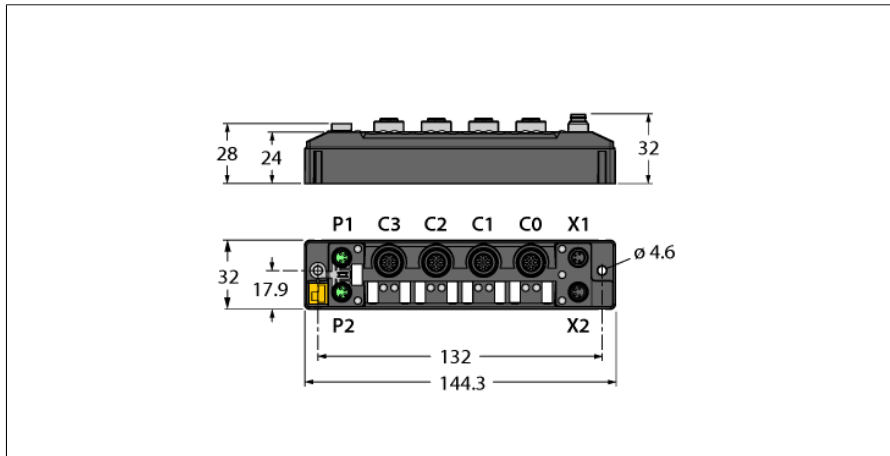


# Compact Multiprotocol I/O Module for Ethernet

## 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
- 4-pin M8 male 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

<b>Type designation</b>	TBEN-S2-4AO
Ident no.	6814028
<b>Supply</b>	
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
Electrical isolation	not short-circuit proof, max. 4 A per group C0-C3
	galvanic isolation of the voltage groups V1 and V2, voltages up to 500 VAC
<b>System data</b>	
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
<b>Field Logic Controller (FLC)</b>	
ARGEE Firmware Version	3.0.2.0
ARGEE Engineering Version	2.0.25.0
<b>Modbus TCP</b>	
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)
<b>Ethernet/IP</b>	
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

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

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#### Analog outputs

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

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#### Operating mode voltage

Load resistor	1 k $\Omega$
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)	$\leq$ 0.23%

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#### Operating mode current

Load resistor	600 $\Omega$
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)	$\leq$ 0.28 %

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#### 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.

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#### General Information

Dimensions (W x L x H)	32 x 144 x 32mm
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
Male connector material	Nickel-plated brass
Material label	Polycarbonate
Halogen-free	yes
Mounting	2 mounting holes $\square$ 4.6 mm

## Compact Multiprotocol I/O Module for Ethernet

### 4 Analog Outputs, Configurable as Voltage or Current

#### TBEN-S2-4AO

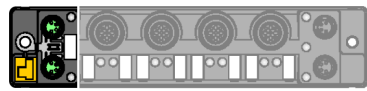
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Note the numbering of the IO range:  
From firmware version 3.0.2.0 and higher ports C0 to C3 and channels CH0 to CH3 are counted. For more details on the corresponding change see manual.

# Compact Multiprotocol I/O Module for Ethernet

## 4 Analog Outputs, Configurable as Voltage or Current

### TBEN-S2-4AO



#### 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

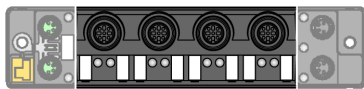
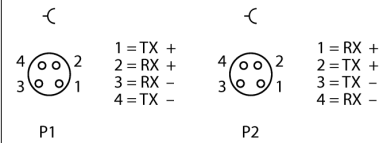
M8-RJ45:

ID number 6935342 PSGS4M-RJ45S-4416-1M

M8-M12:

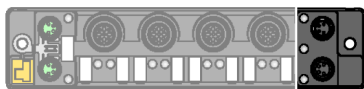
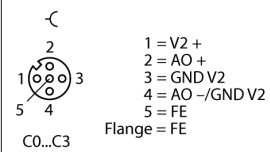
ID number 6935351 RSSD-PSGS4M-4416-2M

#### M8 x 1 Ethernet



#### Operating Mode: Voltage and Current

#### M12 x 1 I/O Port



#### Note

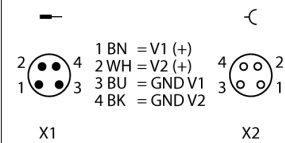
Power supply cable (example):

M8-M8

ID number 6627044 PKG4M-0,2-PSG4M/TXL

ID number 6626679 PKG4M-4-PSG4M/TXL

#### M8 x 1 Voltage Supply



## Compact Multiprotocol I/O Module for Ethernet

### 4 Analog Outputs, Configurable as Voltage or Current

#### TBEN-S2-4AO

#### 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 <sub>1</sub> and V <sub>2</sub> power supply OK
	Red	On	V <sub>2</sub> power supply off or below defined threshold of 18 V
		Off	V <sub>1</sub> power supply off or below defined threshold of 18 V

#### LED Status I/O

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

# Compact Multiprotocol I/O Module for Ethernet

## 4 Analog Outputs, Configurable as Voltage or Current

### TBEN-S2-4AO

#### 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	0x0000							WBR	OVL							WBR	OVL
LSB Channel 1																	
MSB Channel 2																	
LSB Channel 3	0x0001							WBR	OVL							WBR	OVL
MSB Channel 4																	
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	0x0001							WBR	OVL							WBR	OVL
LSB channel 1																	
MSB channel 2																	
LSB channel 3	0x0002							WBR	OVL							WBR	OVL
MSB channel 4																	
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						
	0x0D		FCE					V1	DIAG

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		