CM589-PNIO-4-Device CM589-PNIO-Device DSQC688 FENA-01 FENA-02 FENA	Short Description 8DI/8DO/8DC PRO 3RS232/485 Serial 2xRS232/485, 1xCA PROFINET IO devic PROFINET IO devic
Close this dialog after each transaction	Display all versions	
Reset filter	Add object	Close

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3. Double click PSTX_2_port_DAP_2_0 in device tree. Click on General and change Station Name and IP Parameter.



The station name and IP parameters should match what you entered in section 3.4 "Setup IP-Addresses and slave station name".

4. Map the signals to variable names in I/O Mapping list for the object PSTX_2_port_DAP_2_0. For example:

Devices 👻 👎 🗙	pstx 🔡 CM579_PNIO	PNIO_Controller	Digital_Output 🗙 🙀 PSTX_2_p	ort_DAP_2_0		
	General	ं 🤊 ୯ 🗙 Clear mappings 🔳	7			
= I pstx_control		Object Name	Variable	Channel	Address	Туре
О Арр	PNIO Module I/O Mapping	Digital_Output	digital_output_1	Output	%QB1.0	USINT
IO_Bus	I/O mapping list	Digital_Output	digital_output_2	Output	%QB1.1	USINT
interfaces	yo mopping ise	Digital_Output	digital_output_3	Output	%QB1.2	USINT
COM1_Online_Access (COM1 - Online Access)	Information	Digital_Output	digital_output_4	Output	%QB1.3	USINT
COM2_Online_Access (COM2 - Online Access)						
FBP_Online_Access (FBP - Online Access)						
Ethernet						
ETH1 (ETH1)						
Protocols (Protocols)						
E Extension_Bus						
CM579_PNIO (CM579-PNIO)						
PNIO_Controller (PROFINET-IO-Controller)						
PSTX_2_port_DAP_2_0 (PSTX 2-port (DAP 2.0))						
Digital_Output (Digital Output)						
Analog_Output (Analog Output)						
Digital_Input (Digital Input)						
Analog_Input (Analog Input)						
Slot_2 (TA524)						

4.6. 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.



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

😼 CoDeSys - Application.AC500PR	0	New POU		×
File Edit Project Insert Extra	s Online Window Help	Name of the new POU:	demo	ОК
		Program G Security Plant		
E. PLC_PRG (PRG)	Add Object	O Function	CFBD	
	Rename Object	Return Type:	C SFC	
	Edit Object	BOOL	C ST	
	Copy Object		C CFC	
	Delete Object			

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 0. The name digital_output_1 comes from end of Section 4 (map signals to variable names).

🎭 demo (PRG-LD)	
0001 PROGRAM demo 0002 VAR	
0004 END_VAR	
• • • • • • • • • • • • • • • • • • •	•
0001 START	digital_output_1.0 ()
< III	4

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- 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 -()
0002		digital_output_1.3 ()

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.

🍤 📀	CoDeSy	/s - Appli	cation.A	C500PRC)			New Visualization		×
File	Edit	Project	Insert	Extras	Online	Window	He	Name of the new Visualization:	view	OK
	↓ ≣	③ ~~		¥ 🗖	¥ 🖻	¥ 🖻			,	Cancel
	Visualia vie	w	types 🛱) Visualiz	at 률 F	Resources				

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

Regular Element Config	uration (#0)	×
Category: Bitmap Text Text variables Colorvariables Variables Input Text for tooltip Security Programmability	Input demo.START Tap variable demo.START Tap variable Tap FALSE Zoom to vis.:	OK Cancel

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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	^	Taskattribut	tes
🕑 NewTask	Insert Task		
	Append Program Call		
	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.

Sector Se			
Task configuration System events NewTask	Program Call	dema():	
4	-		L

4.7. 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.

denio (FRO-ED)	
001 START = TRUE 002	
003	
005	
START	digital_output_1.0
	digital output 1.1
02	
	digital_output_1.3
	_
03	
03	
03	
03	
03 2 view	
os 2 view	,
a view	,
a view	,
az view	
23	
2 view Start/Stop	
2 view	,

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5. Contact us

For more information, please contact your local ABB representative or visit https://solutions.abb/softstarters

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