

**Continental Disc<sup>®</sup>  
Corporation**

3160 WEST HEARTLAND DRIVE LIBERTY, MISSOURI 64068-3385  
PHONE: (816) 792-1500 FAX: (816) 792-2277 / 5447

## MTB-700 OPERATOR'S MANUAL FOR THE 240 VAC TWO / FOUR CHANNEL CONTINENTAL B.D.I. ALARM MONITOR WITH ANNUNCIATOR AND INTRINSICALLY SAFE BARRIERS

### BARRIER APPROVALS:

IEC EX BAS05.0008 [Ex ia] IIC -20°C ≤ Ta ≤ +60°C Uo=10.5V, Io=14V



II (1)GD [EEx ia] IIC  
-20°C ≤ Ta ≤ +60°C  
Uo : 10.5V Io : 14mA

Baseefa02ATEX0155  
Um = 265V max  
Power Supply : 85V to 265V AC, 6VA, 45-65Hz



Use in CL I, DIV 2, GP ABCD ; CL I, ZN2, IIC  
T4 with IS Con to CL I, II, III, DIV I, GP ABCDEFG;  
[AEx ia] IIC per dwg. MTLI/SCI50-018-11

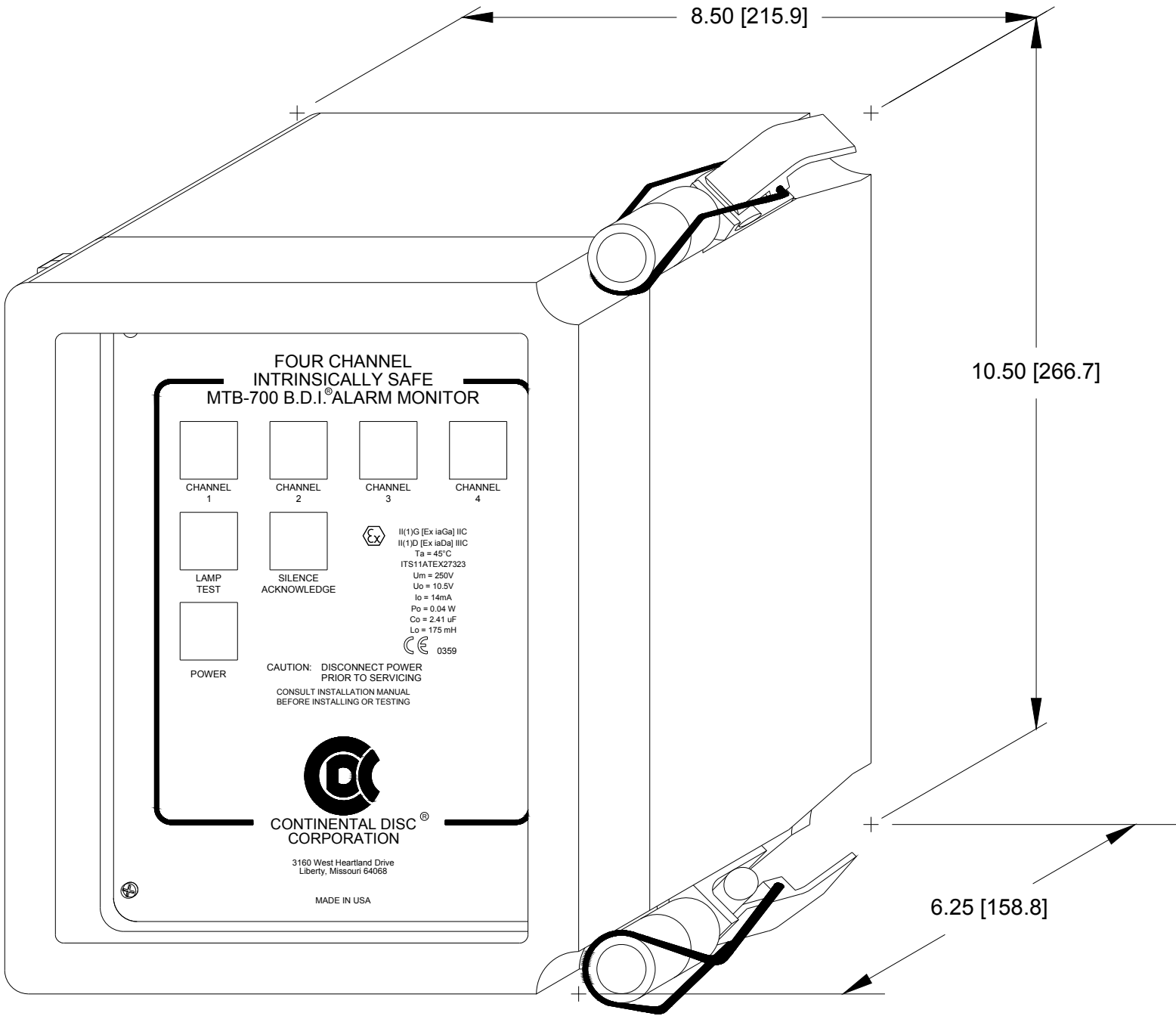


2005 1642744 X  
IS Field Connections for Class I Zone 0 and Class I Groups A,B,C,D; Class II  
Groups E,F,G; Class III. When connected per MTL Dwg MTLI/SCI50-018-21  
Suitable for use in Class I, Div 2, Groups A,B,C,D  
Ex [ia] IIC T4 Tamb=60°C  
Input Rated 85-265Vac, 45-65Hz, 7VA Um=265V max  
Relay Contact Rated 40Vdc, 2A max. Um=250V

### IMPORTANT

USER SHOULD READ CAREFULLY AND UNDERSTAND  
THIS MANUAL BEFORE INSTALLING, CONNECTING OR  
TESTING THIS UNIT

PART NO.'s: M2A-0000-V240  
M4A-0000-V240




## I. GENERAL INFORMATION

The Continental Disc Four Channel Alarm Monitor can be purchased with only one MTL barrier making it a two channel monitor, or with two MTL barriers making it a four channel monitor. The two channel monitor can be upgraded to a four channel monitor by purchasing another MTL barrier (see Replacement Parts List).

The Four Channel Alarm Monitor, when used in conjunction with the patented Continental Disc B.D.I. ® (Burst Disc Indicator) system, is designed to signal the operator immediately when a rupture disc has relieved an over-pressure condition from either a positive pressure or a negative (vacuum) pressure depending on the type of rupture disc installed.

The Four Channel Alarm Monitor uses MTL intrinsically safe barriers and DPDT relays for auxiliary contacts. It is designed to continuously monitor four separate field contacts and contains one Form C DPDT relay per channel. Modular construction is utilized with all circuitry.

The Four Channel Alarm Monitor circuitry is enclosed in a strong wall-mount, fiberglass enclosure which meets the requirements of Nema Types 4, 4X, 12, 13 and ATEX (Code: CE 0359 )

II (1) G [Ex iaGa] IIC / II (1) D [Ex iaDa] IIIC Ta = 45 / Certification Number: ITS11ATEX 27323). This unit must be installed in a general purpose non-hazardous environment.

## II. STORAGE

The Four Channel Alarm Monitor is to remain packed in the box in which it is shipped until ready for installation. This unit should be stored in a cool dry atmosphere with ambient temperatures within -40° to +122° Fahrenheit (-40° to +50° C).

## III. INSTALLATION

**WARNING:** These installation and servicing instructions are for use by qualified personnel only. To avoid injury and electrical shock, do not perform any servicing other than that contained in this manual. The installation and wiring of this unit should be performed in accordance with the latest edition of the governing Electrical Code.

**CAUTION:** The B.D.I. Alarm Monitor **MUST** be installed as follows:

### 1. Mount Enclosure

Bolt the monitor unit to wall using supplied mounting bracket hardware. This unit must be installed in a non-hazardous environment.

### 2. Install Barriers

Open the monitor front cover by rotating the handle located on the front. Remove the Annunciator Board by unscrewing the four outer screws and disconnecting the multi-lead wire from the board if necessary. Mount the MTL 5018AC Barrier on the 35mm symmetrical "top hat" rail located at the bottom of the monitor by means of the clip mechanism located at the base of the barrier. This is achieved by hooking one clip onto the rail and then rotating the unit until the other clip engages. The blue terminal block of the barrier should face to the right. Connect the wiring plug into connector P3 for barrier 1 (Channels 1 and 2) and into connector P4 for barrier 2 (Channels 3 and 4) while observing connector polarity.

### 3. Connect Power Supply Wiring

**CAUTION:** All power supply and relay contact wiring must be routed into the monitor by fabricating conduit holes in the top of the enclosure. Consult the current applicable governing Electrical Code Standard for wire size and conduit requirements.

#### A. For 240 VAC Operation Only

This unit is designed to receive direct 240 VAC Input. Connect the positive DC wire to terminal L1 of TB1 and the negative DC wire to terminal L2 of TB1 located on the left hand side of the circuit board (see Figure 1).

### 4. Connect External Relay Operated Devices

One DPDT Form C relay is provided for each of the four channels. These relays enable this unit to activate remote bells, buzzers, or lamps, as well as deactivate pumps, valves, etc. Each relay is installed such that it may use an independent power source. The relay connections (see Figure 1) for the rupture disc channels are as follows:

<u>Channel Number</u>	<u>Relay Pole Number</u>	<u>Common Connection</u>	<u>Normally Open Connection</u>	<u>Normally Closed Connection</u>
1	1	TB2-2	TB2-1	TB2-3
	2	TB2-5	TB2-6	TB2-4
2	1	TB3-2	TB3-1	TB3-3
	2	TB3-5	TB3-6	TB3-4
3	1	TB4-2	TB4-1	TB4-3
	2	TB4-5	TB4-6	TB4-4
4	1	TB5-2	TB5-1	TB5-3
	2	TB5-5	TB5-6	TB5-4

NOTE: "Normal" as used in this manual **DOES NOT** designate the shelf state of the relay. Normal state is monitor power ON, non-alarm with the coil relay energized. Non-alarm condition exists only when the intrinsically safe B.D.I. circuits are closed.

When determining what devices can be driven by these relays, the following relay limitations should not be exceeded.

Relay Output Ratings:

- 5 Amps @ 240 VAC Resistive
- 5 Amps @ 24 VDC Resistive
- 1/8 HP @ 120/240 VAC
- 7 amps maximum carry current

## 5. Mode of Operation

When powering up either on initial installation or upon restoring power from a lost power condition, the unit will power up in an alarm state, activating the horn and lamps, and will require resetting to return to the non-alarm state. After a rupture disc bursts, the horn and lamp will activate, indicating an alarm state. The monitor may be reset to non-alarm state by either of the following procedures.

- A. Silence the horn by depressing the momentary reset switch or momentarily closing the remote reset contacts. The monitor can then be returned to non-alarm state by replacing the B.D.I. Assembly.

NOTE: The momentary switch must be depressed for a minimum of one second.

- B. Alternatively the monitor may be returned to non-alarm state by replacing the B.D.I. Assembly and then resetting the monitor.

## 6. Connect Remote Reset and Test Switches

**CAUTION:** A two conductor shielded wire such as Belden #8412, #8441, or equivalent should be used for wiring these switches and should be physically separated from both AC wiring and the intrinsically safe disc signal wiring. Failure to do so could introduce false signals into the circuitry.

- A. Connect Remote Alarm Master Reset Switch

This switch must be a normally open momentary contact switch with a contact rating of at least 10 milliamperes at 12 VDC. The switch wire should enter the monitor through the upper right side of the enclosure and be connected at TB6 on terminals "Reset" and "GND".

- B. Connect Remote Master Test Switch

This switch must be a normally open momentary contact switch with a contact rating of at least 10 milliamperes at 12 VDC. The switch wire should enter the monitor through the upper right side of the enclosure and be connected at TB6 on terminals "Test" and "GND".

## 7. Connect Disc Signal Wiring at Safety Barrier

**WARNING:** Disconnect power to the monitor before wiring.

**CAUTION:** To properly maintain the intrinsic safety of the system and to ensure immunity of the system to external interference, approved shielded cable should be used. Individual runs should use a 2 conductor shielded cable such as Belden #8412, #8441, or equivalent. Runs from monitor to field junction box should use an 8 conductor shielded cable such as Belden #9504 or equivalent. Remove a maximum 2 cm of insulation from wires prior to connecting. All wires must be tie wrapped together prior to exiting the enclosure.

The disc signal wires should be routed into the monitor through the lower right side of the enclosure and should be connected to the appropriate MTL Barrier terminals. The terminals correspond to the disc channel numbers as follows:

<u>Channel Number</u>	<u>MTL Barrier</u>	<u>Terminal Number</u>
1	Top	5-6
2	Top	1-2
3	Bottom	5-6
4	Bottom	1-2

**CAUTION: Factory Mutual Specified field wiring must be within the following limits:**

Group A & B:	Series inductance	$L_a = 75$	Millihenries
	Shunt capacitance	$C_a = 5.5$	Microfarads
Group C:	Series inductance	$L_a = 270$	Millihenries
	Shunt capacitance	$C_a = 16.5$	Microfarads
Group D:	Series inductance	$L_a = 600$	Millihenries
	Shunt capacitance	$C_a = 44$	Microfarads

**CAUTION: BASEEFA Specified field wiring must be within the following limits:**

Group A:	Series inductance	$L_a = 552$	Millihenries
	Shunt capacitance	$C_a = 104$	Microfarads
Group B:	Series inductance	$L_a = 207$	Millihenries
	Shunt capacitance	$C_a = 39$	Microfarads
Group C:	Series inductance	$L_a = 69$	Millihenries
	Shunt capacitance	$C_a = 13$	Microfarads

**NOTE: Lead polarity is not important when connecting the disc signal wiring to the monitor. Any channel not being utilized should have its two corresponding MTL barrier terminals jumpered together.**

## 8. Final Assembly

Check all internal wiring to ensure proper connections with no unwanted possible shorts, grounds, or open circuits. Check all fuses to make sure they are still operable. Install the Annunciator Board by connecting the multi-lead wire to the board. Aligning the board over the four threaded hex standoffs and reinstall the four mounting screws.

## 9. Energize Power to Unit

With the monitor, disc, and remote indicators installed and properly connected, close the circuit breaker to apply power. The monitor should now power up indicating an alarm condition. Reset monitor to a non-alarm state.

## IV. MAINTENANCE

This monitor has been designed to operate continuously with little maintenance required. Periodic checks to make sure that units are clean and free from contaminating atmospheres, and are in good physical and electrical condition, constitute the only maintenance required.

Should the system fail to function properly, the operator should check for the following items where applicable:

- A. Does the unit have power?
- B. Are all fuses operable?
- C. Are the affected barriers and relays operating properly?
- D. Is all wiring connected properly?
- E. Is there a short or open circuit in the disc signal wiring or disc sensor?
- F. Is the disc alarm sensor strip broken?

Although this unit utilizes long life components and relays, every effort has been made to make this unit as easily serviceable as possible. Replacement components may be purchased from the following list or consult the factory for maintenance.

## V. REPLACEMENT PARTS LIST

<u>Description</u>	<u>Part Number</u>
Replacement parts kit for the M4A/M2A BDI monitor	516-0002-00
(2) Fuse, AGC 1/4 AMP	
(5) Lamp, type 7839	
(1) Lamp remover	
Four Channel Mother Board	219-0000-00
Board, Four Channel Annunciator	ANN-0000-00-V240-00-000
Barrier Assembly, MTL 5018AC, 240 VAC	513-0004-00
Fuse, 160mA MTL Barrier	110-1004-00

## VI. SPECIFICATIONS

Input Power:	240 VAC 50, 60 Hz
Signal Level:	7 VDC @ 22 MA MAX
Field Circuit Resistance to Operate:	Energize: $\leq 200 \Omega$ De-energize: $\geq 500 \Omega$
	Hysteresis: $100 \Omega$ nominal
Output Relay Contacts:	5 Amps @ 240 VAC Resistive MAX. 5 Amps @ 24 VDC Resistive MAX. 1/8 HP @ 120/240 VAC, 7 Amps maximum carry current
Operating Temperature Range:	-20° to + 45°C

## VII. LIMITED WARRANTY

Products manufactured by C.D.C. have a warranty against defective workmanship and material for a period of one year after date of invoice. In no event shall C.D.C.'s liability for damages with respect to any of the products furnished under this Agreement exceed the charges previously paid by the customer to C.D.C. for such products. Buyer's sole remedy for breach of this Agreement is repair or replacement of defective parts furnished by C.D.C., which have been returned to C.D.C.'s factory at purchaser's expense. It is expressly agreed between purchaser and C.D.C. that the remedy of repair and replacement is the exclusive and sole remedy of the purchaser.

## VIII. DISCLAIMER OF WARRANTIES

Except as specifically provided in this Agreement, there are no warranties, expressed or implied, including, but not limited to any implied warranties of merchantability or fitness for a particular purpose.

## **IX. DISCLAIMER OF CONSEQUENTIAL DAMAGES**

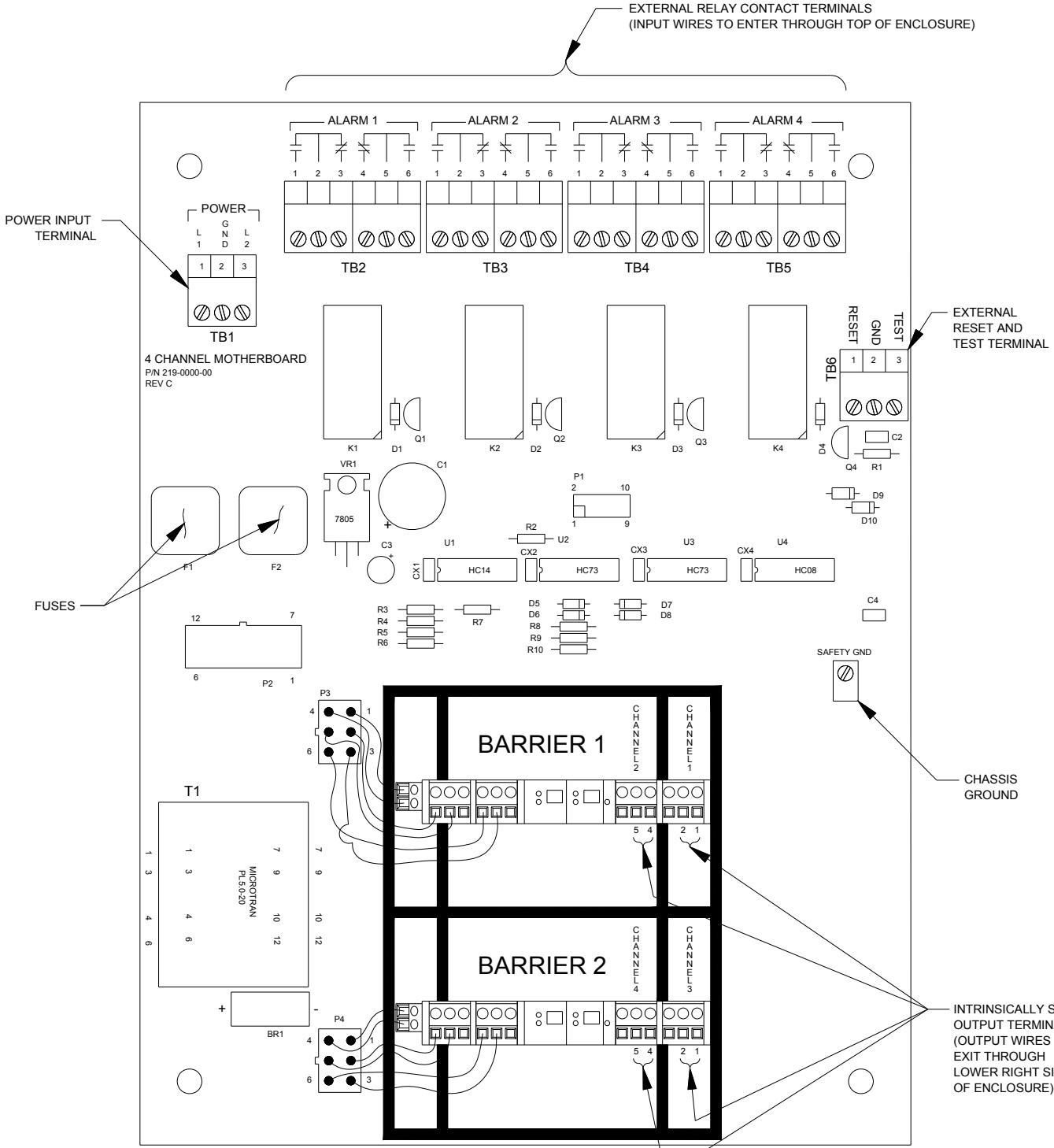
In no event shall C.D.C. be liable for consequential damages, including but not limited to damages for loss of use, damages for lost profits, and damages for resulting harm to property other than the C.D.C. assemblies and their component parts.

Customer acknowledges and understands that the provisions of these additional terms and conditions, including this paragraph concerning disclaimer of consequential damages and limitation or remedy, apply fully to the purchase of the products.

## **X. WARRANTY EXCLUSIONS**

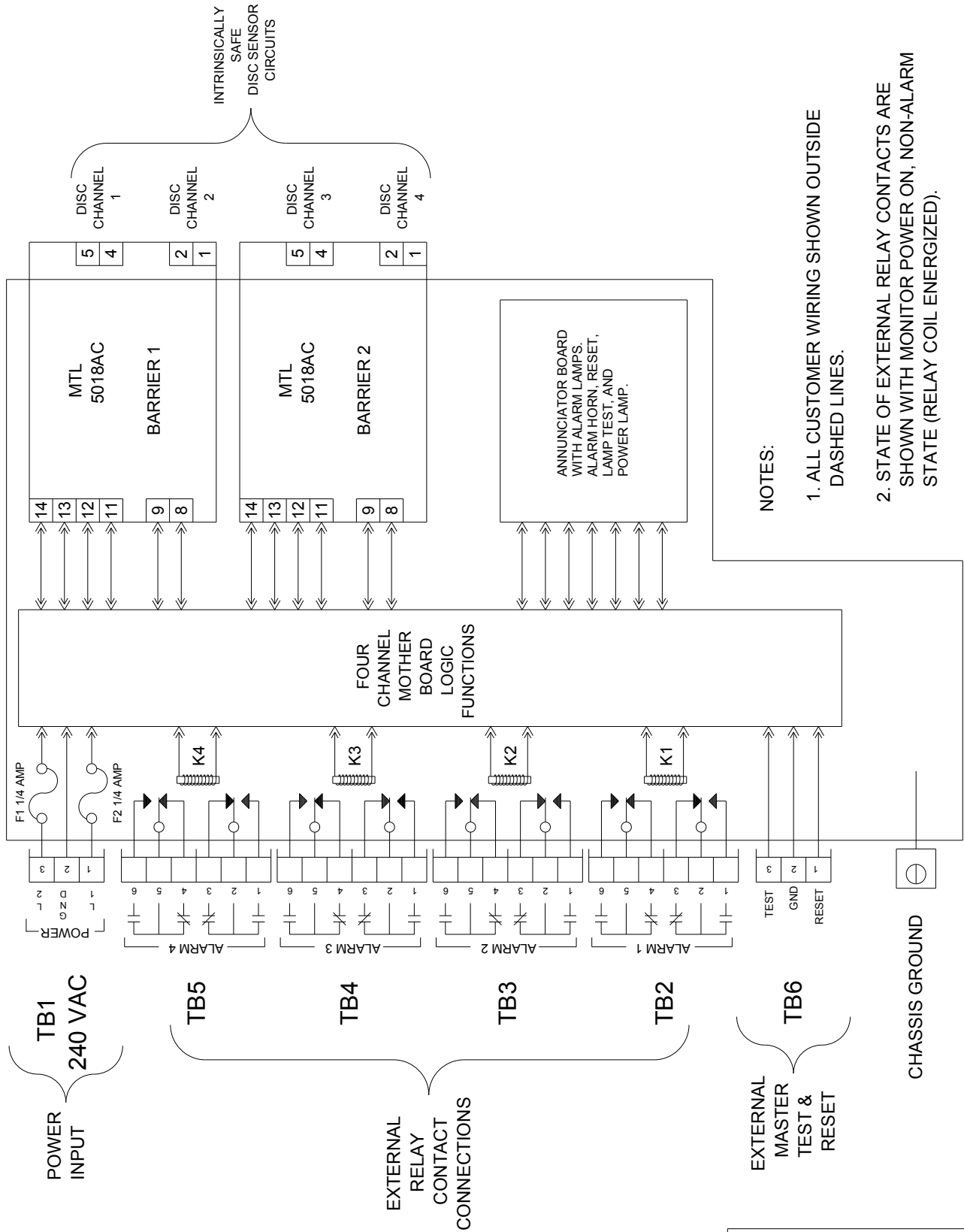
This warranty does not apply in the event of misuse or abuse of the product or as a result of unauthorized alterations or repairs. It is void if the serial number is altered, defaced, or removed.





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4 CHANNEL INTRINSICALLY  
SAFE ALARM MONITOR  
COMPONENT LAYOUT  
FIGURE #1



**NOTES:**

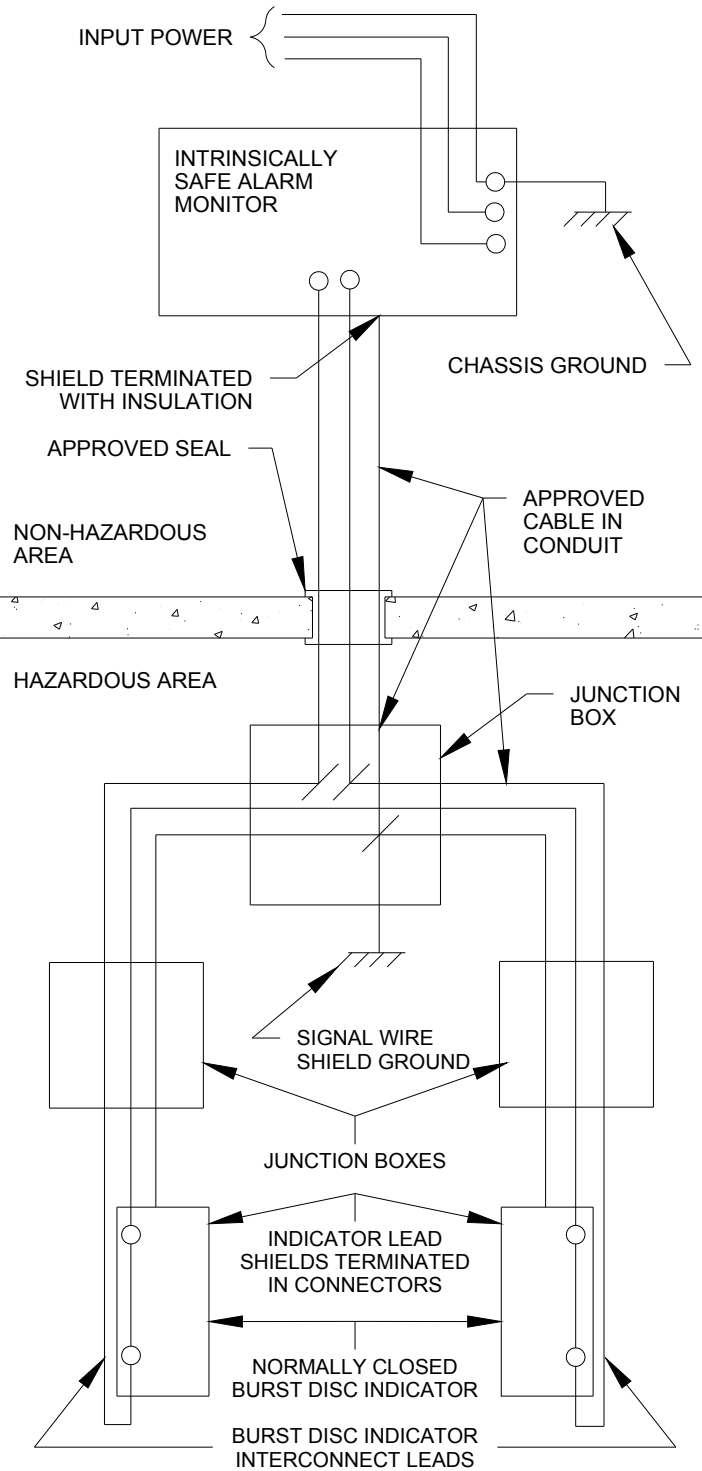
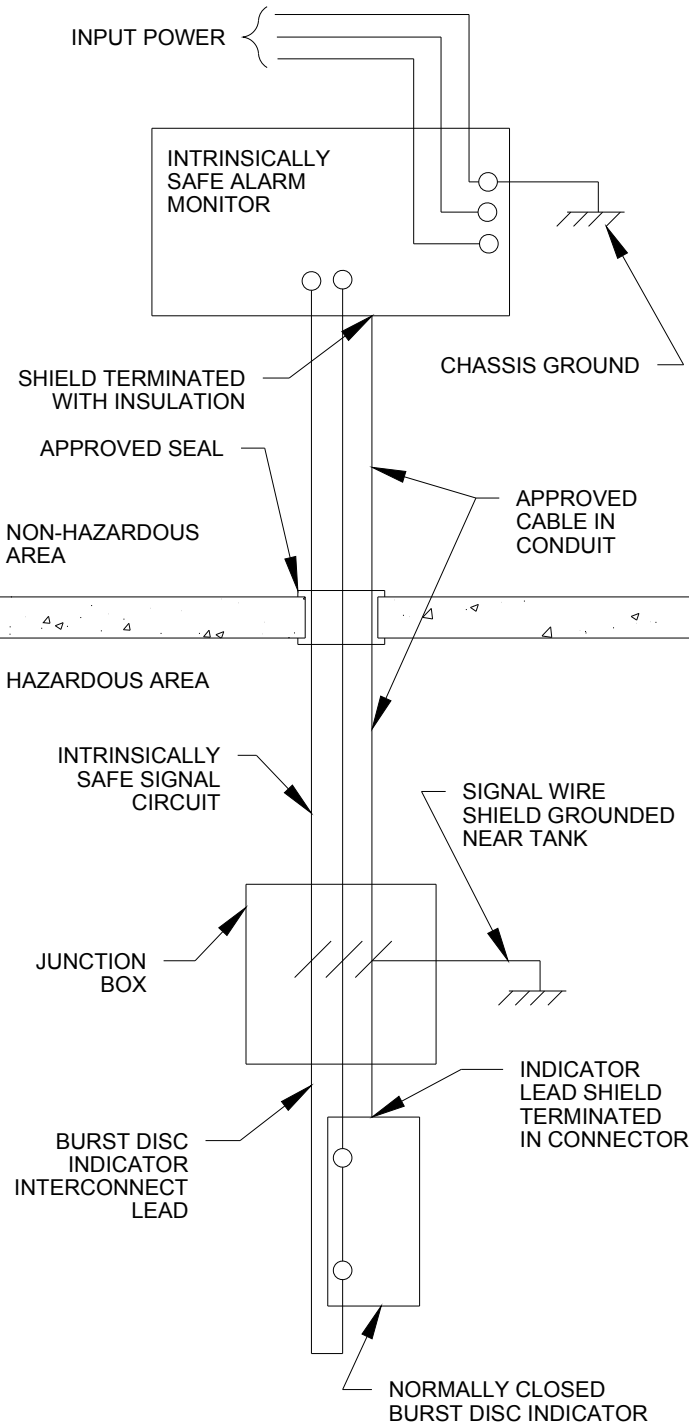
1. ALL CUSTOMER WIRING SHOWN OUTSIDE DASHED LINES.
2. STATE OF EXTERNAL RELAY CONTACTS ARE SHOWN WITH MONITOR POWER ON, NON-ALARM STATE (RELAY COIL ENERGIZED).

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4 CHANNEL CONTINENTAL  
B.D.I. ALARM MONITOR  
240 VAC CIRCUIT  
SCHEMATIC FIGURE #2

### SINGLE B.D.I. PER CHANNEL

### MULTIPLE B.D.I. PER CHANNEL



**NOTES:**

1. FACTORY MUTUAL FIELD WIRING MUST BE WITHIN THE FOLLOWING LIMITS:
  - GROUP A & B: SERIES INDUCTANCE  $L_s = 75$  MILLIHENRIES
  - SHUNT CAPACITANCE  $C_s = 5.5$  MICROFARADS
  - GROUP C & D: SERIES INDUCTANCE  $L_s = 270$  MILLIHENRIES
  - SHUNT CAPACITANCE  $C_s = 16.5$  MICROFARADS
2. BASEEFA SPECIFIED FIELD WIRING MUST BE WITHIN THE FOLLOWING LIMITS:
  - GROUP A & B: SERIES INDUCTANCE  $L_s = 207$  MILLIHENRIES
  - SHUNT CAPACITANCE  $C_s = 39$  MICROFARADS
  - GROUP C & D: SERIES INDUCTANCE  $L_s = 69$  MILLIHENRIES
  - SHUNT CAPACITANCE  $C_s = 13$  MICROFARADS

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**B.D.I. ALARM MONITOR  
INTRINSIC SAFETY  
WIRING DIAGRAM  
FIGURE #3**