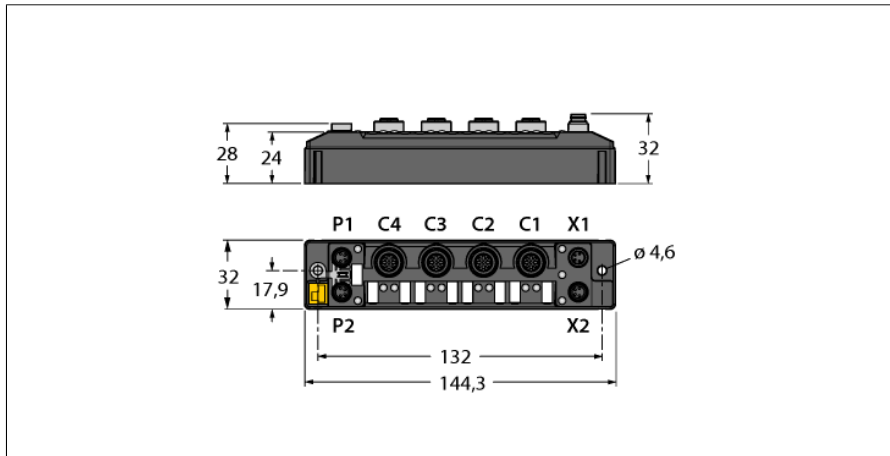


Compact multiprotocol I/O module for Ethernet
4 Analog Inputs, Configurable as Voltage, Current, RTD or Thermocouple
TBEN-S2-4AI



- Each channel can be selected for voltage, current, RTD, resistance, thermocouple
- Measuring ranges:
 - Voltage: +/-500 mV, +/-100 mV, +/-50 mV, +/-1 V, 0 / 1-5 V, +/-10 V, 0 / 2-10 V,
 - Current: 0 / 4 ... 20 mA, +/-20 mA
 - RTD: PT100, NI100, PT200, PT500, PT1000, NI1000
 - Resistance: 0 ...100 / 200 / 400 / 1000 Ohm
 - Thermocouples: Type B, C, E, G, J, K, N, R, S, T
- Inputs differential or common reference
- Male M8, 4-pin, for power supply
- Glass-fiber reinforced housing
- Shock and vibration tested
- Fully potted module electronics
- Protection classes IP65 / IP67 / IP69K

Type code	TBEN-S2-4AI
Ident no.	6814025
Supply	
Supply voltage	24 VDC
Admissible range	18...30 VDC
	Total current max. 4A per voltage group
Operating current	< 150 mA
Sensor/Actuatorsupply V_{AUX1}	Slots C1-C4 powered by V1
	Short-circuit proof, max. 1 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 inputs	
Number of channels	4
Operating modes	Voltage, current, RTD, resistance, thermocouple
Resolution	16 bit
Basic error at 25 °C	< 0.1 %
Repeatability	< 0.015 %
Temperature coefficient	< 100 ppm/°C of full scale

Compact multiprotocol I/O module for Ethernet

4 Analog Inputs, Configurable as Voltage, Current, RTD or Thermocouple

TBEN-S2-4AI

Operation Mode Voltage

EingangsfILTER	standard, smooth, fast, off
Max. Eingangsspannung	11.85 V
Load resistor	> 100 K Ω
Eingangssignalarten	differential, single ended, differential without ground
Measurement type	0...10V, +/-10V, 2...10V, 0...5V, 1...5V, +/-1V +/-500mV, +/-100mV, +/-50mV
Netzunterdrückung	keine, 50Hz, 60Hz

Operation Mode Current

EingangsfILTER	standard, smooth, fast, off
Max. Eingangsstrom	23 mA
Load resistor	< 50 Ω
Eingangssignalarten	differential, single ended, differential without ground
Measurement type	0...20mA, 4...20mA, +/-20mA
Netzunterdrückung	keine, 50Hz, 60Hz

Operation Mode RTD/Resistor

Temperature scale	°Celsius, °Fahrenheit
Measurement type	PT 100 -200°C..850°C, PT 100 -200°C..150°C PT 200 -200°C..850°C, PT 200 -200°C..150°C PT 500 -200°C..850°C, PT 500 -200°C..150°C PT 1000 -200°C..850°C, PT 1000 -200°C..150°C NI 100 -60°C..250°C, NI 100 -60°C..150°C NI 1000 -60°C..250°C, NI 1000 -60°C..150°C 0...100Ohm, 0...400Ohm, 0...2kOhm, 0...4kOhm
Anschlussarten	2-wire, 3-wire, 4-wire
EingangsfILTER	standard, smooth

Operation Mode Thermocouple

Temperature scale	°Celsius, °Fahrenheit
Measurement type	Type K -270...1370°C, Type B 100...1820°C Type E -270...1000°C, Type J -210...1200°C Type N -270...1300°C, Type R -50...1768°C Type S -50...1768°C, Type T -270...400°C Type C 0...2315°C, Type G 0...2315°C
EingangsfILTER	standard, smooth
Kaltstellenkompensation	none, PT100, PT1000, Channel1

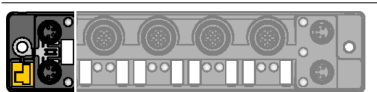
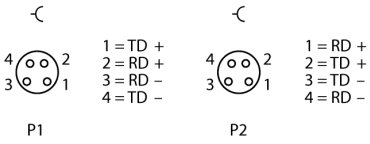
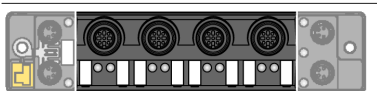
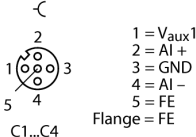
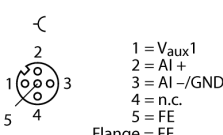
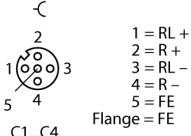
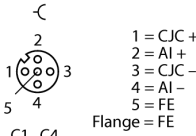
Conformance of Standard and Directives

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.

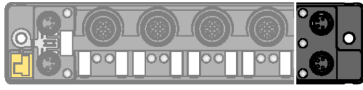
General Information

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 \square 4.6 mm

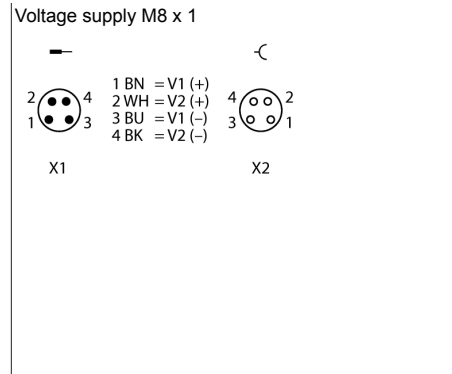
Compact multiprotocol I/O module for Ethernet
4 Analog Inputs, Configurable as Voltage, Current, RTD or Thermocouple
TBEN-S2-4AI

	<p>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</p>	<p>Ethernet M8 x 1</p> 
	<p>Operating mode: voltage Operating mode voltage/current</p>	<p>I/O port M12 x 1</p>  <p>Common ground</p> 
	<p>Operating mode: RTD/Resistance</p>	<p>I/O port M12 x 1</p> 
	<p>Operating mode: Thermocouple</p>	<p>I/O port M12 x 1</p> 

Compact multiprotocol I/O module for Ethernet
4 Analog Inputs, Configurable as Voltage, Current, RTD or Thermocouple
TBEN-S2-4AI



Note
 Power supply cable (example):
 M8-M8 4 m
 PKG4M-4-PSG4M/TXL
 Ident. no. 6626679



Compact multiprotocol I/O module for Ethernet

4 Analog Inputs, Configurable as Voltage, Current, RTD or Thermocouple

TBEN-S2-4AI

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	off	V ₁ power off or below defined tolerance

LED status IOs

LED	Color	Status	Description
Operating mode voltage/current LED AI1...4	Green	on	Input active
		Red	Flashing (~0.5Hz)
	Flashing (~4 Hz)		Measuring range exceeded
	ON		Overload of the slot supply V _{aux1}
	OFF	Input inactive	
Operating mode RTD/Resistance LED AI1...4	Green	ON	Input active
		Red	Flashing (~0.5Hz)
	Flashing (~4 Hz)		Measured value out of range
	ON		Short-circuit
	OFF	Input inactive	
Operating mode Thermocouple LED AI1...4	Green	ON	Input active
		Red	Flashing (~0.5Hz)
	Flashing (~4 Hz)		Measured value out of range
	ON		Error cold-junction compensation
	OFF	Input inactive	

Compact multiprotocol I/O module for Ethernet
4 Analog Inputs, Configurable as Voltage, Current, RTD or Thermocouple
TBEN-S2-4AI

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
Inputs (RO)	0x0000	Channel 1 MSB								Channel 1 LSB							
	0x0001	Channel 2 MSB								Channel 2 LSB							
	0x0002	Channel 3 MSB								Channel 3 LSB							
	0x0003	Channel 4 MSB								Channel 4 LSB							
Diag LSB Channel 1 MSB Channel 2	0x0004	OOB	UFL	OFL	WBR	V1AOL	TOOR	RTD-SC	CJE	OOB	UFL	OFL	WBR	V1AOL	TOOR	RTD-SC	CJE
LSB Channel 3 MSB Channel 4	0x0005	OOB	UFL	OFL	WBR	V1AOL	TOOR	RTD-SC	CJE	OOB	UFL	OFL	WBR	V1AOL	TOOR	RTD-SC	CJE
Status (RO)	0x0006		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
Inputs (RO)	0x0001	Channel 1 MSB								Channel 1 LSB							
	0x0002	Channel 2 MSB								Channel 2 LSB							
	0x0003	Channel 3 MSB								Channel 3 LSB							
	0x0004	Channel 4 MSB								Channel 4 LSB							
Diag LSB Channel 1 MSB Channel 2	0x0005	OOB	UFL	OFL	WBR	V1AOL	TOOR	RTD-SC	CJE	OOB	UFL	OFL	WBR	V1AOL	TOOR	RTD-SC	CJE
LSB Channel 3 MSB Channel 4	0x0006	OOB	UFL	OFL	WBR	V1AOL	TOOR	RTD-SC	CJE	OOB	UFL	OFL	WBR	V1AOL	TOOR	RTD-SC	CJE

PROFINET Process Data

	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Inputs	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	OOB	UFL	OFL	WBR	V1AOL	TOOR	RTDSC	CJE
Diag Channel2	0x09	OOB	UFL	OFL	WBR	V1AOL	TOOR	RTDSC	CJE
Diag Channel3	0x0A	OOB	UFL	OFL	WBR	V1AOL	TOOR	RTDSC	CJE
Diag Channel4	0x0B	OOB	UFL	OFL	WBR	V1AOL	TOOR	RTDSC	CJE
Status	0x0C	V2							
	0x0D	FCE							

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	OOB	Measured value out of range
OVL	Overload		