INSTRUCTION MANUAL

SIL 3 HART® Multiplexer Termination Board
with SIL 3 HART® Multiplexer Modem 5700 series
for Tricon and Tricon CX systems,
TBE-D5001-TRI-xxx

gmI
technology for safety

General description

This instruction manual refers to the following HART® Multiplexer termination boards for Tricon and Tricon CX systems:

MODEL	PAGE
TBE-D5001-TRI-001	5

Common specifications
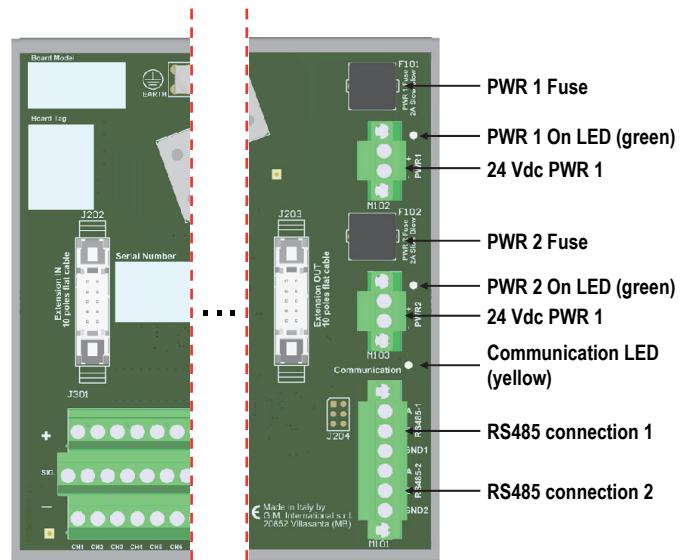
Power supplies and communication

For all termination boards.
Redundant power supply connections and LED indications are shown here below.

LED Signaling:
Meaning of LEDs on termination boards:

TAG	LED COLOR	MEANING
PWR 1	GREEN	The LED is on when the PWR 1 is connected
PWR 2	GREEN	The LED is on when the PWR 2 is connected
Communication	YELLOW	The LED is off when modem in not connected, steady on when communication with modem is correctly established, blinking otherwise

- PWR 1 Fuse
- PWR 1 On LED (green)
- 24 Vdc PWR 1
- PWR 2 Fuse
- PWR 2 On LED (green)
- 24 Vdc PWR 1
- Communication LED (yellow)
- RS485 connection 1
- RS485 connection 2

Start-up

Before powering the unit check that all wires are properly connected, particularly supply conductors and their polarity.
Check conductors for exposed wires that could touch each other causing dangerous unwanted shorts.
Turn on power, the "PWR 1" and/or "PWR 2" green LED must be lit.

Warning

Termination Boards are installed onto standard EN/IEC60715 TH 35 DIN-Rail located in Safe Area or Ordinary Location within the specified operating temperature limits Tamb -40 to +70 °C. Termination Boards must be installed, operated and maintained only by qualified personnel, in accordance to the relevant national/international installation standards, following the established installation rules.
Failure of a proper installation or use of the equipment may risk to damage the unit or severe personal injury.
Termination boards cannot be repaired by the end user and must be returned to the manufacturer or his authorized representative. Any unauthorized modification must be avoided.
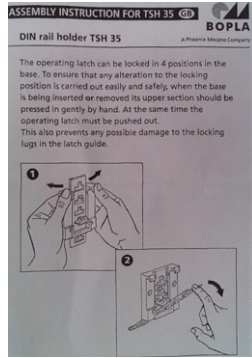
DIN-Rail clip installation on termination board enclosure

The Termination Board is already provided with plastic DIN-rail clips. Metal clips, replacement plastic clips as well as conformal coating must be ordered as a separate accessory. Should customer need different or additional clips, they can be ordered as TBE-FIX-PL-001 (plastic) or TBE-FIX-MT-001 (metal). Customer can add also TBE-MNT-001 code (for each DIN-Rail clip) to request further DIN-Rail clip factory mounting. Otherwise, customer follows DIN-Rail clip installation procedure.

For termination board with 2x Plastic DIN-Rail clips TBE-FIX-PL-001, extract each clip and related instruction sheet from plastic bag. Follow the instruction sheet and the following figures to change lever position (from default to specific for TBE-D5001-TRI-xxx) on each clip:
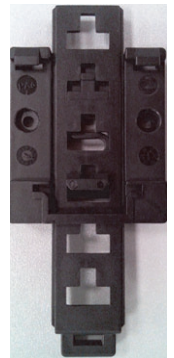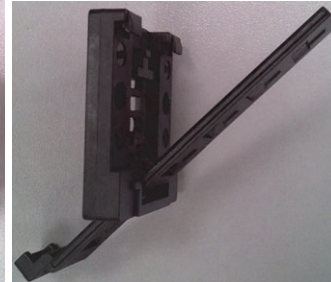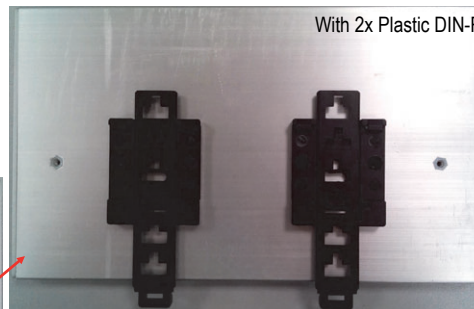

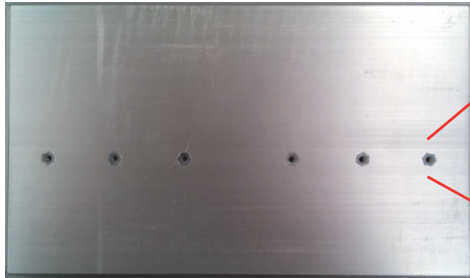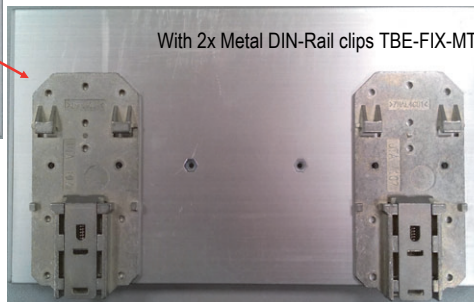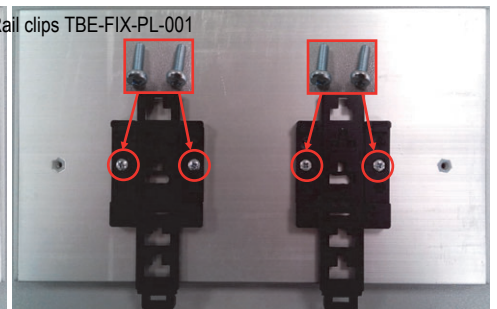Default position   Instruction sheet   Changing lever position   Specific position for TBE-D5001-TRI-xxx

For the termination boards **TBE-D5001-TRI-xxx**, place the enclosure as shown in the following figures and fix each Plastic or Metal DIN-Rail clip to enclosure by 2 x M3 (10 mm) screws included on TBE-FIX set:

With 2x Plastic DIN-Rail clips TBE-FIX-PL-001

With 2x Metal DIN-Rail clips TBE-FIX-MT-002
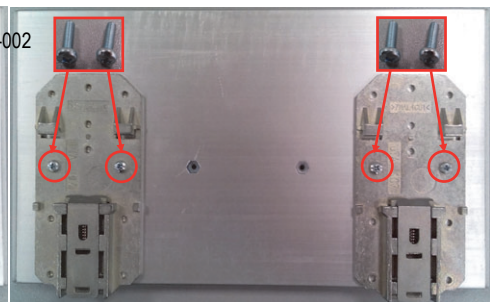
TBE with Conformal Coating

On TBE order, customer can add the following code to request Conformal Coating applied on TBE by factory process:
TBE-CTG-001 code for TBE-D5001-TRI-xxx.

Models mounting and removing

For termination board with 2 x Plastic DIN-Rail clips TBE-FIX-PL-001:

Mounting:
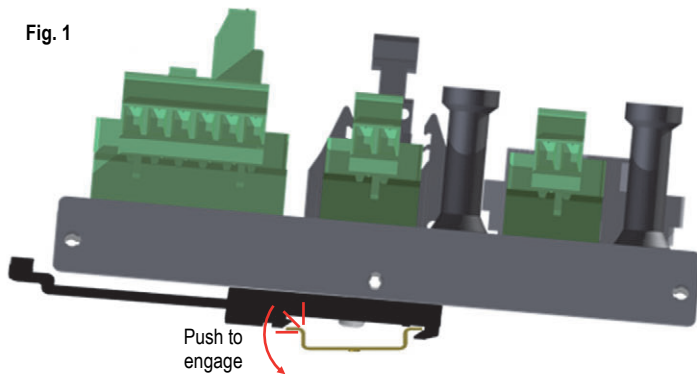To mount termination board on 35 mm DIN-Rail, hook one side of the mounting foot over the rail's lip and press the Termination Board down firmly until fixed (see Fig.1).

Fig. 1

Push to engage

Removing:
To remove a termination board from the mounting rail, insert a blade screwdriver in the mounting foot and lever (see Fig. 2).

Fig. 2   Pull the termination board upwards and remove from DIN-Rail

For termination board with 2 x Metal DIN-Rail clips TBE-FIX-MT-002:

Mounting:
To mount termination board on 35 mm DIN-Rail, hook one side of the mounting foot over the rail's lip and press the Termination Board down firmly until fixed (see Fig.3).
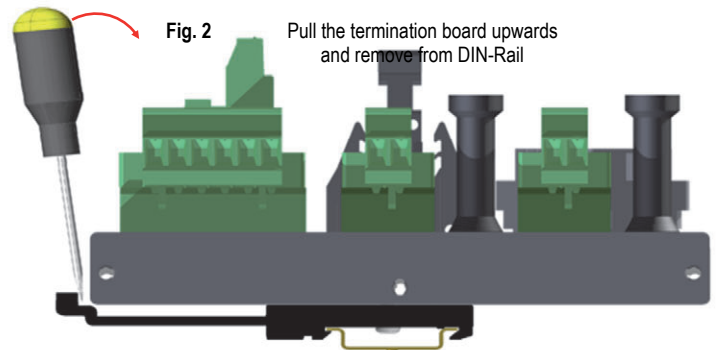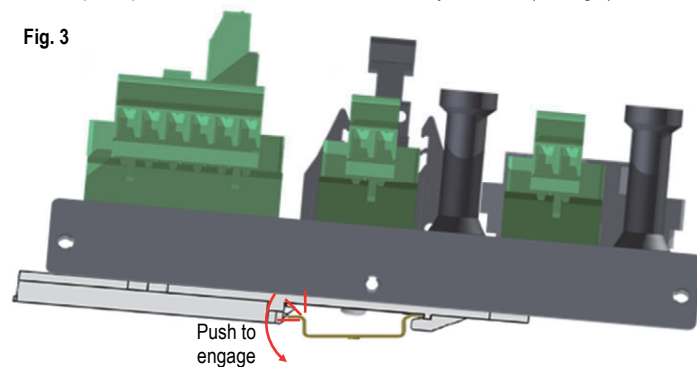
Fig. 3

Push to engage

Removing:
To remove a termination board from the mounting rail, insert a blade screwdriver in the mounting foot and lever (see Fig. 4).

Fig. 4   Pull the termination board upwards and remove from DIN-Rail
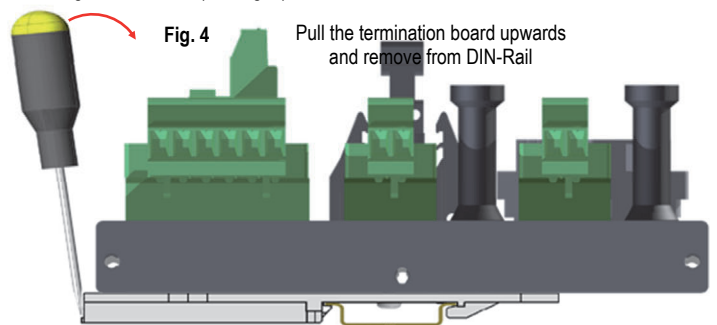
Overall dimensions

For all termination boards TBE-D5001-TRI-xxx.

With 2 x Plastic DIN-Rail clips TBE-FIX-PL-001, with all dimensions are expressed in millimeters [inches]:

125 [4.9"] 154 [6.0"] 29 [1.1"]

77 [3.0"] 135 [5.3"] 58 [2.3"] 12 [0.5"] 73 [2.9"] 73 [2.9"] 235 [9.3"]
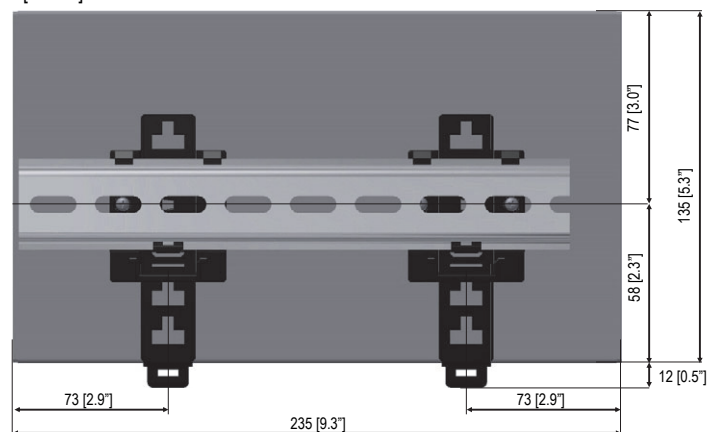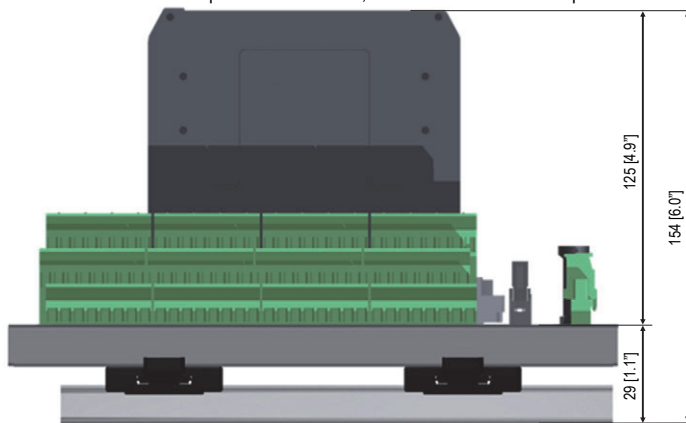
With 2 x Metal DIN-Rail clips TBE-FIX-MT-002, with all dimensions are expressed in millimeters [inches]:

125 [4.9"] 154 [6.0"] 29 [1.1"]

77 [3.0"] 135 [5.3"] 58 [2.3"] 5 [0.2"] 39 [1.5"] 39 [1.5"] 235 [9.3"]

TBE-D5001-TRI-001

SIL3 HART® Mux Term. Board for Tricon AI Cards 3700, 3700A, 3721 and Tricon CX AI Card 3722X
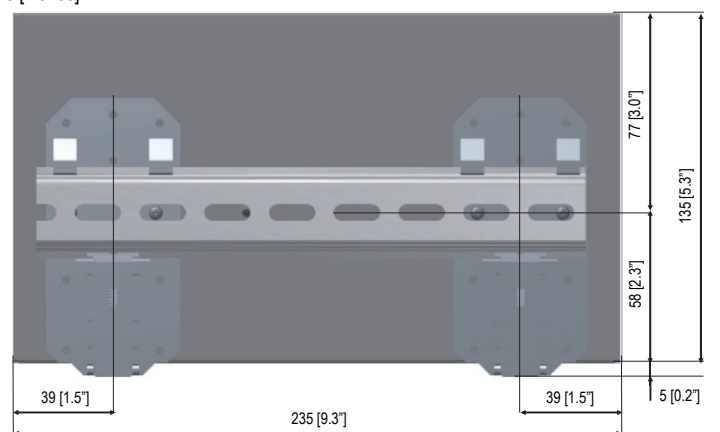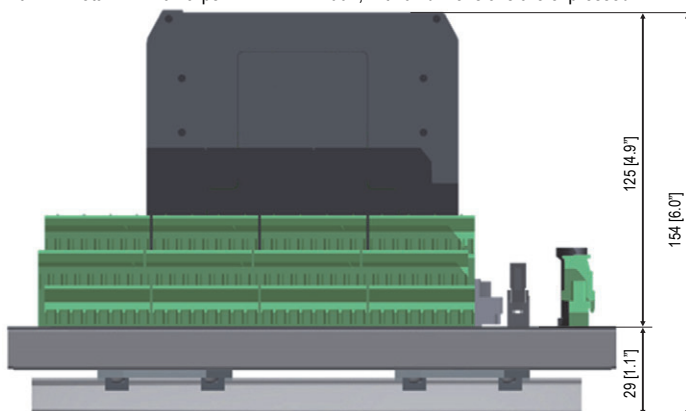
Characteristics:

General description:

This Termination Board with Enclosure (TBE) provides direct connection between the I/O Card of the system and 2-wire passive or active transmitters, providing voltage/current protections against unintentional short circuits. At the same time, it makes available an interface for the remote monitoring of any HART®-compatible 4/20 mA field device. This is obtained by a locally mounted HART® Multiplexer Modem 5700 series and by terminal block connectors to access the loops. This model is suitable for interfacing with Tricon AI Cards 3700, 3700A, 3721 and Tricon CX AI Card 3722X needing a 1/5 V input signal.

The single TBE-D5001-TRI-001 Termination Board supports 32 channels.
Yet, it could be extended with additional units (up to 8) to manage all 256 channels available on the HART® Modem 5700 series.

The Mux unit connects, via the RS-485 interface, to an external PC running an FDT-based software package (PACTware™, etc...) through a dedicated Device Type Manager (DTM). The PC can communicate with multiple Mux units, located on different boards, in a multi-drop RS-485 mode.

The TBE-D5001-TRI-001 is SIL 3 certified as non-interfering with the signal loops.

The 24 Vdc Power Supply of the TBE is connected to two plug-in terminal blocks, for a redundant power supply.

Installation:

TBE-D5001-TRI-001 is a Termination Board supported by an aluminum shell suitable for installation on EN/IEC60715 TH 35 DIN-Rail. TBE-D5001-TRI-001 shall only be used to mount one HART® Multiplexer Modem 5700 series.

TBE-D5001-TRI-001 unit can be mounted with any orientation over the entire ambient temperature range.

Electrical connections are the following:

● PWR1, PWR 2, RS485-1, RS485-2: polarized removable screw terminal blocks for conductors up to 2.5 mm² (13 AWG) with a torque of 0.5-0.6 Nm.

● J301-J302, J501-J502: polarized fixed screw terminal blocks for conductors up to 2.5 mm² (13 AWG) with a torque of 0.5-0.6 Nm.

● J202, J203: for additional TBE Interface, 10 poles male connector with retaining method.

● CON301, CON501: ELCO 8016, 56-poles receptacle connector.

Electrical connection can be plugged in/out into a powered unit without suffering or causing any damage. Connect only one individual conductor per each clamping point. Use only cables that are suitable for a temperature of at least 85°C.

Wiring has to be sized according to the current and the length of the cables.

On the section "Termination Board Description" a block diagram identifies all connections. Installation and wiring must be in accordance to the relevant national/international installation standards, make sure that conductors are well isolated from each other and do not produce any unintentional connection.

The unit shall be installed in an area of not more than pollution degree 2 according to EN/IEC60664-1. Units must be protected against dirt, dust, extreme mechanical (e.g. vibration, impact and shock) and thermal stress, and casual contacts. If enclosure needs to be cleaned use only a cloth lightly moistened by a mixture of detergent in water. Any penetration of cleaning liquid must be avoided to prevent damage to the unit. Any unauthorized card modification must be avoided.

According to EN/IEC61010, TBE-D5001-TRI-001 unit must be connected to SELV or PELV supplies.

All circuits connected to TBE-D5001-TRI-001 unit must comply with the overvoltage category II (or better) according to EN/IEC60664-1.

Technical Data:

General:
Number of positions: 1 x HART® Multiplexer Modem 5700 series
Maximum number of channels: 32 on a single board, extendable to 256 with 8 boards and 1 HART® Multiplexer Modem 5700 series. Up to 16128 smart devices in full topology with 504 boards and 63 HART® Multiplexer Modem 5700 series.
Supply:
24 Vdc nom (20 to 30 Vdc), reverse polarity protected, double terminal blocks for redundant power supply, with OR diodes to mix supply voltages.
Current consumption: 44 mA @ 24 Vdc with full topology (8 boards), typical.
Connection: by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm².
Protection fuse: 2 A time lag.
I/O Card Interface:
Connection: 2 x ELCO 8016, 56-poles receptacle connector (require male mating connector).
Connection: system cable 4000189-5xx.
Field Interface:
Connection: by screw with terminations up to 2.5 mm².
Max supply current per channel: 50 mA (resettable fuse protected).
Signal current range: 0 to 25 mA.
Serial Interface:
Connection: by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm².
Protocol: HART® over RS-485.
Additional TBs Interface:
Connection: 2 x flat cable 10 poles male connectors (requires female mating connector).
Cable: flat cables CABF022, CABF023, CABF024.
Compatibility:
CE mark compliant, conforms to Directive: 2014/30/EU EMC, 2014/35/EU LVD, 2011/65/EU RoHS.
Environmental conditions:
Operating: temperature limits – 40 to + 70 °C, relative humidity max 90 % non condensing, up to 35 °C.
Max altitude: 2000 m a.s.l.
Storage temperature: temperature limits –45 to +80 °C.
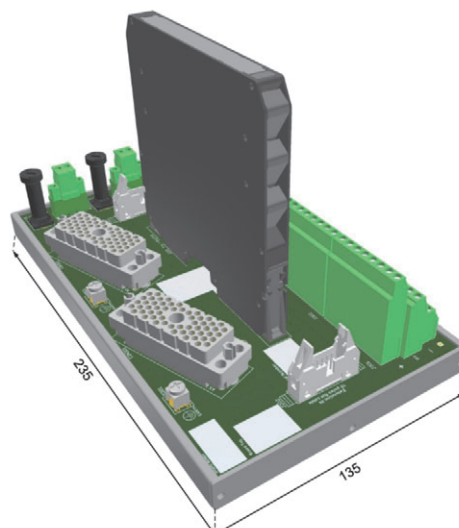*Approvals:*
SIL 3 conforms to IEC61508:2010 Ed.2.
Mounting:
Hardware included for mounting on single DIN-rail 35 mm.
Weight: about 778 g (+ 50 g plastic clips or 380 g metal clips).
Location: installation in Safe Area/Ordinary Location.
Dimensions: Width 235 mm, Depth 135 mm, Height 154 mm.

Image:

Board tag

Passive Tx (Ch.1) - +

Active Tx (Ch.6) + -

Passive Tx (Ch.27) - +

Active Tx (Ch.32) + -

HART® Multiplexer Modem 5700

3700
3700A
3721

3722X

Power supply 1 fuse

Power supply 2 fuse

Power supply 1

Power supply 2

RS485   Out   In

Optional expansion board connection
CABF022/CABF023/CABF024

Board tag

Passive Tx (Ch.1) - +

Active Tx (Ch.6) + -

Passive Tx (Ch.27) - +

Active Tx (Ch.32) + -

3700
3700A
3721

3722X

Power supply 1

Power supply 2

Optional expansion board connection
(up to 8 total boards)

Up to 63

Direct connection
No isolation

Field Smart Devices (transmitters, etc.)

Analog
HART®-Transparent
Isolators

Isolators on DIN-Rail or
Direct Field Connections
(Non-IS Loops)

Up to 8

Analog In
signals

Tricon Safety

RS485

USB

USB-RS485
converter

Workstation/PC running
network management software

Hazardous Area

Up to 63

Field Smart Devices (transmitters, etc.)

Analog
HART®-Transparent
IS Barriers

Barriers on DIN-Rail
(IS Loops)

Up to 8

Analog In
signals

Tricon Safety

RS485

USB

USB-RS485
converter

Workstation/PC running
network management software