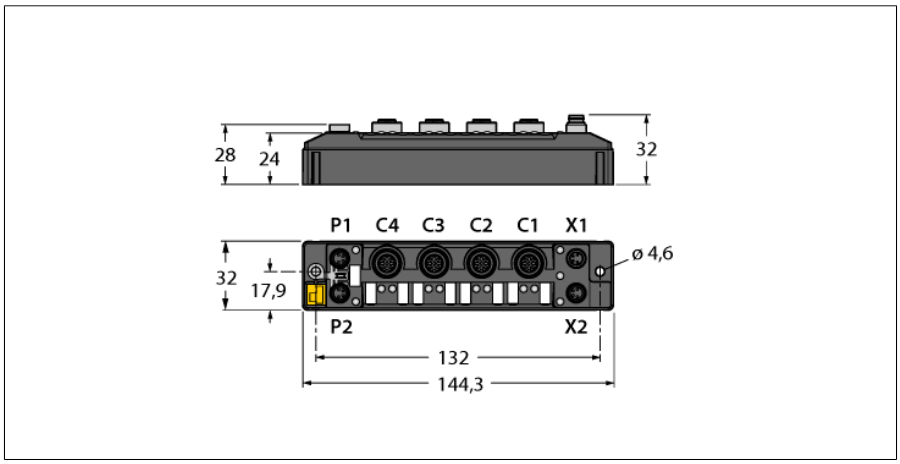
PRELIMINARY

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



- **Each channel can be selected for voltage or current**
- **Output ranges:**
- **Voltage: 0 / 1…5 V, +/-10 V, 0 / 2…10 V**
- **Current: 0 / 4…20 mA**
- **Male M8, 4-pin, for power supply**
- **Separated power groups for safety shutdown**
- **Glass-fiber reinforced housing**
- **Shock and vibration tested**
- **Fully potted module electronics**
- **Protection classes IP65 / IP67 / IP69K**

Type code	TBEN-S2-4AO
Ident no.	6814028
Supply	
Supply voltage	24 VDC
Admissible range	18…30 VDC Total current max. 4A per voltage group
Operating current	< 150 mA
Sensor/Actuatorsupply V_{AUX2}	Slots C1-C4 powered by V2; Not short-circuit proof, max. 4 A per group C1-C4
Electrical isolation	V1 and V2 voltage groups galvanically isolated, voltages up to 500 VDC
System data	
Fieldbus transmission rate	10 Mbps / 100 Mbps
Fieldbus connection technology	2 x M8, 4-pin
Protocol detection	automatic
Web server	integrated
Service interface	Ethernet via P1 or P2
Modbus TCP	
Addressing	Static IP, BOOTP, DHCP
Supported function codes	FC1, FC2, FC3, FC4, FC5, FC6, FC15, FC16, FC23
Simultaneous CIP connections	8
EtherNet/IP™	
Addressing	acc. to EtherNet/IP™ specification
Quick Connect (QC)	< 500 ms
Device Level Ring (DLR)	supported
Simultaneous CIP connections	3
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

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Operation Mode Voltage	
Load resistor	> 1 kΩ
Output signal	differenziell
Measurement type	0...10V +/- 10V, 2... 10V, 0...5V, 1...5V
Zykluszeit	<= 4 ms
Basic error at 25 °C	< 0.1 %
Wiederholgenauigkeit	0.05 %
Temperaturkoeffizient	<20ppm/°C
Error total (FSR)	+/- 0,15%

Operation Mode Current	
Load resistor	< 600 Ω
Ausgangssignalart	differenziell
Measurement type	0...10V +/- 10V, 2... 10V, 0...5V, 1...5V
Zykluszeit	<= 4 ms
Basic error at 25 °C	< 0.15 %
Wiederholgenauigkeit	0.05 %
Temperaturkoeffizient	<20ppm/°C
Error total (FSR)	+/- 0,20%

Conformance of Standard and Directives	
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 IEC 60068-2-31/IEC 60068-2-32 1
Electro-magnetic compatibility	acc. to EN 61131-2
Approvals and certificates	CE
UL conditions	cULus LISTED 21 W2, Encl.Type 1 IND.CONT.EQ.

General Information	
Dimensions (W x L x H)	32x144x31mm
Operating temperature	-40 … +70 °C
Storage temperature	-40 … +70 °C
Altitude	max.5000 m
IP Rating	IP65 IP67 IP69K
Housing material	PA6-GF30
Housing color	black
halogen-free	yes
Mounting	2 mounting holes □ 4.6 mm

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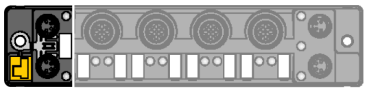
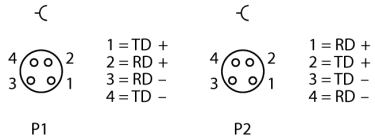
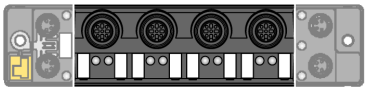
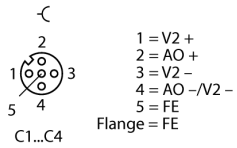
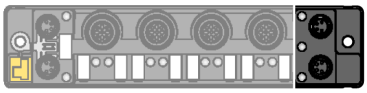
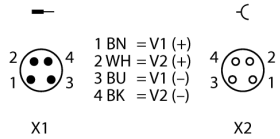
Industrial Automation

	**Note** It is strongly recommended to use only ready-made Ethernet cables! Ethernet cable (example): M8-M8: PSGS4M-PSGS4M-4414-1M Ident. no. 6932993 M8-RJ45: PSGS4M-RJ45S-4414-1M Ident. no.: 6933004 M8-M12: RSSD-PSGS4M-4414-2M Ident. no.: 6933008	Ethernet M8 x 1 
	**Operating mode: voltage** Operating mode voltage/current	I/O port M12 x 1 
	**Note** Power supply cable (example): M8-M8 4 m PKG4M-4-PSG4M/TXL Ident. no. 6626679	Voltage supply M8 x 1 

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Module LED status

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	ready
	red	on	IP-address conflict or Restore Mode or Modbus timeout
		flashing	Blink/Wink command active
		off	Power off
ERR	green	on	Diagnostics disabled
	red	on	Diagnostics enabled
PWR	green	on	V_1 and V_2 power on
	red	on	V_2 power off or below defined tolerance
		off	V_1 power off or below defined tolerance

LED status IOs

LED	Color	Status	Description
LED AO1 … 4	Green	ON	Output active
	Red	Flashing ~4 Hz	Voltage: Short-circuit at output Current: Wire-break at output
		OFF	Input inactive

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Process data mapping of 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 1 MSB								Channel 1 LSB							
	0x0801	Channel 2 MSB								Channel 2 LSB							
	0x0802	Channel 3 MSB								Channel 3 LSB							
	0x0803	Channel 4 MSB								Channel 4 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	0x0001		FCE					V1		V2							DIAG
Diag LSB Channel 1 MSB Channel 2	0x0002							WBR	OVL							WBR	OVL
LSB Channel 3 MSB Channel 4	0x0003							WBR	OVL							WBR	OVL
Output (Scanner -> Station)																	
Status Word	0x0001																
Outputs	0x0002	Channel 1 MSB								Channel 1 LSB							
	0x0003	Channel 2 MSB								Channel 2 LSB							
	0x0004	Channel 3 MSB								Channel 3 LSB							
	0x0005	Channel 4 MSB								Channel 4 LSB							

PROFINET Process Data

	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Outputs	0x00	Channel1 LSB							
	0x01	Channel1 MSB							
	0x02	Channel2 LSB							
	0x03	Channel2 MSB							
	0x04	Channel3 LSB							
	0x05	Channel3 MSB							
	0x06	Channel4 LSB							
	0x07	Channel4 MSB							
Diag Channel1	0x08							WBR	OVL
Diag Channel2	0x09							WBR	OVL
Diag Channel3	0x0A							WBR	OVL
Diag Channel4	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)
TOOR	Temperature out of range	V1AOL	Overcurrent supply VAUX1
WBR	Wire-break	OFL	Overflow
UFL	Underflow	OOR	Measured value out of range
OVL	Overload		

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