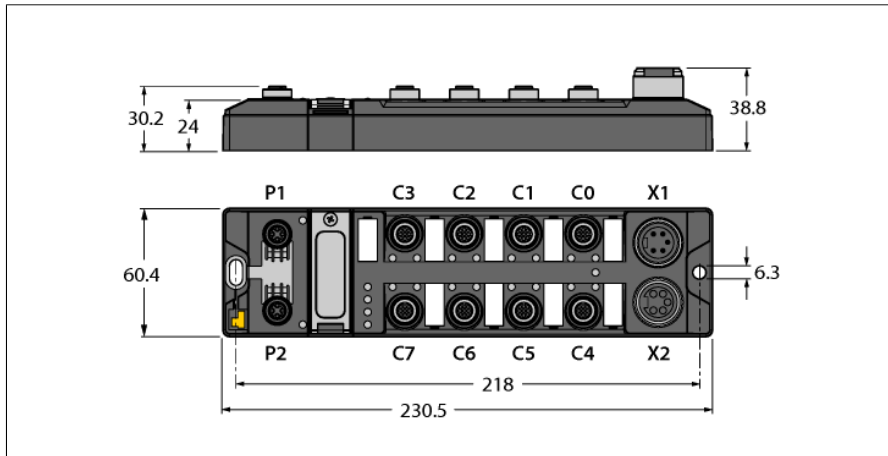


Compact Multiprotocol I/O Module for Ethernet

16 Universal Digital Channels, Configurable as PNP Inputs or 2 A Outputs

TBEN-L5-16DXP



- PROFINET device, EtherNet/IP device or Modbus TCP slave
- 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
- 7/8" male connector for power supply, 5-pin
- Galvanically isolated voltage groups
- ATEX Zone 2/22
- Input diagnostics per port
- Max. 2 A per output
- Output diagnostics per channel
- Two freely selectable digital channels per port
- Programmable ARGEE

Type	TBEN-L5-16DXP
ID	6814088
Supply	
Supply voltage	24 VDC
Admissible range	18...30 VDC
	Total current max. 9 A per voltage group
	Total current V1 + V2 max. 11 A
Voltage supply connection	5-pin male 7/8" connector X1
Sensor/actuator supply	supply of ports C0-C3 from V1
	short-circuit proof, 120 mA per port
Sensor/actuator supply	supply of ports C4-C7 from V2
	short-circuit proof, 120 mA per port
Electrical isolation	galvanic isolation of the voltage groups V1 and V2, voltages up to 500 VAC
Power dissipation, typical	≤ 10 W
System data	
Fieldbus transmission rate	10/100 Mbps
Fieldbus connection technology	2 x M12, 4-pin, D-coded
Protocol detection	automatic
Web server	Default: 192.168.1.254
Service interface	Ethernet via P1 or P2
BEEP functionality	Supported
Field Logic Controller (FLC)	
ARGEE Firmware Version	3.2.9.0
ARGEE Engineering Version	2.0.24.0
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)	< 150 ms
Device Level Ring (DLR)	supported
Class 3 connections (TCP)	3
Class 1 connections (CIP)	10
Input Assembly Instance	101
Output Assembly Instance	102
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)	< 150 ms
Diagnostics	acc. to PROFINET alarm handling
Topology detection	supported
Automatic addressing	supported
Media Redundancy Protocol (MRP)	supported
System redundancy	S2
Netload class	3

Digital inputs

Number of channels	16
Connectivity inputs	M12, 5-pin
Input type	PNP
Type of input diagnostics	Group diagnostics
Switching threshold	EN 61131-2 Typ 3, PNP
Low level signal voltage	< 5 V
High level signal voltage	> 11 V
Low level signal current	< 1.5 mA
High level signal current	> 2 mA
Input delay	2.5 ms
Electrical isolation	Galvanically isolated to the fieldbus Voltage proof up 500 VDC

Digital outputs

Number of channels	16
Connectivity outputs	M12, 5-pin
Output type	PNP
Type of output diagnostics	Channel diagnostics
Output voltage	24 VDC from potential group
Output current per channel	2.0 A, short-circuit proof, max. 2.0 A per port
Output delay	1.3 ms
Load type	EN 60947-5-1: DC-13
Short-circuit protection	yes
Electrical isolation	Galvanically isolated to the fieldbus Voltage proof up 500 VDC

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, FCC, FM Class I, Zone 2, UV-resistant in accordance with 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.

Compact Multiprotocol I/O Module for Ethernet

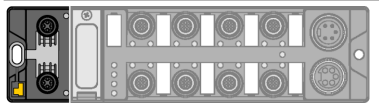
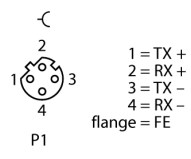
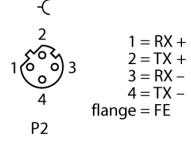
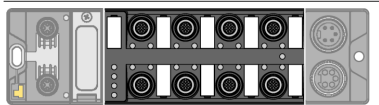
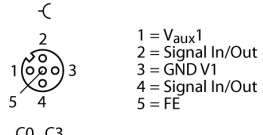
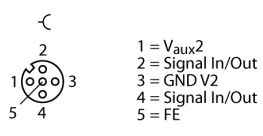
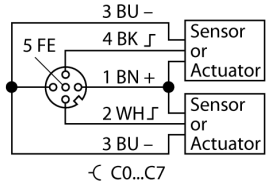
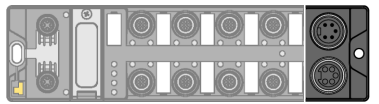
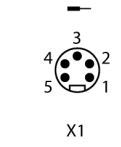
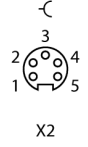
16 Universal Digital Channels, Configurable as PNP Inputs or 2 A Outputs

TBEN-L5-16DXP

General Information

Dimensions (W x L x H)	60.4 x 230.5 x 38.8 mm
Ambient temperature	-40...+70 °C
Storage temperature	-40...+85 °C
Altitude	Max. 5000 m
Protection class	IP65 IP67 IP69K
MTTF	148 years acc. to SN 29500 (Ed. 99) 20 °C
Housing material	PA6-GF30
Housing color	Black
Male connector material	Nickel-plated brass
Window material	Lexan
Material screw	303 stainless steel
Material label	Polycarbonate
Halogen-free	yes
Mounting	2 mounting holes Ø 6.3 mm

Compact Multiprotocol I/O Module for Ethernet
16 Universal Digital Channels, Configurable as PNP Inputs or 2 A Outputs
TBEN-L5-16DXP

	<p>Accessories Ethernet cable (example): RSSD RSSD 441-2M Ident no. U-02482</p>	<p>M12 x 1 Ethernet</p>  <p>P1</p>  <p>P2</p>
	<p>Accessories Accessories: Connection cable , 2-channel (example): RK 4.4T-2-RS 4.4T Ident no. U2445 Splitter, 1-channel (example): YB2-FSM 4.5-2FKM 4.5 Ident no. U0875-78</p>	<p>M12 x 1 I/O Port</p>  <p>C0...C3</p>  <p>C4...C7</p>  <p>⊖ C0...C7</p>
	<p>Accessories Power supply cable (example): RSM RKM 50-2M Ident no. U2282-0</p>	<p>7/8" Power Supply</p>  <p>X1</p>  <p>X2</p>

Compact Multiprotocol I/O Module for Ethernet

16 Universal Digital Channels, Configurable as PNP Inputs or 2 A Outputs

TBEN-L5-16DXP

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 for operation Sequence of 3 flashes in 2 seconds: FLC/ARGEE active
		Off	No connection to a master
	Red	On	IP address conflict or Restore mode or Modbus timeout
		Flashing	Blink/Wink command active
	Green/red	Alternating	Autonegotiation and/or waiting for DHCP/Boot-P addressing
	Off	Power off	
ERR	Green	On	No diagnostics available
	Red	On	Diagnostics available Undervoltage diagnosis response is parameter dependent
	LED response master in the Beep network:		
	Green	1 Hz, 250 ms off	Cyclical IO data exchange
	Red/green	1 Hz, 250 ms red	Cyclical IO data exchange, diagnostics available
	Green/red	1 Hz, alternating	Discovery mode active
	Red		Discovery mode active, diagnostics available
PWR	LED response parameter (PWR) at V_2 undervoltage = "red"		
	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 response parameter (PWR) at V_2 undervoltage = "green"		
	Green	On	V_1 and V_2 power supply OK
		Flashing	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
LED 0 ... 15	Green	ON	Input or output active
	Red	ON	Output active with overload/short circuit
		flashing	Power overload at the corresponding port. Both port LEDs are flashing.
		OFF	Input or output inactive

Compact Multiprotocol I/O Module for Ethernet

16 Universal Digital Channels, Configurable as PNP Inputs or 2 A Outputs

TBEN-L5-16DXP

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
Inputs (RO)	0x0000	DI15 C7P2	DI14 C7P4	DI13 C6P2	DI12 C6P4	DI11 C5P2	DI10 C5P4	DI9 C4P2	DI8 C4P4	DI7 C3P2	DI6 C3P4	DI5 C2P2	DI4 C2P4	DI3 C1P2	DI2 C1P4	DI1 C0P2	DI0 C0P4
Status (RO)	0x0001	-	FCE	-	-	CFG	COM	V1	-	V2	-	-	-	-	-	-	Diag Warn
Diag (RO)	0x0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	I/O Diag
Outputs (RW)	0x0800	DO15 C7P2	DO14 C7P4	DO13 C6P2	DO12 C6P4	DO11 C5P2	DO10 C5P4	DO9 C4P2	DO8 C4P4	DO7 C3P2	DO6 C3P4	DO5 C2P2	DO4 C2P4	DO3 C1P2	DO2 C1P4	DO1 C0P2	DO0 C0P4
I/O Diag (RO)	0xA000	SCO7	SCO6	SCO5	SCO4	SCO3	SCO2	SCO1	SCO0	SCS7	SCS6	SCS5	SCS4	SCS3	SCS2	SCS1	SCS0
I/O Diag (RO)	0xA001	-	-	-	-	-	-	-	-	SCO15	SCO14	SCO13	SCO12	SCO11	SCO10	SCO9	SCO8

EtherNet/IP™ data mapping with activated scheduled diagnostics, default settings

	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)																	
GW status	0	-	FCE	-	-	CFG	COM	V1	-	V2	-	-	-	-	-	-	Diag Warn
Inputs	1	DI15 C7P2	DI14 C7P4	DI13 C6P2	DI12 C6P4	DI11 C5P2	DI10 C5P4	DI9 C4P2	DI8 C4P4	DI7 C3P2	DI6 C3P4	DI5 C2P2	DI4 C2P4	DI3 C1P2	DI2 C1P4	DI1 C0P2	DI0 C0P4
Diag 1	2	-	-	Sched Diag	-	-	-	-	-	-	-	-	-	-	-	-	I/O Diag
Diag 2	3	SCO7	SCO6	SCO5	SCO4	SCO3	SCO2	SCO1	SCO0	SCS7	SCS6	SCS5	SCS4	SCS3	SCS2	SCS1	SCS0
Diag 3	4	-	-	-	-	-	-	-	-	SCO15	SCO14	SCO13	SCO12	SCO11	SCO10	SCO9	SCO8
Output data (scanner -> station)																	
Control	0	reserved															
Outputs	1	DO15 C7P2	DO14 C7P4	DO13 C6P2	DO12 C6P4	DO11 C5P2	DO10 C5P4	DO9 C4P2	DO8 C4P4	DO7 C3P2	DO6 C3P4	DO5 C2P2	DO4 C2P4	DO3 C1P2	DO2 C1P4	DO1 C0P2	DO0 C0P4

EtherNet/IP™ data mapping with activated summarized diagnostics

	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)																	
GW status	0	-	FCE	-	-	CFG	COM	V1	-	V2	-	-	-	-	-	-	Diag Warn
Inputs	1	DI15 C7P2	DI14 C7P4	DI13 C6P2	DI12 C6P4	DI11 C5P2	DI10 C5P4	DI9 C4P2	DI8 C4P4	DI7 C3P2	DI6 C3P4	DI5 C2P2	DI4 C2P4	DI3 C1P2	DI2 C1P4	DI1 C0P2	DI0 C0P4
Diag 1	2																I/O Diag
Output data (scanner -> station)																	
Control	0	reserved															
Outputs	1	DO15 C7P2	DO14 C7P4	DO13 C6P2	DO12 C6P4	DO11 C5P2	DO10 C5P4	DO9 C4P2	DO8 C4P4	DO7 C3P2	DO6 C3P4	DO5 C2P2	DO4 C2P4	DO3 C1P2	DO2 C1P4	DO1 C0P2	DO0 C0P4

PROFINET process data

	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Inputs	0	DI8 C4P2	DI7 C4P4	DI6 C3P2	DI5 C3P4	DI4 C2P2	DI3 C2P4	DI2 C1P2	DI1 C1P4
	1	DI16 C8P2	DI15 C8P4	DI14 C7P2	DI13 C7P4	DI12 C6P2	DI11 C6P4	DI10 C5P2	DI9 C5P4
Outputs	0	DO8 C4P2	DO7 C4P4	DO6 C3P2	DO5 C3P4	DO4 C2P2	DO3 C2P4	DO2 C1P2	DO1 C1P4
	1	DO16 C8P2	DO15 C8P4	DO14 C7P2	DO13 C7P4	DO12 C6P2	DO11 C6P4	DO10 C5P2	DO9 C5P4

Key:

DIx	Digital input channel x	CFG	I/O Configuration error
DOx	Digital output channel x	FCE	I/O-ASSISTANT Force Mode active
Cx	Port x	I/O Diag	I/O diagnostics connected
Px	Pin x	SchedDiag	Manufacturer-specific diagnostics configured and active
DiagWarn	Diagnostic at least on 1 channel	SCSx	Short-circuit at port x
V1	Undervoltage V1	SCG1	Short-circuit supply ports C0-C3

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V2	Undervoltage V2	SCG2	Short-circuit supply ports C4-C7
COM	Communication error on internal module bus	SCOx	Short-circuit output channel x

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Accessories

Type code	Ident-No.		Dimension drawing
TB-SG-L	100014865	Protective housing for TBEN-L and TBIL-M block I/O modules for use in ATEX Zone 2/22	