Safe Area Load Cell Intrinsic Safety Barrier

Installation Instructions

B15055200A
(11/98)

INTRODUCTION

This publication is provided for individuals installing the described Mettler Toledo product designed for hazardous area protection of load cell applications.

All individuals and organizations are warned concerning installation and the dangers associated with the use of unauthorized parts/components and engineering designs.

Information regarding Mettler Toledo technical training may be obtained by contacting:

METTLER TOLEDO
1900 Polaris Parkway
Columbus, Ohio 43240-2020
(614) 438-4511

Notice

This intrinsic safety module is not Factory Mutual Approved.

The 0901-0416 Safe Area Load Cell Intrinsic Safety Module is designed to meet the specifications of ANSI/ISA RP 12.6 and Factory Mutual Approval Standard, Class Number 3610, when installed in a safe area.

PRECAUTIONS

READ this manual BEFORE operating or servicing this equipment.

FOLLOW these instructions carefully.

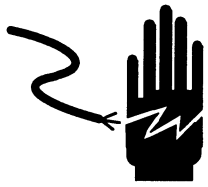
SAVE this manual for future reference.

DO NOT allow untrained personnel to operate, clean, inspect, maintain, service, or tamper with this equipment.

ALWAYS DISCONNECT this equipment from the power source before cleaning or performing maintenance.

CALL METTLER TOLEDO for parts, information, and service.

Note: If the unit has been stored or transported in below freezing temperatures, allow the unit to warm up to room temperature before turning on AC power.

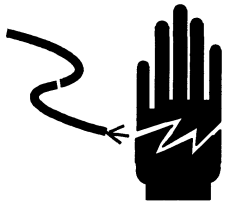


⚠ WARNING

DO NOT PERFORM ANY INSTALLATION OR SERVICING BEFORE THE HAZARDOUS AREA HAS BEEN SECURED BY THE RESPONSIBLE CUSTOMER OR HIS/HER AUTHORIZED PERSONNEL.

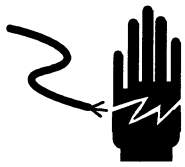
⚠ NOTICE

THE 0901-0416 SAFE AREA LOAD CELL INTRINSIC SAFETY MODULE IS NOT AGENCY APPOVED THOUGH ELECTRICALLY THE SAME AS THE 09010148000 HAZARDOUS AREA PROTECTION MODULE. THIS UNIT MUST BE INSTALLED IN A SAFE AREA OR ENCLOSED IN AN APPROPRIATE ENCLOSURE, PER N.E.C. ARTICLE 500.



⚠ WARNING

ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.



⚠ WARNING

FOR CONTINUED PROTECTION AGAINST SHOCK HAZARD, CONNECT TO PROPERLY GROUNDED OUTLET ONLY. DO NOT REMOVE THE GROUND PRONG.

⚠ CAUTION

BEFORE CONNECTING OR DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT, ALWAYS REMOVE POWER AND WAIT AT LEAST THIRTY (30) SECONDS BEFORE ANY CONNECTIONS OR DISCONNECTION'S ARE MADE. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT, OR BODILY HARM.

⚠WARNING

THE SAFE AREA LOAD CELL INTRINSIC SAFETY MODULE IS NOT DESIGNED FOR INSTALLATION WITHIN HAZARDOUS AREA LOCATIONS.

⚠WARNING

THE SAFE AREA LOAD CELL INTRINSIC SAFETY MODULE MUST EITHER BE INSTALLED IN A SAFE ENVIRONMENT WITHIN A NEMA 12 ENCLOSURE, OR INSTALLED INTERNAL TO AN APPROPRIATELY PURGED ENCLOSURE OR WITHIN AN APPROPRIATE NEMA 7/9 ENCLOSURE. PER N.E.C. ARTICLE 500

⚠CAUTION

FM LABELS MUST NOT BE AFFIXED TO THE SAFE AREA LOAD CELL INTRINSIC SAFETY MODULE OR ANY OTHER PART OF THE SYSTEM CONNECTED TO THE SAFET AREA LOAD CELL INTRINSIC SAFETY MODULE.

⚠WARNING

THE LOAD NON-INTRINSICALLY SAFE LOAD CELL POWER FROM THE TERMINAL MUST NOT STORE THE SAME CONDUIT AS THE INTRINSICALLY SAFE WIRING TO THE LOAD CELLS.

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Product Installation

The ***Safe Area Load Cell Intrinsic Safety Barrier*** (Model 0901-0416) is a safety device designed to limit voltage and current to analog load cell(s) located in a hazardous area from a Mettler Toledo digital indicator located in a **non-hazardous area**. The barrier is of a dual zener design that must have proper grounding and must be located in a safe area. It can be used to power up to six 350 ohm load cells.

The Safe Area Load Cell Intrinsic Safety Barrier is designed to meet the standards set forth in the National Electric Code (N.E.C.).

Installation Instructions

READ THESE INSTRUCTIONS COMPLETELY BEFORE STARTING INSTALLATION! Deviations from the instructions and specifications in this manual are prohibited unless written approval is obtained from METTLER TOLEDO ENGINEERING prior to installation. For assistance with technical problems or questions about installation procedures, contact your authorized Mettler Toledo representative.

Examine the equipment that is to be connected to the Safe Area Load Cell Intrinsic Safety Module (ISM). Any equipment condition which could create a safety hazard must be reported to the customer/user and documented on a service report. A copy of the report must be given to the customer and/or user. The same applies to any known environmental condition or application which is or could create a safety hazard.

All safety hazards must be corrected prior to installation or prior to the completion of the installation if they are detected during the installation process. If the customer/user decides not to have the hazards corrected, the person handling the installation must contact his or her supervisor/service manager for instructions. Whenever service is denied for safety reasons, the installer/service person must document the circumstances and facts of the incident and send the information to:

PRODUCT SAFETY MANAGER
METTLER TOLEDO INC.
1900 POLARIS PARKWAY
COLUMBUS, OHIO 43240-2020

The following information is required:

1. Customer name and address
2. Name and title of person disallowing safety corrections
3. Equipment model/factory and serial number
4. Safety discrepancies found (describe)
5. Mettler Toledo order numbers

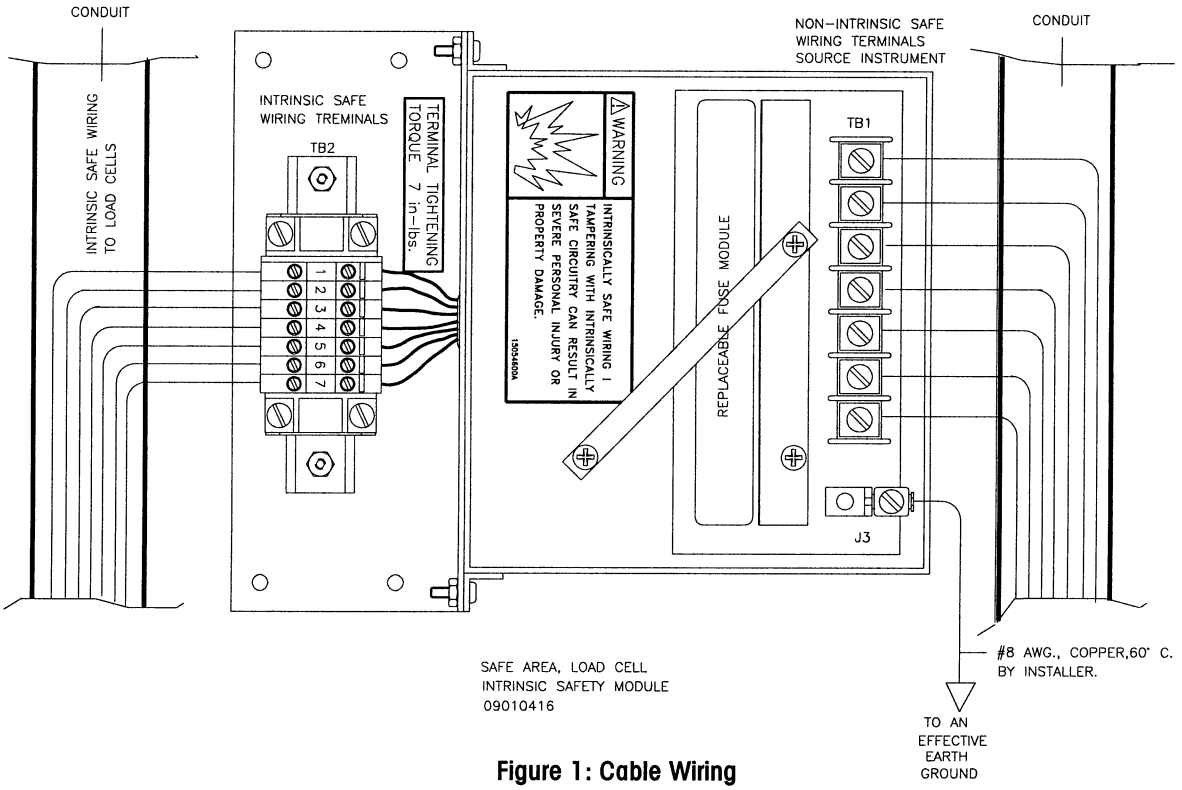

Figure 1: Cable Wiring

TB2 Terminal	Signal Description	Wire Color
1	+Signal	Green
2	-Signal	Black
3	Analog Ground	Orange
4	-Excitation	Blue
5	+Excitation	White
6	+Sense	Yellow
7	-Sense	Red

TB1 Terminal	Signal Description	Wire Color
1	+Signal	Green
2	-Signal	Black
3	Analog Ground	Orange
4	-Excitation	Blue
5	+Excitation	White
6	+Sense	Yellow
7	-Sense	Red

⚠WARNING

THE NON-INTRINSICALLY SAFE LOAD CELL POWER FROM THE TERMINAL MUST NOT SHARE THE SAME CONDUIT AS THE INTRINSICALLY SAFE WIRING TO THE LOAD CELLS.

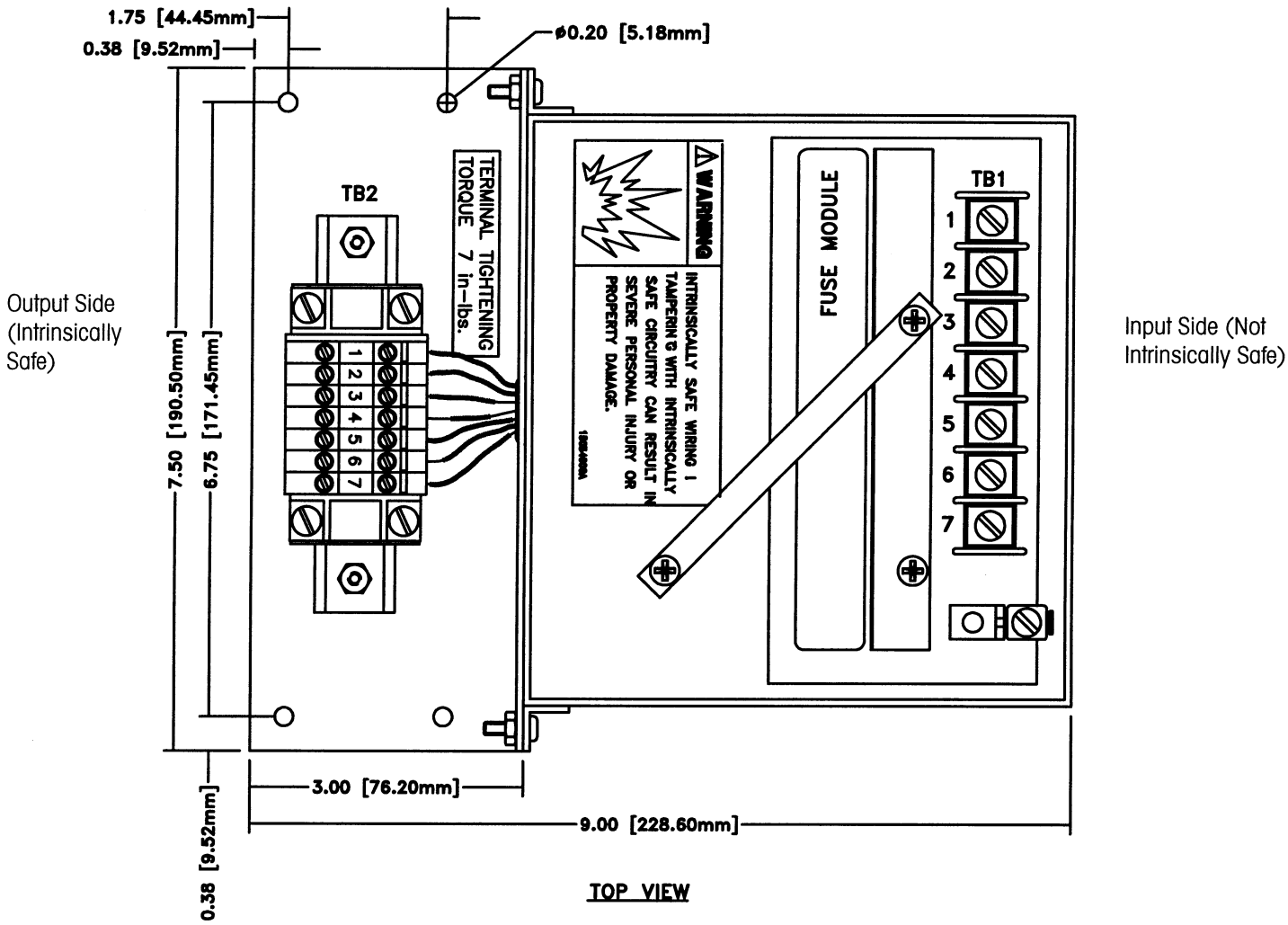

Figure 2: Mounting and General Dimensions

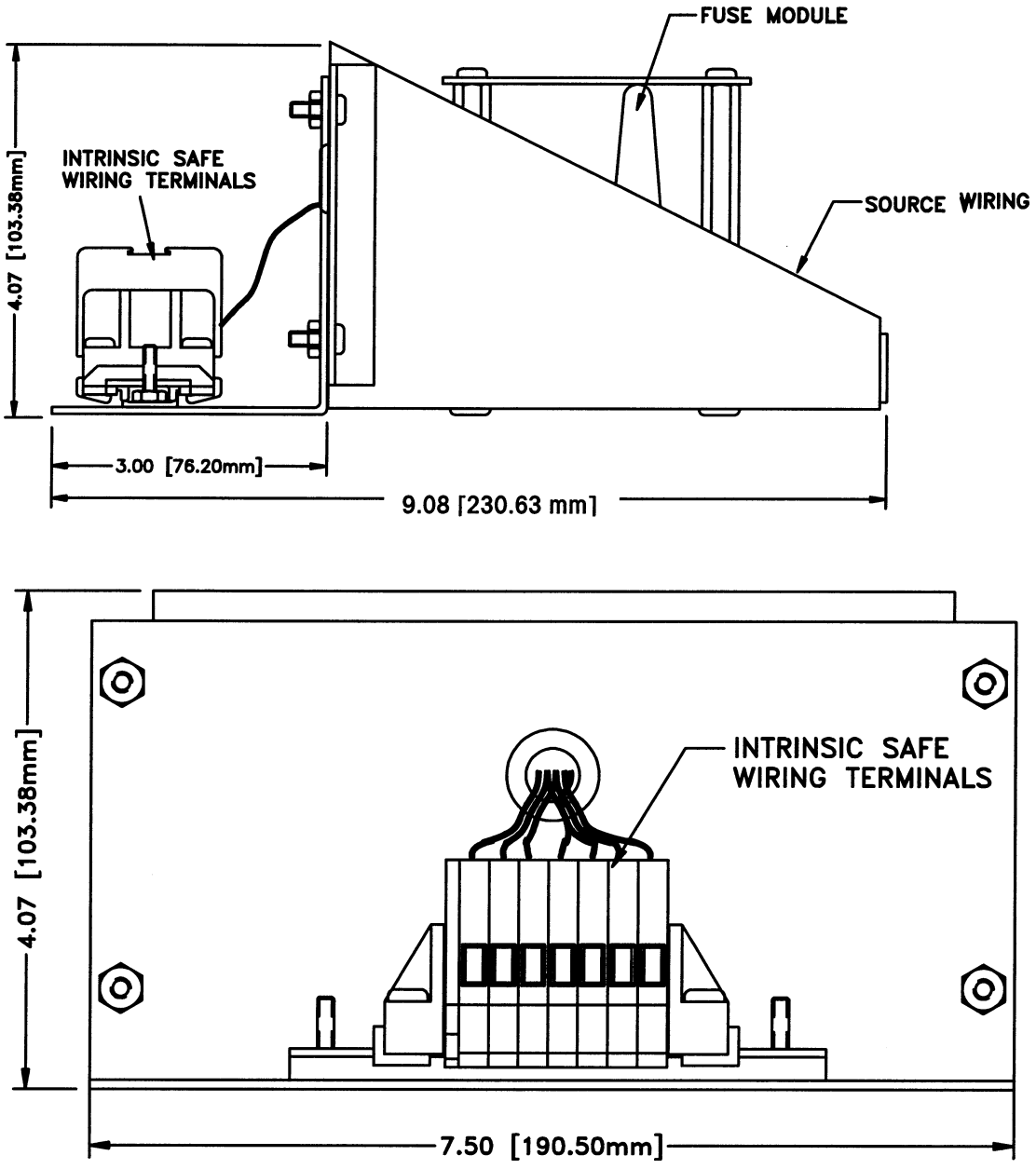

Figure 3: Side View, General Dimensions

Safe Area Wiring

When the Safe Area Load Cell Intrinsic Safety Module (0901-0416) is located inside a safe area enclosure, exposed terminals and wiring for intrinsic safe circuit must be separated from non-intrinsic safe terminals and wiring by:

1. Using an insulating or grounded metal partition between Input and Output connections. When a partition is used to segregate terminals , it must extend far enough beyond the connections to provide a two-inch spacing.

   Or,

2. Providing a two-inch separation between connections.

Care must be taken in laying out connections and in wiring to assure a two-inch minimum spacing between intrinsic safe and non-intrinsic safe circuits. Some layouts (such as when connections are arranged one above another) will not provide adequate separation if a wire becomes disconnected. In these cases, additional precautions (such as tie-downs) are necessary.

Please note the following:

- Non-intrinsically safe wiring MUST be connected at terminal strip TB1 of the Safe Area Load Cell Intrinsic Safety Module (0901-0416).
- Separate raceways must be used to keep the intrinsic safe wiring separate from the non-intrinsically safe wiring. Wire ties or equal are acceptable methods to separate wiring.
- Non-hazardous location equipment connected to the Safe Area Load Cell Intrinsic Safety Module (0901-0416) must not be powered by more than 250 volts (R.M.S. or D.C., line to line or line to ground) or generate any voltage internally in excess of this value.
- Source instrument excitation cannot exceed plus and minus 6 VDC referenced to ground.
- Acceptable methods of separation of intrinsically safe and non-intrinsically safe circuits by separate wire ways are shown in Figure 1.

Grounding the Safety Module

The safety of the intrinsically safe installation is assured by proper grounding. The ground connection to the Safe Area Load Cell Intrinsic Safety Module is connected to the ground lug 'J3' (refer to Figure 1) on the non-intrinsic safe wiring side of the barrier. The grounding path resistance from the barrier ground 'J3' to the designated ground electrode must be less than one ohm. Use a ground fault indicating instrument to confirm.

The intrinsic safety ground conductor must be used only for grounding of lug 'J3' to a grounding electrode. Reference N.E.C. Article 500.The grounding conductor must be a No. 8 A.W.G. or larger copper conductor. Aluminum must not be used in an intrinsic safety grounding system unless precautions are taken to prevent corrosion at connection points.

Grounding conductors must be installed in metal conduit, intermediate metal conduit, rigid non-metallic conduit, electrical metallic tubing or cable armor.

Hazardous Location Wiring

The output connection of the Safe Area Load Cell Intrinsic Safety Module (TB2 - blue terminals) must not be interconnected through plugs, cables, terminal blocks, or other connecting devices which contain non-intrinsically safe wiring.

All load cell cable conduits must only contain load cell wiring, and must be separate from all other wiring.

Wiring from the Safe Area Load Cell Intrinsic Safety Module must enter the hazardous area by the shortest route. Maximum total cable length from instrument to the load cell(s) through the Intrinsic Safety Module is 250 feet.

Most Mettler Toledo load cell cables with factory-installed connectors follow the Mettler Toledo six-wire color code. If the load cell cable contains only four wires, jumper the (+)excitation to the (+)sense and the (-)excitation to the (-)sense on the intrinsic safe side of the Safe Area Intrinsic Safety Module.

When using dual shield load cell cable DO NOT connect the outer shield to the intrinsic safety ground 'J3'. Connect the outer shield at the scale end and to an appropriate enclosure ground. Connect the inner shield of the load cell cable to the intrinsic safety ground 'J3'. Mettler Toledo recommends that intrinsically safe wiring be marked either by labeling or wire color code of light blue.

For additional installation information refer to "INSTALLATION of INTRINSICALLY SAFE SYSTEMS FOR HAZARDOUS (CLASSIFIED) LOCATIONS" ANSI / ISA - RP 12.6.

Hazardous Area Environmental Check

⚠WARNING

THE SAFE AREA LOAD CELL INTRINSIC SAFETY MODULE IS NOT DESIGNED FOR INSTALLATION WITHIN HAZARDOUS AREA LOCATIONS.

⚠WARNING

THE SAFE AREA LOAD CELL INTRINSIC SAFETY MODULE MUST EITHER BE INSTALLED IN A SAFE ENVIRONMENT WITHIN A NEMA 12 ENCLOSURE, OR INSTALLED INTERNAL TO AN APPROPRIATELY PURGED ENCLOSURE OR WITHIN AN APPROPRIATE NEMA 7/9 ENCLOSURE. PER N.E.C. ARTICLE 500

NOTICE

IF THE SAFE AREA LOAD CELL INTRINSIC SAFETY MODULE IS TO BE LOCATED WITHIN THE HAZARDOUS LOCATION, A SUITABLE NEMA 7/9 OR PURGED ENCLOSURE MUST BE PROVIDED WITHIN WHICH TO INSTALL THE SAFE AREA LOAD CELL INTRINSIC SAFETY MODULE. REFERENCE N.E.C. ARTICLE 500 FOR PROPER APPLICATION INFORMATION.

Verify with the responsible customer representative that the hazard(s) present is/are rated WITHIN the Class, Division, and Group classifications of the enclosure that will house the Safe Area Load Cell Intrinsic Safety Module.

Also verify that the auto-ignition temperature of the hazardous material present exceeds the temperature rating of the enclosure that will house the Safe Area Load Cell Intrinsic Safety Module, as defined by NFPA 70 and The National Electrical Code, Article 500. If the hazard rating does not fit these classifications or cannot be determined, refer this matter to your authorized METTLER TOLEDO representative before proceeding.

NOTE: Mettler Toledo listed load cells have a N.E.C. temperature rating of T4 (275 F., 135 C.). The Safe Area Load Cell Intrinsic Safety Module (0901-0416) has a N.E.C. temperature rating of T6 (185 F., 85 C.).

System Equipment Requirements

The Safe Area Load Cell Intrinsic Safety Module (0901-0416) is designed for use with Mettler Toledo terminals or load cell signal converters that provide excitation voltages not exceeding 6 volts D.C. The +Excitation voltage must not exceed +6 volts D.C., or switched peak referenced to ground. The -Excitation voltage must not exceed -6 volts D.C.. The Safe Area Load Cell Intrinsic Safety Module must only be connected to load cells listed on Mettler Toledo drawing 122502.

DO NOT CONNECT THE SAFE AREA LOAD CELL INTRINSIC SAFETY MODULE (09010416) TO ANY OTHER EXCITATION DEVICE OR LOAD CELLS.

System Installation and Wiring

Installation and wiring of the Safe Area Load Cell Intrinsic Safety Module (0901-0416) MUST be completed as specified on the drawings provided as reference that are included with these instructions:

122502	Load Cell List
150554R	External Wiring Diagram

Due to the open design of the Safe Area Load Cell Intrinsic Safety Module (0901-0416), load cell cable connections must be made using closed crimp-on terminations to provide appropriate wire restraint.

Pre-Power Checks

Make all of the following checks prior to applying power to the system. The Safe Area Load Cell Intrinsic Safety Module (0901-0416) has a replaceable barrier Fuse Module. Misconnection, misapplication, shorts, or opens incurred may cause the fuses inside the Fuse Module to open.

Check the terminal or load cell signal converter for correct low voltage PCB part number.

Check the connections and wiring as specified on drawing 150554R and the Figure 1 diagram at the beginning of this manual.

Check for shorted or open load cells lines and proper grounding as follows: [Resistance values indicated apply only when installed using listed load cells.]

- Disconnect the load cell cable from the terminal or signal converter.
- Measure the resistance between terminals 1 and 2 on terminal strip TB1 of the Intrinsic Safety Module. RESISTANCE MEASURED MUST BE GREATER THAN 500 OHMS.
- Measure the resistance between terminals 4 and 5 on terminal strip TB1 of the Intrinsic Safety Module. RESISTANCE MEASURED MUST BE GREATER THAN 120 OHMS.
- Measure the resistance between terminals 6 and 7 on terminal strip TB1 of the Intrinsic Safety Module. RESISTANCE MEASURED MUST BE GREATER THAN 120 OHMS.
- Measure the resistance between terminals 4 and 7 on terminal strip TB1 of the Intrinsic Safety Module. RESISTANCE MEASURED MUST BE GREATER THAN 60 OHMS BUT LESS THAN 80 OHMS.
- Measure the resistance between terminals 5 and 6 on terminal strip TB1 of the Intrinsic Safety Module. RESISTANCE MEASURED MUST BE GREATER THAN 60 OHMS BUT LESS THAN 80 OHMS.
- Assure that the terminal or signal converter chassis/frame is connected to power ground and to a true earth ground.

NOTICE
METAL BUILDING FRAMEWORK AND CONSTRUCTION MEMBERS ARE NOT CONSIDERRED TO BE EFFECTIVE EARTH GROUNDS.

- Make sure that scale rebars, framework, platters, and junction boxes are connected, through proper sized bonding wires, to an effective earth ground outside of the hazardous (classified) area.
- Make sure that the internal cable shield and ground terminals within the Safe Area Load Cell Intrinsic Safety Module and junction boxes are connected to proper grounds outside the hazardous (classified) area.
- Reconnect the load cell cable to the terminal or signal converter.
- Make sure all wiring connections are secure.
- Install and tighten covers of all enclosures.

NOTICE
BEFORE POWER IS APPLIED, REPEAT THE CHECKS IN THIS SECTION IF ANY CHANGES ARE MADE TO THE LOAD CELL WIRING.

System Checkout and Calibration

NOTICE
ASSURE THAT THE SYSTEM IS OPERATING PROPERLY BEFORE INTRODUCING THE HAZARDOUS MATERIAL. NO SERVICE OF THE SYSTEM MUST BE PERFORMED WHEN HAZARDOUS MATERIAL IS PRESENT.

Note: Initial checkout must be made when the complete area is safe.

NOTICE
MAKE SURE THE LOAD CELL WIRING IS NOT SHORTED OR DISCONNECTED WITH POWER APPLIED.

Apply power and complete system calibration and checkout as specified in the manuals for the terminal or signal converter and scales applicable for your system.

NOTICE
THE POTTED FUSE MODULE ASSEMBLY (PART NUMBER 11906900A) IS DESIGNED TO BE REPLACEABLE MUST LOSS OF EXCITATION OR RETURN SIGNAL OCCUR.

⚠CAUTION
FM LABELS MUST NOT BE AFFIXED TO THE SAFE AREA LOAD CELL INTRINSIC SAFETY MODULE OR ANY OTHER PART OF THE SYSTEM CONNECTED TO THE SAFET AREA LOAD CELL INTRINSIC SAFETY MODULE.

NOTES
1. The load cells listed on drawing 122502 are acceptable for use in Class I and II, Divisions 1 and 2, Group C, D, E, F, and G locations when interfaced using the Safe Area Intrinsic Safety Module (09010416000). Load cells are rated for a T-4 Temperature Code (135 C, 275 F). See NFPA 70, National Electrical Code, and NFPA 497 for description of this rating. 2. Individual load cell cable lengths may be increased up to 100 feet. Modification drawings must reference only approved load cells from list 122502. Four wire cells must be modified by the manufacturer, as proper load cell calibration is dependent upon cable lengths.

NOTES

METTLER TOLEDO
Scales & Systems
1900 Polaris Parkway
Columbus, Ohio 43240-2020

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