

Characteristics:

General description:

This Termination Board (TB) provides direct connection between the I/O Card of the system and D5000 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-D5012-INV-001	12 (= 4+8)	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
FBM241c	Digital In	8	1	8 = 4 x 2	D5031D, D5032D, D5037D
	Digital Out	8	1	8 = 8 x 1	D5040S D5048S D5049S

Features:

- I/O card type FBM 241c, 8+8 channels Digital I/O board interface.
- 12 positions Terminal Board for up to 8 DI + 8 DO 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-D5012-INV-001

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 mm².
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 * 10⁶ / 1 * 10⁵ 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 mm².

FBM200 I/O card interface:

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

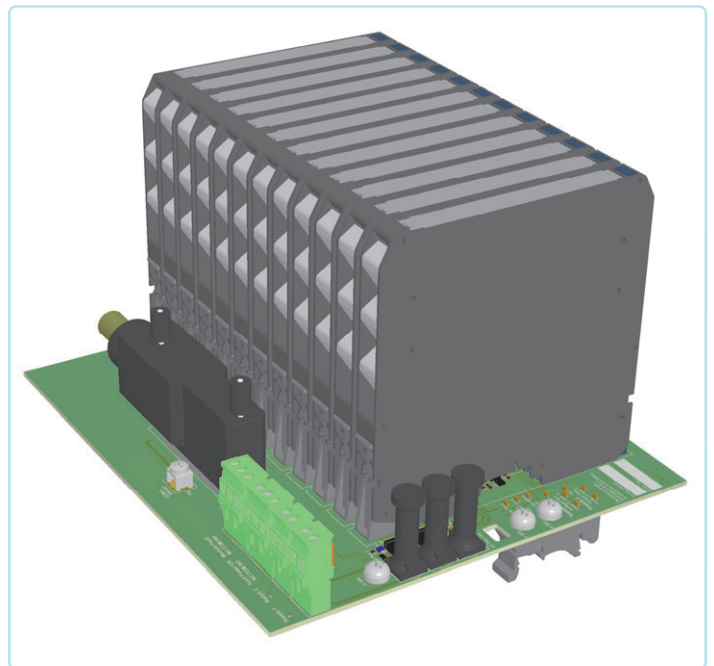
Environmental conditions:

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 300 g (excluding modules and mounting options).
Location: Safe Area / Ordinary locations.
Dimensions: Width 207 mm, Depth 176 mm, Height 125 mm.

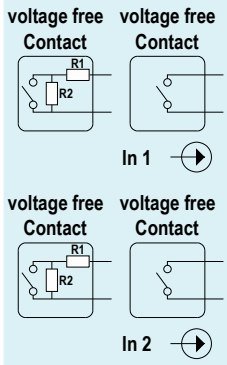
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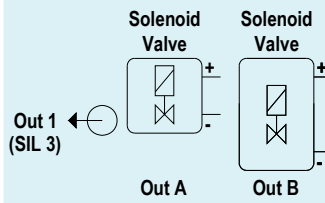
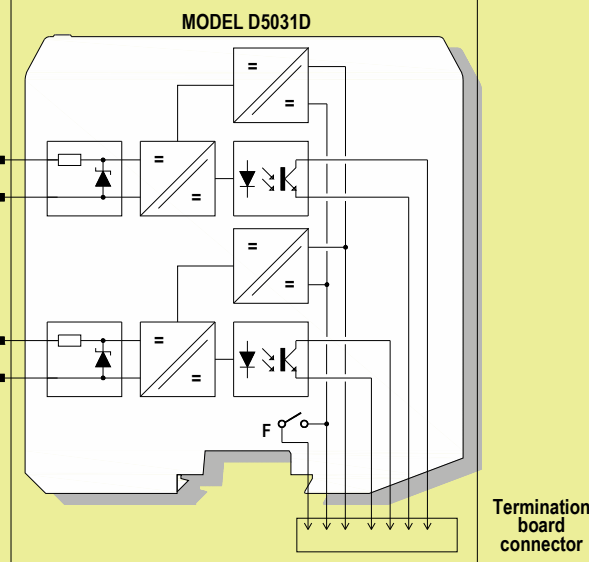
Loop Diagrams for FBM241c (8 DI + 8 DO) Interface Card:

HAZARDOUS AREA

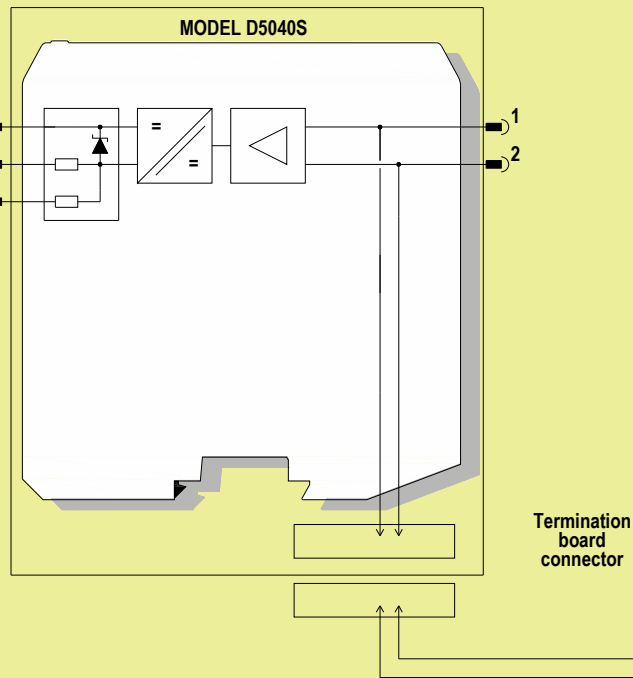
SAFE AREA



TB position 1 to 4 for double channel DI module (transistor output)



TB position 5 to 12 for single channel DO module



Termination board connector

+ Supply from TB
- Cumulative Fault

FBM 241c
8DI + 8DO

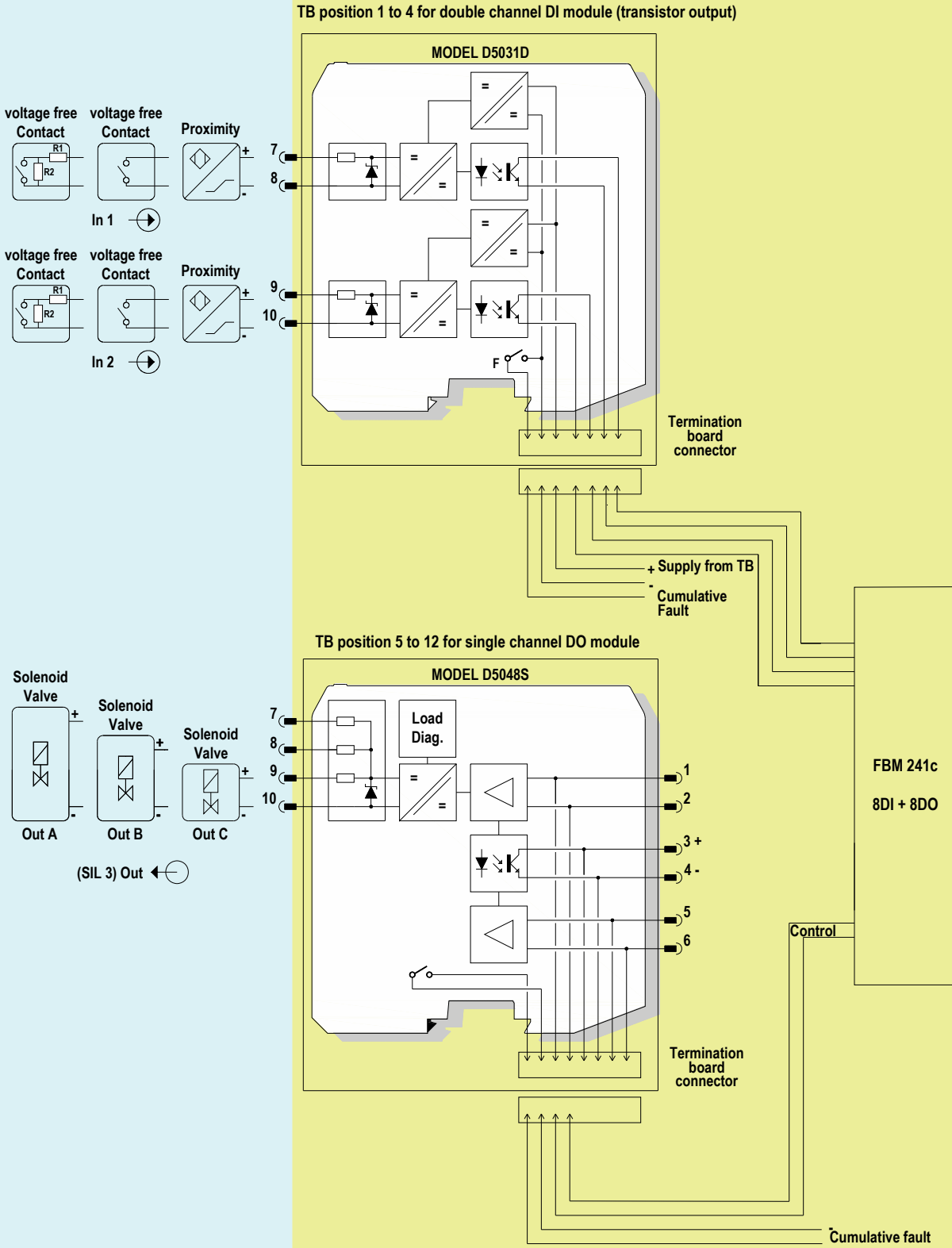
Control

Termination board connector

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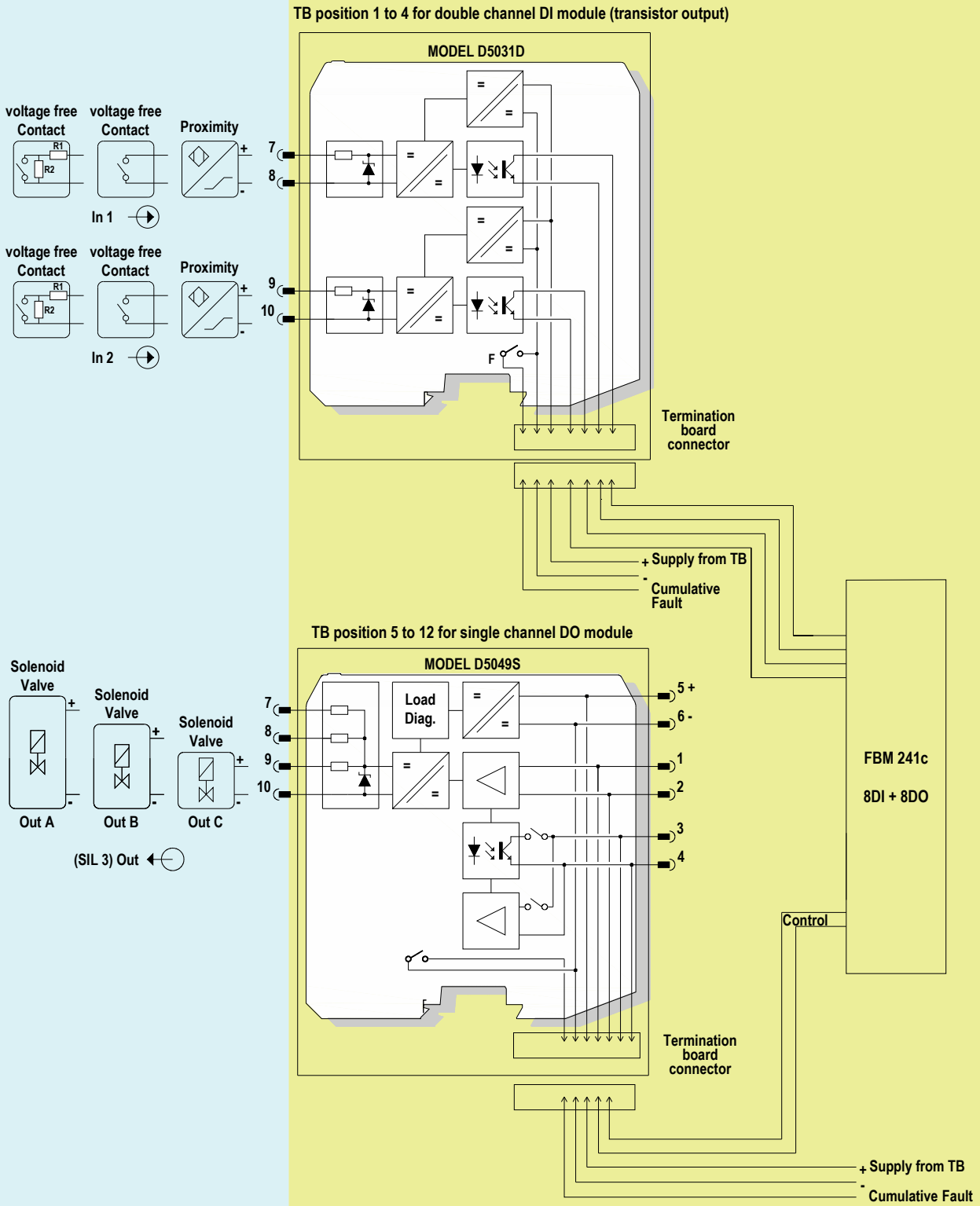
SAFE AREA



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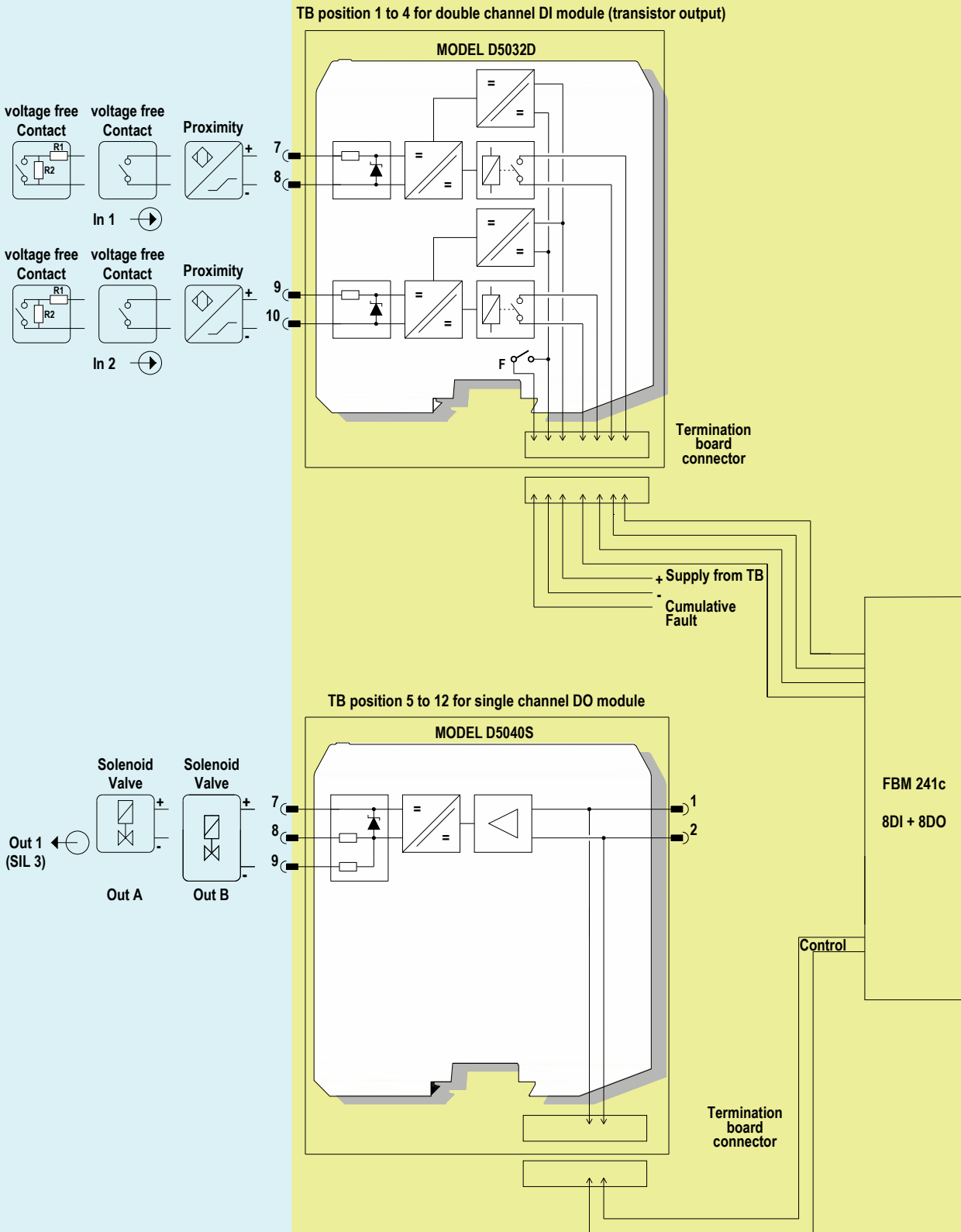
SAFE AREA



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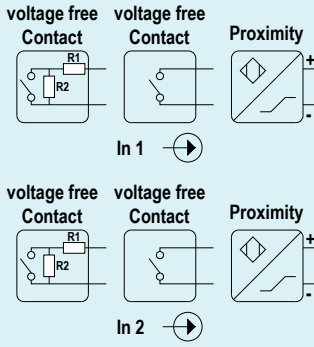
SAFE AREA



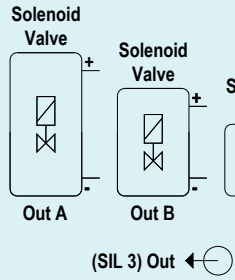
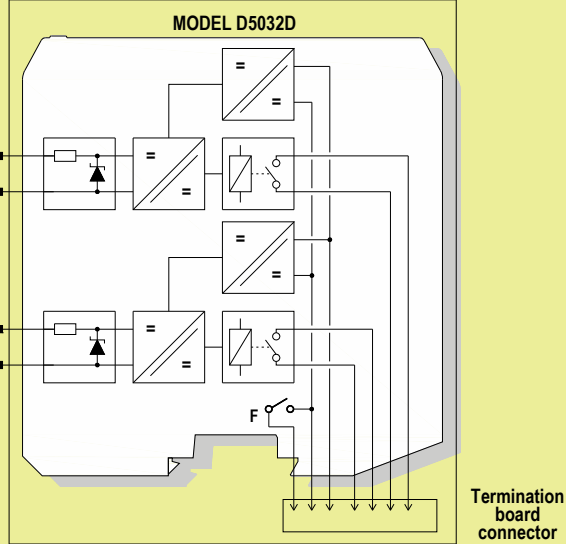
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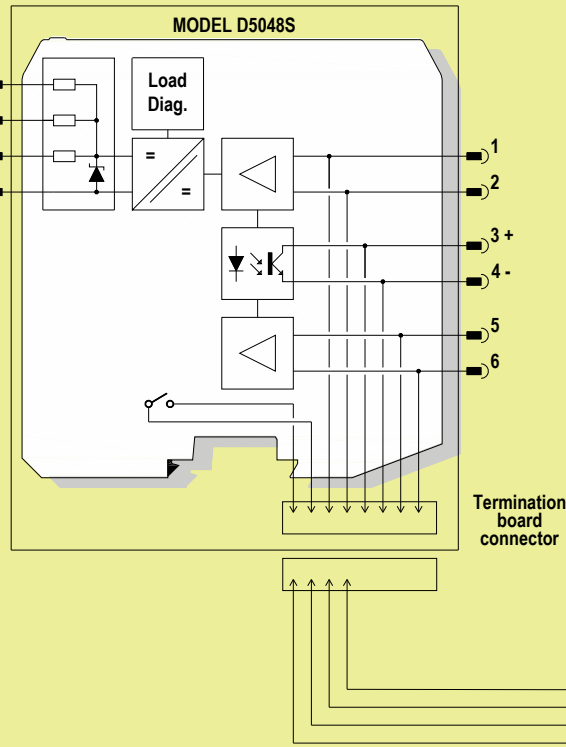
SAFE AREA



TB position 1 to 4 for double channel DI module (transistor output)



TB position 5 to 12 for single channel DO module



+ Supply from TB
- Cumulative Fault

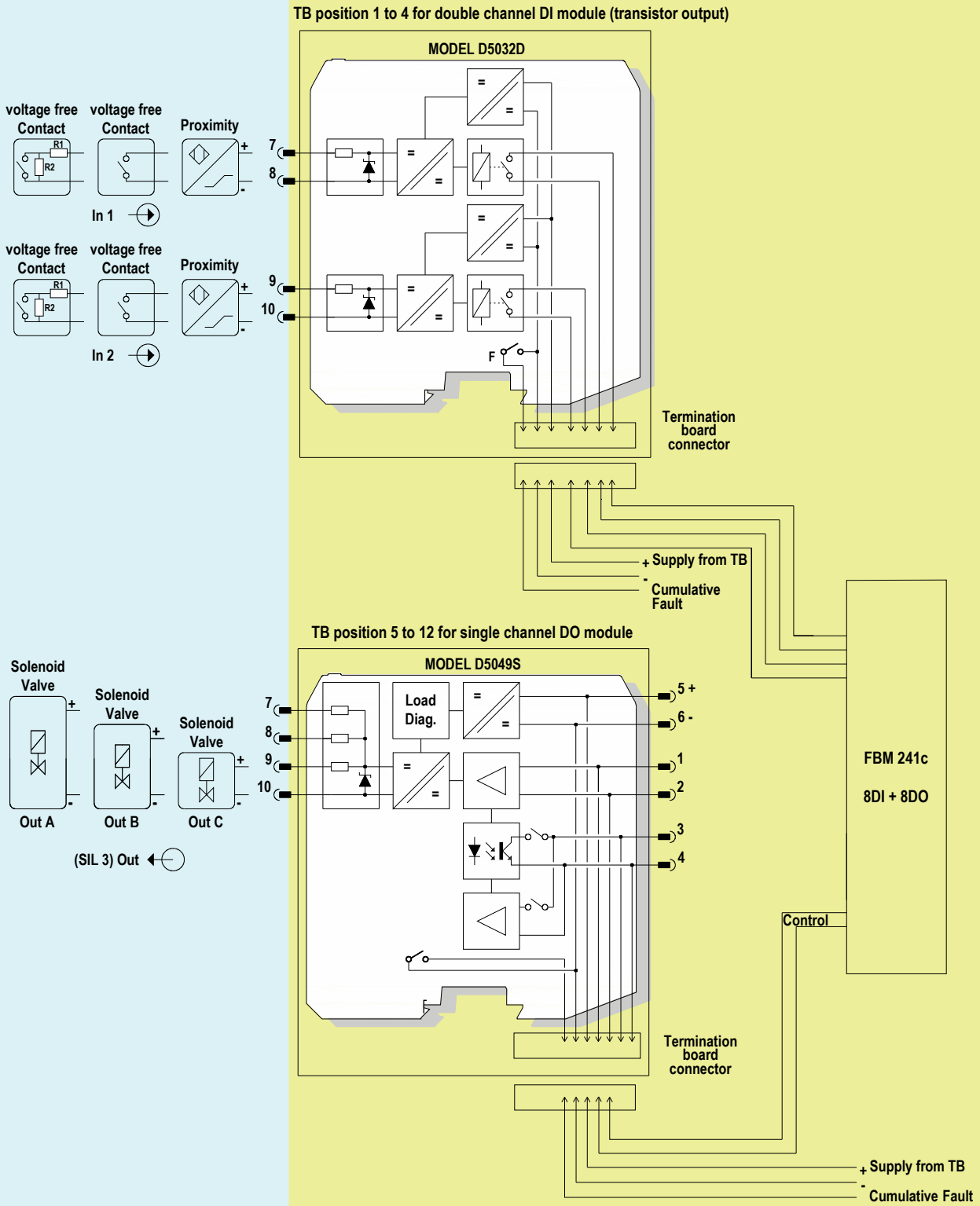
FBM 241c
8DI + 8DO

Cumulative fault

Loop Diagrams for FBM241c (8 DI + 8 DO) Interface Card:

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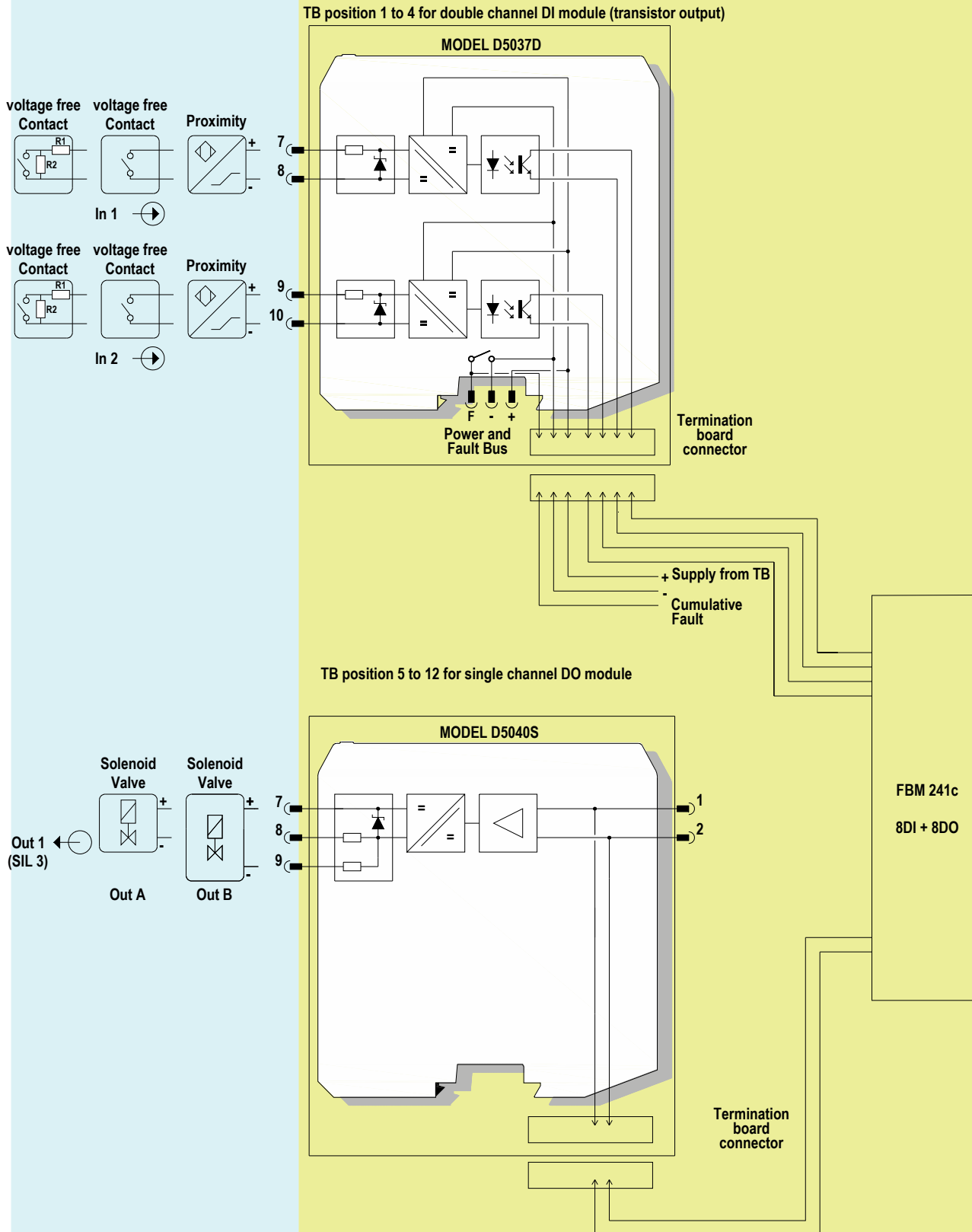
SAFE AREA



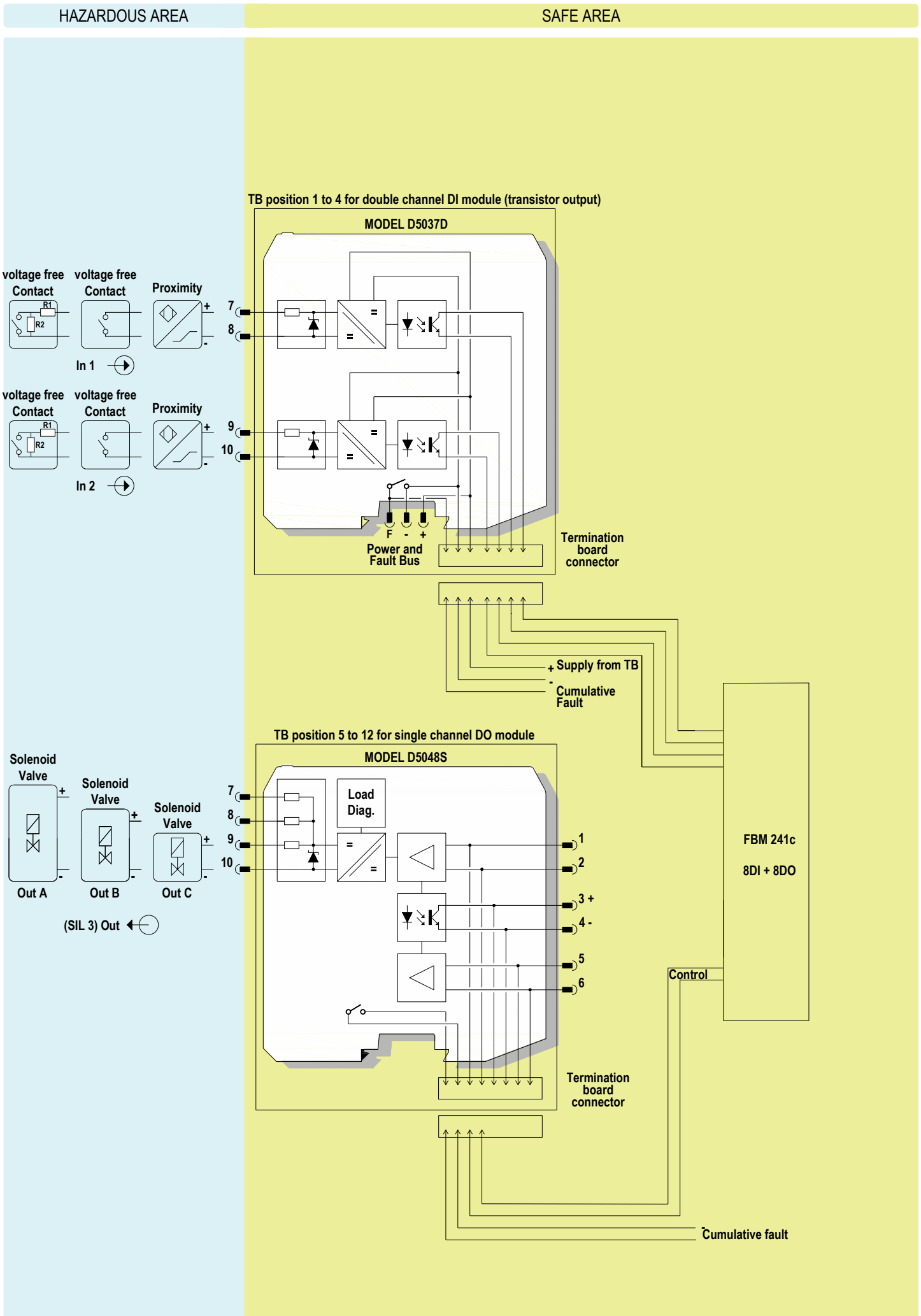
Loop Diagrams for FBM241c (8 DI + 8 DO) Interface Card:

HAZARDOUS AREA

SAFE AREA



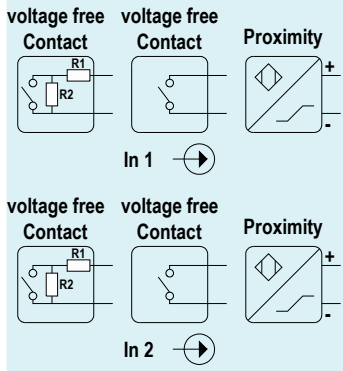
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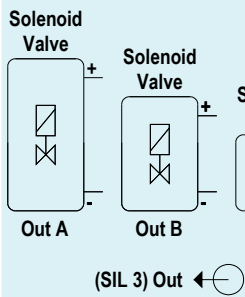
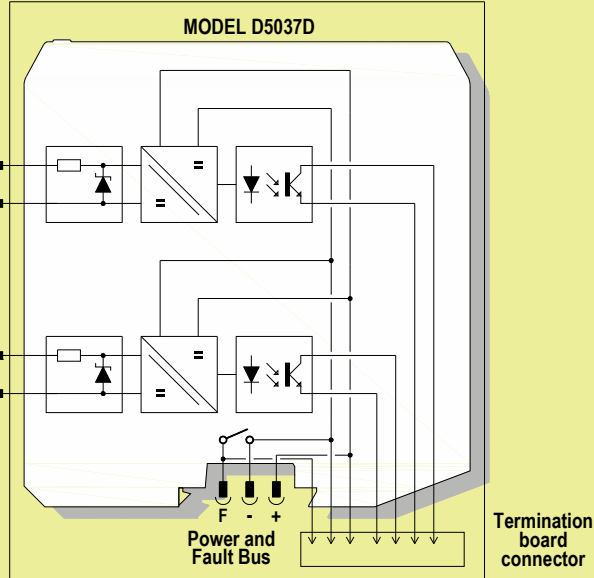
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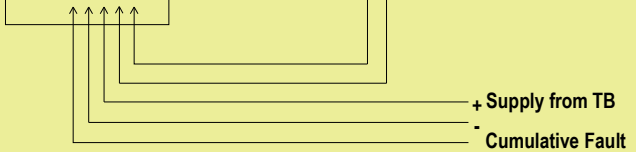
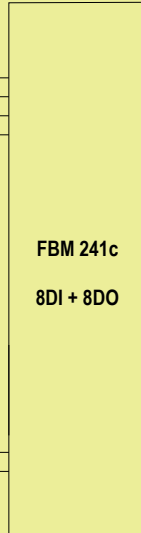
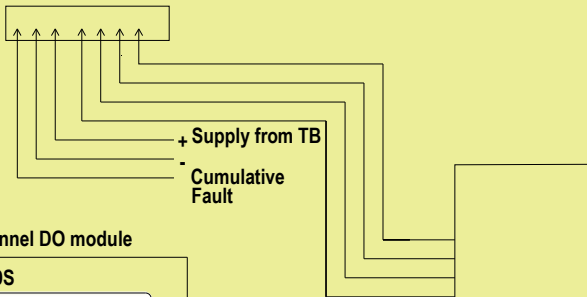
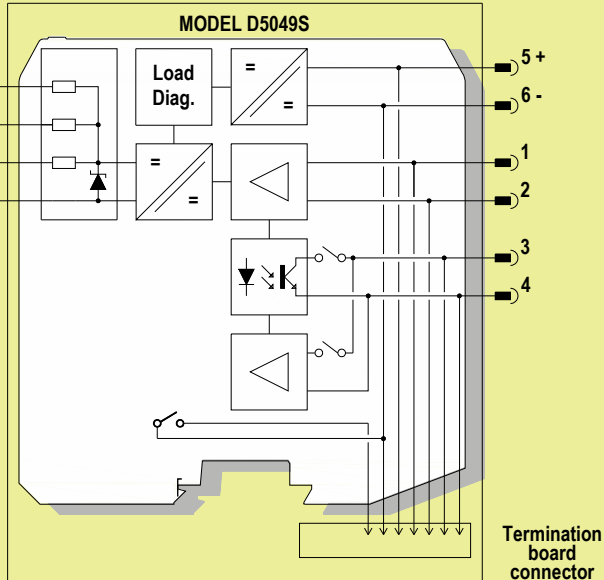
SAFE AREA



TB position 1 to 4 for double channel DI module (transistor output)



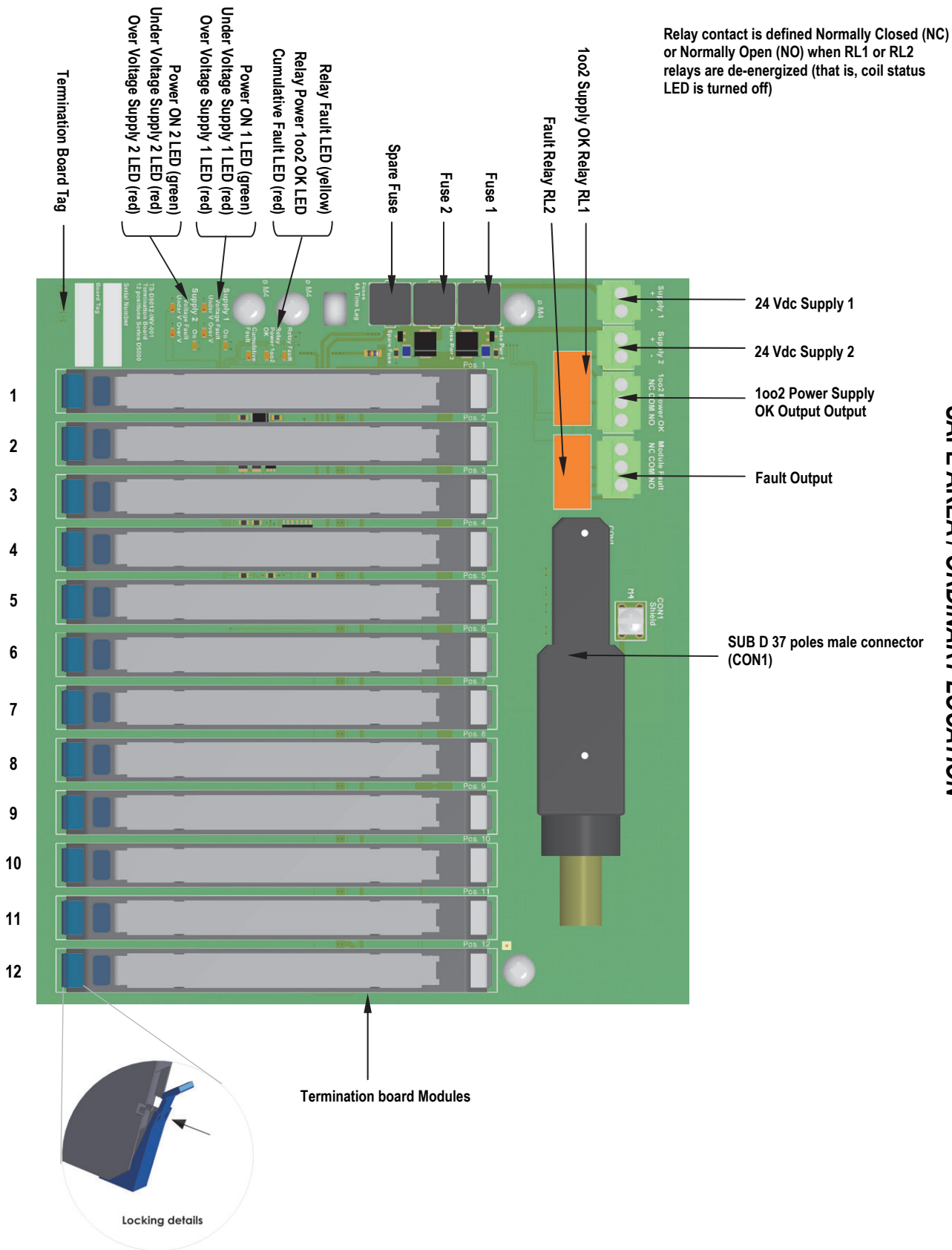
TB position 5 to 12 for single channel DO module



Termination Board Description:

HAZARDOUS AREA / HAZARDOUS LOCATION

SAFE AREA / ORDINARY LOCATION

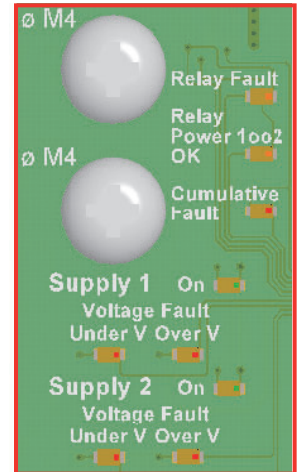


Termination Board Fault Logic:

LED Signaling:

Meaning of LEDs on termination boards:

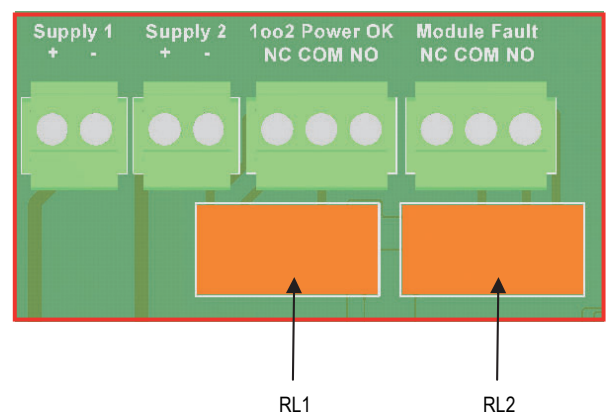
TAG	LED COLOR	MEANING
Supply 1 On	GREEN	The LED is on when the Supply 1 is present, regardless of its voltage
Supply 1 Under V	RED	The LED is on when the Supply 1 is under-voltage (<18 V)
Supply 1 Over V	RED	The LED is on when the Supply 1 is over-voltage (>30 V)
Supply 2 On	GREEN	The LED is on when 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



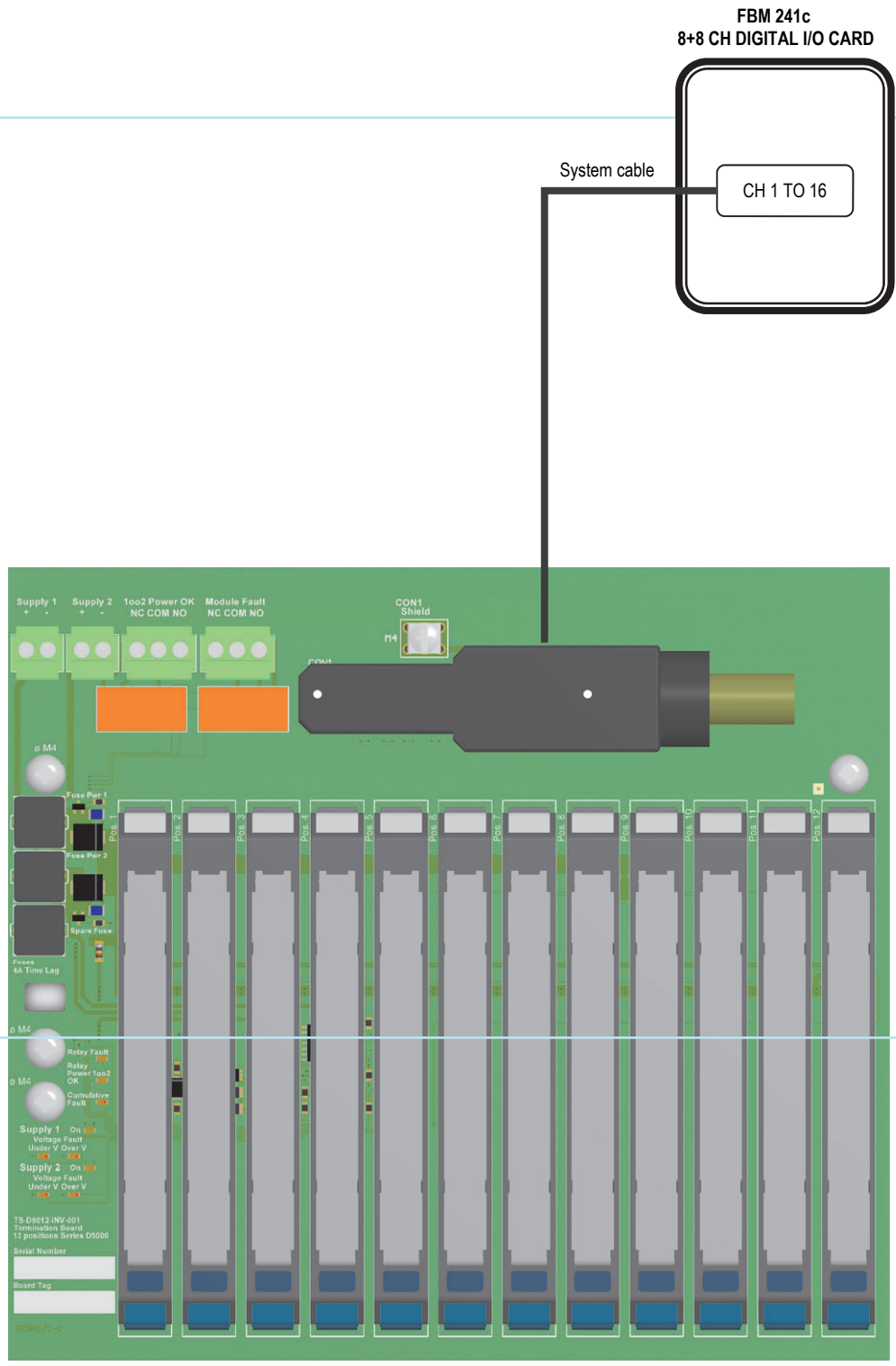
Relay Activation Conditions:

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.

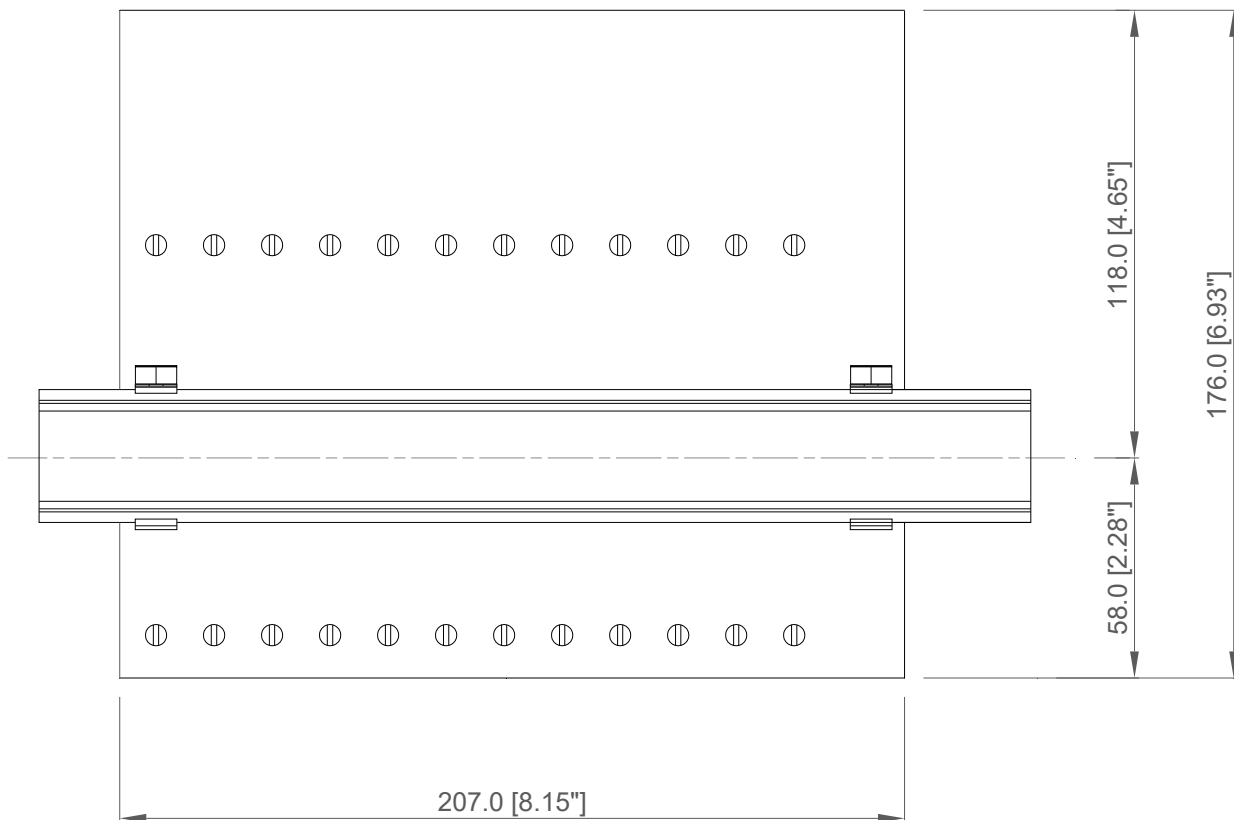


SAFE AREA / ORDINARY LOCATION

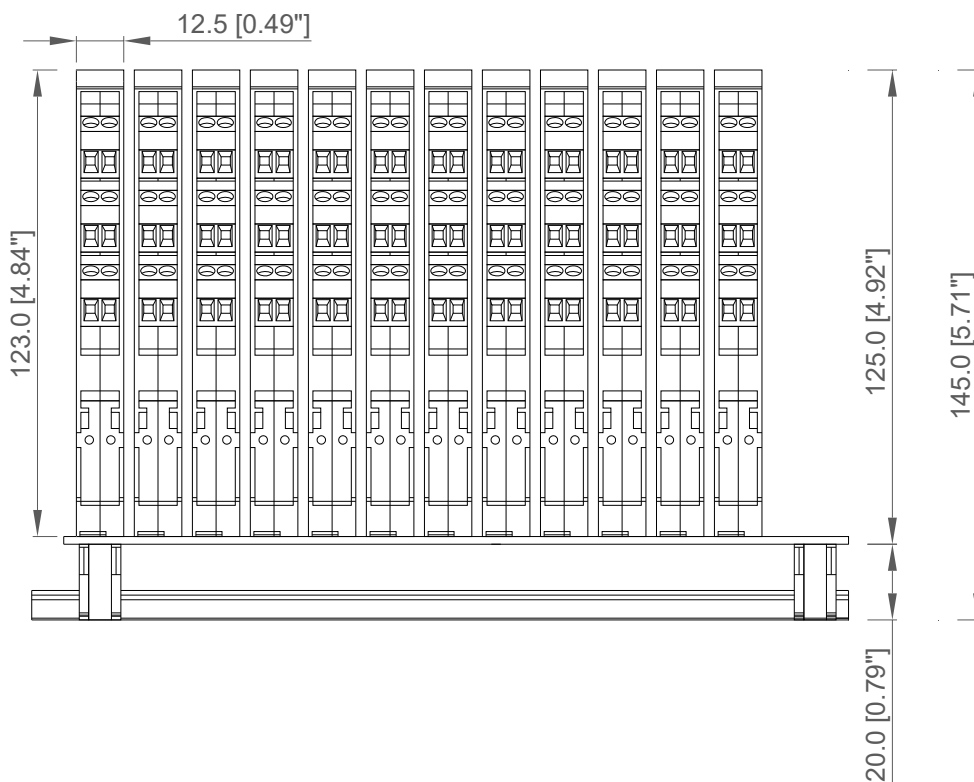


HAZARDOUS AREA / HAZARDOUS LOCATION

Bottom view

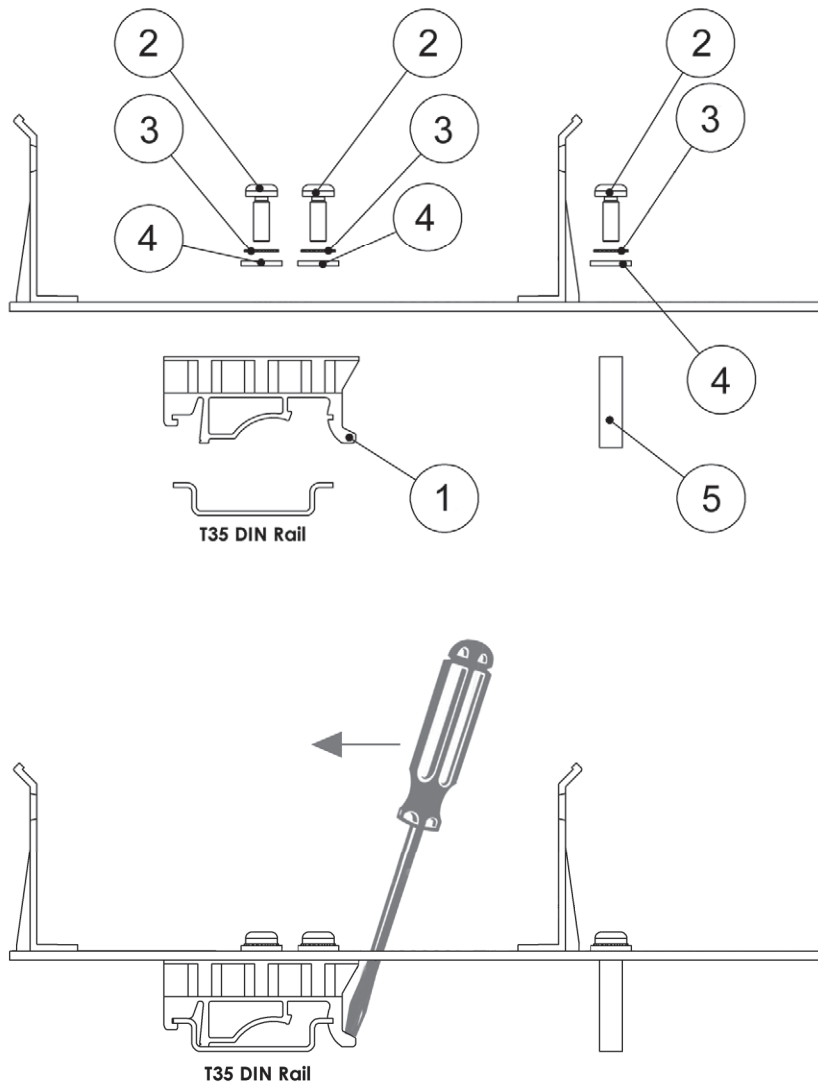


Side view



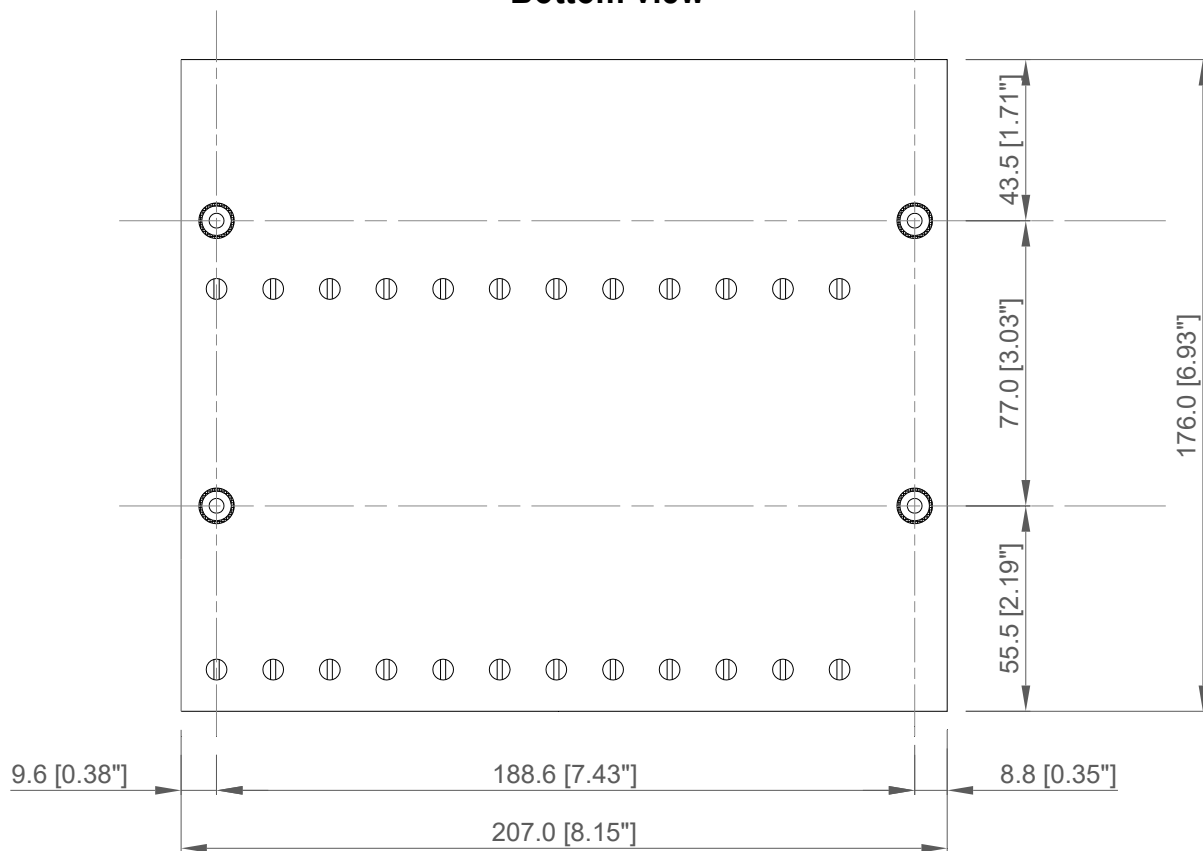
All dimensions are expressed in millimeters [inches]

Mounting features kit TB-OPT-001

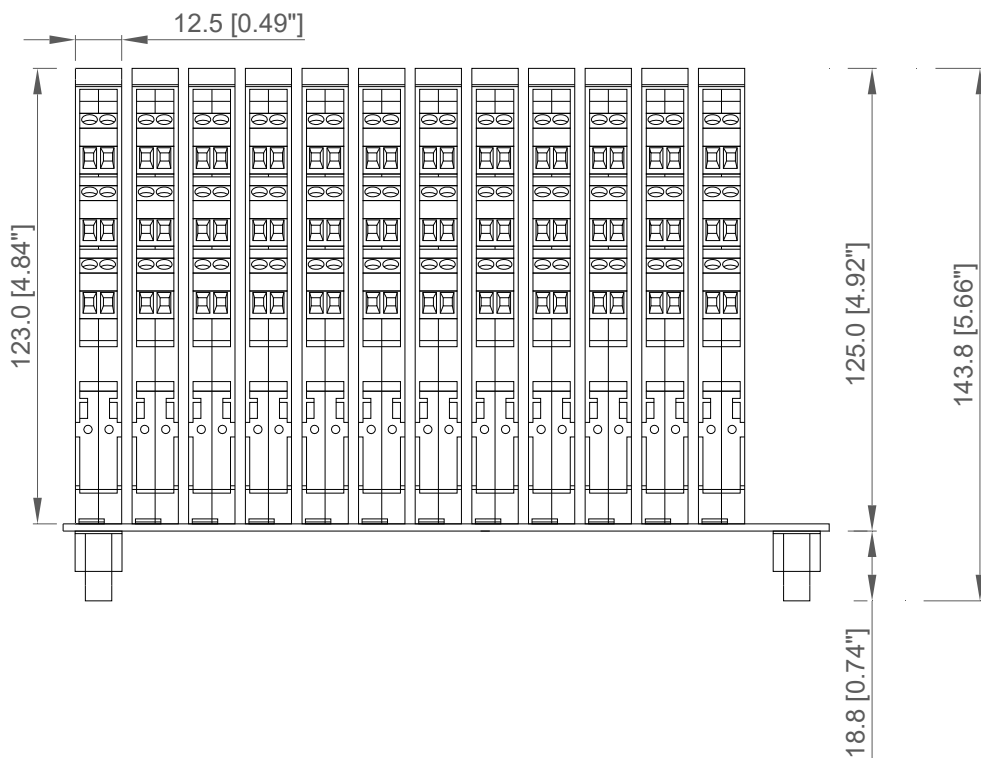


Ref. Nr	Q.ty	Description	Material
1	2	T35 Din Rail Adapter	PA
2	6	3.5 x 9.5 Self tapping screw	Stainless Steel
3	6	M3 External Tooth lock Washer	Stainless Steel
4	6	M3 Washer	Stainless Steel
5	2	6 c 20 Spacer	PA

Bottom view

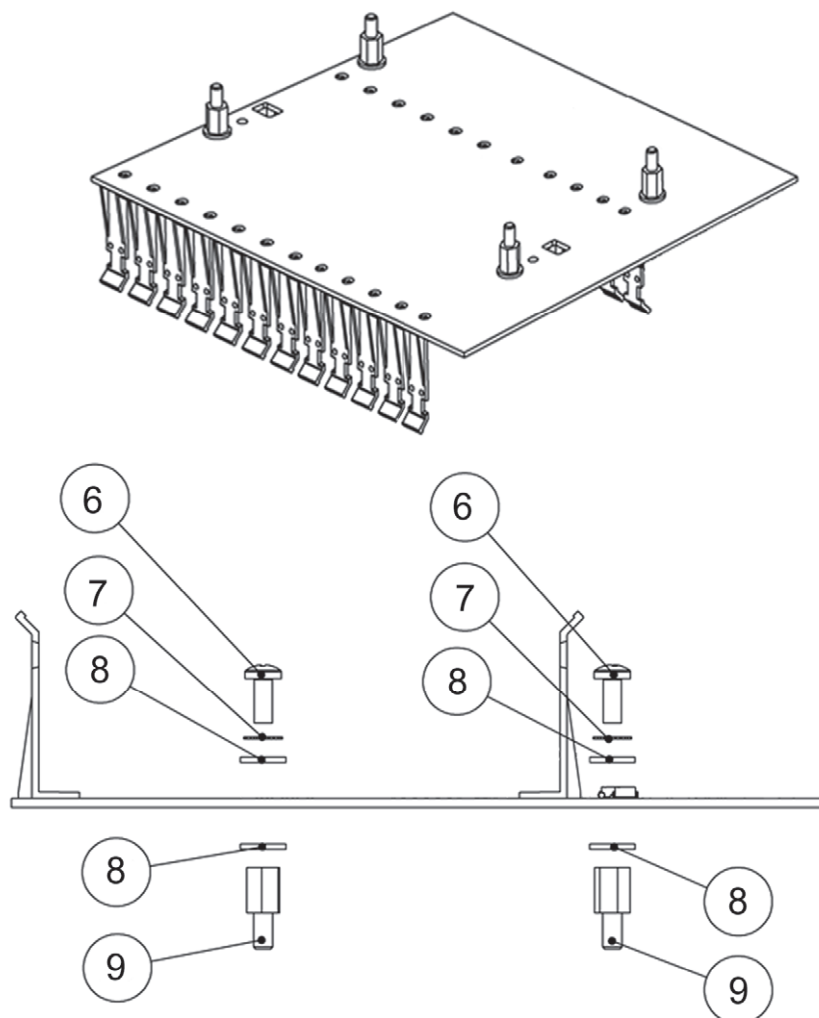


Side view



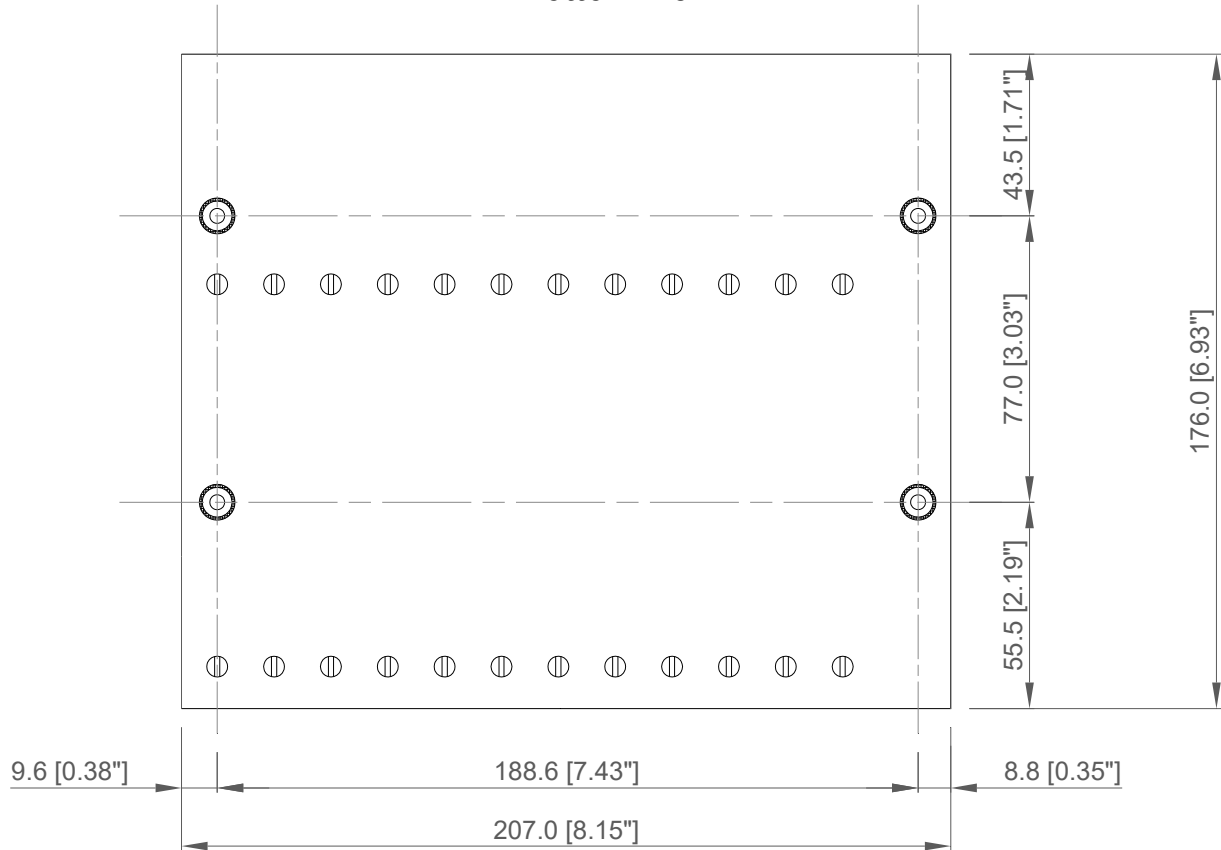
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Mounting features kit TB-OPT-001

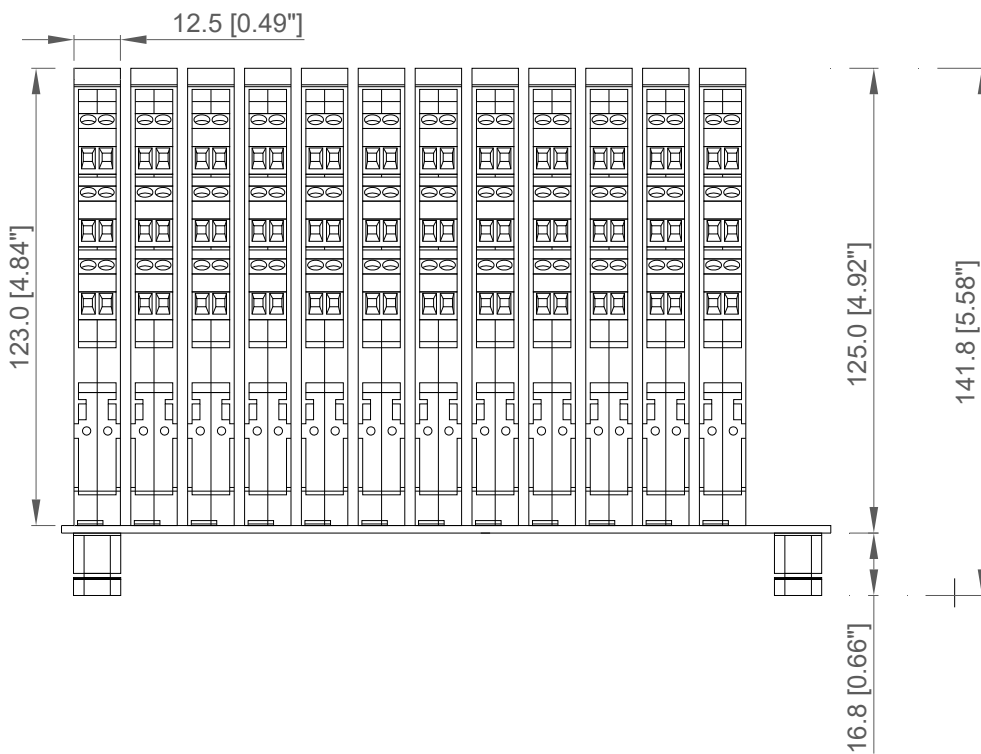


Ref. Nr	Q.ty	Description	Material
6	4	M4 x 8 Screw	Stainless Steel
7	4	M4 External Tooth lock Washer	Stainless Steel
8	8	M4 Washer	Stainless Steel
9	4	Self Tapping Spacer	NI - Plated Brass

Bottom view

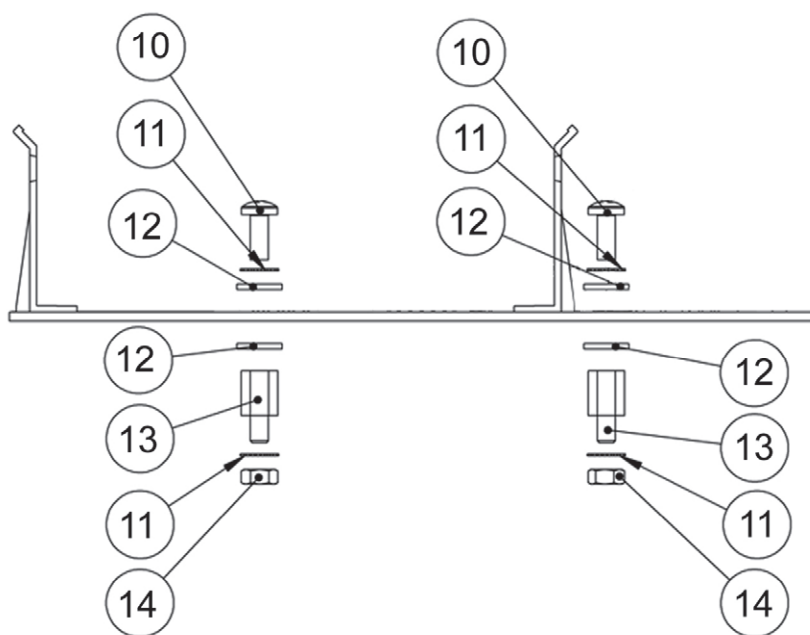
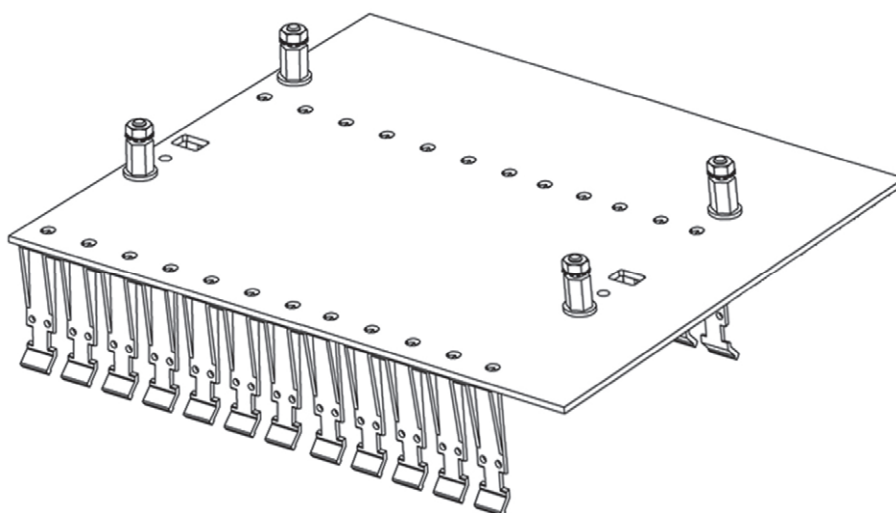


Side view





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 FBM241c (8 DI + 8 DO) Interface Card:

FIELD DEVICE	MODULE TYPE	MODULE FUNCTION	MODULE POSITION	MODULE CHANNEL NUMBER ("B" is only for Double channel)	INTERFACE CARD CHANNEL NUMBER	INTERFACE CARD CONNECTOR CONN.(37 poles) PIN NUMBER	NOTE				
	D5031D, D5032D, D5037D (Double channel)	Digital Input	1	1A	1	(-) 18 (+) 36					
				1B	2	(-) 17 (+) 35					
			2	2A	3	(-) 16 (+) 34					
				2B	4	(-) 15 (+) 33					
			3	3A	5	(-) 14 (+) 32					
				3B	6	(-) 13 (+) 31					
			4	4A	7	(-) 12 (+) 30					
				4B	8	(-) 11 (+) 29					
				D5040S D5048S, D5049S (Single channel)	Digital Output	5		5	9	(-) 10	
						6		6	10	(-) 9	
						7		7	11	(-) 8	
						8		8	12	(-) 7	
9	9	13				(-) 6					
10	10	14				(-) 5					
11	11	15				(-) 4					
12	12	16				(-) 3					

- Interface Card Connectors CON1: SUB D 37 poles male.
All positive poles of the DO signals are connected to +24 Vdc.
Shield terminal block provided on pin number 1.
The poles No. 2, 19, 20, 37 are not connected because not used.
- Poles from 21 to 28 of CON 1 are connected to ground

Termination Board supply connection details:

