Your Global Automation Partner

TURCK

TBEN-L...-SE-U1
Unmanaged 8 Port Ethernet Switch

Instructions for Use

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1 About These Instructions

These instructions for use describe the structure, functions and the use of the product and will help you to operate the product as intended. Read these instructions carefully before using the product. This is to avoid possible damage to persons, property or the device. Retain the instructions for future use during the service life of the product. If the product is passed on, pass on these instructions as well.

1.1 Target groups

These instructions are aimed at qualified personnel and must be carefully read by anyone mounting, commissioning, operating, maintaining, dismantling or disposing of the device.

When operating the device in a hazardous area, the user must have a working knowledge of explosion protection (EN 60079-14, etc.).

1.2 Explanation of symbols used

The following symbols are used in these instructions:

	**DANGER** DANGER indicates a dangerous situation with high risk of death or severe injury if not avoided.
	**WARNING** WARNING indicates a dangerous situation with medium risk of death or severe injury if not avoided.
	**CAUTION** CAUTION indicates a dangerous situation of medium risk which may result in minor or moderate injury if not avoided.
	**NOTICE** NOTICE indicates a situation which may lead to property damage if not avoided.
	**NOTE** NOTE indicates tips, recommendations and useful information on specific actions and facts. The notes simplify your work and help you to avoid additional work.
▶	**CALL TO ACTION** This symbol denotes actions that the user must carry out.
⇨	**RESULTS OF ACTION** This symbol denotes relevant results of actions.

1.3 Additional documents

The following additional documents are available online at **www.turck.com**

- Data sheet
- Declarations of conformity (current version)
- Notes on Use in Ex zone 2 and 22 (100022986)
- Approvals

1.4 Feedback about these instructions

We make every effort to ensure that these instructions are as informative and as clear as possible. If you have any suggestions for improving the design or if some information is missing in the document, please send your suggestions to **techdoc@turck.com**.

2 Notes on the Product

2.1 Product identification

These instructions are valid for the following unmanaged IP67-Switches:

- TBEN-L4-SE-U1
- TBEN-LL-SE-U1

2.2 Scope of delivery

The scope of delivery includes:

- TBEN switch
- Closing caps for M12 sockets
- Labelling clips

2.3 Legal requirements

The device falls under the following EU directives:

- 2014/30/EU (electromagnetic compatibility)
- 2011/65/EU (RoHS directive)
- 2014/34/EU (ATEX directive)

2.4 Turck service

Turck supports you with your projects, from initial analysis to the commissioning of your application. The Turck product database under www.turck.com contains software tools for programming, configuration or commissioning, data sheets and CAD files in numerous export formats.

The contact details of Turck subsidiaries worldwide can be found on p. [▷ 23].

3 For Your Safety

The product is designed according to state-of-the-art technology. However, residual risks still exist. Observe the following warnings and safety notices to prevent damage to persons and property. Turck accepts no liability for damage caused by failure to observe these warning and safety notices.

3.1 Intended Use

These devices are designed solely for use in industrial areas.

The unmanaged switch TBEN-L…-SE-U1 is used within a machine or cell for decentralized connection of Industrial Ethernet devices to controllers. Line, star, ring and mixed topologies are supported. The device is used to network machine cells or to integrate machines into higher-level factory networks.

The devices may only be used as described in these instructions. Any other use is not in accordance with the intended use. Turck accepts no liability for any resulting damage.

3.2 General safety notes

- The device may only be assembled, installed, operated, parameterized and maintained by professionally-trained personnel.
- The device may only be used in accordance with applicable national and international regulations, standards and laws.
- The device only meets the EMC requirements for industrial areas and is not suitable for use in residential areas.

3.3 Notes on UL approval

- Use UL certified PVVA or CYJV cables that are suitable for the current/voltage rating and have an insulation temperature of at least 90 °C.
- Only use the device in an area of not more than pollution degree 2.

3.4 Notes on Ex protection

- When using the device in explosion-protection circuits, the user must have a working knowledge of explosion protection (EN 60079-14 etc.).
- Observe national and international regulations for explosion protection.
- Use the device only within the permissible operating and ambient conditions (see approval data and Ex approval specifications).

3.5 ATEX and IECEx approval requirements for use in Ex area

- Only use the device in an area with no more than pollution degree 2.
- Only disconnect and connect circuits when no voltage is applied.
- Only operate the switches if no voltage is present.
- Connect the metal protective cover to the equipotential bonding in the Ex area.
- Ensure impact resistance in accordance with EN IEC 60079-0 – alternative measures:
  - Install the device in the TB-SG-L protective housing (available in the set with Ultem window: ID 100014865) and replace the service window with an Ultem window.
  - Install the device in an area offering impact protection (e.g. in robot arm) and attach a warning: "DANGER: Only connect and disconnect circuits when no voltage is present. Do not operate switch when energized.".
- Do not install the device in areas critically exposed to UV light.
- Prevent risks caused by electrostatic charge.
- Protect unused connectors with dummy plugs to ensure protection class IP67.

4 Product Description

The devices are designed in a fully encapsulated housing with degree of protection IP65/IP67/IP69K.

The TBEN-L…-SE-U1 is an 8-port Ethernet switch. The switch has eight 4-pin, D coded M12 Fast Ethernet ports (XF1…XF8) with a transmission speed of 10/100 Mbps.

For connecting the supply voltage, 4-pin (TBEN-L4) 7/8" connectors or 5-pin M12 connectors (TBEN-LL) are available.

4.1 Device overview

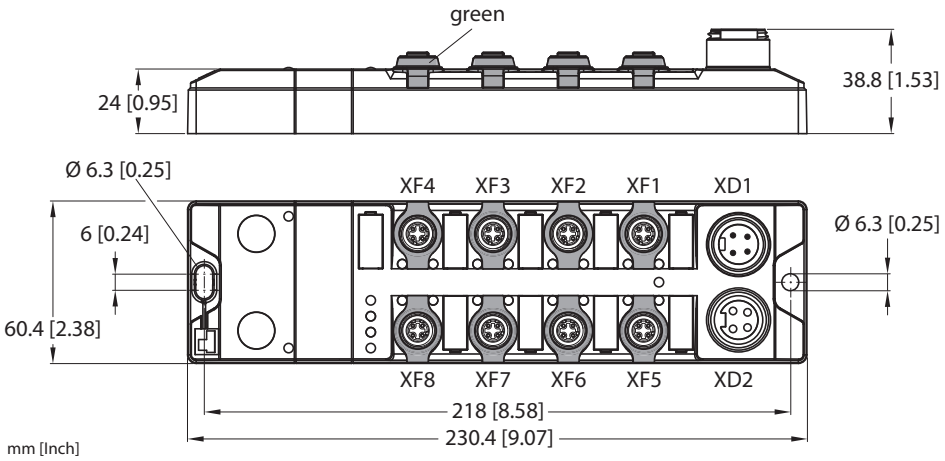

Fig. 1: Dimensions TBEN-L4-SE-U1

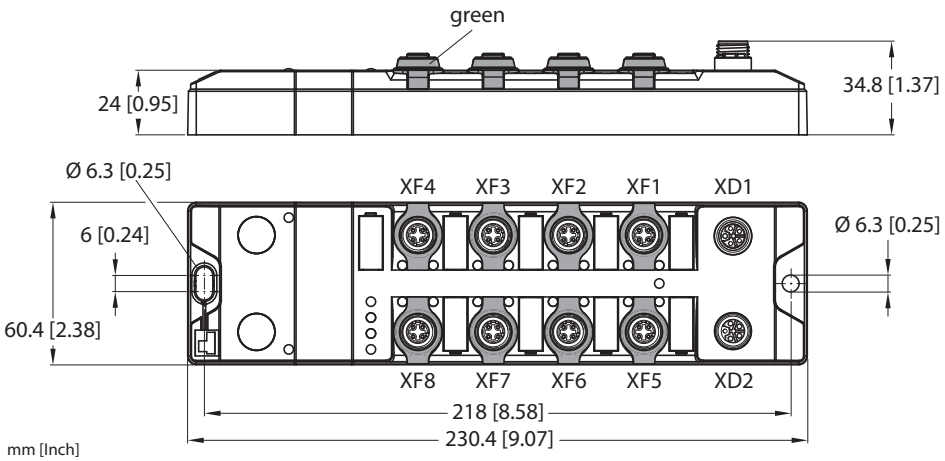

Fig. 2: Dimensions TBEN-LL-SE-U1

4.1.1 Display elements

The device has the following LED indicators:

- Supply voltage
- Ethernet link

4.2 Properties and features

- Fibre-glass reinforced housing
- Shock and vibration tested
- Fully potted module electronics
- Protection class IP65/IP67/IP69K
- UV-resistant according to DIN EN ISO 4892-2
- Metal connectors
- 8 Fast Ethernet ports (10/100 Mbps)

4.3 Operating principle

The Ethernet switch TBEN-L…-SE-U1 is used to build industrial Ethernet networks according to IEEE 802.3. and connects up to eight network segments. The switch controls the data traffic within a network domain and forwards data telegrams specifically to connected devices. A switch can send and receive messages simultaneously.

5 Installing

5.1 Installing the device in Zone 2 and Zone 22

In Zone 2 and Zone 22, the devices can be used in conjunction with the protective housing set .

DANGER
Potentially explosive atmosphere
Risk of explosion through spark ignition
For use in Zone 2 and Zone 22:
- ▶ Only install the device if there is no potentially explosive atmosphere present.
- ▶ Observe requirements for Ex approval.

- ▶ Unscrew the housing. Use Torx T8 screwdriver.
- ▶ Replace the service window with the enclosed Ultem window.
- ▶ Place the device on the base plate of the protective housing and fasten both together on the mounting plate, see [▷ 11].
- ▶ Connect the device, see [▷ 13].
- ▶ Mount and screw the housing cover according to the following figure. The tightening torque for the Torx T8 screw is 0.5 Nm.

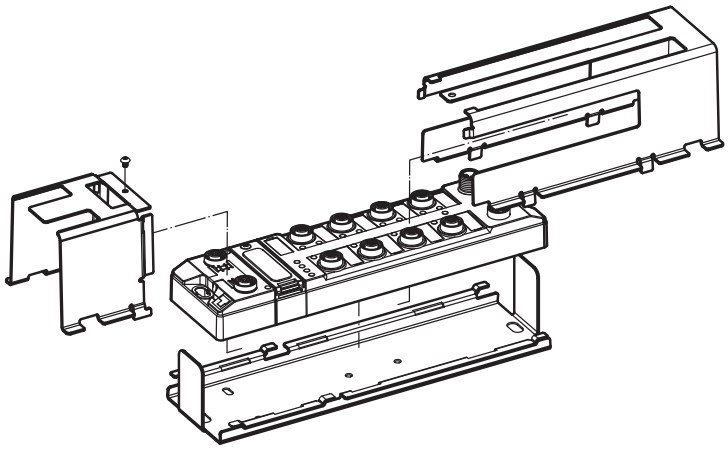

Fig. 3: Mounting the device in protection housing TB-SG-L

5.2 Mounting onto a mounting plate

NOTICE
Mounting on uneven surfaces
Device damage due to stresses in the housing
- ▶ Fix the device on a flat mounting surface.
- ▶ Use two M6 screws to mount the device.

The device can be screwed onto a flat mounting plate.

- ▶ Attach the module to the mounting surface with two M6 screws. The maximum tightening torque for the screws is 1.5 Nm.
- ▶ Avoid mechanical stresses.
- ▶ Optional: Ground the device.

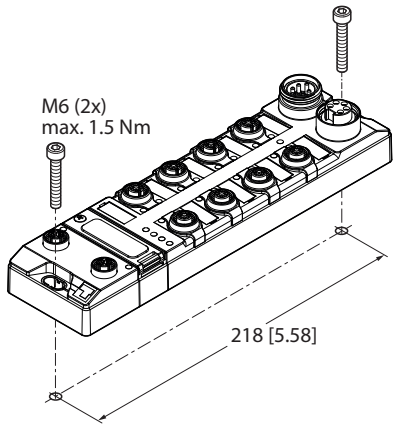

Fig. 4: Mounting the device onto a mounting plate

5.3 Mounting the device outdoors

The device is UV-resistant according to DIN EN ISO 4892-2. Direct sunlight can cause material abrasion and color changes. The mechanical and electrical properties of the device are not affected.

- ▶ To avoid material abrasion and color changes: Protect the device from direct sunlight, e.g. by using protective shields.

5.4 Grounding the device

5.4.1 Equivalent wiring diagram and shielding concept

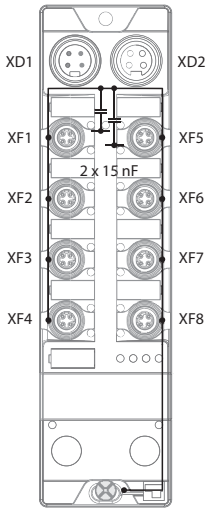

Fig. 5: TBEN-L4-SE-U1 – equivalent wiring diagram and shielding concept

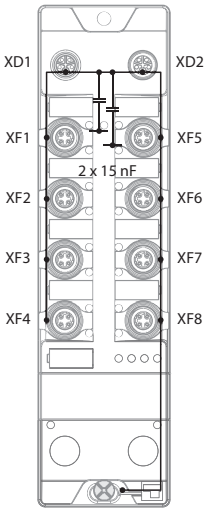

Fig. 6: TBEN-LL-SE-U1– equivalent wiring diagram and shielding concept

5.4.2 Shielding the Ethernet ports

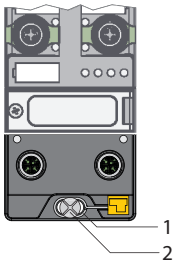

Fig. 7: Grounding ring (1) and mounting screw (2)

The grounding ring (1) is the module grounding. The shielding of the Ethernet ports is permanently connected to the module grounding. The module grounding is only connected to the reference potential of the installation when the module is mounted.

In The device variant TBEN-LL-SE-U1, the earthing can also be connected via pin 5 of the connector for the supply voltage.

5.4.3 Grounding the device

Grounding the device – mounting on a mounting plate

- ▶ For mounting onto a mounting plate: Fix the module with an M6 metal screw through the lower mounting hole.
- ⇨ The shielding of the M12 flanges for the I/O level is connected to the reference potential of the installation via the M6 metal screw.

6 Connecting

NOTICE
Intrusion of liquids or foreign bodies through leaking connections
Loss of protection class IP65/IP67/IP69K, device damage possible

- Tighten M12 connectors with a tightening torque of 0.6 Nm.
- Tighten 7/8" connectors with a tightening torque of 0.8 Nm.
- Only use accessories that guarantee the protection class.
- Always seal unused connectors with suitable screw caps or blind caps. The tightening torque for the screw caps is 0.5 Nm.

6.1 Connecting the device in Zone 2 and Zone 22

DANGER
Potentially explosive atmosphere
Risk of explosion through spark ignition
When used in Zone 2 and Zone 22:

- Only disconnect and connect circuits when no voltage is applied.
- Only use connecting cables that are approved for use in potentially explosive atmospheres.
- Use all connectors or seal them with blind plugs.
- Observe requirements for Ex approval.

6.2 Connecting network segments

To connect the Ethernet network segments, the device has eight 4-pin M12 connectors. The maximum tightening torque is 0.6 Nm.

Fast Ethernet ports (10/100 MBit/s)

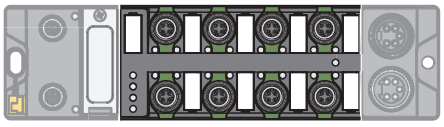

Fig. 8: M12 Fast Ethernet connector

- Connect the device to Ethernet according to the pin assignment below.

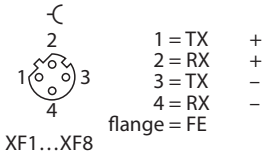

Fig. 9: M12 Fast Ethernet connector

6.3 Connecting the power supply

TBEN-L4-SE-U1

For the connection to the power supply, the device has two 7/8" connectors. The power supply connectors are designed as 4-pole (TBEN-L4) connectors. V1 and V2 are galvanically isolated from each other. The maximum tightening torque is 0.8 Nm.

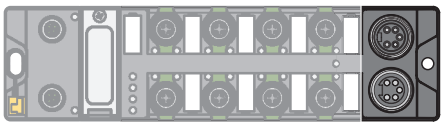

Fig. 10: 7/ 8" connector for connecting the supply voltage

▶ Connect the device to the power supply according to the pin assignment shown below.

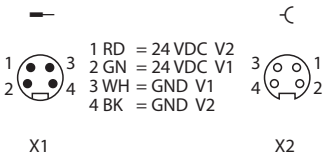

Fig. 11: TBEN- L4… – pin assignment power supply connectors

Connector	Function
X1	Power feed
X2	Continuation of the power to the next node

Voltage	Function
V1	System voltage: power supply 1 (incl. supply of electronics)
V2	Load voltage: power supply 2, fed through, not used in device

For the connection to the power supply, the device has two 5-pin, L coded M12 connectors. V1 and V2 are galvanically isolated. The maximum tightening torque is 0.6 Nm.

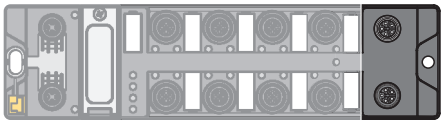

Fig. 12: M12 connector for connecting the supply voltage

- ▶ Connect the device to the power supply according to the pin assignment shown below.
- ▶ Always seal unused connectors with suitable screw caps or blind caps. The tightening torque for the screw caps is 0.5 Nm.

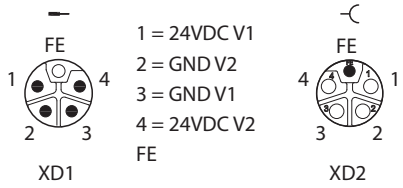

Fig. 13: Pin assignment power supply connectors

Connector	Function
XD1	Power feed
XD2	Continuation of the power to the next node

Voltage	Function
V1	System voltage: power supply 1 (incl. supply of electronics)
V2	Load voltage: power supply 2, fed through, not used in device

6.3.1 Supply concept

The device is supplied via V1. All Ethernet ports are galvanically isolated. V2 is fed through.

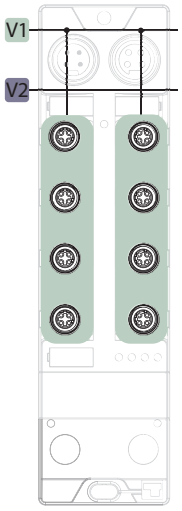

Fig. 14: Supply TBEN-L4-SE-U1

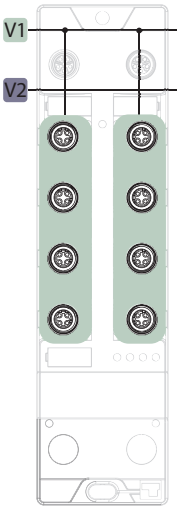

Fig. 15: Supply TBEN-LL-SE-U1

7 Operating

7.1 LED displays

LED PWR	Meaning
Off	No voltage connected or under voltage at V1
Green	Voltage at V1 OK

NOTE
Each of the Ethernet ports XF1…XF8 has an LED L/A.

LED L/A	Meaning
Off	No Ethernet connection
Green	Ethernet connection established, 100 Mbps (XF1…XF8)
Yellow	Ethernet connection established, 10 Mbps
Green flashing	Data transfer, 100 Mbps (XF1…XF8)
Yellow blinking	Data transfer, 10 Mbps

8 Troubleshooting

If the device does not function as expected, first check whether ambient interference is present. If there is no ambient interference present, check the connections of the device for faults.

If there are no faults, there is a device malfunction. In this case, decommission the device and replace it with a new device of the same type.

9 Maintenance

Ensure that the plug connections and cables are always in good condition.

The devices are maintenance-free, clean dry if required.

10 Repair

The device must not be repaired by the user. The device must be decommissioned if it is faulty. Observe our return acceptance conditions when returning the device to Turck.

10.1 Returning devices

Returns to Turck can only be accepted if the device has been equipped with a Decontamination declaration enclosed. The decontamination declaration can be downloaded from **https://www.turck.de/en/retoure-service-6079.php** and must be completely filled in, and affixed securely and weather-proof to the outside of the packaging.

11 Disposal

The devices must be disposed of correctly and must not be included in general household garbage.

12 Technical Data

Technical data	
Power supply	
Supply voltage	24 VDC
Permissible range	8…30 VDC with load dump protection
Current feedthrough	
■ TBEN-L4/TBEN-L5 (X1 to X2)	Max. 9 A per voltage group
■ TBEN-LL (XD1 to XD2)	Max. 16 A per voltage group
Input current (at 24 VDC)	Max. 120 mA
Power loss	≤ 2,9 W
Connectors	
Power supply	
■ TBEN-L4	■ X1: 7/8“ male connector, 4-pin ■ X2: 7/8'' female connector, 4-pin
■ TBEN-LL	■ XD1: M12 male connector, 5-pin, L-coded ■ XD2: M12 female connector, 5-pin, L-coded
Ethernet	8 x M12, 4-pin, D coded
Permissible torques ■ Ethernet ■ Mounting (M6 screws)	 0.6 Nm 1.5 Nm
Isolation voltages	
V1 to V2	≤ 500 V AC
V1/V2 to field bus	≤ 500 V AC
System data	
Transmission rate	XF1…XF8: 10/100 Mbps
Mounting	
Type of mounting	Via 2 mounting holes, Ø 6.3 mm
Mounting distance (device to device)	≥ 50 mm Valid for operation in the ambient temperatures mentioned below with sufficient ventilation as well as maximum load (horizontal mounting). For low simultaneity factors and low ambient temperatures, mounting distances of < 50 mm may also be realizable.
Standard/directive conformity	
Vibration test	According to EN 60068-2-6
Acceleration	Up to 20 g
Shock test	According to EN 60068-2-27
Drop and topple	According to IEC 60068-2-31/IEC 60068-2-32
Electro magnetic compatibility	According to EN 61131-2
Approvals and certificates	CE UL UV-resistant according to DIN EN ISO 4892-2A (2013)

Technical data	
General Information	
Dimensions (B × L × H)	64 × 230.4 × 39 mm
Operating temperature	-40…+70 °C
Storage temperature	-40…+85 °C
Relative humidity	100 %, indoor use (UL only)
Overvoltage category	II
Weight	595 g
Operating height	Max. 5000 m
Protection class	IP65 IP67/IP69K (not evaluated by UL)
Pollution degree	2
MTTF	284 years acc. to SN 29500 (Ed. 99) 20 °C
Housing material	PA6-GF30
Halogen-free	Yes

FCC declaration

NOTE
This device complies with the limits for a Class A digital device, according to Part 15 of the FCC Rules. Operation of this equipment in a residential area may cause harmful interference. In this case, the user must correct the interference at his own expense.

13 Appendix: Approvals and Markings

Approvals	Marking according to ATEX directive	EN 60079-0/-7/-31
ATEX approval no.: TÜV 20 ATEX 264795 X	⟨Ex⟩ II 3 G ⟨Ex⟩ II 3 D	Ex ec IIC T4 Gc Ex tc IIIC T115 °C Dc
IECEx approval no.: IECEx TUN 20.0010X		Ex ec IIC T4 Gc Ex tc IIIC T115 °C Dc

Ambient temperature T_{amb}.: -25 °C…+60 °C

Type designation	TBEN-L_-SE-…
Supply voltage	24 VDC ±10 %
Input current I_{max}	9 A (total per module)
Output current I_{max}	1,5 A (per output)

14 Turck Subsidiaries - Contact Information

Germany	Hans Turck GmbH & Co. KG Witzlebenstraße 7, 45472 Mülheim an der Ruhr **www.turck.de**
Australia	Turck Australia Pty Ltd Building 4, 19-25 Duerdin Street, Notting Hill, 3168 Victoria **www.turck.com.au**
Belgium	TURCK MULTIPROX Lion d'Orweg 12, B-9300 Aalst **www.multiprox.be**
Brazil	Turck do Brasil Automação Ltda. Rua Anjo Custódio Nr. 42, Jardim Anália Franco, CEP 03358-040 São Paulo **www.turck.com.br**
China	Turck (Tianjin) Sensor Co. Ltd. 18,4th Xinghuazhi Road, Xiqing Economic Development Area, 300381 Tianjin **www.turck.com.cn**
France	TURCK BANNER S.A.S. 11 rue de Courtalin Bat C, Magny Le Hongre, F-77703 MARNE LA VALLEE Cedex 4 **www.turckbanner.fr**
Great Britain	TURCK BANNER LIMITED Blenheim House, Hurricane Way, GB-SS11 8YT Wickford, Essex **www.turckbanner.co.uk**
India	TURCK India Automation Pvt. Ltd. 401-403 Aurum Avenue, Survey. No 109 /4, Near Cummins Complex, Baner-Balewadi Link Rd., 411045 Pune - Maharashtra **www.turck.co.in**
Italy	TURCK BANNER S.R.L. Via San Domenico 5, IT-20008 Bareggio (MI) **www.turckbanner.it**
Japan	TURCK Japan Corporation Syuuhou Bldg. 6F, 2-13-12, Kanda-Sudacho, Chiyoda-ku, 101-0041 Tokyo **www.turck.jp**
Canada	Turck Canada Inc. 140 Duffield Drive, CDN-Markham, Ontario L6G 1B5 **www.turck.ca**
Korea	Turck Korea Co, Ltd. B-509 Gwangmyeong Technopark, 60 Haan-ro, Gwangmyeong-si, 14322 Gyeonggi-Do **www.turck.kr**
Malaysia	Turck Banner Malaysia Sdn Bhd Unit A-23A-08, Tower A, Pinnacle Petaling Jaya, Jalan Utara C, 46200 Petaling Jaya Selangor **www.turckbanner.my**

Mexico	Turck Comercial, S. de RL de CV Blvd. Campestre No. 100, Parque Industrial SERVER, C.P. 25350 Arteaga, Coahuila **www.turck.com.mx**
Netherlands	Turck B. V. Ruiterlaan 7, NL-8019 BN Zwolle **www.turck.nl**
Austria	Turck GmbH Graumanngasse 7/A5-1, A-1150 Wien **www.turck.at**
Poland	TURCK sp.z.o.o. Wroclawska 115, PL-45-836 Opole **www.turck.pl**
Romania	Turck Automation Romania SRL Str. Siriului nr. 6-8, Sector 1, RO-014354 Bucuresti **www.turck.ro**
Russian Federation	TURCK RUS OOO 2-nd Pryadilnaya Street, 1, 105037 Moscow **www.turck.ru**
Sweden	Turck Sweden Office Fabriksstråket 9, 433 76 Jonsered **www.turck.se**
Singapore	TURCK BANNER Singapore Pte. Ltd. 25 International Business Park, #04-75/77 (West Wing) German Centre, 609916 Singapore **www.turckbanner.sg**
South Africa	Turck Banner (Pty) Ltd Boeing Road East, Bedfordview, ZA-2007 Johannesburg **www.turckbanner.co.za**
Czech Republic	TURCK s.r.o. Na Brne 2065, CZ-500 06 Hradec Králové **www.turck.cz**
Turkey	Turck Otomasyon Ticaret Limited Sirketi Inönü mah. Kayisdagi c., Yesil Konak Evleri No: 178, A Blok D:4, 34755 Kadiköy/ Istanbul **www.turck.com.tr**
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