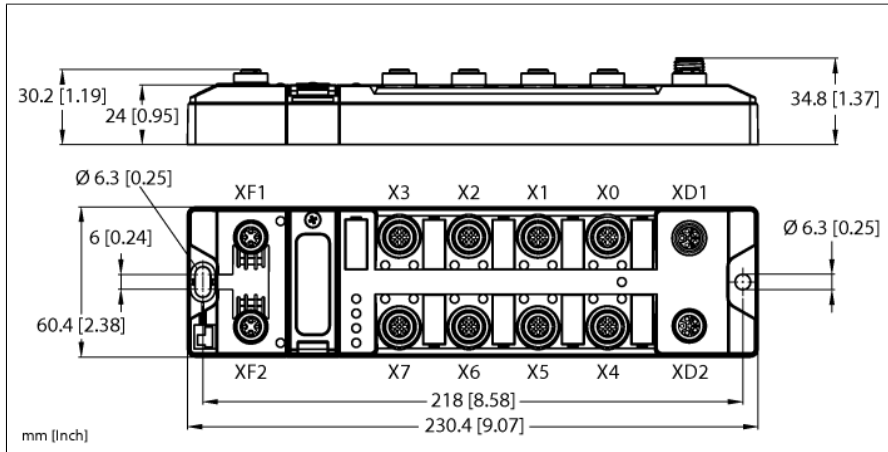


Compact and Secure Ethernet I/O Module

Safe Digital Inputs and Outputs

M12 L-Coded Voltage Connector

TBPN-LL-4FDI-4FDX



Type	TBPN-LL-4FDI-4FDX
ID	100029878

Supply	
Supply voltage	24 VDC
Admissible range	20.4...28.8 V DC
Voltage supply connection	M12, L-coded
Electrical isolation	galvanic isolation of the voltage groups V1 and V2, voltages up to 500 VAC
Power dissipation, typical	≤ 5 W

System data	
Fieldbus transmission rate	100 Mbps
Fieldbus connection technology	2 x M12, 4-pin, D-coded
Web server	integrated
Service interface	Ethernet via P1 or P2

PROFINET	
Addressing	DCP
Conformance class	B (RT)
MinCycleTime	1 ms
Diagnostics	acc. to PROFINET alarm handling
Topology detection	supported
Automatic addressing	supported
Media Redundancy Protocol (MRP)	supported

Safety Data	
PL acc. to EN ISO 13849-1	Level e
Category acc. to DIN EN 13849-1:2008	4
MTTF _a gemäß ISO 13849-1:2008	>200 Jahre
DC acc. to ISO 13849-1:2008	99%
SIL acc. to IEC 61508	3
PFH according IEC 61508	< 1* 10E-09 /h
PFD according IEC 61508	< 1* 10E-05
Useful Lifetime	20 years (EN ISO 13849-1)

- PROFINET device
- Integrated Ethernet switch
- 100 Mbps supported
- 2 x M12, 4-pin, D-coded, Ethernet fieldbus connection
- 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
- ATEX zone 2/22
- CCC-Ex
- Four secure digital SIL3 inputs
- Four secure configurable digital SIL3 inputs or outputs

Figure 1

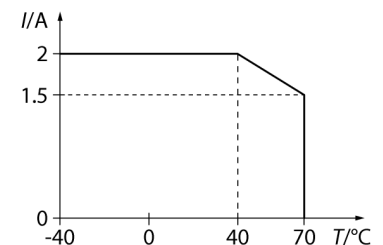
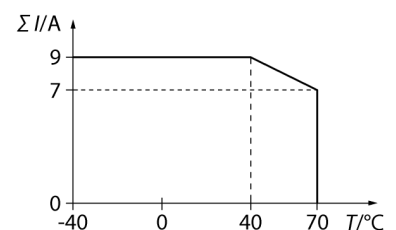


Figure 2

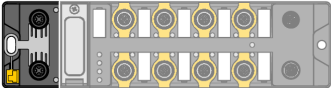
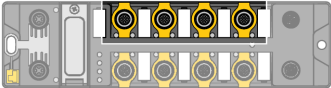
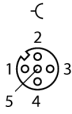
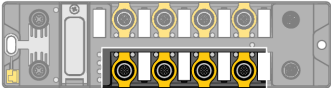
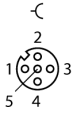
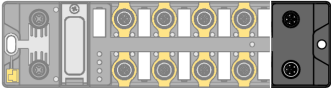
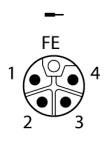
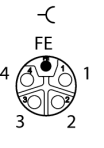


Safety Inputs OSSD	
Low-level signal voltage	EN 61131-2 type 1 (< 5 V; < 0.5 mA)
High-level signal voltage	EN 61131-2 type 1 (> 15 V; > 2 mA)
Max. OSSD supply per channel	2 A per C0 to C7 1.5 A at 70 °C Please note derating as shown in figure 1
Max. tolerance test pulse width	1 ms
Interval between 2 test pulses, minimum	20 ms at 1 ms test pulse width 15 ms at 0.5 ms test pulse width
Safety Inputs floating/antivalent	
Max. loop resistance	< 150 Ω
Max. cable length	Max. 1 µF at 150 Ω Limited by line capacity
Test pulse, typical	0.6 ms
Test pulse, maximum	0.8 ms
Sensor supply	Power supply V AUX1/T1 max. 2 A Please note derating as shown in figure 1
Interval between 2 test pulses, minimum	900 ms
Additional information	No connection to external potential allowed
Safety Outputs	
Output current in off state	< 5 V
Output current in off state	< 1 mA Suitable for inputs according to EN 61131-2 type 1
Test pulse, typical	0.5 ms
Test pulse, maximum	1.25 ms
Interval between 2 test pulses, typical	500 ms
Interval between 2 test pulses, minimum	250 ms
Actuator power supply	Power supply V AUX1/T1 max. 2 A Please note derating as shown in figure 1
Max. output current	2 A (resistive) 1 A (inductive)
Additional information	The load must be mechanically or electrically inert to tolerate the test pulses. When configured as a PM switching output the negative pole of the load must be wired to the M-terminal of the corresponding output (Pin 2).
Connectivity inputs	
Input delay	M12, 5-pin 2.5 ms
Connectivity outputs	
	M12, 5-pin

Standard/Directive conformity	
	With request for perusal
Directive	2006/42/EC Machine Directive 2014/35/EC Low Voltage Directive 2014/30/EC EMC Directive
Safety standard	EN/IEC 61508
Application Standard	EN ISO 13849-1 EN/IEC 62061
Product Standard	IEC 61131-6
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 UKCA ATEX zone 2/22 CCC-Ex 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 areas 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
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

The data sheet serves as advance information. For definitive values see the corresponding product manual. In this respect, no liability for completeness and accuracy can be applied to the content of this data sheet.

	Accessories Ethernet cordset (example): RSSD RSSD 441-2M Ident. no. U-02482	M12 × 1 Ethernet  1 = TX + 2 = RX + 3 = TX - 4 = RX - flange = FE P1  1 = RX + 2 = TX + 3 = RX - 4 = TX - flange = FE P2
	Accessories Actuator and sensor cordset, PVC, red plug bodies (example): RK 4.5T-2-WS 4.5T/S1055 Ident. no. 100031634	M12 × 1 safety inputs  1 = V_{aux}1/T1 2 = FDI (T2) 3 = GND (V1) 4 = FDI (T1) 5 = T2
	Accessories Actuator and sensor cordset, PVC, red plug bodies (example): RK 4.5T-2-WS 4.5T/S1055 Ident. no. 100031634	M12 × 1 safety I/O slot  1 = V_{aux}1/T1 2 = FDO-/FDI (T2) 3 = GND (V1) 4 = FDO+/FDI (T1) 5 = T2
	Accessories	M12 L-coded power cable  1 = 24VDC V1 2 = GND V2 3 = GND V1 4 = 24VDC V2 FE XD1  1 = 24VDC V1 2 = GND V2 3 = GND V1 4 = 24VDC V2 FE XD2

Module Status LED

LED	Color	Status	Description
ETH1/ETH2	Green	On	Ethernet link (100 Mbps)
		Flashing	Ethernet communication (100 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
	Red/green	Alternating	Autonegotiation or waiting for DHCP/Boot-P addressing
ERR	Green	On	No diagnosis is present
	Red	On	Diagnosis is pending
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
0...7	Green	On	Channel active
		Flashing	Self test
	Red	On	Discrepancy
		Flashing	Cross circuit
8...15	Green	On	Channel active
		Flashing	Self test (input only)
	Red	On	Discrepancy, overload (output only)
		Flashing	Cross circuit

Process data mapping of the single protocols

See the manual for more details of the relevant protocols.

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	