

# INSTRUCTION MANUAL

## Termination Boards for Tricon & Tricon CX



# General description

This instruction manual refers to the following termination boards that can be connected to the Tricon and Tricon CX systems:

MODEL	TRICON SYSTEM	TRICON CX SYSTEM	PAGE
TBE-D5016-TRI-001	✓		8
TBE-D5016-TRI-002	✓		11
TBE-D5016-TRI-003	✓		14
TBE-D5016-TRI-004	✓		18
TBE-D5016-TRI-005	✓		21
TBE-D5016-TRI-006	✓		24
TBE-D5016-TRI-007	✓	✓	28
TBE-D5016-TRI-008	✓		31
TBE-D5016-TRI-009	✓	✓	35
TB-D5016-TRI-010 / TBE-D5016-TRI-010		✓	39
TBE-D5016-TRI-011		✓	42
TBE-D5016-TRI-012		✓	46
TBE-D5008-TRI-001	✓		50

## Common specifications

### Power supplies and faults

For the following termination boards:

- TBE-D5016-TRI-001;
- TBE-D5016-TRI-002;
- TBE-D5016-TRI-003;
- TBE-D5016-TRI-004;
- TBE-D5016-TRI-005;
- TBE-D5016-TRI-006;
- TBE-D5016-TRI-007;

- TBE-D5016-TRI-008;
- TBE-D5016-TRI-009;
- TBE-D5016-TRI-011;
- TBE-D5016-TRI-012;
- TBE-D5008-TRI-001.

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 On	GREEN	The LED is on when the PWR 1 is within range
PWR 1 Fault	RED	The LED is on when the PWR 1 is out of range
PWR 2 On	GREEN	The LED is on when the PWR 2 is within range
PWR 2 Fault	RED	The LED is on when the PWR 2 is out of range
Cumulative Fault	RED	The LED is on when at least one connected module returns a fault

#### Alarm contact:

Alarm contact is closed in normal operation, while it opens in case of any fault.

For the following termination board:

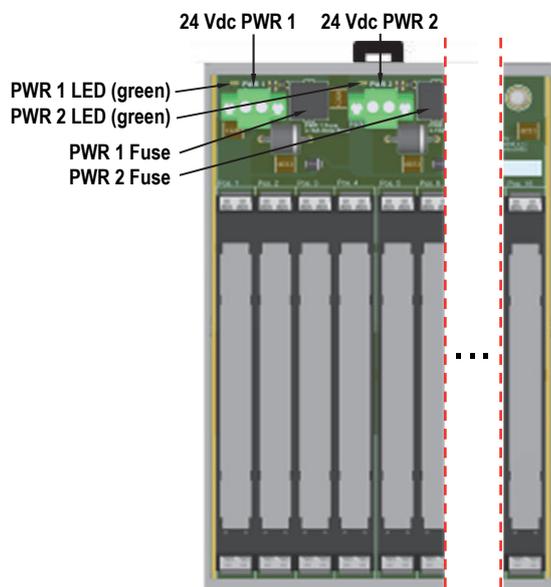
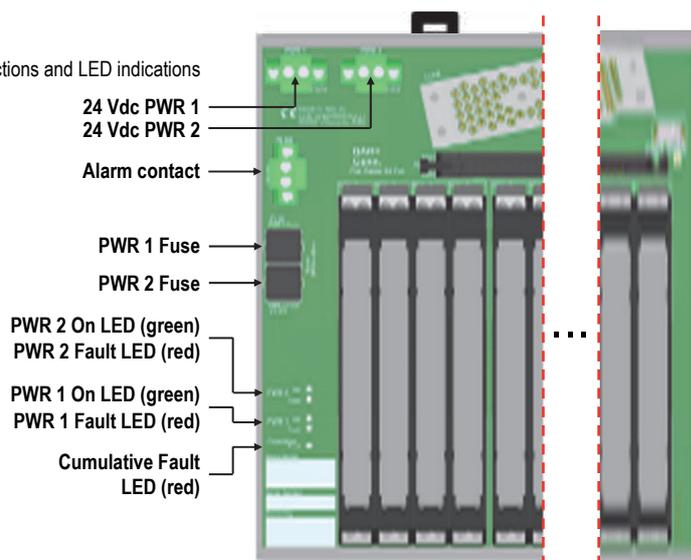
- TB-D5016-TRI-010 / TBE-D5016-TRI-010.

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 present
PWR 2	GREEN	The LED is on when the PWR 2 is present



## 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 Zone 2, Group IIC, Temperature T4 Hazardous Area 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 (e.g. EN/IEC60079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines)), following the established installation rules. De-energize power source (turn off power supply voltage) before plugging or unplugging the terminal blocks when installed in Hazardous Area or unless area is known to be nonhazardous.

**Warning: substitution of components may impair suitability for Zone 2/Division 2. Avertissement: la substitution des composants peut nuire à l'aptitude à la Zone 2/Div. 2.**

**Explosion Hazard: to prevent ignition of flammable or combustible atmospheres, disconnect power before servicing or unless area is known to be nonhazardous.**

**Danger d'Explosion: pour prévenir une inflammation de l'atmosphère inflammable ou combustible, couper l'alimentation avant de réparer à moins de savoir que l'emplacement n'est pas dangereux.**

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.

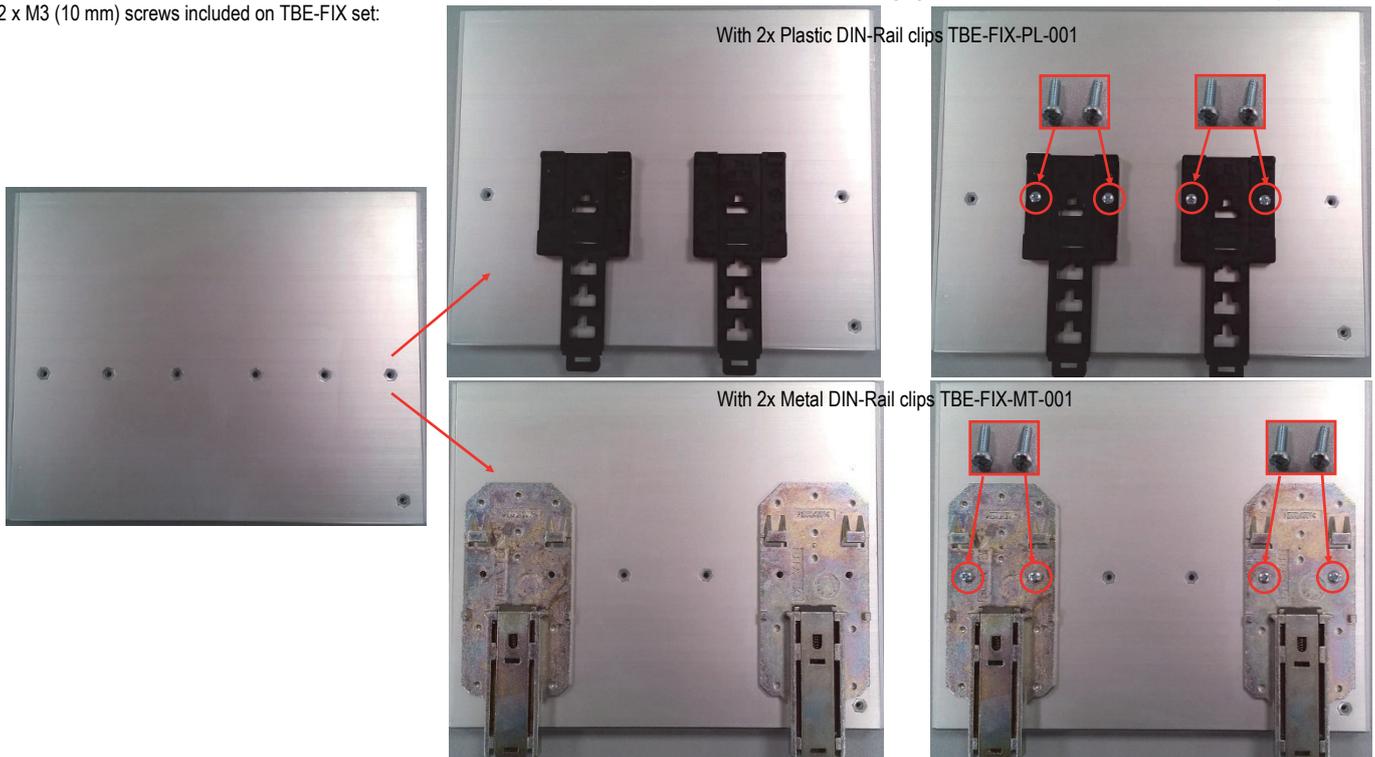
## DIN-Rail clip installation on termination board enclosure

The Termination Board is already provided with plastic DIN-rail clips (except for TB-D5016-TRI-010, provided with metal 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.

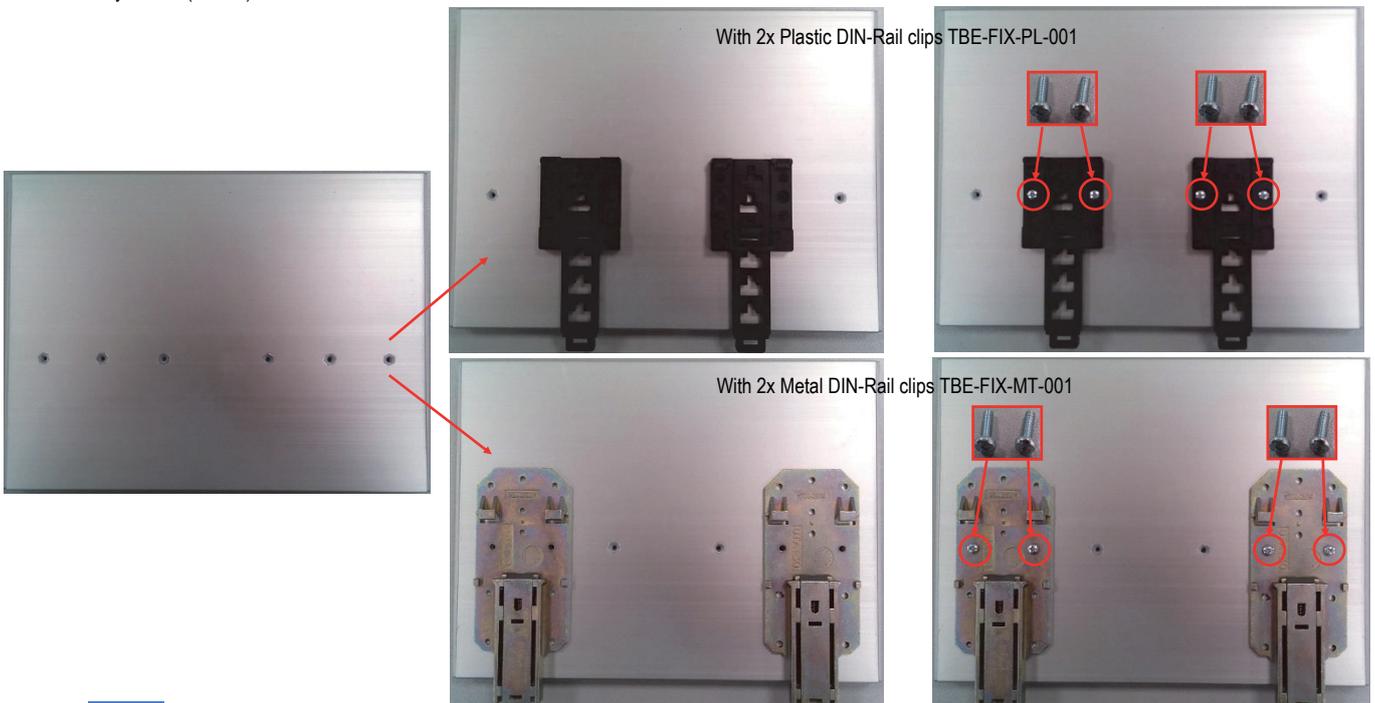
For termination board with 1x or 2x Plastic DIN-Rail clips TBE-FIX-PL-001, extract each clip and related instruction sheet from plastic bag. Follow the instruction sheet and the following figures to change lever position (from default to specific for TBE-D50xx-TRI-xxx) on each clip:



For the termination boards **TB-D5016-TRI-010** and **TBE-D5016-TRI-010**, 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:

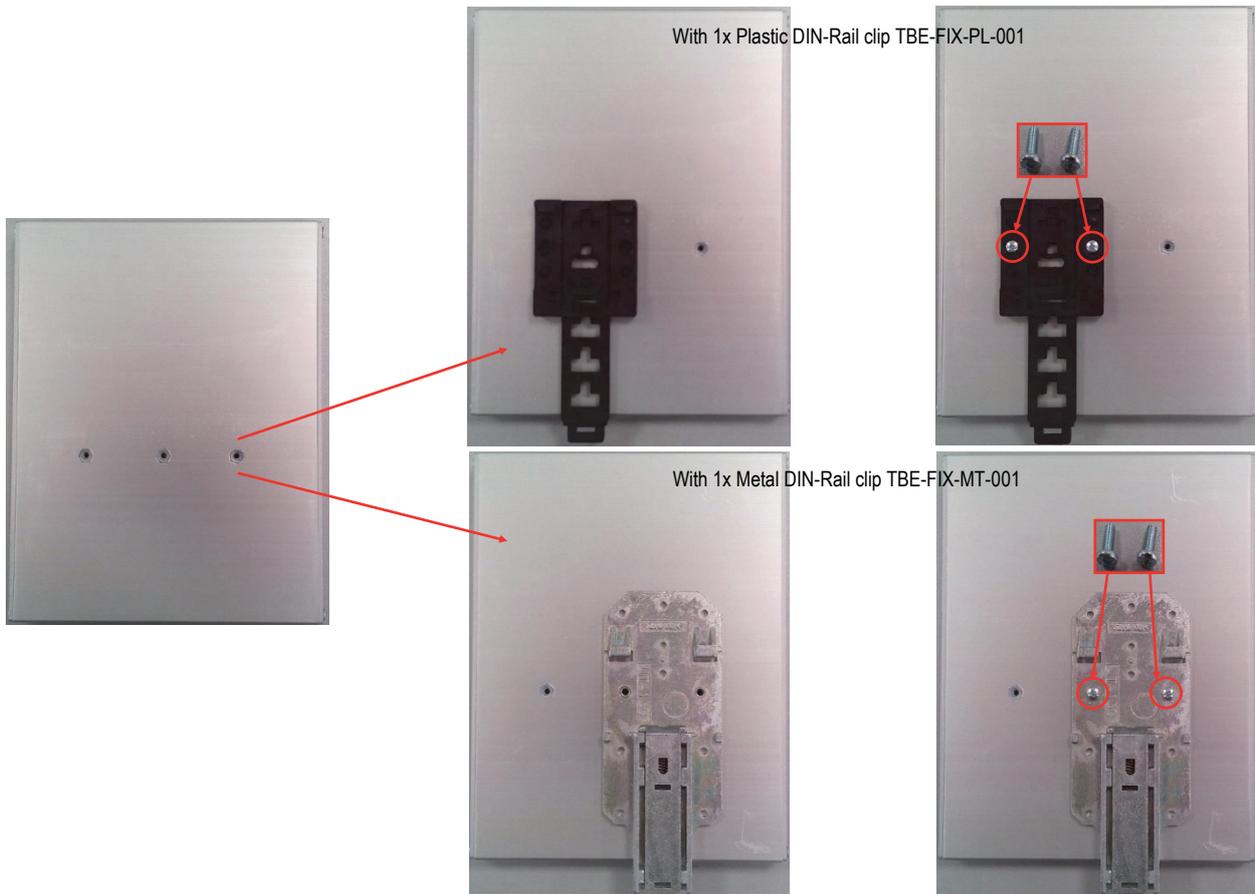


For the termination boards **TBE-D5016-TRI-001**, **TBE-D5016-TRI-002**, **TBE-D5016-TRI-003**, **TBE-D5016-TRI-004**, **TBE-D5016-TRI-005**, **TBE-D5016-TRI-006**, **TBE-D5016-TRI-007**, **TBE-D5016-TRI-008**, **TBE-D5016-TRI-009**, **TBE-D5016-TRI-011** and **TBE-D5016-TRI-012**, place the enclosure 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:



## DIN-Rail clip installation on termination board enclosure

For the termination board **TBE-D5008-TRI-001**, place the enclosure as shown in the following figures and fix Plastic or Metal DIN-Rail clip to enclosure by 2 x M3 (10 mm) screws included on TBE-FIX set:



## TBE with Conformal Coating

On TBE order, customer can add one of the following codes to request Conformal Coating applied on TBE by factory process:

- 1) TBE-CTG-001 code for TBE-D5008-TRI-001;
- 2) TBE-CTG-002 code for TBE-D5016-TRI-001, TBE-D5016-TRI-003, TBE-D5016-TRI-004, TBE-D5016-TRI-006, TBE-D5016-TRI-007, TBE-D5016-TRI-008, TBE-D5016-TRI-009, TBE-D5016-TRI-010, TBE-D5016-TRI-011, TBE-D5016-TRI-012;
- 3) TBE-CTG-003 code for TBE-D5016-TRI-002, TBE-D5016-TRI-005.

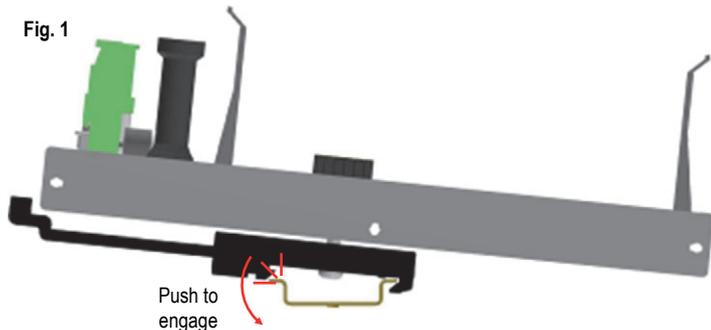
## Models mounting and removing

For termination board with 1x or 2x 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).

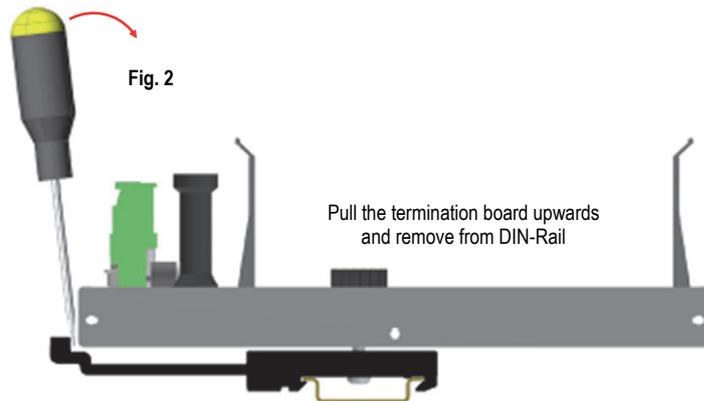
Fig. 1



**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

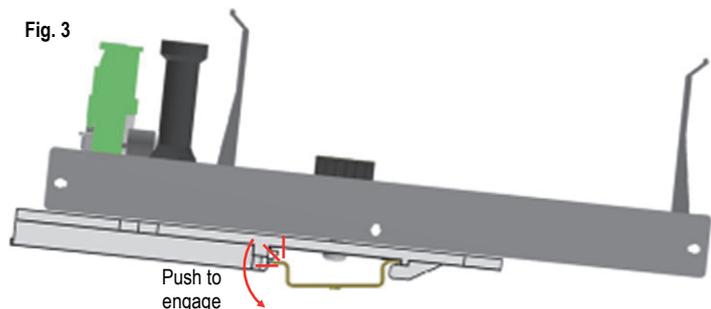


For termination board with 1x or 2x Metal DIN-Rail clips TBE-FIX-MT-001:

**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.3).

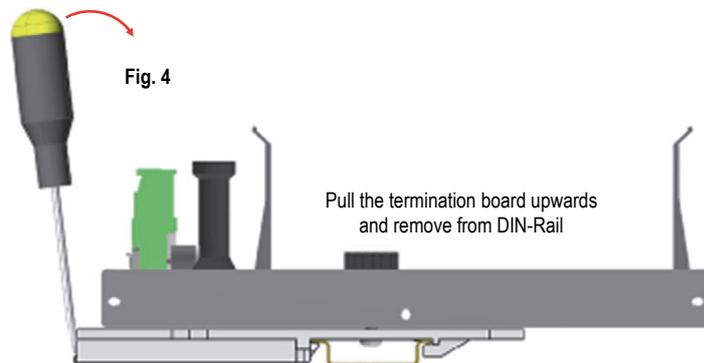
Fig. 3



**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

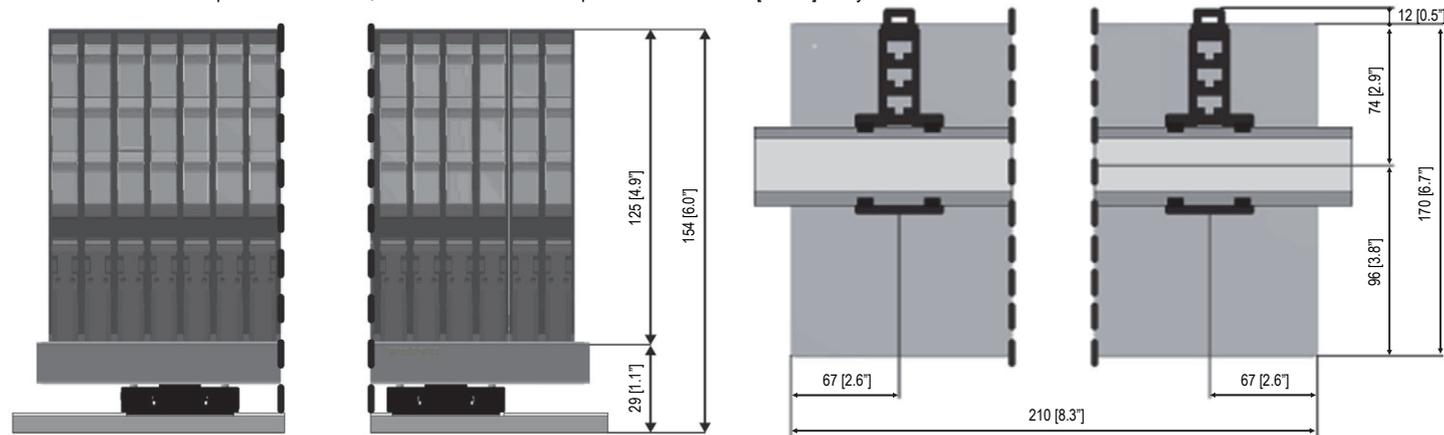


## Overall dimensions

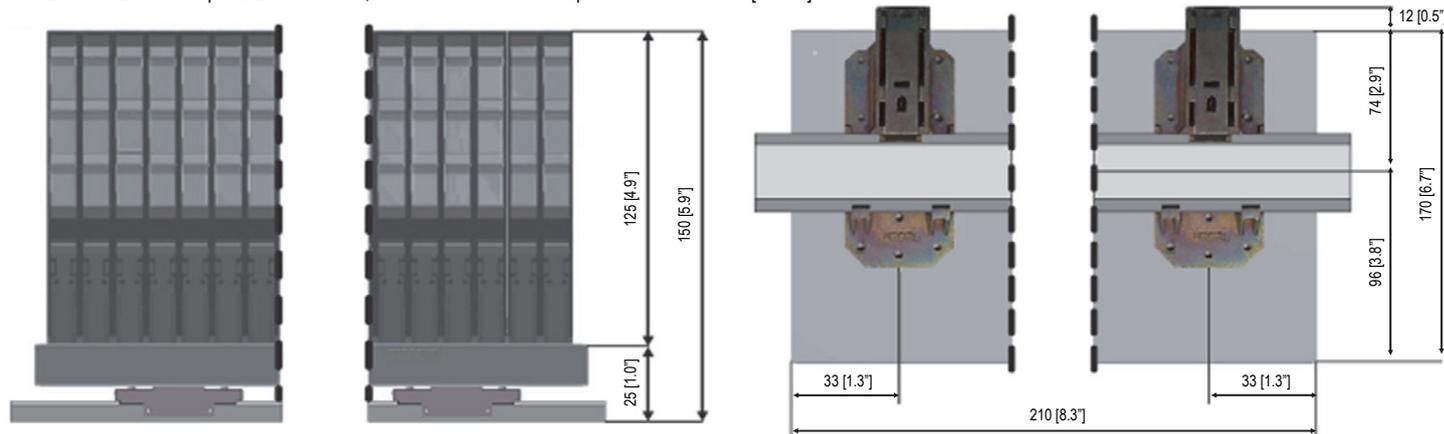
For the following termination board:

- TB-D5016-TRI-010 / TBE-D5016-TRI-010.

With 2x Plastic DIN-Rail clips TBE-FIX-PL-001, with all dimensions are expressed in millimeters [inches] - only for TBE-D5016-TRI-010:



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

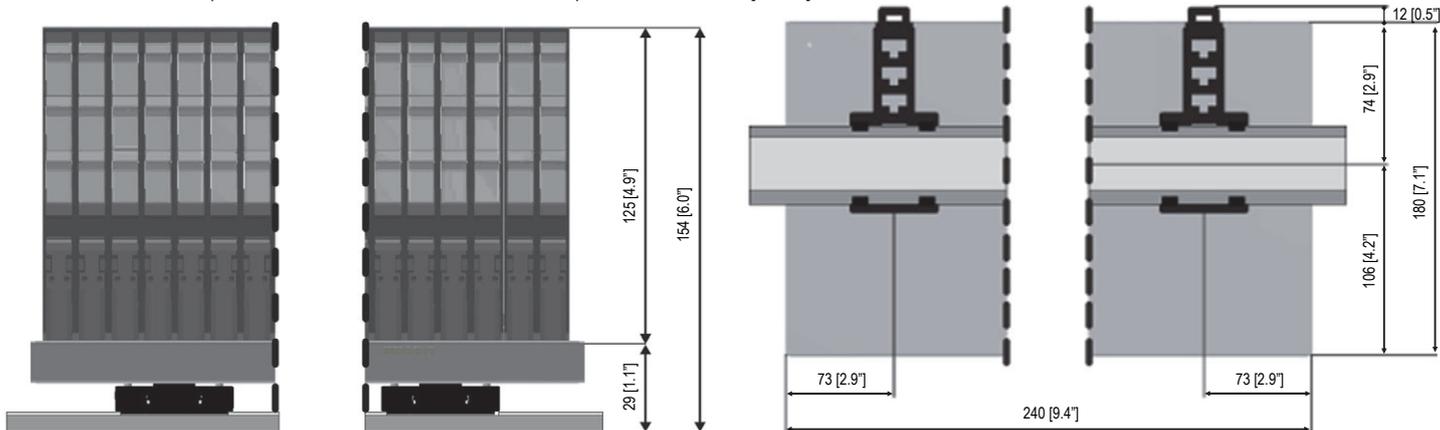


## Overall dimensions

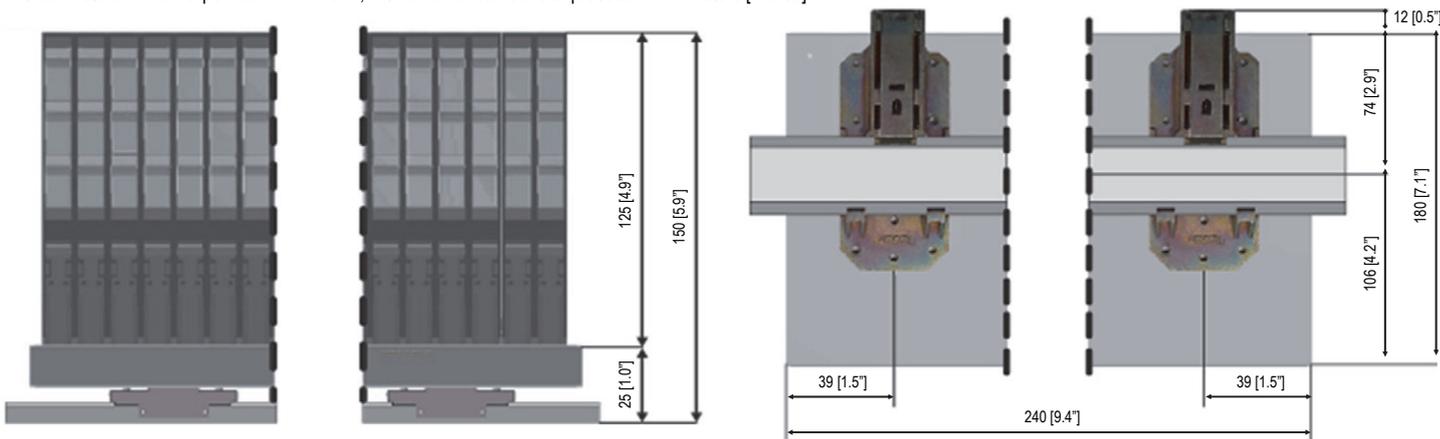
For the following termination boards:

- TBE-D5016-TRI-001;
- TBE-D5016-TRI-002 (overall dimensions and DIN-Rail clip quantity are the same for Part A and Part B of this model);
- TBE-D5016-TRI-003;
- TBE-D5016-TRI-004;
- TBE-D5016-TRI-005 (overall dimensions and DIN-Rail clip quantity are the same for Part A and Part B of this model);
- TBE-D5016-TRI-006;
- TBE-D5016-TRI-007;
- TBE-D5016-TRI-008;
- TBE-D5016-TRI-009;
- TBE-D5016-TRI-011;
- TBE-D5016-TRI-012.

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



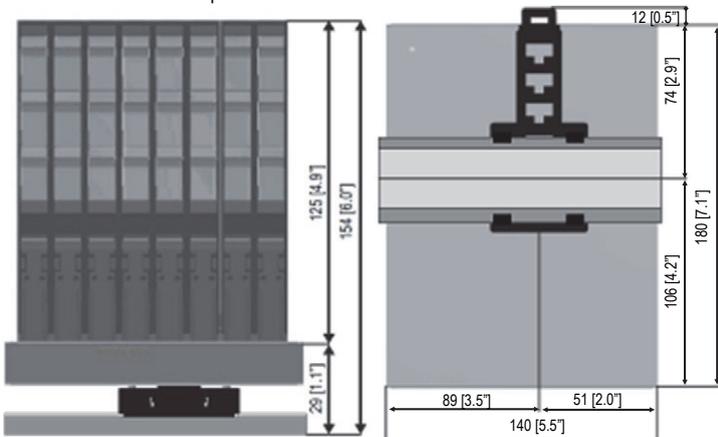
With 2x Metal DIN-Rail clips TBE-FIX-MT-001, with all dimensions are expressed in millimeters [inches]:



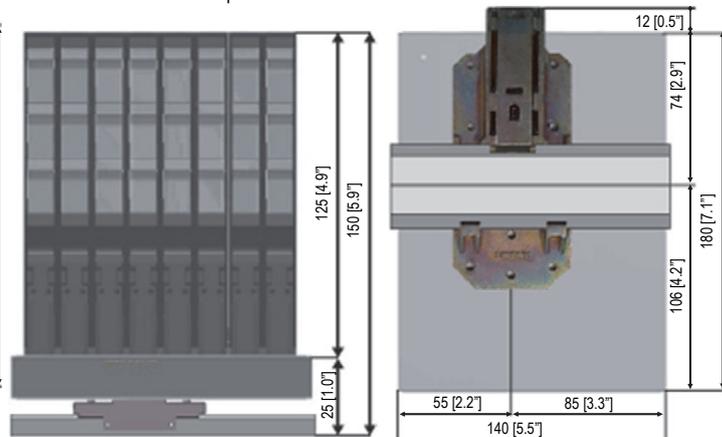
For the following termination board:

- TBE-D5008-TRI-001.

With 1x Plastic DIN-Rail clip TBE-FIX-PL-001:



With 1x Metal DIN-Rail clip TBE-FIX-MT-001:



All dimensions are expressed in millimeters [inches]

## Characteristics:

### General description:

This Termination Board with Enclosure (TBE) provides direct connection between the I/O Card of the system and D5000 / D6000 Series modules. The Intrinsically Safe protection and signal isolation between Safe and Hazardous Area, is provided by D5000 Series Associated Apparatus. The 24 Vdc Power Supply of the TBE is connected to two plug-in terminal blocks, for a redundant power supply. The power supply for modules is given by TBE power bus.

### Termination Board general characteristics:

Number of positions	Features
16	Power Supply voltage redundancy; Abnormal supply voltage signaling; Cumulative module fault signaling; HART Multiplexing.

### Supported Tricon I/O Cards and D5000 / D6000 Series modules:

Refer to DTS0499 and DTS0886.

### Functional Safety Management Certification:

G.M. International is certified by TUV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL3.



### Functional Safety Applications:

Refer to Safety Manual ISM0472.

## Installation:

TBE-D5016-TRI-001 is a Termination Board supported by an aluminum shell suitable for installation on EN/IEC60715 TH 35 DIN-Rail.

TBE-D5016-TRI-001 unit can be mounted with any orientation over the entire ambient temperature range.

Electrical connections are the following:

- ALARM, PWR1, PWR 2: polarized plug-in removable screw terminal blocks for conductors up to 2.5 mm<sup>2</sup> (13 AWG) with a torque of 0.5-0.6 Nm.
- CON1 SHIELD: screw terminal block for conductors up to 2 mm<sup>2</sup> (14 AWG) fully tight.
- CON1: ELCO 8016, 56 poles connector with screws retaining method.
- J17 and J18 HART: 2 x 34 poles male connector.

Electrical connection can be plugged in/out into a powered unit without suffering or causing any damage (**for Zone 2 installations check the area to be nonhazardous before servicing**). Connect only one individual conductor per each clamping point. For USA and Canada installations, 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 (e.g. EN/IEC60079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines)), 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. When installed in EU Zone 2, the unit shall be mounted in a certified Ex enclosure that provides a minimum ingress protection of IP54 in accordance with EN/IEC60079-0. When installed in a Class I, Division 2 Hazardous Location, the unit shall be mounted in a supplemental enclosure that provides a degree of protection not less than IP54. The enclosure must have a door or cover accessible only by the use of a tool. The end user is responsible to ensure that the operating temperature of the module is not exceeded in the end use application.

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-D5016-TRI-001 unit must be connected to SELV or PELV supplies.

All circuits connected to TBE-D5016-TRI-001 unit must comply with the overvoltage category II (or better) according to EN/IEC60664-1.

## Technical Data:

### 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.

**Max allowed current consumption:** 1.5 A (as total supply).

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Protection fuse:** 4 A time lag.

### Fault detection:

The on-board diagnostic monitors both power supplies integrity and the module cumulative fault. Any malfunction is reported by deactivating a solid-state relay and activating the corresponding LEDs.

Alarm is issued if:

- 1) Power supply 1 or 2 < 17 Vdc or
- 2) Power supply 1 or 2 > 33 Vdc or
- 3) Module cumulative fault ON.

Alarm is removed if:

- 1) 20 Vdc < Power supply 1 and 2 < 30 Vdc and
- 2) No module cumulative fault.

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Output rating:** 100 mA 35 V (≤ 1 V voltage drop)

### I/O Card Interface:

**Connection:**

1 x ELCO 8016, 56 poles receptacle connector (require male mating connector).

**Connector Keys:** CON1, Large Key pos.5, Small Key pos.1.

**Board configuration:** TBE n.1 (1-32ch.), J21 in 2-3 and J22 in 2-3. TBE n.2 (33-64ch.), J21 in 1-2 and J22 in 1-2.

**Cable:** system cable 4000206-5xx.

### HART Mux Interface:

**Connection:** 2 x 34-poles receptacle connector (require female mating connector).

**Cable:** flat cable CABF032.

### Compatibility:

CE mark compliant, conforms to Directive:

2014/34/EU ATEX, 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 limits – 45 to + 80 °C.

### Safety Description:



**ATEX:** II 3G Ex ec IIC T4 Gc; **IECEx:** Ex ec IIC T4 Gc

**UL:** NI / I / 2 / ABCD / T4; **C-UL:** NI / I / 2 / ABCD / T4

**CCC:** Ex ec IIC T4 Gc

### Approvals:

IMQ 19 ATEX 073 X conforms to EN60079-0, EN60079-7.

IECEx IMQ 19.0013X conforms to IEC60079-0, IEC60079-7.

UL & C-UL E222308 conforms to UL 61010-1 and UL 121201 for UL and CAN/CSA

C22.2 No.61010-1-12 and CSA C22.2 No. 213 for C-UL.

CCC n. 2023322308005685 conforms to GB/T 3836.1, GB/T 3834.3.

TUV Certificate No. C-IS-272994-01 SIL 3 conforms to IEC61508:2010 Ed. 2.

SIL 3 Functional Safety TÜV Certificate conforms to IEC61508:2010 Ed.2, for Management of Functional Safety.

### Mounting:

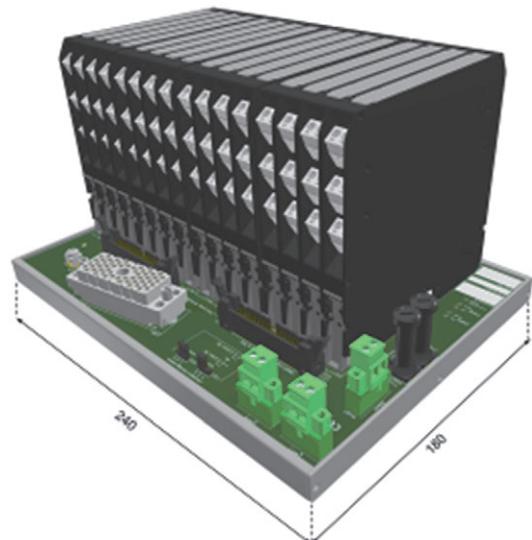
Hardware included for mounting on single DIN rail 35 mm.

**Weight:** about 700 g (excluding modules).

**Location:** installation in Safe Area/Ordinary Location or Zone 2, Group IIC T4, or Class 1, Div. 2, Group A, B, C, D, T4.

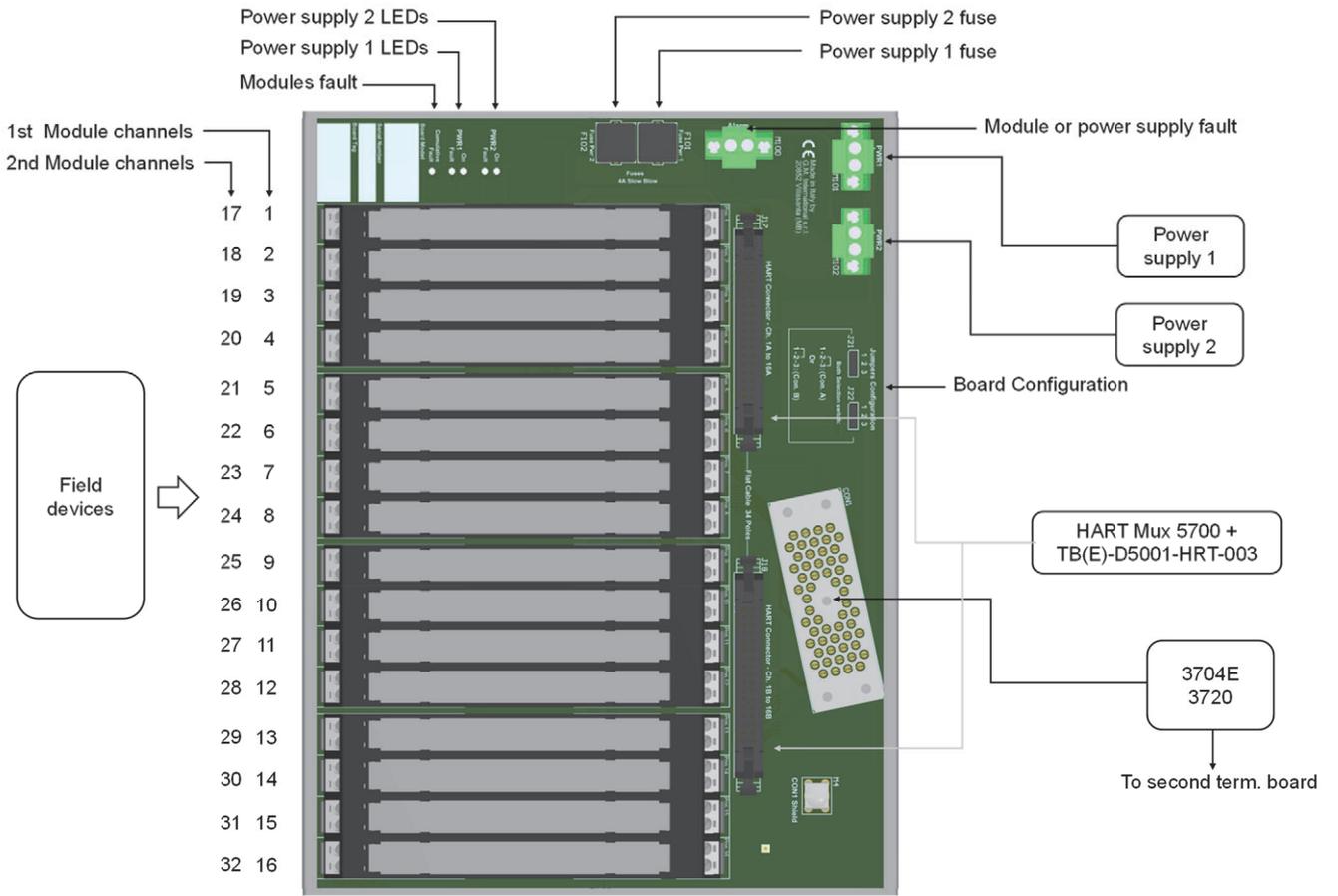
**Dimensions:** Width 240 mm, Depth 180 mm, Height 154 mm.

## Image:



# Termination Board Description

**Note :** Do not mix D5000 Intrinsically Safe barriers with D6000 isolators on same termination board.



Connections Table to Interface Cards

MODULE POSITION	MODULE CHANNEL NUMBER	INTERFACE CARD(S) CHANNEL NUMBER (ELCO1) for TBE n.1	INTERFACE CARD(S) CHANNEL NUMBER (ELCO2) for TBE n.2	MODULE CHANNEL POSITIVE (+) CONNECTION (CON1)	MODULE CHANNEL NEGATIVE (-) CONNECTION	HART MULTIPLEXING CONNECTOR POSITIVE (+) PIN NUMBER	HART MULTIPLEXING CONNECTOR NEGATIVE (-) PIN NUMBER	NOTES
1	1A	1	33	AA	GND	1 (J17)	2 (J17)	CON1: • Chassis Ground provided on poles: T, H, w, FF. • Ground available on poles: E, A, NN, JJ, y, n, d, V, K, D • +24 Vdc available on poles (only ELCO 1): DD, k, R. • Ground available on poles (only ELCO 2): DD, k, R, KK, u, a. • Unconnected poles: s, r, X, Y.
	1B	2	34	LL	GND	1 (J18)	2 (J18)	
2	2A	3	35	z	GND	3 (J17)	4 (J17)	
	2B	4	36	EE	GND	3 (J18)	4 (J18)	
3	3A	5	37	p	GND	5 (J17)	6 (J17)	
	3B	6	38	v	GND	5 (J18)	6 (J18)	
4	4A	7	39	h	GND	7 (J17)	8 (J17)	
	4B	8	40	l	GND	7 (J18)	8 (J18)	
5	5A	9	41	e	GND	9 (J17)	10 (J17)	
	5B	10	42	b	GND	9 (J18)	10 (J18)	
6	6A	11	43	W	GND	11 (J17)	12 (J17)	
	6B	12	44	S	GND	11 (J18)	12 (J18)	
7	7A	13	45	L	GND	13 (J17)	14 (J17)	
	7B	14	46	F	GND	13 (J18)	14 (J18)	
8	8A	15	47	M	GND	15 (J17)	16 (J17)	
	8B	16	48	B	GND	15 (J18)	16 (J18)	
9	9A	17	49	BB	GND	17 (J17)	18 (J17)	
	9B	18	50	MM	GND	17 (J18)	18 (J18)	
10	10A	19	51	CC	GND	19 (J17)	20 (J17)	
	10B	20	52	HH	GND	19 (J18)	20 (J18)	
11	11A	21	53	t	GND	21 (J17)	22 (J17)	
	11B	22	54	x	GND	21 (J18)	22 (J18)	
12	12A	23	55	j	GND	23 (J17)	24 (J17)	
	12B	24	56	m	GND	23 (J18)	24 (J18)	
13	13A	25	57	f	GND	25 (J17)	26 (J17)	
	13B	26	58	c	GND	25 (J18)	26 (J18)	
14	14A	27	59	Z	GND	27 (J17)	28 (J17)	
	14B	28	60	U	GND	27 (J18)	28 (J18)	
15	15A	29	61	P	GND	29 (J17)	30 (J17)	
	15B	30	62	J	GND	29 (J18)	30 (J18)	
16	16A	31	63	N	GND	31 (J17)	32 (J17)	
	16B	32	64	C	GND	31 (J18)	32 (J18)	

## Characteristics:

### General description:

This Termination Board with Enclosure (TBE) provides direct connection between the I/O Card of the system and D5000 / D6000 Series modules. The Intrinsically Safe protection and signal isolation between Safe and Hazardous Area, is provided by D5000 Series Associated Apparatus. The 24 Vdc Power Supply of the TBE is connected to two plug-in terminal blocks, for a redundant power supply. The power supply for modules is given by TBE power bus.

### Termination Board general characteristics:

Number of positions	Features
16 (TBE Part A) +	Power Supply voltage redundancy; Abnormal supply voltage signaling; Cumulative module fault signaling; HART Multiplexing.
16 (TBE Part B)	

### Supported Tricon I/O Cards and D5000 / D6000 Series modules:

Refer to DTS0499 and DTS0887.

### Functional Safety Management Certification:

G.M. International is certified by TUV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL3.



### Functional Safety Applications:

Refer to Safety Manual ISM0472.

## Installation:

TBE-D5016-TRI-002 Part A and TBE-D5016-TRI-002 Part B are Termination Boards supported by an aluminum shell suitable for installation on EN/IEC60715 TH 35 DIN-Rail. TBE-D5016-TRI-002 Part A and TBE-D5016-TRI-002 Part B units can be mounted with any orientation over the entire ambient temperature range.

Electrical connections are the following:

- ALARM, PWR1, PWR 2 (for each Part A or Part B): polarized plug-in removable screw terminal blocks for conductors up to 2.5 mm<sup>2</sup> (13 AWG) with a torque of 0.5-0.6 Nm.
- CON1 SHIELD (only for Part A): screw terminal block for conductors up to 2 mm<sup>2</sup> (14 AWG) fully tight.
- CON1 (only for Part A): ELCO 8016, 56 poles connector with screws retaining method.
- J17 HART + J19 TBE A to B (only for Part A): 1+1 x 34 poles male connector.
- J17 HART + J18 TBE B to A (only for Part B): 1+1 x 34 poles male connector.

Electrical connection can be plugged in/out into a powered unit without suffering or causing any damage (for Zone 2 installations check the area to be nonhazardous before servicing). Connect only one individual conductor per each clamping point. For USA and Canada installations, 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 (e.g. EN/IEC60079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines)), 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. When installed in EU Zone 2, the unit shall be mounted in a certified Ex enclosure that provides a minimum ingress protection of IP54 in accordance with EN/IEC60079-0. When installed in a Class I, Division 2 Hazardous Location, the unit shall be mounted in a supplemental enclosure that provides a degree of protection not less than IP54. The enclosure must have a door or cover accessible only by the use of a tool. The end user is responsible to ensure that the operating temperature of the module is not exceeded in the end use application.

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-D5016-TRI-002 Part A and TBE-D5016-TRI-002 Part B units must be connected to SELV or PELV supplies.

All circuits connected to TBE-D5016-TRI-002 Part A and TBE-D5016-TRI-002 Part B units must comply with the overvoltage category II (or better) according to EN/IEC60664-1.

## Technical Data:

### 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.

**Max allowed current consumption:** 1.5 A (as total supply).

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Protection fuse:** 4 A time lag.

### Fault detection:

The on-board diagnostic monitors both power supplies integrity and the module cumulative fault. Any malfunction is reported by deactivating a solid-state relay and activating the corresponding LEDs.

Alarm is issued if:

- 1) Power supply 1 or 2 < 17 Vdc or
- 2) Power supply 1 or 2 > 33 Vdc or
- 3) Module cumulative fault ON.

Alarm is removed if:

- 1) 20 Vdc < Power supply 1 and 2 < 30 Vdc and
- 2) No module cumulative fault.

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Output rating:** 100 mA 35 V (≤ 1 V voltage drop)

### I/O Card Interface:

#### Connection:

1 x ELCO 8016, 56 poles receptacle connector (require male mating connector).

**Connector Keys:** CON1, Large Key pos.5, Small Key pos.1.

**Board configuration:** TBE n.1 Part A and Part B (1-32ch.): J21 and J22 in 2-3.

TBE n.2 Part A and Part B (33-64ch.): J21 and J22 in 1-2.

**Cable:** system cable 4000206-5xx.

### HART Mux Interface + TBE Part A / Part B interconnection:

**Connection:** 1+1 x 34-poles receptacle connector (require female mating connector).

**Cable:** flat cable CABF032.

### Compatibility:

CE mark compliant, conforms to Directive: 2014/34/EU ATEX, 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 limits – 45 to + 80 °C.

### Safety Description:



**ATEX:** II 3G Ex ec IIC T4 Gc; **IECEx:** Ex ec IIC T4 Gc

**UL:** NI / I / 2 / ABCD / T4; **C-UL:** NI / I / 2 / ABCD / T4

**CCC:** Ex ec IIC T4 Gc

### Approvals:

IMQ 19 ATEX 073 X conforms to EN60079-0, EN60079-7.

IECEx IMQ 19.0013X conforms to IEC60079-0, IEC60079-7.

UL & C-UL E222308 conforms to UL 61010-1 and UL 121201 for UL and CAN/CSA C22.2 No.61010-1-12 and CSA C22.2 No. 213 for C-UL.

CCC n. 2023322308005685 conforms to GB/T 3836.1, GB/T 3834.3.

TUV Certificate No. C-IS-272994-01 SIL 3 conforms to IEC61508:2010 Ed. 2.

SIL 3 Functional Safety TÜV Certificate conforms to IEC61508:2010 Ed.2, for Management of Functional Safety.

### Mounting:

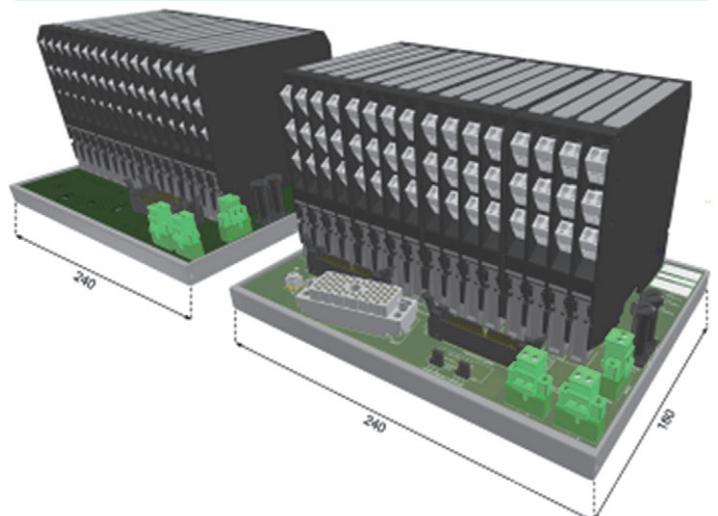
Hardware included for mounting on single DIN rail 35 mm.

**Weight:** about 2 x 700 g (excluding modules).

**Location:** installation in Safe Area/Ordinary Location or Zone 2, Group IIC T4, or Class 1, Div. 2, Group A, B, C, D, T4.

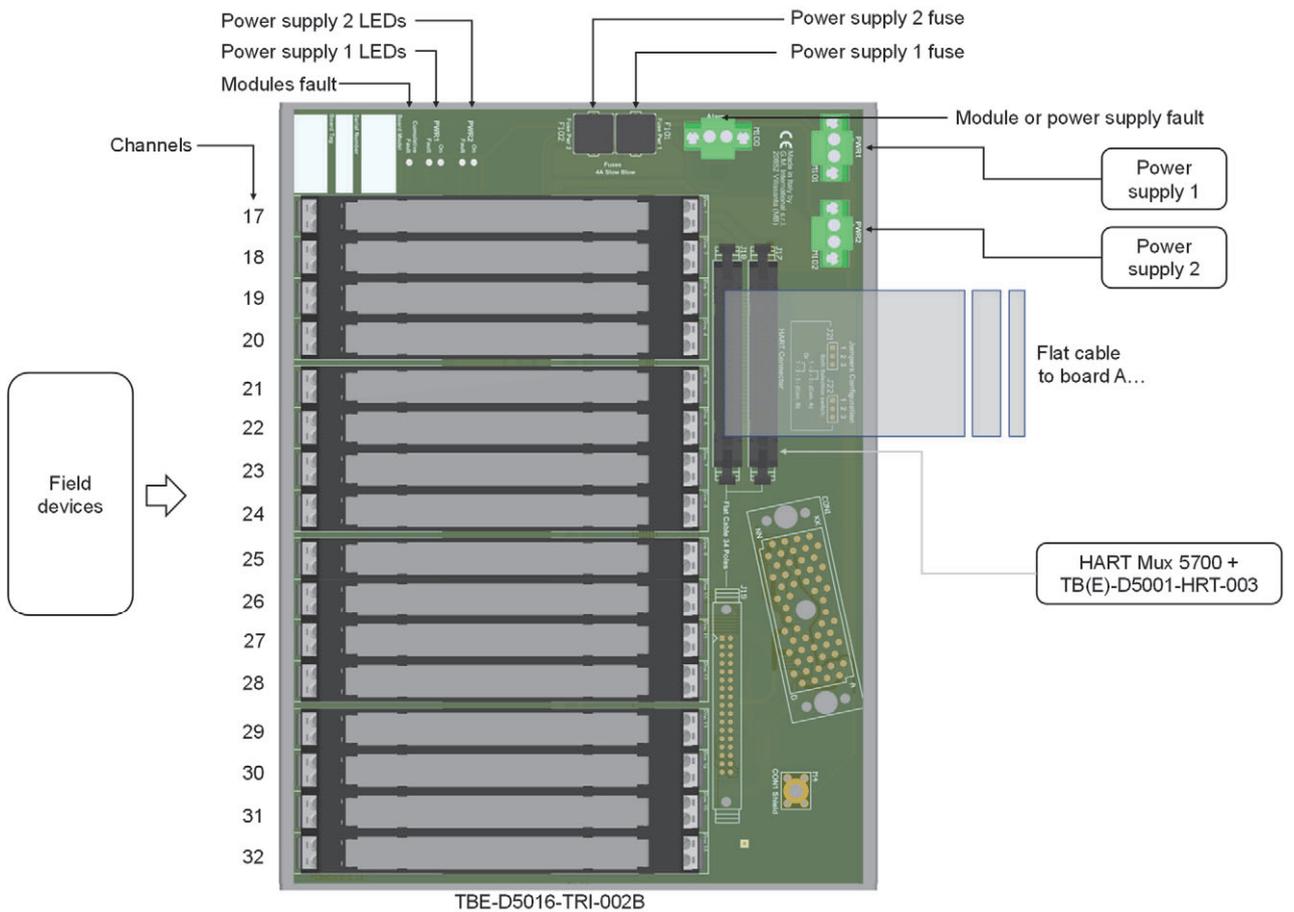
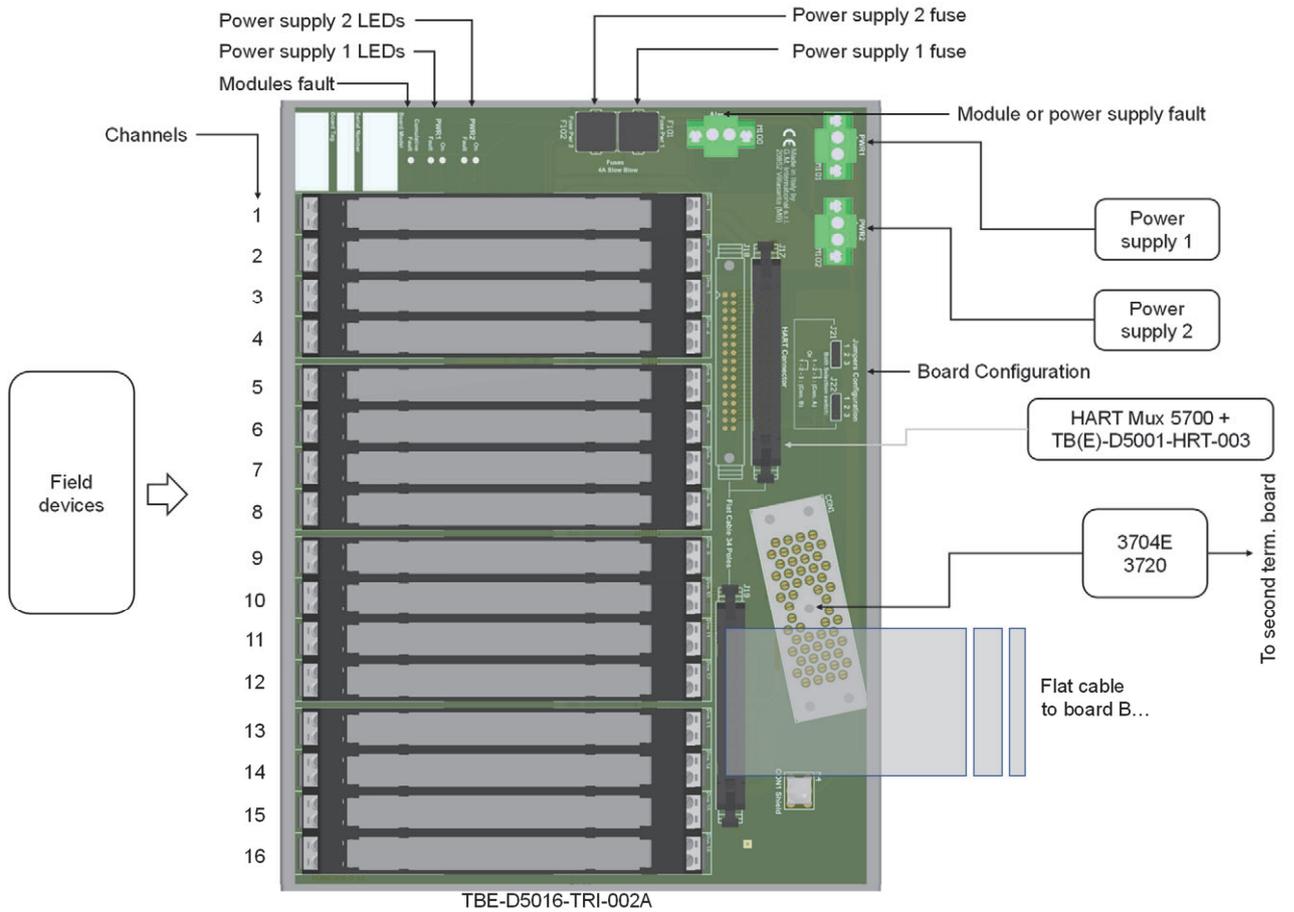
**Dimensions:** 2 x Width 240 mm, Depth 180 mm, Height 154 mm.

## Image:



## Termination Board Description

**Note :** Do not mix D5000 Intrinsically Safe barriers with D6000 isolators on same termination board.



Connections Table to Interface Cards

MODULE POSITION	MODULE CHANNEL NUMBER	INTERFACE CARD(S) CHANNEL NUMBER (ELCO1) for TBE n.1 Part A & Part B	INTERFACE CARD(S) CHANNEL NUMBER (ELCO2) for TBE n.2 Part A & Part B	MODULE CHANNEL POSITIVE (+) CONNECTION (CON1)	MODULE CHANNEL NEGATIVE (-) CONNECTION	HART MULTIPLEXING CONNECTOR POSITIVE (+) PIN NUMBER (J17)	HART MULTIPLEXING CONNECTOR NEGATIVE (-) PIN NUMBER (J17)	NOTES
1	1A	1	33	AA	GND	1 (TBE Part A)	2 (TBE Part A)	CON1: • Chassis Ground provided on poles: T, H, w, FF. • Ground available on poles: E, A, NN, JJ, y, n, d, V, K, D • +24 Vdc available on poles (only ELCO 1): DD, k, R. • Ground available on poles (only ELCO 2): DD, k, R, KK, u, a. • Unconnected poles: s, r, X, Y.
2	2A	2	34	LL	GND	3 (TBE Part A)	4 (TBE Part A)	
3	3A	3	35	z	GND	5 (TBE Part A)	6 (TBE Part A)	
4	4A	4	36	EE	GND	7 (TBE Part A)	8 (TBE Part A)	
5	5A	5	37	p	GND	9 (TBE Part A)	10 (TBE Part A)	
6	6A	6	38	v	GND	11 (TBE Part A)	12 (TBE Part A)	
7	7A	7	39	h	GND	13 (TBE Part A)	14 (TBE Part A)	
8	8A	8	40	l	GND	15 (TBE Part A)	16 (TBE Part A)	
9	9A	9	41	e	GND	17 (TBE Part A)	18 (TBE Part A)	
10	10A	10	42	b	GND	19 (TBE Part A)	20 (TBE Part A)	
11	11A	11	43	W	GND	21 (TBE Part A)	22 (TBE Part A)	
12	12A	12	44	S	GND	23 (TBE Part A)	24 (TBE Part A)	
13	13A	13	45	L	GND	25 (TBE Part A)	26 (TBE Part A)	
14	14A	14	46	F	GND	27 (TBE Part A)	28 (TBE Part A)	
15	15A	15	47	M	GND	29 (TBE Part A)	30 (TBE Part A)	
16	16A	16	48	B	GND	31 (TBE Part A)	32 (TBE Part A)	
17	17A	17	49	BB	GND	1 (TBE Part B)	2 (TBE Part B)	
18	18A	18	50	MM	GND	3 (TBE Part B)	4 (TBE Part B)	
19	19A	19	51	CC	GND	5 (TBE Part B)	6 (TBE Part B)	
20	20A	20	52	HH	GND	7 (TBE Part B)	8 (TBE Part B)	
21	21A	21	53	t	GND	9 (TBE Part B)	10 (TBE Part B)	
22	22A	22	54	x	GND	11 (TBE Part B)	12 (TBE Part B)	
23	23A	23	55	j	GND	13 (TBE Part B)	14 (TBE Part B)	
24	24A	24	56	m	GND	15 (TBE Part B)	16 (TBE Part B)	
25	25A	25	57	f	GND	17 (TBE Part B)	18 (TBE Part B)	
26	26A	26	58	c	GND	19 (TBE Part B)	20 (TBE Part B)	
27	27A	27	59	Z	GND	21 (TBE Part B)	22 (TBE Part B)	
28	28A	28	60	U	GND	23 (TBE Part B)	24 (TBE Part B)	
29	29A	29	61	P	GND	25 (TBE Part B)	26 (TBE Part B)	
30	30A	30	62	J	GND	27 (TBE Part B)	28 (TBE Part B)	
31	31A	31	63	N	GND	29 (TBE Part B)	30 (TBE Part B)	
32	32A	32	64	C	GND	31 (TBE Part B)	32 (TBE Part B)	

## Characteristics:

### General description:

This Termination Board with Enclosure (TBE) provides direct connection between the I/O Card of the system and D5000 / D6000 Series modules. The Intrinsically Safe protection and signal isolation between Safe and Hazardous Area, is provided by D5000 Series Associated Apparatus. The 24 Vdc Power Supply of the TBE is connected to two plug-in terminal blocks, for a redundant power supply. The power supply for modules is given by TBE power bus.

### Termination Board general characteristics:

Number of positions	Features
16	Power Supply voltage redundancy; Abnormal supply voltage signaling; Cumulative module fault signaling; HART Multiplexing.

### Supported Tricon I/O Cards and D5000 / D6000 Series modules:

Refer to DTS0499 and DTS0885.

### Functional Safety Management Certification:

G.M. International is certified by TUV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL3.



### Functional Safety Applications:

Refer to Safety Manual ISM0472.

## Installation:

TBE-D5016-TRI-003 is a Termination Board supported by an aluminum shell suitable for installation on EN/IEC60715 TH 35 DIN-Rail.

TBE-D5016-TRI-003 unit can be mounted with any orientation over the entire ambient temperature range.

Electrical connections are the following:

- ALARM, PWR1, PWR 2: polarized plug-in removable screw terminal blocks for conductors up to 2.5 mm<sup>2</sup> (13 AWG) with a torque of 0.5-0.6 Nm.
- CON1 SHIELD: screw terminal block for conductors up to 2 mm<sup>2</sup> (14 AWG) fully tight.
- CON1: ELCO 8016, 56 poles connector with screws retaining method.
- CON2 SHIELD: screw terminal block for conductors up to 2 mm<sup>2</sup> (14 AWG) fully tight.
- CON2: ELCO 8016, 56 poles connector with screws retaining method.
- J17 and J18 HART: 2 x 34 poles male connector.

Electrical connection can be plugged in/out into a powered unit without suffering or causing any damage (for Zone 2 installations check the area to be nonhazardous before servicing). 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 (e.g. EN/IEC60079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines)), 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. When installed in EU Zone 2, the unit shall be mounted in a certified Ex enclosure that provides a minimum ingress protection of IP54 in accordance with EN/IEC60079-0. When installed in a Class I, Division 2 Hazardous Location, the unit shall be mounted in a supplemental enclosure that provides a degree of protection not less than IP54. The enclosure must have a door or cover accessible only by the use of a tool. The end user is responsible to ensure that the operating temperature of the module is not exceeded in the end use application.

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-D5016-TRI-003 unit must be connected to SELV or PELV supplies.

All circuits connected to TBE-D5016-TRI-003 unit must comply with the overvoltage category II (or better) according to EN/IEC60664-1.

## Technical Data:

### 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.

**Max allowed current consumption:** 1.5 A (as total supply).

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Protection fuse:** 4 A time lag.

### Fault detection:

The on-board diagnostic monitors both power supplies integrity and the module cumulative fault. Any malfunction is reported by deactivating a solid-state relay and activating the corresponding LEDs.

Alarm is issued if:

- 1) Power supply 1 or 2 < 17 Vdc or
- 2) Power supply 1 or 2 > 33 Vdc or
- 3) Module cumulative fault ON.

Alarm is removed if:

- 1) 20 Vdc < Power supply 1 and 2 < 30 Vdc and
- 2) No module cumulative fault.

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Output rating:** 100 mA 35 V (≤ 1 V voltage drop)

### I/O Card Interface:

#### Connection:

2 x ELCO 8016, 56 poles receptacle connector (require male mating connector).

**Connector Keys:** CON1, Large Key pos.5, Small Key pos.1.

CON2, Large Key pos.5, Small Key pos.1.

**Cable:** system cable 4000189-5xx.

### HART Mux Interface:

**Connection:** 2 x 34-poles receptacle connector (require female mating connector).

**Cable:** flat cable CABF032.

### Compatibility:

CE mark compliant, conforms to Directive: 2014/34/EU ATEX, 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 limits – 45 to + 80 °C.

### Safety Description:



**ATEX:** II 3G Ex ec IIC T4 Gc; **IECEx:** Ex ec IIC T4 Gc

**UL:** NI / I / 2 / ABCD / T4; **C-UL:** NI / I / 2 / ABCD / T4

**CCC:** Ex ec IIC T4 Gc

### Approvals:

IMQ 19 ATEX 073 X conforms to EN60079-0, EN60079-7.

IECEx IMQ 19.0013X conforms to IEC60079-0, IEC60079-7.

UL & C-UL E222308 conforms to UL 61010-1 and UL 121201 for UL and CAN/CSA

C22.2 No.61010-1-12 and CSA C22.2 No. 213 for C-UL.

CCC n. 2023322308005685 conforms to GB/T 3836.1, GB/T 3834.3.

TUV Certificate No. C-IS-272994-01 SIL 3 conforms to IEC61508:2010 Ed. 2.

SIL 3 Functional Safety TÜV Certificate conforms to IEC61508:2010 Ed.2,

for Management of Functional Safety.

### Mounting:

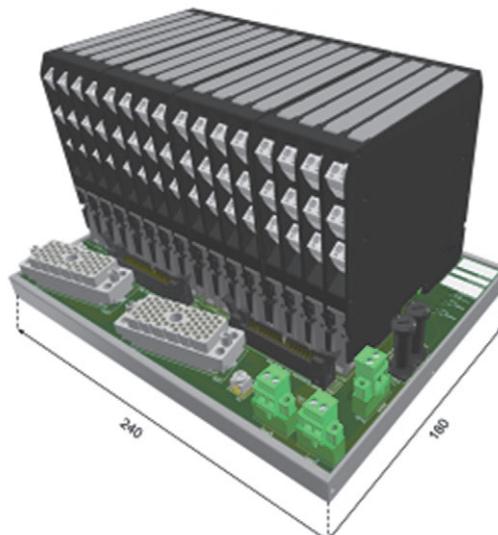
Hardware included for mounting on single DIN rail 35 mm.

**Weight:** about 700 g (excluding modules).

**Location:** installation in Safe Area/Ordinary Location or Zone 2, Group IIC T4, or Class 1, Div. 2, Group A, B, C, D, T4.

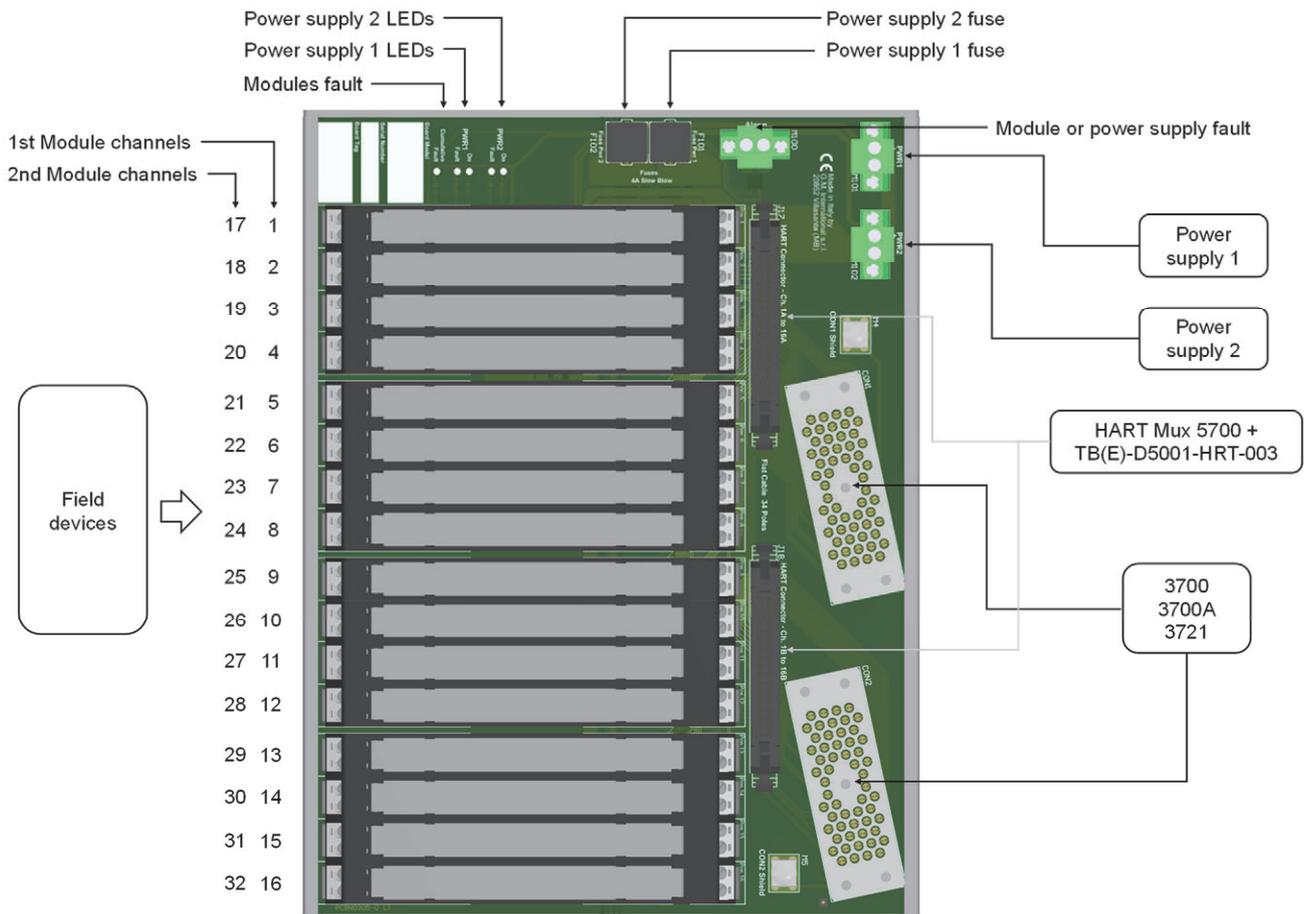
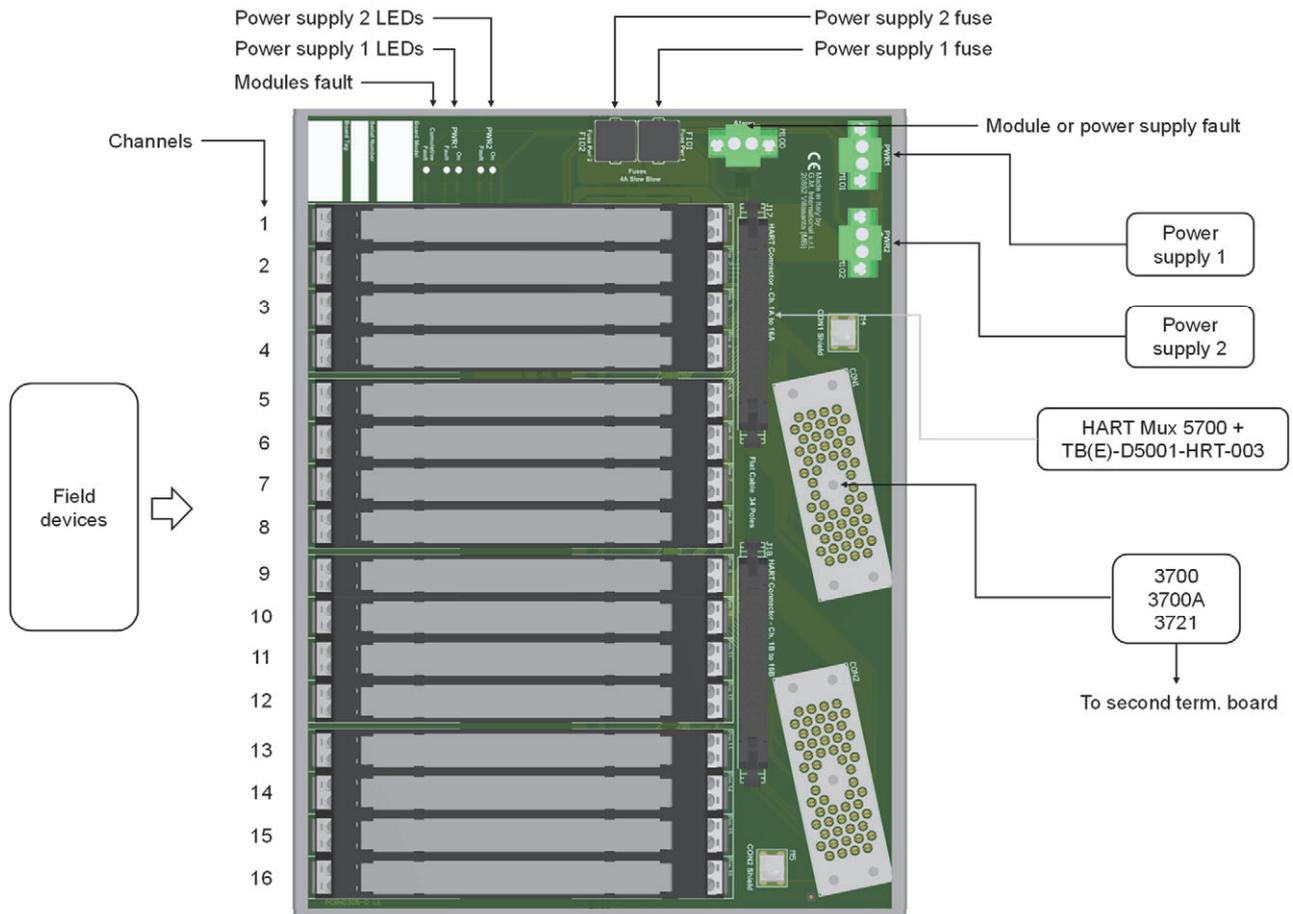
**Dimensions:** Width 240 mm, Depth 180 mm, Height 154 mm.

## Image:



## Termination Board Description

**Note :** Do not mix D5000 Intrinsically Safe barriers with D6000 isolators on same termination board.



**Connections Table to Interface Cards**

<u>SINGLE CHANNEL MODULE POSITION</u>	<u>MODULE CHANNEL NUMBER</u>	<u>INTERFACE CARD(S) CHANNEL NUMBER</u>	<u>MODULE CHANNEL POSITIVE (+) CONNECTION</u>	<u>MODULE CHANNEL NEGATIVE (-) CONNECTION</u>	<u>HART MULTIPLEXING CONNECTOR POSITIVE (+) PIN NUMBER</u>	<u>HART MULTIPLEXING CONNECTOR NEGATIVE (-) PIN NUMBER</u>	<u>NOTES</u>
1 of TBE n.1	1A	1 (ELCO1)	AA (CON1)	LL (CON1)	1 (J17)	2 (J17)	CON1: • Chassis Ground provided on poles: T, H, w, FF. • Unconnected poles: KK, u, a, DD, k, R, E, A, NN, JJ, y, n, d, V, K, D, s, r, X, Y.  CON 2 is not used.
1 of TBE n.2	1A	17 (ELCO2)	AA (CON1)	LL (CON1)	1 (J17)	2 (J17)	
2 of TBE n.1	2A	2 (ELCO1)	z (CON1)	EE (CON1)	3 (J17)	4 (J17)	
2 of TBE n.2	2A	18 (ELCO2)	z (CON1)	EE (CON1)	3 (J17)	4 (J17)	
3 of TBE n.1	3A	3 (ELCO1)	p (CON1)	v (CON1)	5 (J17)	6 (J17)	
3 of TBE n.2	3A	19 (ELCO2)	p (CON1)	v (CON1)	5 (J17)	6 (J17)	
4 of TBE n.1	4A	4 (ELCO1)	h (CON1)	l (CON1)	7 (J17)	8 (J17)	
4 of TBE n.2	4A	20 (ELCO2)	h (CON1)	l (CON1)	7 (J17)	8 (J17)	
5 of TBE n.1	5A	5 (ELCO1)	e (CON1)	b (CON1)	9 (J17)	10 (J17)	
5 of TBE n.2	5A	21 (ELCO2)	e (CON1)	b (CON1)	9 (J17)	10 (J17)	
6 of TBE n.1	6A	6 (ELCO1)	W (CON1)	S (CON1)	11 (J17)	12 (J17)	
6 of TBE n.2	6A	22 (ELCO2)	W (CON1)	S (CON1)	11 (J17)	12 (J17)	
7 of TBE n.1	7A	7 (ELCO1)	L (CON1)	F (CON1)	13 (J17)	14 (J17)	
7 of TBE n.2	7A	23 (ELCO2)	L (CON1)	F (CON1)	13 (J17)	14 (J17)	
8 of TBE n.1	8A	8 (ELCO1)	M (CON1)	B (CON1)	15 (J17)	16 (J17)	
8 of TBE n.2	8A	24 (ELCO2)	M (CON1)	B (CON1)	15 (J17)	16 (J17)	
9 of TBE n.1	9A	9 (ELCO1)	BB (CON1)	MM (CON1)	17 (J17)	18 (J17)	
9 of TBE n.2	9A	25 (ELCO2)	BB (CON1)	MM (CON1)	17 (J17)	18 (J17)	
10 of TBE n.1	10A	10 (ELCO1)	CC (CON1)	HH (CON1)	19 (J17)	20 (J17)	
10 of TBE n.2	10A	26 (ELCO2)	CC (CON1)	HH (CON1)	19 (J17)	20 (J17)	
11 of TBE n.1	11A	11 (ELCO1)	t (CON1)	x (CON1)	21 (J17)	22 (J17)	
11 of TBE n.2	11A	27 (ELCO2)	t (CON1)	x (CON1)	21 (J17)	22 (J17)	
12 of TBE n.1	12A	12 (ELCO1)	j (CON1)	m (CON1)	23 (J17)	24 (J17)	
12 of TBE n.2	12A	28 (ELCO2)	j (CON1)	m (CON1)	23 (J17)	24 (J17)	
13 of TBE n.1	13A	13 (ELCO1)	f (CON1)	c (CON1)	25 (J17)	26 (J17)	
13 of TBE n.2	13A	29 (ELCO2)	f (CON1)	c (CON1)	25 (J17)	26 (J17)	
14 of TBE n.1	14A	14 (ELCO1)	Z (CON1)	U (CON1)	27 (J17)	28 (J17)	
14 of TBE n.2	14A	30 (ELCO2)	Z (CON1)	U (CON1)	27 (J17)	28 (J17)	
15 of TBE n.1	15A	15 (ELCO1)	P (CON1)	J (CON1)	29 (J17)	30 (J17)	
15 of TBE n.2	15A	31 (ELCO2)	P (CON1)	J (CON1)	29 (J17)	30 (J17)	
16 of TBE n.1	16A	16 (ELCO1)	N (CON1)	C (CON1)	31 (J17)	32 (J17)	
16 of TBE n.2	16A	32 (ELCO2)	N (CON1)	C (CON1)	31 (J17)	32 (J17)	

**Connections Table to Interface Cards**

<b><u>DOUBLE CHANNEL MODULE POSITION</u></b>	<b>MODULE CHANNEL NUMBER</b>	<b>INTERFACE CARD(S) CHANNEL NUMBER for TBE n.1</b>	<b>MODULE CHANNEL POSITIVE (+) CONNECTION</b>	<b>MODULE CHANNEL NEGATIVE (-) CONNECTION</b>	<b>HART MULTIPLEXING CONNECTOR POSITIVE (+) PIN NUMBER</b>	<b>HART MULTIPLEXING CONNECTOR NEGATIVE (-) PIN NUMBER</b>	<b>NOTES</b>
1	1A	1 (ELCO1)	AA (CON1)	LL (CON1)	1 (J17)	2 (J17)	CON1, CON2: • Chassis Ground provided on poles: T, H, w, FF. • Unconnected poles: KK, u, a, DD, k, R, E, A, NN, JJ, y, n, d, V, K, D, s, r, X, Y.
	1B	17 (ELCO2)	AA (CON2)	LL (CON2)	1 (J18)	2 (J18)	
2	2A	2 (ELCO1)	z (CON1)	EE (CON1)	3 (J17)	4 (J17)	
	2B	18 (ELCO2)	z (CON2)	EE (CON2)	3 (J18)	4 (J18)	
3	3A	3 (ELCO1)	p (CON1)	v (CON1)	5 (J17)	6 (J17)	
	3B	19 (ELCO2)	p (CON2)	v (CON2)	5 (J18)	6 (J18)	
4	4A	4 (ELCO1)	h (CON1)	I (CON1)	7 (J17)	8 (J17)	
	4B	20 (ELCO2)	h (CON2)	I (CON2)	7 (J18)	8 (J18)	
5	5A	5 (ELCO1)	e (CON1)	b (CON1)	9 (J17)	10 (J17)	
	5B	21 (ELCO2)	e (CON2)	b (CON2)	9 (J18)	10 (J18)	
6	6A	6 (ELCO1)	W (CON1)	S (CON1)	11 (J17)	12 (J17)	
	6B	22 (ELCO2)	W (CON2)	S (CON2)	11 (J18)	12 (J18)	
7	7A	7 (ELCO1)	L (CON1)	F (CON1)	13 (J17)	14 (J17)	
	7B	23 (ELCO2)	L (CON2)	F (CON2)	13 (J18)	14 (J18)	
8	8A	8 (ELCO1)	M (CON1)	B (CON1)	15 (J17)	16 (J17)	
	8B	24 (ELCO2)	M (CON2)	B (CON2)	15 (J18)	16 (J18)	
9	9A	9 (ELCO1)	BB (CON1)	MM (CON1)	17 (J17)	18 (J17)	
	9B	25 (ELCO2)	BB (CON2)	MM (CON2)	17 (J18)	18 (J18)	
10	10A	10 (ELCO1)	CC (CON1)	HH (CON1)	19 (J17)	20 (J17)	
	10B	26 (ELCO2)	CC (CON2)	HH (CON2)	19 (J18)	20 (J18)	
11	11A	11 (ELCO1)	t (CON1)	x (CON1)	21 (J17)	22 (J17)	
	11B	27 (ELCO2)	t (CON2)	x (CON2)	21 (J18)	22 (J18)	
12	12A	12 (ELCO1)	j (CON1)	m (CON1)	23 (J17)	24 (J17)	
	12B	28 (ELCO2)	j (CON2)	m (CON2)	23 (J18)	24 (J18)	
13	13A	13 (ELCO1)	f (CON1)	c (CON1)	25 (J17)	26 (J17)	
	13B	29 (ELCO2)	f (CON2)	c (CON2)	25 (J18)	26 (J18)	
14	14A	14 (ELCO1)	Z (CON1)	U (CON1)	27 (J17)	28 (J17)	
	14B	30 (ELCO2)	Z (CON2)	U (CON2)	27 (J18)	28 (J18)	
15	15A	15 (ELCO1)	P (CON1)	J (CON1)	29 (J17)	30 (J17)	
	15B	31 (ELCO2)	P (CON2)	J (CON2)	29 (J18)	30 (J18)	
16	16A	16 (ELCO1)	N (CON1)	C (CON1)	31 (J17)	32 (J17)	
	16B	32 (ELCO2)	N (CON2)	C (CON2)	31 (J18)	32 (J18)	

## Characteristics:

### General description:

This Termination Board with Enclosure (TBE) provides direct connection between the I/O Card of the system and D5000 / D6000 Series modules. The Intrinsically Safe protection and signal isolation between Safe and Hazardous Area, is provided by D5000 Series Associated Apparatus. The 24 Vdc Power Supply of the TBE is connected to two plug-in terminal blocks, for a redundant power supply. The power supply for modules is given by TBE power bus.

### Termination Board general characteristics:

Number of positions	Features
16	Power Supply voltage redundancy; Abnormal supply voltage signaling; Cumulative module fault signaling.

### Supported Tricon I/O Cards and D5000 / D6000 Series modules:

Refer to DTS0499 and DTS0888.

### Functional Safety Management Certification:

G.M. International is certified by TUV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL3.



### Functional Safety Applications:

Refer to Safety Manual ISM0472.

## Installation:

TBE-D5016-TRI-004 is a Termination Board supported by an aluminum shell suitable for installation on EN/IEC60715 TH 35 DIN-Rail.

TBE-D5016-TRI-004 unit can be mounted with any orientation over the entire ambient temperature range.

Electrical connections are the following:

- ALARM, PWR1, PWR 2: polarized plug-in removable screw terminal blocks for conductors up to 2.5 mm<sup>2</sup> (13 AWG) with a torque of 0.5-0.6 Nm.
- CON1 SHIELD: screw terminal block for conductors up to 2 mm<sup>2</sup> (14 AWG) fully tight.
- CON1: ELCO 8016, 56 poles connector with screws retaining method.

Electrical connection can be plugged in/out into a powered unit without suffering or causing any damage (for Zone 2 installations check the area to be nonhazardous before servicing). Connect only one individual conductor per each clamping point. For USA and Canada installations, 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 (e.g. EN/IEC60079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines)), 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. When installed in EU Zone 2, the unit shall be mounted in a certified Ex enclosure that provides a minimum ingress protection of IP54 in accordance with EN/IEC60079-0. When installed in a Class I, Division 2 Hazardous Location, the unit shall be mounted in a supplemental enclosure that provides a degree of protection not less than IP54. The enclosure must have a door or cover accessible only by the use of a tool. The end user is responsible to ensure that the operating temperature of the module is not exceeded in the end use application.

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-D5016-TRI-004 unit must be connected to SELV or PELV supplies.

All circuits connected to TBE-D5016-TRI-004 unit must comply with the overvoltage category II (or better) according to EN/IEC60664-1.

## Technical Data:

### 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.

**Max allowed current consumption:** 1.5 A (as total supply).

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Protection fuse:** 4 A time lag.

### Fault detection:

The on-board diagnostic monitors both power supplies integrity and the module cumulative fault. Any malfunction is reported by deactivating a solid-state relay and activating the corresponding LEDs.

Alarm is issued if:

- 1) Power supply 1 or 2 < 17 Vdc or
- 2) Power supply 1 or 2 > 33 Vdc or
- 3) Module cumulative fault ON.

Alarm is removed if:

- 1) 20 Vdc < Power supply 1 and 2 < 30 Vdc and
- 2) No module cumulative fault.

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Output rating:** 100 mA 35 V (≤ 1 V voltage drop)

### I/O Card Interface:

#### Connection:

1 x ELCO 8016, 56 poles receptacle connector (require male mating connector).

**Connector Keys:** CON1, Large Key pos.3, Small Key pos.1.

**Board configuration:** Card 3504E: J20 in 2-3 for both TBE n.1 and TBE n.2 ; TBE n.1 (1-32ch.), J19 in 1-2; TBE n.2 (33-64ch.), J19 in 2-3.

Card 3564: J20 in 1-2 for both TBE n.1 and TBE n.2 ; TBE n.1 (1-32ch.), J19 in 1-2; TBE n.2 (33-64ch.), J19 in 2-3.

**Cable:** system cable 4000187-3xx.

### Compatibility:

CE mark compliant, conforms to Directive:

2014/34/EU ATEX, 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 limits – 45 to + 80 °C.

### Safety Description:



**ATEX:** II 3G Ex ec IIC T4 Gc; **IECEx:** Ex ec IIC T4 Gc

**UL:** NI / I / 2 / ABCD / T4; **C-UL:** NI / I / 2 / ABCD / T4

**CCC:** Ex ec IIC T4 Gc

### Approvals:

IMQ 19 ATEX 073 X conforms to EN60079-0, EN60079-7.

IECEx IMQ 19.0013X conforms to IEC60079-0, IEC60079-7.

UL & C-UL E222308 conforms to UL 61010-1 and UL 121201 for UL and CAN/CSA C22.2 No.61010-1-12 and CSA C22.2 No. 213 for C-UL.

CCC n. 2023322308005685 conforms to GB/T 3836.1, GB/T 3834.3.

TUV Certificate No. C-IS-272994-01 SIL 3 conforms to IEC61508:2010 Ed. 2.

SIL 3 Functional Safety TÜV Certificate conforms to IEC61508:2010 Ed.2, for Management of Functional Safety.

### Mounting:

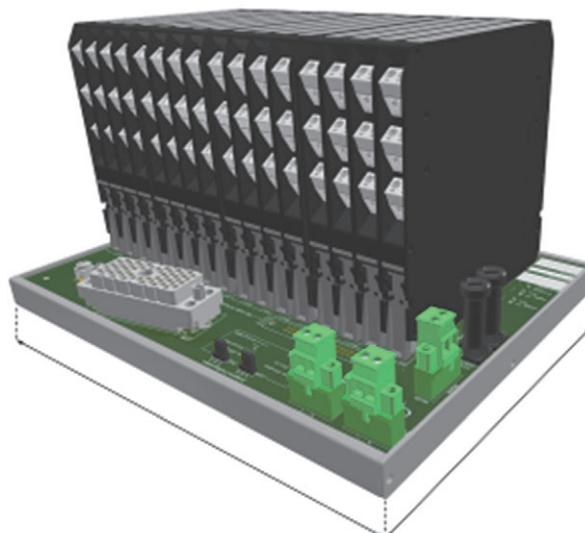
Hardware included for mounting on single DIN rail 35 mm.

**Weight:** about 700 g (excluding modules).

**Location:** installation in Safe Area/Ordinary Location or Zone 2, Group IIC T4, or Class 1, Div. 2, Group A, B, C, D, T4.

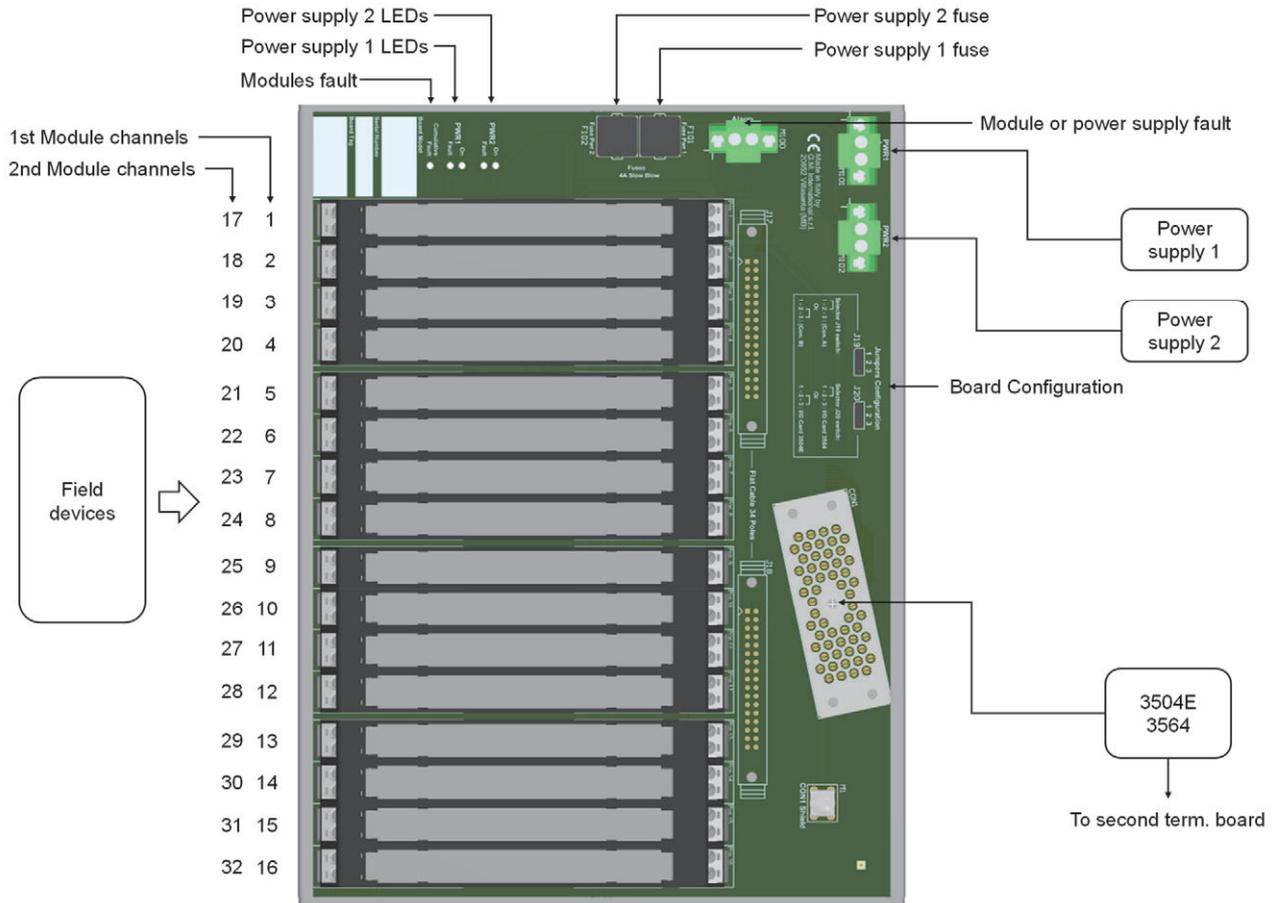
**Dimensions:** Width 240 mm, Depth 180 mm, Height 154 mm.

## Image:



## Termination Board Description

**Note :** Do not mix D5000 Intrinsically Safe barriers with D6000 isolators on same termination board.



Connections Table to Interface Cards

MODULE POSITION	MODULE CHANNEL NUMBER	INTERFACE CARD(S) CHANNEL NUMBER (ELCO1) for TBE n.1	INTERFACE CARD(S) CHANNEL NUMBER (ELCO2) for TBE n.2	MODULE CHANNEL POSITIVE (+) CONNECTION	MODULE CHANNEL NEGATIVE (-) CONNECTION (CON1)	NOTES
1	1A	1	33	+24 Vdc	AA	CON1: • Chassis Ground provided on poles: T, H, w, FF. • Ground available on poles: E, A, NN, JJ, y, n, d, V, K, D • +24 Vdc available on poles (only 3564 card): DD, k, R. • Ground available on poles (only 3504E card): DD, k, R. • Unconnected poles: s, r, X, Y.
	1B	17	49	+24 Vdc	BB	
2	2A	2	34	+24 Vdc	LL	
	2B	18	50	+24 Vdc	MM	
3	3A	3	35	+24 Vdc	z	
	3B	19	51	+24 Vdc	CC	
4	4A	4	36	+24 Vdc	EE	
	4B	20	52	+24 Vdc	HH	
5	5A	5	37	+24 Vdc	p	
	5B	21	53	+24 Vdc	t	
6	6A	6	38	+24 Vdc	v	
	6B	22	54	+24 Vdc	x	
7	7A	7	39	+24 Vdc	h	
	7B	23	55	+24 Vdc	j	
8	8A	8	40	+24 Vdc	l	
	8B	24	56	+24 Vdc	m	
9	9A	9	41	+24 Vdc	e	
	9B	25	57	+24 Vdc	f	
10	10A	10	42	+24 Vdc	b	
	10B	26	58	+24 Vdc	c	
11	11A	11	43	+24 Vdc	W	
	11B	27	59	+24 Vdc	Z	
12	12A	12	44	+24 Vdc	S	
	12B	28	60	+24 Vdc	U	
13	13A	13	45	+24 Vdc	L	
	13B	29	61	+24 Vdc	P	
14	14A	14	46	+24 Vdc	F	
	14B	30	62	+24 Vdc	J	
15	15A	15	47	+24 Vdc	M	
	15B	31	63	+24 Vdc	N	
16	16A	16	48	+24 Vdc	B	
	16B	32	64	+24 Vdc	C	

## Characteristics:

### General description:

This Termination Board with Enclosure (TBE) provides direct connection between the I/O Card of the system and D5000 / D6000 Series modules. The Intrinsically Safe protection and signal isolation between Safe and Hazardous Area, is provided by D5000 Series Associated Apparatus. The 24 Vdc Power Supply of the TBE is connected to two plug-in terminal blocks, for a redundant power supply. The power supply for modules is given by TBE power bus.

### Termination Board general characteristics:

Number of positions	Features
16 (TBE Part A) +	Power Supply voltage redundancy; Abnormal supply voltage signaling;
16 (TBE Part B)	Cumulative module fault signaling.

### Supported Tricon I/O Cards and D5000 / D6000 Series modules:

Refer to DTS0499 and DTS0889.

### Functional Safety Management Certification:

G.M. International is certified by TUV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL3.



### Functional Safety Applications:

Refer to Safety Manual ISM0472.

## Installation:

TBE-D5016-TRI-005 Part A and TBE-D5016-TRI-005 Part B are Termination Boards supported by an aluminum shell suitable for installation on EN/IEC60715 TH 35 DIN-Rail. TBE-D5016-TRI-005 Part A and TBE-D5016-TRI-005 Part B units can be mounted with any orientation over the entire ambient temperature range.

Electrical connections are the following:

- ALARM, PWR1, PWR 2 (for each Part A or Part B): polarized plug-in removable screw terminal blocks for conductors up to 2.5 mm<sup>2</sup> (13 AWG) with a torque of 0.5-0.6 Nm.
- CON1 SHIELD (only for Part A): screw terminal block for conductors up to 2 mm<sup>2</sup> (14 AWG) fully tight.
- CON1 (only for Part A): ELCO 8016, 56 poles connector with screws retaining method.
- J18 TBE A to B (only for Part A): 1 x 34 poles male connector.
- J17 TBE B to A (only for Part B): 1 x 34 poles male connector.

Electrical connection can be plugged in/out into a powered unit without suffering or causing any damage (for Zone 2 installations check the area to be nonhazardous before servicing). Connect only one individual conductor per each clamping point. For USA and Canada installations, 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 (e.g. EN/IEC60079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines)), 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. When installed in EU Zone 2, the unit shall be mounted in a certified Ex enclosure that provides a minimum ingress protection of IP54 in accordance with EN/IEC60079-0. When installed in a Class I, Division 2 Hazardous Location, the unit shall be mounted in a supplemental enclosure that provides a degree of protection not less than IP54. The enclosure must have a door or cover accessible only by the use of a tool. The end user is responsible to ensure that the operating temperature of the module is not exceeded in the end use application.

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-D5016-TRI-005 Part A and TBE-D5016-TRI-005 Part B units must be connected to SELV or PELV supplies.

All circuits connected to TBE-D5016-TRI-005 Part A and TBE-D5016-TRI-005 Part B units must comply with the overvoltage category II (or better) according to EN/IEC60664-1.

## Technical Data:

### 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.

**Max allowed current consumption:** 1.5 A (as total supply).

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Protection fuse:** 4 A time lag.

### Fault detection:

The on-board diagnostic monitors both power supplies integrity and the module cumulative fault. Any malfunction is reported by deactivating a solid-state relay and activating the corresponding LEDs.

Alarm is issued if:

- 1) Power supply 1 or 2 < 17 Vdc or
- 2) Power supply 1 or 2 > 33 Vdc or
- 3) Module cumulative fault ON.

Alarm is removed if:

- 1) 20 Vdc < Power supply 1 and 2 < 30 Vdc and
- 2) No module cumulative fault.

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Output rating:** 100 mA 35 V (≤ 1 V voltage drop)

### I/O Card Interface:

#### Connection:

1 x ELCO 8016, 56 poles receptacle connector (require male mating connector).

**Connector Keys:** CON1, Large Key pos.3, Small Key pos.1.

**Board configuration:** Card 3504E: J20 in 2-3 for both TBE n.1 and TBE n.2 ; TBE n.1 (1-32ch.), J19 in 1-2; TBE n.2 (33-64ch.), J19 in 2-3.

Card 3564: J20 in 1-2 for both TBE n.1 and TBE n.2 ; TBE n.1 (1-32ch.), J19 in 1-2; TBE n.2 (33-64ch.), J19 in 2-3.

**Cable:** system cable 4000187-3xx.

### TBE Part A / Part B interconnection:

**Connection:** 1 x 34-poles receptacle connector (require female mating connector).

**Cable:** flat cable CABF032.

### Compatibility:

CE mark compliant, conforms to Directive:

2014/34/EU ATEX, 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 limits – 45 to + 80 °C.

### Safety Description:



**ATEX:** II 3G Ex ec IIC T4 Gc; **IECEx:** Ex ec IIC T4 Gc

**UL:** NI / I / 2 / ABCD / T4; **C-UL:** NI / I / 2 / ABCD / T4

**CCC:** Ex ec IIC T4 Gc

### Approvals:

IMQ 19 ATEX 073 X conforms to EN60079-0, EN60079-7.

IECEx IMQ 19.0013X conforms to IEC60079-0, IEC60079-7.

UL & C-UL E222308 conforms to UL 61010-1 and UL 121201 for UL and CAN/CSA C22.2 No.61010-1-12 and CSA C22.2 No. 213 for C-UL.

CCC n. 2023322308005685 conforms to GB/T 3836.1, GB/T 3834.3.

TUV Certificate No. C-IS-272994-01 SIL 3 conforms to IEC61508:2010 Ed. 2.

SIL 3 Functional Safety TÜV Certificate conforms to IEC61508:2010 Ed.2, for Management of Functional Safety.

### Mounting:

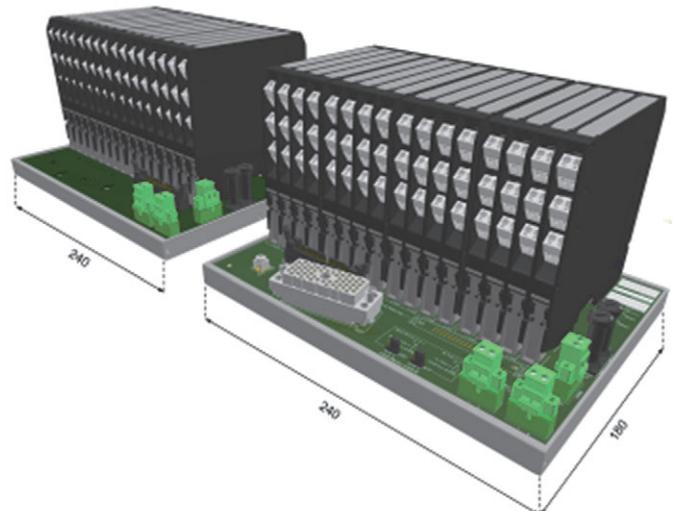
Hardware included for mounting on single DIN rail 35 mm.

**Weight:** about 2 x 700 g (excluding modules).

**Location:** installation in Safe Area/Ordinary Location or Zone 2, Group IIC T4, or Class 1, Div. 2, Group A, B, C, D, T4.

**Dimensions:** 2 x Width 240 mm, Depth 180 mm, Height 154 mm.

## Image:





**Connections Table to Interface Cards**

MODULE POSITION	MODULE CHANNEL NUMBER	INTERFACE CARD(S) CHANNEL NUMBER (ELCO1) for TBE n.1 Part A & Part B	INTERFACE CARD(S) CHANNEL NUMBER (ELCO2) for TBE n.2 Part A & Part B	MODULE CHANNEL POSITIVE (+) CONNECTION	MODULE CHANNEL NEGATIVE (-) CONNECTION (CON1)	NOTES
1	1A	1	33	+24 Vdc	AA	<b>CON1:</b> • Chassis Ground provided on poles: T, H, w, FF. • Ground available on poles: E, A, NN, JJ, y, n, d, V, K, D • +24 Vdc available on poles (only 3564 card): DD, k, R. • Ground available on poles (only 3504E card): DD, k, R. • Unconnected poles: s, r, X, Y
2	2A	2	34	+24 Vdc	LL	
3	3A	3	35	+24 Vdc	z	
4	4A	4	36	+24 Vdc	EE	
5	5A	5	37	+24 Vdc	p	
6	6A	6	38	+24 Vdc	v	
7	7A	7	39	+24 Vdc	h	
8	8A	8	40	+24 Vdc	l	
9	9A	9	41	+24 Vdc	e	
10	10A	10	42	+24 Vdc	b	
11	11A	11	43	+24 Vdc	W	
12	12A	12	44	+24 Vdc	S	
13	13A	13	45	+24 Vdc	L	
14	14A	14	46	+24 Vdc	F	
15	15A	15	47	+24 Vdc	M	
16	16A	16	48	+24 Vdc	B	
17	17A	17	49	+24 Vdc	BB	
18	18A	18	50	+24 Vdc	MM	
19	19A	19	51	+24 Vdc	CC	
20	20A	20	52	+24 Vdc	HH	
21	21A	21	53	+24 Vdc	t	
22	22A	22	54	+24 Vdc	x	
23	23A	23	55	+24 Vdc	j	
24	24A	24	56	+24 Vdc	m	
25	25A	25	57	+24 Vdc	f	
26	26A	26	58	+24 Vdc	c	
27	27A	27	59	+24 Vdc	Z	
28	28A	28	60	+24 Vdc	U	
29	29A	29	61	+24 Vdc	P	
30	30A	30	62	+24 Vdc	J	
31	31A	31	63	+24 Vdc	N	
32	32A	32	64	+24 Vdc	C	

## Characteristics:

### General description:

This Termination Board with Enclosure (TBE) provides direct connection between the I/O Card of the system and D5000 / D6000 Series modules. The Intrinsically Safe protection and signal isolation between Safe and Hazardous Area, is provided by D5000 Series Associated Apparatus. The 24 Vdc Power Supply of the TBE is connected to two plug-in terminal blocks, for a redundant power supply. The power supply for modules is given by TBE power bus.

### Termination Board general characteristics:

Number of positions	Features
16	Power Supply voltage redundancy; Abnormal supply voltage signaling; Cumulative module fault signaling.

### Supported Tricon I/O Cards and D5000 / D6000 Series modules:

Refer to DTS0499 and DTS0890.

### Functional Safety Management Certification:

G.M. International is certified by TUV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL3.



### Functional Safety Applications:

Refer to Safety Manual ISM0472.

## Installation:

TBE-D5016-TRI-006 is a Termination Board supported by an aluminum shell suitable for installation on EN/IEC60715 TH 35 DIN-Rail.

TBE-D5016-TRI-006 unit can be mounted with any orientation over the entire ambient temperature range.

Electrical connections are the following:

- ALARM, PWR1, PWR 2: polarized plug-in removable screw terminal blocks for conductors up to 2.5 mm<sup>2</sup> (13 AWG) with a torque of 0.5-0.6 Nm.
- CON1 SHIELD: screw terminal block for conductors up to 2 mm<sup>2</sup> (14 AWG) fully tight.
- CON1: ELCO 8016, 56 poles connector with screws retaining method.
- CON2 SHIELD: screw terminal block for conductors up to 2 mm<sup>2</sup> (14 AWG) fully tight.
- CON2: ELCO 8016, 56 poles connector with screws retaining method.

Electrical connection can be plugged in/out into a powered unit without suffering or causing any damage (**for Zone 2 installations check the area to be nonhazardous before servicing**). Connect only one individual conductor per each clamping point. For USA and Canada installations, 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 (e.g. EN/IEC60079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines)), 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. When installed in EU Zone 2, the unit shall be mounted in a certified Ex enclosure that provides a minimum ingress protection of IP54 in accordance with EN/IEC60079-0. When installed in a Class I, Division 2 Hazardous Location, the unit shall be mounted in a supplemental enclosure that provides a degree of protection not less than IP54. The enclosure must have a door or cover accessible only by the use of a tool. The end user is responsible to ensure that the operating temperature of the module is not exceeded in the end use application.

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-D5016-TRI-006 unit must be connected to SELV or PELV supplies.

All circuits connected to TBE-D5016-TRI-006 unit must comply with the overvoltage category II (or better) according to EN/IEC60664-1.

## Technical Data:

### 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.

**Max allowed current consumption:** 1.5 A (as total supply).

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Protection fuse:** 4 A time lag.

### Fault detection:

The on-board diagnostic monitors both power supplies integrity and the module cumulative fault. Any malfunction is reported by deactivating a solid-state relay and activating the corresponding LEDs.

Alarm is issued if:

- 1) Power supply 1 or 2 < 17 Vdc or
- 2) Power supply 1 or 2 > 33 Vdc or
- 3) Module cumulative fault ON.

Alarm is removed if:

- 1) 20 Vdc < Power supply 1 and 2 < 30 Vdc and
- 2) No module cumulative fault.

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Output rating:** 100 mA 35 V (≤ 1 V voltage drop)

### I/O Card Interface:

#### Connection:

2 x ELCO 8016, 56 poles receptacle connector (require male mating connector).

**Connector Keys:** CON1, Large Key pos.3, Small Key pos.1.

CON2, Large Key pos.3, Small Key pos.1.

**Cable:** system cable 4000187-3xx.

### Compatibility:

CE mark compliant, conforms to Directive: 2014/34/EU ATEX, 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 limits - 45 to + 80 °C.

### Safety Description:



**ATEX:** II 3G Ex ec IIC T4 Gc; **IECEx:** Ex ec IIC T4 Gc

**UL:** NI / I / 2 / ABCD / T4; **C-UL:** NI / I / 2 / ABCD / T4

**CCC:** Ex ec IIC T4 Gc

### Approvals:

IMQ 19 ATEX 073 X conforms to EN60079-0, EN60079-7.

IECEx IMQ 19.0013X conforms to IEC60079-0, IEC60079-7.

UL & C-UL E222308 conforms to UL 61010-1 and UL 121201 for UL and CAN/CSA C22.2 No.61010-1-12 and CSA C22.2 No. 213 for C-UL.

CCC n. 2023322308005685 conforms to GB/T 3836.1, GB/T 3834.3.

TUV Certificate No. C-IS-272994-01 SIL 3 conforms to IEC61508:2010 Ed. 2.

SIL 3 Functional Safety TUV Certificate conforms to IEC61508:2010 Ed.2, for Management of Functional Safety.

### Mounting:

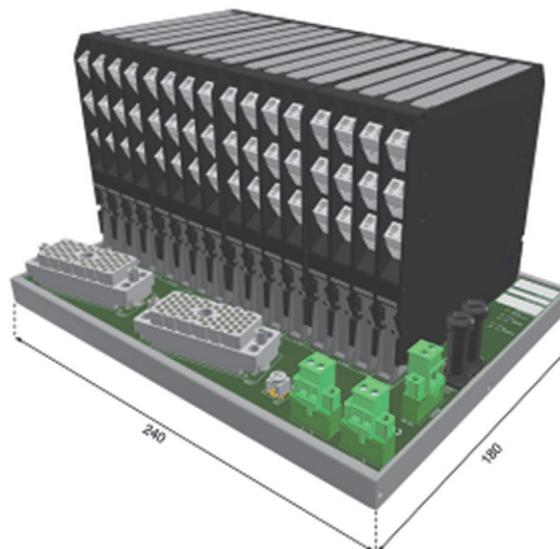
Hardware included for mounting on single DIN rail 35 mm.

**Weight:** about 700 g (excluding modules).

**Location:** installation in Safe Area/Ordinary Location or Zone 2, Group IIC T4, or Class 1, Div. 2, Group A, B, C, D, T4.

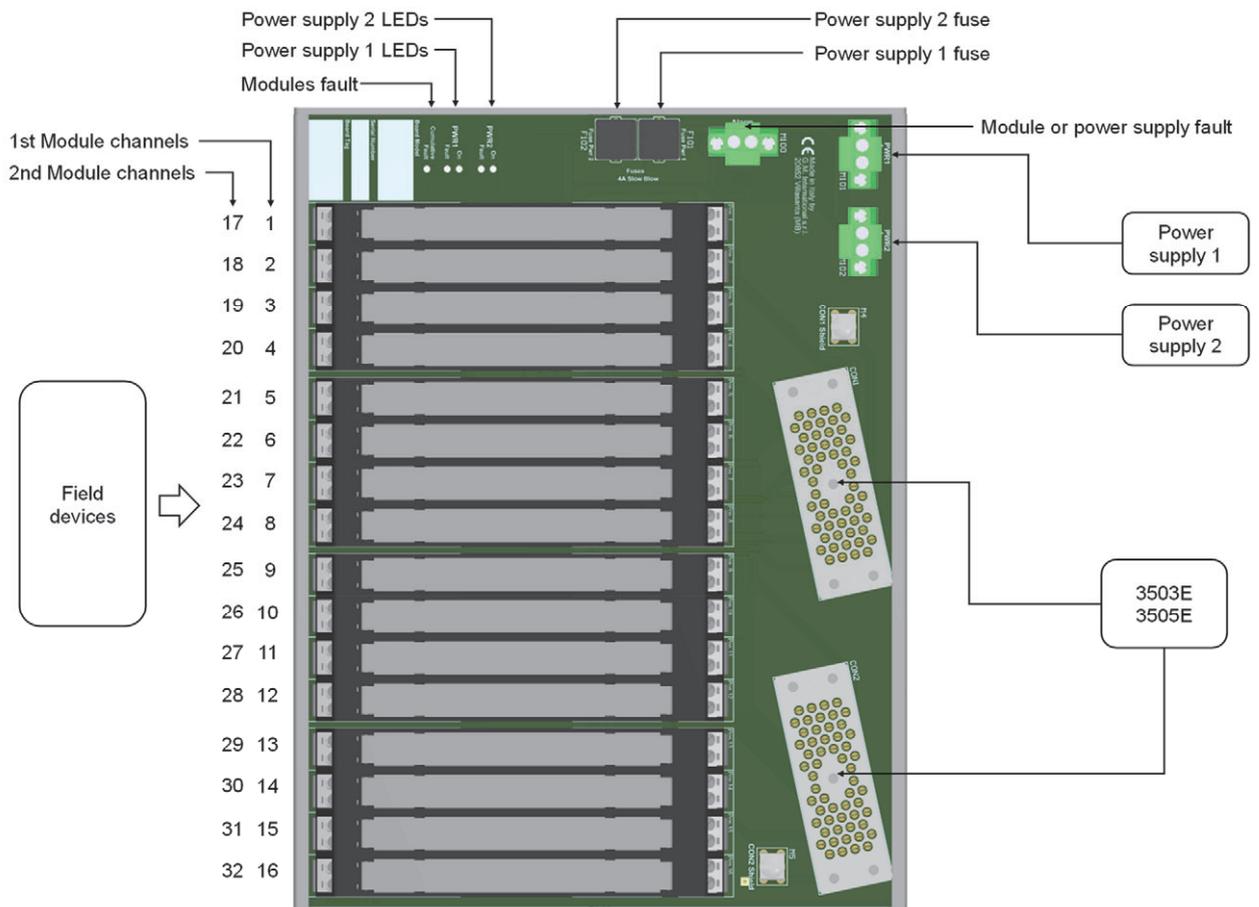
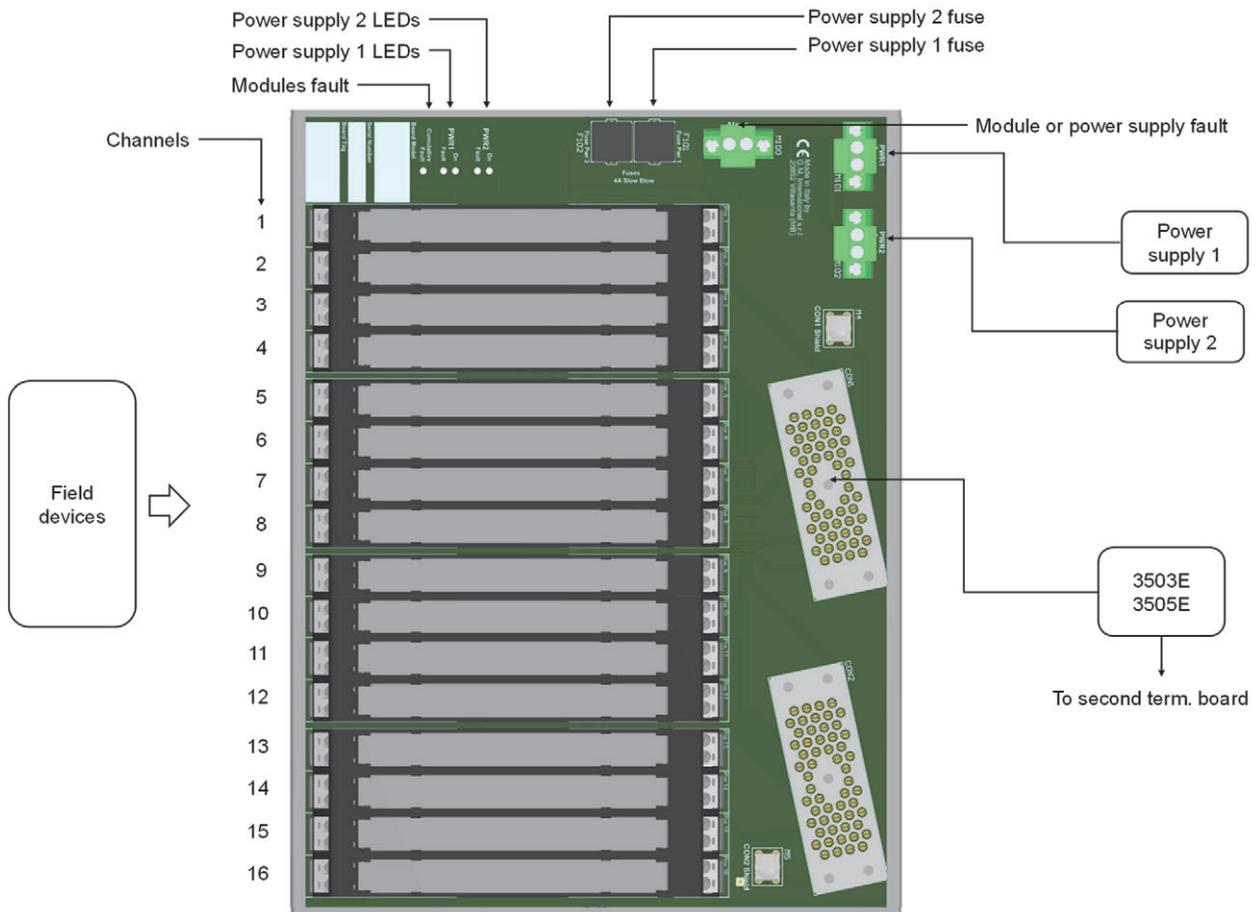
**Dimensions:** Width 240 mm, Depth 180 mm, Height 154 mm.

## Image:



## Termination Board Description

**Note :** Do not mix D5000 Intrinsically Safe barriers with D6000 isolators on same termination board.



**Connections Table to Interface Cards**

<u>SINGLE CHANNEL MODULE POSITION</u>	<u>MODULE CHANNEL NUMBER</u>	<u>INTERFACE CARD(S) CHANNEL NUMBER</u>	<u>MODULE CHANNEL POSITIVE (+) CONNECTION</u>	<u>MODULE CHANNEL NEGATIVE (-) CONNECTION</u>	<u>NOTES</u>
1 of TBE n.1	1A	1 (ELCO1)	+24 Vdc	AA (CON1)	CON1: • Chassis Ground provided on poles: T, H, w, FF. • Ground available on poles: LL, EE, v, l, b, S, F, B, MM, HH, x, m, c, U, J, C • Unconnected poles: KK, u, a, DD, k, R, E, A, NN, JJ, y, n, d, V, K, D, s, r, X, Y.  CON2 is not used.
1 of TBE n.2	1A	17 (ELCO2)	+24 Vdc	AA (CON1)	
2 of TBE n.1	2A	2 (ELCO1)	+24 Vdc	z (CON1)	
2 of TBE n.2	2A	18 (ELCO2)	+24 Vdc	z (CON1)	
3 of TBE n.1	3A	3 (ELCO1)	+24 Vdc	p (CON1)	
3 of TBE n.2	3A	19 (ELCO2)	+24 Vdc	p (CON1)	
4 of TBE n.1	4A	4 (ELCO1)	+24 Vdc	h (CON1)	
4 of TBE n.2	4A	20 (ELCO2)	+24 Vdc	h (CON1)	
5 of TBE n.1	5A	5 (ELCO1)	+24 Vdc	e (CON1)	
5 of TBE n.2	5A	21 (ELCO2)	+24 Vdc	e (CON1)	
6 of TBE n.1	6A	6 (ELCO1)	+24 Vdc	W (CON1)	
6 of TBE n.2	6A	22 (ELCO2)	+24 Vdc	W (CON1)	
7 of TBE n.1	7A	7 (ELCO1)	+24 Vdc	L (CON1)	
7 of TBE n.2	7A	23 (ELCO2)	+24 Vdc	L (CON1)	
8 of TBE n.1	8A	8 (ELCO1)	+24 Vdc	M (CON1)	
8 of TBE n.2	8A	24 (ELCO2)	+24 Vdc	M (CON1)	
9 of TBE n.1	9A	9 (ELCO1)	+24 Vdc	BB (CON1)	
9 of TBE n.2	9A	25 (ELCO2)	+24 Vdc	BB (CON1)	
10 of TBE n.1	10A	10 (ELCO1)	+24 Vdc	CC (CON1)	
10 of TBE n.2	10A	26 (ELCO2)	+24 Vdc	CC (CON1)	
11 of TBE n.1	11A	11 (ELCO1)	+24 Vdc	t (CON1)	
11 of TBE n.2	11A	27 (ELCO2)	+24 Vdc	t (CON1)	
12 of TBE n.1	12A	12 (ELCO1)	+24 Vdc	j (CON1)	
12 of TBE n.2	12A	28 (ELCO2)	+24 Vdc	j (CON1)	
13 of TBE n.1	13A	13 (ELCO1)	+24 Vdc	f (CON1)	
13 of TBE n.2	13A	29 (ELCO2)	+24 Vdc	f (CON1)	
14 of TBE n.1	14A	14 (ELCO1)	+24 Vdc	Z (CON1)	
14 of TBE n.2	14A	30 (ELCO2)	+24 Vdc	Z (CON1)	
15 of TBE n.1	15A	15 (ELCO1)	+24 Vdc	P (CON1)	
15 of TBE n.2	15A	31 (ELCO2)	+24 Vdc	P (CON1)	
16 of TBE n.1	16A	16 (ELCO1)	+24 Vdc	N (CON1)	
16 of TBE n.2	16A	32 (ELCO2)	+24 Vdc	N (CON1)	

**Connections Table to Interface Cards**

<b>DOUBLE CHANNEL MODULE POSITION</b>	<b>MODULE CHANNEL NUMBER</b>	<b>INTERFACE CARD(S) CHANNEL NUMBER for TBE n.1</b>	<b>MODULE CHANNEL POSITIVE (+) CONNECTION</b>	<b>MODULE CHANNEL NEGATIVE (-) CONNECTION</b>	<b>NOTES</b>
1	1A	1 (ELCO1)	+24 Vdc	AA (CON1)	CON1, CON2: • Chassis Ground provided on poles: T, H, w, FF. • Ground available on poles: LL, EE, v, l, b, S, F, B, MM, HH, x, m, c, U, J, C • Unconnected poles: KK, u, a, DD, k, R, E, A, NN, JJ, y, n, d, V, K, D, s, r, X, Y.
	1B	17 (ELCO2)	+24 Vdc	AA (CON2)	
2	2A	2 (ELCO1)	+24 Vdc	z (CON1)	
	2B	18 (ELCO2)	+24 Vdc	z (CON2)	
3	3A	3 (ELCO1)	+24 Vdc	p (CON1)	
	3B	19 (ELCO2)	+24 Vdc	p (CON2)	
4	4A	4 (ELCO1)	+24 Vdc	h (CON1)	
	4B	20 (ELCO2)	+24 Vdc	h (CON2)	
5	5A	5 (ELCO1)	+24 Vdc	e (CON1)	
	5B	21 (ELCO2)	+24 Vdc	e (CON2)	
6	6A	6 (ELCO1)	+24 Vdc	W (CON1)	
	6B	22 (ELCO2)	+24 Vdc	W (CON2)	
7	7A	7 (ELCO1)	+24 Vdc	L (CON1)	
	7B	23 (ELCO2)	+24 Vdc	L (CON2)	
8	8A	8 (ELCO1)	+24 Vdc	M (CON1)	
	8B	24 (ELCO2)	+24 Vdc	M (CON2)	
9	9A	9 (ELCO1)	+24 Vdc	BB (CON1)	
	9B	25 (ELCO2)	+24 Vdc	BB (CON2)	
10	10A	10 (ELCO1)	+24 Vdc	CC (CON1)	
	10B	26 (ELCO2)	+24 Vdc	CC (CON2)	
11	11A	11 (ELCO1)	+24 Vdc	t (CON1)	
	11B	27 (ELCO2)	+24 Vdc	t (CON2)	
12	12A	12 (ELCO1)	+24 Vdc	j (CON1)	
	12B	28 (ELCO2)	+24 Vdc	j (CON2)	
13	13A	13 (ELCO1)	+24 Vdc	f (CON1)	
	13B	29 (ELCO2)	+24 Vdc	f (CON2)	
14	14A	14 (ELCO1)	+24 Vdc	Z (CON1)	
	14B	30 (ELCO2)	+24 Vdc	Z (CON2)	
15	15A	15 (ELCO1)	+24 Vdc	P (CON1)	
	15B	31 (ELCO2)	+24 Vdc	P (CON2)	
16	16A	16 (ELCO1)	+24 Vdc	N (CON1)	
	16B	32 (ELCO2)	+24 Vdc	N (CON2)	

## Characteristics:

### General description:

This Termination Board with Enclosure (TBE) provides direct connection between the I/O Card of the system and D5000 / D6000 Series modules. The Intrinsically Safe protection and signal isolation between Safe and Hazardous Area, is provided by D5000 Series Associated Apparatus. The 24 Vdc Power Supply of the TBE is connected to two plug-in terminal blocks, for a redundant power supply. The power supply for modules is given by TBE power bus.

### Termination Board general characteristics:

Number of positions	Features
16	Power Supply voltage redundancy; Abnormal supply voltage signaling; Cumulative module fault signaling.

### Supported Tricon and Tricon CX I/O Cards and D5000 / D6000 Series modules:

Refer to DTS0499 and DTS0865.

### Functional Safety Management Certification:

G.M. International is certified by TUV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL3.



### Functional Safety Applications:

Refer to Safety Manual ISM0472.

## Installation:

TBE-D5016-TRI-007 is a Termination Board supported by an aluminum shell suitable for installation on EN/IEC60715 TH 35 DIN-Rail.

TBE-D5016-TRI-007 unit can be mounted with any orientation over the entire ambient temperature range.

Electrical connections are the following:

- ALARM, PWR1, PWR 2: polarized plug-in removable screw terminal blocks for conductors up to 2.5 mm<sup>2</sup> (13 AWG) with a torque of 0.5-0.6 Nm.
- CON1 SHIELD: screw terminal block for conductors up to 2 mm<sup>2</sup> (14 AWG) fully tight.
- CON1: ELCO 8016, 56 poles connector with screws retaining method.

Electrical connection can be plugged in/out into a powered unit without suffering or causing any damage (for Zone 2 installations check the area to be nonhazardous before servicing). Connect only one individual conductor per each clamping point. For USA and Canada installations, 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 (e.g. EN/IEC60079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines)), 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. When installed in EU Zone 2, the unit shall be mounted in a certified Ex enclosure that provides a minimum ingress protection of IP54 in accordance with EN/IEC60079-0. When installed in a Class I, Division 2 Hazardous Location, the unit shall be mounted in a supplemental enclosure that provides a degree of protection not less than IP54. The enclosure must have a door or cover accessible only by the use of a tool. The end user is responsible to ensure that the operating temperature of the module is not exceeded in the end use application.

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-D5016-TRI-007 unit must be connected to SELV or PELV supplies.

All circuits connected to TBE-D5016-TRI-007 unit must comply with the overvoltage category II (or better) according to EN/IEC60664-1.

## Technical Data:

### 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.

**Max allowed current consumption:** 1.5 A (as total supply).

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Protection fuse:** 4 A time lag.

### Fault detection:

The on-board diagnostic monitors both power supplies integrity and the module cumulative fault. Any malfunction is reported by deactivating a solid-state relay and activating the corresponding LEDs.

Alarm is issued if:

- 1) Power supply 1 or 2 < 17 Vdc or
- 2) Power supply 1 or 2 > 33 Vdc or
- 3) Module cumulative fault ON.

Alarm is removed if:

- 1) 20 Vdc < Power supply 1 and 2 < 30 Vdc and
- 2) No module cumulative fault.

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Output rating:** 100 mA 35 V (≤ 1 V voltage drop)

### I/O Card Interface:

#### Connection:

1 x ELCO 8016, 56 poles receptacle connector (require male mating connector).

**Connector Keys:** CON1, Large Key pos.3, Small Key pos.3.

**Cable:** Tricon system cable 4000188-3xx and Tricon CX system cable 4X00188-3xx.

### Compatibility:

**CE** CE mark compliant, conforms to Directive:

2014/34/EU ATEX, 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 limits – 45 to + 80 °C.

### Safety Description:



**ATEX:** II 3G Ex ec IIC T4 Gc; **IECEx:** Ex ec IIC T4 Gc

**UL:** NI // 2 / ABCD / T4; **C-UL:** NI // 2 / ABCD / T4

**CCC:** Ex ec IIC T4 Gc

#### Approvals:

IMQ 19 ATEX 073 X conforms to EN60079-0, EN60079-7.

IECEx IMQ 19.0013X conforms to IEC60079-0, IEC60079-7.

UL & C-UL E222308 conforms to UL 61010-1 and UL 121201 for UL and CAN/CSA

C22.2 No.61010-1-12 and CSA C22.2 No. 213 for C-UL.

CCC n. 2023322308005685 conforms to GB/T 3836.1, GB/T 3834.3.

TUV Certificate No. C-IS-272994-01 SIL 3 conforms to IEC61508:2010 Ed. 2.

SIL 3 Functional Safety TÜV Certificate conforms to IEC61508:2010 Ed.2,

for Management of Functional Safety.

### Mounting:

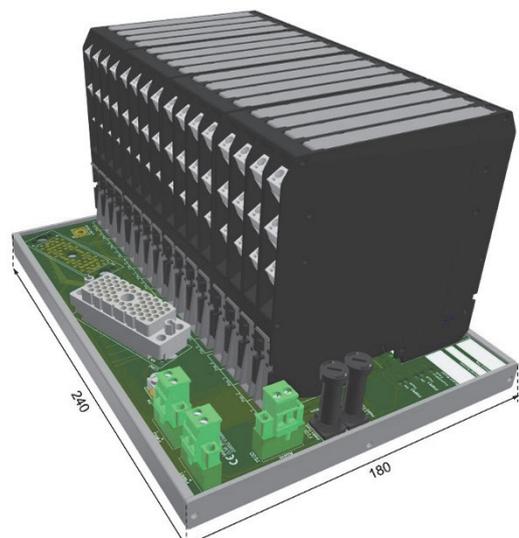
Hardware included for mounting on single DIN rail 35 mm.

**Weight:** about 700 g (excluding modules).

**Location:** installation in Safe Area/Ordinary Location or Zone 2, Group IIC T4, or Class 1, Div. 2, Group A, B, C, D, T4.

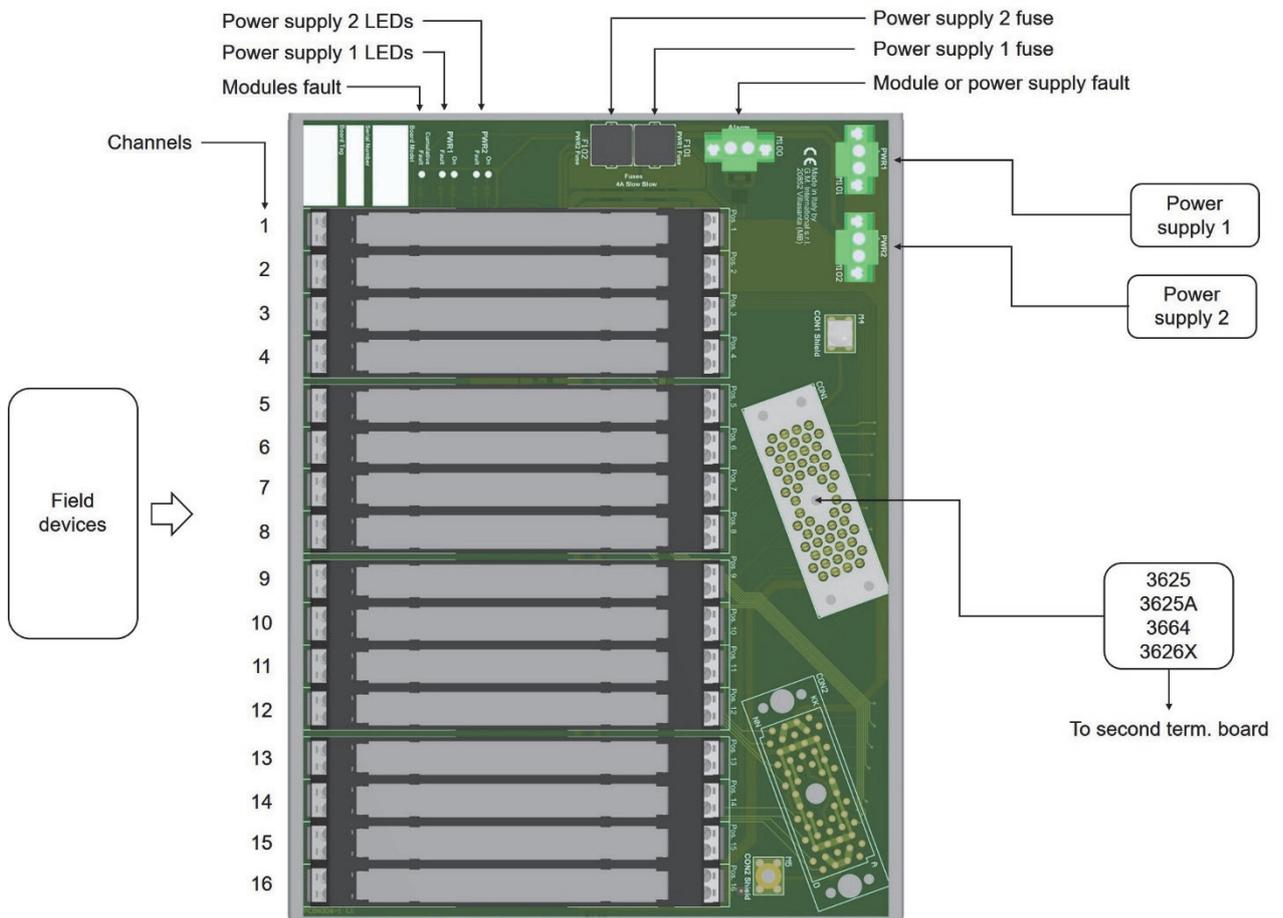
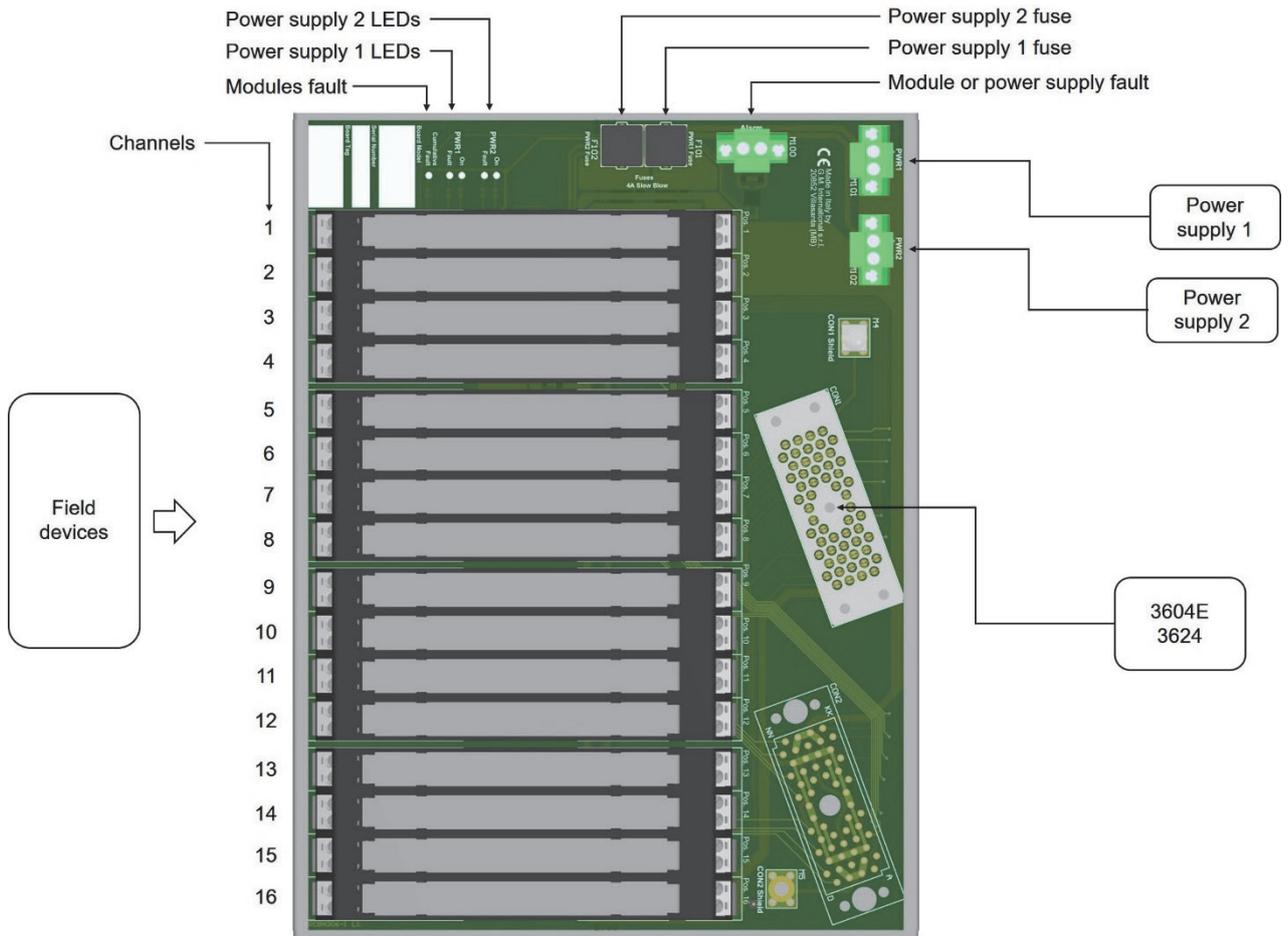
**Dimensions:** Width 240 mm, Depth 180 mm, Height 154 mm.

## Image:



## Termination Board Description

**Note :** Do not mix D5000 Intrinsically Safe barriers with D5000 Relay modules or D6000 isolators on same termination board.



**Connections Table to Interface Cards**

MODULE POSITION	MODULE CHANNEL NUMBER	INTERFACE CARD(S) CHANNEL NUMBER (ELCO1) for TBE n.1	INTERFACE CARD(S) CHANNEL NUMBER (ELCO2) for TBE n.2	MODULE CHANNEL POSITIVE (+) CONNECTION (CON1)	MODULE CHANNEL NEGATIVE (-) CONNECTION	NOTES
1	1	1	17	KK	GND	<p>CON1:</p> <ul style="list-style-type: none"> <li>• Chassis Ground provided on pins: T, H, w, FF.</li> <li>• +24 Vdc available on poles: AA, z, p, h, e, W, L, M, BB, CC, t, j, f, Z, P, N.</li> <li>• Ground available on poles: LL, EE, v, l, b, S, F, B, MM, HH, x, m, c, U, J, C.</li> <li>• Unconnected poles: s, r, X, Y.</li> </ul> <p>Tricon system DO cards 3604E and 3624 have only got ELCO1.</p> <p>Tricon system DO cards 3625, 3625A, 3664 and Tricon CX system DO card 3626X have got ELCO1 and ELCO2.</p>
2	2	2	18	DD	GND	
3	3	3	19	u	GND	
4	4	4	20	k	GND	
5	5	5	21	a	GND	
6	6	6	22	R	GND	
7	7	7	23	E	GND	
8	8	8	24	A	GND	
9	9	9	25	NN	GND	
10	10	10	26	JJ	GND	
11	11	11	27	y	GND	
12	12	12	28	n	GND	
13	13	13	29	d	GND	
14	14	14	30	V	GND	
15	15	15	31	K	GND	
16	16	16	32	D	GND	

## Characteristics:

### General description:

This Termination Board with Enclosure (TBE) provides direct connection between the I/O Card of the system and D5000 / D6000 Series modules. The Intrinsically Safe protection and signal isolation between Safe and Hazardous Area, is provided by D5000 Series Associated Apparatus. The 24 Vdc Power Supply of the TBE is connected to two plug-in terminal blocks, for a redundant power supply. The power supply for modules is given by TBE power bus.

### Termination Board general characteristics:

Number of positions	Features
16	Power Supply voltage redundancy; Abnormal supply voltage signaling; Cumulative module fault signaling; HART Multiplexing.

### Supported Tricon I/O Cards and D5000 / D6000 Series modules:

Refer to DTS0499 and DTS0891.

### Functional Safety Management Certification:

G.M. International is certified by TUV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL3.



### Functional Safety Applications:

Refer to Safety Manual ISM0472.

## Installation:

TBE-D5016-TRI-008 is a Termination Board supported by an aluminum shell suitable for installation on EN/IEC60715 TH 35 DIN-Rail.

TBE-D5016-TRI-008 unit can be mounted with any orientation over the entire ambient temperature range.

Electrical connections are the following:

- ALARM, PWR1, PWR 2: polarized plug-in removable screw terminal blocks for conductors up to 2.5 mm<sup>2</sup> (13 AWG) with a torque of 0.5-0.6 Nm.
- CON1 SHIELD: screw terminal block for conductors up to 2 mm<sup>2</sup> (14 AWG) fully tight.
- CON1: ELCO 8016, 56 poles connector with screws retaining method.
- CON2 SHIELD: screw terminal block for conductors up to 2 mm<sup>2</sup> (14 AWG) fully tight.
- CON2: ELCO 8016, 56 poles connector with screws retaining method.
- J17 and J18 HART: 2 x 34 poles male connector.

Electrical connection can be plugged in/out into a powered unit without suffering or causing any damage (**for Zone 2 installations check the area to be nonhazardous before servicing**). Connect only one individual conductor per each clamping point. For USA and Canada installations, 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 (e.g. EN/IEC6079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines)), 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. When installed in EU Zone 2, the unit shall be mounted in a certified Ex enclosure that provides a minimum ingress protection of IP54 in accordance with EN/IEC60079-0. When installed in a Class I, Division 2 Hazardous Location, the unit shall be mounted in a supplemental enclosure that provides a degree of protection not less than IP54. The enclosure must have a door or cover accessible only by the use of a tool. The end user is responsible to ensure that the operating temperature of the module is not exceeded in the end use application.

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-D5016-TRI-008 unit must be connected to SELV or PELV supplies.

All circuits connected to TBE-D5016-TRI-008 unit must comply with the overvoltage category II (or better) according to EN/IEC60664-1.

## Technical Data:

### 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.

**Max allowed current consumption:** 1.5 A (as total supply).

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Protection fuse:** 4 A time lag.

### Fault detection:

The on-board diagnostic monitors both power supplies integrity and the module cumulative fault. Any malfunction is reported by deactivating a solid-state relay and activating the corresponding LEDs.

Alarm is issued if:

- 1) Power supply 1 or 2 < 17 Vdc or
- 2) Power supply 1 or 2 > 33 Vdc or
- 3) Module cumulative fault ON.

Alarm is removed if:

- 1) 20 Vdc < Power supply 1 and 2 < 30 Vdc and
- 2) No module cumulative fault.

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Output rating:** 100 mA 35 V (≤ 1 V voltage drop)

### I/O Card Interface:

**Connection:**

2 x ELCO 8016, 56 poles receptacle connector (require male mating connector).

**Connector Keys:** CON1, Large Key pos.5, Small Key pos.1.

CON2, Large Key pos.5, Small Key pos.1.

**Cable:** system cable 4000189-5xx.

### HART Mux Interface:

**Connection:** 2 x 34-poles receptacle connector (require female mating connector).

**Cable:** flat cable CABF032.

### Compatibility:

CE mark compliant, conforms to Directive: 2014/34/EU ATEX, 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 limits – 45 to + 80 °C.

### Safety Description:



**ATEX:** II 3G Ex ec IIC T4 Gc; **IECEx:** Ex ec IIC T4 Gc

**UL:** NI / I / 2 / ABCD / T4; **C-UL:** NI / I / 2 / ABCD / T4

**CCC:** Ex ec IIC T4 Gc

### Approvals:

IMQ 19 ATEX 073 X conforms to EN60079-0, EN60079-7.

IECEx IMQ 19.0013X conforms to IEC60079-0, IEC60079-7.

UL & C-UL E222308 conforms to UL 61010-1 and UL 121201 for UL and CAN/CSA

C22.2 No.61010-1-12 and CSA C22.2 No. 213 for C-UL.

CCC n. 2023322308005685 conforms to GB/T 3836.1, GB/T 3834.3.

TUV Certificate No. C-IS-272994-01 SIL 3 conforms to IEC61508:2010 Ed. 2.

SIL 3 Functional Safety TÜV Certificate conforms to IEC61508:2010 Ed.2,

for Management of Functional Safety.

### Mounting:

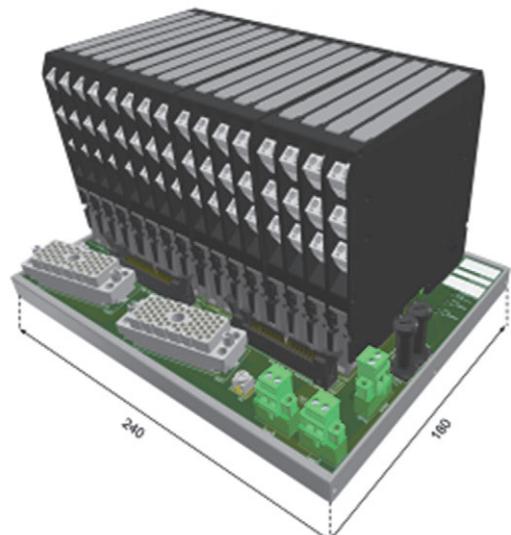
Hardware included for mounting on single DIN rail 35 mm.

**Weight:** about 700 g (excluding modules).

**Location:** installation in Safe Area/Ordinary Location or Zone 2, Group IIC T4, or Class 1, Div. 2, Group A, B, C, D, T4.

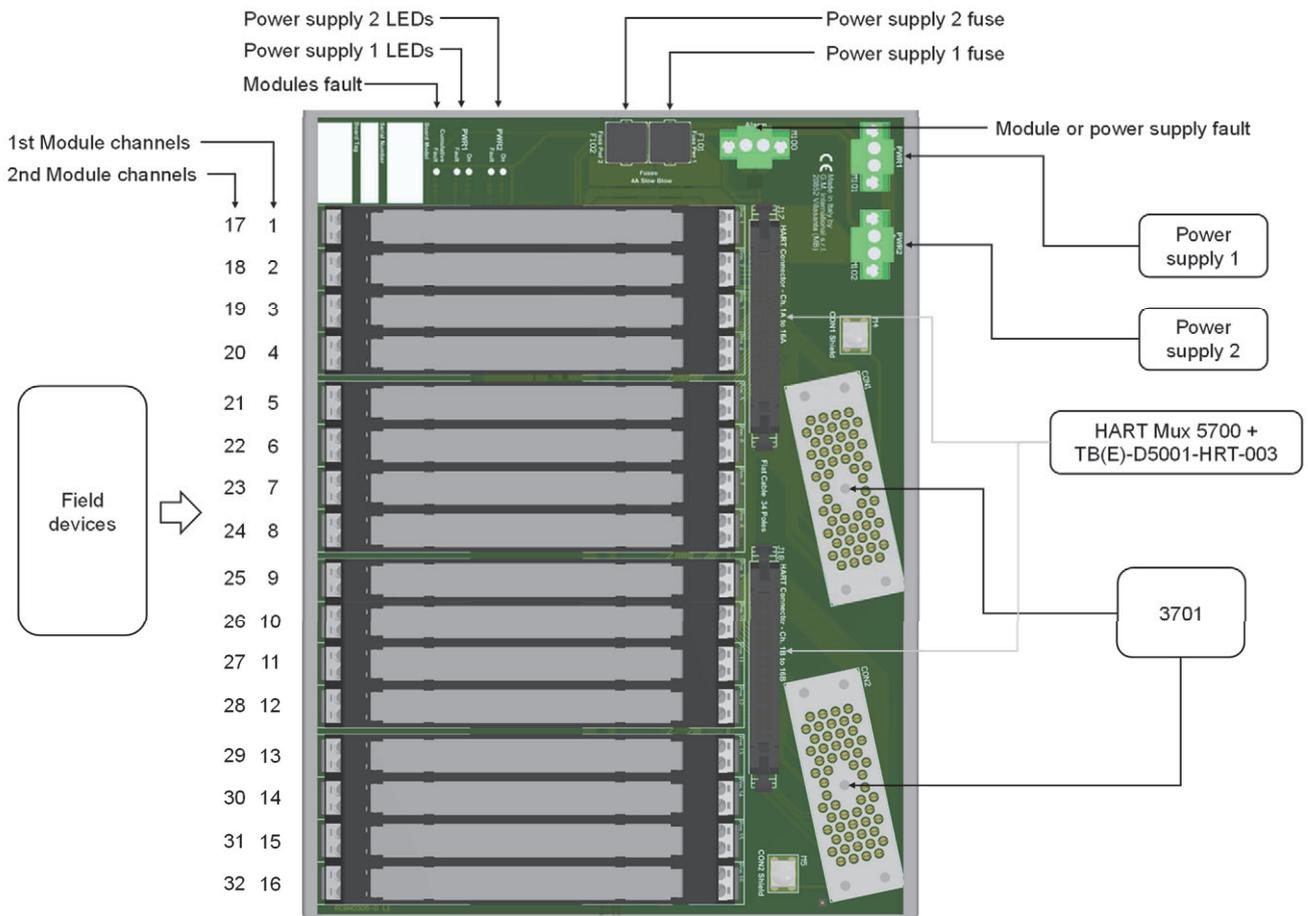
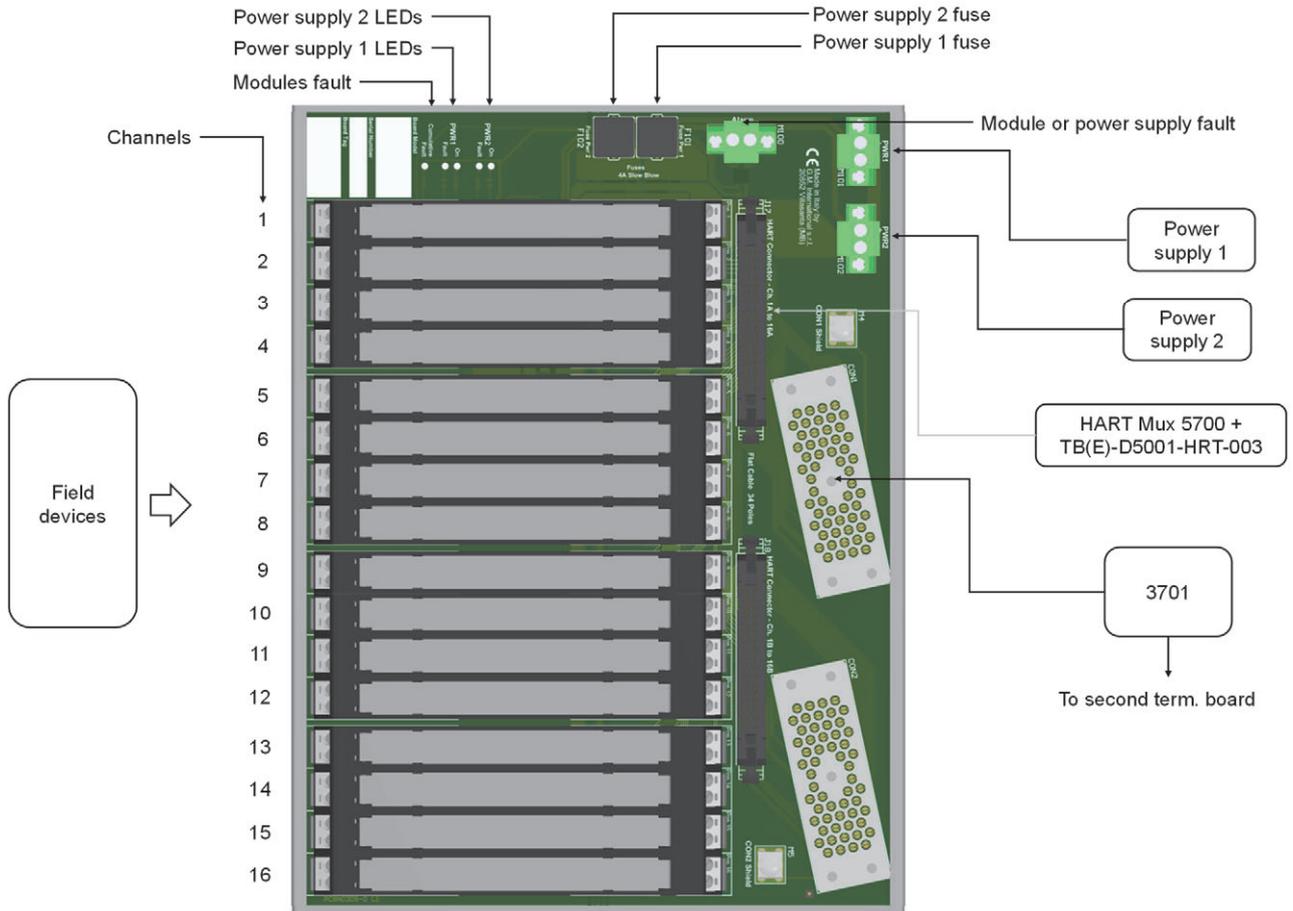
**Dimensions:** Width 240 mm, Depth 180 mm, Height 154 mm.

## Image:



## Termination Board Description

**Note :** Do not mix D5000 Intrinsically Safe barriers with D6000 isolators on same termination board.



**Connections Table to Interface Cards**

<u>SINGLE CHANNEL MODULE POSITION</u>	<u>MODULE CHANNEL NUMBER</u>	<u>INTERFACE CARD(S) CHANNEL NUMBER</u>	<u>MODULE CHANNEL POSITIVE (+) CONNECTION</u>	<u>MODULE CHANNEL NEGATIVE (-) CONNECTION</u>	<u>HART MULTIPLEXING CONNECTOR POSITIVE (+) PIN NUMBER</u>	<u>HART MULTIPLEXING CONNECTOR NEGATIVE (-) PIN NUMBER</u>	<u>NOTES</u>
1 of TBE n.1	1A	1 (ELCO1)	AA (CON1)	LL (CON1)	1 (J17)	2 (J17)	CON1: • Chassis Ground provided on poles: T, H, w, FF. • Unconnected poles: KK, u, a, DD, k, R, E, A, NN, JJ, y, n, d, V, K, D, s, r, X, Y.  CON2 is not used.
1 of TBE n.2	1A	17 (ELCO2)	AA (CON1)	LL (CON1)	1 (J17)	2 (J17)	
2 of TBE n.1	2A	2 (ELCO1)	z (CON1)	EE (CON1)	3 (J17)	4 (J17)	
2 of TBE n.2	2A	18 (ELCO2)	z (CON1)	EE (CON1)	3 (J17)	4 (J17)	
3 of TBE n.1	3A	3 (ELCO1)	p (CON1)	v (CON1)	5 (J17)	6 (J17)	
3 of TBE n.2	3A	19 (ELCO2)	p (CON1)	v (CON1)	5 (J17)	6 (J17)	
4 of TBE n.1	4A	4 (ELCO1)	h (CON1)	l (CON1)	7 (J17)	8 (J17)	
4 of TBE n.2	4A	20 (ELCO2)	h (CON1)	l (CON1)	7 (J17)	8 (J17)	
5 of TBE n.1	5A	5 (ELCO1)	e (CON1)	b (CON1)	9 (J17)	10 (J17)	
5 of TBE n.2	5A	21 (ELCO2)	e (CON1)	b (CON1)	9 (J17)	10 (J17)	
6 of TBE n.1	6A	6 (ELCO1)	W (CON1)	S (CON1)	11 (J17)	12 (J17)	
6 of TBE n.2	6A	22 (ELCO2)	W (CON1)	S (CON1)	11 (J17)	12 (J17)	
7 of TBE n.1	7A	7 (ELCO1)	L (CON1)	F (CON1)	13 (J17)	14 (J17)	
7 of TBE n.2	7A	23 (ELCO2)	L (CON1)	F (CON1)	13 (J17)	14 (J17)	
8 of TBE n.1	8A	8 (ELCO1)	M (CON1)	B (CON1)	15 (J17)	16 (J17)	
8 of TBE n.2	8A	24 (ELCO2)	M (CON1)	B (CON1)	15 (J17)	16 (J17)	
9 of TBE n.1	9A	9 (ELCO1)	BB (CON1)	MM (CON1)	17 (J17)	18 (J17)	
9 of TBE n.2	9A	25 (ELCO2)	BB (CON1)	MM (CON1)	17 (J17)	18 (J17)	
10 of TBE n.1	10A	10 (ELCO1)	CC (CON1)	HH (CON1)	19 (J17)	20 (J17)	
10 of TBE n.2	10A	26 (ELCO2)	CC (CON1)	HH (CON1)	19 (J17)	20 (J17)	
11 of TBE n.1	11A	11 (ELCO1)	t (CON1)	x (CON1)	21 (J17)	22 (J17)	
11 of TBE n.2	11A	27 (ELCO2)	t (CON1)	x (CON1)	21 (J17)	22 (J17)	
12 of TBE n.1	12A	12 (ELCO1)	j (CON1)	m (CON1)	23 (J17)	24 (J17)	
12 of TBE n.2	12A	28 (ELCO2)	j (CON1)	m (CON1)	23 (J17)	24 (J17)	
13 of TBE n.1	13A	13 (ELCO1)	f (CON1)	c (CON1)	25 (J17)	26 (J17)	
13 of TBE n.2	13A	29 (ELCO2)	f (CON1)	c (CON1)	25 (J17)	26 (J17)	
14 of TBE n.1	14A	14 (ELCO1)	Z (CON1)	U (CON1)	27 (J17)	28 (J17)	
14 of TBE n.2	14A	30 (ELCO2)	Z (CON1)	U (CON1)	27 (J17)	28 (J17)	
15 of TBE n.1	15A	15 (ELCO1)	P (CON1)	J (CON1)	29 (J17)	30 (J17)	
15 of TBE n.2	15A	31 (ELCO2)	P (CON1)	J (CON1)	29 (J17)	30 (J17)	
16 of TBE n.1	16A	16 (ELCO1)	N (CON1)	C (CON1)	31 (J17)	32 (J17)	
16 of TBE n.2	16A	32 (ELCO2)	N (CON1)	C (CON1)	31 (J17)	32 (J17)	

**Connections Table to Interface Cards**

<b><u>DOUBLE CHANNEL MODULE POSITION</u></b>	<b>MODULE CHANNEL NUMBER</b>	<b>INTERFACE CARD(S) CHANNEL NUMBER for TBE n.1</b>	<b>MODULE CHANNEL POSITIVE (+) CONNECTION</b>	<b>MODULE CHANNEL NEGATIVE (-) CONNECTION</b>	<b>HART MULTIPLEXING CONNECTOR POSITIVE (+) PIN NUMBER</b>	<b>HART MULTIPLEXING CONNECTOR NEGATIVE (-) PIN NUMBER</b>	<b>NOTES</b>
1	1A	1 (ELCO1)	AA (CON1)	LL (CON1)	1 (J17)	2 (J17)	CON1, CON2: • Chassis Ground provided on poles: T, H, w, FF. • Unconnected poles: KK, u, a, DD, k, R, E, A, NN, JJ, y, n, d, V, K, D, s, r, X, Y.
	1B	17 (ELCO2)	AA (CON2)	LL (CON2)	1 (J18)	2 (J18)	
2	2A	2 (ELCO1)	z (CON1)	EE (CON1)	3 (J17)	4 (J17)	
	2B	18 (ELCO2)	z (CON2)	EE (CON2)	3 (J18)	4 (J18)	
3	3A	3 (ELCO1)	p (CON1)	v (CON1)	5 (J17)	6 (J17)	
	3B	19 (ELCO2)	p (CON2)	v (CON2)	5 (J18)	6 (J18)	
4	4A	4 (ELCO1)	h (CON1)	I (CON1)	7 (J17)	8 (J17)	
	4B	20 (ELCO2)	h (CON2)	I (CON2)	7 (J18)	8 (J18)	
5	5A	5 (ELCO1)	e (CON1)	b (CON1)	9 (J17)	10 (J17)	
	5B	21 (ELCO2)	e (CON2)	b (CON2)	9 (J18)	10 (J18)	
6	6A	6 (ELCO1)	W (CON1)	S (CON1)	11 (J17)	12 (J17)	
	6B	22 (ELCO2)	W (CON2)	S (CON2)	11 (J18)	12 (J18)	
7	7A	7 (ELCO1)	L (CON1)	F (CON1)	13 (J17)	14 (J17)	
	7B	23 (ELCO2)	L (CON2)	F (CON2)	13 (J18)	14 (J18)	
8	8A	8 (ELCO1)	M (CON1)	B (CON1)	15 (J17)	16 (J17)	
	8B	24 (ELCO2)	M (CON2)	B (CON2)	15 (J18)	16 (J18)	
9	9A	9 (ELCO1)	BB (CON1)	MM (CON1)	17 (J17)	18 (J17)	
	9B	25 (ELCO2)	BB (CON2)	MM (CON2)	17 (J18)	18 (J18)	
10	10A	10 (ELCO1)	CC (CON1)	HH (CON1)	19 (J17)	20 (J17)	
	10B	26 (ELCO2)	CC (CON2)	HH (CON2)	19 (J18)	20 (J18)	
11	11A	11 (ELCO1)	t (CON1)	x (CON1)	21 (J17)	22 (J17)	
	11B	27 (ELCO2)	t (CON2)	x (CON2)	21 (J18)	22 (J18)	
12	12A	12 (ELCO1)	j (CON1)	m (CON1)	23 (J17)	24 (J17)	
	12B	28 (ELCO2)	j (CON2)	m (CON2)	23 (J18)	24 (J18)	
13	13A	13 (ELCO1)	f (CON1)	c (CON1)	25 (J17)	26 (J17)	
	13B	29 (ELCO2)	f (CON2)	c (CON2)	25 (J18)	26 (J18)	
14	14A	14 (ELCO1)	Z (CON1)	U (CON1)	27 (J17)	28 (J17)	
	14B	30 (ELCO2)	Z (CON2)	U (CON2)	27 (J18)	28 (J18)	
15	15A	15 (ELCO1)	P (CON1)	J (CON1)	29 (J17)	30 (J17)	
	15B	31 (ELCO2)	P (CON2)	J (CON2)	29 (J18)	30 (J18)	
16	16A	16 (ELCO1)	N (CON1)	C (CON1)	31 (J17)	32 (J17)	
	16B	32 (ELCO2)	N (CON2)	C (CON2)	31 (J18)	32 (J18)	

## Characteristics:

### General description:

This Termination Board with Enclosure (TBE) provides direct connection between the I/O Card of the system and D5000 / D6000 Series modules. The Intrinsically Safe protection and signal isolation between Safe and Hazardous Area, is provided by D5000 Series Associated Apparatus. The 24 Vdc Power Supply of the TBE is connected to two plug-in terminal blocks, for a redundant power supply. The power supply for modules is given by TBE power bus.

### Termination Board general characteristics:

Number of positions	Features
16	Power Supply voltage redundancy; Abnormal supply voltage signaling; Cumulative module fault signaling.

### Supported Tricon and Tricon CX I/O Cards and D5000 / D6000 Series modules:

Refer to DTS0499 and DTS0884.

### Functional Safety Management Certification:

G.M. International is certified by TUV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL3.



### Functional Safety Applications:

Refer to Safety Manual ISM0472.

## Installation:

TBE-D5016-TRI-009 is a Termination Board supported by an aluminum shell suitable for installation on EN/IEC60715 TH 35 DIN-Rail.

TBE-D5016-TRI-009 unit can be mounted with any orientation over the entire ambient temperature range.

Electrical connections are the following:

- ALARM, PWR1, PWR 2: polarized plug-in removable screw terminal blocks for conductors up to 2.5 mm<sup>2</sup> (13 AWG) with a torque of 0.5-0.6 Nm.
- CON1 SHIELD: screw terminal block for conductors up to 2 mm<sup>2</sup> (14 AWG) fully tight.
- CON1: ELCO 8016, 56 poles connector with screws retaining method.
- CON2 SHIELD: screw terminal block for conductors up to 2 mm<sup>2</sup> (14 AWG) fully tight.
- CON2: ELCO 8016, 56 poles connector with screws retaining method.

Electrical connection can be plugged in/out into a powered unit without suffering or causing any damage (**for Zone 2 installations check the area to be nonhazardous before servicing**). Connect only one individual conductor per each clamping point. For USA and Canada installations, 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 (e.g. EN/IEC60079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines)), 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. When installed in EU Zone 2, the unit shall be mounted in a certified Ex enclosure that provides a minimum ingress protection of IP54 in accordance with EN/IEC60079-0. When installed in a Class I, Division 2 Hazardous Location, the unit shall be mounted in a supplemental enclosure that provides a degree of protection not less than IP54. The enclosure must have a door or cover accessible only by the use of a tool. The end user is responsible to ensure that the operating temperature of the module is not exceeded in the end use application.

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-D5016-TRI-009 unit must be connected to SELV or PELV supplies.

All circuits connected to TBE-D5016-TRI-009 unit must comply with the overvoltage category II (or better) according to EN/IEC60664-1.

## Technical Data:

### 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.

**Max allowed current consumption:** 1.5 A (as total supply).

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Protection fuse:** 4 A time lag.

### Fault detection:

The on-board diagnostic monitors both power supplies integrity and the module cumulative fault. Any malfunction is reported by deactivating a solid-state relay and activating the corresponding LEDs.

Alarm is issued if:

- 1) Power supply 1 or 2 < 17 Vdc or
- 2) Power supply 1 or 2 > 33 Vdc or
- 3) Module cumulative fault ON.

Alarm is removed if:

- 1) 20 Vdc < Power supply 1 and 2 < 30 Vdc and
- 2) No module cumulative fault.

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Output rating:** 100 mA 35 V (≤ 1 V voltage drop)

### I/O Card Interface:

#### Connection:

2 x ELCO 8016, 56 poles receptacle connector (require male mating connector).

**Connector Keys:** CON1, Large Key pos.3, Small Key pos.3.

CON2, Large Key pos.3, Small Key pos.3.

**Cable:** Tricon system cable 4000188-3xx and Tricon CX system cable 4X00188-3xx.

### Compatibility:

CE mark compliant, conforms to Directive: 2014/34/EU ATEX, 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 limits - 45 to + 80 °C.

### Safety Description:



**ATEX:** II 3G Ex ec IIC T4 Gc; **IECEx:** Ex ec IIC T4 Gc

**UL:** NI / I / 2 / ABCD / T4; **C-UL:** NI / I / 2 / ABCD / T4

**CCC:** Ex ec IIC T4 Gc

### Approvals:

IMQ 19 ATEX 073 X conforms to EN60079-0, EN60079-7.

IECEx IMQ 19.0013X conforms to IEC60079-0, IEC60079-7.

UL & C-UL E222308 conforms to UL 61010-1 and UL 121201 for UL and CAN/CSA C22.2 No.61010-1-12 and CSA C22.2 No. 213 for C-UL.

CCC n. 2023322308005685 conforms to GB/T 3836.1, GB/T 3834.3.

TUV Certificate No. C-IS-272994-01 SIL 3 conforms to IEC61508:2010 Ed. 2.

SIL 3 Functional Safety TUV Certificate conforms to IEC61508:2010 Ed.2, for Management of Functional Safety.

### Mounting:

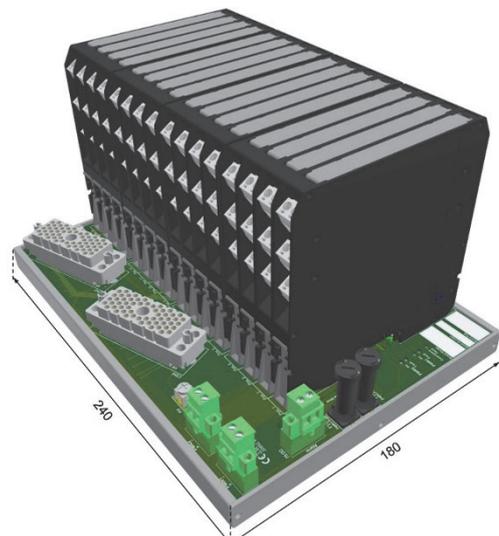
Hardware included for mounting on single DIN rail 35 mm.

**Weight:** about 700 g (excluding modules).

**Location:** installation in Safe Area/Ordinary Location or Zone 2, Group IIC T4, or Class 1, Div. 2, Group A, B, C, D, T4.

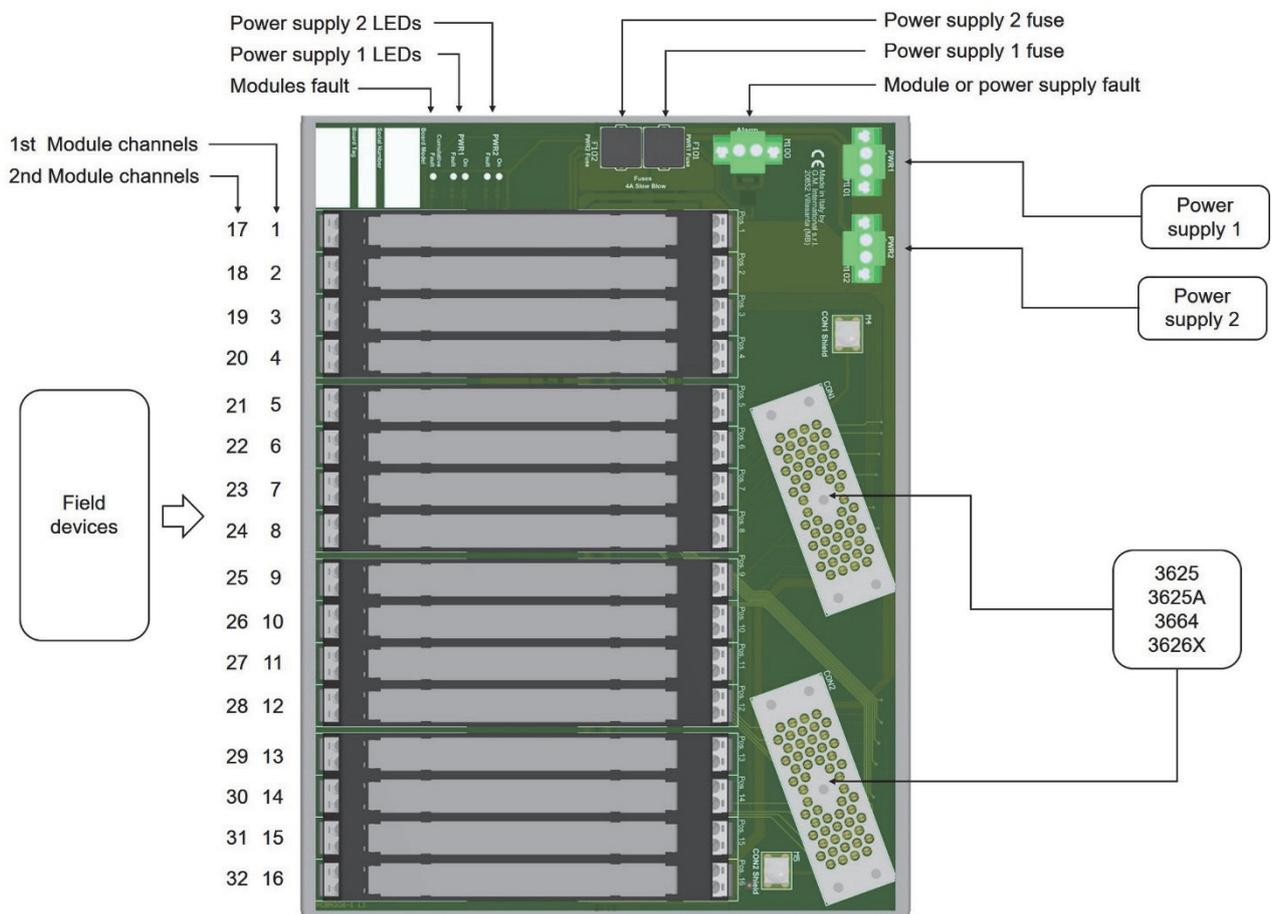
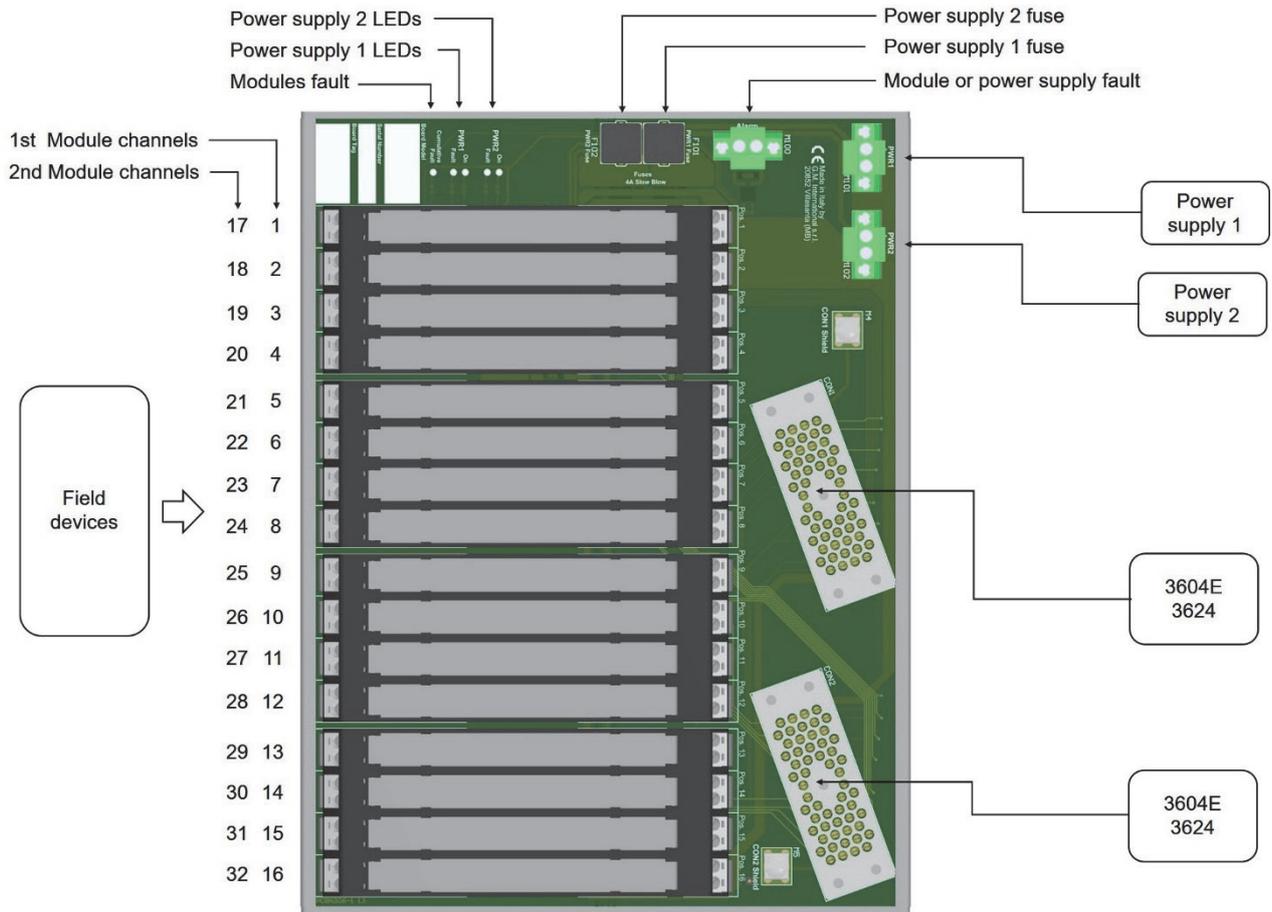
**Dimensions:** Width 240 mm, Depth 180 mm, Height 154 mm.

## Image:



## Termination Board Description

**Note :** Do not mix D5000 Intrinsically Safe barriers with D5000 Relay modules or D6000 isolators on same termination board.



## Connections Table to Interface Cards

The following Table is only valid for connection of TBE-D5016-TRI-009 to Tricon system DO cards 3604E and 3624.

MODULE POSITION	MODULE CHANNEL NUMBER	INTERFACE CARD(S) CHANNEL NUMBER	MODULE CHANNEL POSITIVE (+) CONNECTION (CON1)	MODULE CHANNEL POSITIVE (+) CONNECTION (CON2)	MODULE CHANNEL NEGATIVE (-) CONNECTION	NOTES
1	1A	1 (CARD1)	KK	-	GND	CON1, CON2: • Chassis Ground provided on pins: T, H, w, FF. • +24 Vdc available on poles: AA, z, p, h, e, W, L, M, BB, CC, t, j, f, Z, P, N. • Ground available on poles: LL, EE, v, l, b, S, F, B, MM, HH, x, m, c, U, J, C. • Unconnected poles: s, r, X, Y.  Tricon system DO cards 3604E and 3624 have only got ELCO1, therefore two DO cards 3604E or 3624 are necessary for connection with TBE-D5016-TRI-009
	1B	1 (CARD2)	-	KK	GND	
2	2A	2 (CARD1)	DD	-	GND	
	2B	2 (CARD2)	-	DD	GND	
3	3A	3 (CARD1)	u	-	GND	
	3B	3 (CARD2)	-	u	GND	
4	4A	4 (CARD1)	k	-	GND	
	4B	4 (CARD2)	-	k	GND	
5	5A	5 (CARD1)	a	-	GND	
	5B	5 (CARD2)	-	a	GND	
6	6A	6 (CARD1)	R	-	GND	
	6B	6 (CARD2)	-	R	GND	
7	7A	7 (CARD1)	E	-	GND	
	7B	7 (CARD2)	-	E	GND	
8	8A	8 (CARD1)	A	-	GND	
	8B	8 (CARD2)	-	A	GND	
9	9A	9 (CARD1)	NN	-	GND	
	9B	9 (CARD2)	-	NN	GND	
10	10A	10 (CARD1)	JJ	-	GND	
	10B	10 (CARD2)	-	JJ	GND	
11	11A	11 (CARD1)	y	-	GND	
	11B	11 (CARD2)	-	y	GND	
12	12A	12 (CARD1)	n	-	GND	
	12B	12 (CARD2)	-	n	GND	
13	13A	13 (CARD1)	d	-	GND	
	13B	13 (CARD2)	-	d	GND	
14	14A	14 (CARD1)	V	-	GND	
	14B	14 (CARD2)	-	V	GND	
15	15A	15 (CARD1)	K	-	GND	
	15B	15 (CARD2)	-	K	GND	
16	16A	16 (CARD1)	D	-	GND	
	16B	16 (CARD2)	-	D	GND	

### Connections Table to Interface Cards

The following Connection Table is only valid for connection of TBE-D5016-TRI-009 to Tricon system DO cards 3625, 3625A, 3664 and Tricon CX system DO card 3626X.

MODULE POSITION	MODULE CHANNEL NUMBER	INTERFACE CARD(S) CHANNEL NUMBER	MODULE CHANNEL POSITIVE (+) CONNECTION (CON1)	MODULE CHANNEL POSITIVE (+) CONNECTION (CON2)	MODULE CHANNEL NEGATIVE (-) CONNECTION	NOTES
1	1A	1	KK	-	GND	CON1, CON2: • Chassis Ground provided on pins: T, H, w, FF. • +24 Vdc available on poles: AA, z, p, h, e, W, L, M, BB, CC, t, j, f, Z, P, N. • Ground available on poles: LL, EE, v, l, b, S, F, B, MM, HH, x, m, c, U, J, C. • Unconnected poles: s, r, X, Y.
	1B	17	-	KK	GND	
2	2A	2	DD	-	GND	
	2B	18	-	DD	GND	
3	3A	3	u	-	GND	
	3B	19	-	u	GND	
4	4A	4	k	-	GND	
	4B	20	-	k	GND	
5	5A	5	a	-	GND	
	5B	21	-	a	GND	
6	6A	6	R	-	GND	
	6B	22	-	R	GND	
7	7A	7	E	-	GND	
	7B	23	-	E	GND	
8	8A	8	A	-	GND	
	8B	24	-	A	GND	
9	9A	9	NN	-	GND	
	9B	25	-	NN	GND	
10	10A	10	JJ	-	GND	
	10B	26	-	JJ	GND	
11	11A	11	y	-	GND	
	11B	27	-	y	GND	
12	12A	12	n	-	GND	
	12B	28	-	n	GND	
13	13A	13	d	-	GND	
	13B	29	-	d	GND	
14	14A	14	V	-	GND	
	14B	30	-	V	GND	
15	15A	15	K	-	GND	
	15B	31	-	K	GND	
16	16A	16	D	-	GND	
	16B	32	-	D	GND	

# TB-D5016-TRI-010 TBE-D5016-TRI-010

# SIL3 Termination Board 16 positions for Tricon CX Universal card 3902X & Analog Output card 3809X

## Characteristics:

### General description:

This Termination Board (TB) with enclosure provides direct connection between the I/O Card of the system and D5000 / D6000 Series modules.  
The Intrinsically Safe protection and signal isolation between Safe and Hazardous Area, is provided by D5000 Series Associated Apparatus. The 24 Vdc Power Supply of the TB is connected to two plug-in terminal blocks, for a redundant power supply.  
The power supply for modules is given by TB power bus.

### Termination Board general characteristics:

Number of positions	Features
16	Power Supply voltage redundancy.

### Supported Tricon CX I/O Cards and D5000 / D6000 Series modules:

Refer to DTS0499 and DTS0811, DTS1491.

### Functional Safety Management Certification:

G.M. International is certified by TÜV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL3.



### Functional Safety Applications:

Refer to Safety Manual ISM0385.

## Installation:

TB-D5016-TRI-010 / TBE-D5016-TRI-010 is a Termination Board supported by an aluminum shell suitable for installation on EN/IEC60715 TH 35 DIN-Rail.  
TB-D5016-TRI-010 / TBE-D5016-TRI-010 unit can be mounted with any orientation over the entire ambient temperature range.  
Electrical connections are the following:

- PWR1 and PWR 2: polarized plug-in removable screw terminal blocks for conductors up to 2.5 mm<sup>2</sup> (13 AWG) with a torque of 0.5-0.6 Nm.
- M2: screw terminal block for conductors up to 2 mm<sup>2</sup> (14 AWG) fully tight.
- CON1: SUB D50 connector with screws retaining method.

Electrical connection can be plugged in/out into a powered unit without suffering or causing any damage (**for Zone 2 installations check the area to be nonhazardous before servicing**). Connect only one individual conductor per each clamping point. For USA and Canada installations, 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 (e.g. EN/IEC60079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines)), 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. When installed in EU Zone 2, the unit shall be mounted in a certified Ex enclosure that provides a minimum ingress protection of IP54 in accordance with EN/IEC60079-0. When installed in a Class I, Division 2 Hazardous Location, the unit shall be mounted in a supplemental enclosure that provides a degree of protection not less than IP54. The enclosure must have a door or cover accessible only by the use of a tool. The end user is responsible to ensure that the operating temperature of the module is not exceeded in the end use application.

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, TB-D5016-TRI-010 / TBE-D5016-TRI-010 unit must be connected to SELV or PELV supplies.

All circuits connected to TB-D5016-TRI-010 / TBE-D5016-TRI-010 unit must comply with the overvoltage category II (or better) according to EN/IEC60664-1.

## Technical Data:

### 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.

**Max allowed current consumption:** 1.5 A (as total supply).

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**2 LEDs indication:** green color, one for supply 1 and one for supply 2.

**Protection fuse:** 3.15 A time lag.

### I/O Card Interface:

#### Connection:

1 x SUB D50 male connector (require female mating connector).

### Compatibility:

CE mark compliant, conforms to Directive:

2014/34/EU ATEX, 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 limits – 45 to + 80 °C.

### Safety Description:



**ATEX:** II 3G Ex ec IIC T4 Gc; **IECEx:** Ex ec IIC T4 Gc

**UL:** NI / I / 2 / ABCD / T4; **C-UL:** NI / I / 2 / ABCD / T4

**EAC-EX:** 2Ex ec IIC T4 Gc X

**CCC:** Ex ec IIC T4 Gc

### Approvals:

BVS 18 ATEX E 079 X conforms to EN60079-0, EN60079-7.

IECEx BVS 18.0066X conforms to IEC60079-0, IEC60079-7.

UL & C-UL E222308 conforms to UL 61010-1 and UL 121201 for UL and CAN/CSA

C22.2 No.61010-1-12 and CSA C22.2 No. 213 for C-UL.

EA3C RU C-IT.AA87.B.00796/21 conforms to GOST 31610.0, GOST 31610.7.

CCC n. 2023322308005685 conforms to GB/T 3836.1, GB/T 3834.3.

TÜV Certificate No. C-IS-272994-01 SIL 3 conforms to IEC61508:2010 Ed.2.

SIL 3 Functional Safety TÜV Certificate conforms to IEC61508:2010 Ed.2, for Management of Functional Safety/fety.

### Mounting:

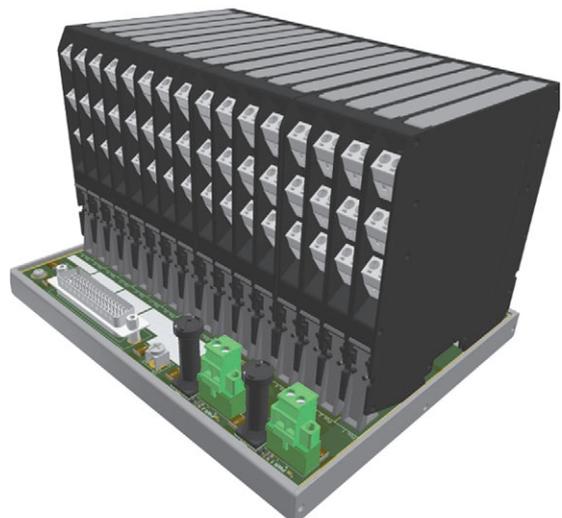
Hardware included for mounting on single DIN rail 35 mm.

**Weight:** about 700 g (excluding modules).

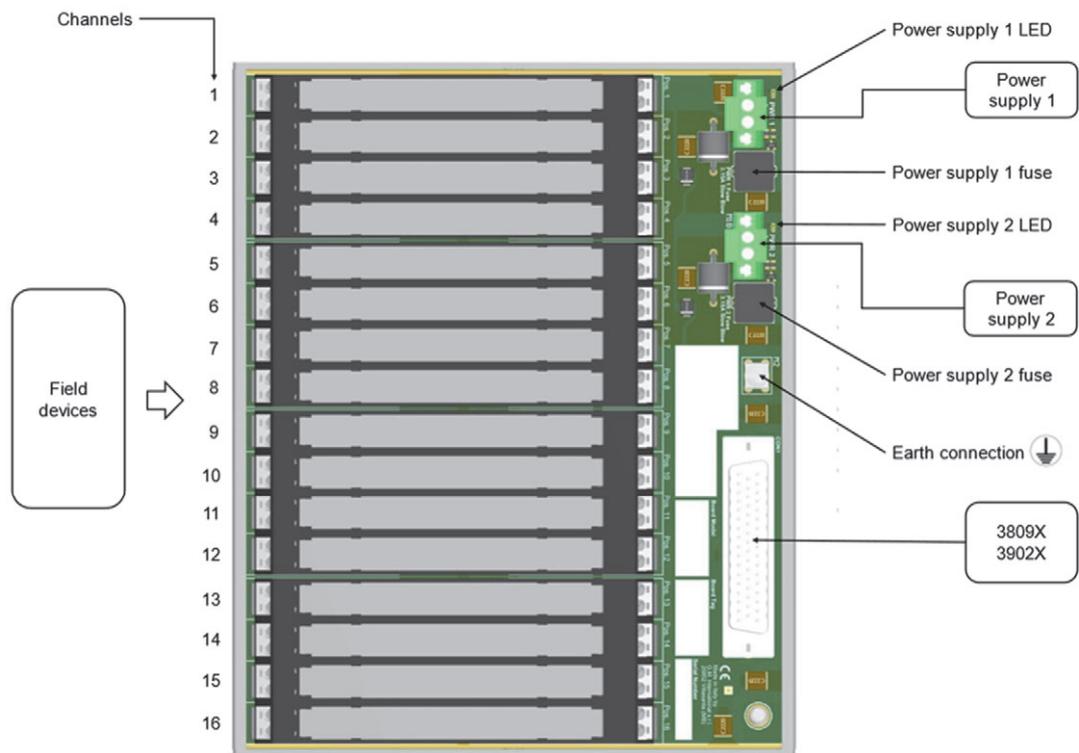
**Location:** installation in Safe Area/Ordinary Location or Zone 2, Group IIC T4, or Class 1, Div. 2, Group A, B, C, D, T4.

**Dimensions:** Width 210 mm, Depth 170 mm, Height 154 mm.

## Image:



**Note :** Do not mix D5000 Intrinsically Safe barriers with D5000 Relay modules or D6000 isolators on same termination board.



### Connections Table to Interface Cards

MODULE POSITION	MODULE CHANNEL NUMBER	INTERFACE CARD(S) CHANNEL NUMBER	MODULE CHANNEL POSITIVE (+) CONNECTION (CON1)	MODULE CHANNEL NEGATIVE (-) CONNECTION	Notes
1	1A	1	18	GND	<b>CON1:</b> <ul style="list-style-type: none"> <li>• Ground available on poles: 9, 10, 11, 26, 27, 28, 42, 43</li> <li>• +24 Vdc available on poles: 12, 13, 29, 30, 44, 45, 46</li> <li>• Supply PWR 1 available on pole 49.</li> <li>• Supply PWR 2 available on pole 32.</li> <li>• Unconnected poles: 14, 15, 16, 17, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 47, 48, 50.</li> </ul>
2	2A	2	19	GND	
3	3A	3	20	GND	
4	4A	4	21	GND	
5	5A	5	22	GND	
6	6A	6	23	GND	
7	7A	7	24	GND	
8	8A	8	25	GND	
9	9A	9	1	GND	
10	10A	10	2	GND	
11	11A	11	3	GND	
12	12A	12	4	GND	
13	13A	13	5	GND	
14	14A	14	6	GND	
15	15A	15	7	GND	
16	16A	16	8	GND	

## Characteristics:

### General description:

This Termination Board with Enclosure (TBE) provides direct connection between the I/O Card of the system and D5000 / D6000 Series modules. The Intrinsically Safe protection and signal isolation between Safe and Hazardous Area, is provided by D5000 Series Associated Apparatus. The 24 Vdc Power Supply of the TBE is connected to two plug-in terminal blocks, for a redundant power supply. The power supply for modules is given by TBE power bus.

### Termination Board general characteristics:

Number of positions	Features
16	Power Supply voltage redundancy; Abnormal supply voltage signaling; Cumulative module fault signaling; HART Multiplexing.

### Supported Tricon CX I/O Cards and D5000 / D6000 Series modules:

Refer to DTS0499 and DTS0893.

### Functional Safety Management Certification:

G.M. International is certified by TUV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL3.



### Functional Safety Applications:

Refer to Safety Manual ISM0472.

## Installation:

TBE-D5016-TRI-011 is a Termination Board supported by an aluminum shell suitable for installation on EN/IEC60715 TH 35 DIN-Rail.

TBE-D5016-TRI-011 unit can be mounted with any orientation over the entire ambient temperature range.

Electrical connections are the following:

- ALARM, PWR1, PWR 2: polarized plug-in removable screw terminal blocks for conductors up to 2.5 mm<sup>2</sup> (13 AWG) with a torque of 0.5-0.6 Nm.
- CON1 SHIELD: screw terminal block for conductors up to 2 mm<sup>2</sup> (14 AWG) fully tight.
- CON1: ELCO 8016, 56 poles connector with screws retaining method.
- CON2 SHIELD: screw terminal block for conductors up to 2 mm<sup>2</sup> (14 AWG) fully tight.
- CON2: ELCO 8016, 56 poles connector with screws retaining method.
- J17 and J18 HART: 2 x 34 poles male connector.

Electrical connection can be plugged in/out into a powered unit without suffering or causing any damage (**for Zone 2 installations check the area to be nonhazardous before servicing**). Connect only one individual conductor per each clamping point. For USA and Canada installations, 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 (e.g. EN/IEC60079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines)), 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. When installed in EU Zone 2, the unit shall be mounted in a certified Ex enclosure that provides a minimum ingress protection of IP54 in accordance with EN/IEC60079-0. When installed in a Class I, Division 2 Hazardous Location, the unit shall be mounted in a supplemental enclosure that provides a degree of protection not less than IP54. The enclosure must have a door or cover accessible only by the use of a tool. The end user is responsible to ensure that the operating temperature of the module is not exceeded in the end use application.

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-D5016-TRI-011 unit must be connected to SELV or PELV supplies.

All circuits connected to TBE-D5016-TRI-011 unit must comply with the overvoltage category II (or better) according to EN/IEC60664-1.

## Technical Data:

### 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.

**Max allowed current consumption:** 1.5 A (as total supply).

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Protection fuse:** 4 A time lag.

### Fault detection:

The on-board diagnostic monitors both power supplies integrity and the module cumulative fault. Any malfunction is reported by deactivating a solid-state relay and activating the corresponding LEDs.

Alarm is issued if:

- 1) Power supply 1 or 2 < 17 Vdc or
- 2) Power supply 1 or 2 > 33 Vdc or
- 3) Module cumulative fault ON.

Alarm is removed if:

- 1) 20 Vdc < Power supply 1 and 2 < 30 Vdc and
- 2) No module cumulative fault.

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Output rating:** 100 mA 35 V (≤ 1 V voltage drop)

### I/O Card Interface:

**Connection:**

2 x ELCO 8016, 56 poles receptacle connector (require male mating connector).

**Connector Keys:** CON1, Large Key pos.5, Small Key pos.1.

CON2, Large Key pos.5, Small Key pos.1.

**Cable:** system cable 4X00189-5xx.

### HART Mux Interface:

**Connection:** 2 x 34-poles receptacle connector (require female mating connector).

**Cable:** flat cable CABF032.

### Compatibility:

CE mark compliant, conforms to Directive: 2014/34/EU ATEX, 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 limits – 45 to + 80 °C.

### Safety Description:



**ATEX:** II 3G Ex ec IIC T4 Gc; **IECEx:** Ex ec IIC T4 Gc

**UL:** NI / I / 2 / ABCD / T4; **C-UL:** NI / I / 2 / ABCD / T4

**CCC:** Ex ec IIC T4 Gc

### Approvals:

IMQ 19 ATEX 073 X conforms to EN60079-0, EN60079-7.

IECEx IMQ 19.0013X conforms to IEC60079-0, IEC60079-7.

UL & C-UL E222308 conforms to UL 61010-1 and UL 121201 for UL and CAN/CSA

C22.2 No.61010-1-12 and CSA C22.2 No. 213 for C-UL.

CCC n. 2023322308005685 conforms to GB/T 3836.1, GB/T 3834.3.

TUV Certificate No. C-IS-272994-01 SIL 3 conforms to IEC61508:2010 Ed. 2.

SIL 3 Functional Safety TÜV Certificate conforms to IEC61508:2010 Ed.2,

for Management of Functional Safety.

### Mounting:

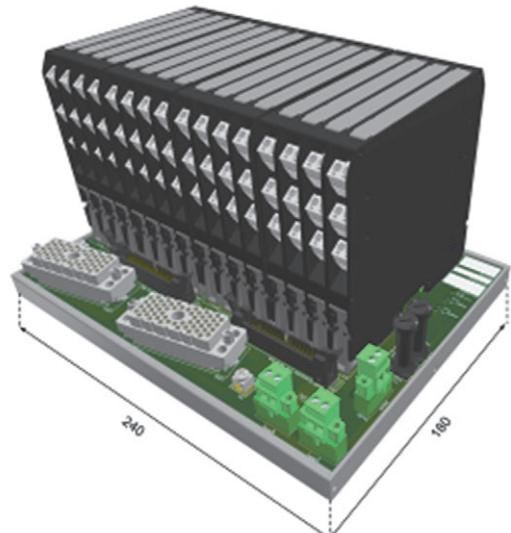
Hardware included for mounting on single DIN rail 35 mm.

**Weight:** about 700 g (excluding modules).

**Location:** installation in Safe Area/Ordinary Location or Zone 2, Group IIC T4, or Class 1, Div. 2, Group A, B, C, D, T4.

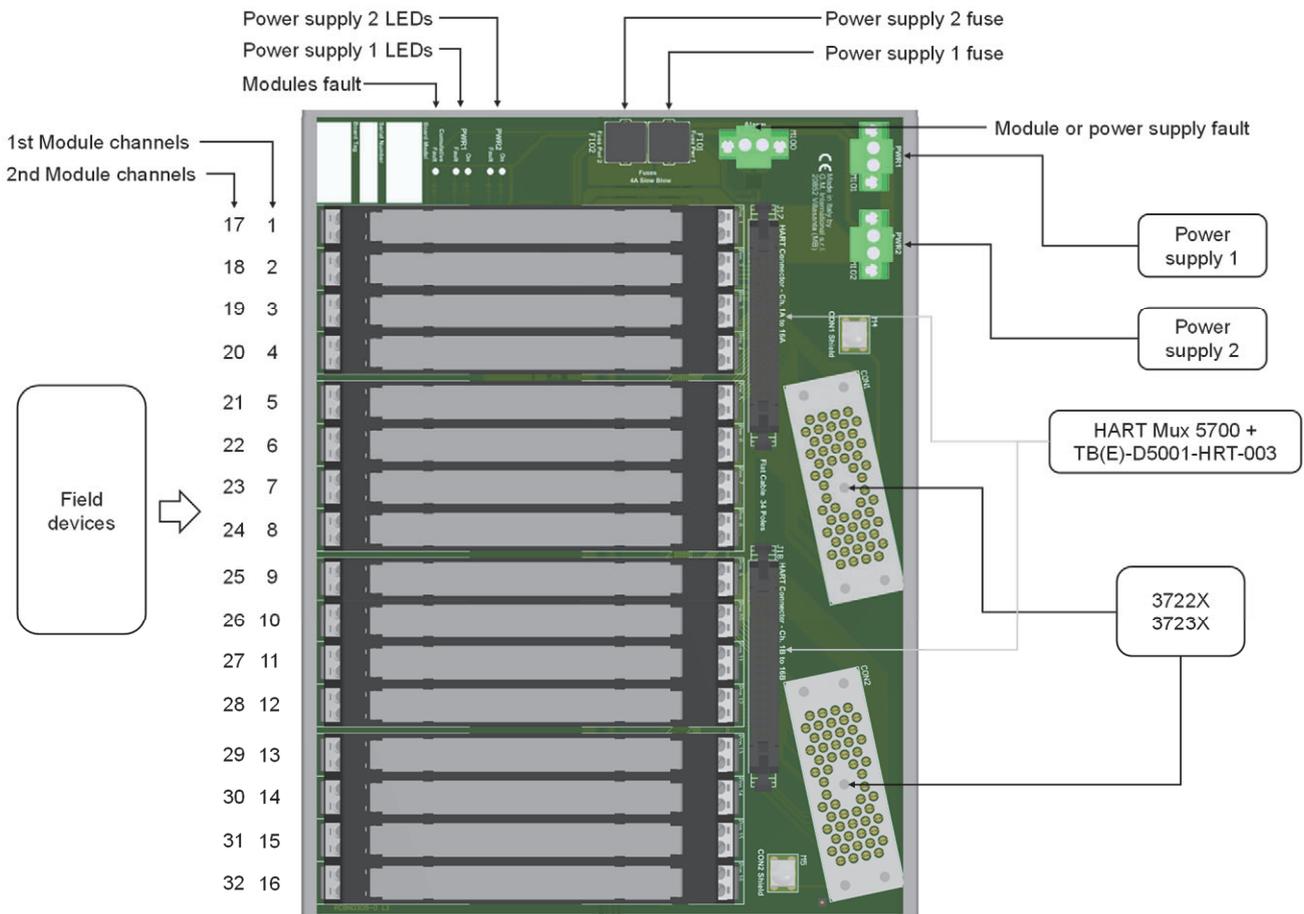
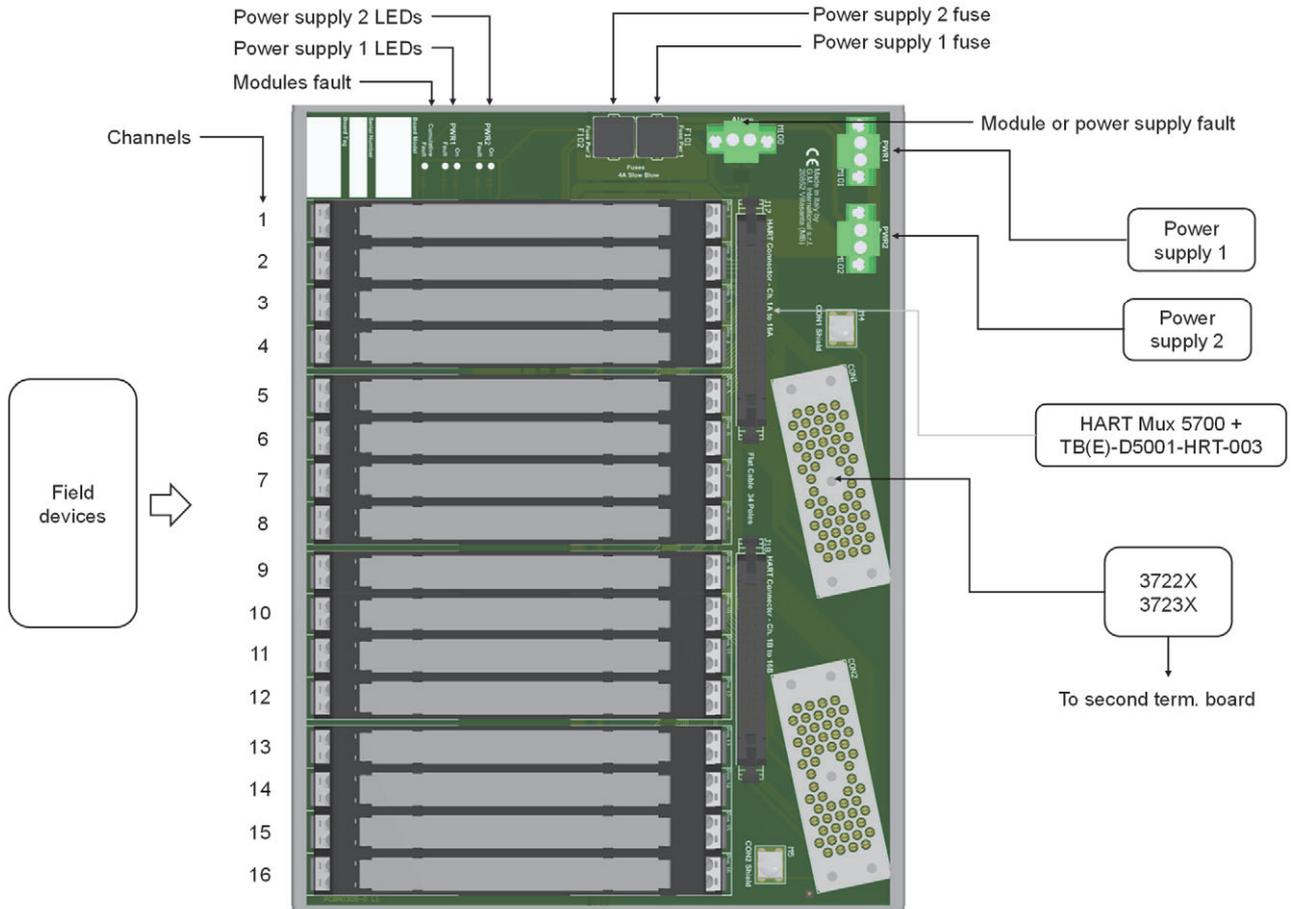
**Dimensions:** Width 240 mm, Depth 180 mm, Height 154 mm.

## Image:



## Termination Board Description

**Note :** Do not mix D5000 Intrinsically Safe barriers with D6000 isolators on same termination board.



**Connections Table to Interface Cards**

<u>SINGLE CHANNEL MODULE POSITION</u>	<u>MODULE CHANNEL NUMBER</u>	<u>INTERFACE CARD(S) CHANNEL NUMBER</u>	<u>MODULE CHANNEL POSITIVE (+) CONNECTION</u>	<u>MODULE CHANNEL NEGATIVE (-) CONNECTION</u>	<u>HART MULTIPLEXING CONNECTOR POSITIVE (+) PIN NUMBER</u>	<u>HART MULTIPLEXING CONNECTOR NEGATIVE (-) PIN NUMBER</u>	<u>NOTES</u>
1 of TBE n.1	1A	1 (ELCO1)	AA (CON1)	GND	1 (J17)	2 (J17)	CON1: • Chassis Ground provided on poles: T, H, w, FF. • Unconnected poles: KK, u, a, DD, k, R, E, A, NN, JJ, y, n, d, V, K, D, s, r, X, Y. • GND is connected to: LL, EE, v, l, b, S, F, B, MM, HH, x, m, c, U, J, C
1 of TBE n.2	1A	17 (ELCO2)	AA (CON1)	GND	1 (J17)	2 (J17)	
2 of TBE n.1	2A	2 (ELCO1)	z (CON1)	GND	3 (J17)	4 (J17)	
2 of TBE n.2	2A	18 (ELCO2)	z (CON1)	GND	3 (J17)	4 (J17)	
3 of TBE n.1	3A	3 (ELCO1)	p (CON1)	GND	5 (J17)	6 (J17)	
3 of TBE n.2	3A	19 (ELCO2)	p (CON1)	GND	5 (J17)	6 (J17)	
4 of TBE n.1	4A	4 (ELCO1)	h (CON1)	GND	7 (J17)	8 (J17)	
4 of TBE n.2	4A	20 (ELCO2)	h (CON1)	GND	7 (J17)	8 (J17)	
5 of TBE n.1	5A	5 (ELCO1)	e (CON1)	GND	9 (J17)	10 (J17)	
5 of TBE n.2	5A	21 (ELCO2)	e (CON1)	GND	9 (J17)	10 (J17)	
6 of TBE n.1	6A	6 (ELCO1)	W (CON1)	GND	11 (J17)	12 (J17)	
6 of TBE n.2	6A	22 (ELCO2)	W (CON1)	GND	11 (J17)	12 (J17)	
7 of TBE n.1	7A	7 (ELCO1)	L (CON1)	GND	13 (J17)	14 (J17)	
7 of TBE n.2	7A	23 (ELCO2)	L (CON1)	GND	13 (J17)	14 (J17)	
8 of TBE n.1	8A	8 (ELCO1)	M (CON1)	GND	15 (J17)	16 (J17)	
8 of TBE n.2	8A	24 (ELCO2)	M (CON1)	GND	15 (J17)	16 (J17)	
9 of TBE n.1	9A	9 (ELCO1)	BB (CON1)	GND	17 (J17)	18 (J17)	
9 of TBE n.2	9A	25 (ELCO2)	BB (CON1)	GND	17 (J17)	18 (J17)	
10 of TBE n.1	10A	10 (ELCO1)	CC (CON1)	GND	19 (J17)	20 (J17)	
10 of TBE n.2	10A	26 (ELCO2)	CC (CON1)	GND	19 (J17)	20 (J17)	
11 of TBE n.1	11A	11 (ELCO1)	t (CON1)	GND	21 (J17)	22 (J17)	
11 of TBE n.2	11A	27 (ELCO2)	t (CON1)	GND	21 (J17)	22 (J17)	
12 of TBE n.1	12A	12 (ELCO1)	j (CON1)	GND	23 (J17)	24 (J17)	
12 of TBE n.2	12A	28 (ELCO2)	j (CON1)	GND	23 (J17)	24 (J17)	
13 of TBE n.1	13A	13 (ELCO1)	f (CON1)	GND	25 (J17)	26 (J17)	
13 of TBE n.2	13A	29 (ELCO2)	f (CON1)	GND	25 (J17)	26 (J17)	
14 of TBE n.1	14A	14 (ELCO1)	Z (CON1)	GND	27 (J17)	28 (J17)	
14 of TBE n.2	14A	30 (ELCO2)	Z (CON1)	GND	27 (J17)	28 (J17)	
15 of TBE n.1	15A	15 (ELCO1)	P (CON1)	GND	29 (J17)	30 (J17)	
15 of TBE n.2	15A	31 (ELCO2)	P (CON1)	GND	29 (J17)	30 (J17)	
16 of TBE n.1	16A	16 (ELCO1)	N (CON1)	GND	31 (J17)	32 (J17)	
16 of TBE n.2	16A	32 (ELCO2)	N (CON1)	GND	31 (J17)	32 (J17)	

**Connections Table to Interface Cards**

<b><u>DOUBLE CHANNEL MODULE POSITION</u></b>	<b>MODULE CHANNEL NUMBER</b>	<b>INTERFACE CARD(S) CHANNEL NUMBER for TBE n.1</b>	<b>MODULE CHANNEL POSITIVE (+) CONNECTION</b>	<b>MODULE CHANNEL NEGATIVE (-) CONNECTION</b>	<b>HART MULTIPLEXING CONNECTOR POSITIVE (+) PIN NUMBER</b>	<b>HART MULTIPLEXING CONNECTOR NEGATIVE (-) PIN NUMBER</b>	<b>NOTES</b>
1	1A	1 (ELCO1)	AA (CON1)	GND	1 (J17)	2 (J17)	CON1, CON2: • Chassis Ground provided on poles: T, H, w, FF. • Unconnected poles: KK, u, a, DD, k, R, E, A, NN, JJ, y, n, d, V, K, D, s, r, X, Y. • GND is connected to: LL, EE, v, l, b, S, F, B, MM, HH, x, m, c, U, J, C
	1B	17 (ELCO2)	AA (CON2)	GND	1 (J18)	2 (J18)	
2	2A	2 (ELCO1)	z (CON1)	GND	3 (J17)	4 (J17)	
	2B	18 (ELCO2)	z (CON2)	GND	3 (J18)	4 (J18)	
3	3A	3 (ELCO1)	p (CON1)	GND	5 (J17)	6 (J17)	
	3B	19 (ELCO2)	p (CON2)	GND	5 (J18)	6 (J18)	
4	4A	4 (ELCO1)	h (CON1)	GND	7 (J17)	8 (J17)	
	4B	20 (ELCO2)	h (CON2)	GND	7 (J18)	8 (J18)	
5	5A	5 (ELCO1)	e (CON1)	GND	9 (J17)	10 (J17)	
	5B	21 (ELCO2)	e (CON2)	GND	9 (J18)	10 (J18)	
6	6A	6 (ELCO1)	W (CON1)	GND	11 (J17)	12 (J17)	
	6B	22 (ELCO2)	W (CON2)	GND	11 (J18)	12 (J18)	
7	7A	7 (ELCO1)	L (CON1)	GND	13 (J17)	14 (J17)	
	7B	23 (ELCO2)	L (CON2)	GND	13 (J18)	14 (J18)	
8	8A	8 (ELCO1)	M (CON1)	GND	15 (J17)	16 (J17)	
	8B	24 (ELCO2)	M (CON2)	GND	15 (J18)	16 (J18)	
9	9A	9 (ELCO1)	BB (CON1)	GND	17 (J17)	18 (J17)	
	9B	25 (ELCO2)	BB (CON2)	GND	17 (J18)	18 (J18)	
10	10A	10 (ELCO1)	CC (CON1)	GND	19 (J17)	20 (J17)	
	10B	26 (ELCO2)	CC (CON2)	GND	19 (J18)	20 (J18)	
11	11A	11 (ELCO1)	t (CON1)	GND	21 (J17)	22 (J17)	
	11B	27 (ELCO2)	t (CON2)	GND	21 (J18)	22 (J18)	
12	12A	12 (ELCO1)	j (CON1)	GND	23 (J17)	24 (J17)	
	12B	28 (ELCO2)	j (CON2)	GND	23 (J18)	24 (J18)	
13	13A	13 (ELCO1)	f (CON1)	GND	25 (J17)	26 (J17)	
	13B	29 (ELCO2)	f (CON2)	GND	25 (J18)	26 (J18)	
14	14A	14 (ELCO1)	Z (CON1)	GND	27 (J17)	28 (J17)	
	14B	30 (ELCO2)	Z (CON2)	GND	27 (J18)	28 (J18)	
15	15A	15 (ELCO1)	P (CON1)	GND	29 (J17)	30 (J17)	
	15B	31 (ELCO2)	P (CON2)	GND	29 (J18)	30 (J18)	
16	16A	16 (ELCO1)	N (CON1)	GND	31 (J17)	32 (J17)	
	16B	32 (ELCO2)	N (CON2)	GND	31 (J18)	32 (J18)	

## Characteristics:

### General description:

This Termination Board with Enclosure (TBE) provides direct connection between the I/O Card of the system and D5000 / D6000 Series modules. The Intrinsically Safe protection and signal isolation between Safe and Hazardous Area, is provided by D5000 Series Associated Apparatus. The 24 Vdc Power Supply of the TBE is connected to two plug-in terminal blocks, for a redundant power supply. The power supply for modules is given by TBE power bus.

### Termination Board general characteristics:

Number of positions	Features
16	Power Supply voltage redundancy; Abnormal supply voltage signaling; Cumulative module fault signaling.

### Supported Tricon CX I/O Cards and D5000 / D6000 Series modules:

Refer to DTS0499 and DTS0894.

### Functional Safety Management Certification:

G.M. International is certified by TUV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL3.



### Functional Safety Applications:

Refer to Safety Manual ISM0472.

## Installation:

TBE-D5016-TRI-012 is a Termination Board supported by an aluminum shell suitable for installation on EN/IEC60715 TH 35 DIN-Rail.

TBE-D5016-TRI-012 unit can be mounted with any orientation over the entire ambient temperature range.

Electrical connections are the following:

- ALARM, PWR1, PWR 2: polarized plug-in removable screw terminal blocks for conductors up to 2.5 mm<sup>2</sup> (13 AWG) with a torque of 0.5-0.6 Nm.
- CON1 SHIELD: screw terminal block for conductors up to 2 mm<sup>2</sup> (14 AWG) fully tight.
- CON1: ELCO 8016, 56 poles connector with screws retaining method.
- CON2 SHIELD: screw terminal block for conductors up to 2 mm<sup>2</sup> (14 AWG) fully tight.
- CON2: ELCO 8016, 56 poles connector with screws retaining method.

Electrical connection can be plugged in/out into a powered unit without suffering or causing any damage (**for Zone 2 installations check the area to be nonhazardous before servicing**). Connect only one individual conductor per each clamping point. For USA and Canada installations, 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 (e.g. EN/IEC60079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines)), 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. When installed in EU Zone 2, the unit shall be mounted in a certified Ex enclosure that provides a minimum ingress protection of IP54 in accordance with EN/IEC60079-0. When installed in a Class I, Division 2 Hazardous Location, the unit shall be mounted in a supplemental enclosure that provides a degree of protection not less than IP54. The enclosure must have a door or cover accessible only by the use of a tool. The end user is responsible to ensure that the operating temperature of the module is not exceeded in the end use application.

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-D5016-TRI-012 unit must be connected to SELV or PELV supplies.

All circuits connected to TBE-D5016-TRI-012 unit must comply with the overvoltage category II (or better) according to EN/IEC60664-1.

## Technical Data:

### 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.

**Max allowed current consumption:** 1.5 A (as total supply).

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Protection fuse:** 4 A time lag.

### Fault detection:

The on-board diagnostic monitors both power supplies integrity and the module cumulative fault. Any malfunction is reported by deactivating a solid-state relay and activating the corresponding LEDs.

Alarm is issued if:

- 1) Power supply 1 or 2 < 17 Vdc or
- 2) Power supply 1 or 2 > 33 Vdc or
- 3) Module cumulative fault ON.

Alarm is removed if:

- 1) 20 Vdc < Power supply 1 and 2 < 30 Vdc and
- 2) No module cumulative fault.

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Output rating:** 100 mA 35 V (≤ 1 V voltage drop)

### I/O Card Interface:

#### Connection:

2 x ELCO 8016, 56 poles receptacle connector (require male mating connector).

**Connector Keys:** CON1, Large Key pos.3, Small Key pos.1.

CON2, Large Key pos.3, Small Key pos.1.

**Cable:** system cable 4X00226-3xx.

### Compatibility:

CE mark compliant, conforms to Directive:

2014/34/EU ATEX, 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 limits – 45 to + 80 °C.

### Safety Description:



**ATEX:** II 3G Ex ec IIC T4 Gc; **IECEx:** Ex ec IIC T4 Gc

**UL:** NI / I / 2 / ABCD / T4; **C-UL:** NI / I / 2 / ABCD / T4

**CCC:** Ex ec IIC T4 Gc

### Approvals:

IMQ 19 ATEX 073 X conforms to EN60079-0, EN60079-7.

IECEx IMQ 19.0013X conforms to IEC60079-0, IEC60079-7.

UL & C-UL E222308 conforms to UL 61010-1 and UL 121201 for UL and CAN/CSA

C22.2 No.61010-1-12 and CSA C22.2 No. 213 for C-UL.

CCC n. 2023322308005685 conforms to GB/T 3836.1, GB/T 3834.3.

TUV Certificate No. C-IS-272994-01 SIL 3 conforms to IEC61508:2010 Ed. 2.

SIL 3 Functional Safety TUV Certificate conforms to IEC61508:2010 Ed.2,

for Management of Functional Safety.

### Mounting:

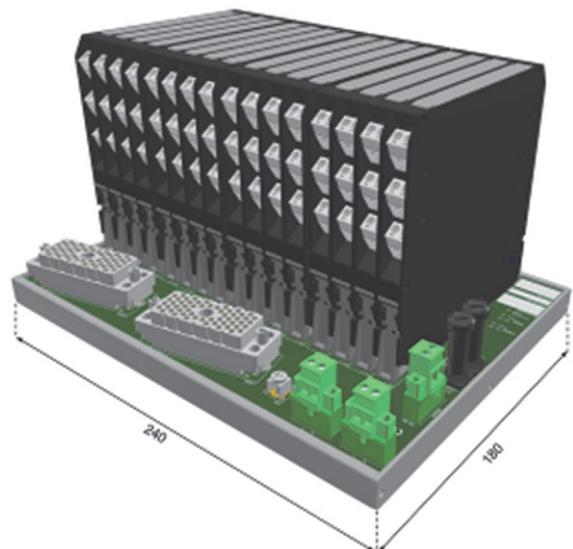
Hardware included for mounting on single DIN rail 35 mm.

**Weight:** about 700 g (excluding modules).

**Location:** installation in Safe Area/Ordinary Location or Zone 2, Group IIC T4, or Class 1, Div. 2, Group A, B, C, D, T4.

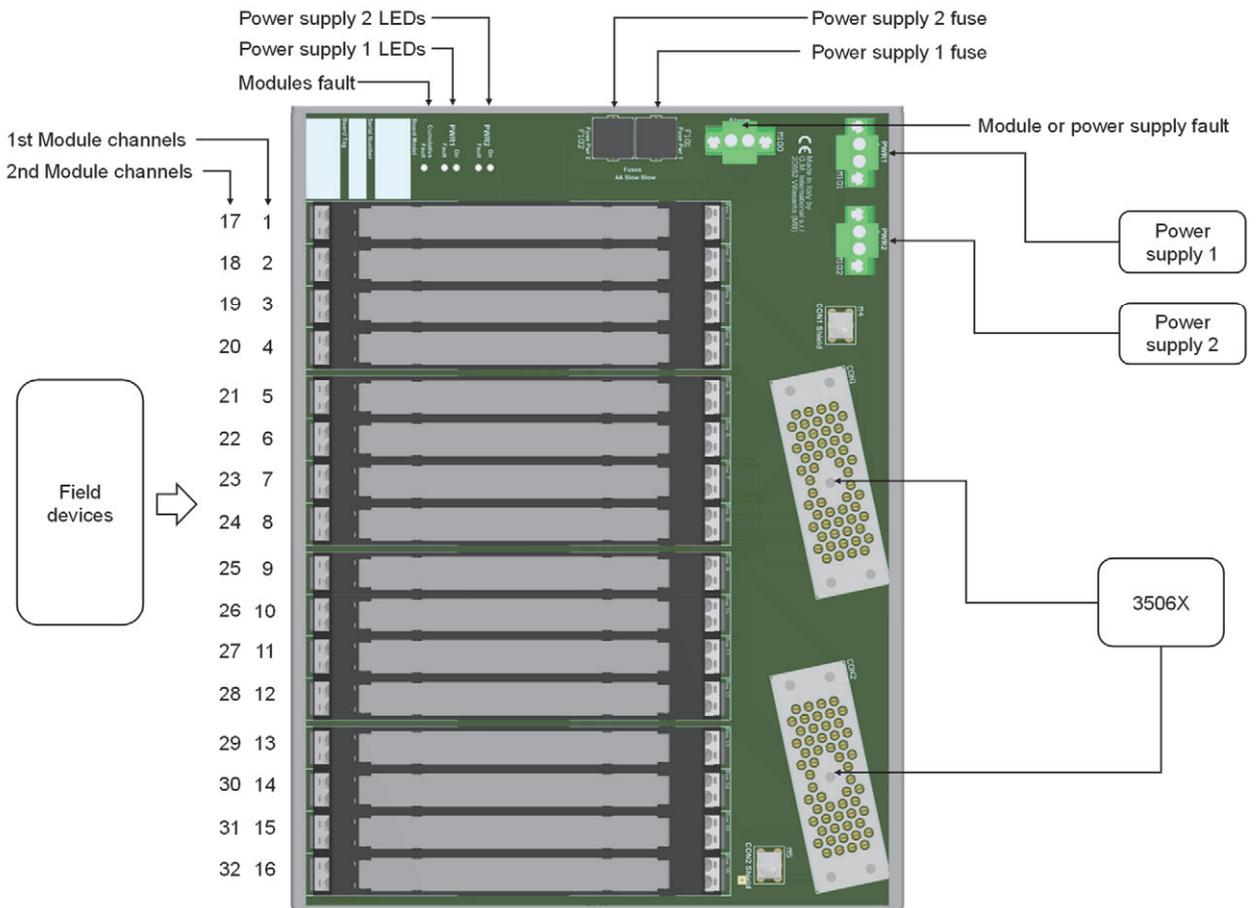
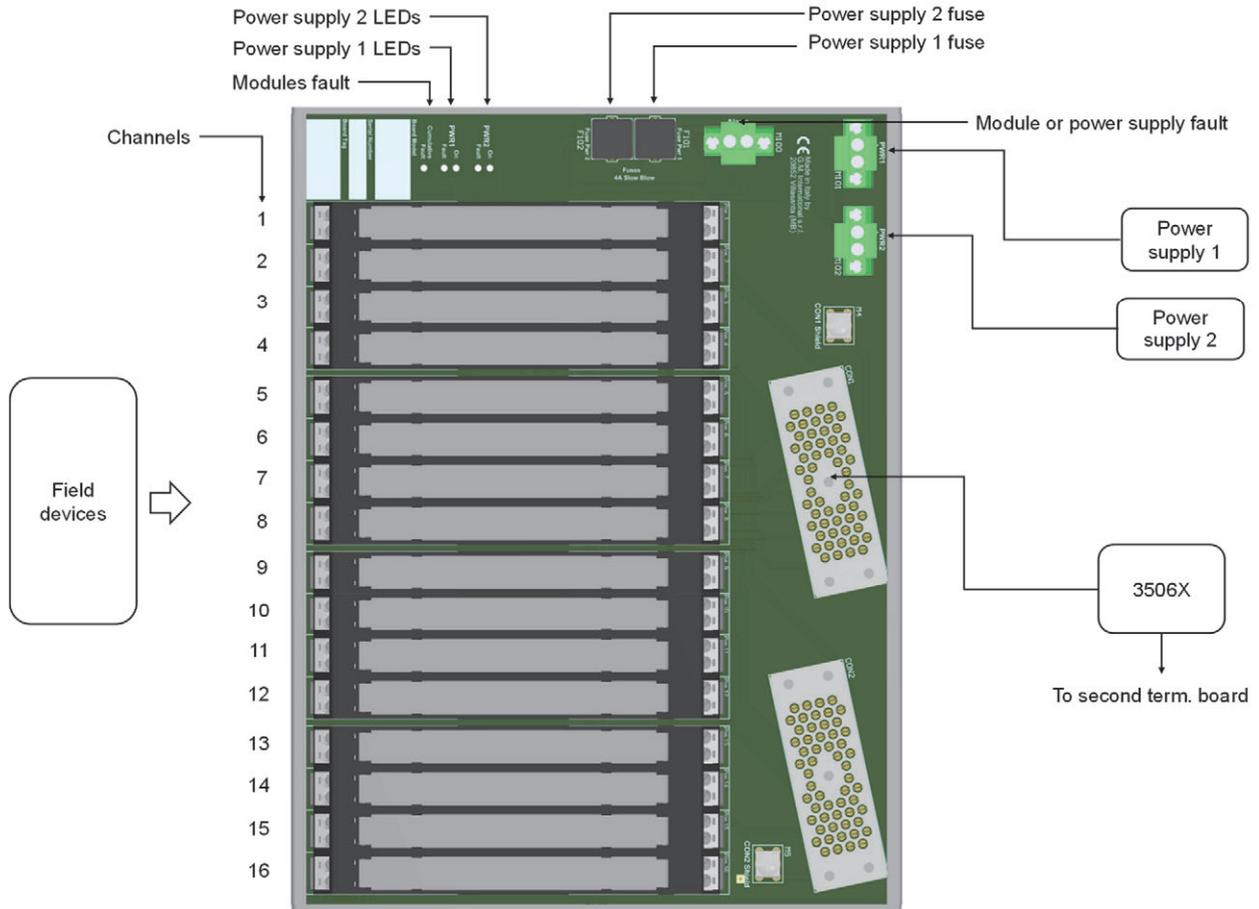
**Dimensions:** Width 240 mm, Depth 180 mm, Height 154 mm.

## Image:



## Termination Board Description

**Note :** Do not mix D5000 Intrinsically Safe barriers with D6000 isolators on same termination board.



Connections Table to Interface Cards

SINGLE CHANNEL MODULE POSITION	MODULE CHANNEL NUMBER	INTERFACE CARD(S) CHANNEL NUMBER	MODULE CHANNEL POSITIVE (+) CONNECTION	MODULE CHANNEL NEGATIVE (-) CONNECTION	NOTES
1 of TBE n.1	1A	1 (ELCO1)	+24 Vdc	AA (CON1)	<p>CON1:</p> <ul style="list-style-type: none"> <li>Chassis Ground provided on poles: T, H, w, FF.</li> <li>Ground available on poles: LL, EE, v, l, b, S, F, B, MM, HH, x, m, c, U, J, C</li> <li>Unconnected poles: KK, u, a, DD, k, R, E, A, NN, JJ, y, n, d, V, K, D, s, r, X, Y.</li> </ul> <p>CON2 is not used.</p>
1 of TBE n.2	1A	17 (ELCO2)	+24 Vdc	AA (CON1)	
2 of TBE n.1	2A	2 (ELCO1)	+24 Vdc	z (CON1)	
2 of TBE n.2	2A	18 (ELCO2)	+24 Vdc	z (CON1)	
3 of TBE n.1	3A	3 (ELCO1)	+24 Vdc	p (CON1)	
3 of TBE n.2	3A	19 (ELCO2)	+24 Vdc	p (CON1)	
4 of TBE n.1	4A	4 (ELCO1)	+24 Vdc	h (CON1)	
4 of TBE n.2	4A	20 (ELCO2)	+24 Vdc	h (CON1)	
5 of TBE n.1	5A	5 (ELCO1)	+24 Vdc	e (CON1)	
5 of TBE n.2	5A	21 (ELCO2)	+24 Vdc	e (CON1)	
6 of TBE n.1	6A	6 (ELCO1)	+24 Vdc	W (CON1)	
6 of TBE n.2	6A	22 (ELCO2)	+24 Vdc	W (CON1)	
7 of TBE n.1	7A	7 (ELCO1)	+24 Vdc	L (CON1)	
7 of TBE n.2	7A	23 (ELCO2)	+24 Vdc	L (CON1)	
8 of TBE n.1	8A	8 (ELCO1)	+24 Vdc	M (CON1)	
8 of TBE n.2	8A	24 (ELCO2)	+24 Vdc	M (CON1)	
9 of TBE n.1	9A	9 (ELCO1)	+24 Vdc	BB (CON1)	
9 of TBE n.2	9A	25 (ELCO2)	+24 Vdc	BB (CON1)	
10 of TBE n.1	10A	10 (ELCO1)	+24 Vdc	CC (CON1)	
10 of TBE n.2	10A	26 (ELCO2)	+24 Vdc	CC (CON1)	
11 of TBE n.1	11A	11 (ELCO1)	+24 Vdc	t (CON1)	
11 of TBE n.2	11A	27 (ELCO2)	+24 Vdc	t (CON1)	
12 of TBE n.1	12A	12 (ELCO1)	+24 Vdc	j (CON1)	
12 of TBE n.2	12A	28 (ELCO2)	+24 Vdc	j (CON1)	
13 of TBE n.1	13A	13 (ELCO1)	+24 Vdc	f (CON1)	
13 of TBE n.2	13A	29 (ELCO2)	+24 Vdc	f (CON1)	
14 of TBE n.1	14A	14 (ELCO1)	+24 Vdc	Z (CON1)	
14 of TBE n.2	14A	30 (ELCO2)	+24 Vdc	Z (CON1)	
15 of TBE n.1	15A	15 (ELCO1)	+24 Vdc	P (CON1)	
15 of TBE n.2	15A	31 (ELCO2)	+24 Vdc	P (CON1)	
16 of TBE n.1	16A	16 (ELCO1)	+24 Vdc	N (CON1)	
16 of TBE n.2	16A	32 (ELCO2)	+24 Vdc	N (CON1)	

Connections Table to Interface Cards

<b>DOUBLE CHANNEL MODULE POSITION</b>	<b>MODULE CHANNEL NUMBER</b>	<b>INTERFACE CARD(S) CHANNEL NUMBER for TBE n.1</b>	<b>MODULE CHANNEL POSITIVE (+) CONNECTION</b>	<b>MODULE CHANNEL NEGATIVE (-) CONNECTION</b>	<b>NOTES</b>
1	1A	1 (ELCO1)	+24 Vdc	AA (CON1)	CON1, CON2: • Chassis Ground provided on poles: T, H, w, FF. • Ground available on poles: LL, EE, v, l, b, S, F, B, MM, HH, x, m, c, U, J, C • Unconnected poles: KK, u, a, DD, k, R, E, A, NN, JJ, y, n, d, V, K, D, s, r, X, Y.
	1B	17 (ELCO2)	+24 Vdc	AA (CON2)	
2	2A	2 (ELCO1)	+24 Vdc	z (CON1)	
	2B	18 (ELCO2)	+24 Vdc	z (CON2)	
3	3A	3 (ELCO1)	+24 Vdc	p (CON1)	
	3B	19 (ELCO2)	+24 Vdc	p (CON2)	
4	4A	4 (ELCO1)	+24 Vdc	h (CON1)	
	4B	20 (ELCO2)	+24 Vdc	h (CON2)	
5	5A	5 (ELCO1)	+24 Vdc	e (CON1)	
	5B	21 (ELCO2)	+24 Vdc	e (CON2)	
6	6A	6 (ELCO1)	+24 Vdc	W (CON1)	
	6B	22 (ELCO2)	+24 Vdc	W (CON2)	
7	7A	7 (ELCO1)	+24 Vdc	L (CON1)	
	7B	23 (ELCO2)	+24 Vdc	L (CON2)	
8	8A	8 (ELCO1)	+24 Vdc	M (CON1)	
	8B	24 (ELCO2)	+24 Vdc	M (CON2)	
9	9A	9 (ELCO1)	+24 Vdc	BB (CON1)	
	9B	25 (ELCO2)	+24 Vdc	BB (CON2)	
10	10A	10 (ELCO1)	+24 Vdc	CC (CON1)	
	10B	26 (ELCO2)	+24 Vdc	CC (CON2)	
11	11A	11 (ELCO1)	+24 Vdc	t (CON1)	
	11B	27 (ELCO2)	+24 Vdc	t (CON2)	
12	12A	12 (ELCO1)	+24 Vdc	j (CON1)	
	12B	28 (ELCO2)	+24 Vdc	j (CON2)	
13	13A	13 (ELCO1)	+24 Vdc	f (CON1)	
	13B	29 (ELCO2)	+24 Vdc	f (CON2)	
14	14A	14 (ELCO1)	+24 Vdc	Z (CON1)	
	14B	30 (ELCO2)	+24 Vdc	Z (CON2)	
15	15A	15 (ELCO1)	+24 Vdc	P (CON1)	
	15B	31 (ELCO2)	+24 Vdc	P (CON2)	
16	16A	16 (ELCO1)	+24 Vdc	N (CON1)	
	16B	32 (ELCO2)	+24 Vdc	N (CON2)	

## Characteristics:

### General description:

This Termination Board with Enclosure (TBE) provides direct connection between the I/O Card of the system and D5000 / D6000 Series modules. The Intrinsically Safe protection and signal isolation between Safe and Hazardous Area, is provided by D5000 Series Associated Apparatus. The 24 Vdc Power Supply of the TBE is connected to two plug-in terminal blocks, for a redundant power supply. The power supply for modules is given by TBE power bus.

### Termination Board general characteristics:

Number of positions	Features
8	Power Supply voltage redundancy; Abnormal supply voltage signaling; Cumulative module fault signaling; HART Multiplexing.

### Supported Tricon I/O Cards and D5000 / D6000 Series modules:

Refer to DTS0499 and DTS0892.

### Functional Safety Management Certification:

G.M. International is certified by TUV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL3.



### Functional Safety Applications:

Refer to Safety Manual ISM0472.

## Installation:

TBE-D5008-TRI-001 is a Termination Board supported by an aluminum shell suitable for installation on EN/IEC60715 TH 35 DIN-Rail.

TBE-D5008-TRI-001 unit can be mounted with any orientation over the entire ambient temperature range.

Electrical connections are the following:

- ALARM, PWR1, PWR 2: polarized plug-in removable screw terminal blocks for conductors up to 2.5 mm<sup>2</sup> (13 AWG) with a torque of 0.5-0.6 Nm.
- CON1 SHIELD: screw terminal block for conductors up to 2 mm<sup>2</sup> (14 AWG) fully tight.
- CON1: ELCO 8016, 56 poles connector with screws retaining method.
- J9 HART: 1 x 34 poles male connector.

Electrical connection can be plugged in/out into a powered unit without suffering or causing any damage (for Zone 2 installations check the area to be nonhazardous before servicing). Connect only one individual conductor per each clamping point. For USA and Canada installations, 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 (e.g. EN/IEC60079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines)), 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. When installed in EU Zone 2, the unit shall be mounted in a certified Ex enclosure that provides a minimum ingress protection of IP54 in accordance with EN/IEC60079-0. When installed in a Class I, Division 2 Hazardous Location, the unit shall be mounted in a supplemental enclosure that provides a degree of protection not less than IP54. The enclosure must have a door or cover accessible only by the use of a tool. The end user is responsible to ensure that the operating temperature of the module is not exceeded in the end use application.

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-D5008-TRI-001 unit must be connected to SELV or PELV supplies.

All circuits connected to TBE-D5008-TRI-001 unit must comply with the overvoltage category II (or better) according to EN/IEC60664-1.

## Technical Data:

### 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.

**Max allowed current consumption:** 1 A (as total supply).

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Protection fuse:** 4 A time lag.

### Fault detection:

The on-board diagnostic monitors both power supplies integrity and the module cumulative fault. Any malfunction is reported by deactivating a solid-state relay and activating the corresponding LEDs.

Alarm is issued if:

- 1) Power supply 1 or 2 < 17 Vdc or
- 2) Power supply 1 or 2 > 33 Vdc or
- 3) Module cumulative fault ON.

Alarm is removed if:

- 1) 20 Vdc < Power supply 1 and 2 < 30 Vdc and
- 2) No module cumulative fault.

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Output rating:** 100 mA 35 V (≤ 1 V voltage drop)

### I/O Card Interface:

#### Connection:

1 x ELCO 8016, 56 poles receptacle connector (require male mating connector).

**Connector Keys:** CON1, Large Key pos.5, Small Key pos.3.

**Cable:** system cable 4000190-5xx.

### HART Mux Interface:

**Connection:** 1 x 34-poles receptacle connector (require female mating connector).

**Cable:** flat cable CABF032.

### Compatibility:

**CE** CE mark compliant, conforms to Directive: 2014/34/EU ATEX, 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 limits – 45 to + 80 °C.

### Safety Description:



**ATEX:** II 3G Ex ec IIC T4 Gc; **IECEx:** Ex ec IIC T4 Gc

**UL:** NI / I / 2 / ABCD / T4; **C-UL:** NI / I / 2 / ABCD / T4

**CCC:** Ex ec IIC T4 Gc

### Approvals:

IMQ 19 ATEX 073 X conforms to EN60079-0, EN60079-7.

IECEx IMQ 19.0013X conforms to IEC60079-0, IEC60079-7.

UL & C-UL E222308 conforms to UL 61010-1 and UL 121201 for UL and CAN/CSA

C22.2 No.61010-1-12 and CSA C22.2 No. 213 for C-UL.

CCC n. 2023322308005685 conforms to GB/T 3836.1, GB/T 3834.3.

TUV Certificate No. C-IS-272994-01 SIL 3 conforms to IEC61508:2010 Ed. 2.

SIL 3 Functional Safety TUV Certificate conforms to IEC61508:2010 Ed.2,

for Management of Functional Safety.

### Mounting:

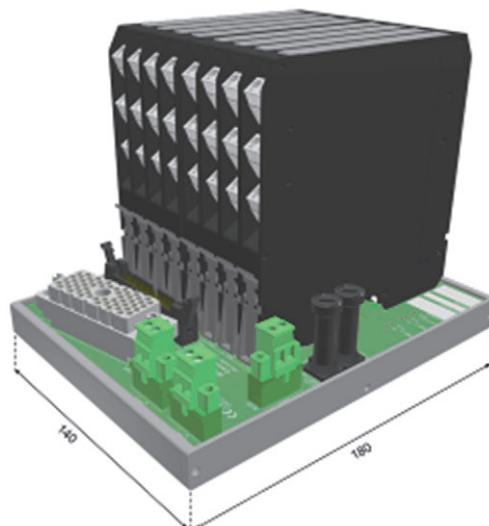
Hardware included for mounting on single DIN rail 35 mm.

**Weight:** about 350 g (excluding modules).

**Location:** installation in Safe Area/Ordinary Location or Zone 2, Group IIC T4, or Class 1, Div. 2, Group A, B, C, D, T4.

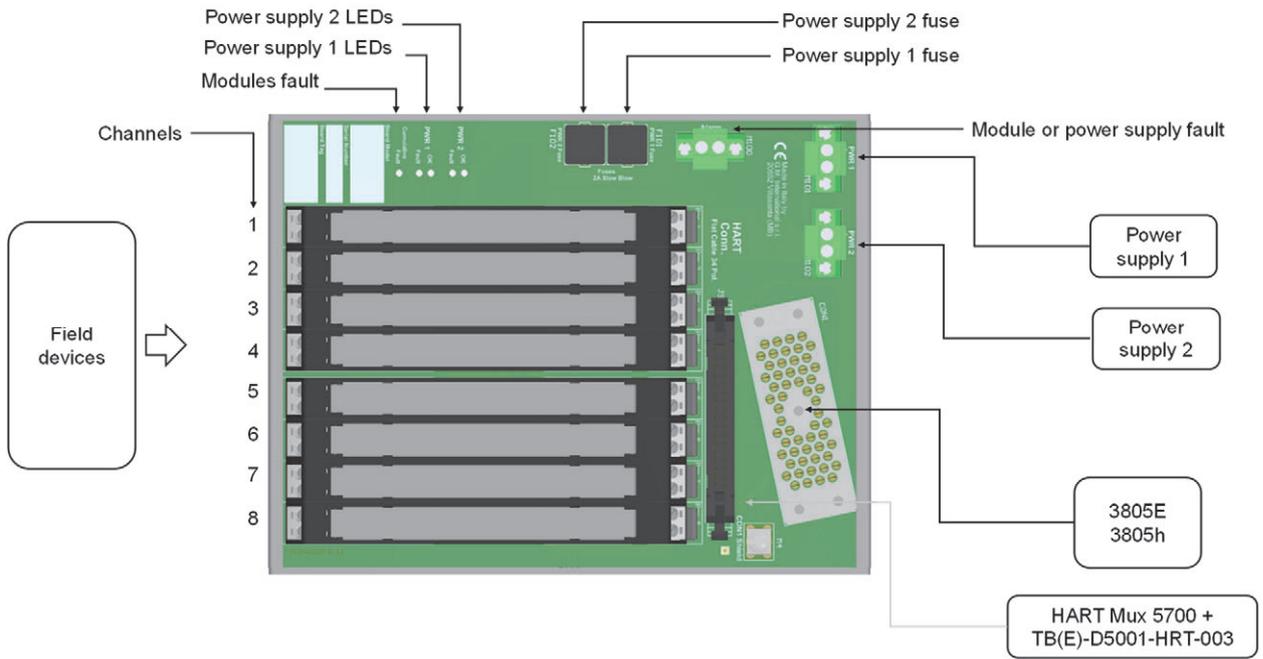
**Dimensions:** Width 140 mm, Depth 180 mm, Height 154 mm.

## Image:



# Termination Board Description

**Note :** Do not mix D5000 Intrinsically Safe barriers with D6000 isolators on same termination board.



**Connections Table to Interface Cards**

MODULE POSITION	MODULE CHANNEL NUMBER	INTERFACE CARD(S) CHANNEL NUMBER	MODULE CHANNEL POSITIVE (+) CONNECTION (CON1)	MODULE CHANNEL NEGATIVE (-) CONNECTION (CON1)	HART MULTIPLEXING CONNECTOR POSITIVE (+) PIN NUMBER (J9)	HART MULTIPLEXING CONNECTOR POSITIVE (-) PIN NUMBER (J9)	NOTES
1	1A	1	AA	LL	1	2	CON1: • Chassis Ground provided on poles: T, H, w, FF. • Ground available on poles: x, m. • +24 Vdc available on poles: t, j. • Unconnected poles: KK, u, a, DD, k, R, BB, MM, CC, HH, f, c, Z, U, P, J, N, C, E, A, NN, JJ, y, n, d, V, K, D, s, r, X, Y.
2	2A	2	z	EE	3	4	
3	3A	3	p	v	5	6	
4	4A	4	h	l	7	8	
5	5A	5	e	b	9	10	
6	6A	6	W	S	11	12	
7	7A	7	L	F	13	14	
8	8A	8	M	B	15	16	