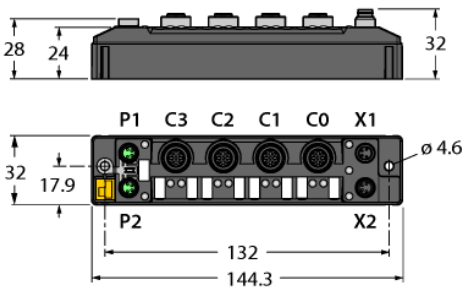
Compact Multiprotocol I/O Module for Ethernet
4 Analog Outputs, Configurable as Voltage or Current
TBEN-S2-4AO



Type	TBEN-S2-4AO
ID	6814028
Supply	
Supply voltage	24 VDC
Admissible range	18…30 VDC Total current max. 4 A per voltage group Total current V1 + V2 max. 5.5 A at 70 °C per module
Voltage supply connection	2 × M8, 4-pin, A-coded
Operating current	V1: min. 50 mA, max. 110 mA V2: min.30 mA, max. 70 mA
Sensor/actuator supply	supply of ports C0-C3 from V2 not short-circuit proof, max. 4 A per group C0-C3
Electrical isolation	galvanic isolation of the voltage groups V1 and V2, voltages up to 500 VAC
System data	
Fieldbus transmission rate	10/100 Mbps
Fieldbus connection technology	2 × M8, 4-pin
Protocol detection	automatic
Web server	default: 192.168.1.254
Service interface	Ethernet via P1 or P2
ARGEE functionality	Supported
ARGEE Engineering Version	2.0.25.0
Modbus TCP	
Addressing	Static IP, DHCP
Supported function codes	FC1, FC2, FC3, FC4, FC5, FC6, FC15, FC16, FC23
Number of TCP connections	8
Input register start address	0 (0x0000 hex)
Output register start address	2048 (0x0800 hex)

- PROFINET device, EtherNet/IP device, Modbus TCP server, CC-Link IE field basic
- Integrated Ethernet switch
- Supports 10 Mbps/100 Mbps
- 2 × M12, 4-pin, D-coded, Ethernet fieldbus connection
- PROFINET S2 system redundancy
- Glass fiber reinforced housing
- Shock and vibration tested
- Fully potted module electronics
- Protection classes IP65, IP67, IP69K
- 4-pin M8 male connector for power supply
- Galvanically isolated voltage groups
- ATEX Zone 2/22
- Each channel can be selected for voltage
- Output ranges:
- Voltage: 0/1…5 V, +/-10 V, 0/2…10 V
- Current: 0/4…20 mA
- Programmable ARGEE

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Ethernet/IP	
Addressing	acc. to EtherNet/IP specification
Quick Connect (QC)	< 500 ms
min. RPI	2 ms
Device Level Ring (DLR)	supported
Class 3 connections (TCP)	3
Class 1 connections (CIP)	10
Input Assembly Instance	103
Output Assembly Instance	104
Configuration Assembly Instance	106

PROFINET	
Version	2.35
Addressing	DCP
Conformance class	B (RT)
MinCycleTime	1 ms
Fast Start-Up (FSU)	< 500 ms
Diagnostics	acc. to PROFINET alarm handling
Topology detection	supported
Automatic addressing	supported
Media Redundancy Protocol (MRP)	supported
System redundancy	S2
Netload class	3

CC-Link	
Interface	CC-Link IE Field Basic
Type	Intelligent device station
Message Transmission	Yes
Profile specification	CSP+
Max. occupied stations	2
IP change mechanism	Yes
Acyclic SLMP communication	Yes

Analog outputs	
Number of channels	4
Operating modes	Voltage, current
Resolution	16 bit

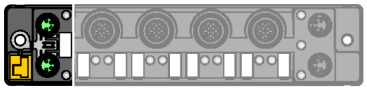
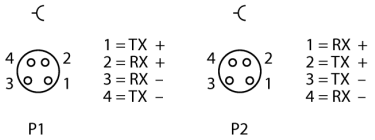
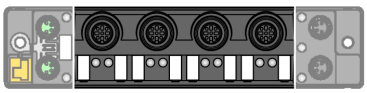
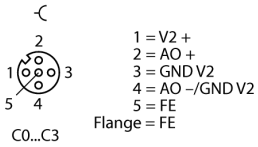
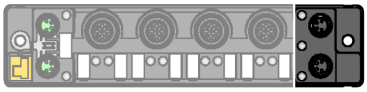
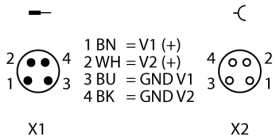
Operating mode voltage	
Load resistor	1 kΩ
Output signal type	Common ground
Output signal range	0...10V, +/- 10V, 2...10V, 0...5V, 1...5V
Cycle time	4 ms
Basic error at 25 °C	0.1 %
Repeat accuracy	0.05 %
Temperature coefficient	< 20 ppm/°C
Error total (FSR)	< 0.23 %

Operating mode current	
Load resistance	600 Ω
Output signal type	Common ground
Output signal range	0…20 mA, 4…20 mA
Cycle time	4 ms
Basic error at 25 °C	0.15 %
Repeat accuracy	0.05 %
Temperature coefficient	< 20 ppm/°C
Error total (FSR)	≤ 0.28 %

Standard/Directive conformity	
Vibration test	Acc. to EN 60068-2-6 Acceleration up to 20 g
Shock test	acc. to EN 60068-2-27
Drop and topple	acc. to EN 60068-2-31/IEC 60068-2-32
Electromagnetic compatibility	Acc. to EN 61131-2
Approvals and certificates	CE and UKCA FCC statement, UV resistant acc. to DIN EN ISO 4892-2A (2013)
UL Certificate	cULus LISTED 21 W2, Encl.Type 1 IND.CONT.EQ.
Note on ATEX/IECEx	The Quick Start Guide with information on use in Ex Zones 2 and 22 must be observed.

General Information	
Dimensions (W x L x H)	32 x 144 x 32 mm
Ambient temperature	-40…+70 °C
Storage temperature	-40…+85 °C
Altitude	Max. 5000 m
Protection class	IP65 IP67 IP69K
MTTF	244 years acc. to SN 29500 (Ed. 99) 20 °C
Housing material	PA6-GF30
Housing color	Black
Connector material	Nickel-plated brass
Material label	Polycarbonate
Halogen-free	yes
Mounting	2 mounting holes □ 4.6 mm

	Note the numbering of the IO range: From firmware version 3.0.2.0 and higher ports C0 to C3 and channels CH0 to CH3 are counted. For more details on the corresponding change see manual.

	**Note** We strongly recommend only using ready-made Ethernet cables!	M8 x 1 Ethernet 
	**Operating Mode: Voltage and Current**	M12 x 1 I/O Port 
		M8 x 1 Voltage Supply 

Module Status LED

LED	Color	Status	Description
ETH1 / ETH2	Green	ON	Ethernet link (100 Mbps)
		flashing	Ethernet communication (100 Mbps)
	Yellow	ON	Ethernet link (10 Mbps)
		flashing	Ethernet communication (10 Mbps)
		OFF	No Ethernet link
BUS	Green	ON	Active connection to a master
		Flashing	Steady flashing: Ready Sequence of 3 flashes in 2 seconds: FLC/ARGEE active
	Red	ON	IP address conflict or Restore Mode or Modbus timeout
		Flashing	Blink/Wink command active
	Red/ Green	Alternating	Waiting for assignment of an IP address, DHCP or BootP
		OFF	Power off
ERR	Green	On	No diagnostics available
	Red	On	Diagnostics available Undervoltage diagnosis response is parameter dependent
PWR	Green	On	V_1 and V_2 power supply OK
	Red	On	V_2 power supply off or V_2 undervoltage
		Off	V_1 power supply off or V_1 undervoltage

LED Status I/O

LED	Color	Status	Description
AO 0…3	Green	ON	Output active
	Red	flashing ~4Hz	Voltage: Short-circuit at output Current: Wire-break at output
		OFF	Input inactive

Process Data Mapping of the Single Protocols

For more details on the corresponding protocols see manual.

Modbus TCP register mapping

	Reg	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Outputs (RO)	0x0800	Channel 0 MSB											Channel 0 LSB				
	0x0801	Channel 1 MSB											Channel 1 LSB				
	0x0802	Channel 2 MSB											Channel 2 LSB				
	0x0803	Channel 3 MSB											Channel 3 LSB				
Diag LSB channel 0 MSB channel 1	0x0000							WBR	OVL							WBR	OVL
LSB channel 2 MSB channel 3	0x0001							WBR	OVL							WBR	OVL
Status (RO)	0x0002		FCE					V1		V2							DIAG

EtherNet/IP data mapping

	Word	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Input data (station -> scanner)																	
Status word	0x0000		FCE					V1		V2							DIAG
Diag LSB channel 0 MSB channel 1	0x0001							WBR	OVL							WBR	OVL
LSB channel 2 MSB channel 3	0x0002							WBR	OVL							WBR	OVL
Output data (scanner -> station)																	
Status word	0x0000																
Outputs	0x0001	Channel 0 MSB											Channel 0 LSB				
	0x0002	Channel 1 MSB											Channel 1 LSB				
	0x0003	Channel 2 MSB											Channel 2 LSB				
	0x0004	Channel 3 MSB											Channel 3 LSB				

PROFINET process data

	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Outputs	0x00		Channel 0 LSB						
	0x01		Channel 0 MSB						
	0x02		Channel 1 LSB						
	0x03		Channel 1 MSB						
	0x04		Channel 2 LSB						
	0x05		Channel 2 MSB						
	0x06		Channel 3 LSB						
	0x07		Channel 3 MSB						
Diag channel 0	0x08							WBR	OVL
Diag channel 1	0x09							WBR	OVL
Diag channel 2	0x0A							WBR	OVL
Diag channel 3	0x0B							WBR	OVL
Status	0x0C	V2							DIAG
	0x0D		FCE					V1	

Key:

V1	Undervoltage V1	CFG	I/O configuration error
V2	Undervoltage V2	FCE	I/O-ASSISTANT Force Mode active
Cx	Port x	Px	Pin x
I/ODiag	I/O diagnostics connected		
Diag	Diagnostic at least on 1 channel		
CJE	Cold junction error	RTDSC	Overcurrent (RTD only)
ULVE	Upper limit value exceeded	V1AOL	Overcurrent supply VAUX1
WBR	Wire-break	OFL	Overflow
UFL	Underflow	LLVU	Lower limit value underrun
OVL	Overload		

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