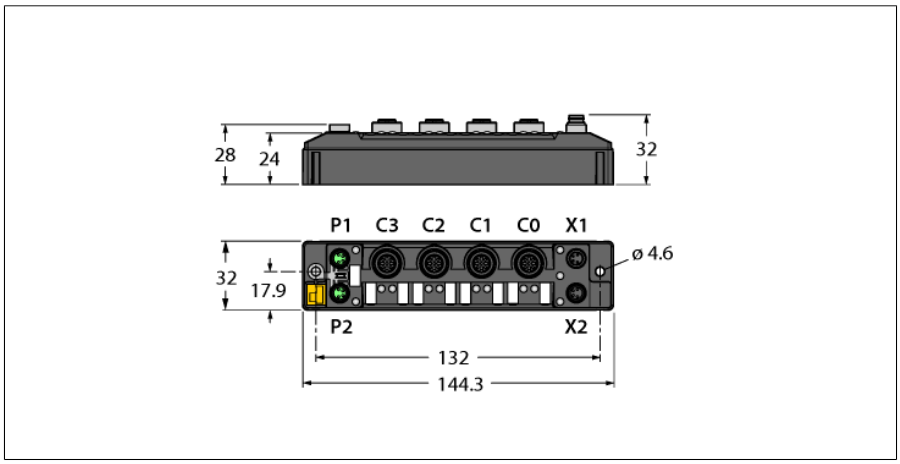
Compact Multiprotocol I/O Module for Ethernet
4 Analog Outputs, Configurable as Voltage or Current
TBEN-S2-4AO



- **PROFINET device, EtherNet/IP device or Modbus TCP slave**
- **Integrated Ethernet switch**
- **Supports 10 Mbps / 100 Mbps**
- **2x M8, 4-pin, Ethernet fieldbus connection**
- **Glass fiber reinforced housing**
- **Shock and vibration tested**
- **Fully potted module electronics**
- **Protection classes IP65, IP67, IP69K**
- **M8, 4-pin connector for power supply**
- **Galvanically isolated voltage groups**
- **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**
- **FLC/ARGEE programmable**

Type designation	TBEN-S2-4AO
Ident no.	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
Operating current	V1: min. 50 mA, max. 110 mA V2: min.30 mA, max. 70 mA
Sensor/Actuator supply V_{AUX2}	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 Mbps/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
Field Logic Controller (FLC)	
ARGEE Firmware Version	3.0.2.0
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)
Ethernet/IP	
Addressing	acc. to EtherNet/IP specification
Quick Connect (QC)	< 500 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

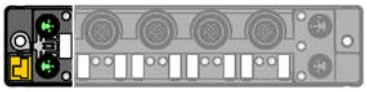
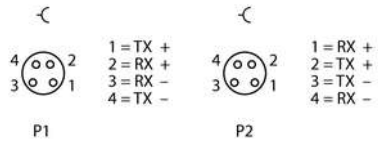
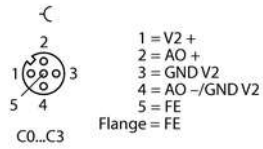
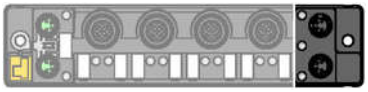
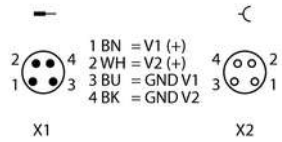
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PROFINET	
Addressing	DCP
Conformance class	B (RT)
MinCycleTime	1 ms
Fast Start-Up (FSU)	< 500 ms
Diagnostics	acc. to PROFINET alarm handling
Topology detection	supported
Automatic addressing	supported
Media Redundancy Protocol (MRP)	supported
Analog 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 resistor	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	acceleration to 20 g acc. to EN 60068-2-6
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, FCC, UV-resistant in accordance with DIN EN ISO 4892-2A (2013)
UL Certificate	cULus LISTED 21 W2, Encl.Type 1 IND.CONT.EQ.
General Information	
Dimensions (W x L x H)	32 x 144 x 32mm
Operating temperature	-40…+70 °C
Storage temperature	-40 °C … +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
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.

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	**Note** It is strongly recommended to use only ready-made Ethernet cables! Ethernet cable (example): M8-M8: ID number 6630376 PSG4M-0,2-PSG4M/TXN ID number 6934033 PSGS4M-PSGS4M-4416-1M M8-RJ45: ID number 6935342 PSGS4M-RJ45S-4416-1M M8-M12: ID number 6935351 RSSD-PSGS4M-4416-2M	M8 x 1 Ethernet 
	**Operating Mode: Voltage and Current**	M12 x 1 I/O Port 
	**Note** Power supply cable (example): M8-M8 ID number 6627044 PKG4M-0,2-PSG4M/TXL ID number 6626679 PKG4M-4-PSG4M/TXL	M8 x 1 Voltage Supply 

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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 diagnosis is present
	Red	On	Diagnosis is pending V_2 undervoltage diagnosis is parameter-dependent
PWR	Green	ON	V_1 and V_2 power on
	Red	ON	V_2 power off or below defined tolerance of 18 V
		OFF	V_1 power off or below defined tolerance of 18 V

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

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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 1 MSB Channel 2	0x0000							WBR	OVL							WBR	OVL
LSB Channel 3 MSB Channel 4	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 1 MSB channel 2	0x0001							WBR	OVL							WBR	OVL
LSB channel 3 MSB channel 4	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 1	0x08							WBR	OVL
Diag Channel 2	0x09							WBR	OVL
Diag Channel 3	0x0A							WBR	OVL
Diag Channel 4	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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