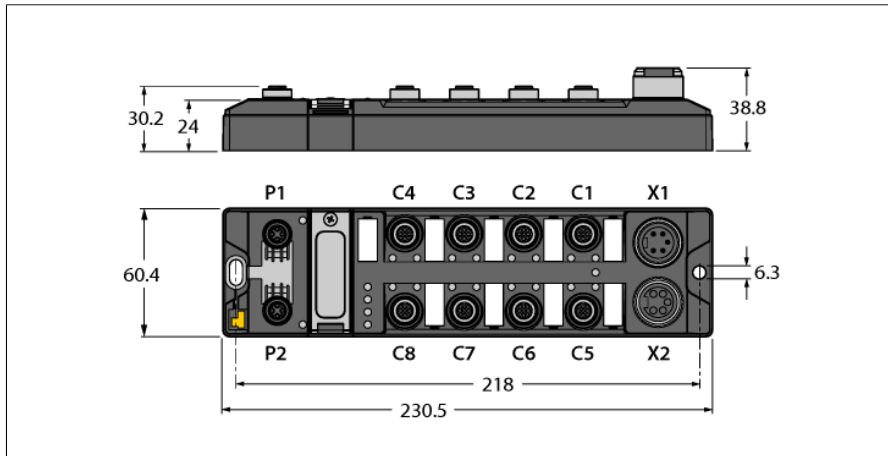


Compact multiprotocol I/O module for Ethernet

16 digital channels, configurable as 2 A PNP inputs or outputs

TBEN-L1-16DXP



- EtherNet/IP™, Modbus® TCP, or PROFINET® slave
- Integrated Ethernet switch
- Supports 10 Mbps/100 Mbps
- 2 x M12, 4-pin, D-coded, Ethernet fieldbus connection
- Glass-fiber reinforced housing
- Shock and vibration tested
- Potted module electronics
- Protection classes IP67 / IP69K
- 7/8" males, 5-pin, for power supply
- Separated power groups for safety shutdown
- Input diagnostics per port
- Max. 2 A per output
- Output diagnostics per channel
- Two freely selectable digital channels per port

Type code	TBEN-L1-16DXP
Ident-No.	6814008
Supply	
Supply voltage	24 VDC
Admissible range	18...30 VDC
Sensor/Actuator supply V_{AUX1}	Total current max. 9 A per voltage group supply of slots C1-C4 from V1 short-circuit proof, 120mA per slot
Sensor/Actuator supply V_{AUX2}	supply of slots C5-C8 from V2 short-circuit proof, 120mA per slot
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 x M12, 4-pin, D-coded
Protocol detection	automatic
Web server	default: 192.168.1.254
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
Number of TCP connections	8
EtherNet/IP™	
Addressing	acc. to EtherNet/IP™ specification
Quick Connect (QC)	< 150 ms
Device Level Ring (DLR)	supported
Number of TCP connections	3
Number of CIP connections	10
PROFINET	
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

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Industrial
Automation

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
Potential separation	galvanic isolation to P1/P2 , voltages up to 500 VDC

Digital outputs

Number of channels	16
Connectivity outputs	M12, 5-pol
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
Simultaneity factor	0.56
Output delay	1.3 ms
Load type	resistive, inductive, lamp load
Short-circuit protection	yes
Potential separation	galvanic isolation to P1/P2 , voltages up to 500 VDC

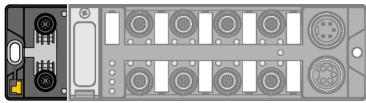
Standard/Directive conformity

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
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

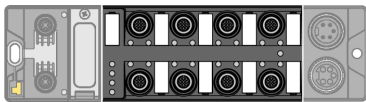
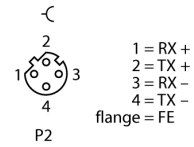
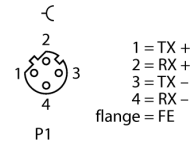
Dimensions (W x L x H)	60.4 x 230.4 x 39mm
Operating temperature	-40...+70 °C
Storage temperature	-40...+70 °C
Altitude	max.5000 m
Protection class	IP65 IP67 IP69K
MTTF	148 years
Housing material	PA6-GF30
Housing color	black
Window material	Lexan
Screw material	303 stainless steel
Halogen-free	yes
Mounting	2 mounting holes □ 6.3 mm

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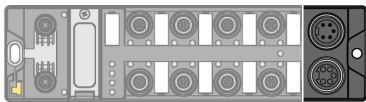
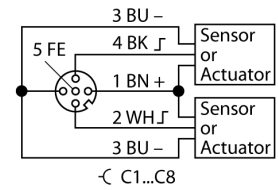
Accessories
 Ethernet cable (example):
 RSSD RSSD 441-2M
 Ident no. U-02482

Ethernet M12 x 1



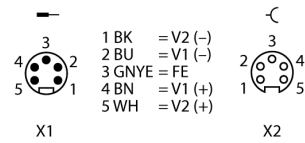
Accessories
 Accessories:
 Connection cable , 2-channel (example):
 RK 4.4T-2-RS 4.4T
 Ident no. U2445
 Splitter, 1-channel (example):
 YB2-FSM 4.5-2FKM 4.5
 Ident no. U0875-78

I/O Port M12 x 1



Accessories
 Power supply cable (example):
 RSM RKM 50-2M
 Ident no. U2282-0

Power Supply 7/8"



Compact multiprotocol I/O module for Ethernet
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Industrial
Automation

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	Power supply V ₁ and V ₂ OK
	Red	ON	Power supply V ₂ off or below defined tolerance of 18 V
		OFF	Power supply V ₁ off or below defined tolerance of 18 V

LED Status I/O

LED	Color	Status	Description
LED 1 ... 16	green	ON	Input or output active
		flashing	Power overload at the corresponding port Both port LEDs are flashing.
	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

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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
Inputs (RO)	0x0000	DI16 C8P2	DI15 C8P4	DI14 C7P2	DI13 C7P4	DI12 C6P2	DI11 C6P4	DI10 C5P2	DI9 C5P4	DI8 C4P2	DI7 C4P4	DI6 C3P2	DI5 C3P4	DI4 C2P2	DI3 C2P4	DI2 C1P2	DI1 C1P4
Status (RO)	0x0001	-	FCE	-	-	CFG	COM	V1	-	V2	-	-	-	-	-	-	Diag Warn
Diag (RO)	0x0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	I/O Diag
Outputs (RW)	0x0800	DO16 C8P2	DO15 C8P4	DO14 C7P2	DO13 C7P4	DO12 C6P2	DO11 C6P4	DO10 C5P2	DO9 C5P4	DO8 C4P2	DO7 C4P4	DO6 C3P2	DO5 C3P4	DO4 C2P2	DO3 C2P4	DO2 C1P2	DO1 C1P4
I/O Diag (RO)	0xA000	SCO8	SCO7	SCO6	SCO5	SCO4	SCO3	SCO2	SCO1	SCS8	SCS7	SCS6	SCS5	SCS4	SCS3	SCS2	SCS1
I/O Diag (RO)	0xA001	-	-	-	-	-	-	-	-	SCO16	SCO15	SCO14	SCO13	SCO12	SCO11	SCO10	SCO9

EtherNet/IP™ data mapping with activated scheduled 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	1	-	FCE	-	-	CFG	COM	V1	-	V2	-	-	-	-	-	-	Diag Warn
Inputs	2	DI16 C8P2	DI15 C8P4	DI14 C7P2	DI13 C7P4	DI12 C6P2	DI11 C6P4	DI10 C5P2	DI9 C5P4	DI8 C4P2	DI7 C4P4	DI6 C3P2	DI5 C3P4	DI4 C2P2	DI3 C2P4	DI2 C1P2	DI1 C1P4
Diag 1	3	-	-	Sched Diag	-	-	-	-	-	-	-	-	-	-	-	-	I/O Diag
Diag 2	4	SCO8	SCO7	SCO6	SCO5	SCO4	SCO3	SCO2	SCO1	SCS8	SCS7	SCS6	SCS5	SCS4	SCS3	SCS2	SCS1
Diag 3	5	-	-	-	-	-	-	-	-	SCO16	SCO15	SCO14	SCO13	SCO12	SCO11	SCO10	SCO9
Output (Scanner -> Station)																	
Control	1	reserved															
Outputs	2	DO16 C8P2	DO15 C8P4	DO14 C7P2	DO13 C7P4	DO12 C6P2	DO11 C6P4	DO10 C5P2	DO9 C5P4	DO8 C4P2	DO7 C4P4	DO6 C3P2	DO5 C3P4	DO4 C2P2	DO3 C2P4	DO2 C1P2	DO1 C1P4

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	1	-	FCE	-	-	CFG	COM	V1	-	V2	-	-	-	-	-	-	Diag Warn
Inputs	2	DI16 C8P2	DI15 C8P4	DI14 C7P2	DI13 C7P4	DI12 C6P2	DI11 C6P4	DI10 C5P2	DI9 C5P4	DI8 C4P2	DI7 C4P4	DI6 C3P2	DI5 C3P4	DI4 C2P2	DI3 C2P4	DI2 C1P2	DI1 C1P4
Diag 1	3																I/O Diag
Output (Scanner -> Station)																	
Control	1	reserved															
Outputs	2	DO16 C8P2	DO15 C8P4	DO14 C7P2	DO13 C7P4	DO12 C6P2	DO11 C6P4	DO10 C5P2	DO9 C5P4	DO8 C4P2	DO7 C4P4	DO6 C3P2	DO5 C3P4	DO4 C2P2	DO3 C2P4	DO2 C1P2	DO1 C1P4

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 C1-C4

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V2	Undervoltage V2	SCG2	Short-circuit supply ports C5-C8
COM	Communication error on internal module bus	SCOx	Short-circuit output channel x
SPEx	Spanner port active		