

## Characteristics:

### General description:

This Termination Board (TB) 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:

Termination Board Model	Number of positions	Features
TB-D5016-INV-002	16	1) Power Supply voltage redundancy; 2) Abnormal supply voltage signaling; 3) Cumulative module fault signaling.

### Supported Invensys FBM200 I/O Cards:

I/O Card Model	I/O Card Type	Number of channels per I/O Card	Number of I/O Cards per board	Number of channels per board	Supported GM Modules*
FBM217	Digital In	32	1	32	D5031D, D5032D, D5037D, D5093D, D6031D

\* Do not mix D5000 Intrinsically Safe barriers with D5000 Relay modules or D6000 Isolators on same termination board.

## Features:

- DI card type FBM217, 32 channels Digital Input board interface.
- 16 positions Terminal Board for up to 32 channels.
- Lower cables installation and maintenance costs.
- Power supplies fault monitoring.
- Spare fuse provided.
- Mounting hardware provided for:
  - Wall mounting, M4 thread screw;
  - Wall mounting, M4 self tapping screw;
  - Single Din Rail mounting kit.

## Ordering Information:

Model: TB-D5016-INV-002

## 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.

**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:** 4 A time lag (spare fuse provided on Termination Board).

### Fault detection:

**1) Preventive - abnormal supply voltage:** supply 1 or supply 2 is < 18 Vdc (Under Voltage, UV) or > 30 Vdc (Over Voltage, OV).

**2) Critical - abnormal supply voltages or cumulative fault:** both supplies are in under (< 18 Vdc) or over (> 30 Vdc) voltage condition OR cumulative fault indication (about presence of short or open field circuit for any DO channel).

**LED fault signaling (for both case 1 and 2):** 2 red LEDs (UV and OV of supply 1); 2 red LEDs (UV and OV of supply 2); a cumulative fault red LED.

**Relay fault signaling (one for each case 1 or 2):** a voltage free NE SPDT - 1 Form C relay contacts (de-energized in fault condition), with the following characteristics:

**Contact material:** AgCdO.

**Contact rating:** 2 A 36 Vac 72 VA, 2 A 48 Vdc 80 W (resistive load).

**Mechanical / Electrical life:** 30 \* 10<sup>6</sup> / 1 \* 10<sup>5</sup> operation, typical.

**Coil status LED indication:** yellow color, turn on when coil is energized.

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

### FBM200 I/O card interface:

**Connection:** SUB D 37 poles male connector (requires female mating connector).

### Environmental conditions:

**Operating:** temperature limits – 40 to + 70 °C, relative humidity max 90 % non condensing, up to 35 °C.

**Storage:** temperature limits – 45 to + 80 °C.

### Mounting:

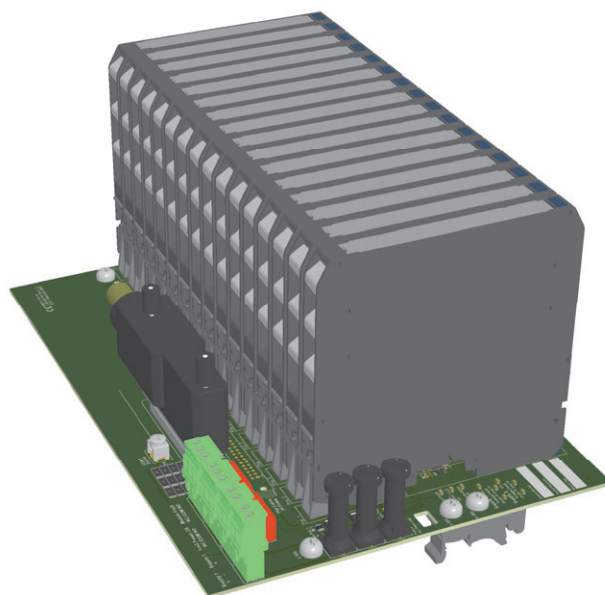
Hardware included for mounting on wall and single DIN rail.

**Weight:** about 400 g (excluding modules and mounting options).

**Location:** Safe Area / Ordinary locations.

**Dimensions:** Width 267 mm, Depth 176 mm, Height 125 mm.

## Image:



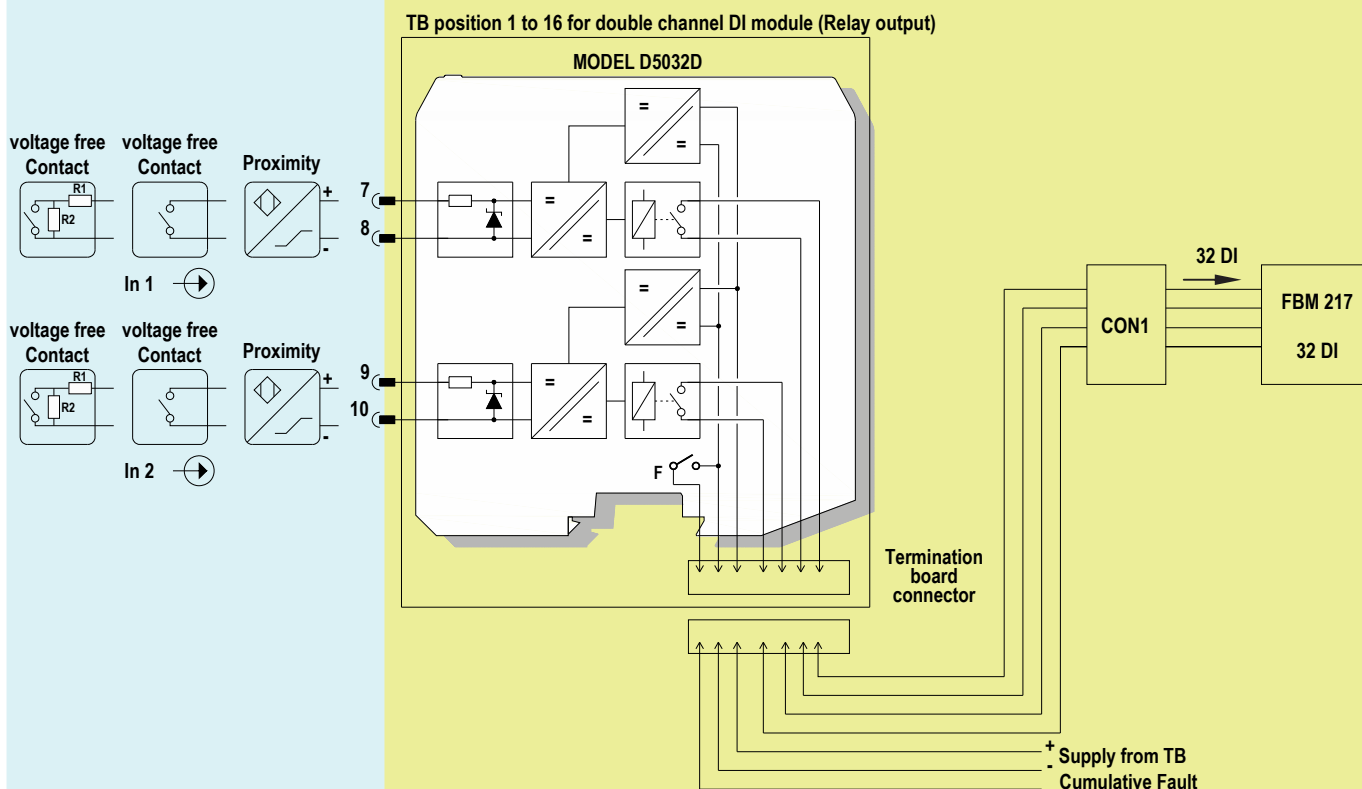
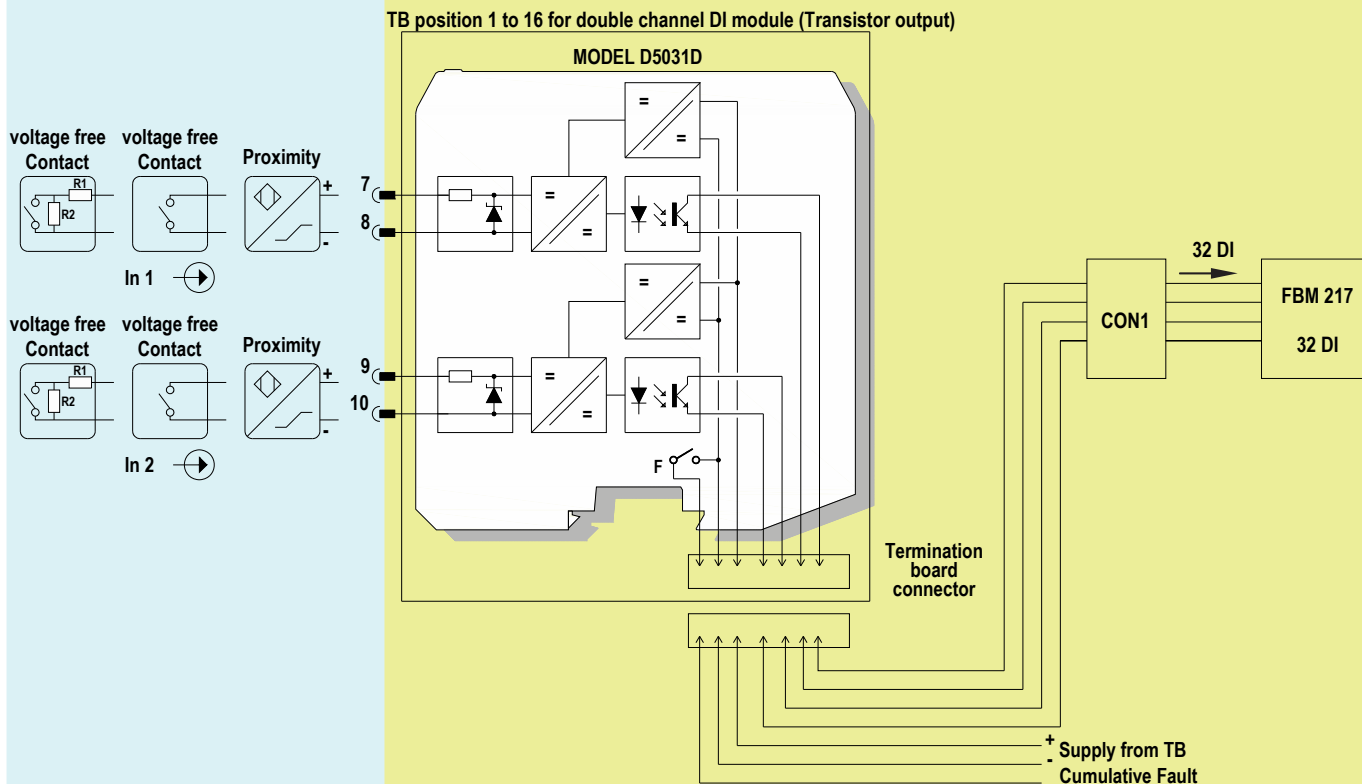
# Loop Diagrams for FBM217 (32 DI) Interface Card:

HAZARDOUS AREA

SAFE AREA

## Note:

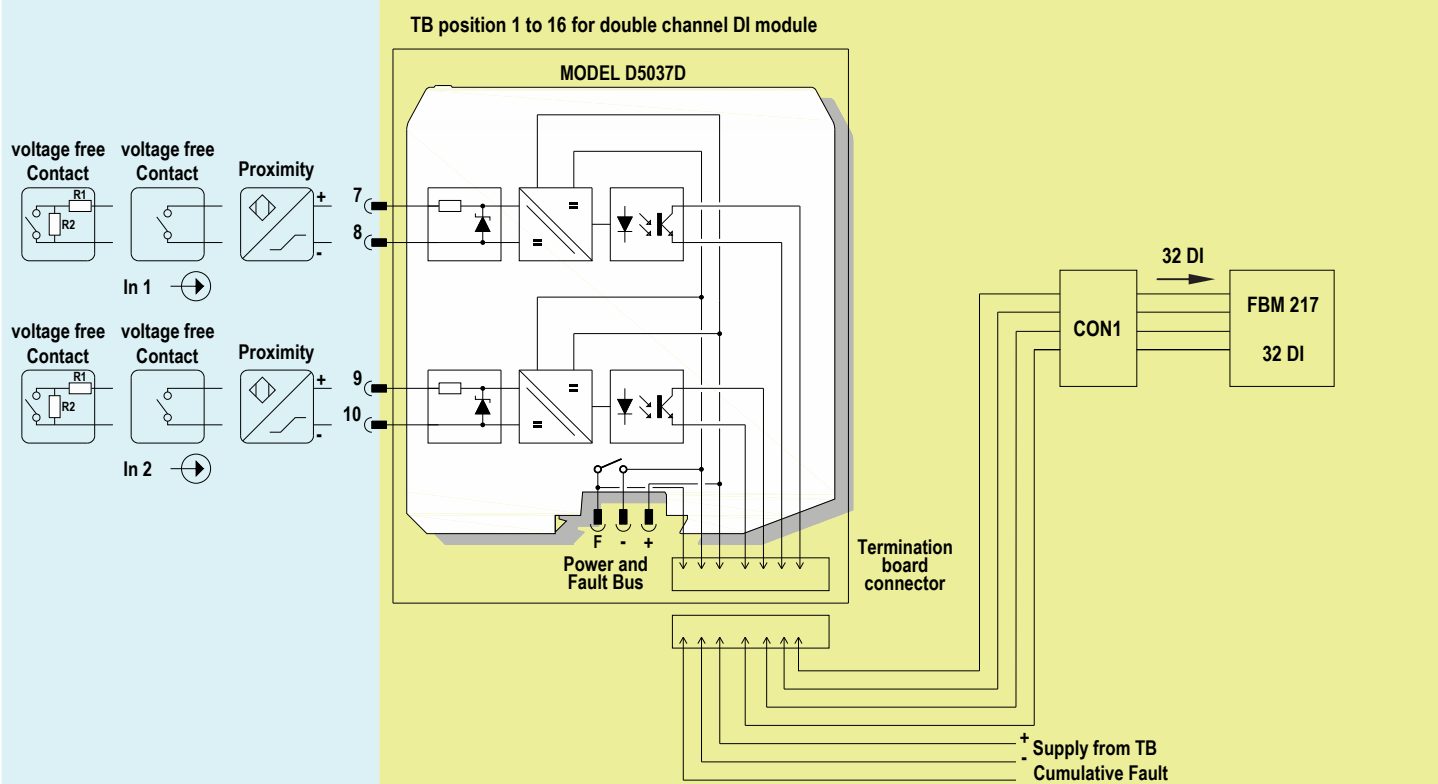
The D6000 isolators have the same function diagrams as the corresponding D5000 barriers, but they cannot be connected to the Hazardous Area



### Loop Diagrams for FBM217 (32 DI) Interface Card:

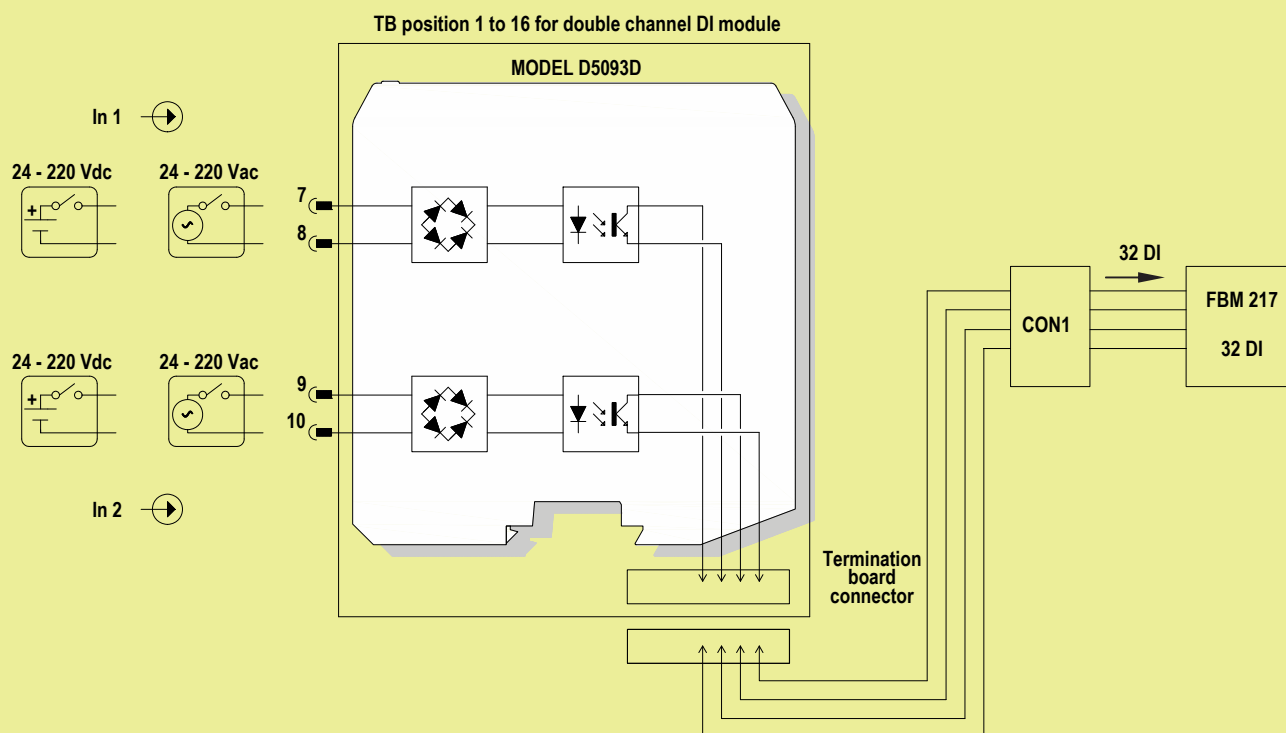
HAZARDOUS AREA

SAFE AREA



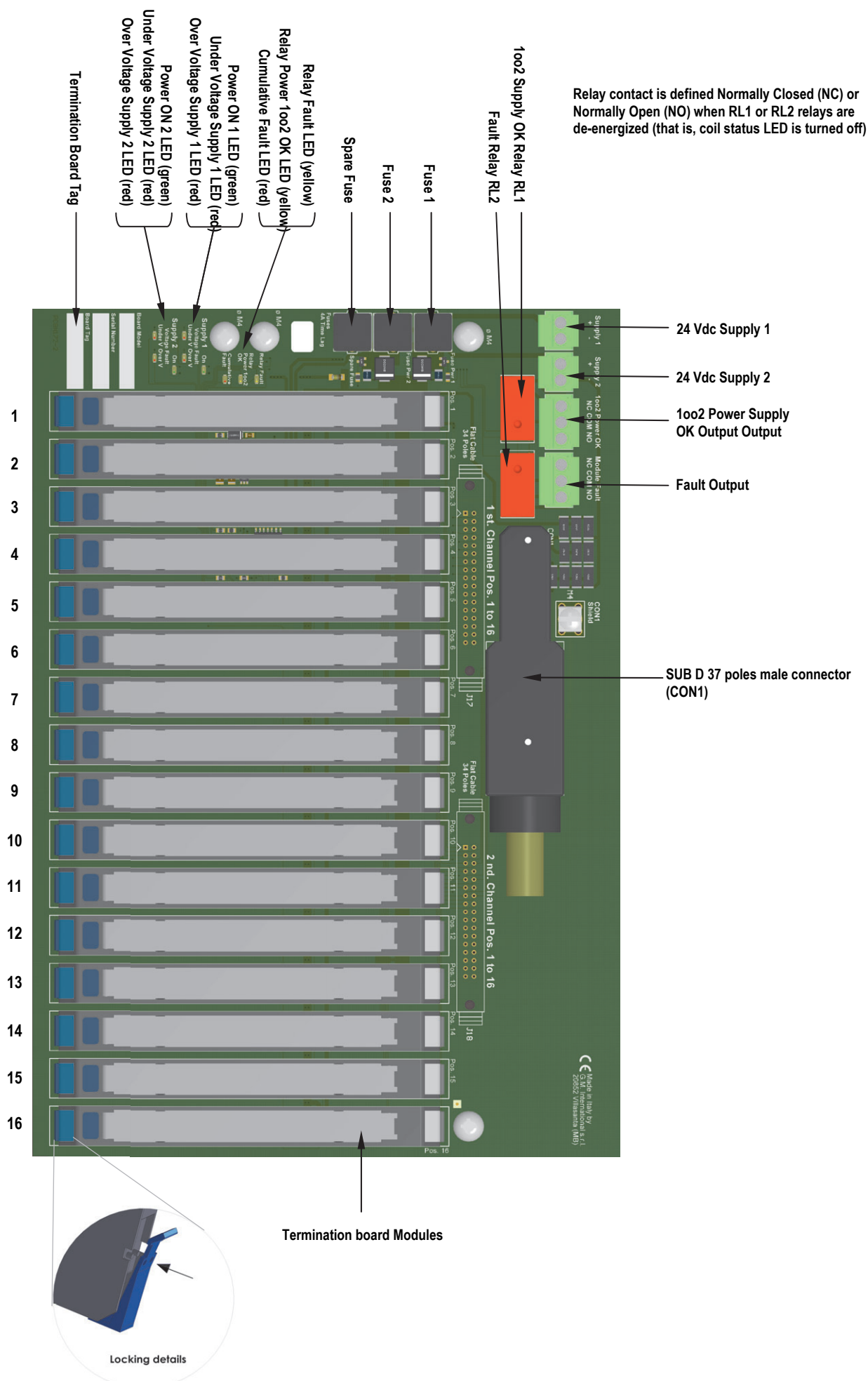
### Note:

Model D5093 does not have Intrinsically safe outputs and therefore must not be placed on same board with D5000 IS barriers.



HAZARDOUS AREA / HAZARDOUS LOCATION

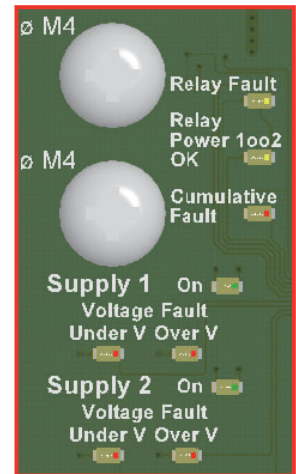
SAFE AREA / ORDINARY LOCATION



Termination Board Fault Logic:

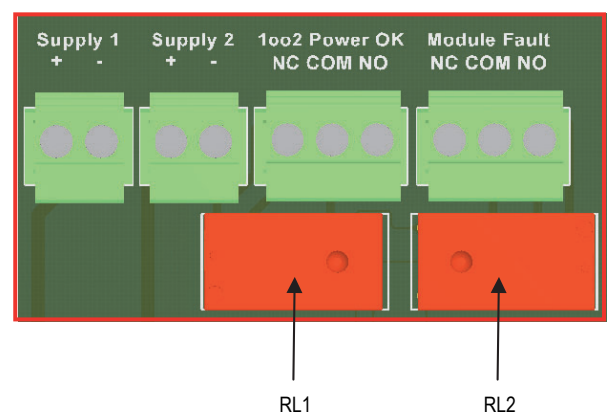
LED Signaling:  
Meaning of LEDs on termination boards:

TAG	LED COLOR	MEANING
Supply 1 On	GREEN	The LED is on when the Supply 1 is present, regardless of its voltage
Supply 1 Under V	RED	The LED is on when the Supply 1 is under-voltage (<18 V)
Supply 1 Over V	RED	The LED is on when the Supply 1 is over-voltage (>30 V)
Supply 2 On	GREEN	The LED is on when the Supply 2 is present, regardless of its voltage
Supply 2 Under V	RED	The LED is on when the Supply 2 is under-voltage (<18 V)
Supply 2 Over V	RED	The LED is on when the Supply 2 is over-voltage (>30 V)
Cumulative Fault	RED	The LED is on when at least one module/barrier reported a fault
Relay Power 1oo2 OK	YELLOW	The LED is on when both supply voltages are within the regular range (>18 V and <30 V)
Relay Fault	YELLOW	The LED is on when the following two conditions hold: 1. at least one voltage supply is within the regular range (>18 V and <30 V) 2. no module/barrier fault is reported

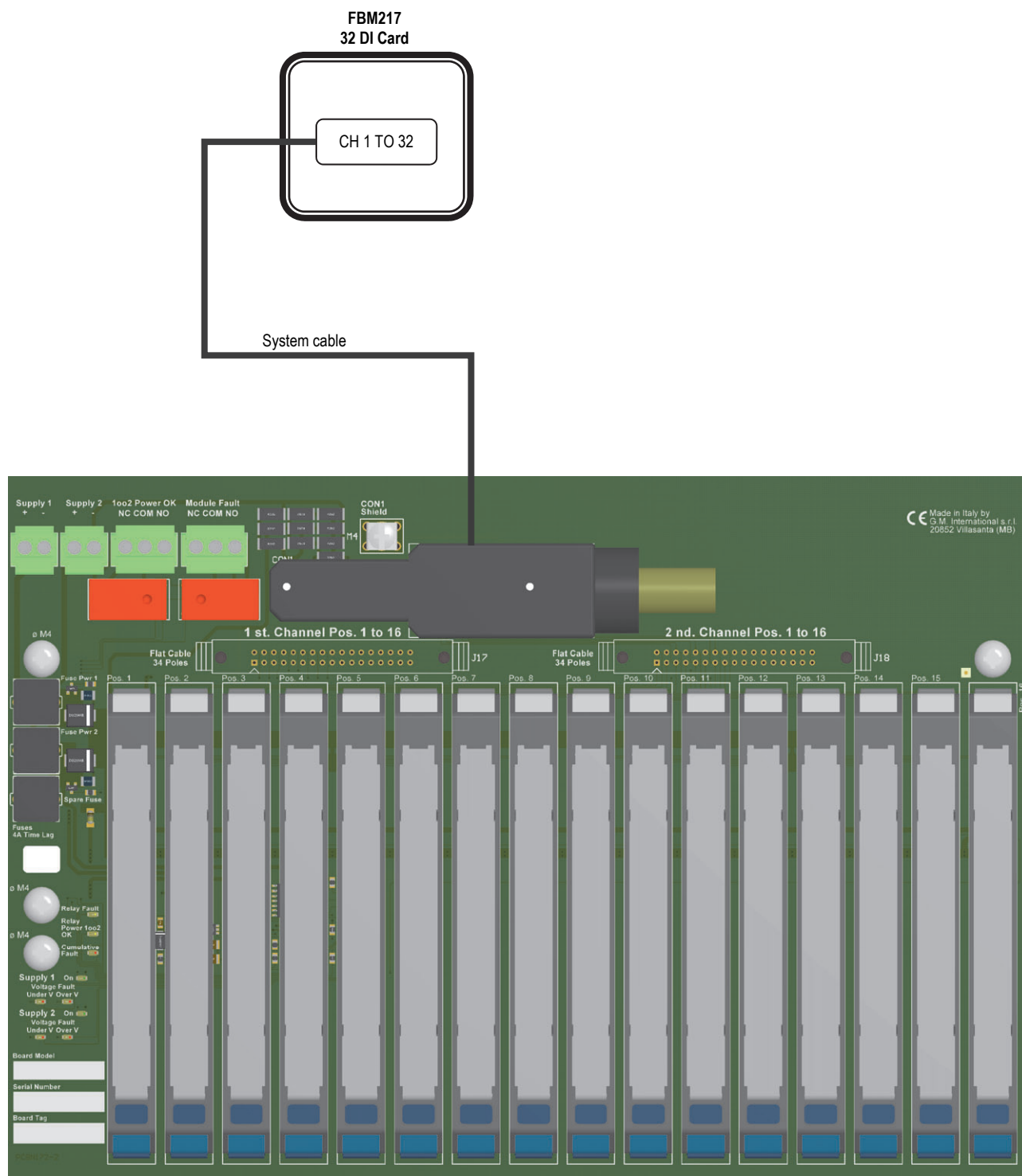


Relay Activation Conditions:  
The two relays are activated according to the following rules:

TAG	ACTIVATION
1oo2 Power OK (RL1)	The relay is energized when both supply voltages are within the regular range (>18 V and <30 V), i.e. when "Relay 1oo2 Power OK" yellow LED is on.
Module Fault (RL2)	The relay is energized when the following two conditions hold: 1. at least one voltage supply is within the regular range (>18 V and <30 V) 2. no module/barrier fault is reported Therefore, the relay is energized when the "Fault" yellow LED is on.

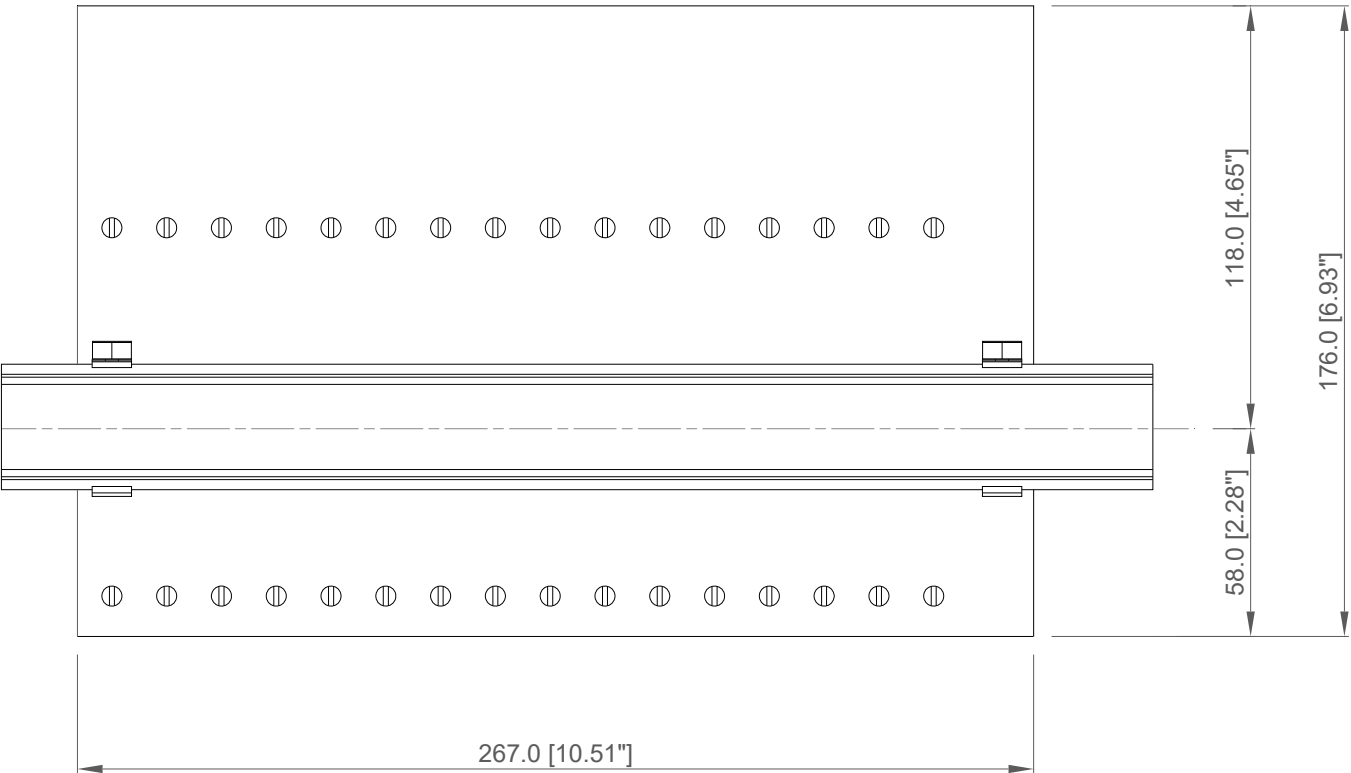


**SAFE AREA**  
**ORDINARY LOCATION**

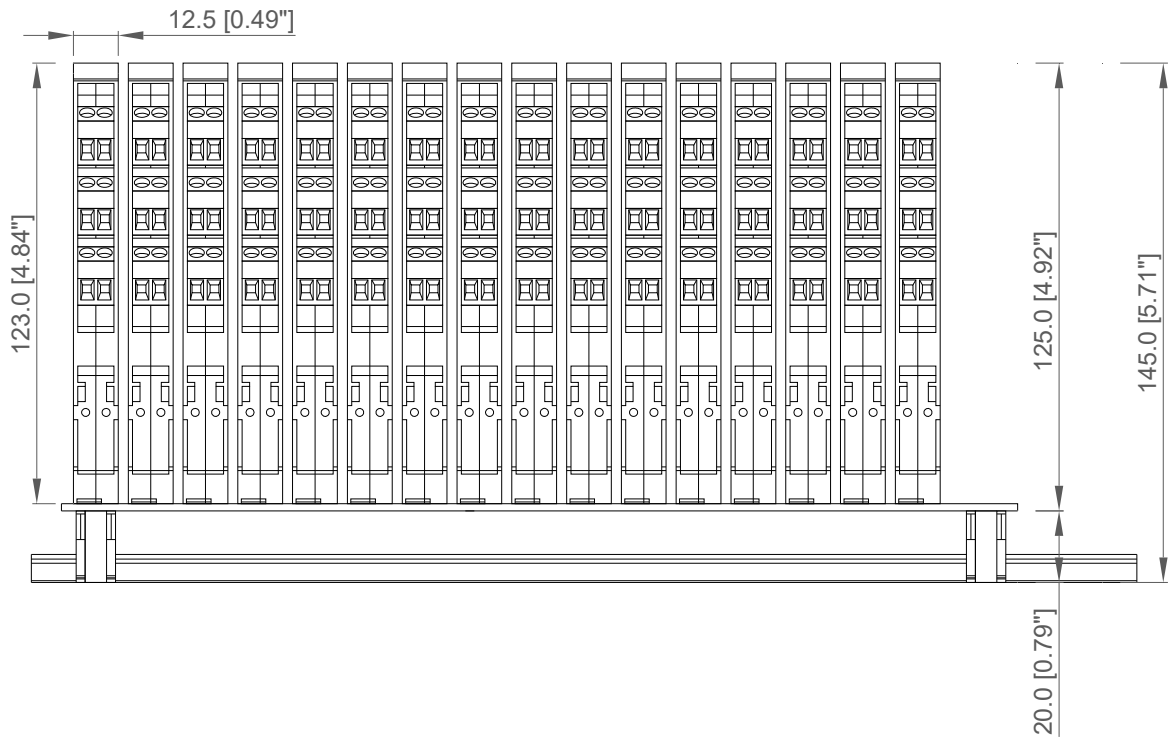


**HAZARDOUS AREA**  
**HAZARDOUS LOCATION**

Bottom view

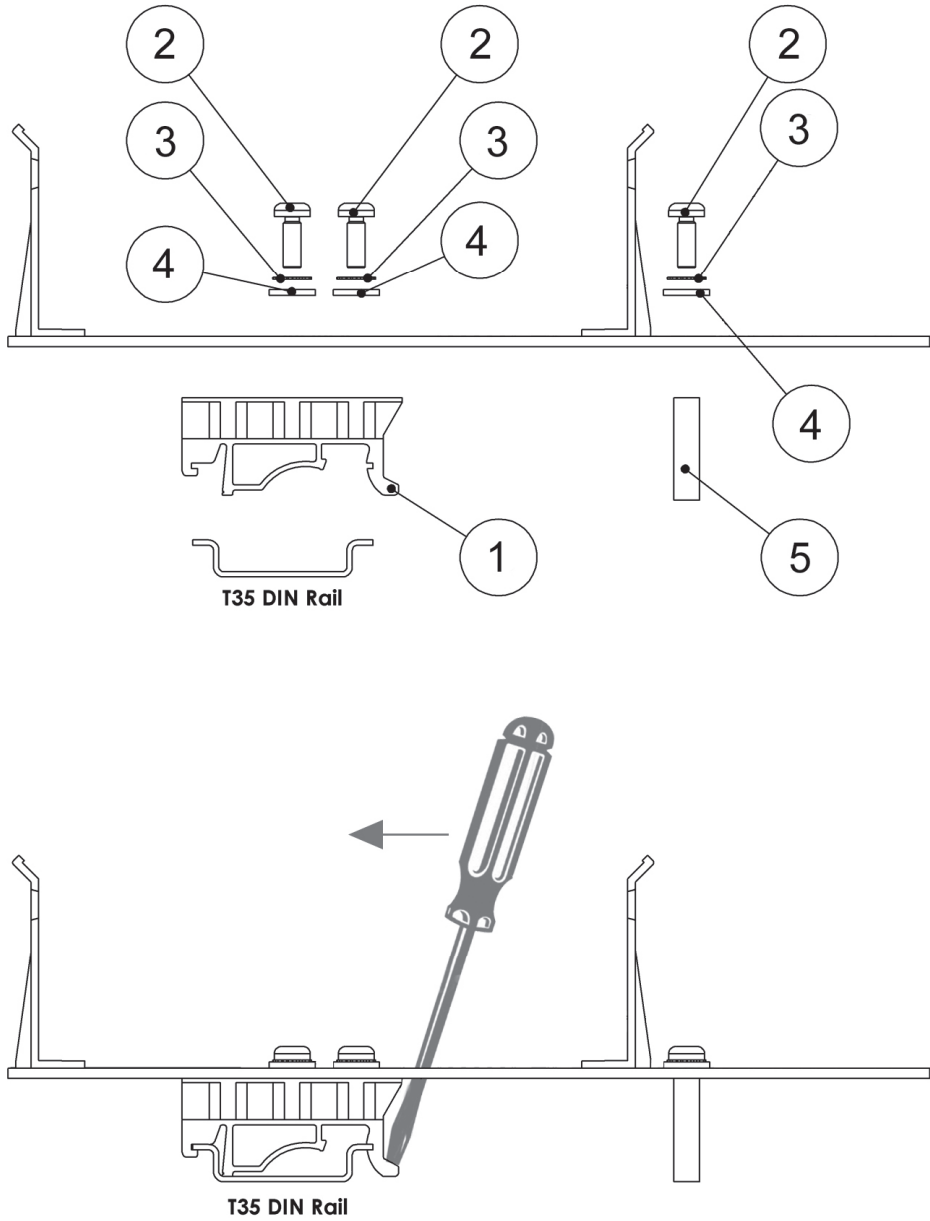


Side view



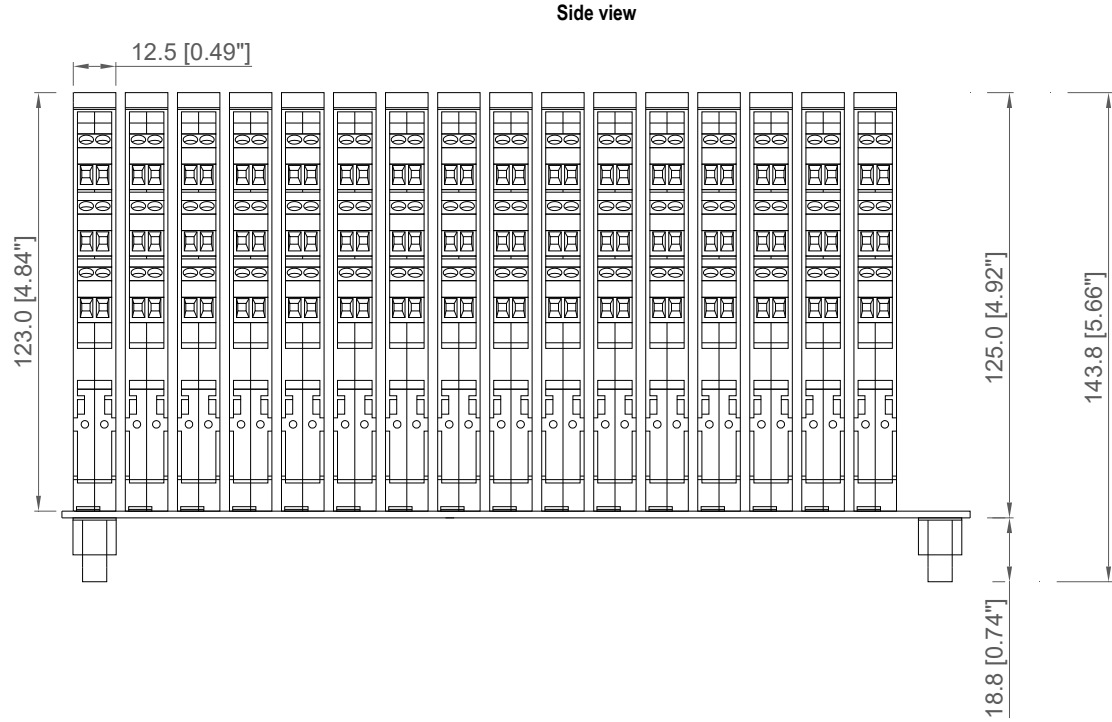
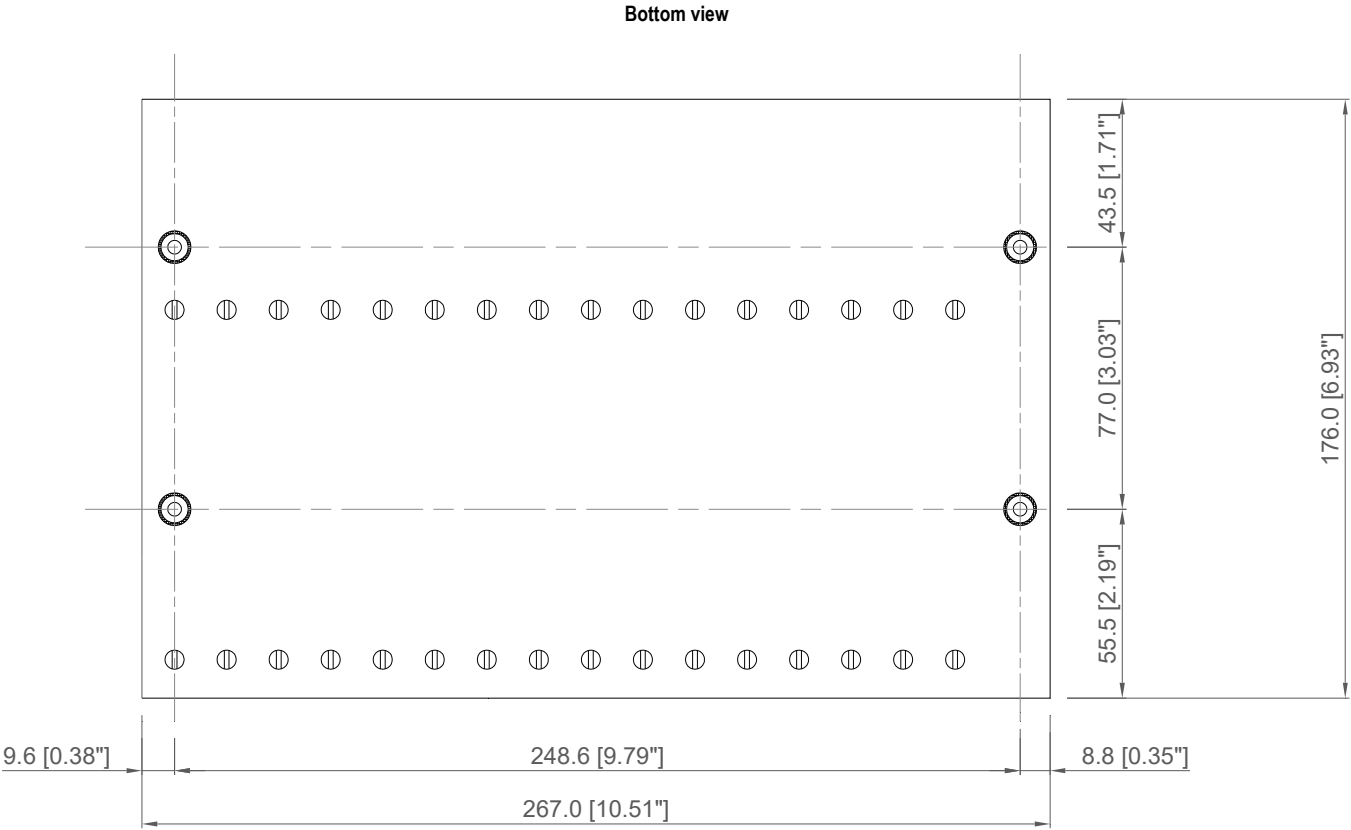
All dimensions are expressed in millimeters [inches]

Mounting features kit TB-OPT-001



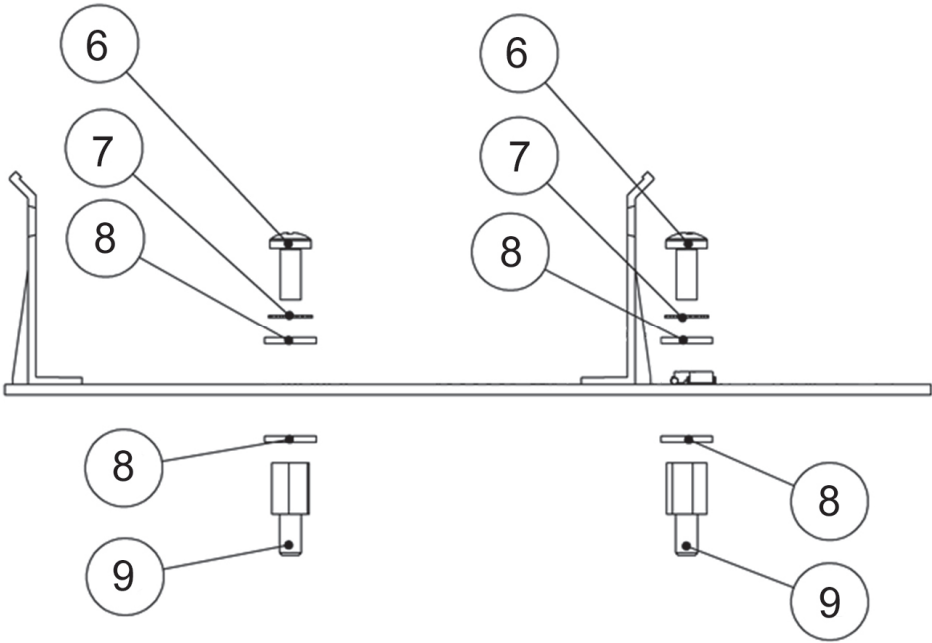
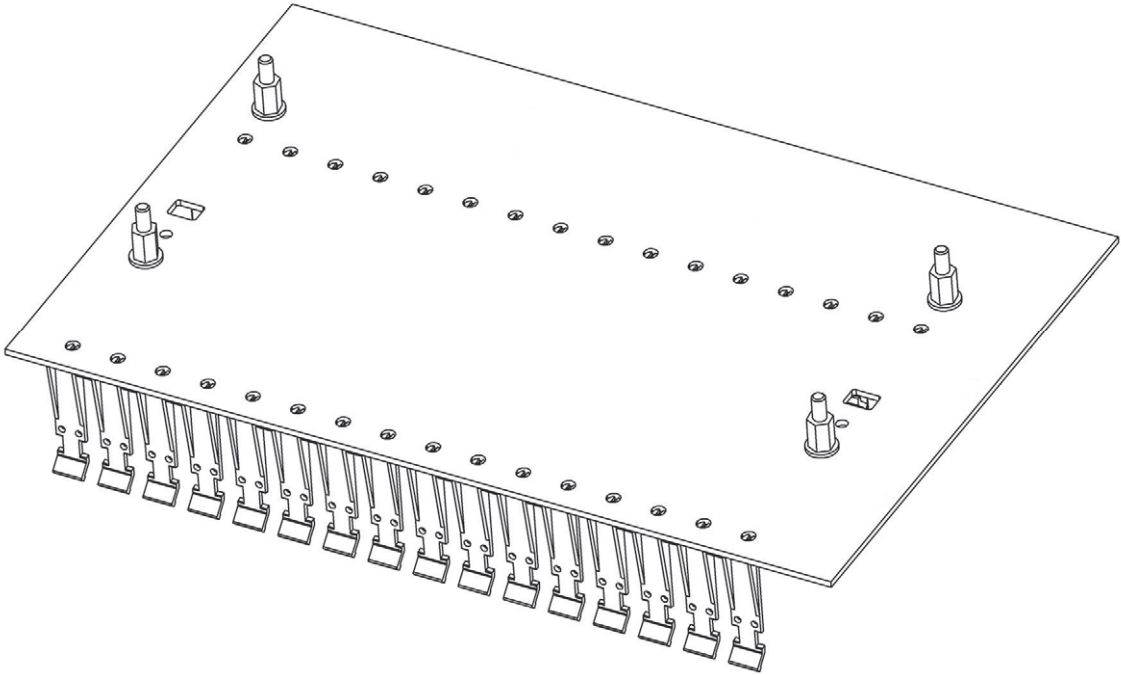
Ref. Nr	Q.ty	Description	Material
1	2	T35 Din Rail Adapter	PA
2	6	3.5 x 9.5 Self tapping screw	Stainless Steel
3	6	M3 External Tooth lock Washer	Stainless Steel
4	6	M3 Washer	Stainless Steel
5	2	6 c 20 Spacer	PA

Wall mounting overall dimensions for M4 self tapping screw:

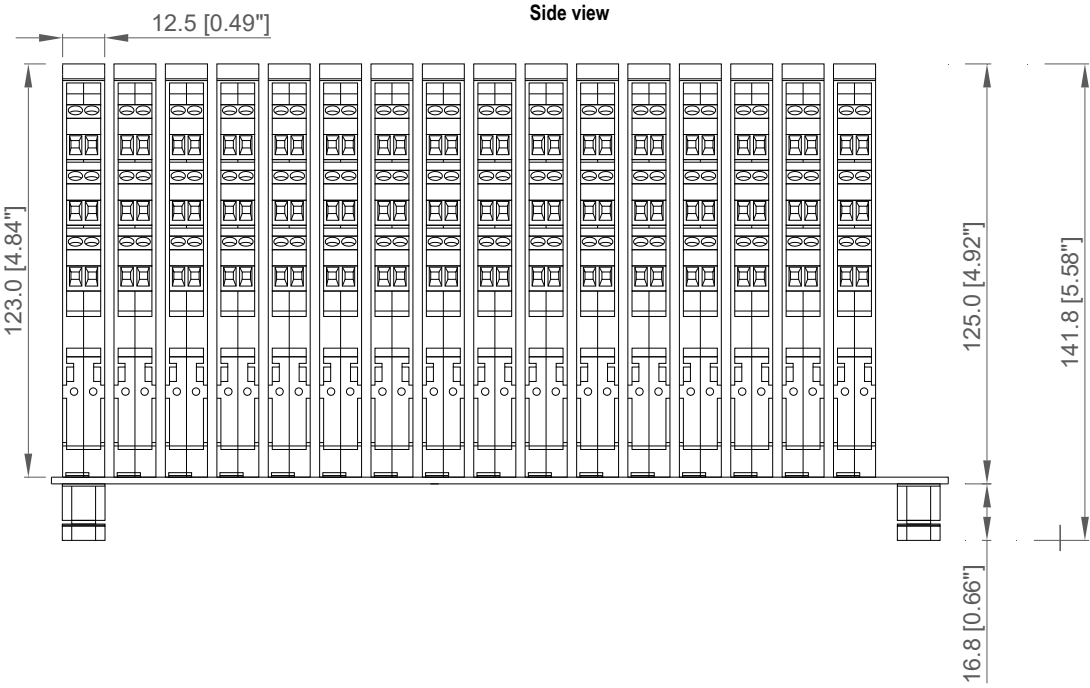
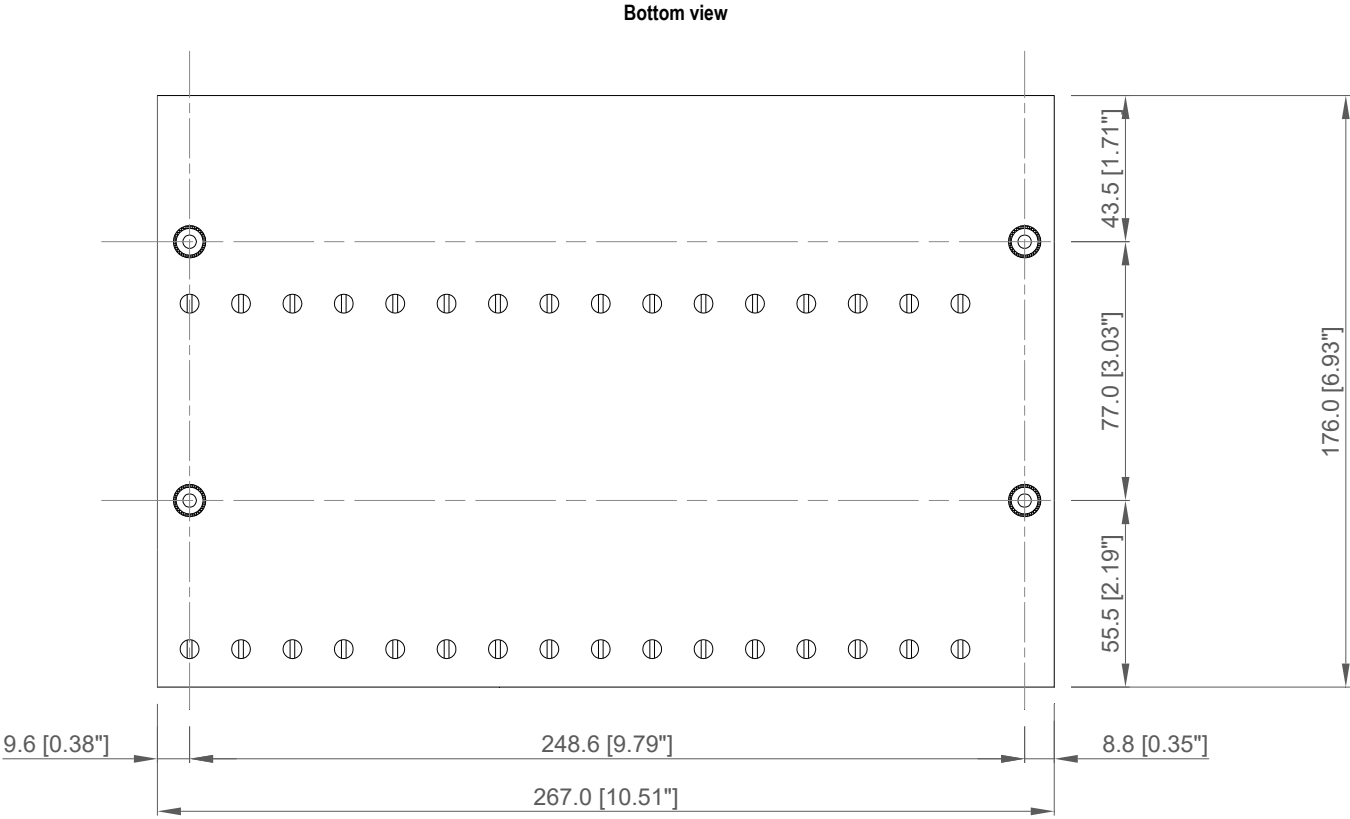


All dimensions are expressed in millimeters [inches]

Mounting features kit TB-OPT-001

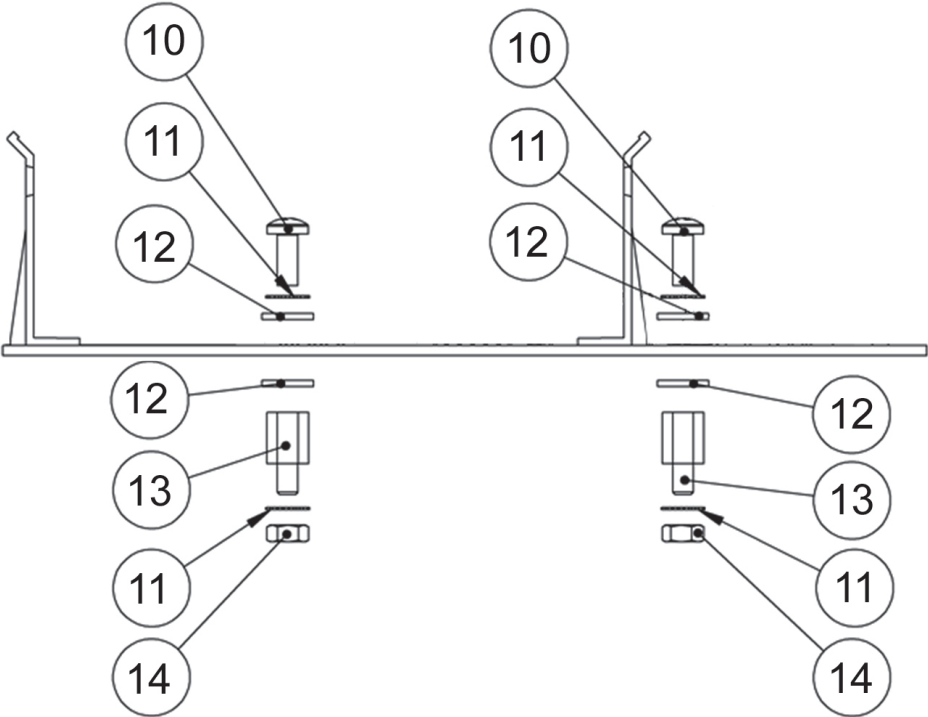
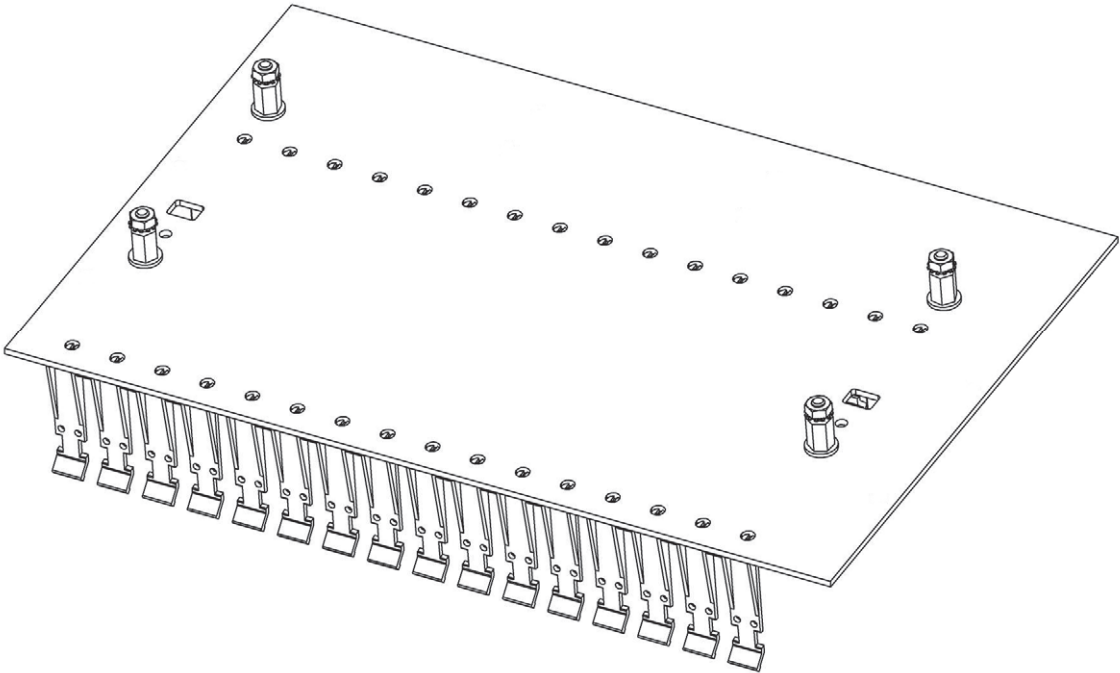


Ref. Nr	Q.ty	Description	Material
6	4	M4 x 8 Screw	Stainless Steel
7	4	M4 External Tooth lock Washer	Stainless Steel
8	8	M4 Washer	Stainless Steel
9	4	Self Tapping Spacer	NI - Plated Brass




All dimensions are expressed in millimeters [inches]

Mounting features kit TB-OPT-001



Ref. Nr	Q.ty	Description	Material
10	4	M4 x 8 Screw	Stainless Steel
11	8	M4 External Tooth lock Washer	Stainless Steel
12	8	M4 Washer	Stainless Steel
13	4	Threaded Spacer	NI - Plated Brass
14	4	M4 Nut	Stainless Steel

# Connections table to FBM217 (32 DI) Interface Card:

FIELD DEVICE	MODULE TYPE	MODULE FUNCTION	MODULE POSITION	MODULE CHANNEL NUMBER	INTERFACE CARD CHANNEL NUMBER	INTERFACE CARD CONNECTOR PIN NUMBER	NOTE
	D5031D, D5032D, D5037D, D5093D, D6031D	Digital Input	1	1A	1	(-) 18	
				1B	17	(-) 10	
			2	2A	2	(-) 36	
				2B	18	(-) 28	
			3	3A	3	(-) 17	
				3B	19	(-) 9	
			4	4A	4	(-) 35	
				4B	20	(-) 27	
			5	5A	5	(-) 16	
				5B	21	(-) 7	
			6	6A	6	(-) 34	
				6B	22	(-) 25	
			7	7A	7	(-) 15	
				7B	23	(-) 8	
			8	8A	8	(-) 33	
				8B	24	(-) 26	
			9	9A	9	(-) 14	
				9B	25	(-) 5	
			10	10A	10	(-) 32	
				10B	26	(-) 23	
			11	11A	11	(-) 13	
				11B	27	(-) 6	
			12	12A	12	(-) 31	
				12B	28	(-) 24	
			13	13A	13	(-) 12	
				13B	29	(-) 3	
			14	14A	14	(-) 30	
				14B	30	(-) 21	
			15	15A	15	(-) 11	
				15B	31	(-) 4	
			16	16A	16	(-) 29	
				16B	32	(-) 22	

- Interface Card Connectors CON1: SUB D 37 poles male.  
All positive poles of the signals are connected together to +24 Vdc.  
Pole No. 20 is connected to ground.  
Shield terminal block provided on pin number 1.  
The poles No. 2, No. 19 and No. 37 are not connected.

Termination Board supply connection details:

