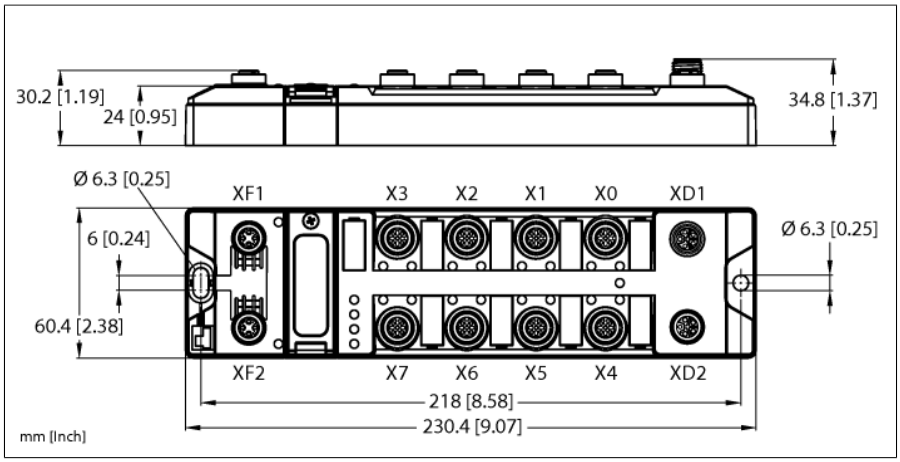
Compact multiprotocol I/O module for Ethernet
8 IO-Link Master Channels
4 Universal Digital PNP Channels, 2 A, Channel Diagnostics
TBEN-LL-8IOL



Type	TBEN-LL-8IOL
ID	100003910

Supply	
Supply voltage	24 VDC
Admissible range	18…30 VDC Pass-through current XD1–XD2 max. 16 A per voltage group Total current max. 9 A per voltage group Total current V1 + V2 max. 11 A
Voltage supply connection	M12, L-coded
Operating current	V1: max. 180 mA, min. 120 mA V2: min. 40 mA, max. 90 mA mA
Sensor/actuator supply	Supply from V1 Short-circuit proof, max. 4 A per slot X0 and X4, max. 2 A per slot X1–X3, X5–X7
Sensor/actuator supply	Class B supply from V2 Short-circuit proof, max. 4 A per slot X4 and X5, max. 2 A per slot X6 and X7
Electrical isolation	galvanic isolation of the voltage groups V1 and V2, voltages up to 500 VAC
Fault exclusion	Yes, acc. to EN ISO 13849-2, appendix D.2

System data	
Fieldbus transmission rate	10/100 Mbps
Fieldbus connection technology	2 × M12, 4-pin, D-coded
Protocol detection	automatic
Service interface	Ethernet via XF1 or XF2
ARGEE functionality	Supported

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)

- PROFINET device, EtherNet/IP device, Modbus TCP server, CC-Link IE field basic
- 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
- M12, 5-pin, L-coded male connector for power supply
- Galvanically isolated voltage groups support passive safety
- ATEX Zone 2/22
- M12 ports for IO-Link master, 5-pin
- IO-Link master port class A and port class B
- IO-Link Protocol 1.1
- Programmable ARGEE

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Ethernet/IP	
Addressing	acc. to EtherNet/IP specification
Quick Connect (QC)	< 150 ms
min. RPI	2 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

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

CC-Link	
Interface	CC-Link IE Field Basic
Type	Intelligent device station
Message Transmission	Yes
Profile specification	CSP+
Max. occupied stations	4
IP change mechanism	Yes
Acyclic SLMP communication	Yes

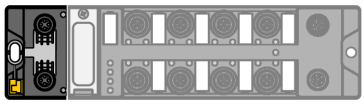
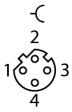
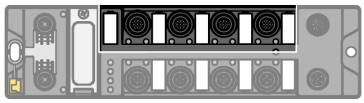
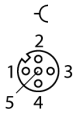
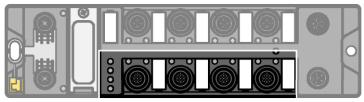
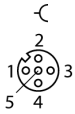
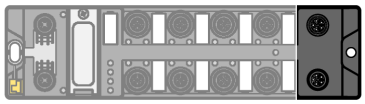
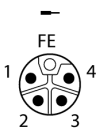
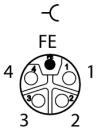
Digital inputs	
Number of channels	4 DXP + 8 SIO
Connectivity inputs	M12, 5-pin
Input type	PNP
Type of input diagnostics	Channel diagnostics
Switching threshold	SIO: EN 61131-2 type 1, PNP DXP: EN 61131-2 type 3, PNP
Low-level signal voltage	< 5 V
High level signal voltage	> 11 V
Low level signal current	< 1.5 mA
High level signal current	> 2 mA
Input delay	0.05 ms
Electrical isolation	Galvanically isolated to the fieldbus voltages up to 500 VAC

Digital outputs	
Number of channels	4 DXP
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 A, short-circuit proof

IO-Link	
Number of channels	8
IO-Link	Pin 4 in IOL mode
IO-Link specification	V 1.1
IO-Link port type	Class A and Class B
Frame type	Supports all specified frame types
Supported devices	Max. 32 bytes in/32 bytes out per port
Transmission rate	4.8 kbps (COM 1) / 38.4 kbps (COM 2) / 230 kbps (COM 3)

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 and UKCA FCC statement, UV resistant acc. to 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.

General Information	
Dimensions (W x L x H)	60.4 x 230.4 x 34.8 mm
Ambient temperature	-40…+70 °C
Storage temperature	-40…+85 °C
Altitude	Max. 5000 m
Protection class	IP65 IP67 IP69K
MTTF	160 years acc. to SN 29500 (Ed. 99) 20 °C
Housing material	PA6-GF30
Housing color	Black
Connector material	Nickel-plated brass
Window material	Lexan
Material screw	303 stainless steel
Material label	Polycarbonate
Halogen-free	yes
Mounting	2 mounting holes □ 6.3 mm

		M12 × 1 Ethernet  XF1 1 = TX + 2 = RX + 3 = TX – 4 = RX – flange = FE XF2 1 = RX + 2 = TX + 3 = RX – 4 = TX – flange = FE
	**Note** Pin 1: V_{AUX1} can be switched off via process data Pin 4: IO-Link data (C/Q) or digital input (SIO mode) X0…X3: IO-Link master class A Pin 2: digital input or output (DXP)	M12 × 1 I/O port  X0…X3 1 = V_{aux}1 (V1) 2 = DXP (V1) 3 = GND (V1) 4 = C/Q (V1) 5 = n.c.
	**Note** Pin 1: V_{AUX1} can be switched off via process data Pin 4: IO-Link data (C/Q) or digital input (SIO mode) X4…X7: IO-Link master class B Pin 2: switchable class B supply (V_{AUX2})	M12 × 1 I/O port  X4…X7 1 = V_{aux}1 (V1) 2 = V_{aux}2 (V2) 3 = GND (V1) 4 = C/Q (V1) 5 = GND (V2)
		M12 power supply, L-coded  XD1 1 = 24VDC V1 2 = GND V2 3 = GND V1 4 = 24VDC V2 FE  XD2

Module Status LED

LED	Color	Status	Description
L/A	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 client
		Flashing	Steady flashing: ready for operation 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
	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
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, 2, 4, 6, 8, 10, 12, 14 IO-Link Port 1-8 IO-Link Mode	Green	Flashing	IO-Link communication, process data valid
	Red	Flashing	IO-Link communication, process data invalid
		On	IO-Link supply OK, no IO-Link Communication
		Off	Port inactive
LED 0, 2, 4, 6, 8, 10, 12, 14 IO-Link Port 1-8 SIO Mode	Green	On	Digital Input signal is present
		Off	No input signal
LED 1, 3, 5, 7 DXP	Green	On	Digital input or output active
	Red	On	Output active with overload/short circuit
		Flashing	Overload supply $V_{AUX\,1}$
		Off	Input or output inactive
LED 9, 11, 13, 15 IO-Link Class B VAUX2	Green	On	V_{AUX2} active on Pin 2
	Red	On	V_{AUX2} active on Pin 2 with overload/short circuit
		Flashing	Overload supply $V_{AUX\,1}$
		Off	V_{AUX2} inactive on Pin 2