

IND780

Weighing Terminal

Division 2, Zone 2/22 Installation Guide | División 2, Zona 2/22 Guía de instalación | Division 2, Zone 2/22 Installationsanleitung | Division 2, Zone 2/22 Guide d'installation | Divisione 2, Zona 2/22 Guida all'installazione



IND780 Weighing Terminal

METTLER TOLEDO Service

Essential Services for Dependable Performance of Your IND780 Weighing Terminal

Congratulations on choosing the quality and precision of METTLER TOLEDO. Proper use of your new equipment according to this Manual and regular calibration and maintenance by our factory-trained service team ensures dependable and accurate operation, protecting your investment. Contact us about a service agreement tailored to your needs and budget. Further information is available at www.mt.com/service.

There are several important ways to ensure you maximize the performance of your investment:

1. **Register your product:** We invite you to register your product at www.mt.com/productregistration so we can contact you about enhancements, updates and important notifications concerning your product.
2. **Contact METTLER TOLEDO for service:** The value of a measurement is proportional to its accuracy – an out of specification scale can diminish quality, reduce profits and increase liability. Timely service from METTLER TOLEDO will ensure accuracy and optimize uptime and equipment life.
 - a. **Installation, Configuration, Integration and Training:** Our service representatives are factory-trained, weighing equipment experts. We make certain that your weighing equipment is ready for production in a cost effective and timely fashion and that personnel are trained for success.
 - b. **Initial Calibration Documentation:** The installation environment and application requirements are unique for every industrial scale so performance must be tested and certified. Our calibration services and certificates document accuracy to ensure production quality and provide a quality system record of performance.
 - c. **Periodic Calibration Maintenance:** A Calibration Service Agreement provides on-going confidence in your weighing process and documentation of compliance with requirements. We offer a variety of service plans that are scheduled to meet your needs and designed to fit your budget.
 - d. **GWP® Verification:** A risk-based approach for managing weighing equipment allows for control and improvement of the entire measuring process, which ensures reproducible product quality and minimizes process costs. GWP (Good Weighing Practice), the science-based standard for efficient life-cycle management of weighing equipment, gives clear answers about how to specify, calibrate and ensure accuracy of weighing equipment, independent of make or brand.

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NOTICE

This document is associated with an agency-approved product. No changes to this document are permitted without agency approval.

ORDERING INFORMATION

It is most important that the correct part number is used when ordering parts. Parts orders are machine processed, using only the part number and quantity as shown on the order. Orders are not edited to determine if the part number and description agree.

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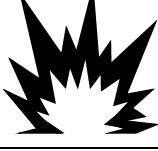









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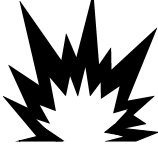



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Warnings and Cautions

- READ this manual BEFORE operating or servicing this equipment and 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 accessories.

	<p style="text-align: center;"> WARNING</p>
	<p>METTLER TOLEDO ASSUMES NO RESPONSIBILITY FOR CORRECT INSTALLATION OF THIS EQUIPMENT WITHIN A DIVISION 2 OR ZONE 2/22 AREA. THE INSTALLER MUST BE FAMILIAR WITH ALL DIVISION 2 OR ZONE 2/22 WIRING AND INSTALLATION REQUIREMENTS.</p>
	<p style="text-align: center;"> WARNING</p> <p>THE IND780 TERMINAL IS NOT INTRINSICALLY SAFE! DO NOT USE WITHIN AREAS CLASSIFIED AS HAZARDOUS DIVISION 1 OR ZONE 0/1 BECAUSE OF COMBUSTIBLE OR EXPLOSIVE ATMOSPHERES. FAILURE TO COMPLY WITH THIS WARNING COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.</p>
	<p style="text-align: center;"> WARNING</p> <p>DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.</p>
	<p style="text-align: center;"> WARNING</p> <p>THE IND780 TERMINAL HAS BEEN CERTIFIED BY UL (U.S., CANADA, ATEX AND IECEx) WITH A TEMPERATURE RATING OF T4 (135° C) FOR USE IN HAZARDOUS ENVIRONMENTS WHERE THE AUTO IGNITION TEMPERATURE OF THE HAZARDOUS MATERIAL IS BELOW THIS RATING.</p>
	<p style="text-align: center;"> WARNING</p> <p>IND780 TERMINALS THAT ARE NOT FACTORY-LABELED AS DIVISION 2 APPROVED OR MARKED AS EUROPEAN CATEGORY 3 MUST NOT BE INSTALLED INTO A DIVISION 2 OR ZONE 2/22 ENVIRONMENT.</p>
	<p style="text-align: center;"> WARNING</p> <p>IN ORDER TO INSTALL THE DIVISION 2 APPROVED IND780 TERMINAL UTILIZING THE U.S. OR CANADIAN UL APPROVAL, METTLER TOLEDO CONTROL DRAWING 64069877 MUST BE FOLLOWED WITHOUT EXCEPTION. IN ORDER TO INSTALL THE CATEGORY 3 MARKED IND780 TERMINAL UTILIZING THE EUROPEAN ATEX APPROVAL, THE TYPE EXAMINATION CERTIFICATE DEMKO 07ATEX0520819X AND ALL LOCAL REGULATIONS MUST BE FOLLOWED WITHOUT EXCEPTION. IN ORDER TO INSTALL THE IND780 TERMINAL UTILIZING THE IECEx APPROVAL, THE CERTIFICATE OF CONFORMITY IECEx UL 10.0014X AND ALL LOCAL REGULATIONS MUST BE FOLLOWED WITHOUT EXCEPTION. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.</p>

	<p style="text-align: center;"> WARNING</p> <p>THE IND780 TERMINAL MUST BE INSTALLED AND MAINTAINED PER THE SPECIAL CONDITIONS LISTED IN CHAPTERS 2 AND 3 OF THIS MANUAL WITHOUT EXCEPTION. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.</p>
	<p style="text-align: center;"> WARNING</p> <p>IF THE KEYBOARD, DISPLAY LENS OR ENCLOSURE IS DAMAGED ON A DIVISION 2 OR ZONE 2/22 MARKED IND780 TERMINAL THAT IS USED IN A DIVISION 2 OR ZONE 2/22 AREA, THE DEFECTIVE COMPONENT MUST BE REPAIRED IMMEDIATELY. REMOVE AC POWER IMMEDIATELY AND DO NOT REAPPLY AC POWER UNTIL THE DISPLAY LENS, KEYBOARD OR ENCLOSURE HAS BEEN REPAIRED OR REPLACED BY QUALIFIED SERVICE PERSONNEL. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.</p>
	<p style="text-align: center;"> WARNING</p> <p>THE INTERNAL #64064718 PDX[®] OPTION (KIT NUMBER 64067252) MUST NOT BE USED IN AN IND780 TERMINAL INSTALLED IN AN AREA CLASSIFIED AS CL I GP A,B DIVISION 2 OR CL I ZONE 2 GP IIC IN THE UNITED STATES and CANADA. FAILURE TO COMPLY WITH THIS WARNING COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.</p>
	<p style="text-align: center;"> WARNING</p> <p>THE INTERNAL #22009911 DISCRETE I/O RELAY OPTION (KIT NUMBER 64057419) MUST NOT BE USED IN AN IND780 TERMINAL INSTALLED IN AN AREA CLASSIFIED AS DIVISION 2 OR ZONE 2/22. FAILURE TO COMPLY WITH THIS WARNING COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.</p>
	<p style="text-align: center;"> WARNING</p> <p>DO NOT INSTALL, DISCONNECT OR PERFORM ANY SERVICE ON THIS EQUIPMENT BEFORE POWER HAS BEEN SWITCHED OFF OR THE AREA HAS BEEN SECURED AS NON-HAZARDOUS BY PERSONNEL AUTHORIZED TO DO SO BY THE RESPONSIBLE PERSON ON-SITE.</p>
	<p style="text-align: center;"> WARNING</p> <p>ONLY THE COMPONENTS SPECIFIED IN THIS MANUAL CAN BE USED IN THIS TERMINAL. ALL EQUIPMENT MUST BE INSTALLED IN ACCORDANCE WITH THE INSTALLATION INSTRUCTIONS DETAILED IN THIS MANUAL. INCORRECT OR SUBSTITUTE COMPONENTS AND/OR DEVIATION FROM THESE INSTRUCTIONS CAN IMPAIR THE INTRINSIC SAFETY OF THE TERMINAL AND COULD RESULT IN BODILY INJURY AND/OR PROPERTY DAMAGE.</p>

Disposal of Electrical and Electronic Equipment

In conformance with the European Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) this device may not be disposed of in domestic waste. This also applies to countries outside the EU, per their specific requirements.



Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment.

If you have any questions, please contact the responsible authority or the distributor from which you purchased this device.

Should this device be passed on to other parties (for private or professional use), the content of this regulation must also be related.

Thank you for your contribution to environmental protection.


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1 Introduction

This installation guide describes some basic concepts about Division 2 and Zone 2/22 hazardous areas and provides guidelines for installing the UL and DEMKO approved IND780 terminal into hazardous environments rated as Division 2 or Zone 2/22. Only IND780 terminals that are factory-labeled as Division 2 approved or marked as Category 3 may be installed into a Division 2 or Zone 2/22 hazardous area. Refer to the next chapter for details of the data plate markings on approved terminals. Models of the IND780 terminal that are not factory labeled for Division 2 compliance or as Category 3 devices may not be installed into a Division 2 or Zone 2/22 environment.



	 WARNING
	METTLER TOLEDO ASSUMES NO RESPONSIBILITY FOR CORRECT INSTALLATION OF THIS EQUIPMENT WITHIN A DIVISION 2 OR ZONE 2/22 AREA. THE INSTALLER MUST BE FAMILIAR WITH ALL DIVISION 2 OR ZONE 2/22 WIRING AND INSTALLATION REQUIREMENTS.

The approval by Underwriters Laboratories (UL) applies to Division 2 or Zone 2 applications that require certification to the appropriate United States and Canadian standards (see below). The ATEX certification applies to European Zone 2/22 applications that require certification to CENELEC standards to the ATEX directive. UL has also issued an IECEx Certificate of Conformity to appropriate IEC standards. These approvals may also be acceptable in other worldwide locations. Confirm with the customer or with local authorities the acceptance of these approvals before installation. Regardless of the installation location, all local and national wiring and installation requirements must be followed during installation.

The IND780 is certified to the following standards:

- United States
 - ISA 12.12.01:2013
- Canada
 - CSA C22.2 NO. 213 M1987
 - CSA C22.2 NO. 157-92
 - CSA C22.2 NO. 13-14
- ATEX
 - EN60079-0:2012+A11:2013
 - EN60079-11:2012
 - EN60079-15:2010
 - EN60079-31:2014
- IECEx
 - IEC60079-0:2011
 - IEC60079-11:2011
 - IEC60079-15:2010
 - IEC60079-31:2013

If so marked, the IND780 terminal has been approved for use in areas classified as Division 2 or Zone 2 or Zone 22. This approval DOES NOT mean that the IND780 terminal can be used in Division 1, Zone 0 or Zone 1 areas. Different precautions must be taken when installing equipment into these areas. Please consult your local METTLER TOLEDO representative regarding applications in a Division 1, Zone 0 Zone 1, Zone 20, or Zone 21 area.

	 WARNING
	<p>THE IND780 TERMINAL IS NOT INTRINSICALLY SAFE FOR USE WITHIN AREAS CLASSIFIED AS HAZARDOUS DIVISION 1 OR ZONE 0/1 BECAUSE OF COMBUSTIBLE OR EXPLOSIVE ATMOSPHERES. FAILURE TO COMPLY WITH THIS WARNING COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.</p>

The Category 3 marking of the IND780 permits use of the IDNet version with Category 3 approved "T-brick" versions of the High Precision base within Zone 2 and Zone 22 areas.

1.1. Hazardous Area Classification

A hazardous (explosive) area is classified as a Division 2 area when the hazard is either not present during normal operating conditions or is present only for very short periods of time.

A hazardous (explosive) area is classified as a Zone 2 area when an explosive gas-air mixture is either not present during normal operating conditions or is present only for very short periods of time.

A hazardous (explosive) area is classified as a Zone 22 area when an explosive atmosphere, in the form of a cloud of combustible dust in the air, is either not present during normal operating conditions or is present only for very short periods of time.

The area must be classified by an agent of the customer.

1.2. Protection Approaches

Various protection methods are used by different manufacturers for equipment located within Division 2 or Zone 2 or 22 classified areas. METTLER TOLEDO uses intrinsically safe level c "ic" protection method for the Analog load cell circuit and the Flow meter circuit and non-sparking "nA" protection on other connections and the entire terminal. This means the power present is insufficient to ignite an explosive atmosphere under normal operation conditions.

For Division 2, the protection method is non-incendive.

Other inputs and outputs to the IND780 terminal have been classified as incendive, which means they are capable of igniting such an atmosphere if not protected. Whether an input or output is defined as incendive or non-incendive, it must be protected accordingly. For installation in the United States refer to the control drawing 64069877 and the current version of the National Electrical Code (NFPA 70, Articles 500 – 504) and ANSI/ISA-RP12.6 for specific requirements. For installation in Canada refer to the control drawing 64069877 and the Canadian Electrical Code C22.1 Section 18, Appendix F. If installed outside the US and Canada, refer to the electrical regulations for the country of installation for specific wiring requirements.

**METTLER
TOLEDO DOES
NOT CLASSIFY
HAZARDOUS
AREAS!**

As a general guide, if a signal is rated as non-incendive or intrinsically safe, and is connected to another device that is non-incendive or intrinsically safe, and the non-incendive field circuit parameters agree in the correct manner, no special protection of the wiring is required. On the control drawings and certificates in this manual, a list of non-incendive field circuit and entity parameters for the Analog load cell, PDX digital load cell (except for ATEX and IECEx), and Flow meter connections of the IND780 terminal is given. These parameters include voltage, current, power, capacitance and inductance values. Comparing these values from the IND780 terminal with the values of other approved apparatuses (such as load cells) provides the ability to use the IND780 terminal with METTLER TOLEDO load cells and other manufacturers' load cells and approved apparatuses in an approved system. This process is explained in the next chapter.

If a signal cannot be classified as non-incendive or intrinsically safe, follow the electrical regulations for the country of installation for specific wiring requirements of incendive equipment in a Division 2 or Zone 2/22 area. This may require conduit or special protective cabling.

	 WARNING
	<p>IN ORDER TO INSTALL THE DIVISION 2 MARKED IND780 TERMINAL UTILIZING THE U.S. OR CANADIAN UL APPROVAL, METTLER TOLEDO CONTROL DRAWING 64069877 MUST BE FOLLOWED WITHOUT EXCEPTION. IN ORDER TO INSTALL THE CATEGORY 3 MARKED IND780 TERMINAL UTILIZING THE EUROPEAN ATEX APPROVAL, THE TYPE EXAMINATION CERTIFICATE DEMKO 07ATEX0520819X AND ALL LOCAL REGULATIONS MUST BE FOLLOWED WITHOUT EXCEPTION. IN ORDER TO INSTALL THE IND780 TERMINAL UTILIZING THE IECEx APPROVAL, THE CERTIFICATE OF CONFORMITY IECEx UL 10.0014X AND ALL LOCAL REGULATIONS MUST BE FOLLOWED WITHOUT EXCEPTION. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.</p>

1.3. Product Markings

The analog load cell versions of both enclosure types of the IND780 terminal have received Division 2 and Zone 2/22 approvals from UL and DEMKO. Terminals ending in Y96 are approved for use in the US and Canada; terminals ending in Z97 are approved for use in Europe.

Up to four analog load cell option cards can be installed in the IND780 terminal with the following factory numbers (replace y with 1):

- 78R-yyyx-xxx-000 (Color Panel mount enclosure – Analog)
- 78J-yyyx-xxx-Y96 (Color Harsh enclosure – Analog, US/Canada)
- 78J-yyyx-xxx-Z97 (Color Harsh enclosure – Analog, ATEX)

The flow meter versions of both enclosure types of the IND780 terminal have received Division 2 and Zone 2/22 approvals from UL and DEMKO. One or two flow meter option cards can be installed in standard IND780 terminal, and up to six in IND780 Q.iMPACT terminals, with the following factory numbers (replace y with F):

- 78R-yyy-xxx-000 (Color Panel mount enclosure – Flow Meter)
- 78J-yyy-xxx-Y96 (Color Harsh enclosure – Flow Meter, US/Canada)
- 78J-yyy-xxx-Z97 (Color Harsh enclosure - Flow Meter, ATEX)



The High Precision IDNet versions of both enclosure types of the IND780 terminal have received Zone 2/22 approval from UL and DEMKO. Up to four IDNet option cards can be installed in the IND780 terminal with the following factory numbers (replace y with 4):

- 78R-yyyyxx-xxx-000 (Color Panel mount enclosure – IDNet)
 - 78J-yyyyxx-xxx-Y96 (Color Harsh enclosure – IDNet, US/Canada)
 - 78J-yyyyxx-xxx-Z97 (Color Harsh enclosure – IDNet, ATEX)
- **Note that the METTLER TOLEDO High Precision IDNet bases are not approved for use within an area rated as Division 2 or Zone 2 in the United States and Canada.**

The above listed IND780 terminals and options are suitable for use in CL I GP A-D DIV 2; CL II GP F,G DIV 2; CL III; CL I ZONE 2 GP IIC locations when installed per METTLER TOLEDO drawing 64069877. Note that not all IND780 Options are approved for all areas. The panel-mount versions must be installed in a nationally recognized test laboratory approved, dust-tight enclosure appropriate for the environment. All approved versions must be installed per METTLER TOLEDO control drawing 64069877.

The PDX versions of both enclosure types of the IND780 terminal have received Division 2 and Zone 2/22 approval from UL and DEMKO. One PDX option card can be installed in the IND780 terminal in slot 1 or 2 with the following factory numbers (replace one y with 6):



- 78R-yyxxxx-xxx-000 (Color Panel mount enclosure – PDX)
 - 78J-yyxxxx-xxx-Y96 (Color Harsh enclosure – PDX, US/Canada)
 - 78J-yyxxxx-xxx-Z97 (Color Harsh enclosure – PDX, ATEX)
- **Note that the METTLER TOLEDO PDX is only approved for use within an area rated as CL I GP C,D DIV 2; CL II GP F,G Div 2; CL III; and CL I ZONE 2 GP IIB in the United States and Canada.**

	 WARNING
	<p>THE INTERNAL #64064718 PDX[®] OPTION (KIT NUMBER 64067252) MUST NOT BE USED IN AN IND780 TERMINAL INSTALLED IN AN AREA CLASSIFIED AS CL I GP A,B DIVISION 2 OR CL I ZONE 2 GP IIC IN THE UNITED STATES and CANADA. FAILURE TO COMPLY WITH THIS WARNING COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.</p>

The above listed IND780 terminals with the PDX option are suitable for use in CL I GP C,D DIV 2; CL II GP F,G DIV 2; CL III; CL I ZONE 2 GP IIB locations when installed per METTLER TOLEDO drawing 64069877. The panel-mount versions must be installed in a nationally recognized test laboratory approved, dust-tight enclosure appropriate for the environment. All approved versions must be installed per METTLER TOLEDO control drawing 64069877.

Harsh enclosure IND780 terminals that have been approved for use in Division 2 and Zone 2/22 areas by UL will have an approval label as shown in Figure 1-2 below. Panel-mount IND780 terminals that have been approved for use in Division 2 and Zone 2/22 areas by UL will have an approval label as shown in Figure 1-3 below.

The above listed models of the IND780 terminal have been European ATEX certified Category 3 by DEMKO and issued a Type Examination Certificate DEMKO 07ATEX0520819X. This authorizes METTLER TOLEDO to mark the terminal as:

Harsh:  II 3 G Ex ic nA [ic] IIB T4 Gc
 II 3 D Ex tc IIIC T85°C Dc
Panel:  II 3 G Ex ic nA [ic] IIB T4 Gc
 II 3 D Ex tc IIIC T85°C Dc

IND780 terminals that have been certified as European ATEX certified equipment by DEMKO will have the data labels as shown in Figure 1-2 and Figure 1-3, below.

The above listed models of the IND780 terminal have been IECEx certified by UL and issued a Certificate of Conformity IECEx UL 10.0014X. This authorizes METTLER TOLEDO to mark the terminal as:

Harsh: IECEx UL 10.0014X Ex ic nA [ic] IIB T4 Gc
 Ex tc IIIC T85°C Dc
Panel: IECEx UL 10.0014X Ex ic nA [ic] IIB T4 Gc
 Ex tc IIIC T85°C Dc

IND780 terminals that have been certified as IECEx-certified equipment by UL will have data labels as shown in Figure 1-1 and Figure 1-3, below.

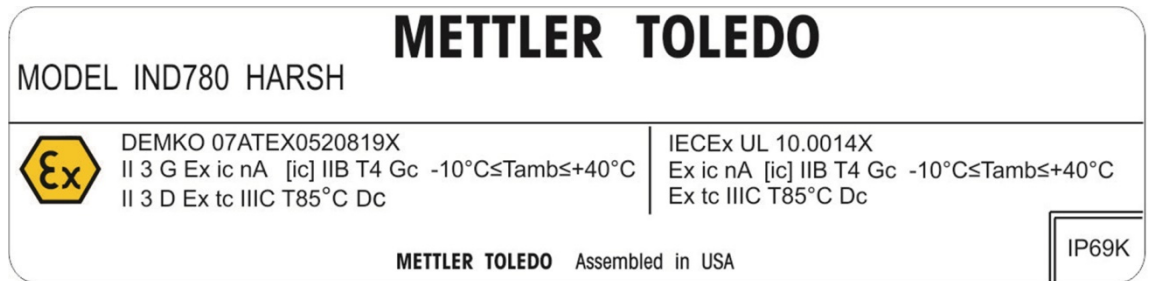


Figure 1-1: Harsh Enclosure Label, ATEX/IECEx



Figure 1-2: Harsh Enclosure Label, Division 2



Figure 1-3: Panel Mount Enclosure Label, Global

1.4. Product Date Code

The product date code for the IND780 terminal can be found on the serial data plate (on the top of both the panel-mount and harsh enclosures).

The serial number will begin with a letter and a number (for example B212000371). The letter represents the first three digits of the year per the date code chart in Table 1-1 (the letter “B” in our example represents “201x”) and the number is the unit’s digit of the year (the number “2” in our example). So, “B4” decodes to the year 2014.

Table 1-1: Current and Later Date Code Formats

Date Code	Year	Date Code	Year
A	200x	F	205x
B	201x	G	206x
C	202x	H	207x
D	203x	J	208x
E	204x	K	209x

1.5. Materials of Construction

The following materials are used externally in the construction of the IND780 terminal:

1.5.1. Harsh Enclosure

- Enclosure – type 304L stainless steel
- Enclosure gasket – silicon rubber
- Keypad overlay – 0.2mm polyester (PET) with hardcoating
- Display lens – 0.7mm polycarbonate (PC) with hardcoating
- Cable glands – nickel plated brass (as applicable)
- Cable gland plugs – polycarbonate
- Power cord (US/Canada) – Extra hard usage STOW cord, no plug

- Power cord (ATEX/IECEX) – PVC jacket with ferrules







1.5.2. Panel-mount Enclosure

- Front panel – type 304L stainless steel
- Front panel gasket – neoprene
- Keypad overlay – 0.2mm polyester (PET) with hardcoating
- Display lens – 0.7mm polycarbonate (PC) with hardcoating

2 Installation

Before installing the IND780 terminal into an area classified as Division 2 or Zone 2 according to the UL approval, read and understand METTLER TOLEDO control drawing 64069877 in the appendix of this guide. Make note of the inputs and outputs that will be used and the type of protection required for each I/O. Also note that the panel-mount IND780 terminal must be installed into a Nationally Recognized Test Laboratory approved dust tight enclosure appropriate for the environment.

Before installing the Category 3 rated IND780 terminal into an area classified as Zone 2 or Zone 22 per European ATEX or IECEx approval, read and understand the DEMKO Type Examination Certificate or the IECEx certificate in the appendix of this guide. Make note of the electrical data section for the energy limited values and the special conditions of use.

	 WARNING
	<p>PRIOR TO INSTALLING THE EQUIPMENT, ENSURE THE HAZARDOUS AREA IS MADE SAFE.</p>
	 WARNING
	<p>METTLER TOLEDO ASSUMES NO RESPONSIBILITY FOR CORRECT INSTALLATION OF THIS EQUIPMENT WITHIN A DIVISION 2 OR ZONE 2/22 AREA. THE INSTALLER MUST BE FAMILIAR WITH ALL DIVISION 2 OR ZONE 2/22 WIRING AND INSTALLATION REQUIREMENTS.</p>
	 WARNING
	<p>IN ORDER TO INSTALL THE DIVISION 2 APPROVED IND780 TERMINAL UTILIZING THE U.S. OR CANADIAN UL APPROVAL, METTLER TOLEDO CONTROL DRAWING 64069877 MUST BE FOLLOWED WITHOUT EXCEPTION. IN ORDER TO INSTALL THE CATEGORY 3 MARKED IND780 TERMINAL UTILIZING THE EUROPEAN ATEX APPROVAL, THE TYPE EXAMINATION CERTIFICATE DEMKO 07ATEX0520819X AND ALL LOCAL REGULATIONS MUST BE FOLLOWED WITHOUT EXCEPTION. IN ORDER TO INSTALL THE IND780 TERMINAL UTILIZING THE IECEx APPROVAL, THE CERTIFICATE OF CONFORMITY IECEx UL 10.0014X AND ALL LOCAL REGULATIONS MUST BE FOLLOWED WITHOUT EXCEPTION. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.</p>

Before beginning the installation, confirm that the correct markings are on the IND780 terminal indicating that the terminal has been approved for use in Division 2 or Zone 2/22 areas. The required markings were shown in Figures 1-1 and 1-2 in the first chapter of this guide.

If the IND780 terminal does not include the approval information label as shown in Figures 1-1 and 1-2, the IND780 terminal cannot be installed in the hazardous area.

	<p style="text-align: center;">! WARNING</p> <p>THE IND780 TERMINAL IS NOT INTRINSICALLY SAFE FOR USE WITHIN AREAS CLASSIFIED AS HAZARDOUS DIVISION 1 OR ZONE 0/1 OR ZONE 20/21 BECAUSE OF COMBUSTIBLE OR EXPLOSIVE ATMOSPHERES. FAILURE TO COMPLY WITH THIS WARNING COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.</p>
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2.1. Review Wiring Regulations

There are many methods that may be used to install properly approved equipment within hazardous areas. In some cases, the field circuit characteristics (electrical approval data) must be compared to those of the device connected to make sure the combination is safe. In other situations, only a confirmation of a certain IP rating and/or maximum surface temperature may be required to connect the devices.

METTLER TOLEDO claims no expertise with respect to all the electrical regulations that may be in effect at any specific location. You must refer to a national and/or local electrical standards handbook for the safest installation possible that meets all required standards.

Some national standards (including the NEC in the United States) require protection of incandive lines such as the AC power line or PLC interfaces using conduit or flexible conduit. This will require removal of the existing power cord and installation of approved hardware such as increased safety glands or conduit hubs. When new hardware connections are added to the IND780 enclosure, the connections must maintain the integrity of the sealing of the enclosure.

2.1.1. Conduit Hub Installation

It is recommended that the AC power be supplied to the terminal using a 1/2" or 3/4" conduit hub by making a hole in the upper part of the enclosure near the power supply using an appropriately sized chassis punch. Keeping the AC power entry near the internal power supply will help minimize electrical interference. The centerline of the hole should be approximately 2" from the top edge of the enclosure and 1 7/8" from the outside edge of the power supply side of the enclosure. When using the conduit hub instead of the supplied cable gland, the original enclosure opening for the power cord should be sealed with the 16 mm hole plug included with the terminal's standard bag of parts (#64057809) to maintain the sealing integrity of the harsh enclosure.



Figure 2-1: Conduit Hub Installation, Harsh Enclosure

2.1.2. Incendive Signal Lines

PLC and other incendive signal lines can be supplied to the terminal using a 1/2" conduit hub installed directly in the opening for either large cable plug. If a larger 3/4" hub is preferred, it can be installed by enlarging one of the large cable plug positions. Refer to Figure 2-1 for an example of the installation of a 3/4" conduit hub for AC power and a 1/2" conduit hub for the incendive signal lines.

To provide AC power to the harsh terminal, the power cord may be routed through an increased safety gland (supplied) or a conduit hub installed on the enclosure. If longer distance wiring is required, make a splice connection to the power cord outside the terminal's enclosure. Refer to the national and local electrical standards on power wiring and termination requirements in the Division 2 and Zone 2/22 environment. When wiring to the harsh terminal, the gage (or cross-sectional area) of the protective power ground must be equal to or greater than the gage (or cross-sectional area) of the power phased connectors. The power phased connectors (neutral and line) shall be a minimum of .9mm² (size 18awg) and a maximum of 3.6mm² (12awg) stranded wire.

2.1.2.1. Power Cord Notes for US/Canada

It is possible to use a power cord that conforms to NEC 501.105(B)(6) Flexible Cord for certain installations, provided that:

- The cord is equipped with a locking plug
- There is a power switch at the socket
- The cord's maximum length is 3 feet. (The supplied 6 foot cord must be trimmed in order to conform.)

Refer to NEC 501.105(B)(6) for complete requirements.

Figure 2-2 shows the harsh terminal as shipped, with unterminated power cord.



Figure 2-2: Terminal with Power Cord

2.1.3. Glands and Plugs

The European ATEX certification and the IECEx certification require that all glands and plugs on the harsh enclosure IND780 be ATEX- or IECEx-certified increased safety glands and plugs when the terminal is installed into a Zone 2 or Zone 22 area. The standard glands and plugs are **NOT** certified for increased safety. IND780 terminals with factory numbers ending in Z97 have ATEX plugs in their openings, and are shipped with a kit of ATEX glands.

Figure 2-3 shows examples of these ATEX-certified increased safety “e” glands and plugs.



Figure 2-3: ATEX-Certified Increased Safety Plug and Gland

2.2. Non-Incendive or I.S. Level c Inputs and Outputs

If a specific input or output is rated non-incendive, or I.S. level c, then a list of the field circuit parameters for that I/O will be given on the control drawing or certificate that can include the voltage, current, power, capacitance, and inductance. If an approved apparatus will be connected to a non-incendive input or output, then a comparison must be made between some of the electrical field circuit parameters of both devices including the connecting cable. These field circuit parameters include voltage, capacitance and inductance for Division 2 and Zone 2/22 applications. A current comparison and power comparison is not required in Division 2 or Zone 2/22 applications since the evaluation is made under normal operating conditions.

The two devices must compare as follows in order for the wiring to be considered non-incendive:

$$\begin{aligned}
 V_{\max} \text{ or } U_i \text{ (Maximum voltage permitted)} &\geq \underline{V_{oc}} \text{ or } \underline{U_o} \text{ (Total voltage output)} \\
 C_i \text{ (Input capacitance)} + C_{\text{cable}} \text{ (Cable capacitance)} &\leq \underline{C_o} \text{ or } \underline{C_o} \text{ (Allowable capacitance)} \\
 L_i \text{ (Input inductance)} + L_{\text{cable}} \text{ (Cable inductance)} &\leq \underline{L_o} \text{ or } \underline{L_o} \text{ (Allowable inductance)}
 \end{aligned}$$

The field circuit parameters associated with the IND780 terminal are underlined in the above formulas. The other parameters are related to the other approved apparatus or the connecting cable.

If the above conditions are not true, then the circuit must be treated as an incendive input or output and protected accordingly. If the parameters compare favorably as shown above, then no special protection is required for the wiring. Always refer to the electrical regulations for the country of installation for specific wiring requirements.

2.2.1. Analog Load Cell Interface

The analog load cell connection is rated non-incendive on the IND780 terminal by both UL and DEMKO. The field circuit parameters are listed next.

cULus	ATEX/IECEX
$V_{oc} = 10 \text{ VDC}$	$U_o = 10 \text{ VDC}$
$I_{sc} = 313 \text{ mA}$	$I_o = 313 \text{ mA}$
$P_o = 3.13 \text{ W}$	$P_o = 3.13 \text{ W}$
$C_o = 100 \mu\text{F}$	$C_o = 100 \mu\text{F}$
$L_o = 1.2 \text{ mH}$	$L_o = 1.2 \text{ mH}$

2.2.2. High Precision (IDNet) interface

For the IDNet interface in Europe, the normal operating parameters for voltage must be compared and the temperature must be reviewed. A power comparison and current comparison are not required in Zone 2/22 applications. The comparison is the same as for analog load cells.

$$V_{\max} \text{ or } U_i \text{ (T-Brick voltage permitted)} \geq \underline{V_{oc} \text{ or } U_o} \text{ (IND780 voltage output)}$$

$$I_{\max} \text{ or } I_i \text{ (T-brick current permitted)} \geq \underline{I_f \text{ or } I_o} \text{ (IND780 current output)}$$

- Note: The scale connected to the IDNet interface must also be approved for use in Zone 2/22 applications.

ATEX/IECEX			
Electrical Parameters			
IDNet Supply	(connector P1-C, P1-H)	Voltage max.	12.4 VDC
IDNet current loop interface circuit	(connector P1-A, P1-J, P1-D, P1-F)	Voltage max. Current max.	12.4 VDC 24.8 mA
RS422 interface circuit	(connector P1-E, P1-M, P1-L, P1-K)	Voltage max.	5.15 VDC

2.2.3. PDX® Digital Load Cell Interface

The PDX digital load cell connection is rated non-incendive on the IND780 terminal by UL for the US and Canada and nonsparking (nA) by DEMKO for ATEX and IECEX installations. The field circuit parameters are associated with power to the digital load cells, communication on the CANBus network while listening, and communication on the CANBus while talking. The field circuit parameters are listed next.

Power to PDX Load Cell	
cULus	ATEX/IECEX
$V_{oc} = 12.6 \text{ VDC}$	Voltage max = 12.6 VDC
$I_{sc} = 1181 \text{ mA}$	
$C_o = 59.4 \mu\text{F}$	
$L_o = 200 \mu\text{H}$	

CANBus Communication			
Listening		Talking	
cULus	ATEX/IECEX	cULus	ATEX/IECEX
$V_{max} = 26.8$ VDC	Input voltage max = 26.8 VDC	$V_{oc} = 5.277$ VDC	Output voltage max = 5.277 VDC
$I_{max} = 4$ mA		$I_{sc} = 200$ mA	
$C_i = 0.602$ nF		$C_o = 1000$ μ F	
$L_i = 0$ μ H		$L_o = 2$ mH	

2.2.4. Flow Meter Interface

The Flow meter connection is rated non-incendive on the IND780 terminal by both UL and DEMKO. The field circuit parameters are listed next.

cULus	ATEX/IECEX
$V_{max} = 26.8$ VDC	$U_i = 26.8$ VDC
$I_{max} = 200$ mA	$I_i = 200$ mA
$C_i = 0$ μ F	$C_i = 0$ μ F
$L_i = 30$ μ H	$L_i = 30$ μ H

2.3. Incendive Inputs and Outputs



If a specific input or output is rated incendive, then special wiring precautions must be taken to protect the wiring in the Division 2 or Zone 2/22 area. Refer to the electrical regulations for the country of installation for specific wiring requirements. Note that the United States and Canada requires installation of conduit hubs and conduit to protect incendive signals. Refer to the first part of this chapter for details.

All inputs and outputs to the IND780 terminal not listed in the section above as non-incendive must be treated as incendive.

2.4. Discrete I/O Relay Option



An arcing or sparking device cannot be used inside the Division 2 or Zone 2/22 hazardous area without use of a properly rated enclosure or other nationally approved protection. Because the optional Discrete I/O Relay board contains non-sealed relays, it cannot be installed and used in an IND780 used within a Division 2 or Zone 2/22 hazardous area.

If discrete inputs and outputs are required, the Discrete I/O Solid State option (Kit number: 64057422, PCB: 22009913, as shown in the control drawing) can be used. It is also possible to use an ARM100 remote module (#71209352), which must be located in the safe area or inside a properly rated enclosure. **The Discrete I/O Relay option (Kit number: 64057419, PCB 22009911) MUST NOT BE USED in an area classified as Division 2 or Zone 2/22.**

	 WARNING
	<p>THE INTERNAL #22009911 DISCRETE I/O RELAY OPTION (KIT NUMBER 64057419) MUST NOT BE USED IN AN IND780 TERMINAL INSTALLED IN AN AREA CLASSIFIED AS DIVISION 2 OR ZONE 2/22. FAILURE TO COMPLY WITH THIS WARNING COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.</p>

2.5. Temperature Rating

It is important that the temperature rating of the IND780 terminal be appropriate for the environment in which it will be used. The IND780 terminal is approved for US and Canada, ATEX and IECEx, with a temperature rating of T4 (135° C) for gas and dust environments. This value must be lower than the Auto Ignition Temperature (AIT) of the hazardous product in order to be safe. If the AIT of the hazardous product is lower than the temperature rating of the IND780 terminal, the IND780 terminal **MUST NOT BE USED** in that environment.

	 WARNING
	<p>THE IND780 TERMINAL HAS BEEN APPROVED BY UL (U.S. AND CANADA) WITH A TEMPERATURE RATING OF T4 (135° C) FOR USE IN HAZARDOUS ENVIRONMENTS. IT HAS BEEN CERTIFIED FOR ATEX IECEx WITH A TEMPERATURE RATING OF T4 (135° C) FOR GAS AND DUST ENVIRONMENTS. IT MUST NOT BE USED IN AREAS WHERE THE AUTO IGNITION TEMPERATURE OF THE HAZARDOUS MATERIAL IS BELOW THIS RATING.</p>

2.6. Division 2 Application Example Using Load Cells

The following is an example of applying the IND780 terminal in a Division 2 application connecting a model 2158 Vertex floor scale with 50 feet of load cell cable. The field circuit parameters for all devices and cables in the load cell line (including the load cells and junction box) must also be known.

Terminal model: IND780 terminal (Division 2 approved)

Base model: 2158 VERTEX® (with approved cells)

Load cell model: METTLER TOLEDO 0745A

Quantity of load cells: 4

Load cell cable length: 50 feet

Junction box PCB p/n: 13640300A

IND780 load cell field circuit parameters from control drawing 64069877:

$$V_{oc} \text{ or } U_o = 10.0 \text{ VDC}$$

$$I_{sc} \text{ or } I_o = 313 \text{ mA}$$

$$P_o = 3.13 \text{ W}$$

$$C_o \text{ or } C_o = 100 \mu\text{F}$$

$$L_a \text{ or } L_o = 1.2 \text{ mH}$$

Load cell field circuit parameters from model 745A load cell control drawing:

$$V_{\text{max}} \text{ or } U_i = 25 \text{ VDC}$$

$$I_{\text{max}} \text{ or } I_i = 600 \text{ mA}$$

$$C_i = 0 \text{ } \mu\text{F}$$

$$L_i = 29 \text{ } \mu\text{H}$$

Default load cell cable values from IND780 terminal control drawing 64069877:

$$C_{\text{cable}} = 60 \text{ pF / foot}$$

$$L_{\text{cable}} = 0.2 \text{ } \mu\text{H / foot}$$

The 2158 junction box PCB was determined not to have significant capacitance or inductance impact. Values shown below should be used.

$$C_i = 0 \text{ pF}$$

$$L_i = 0 \text{ } \mu\text{H}$$

Now, compare these values using the formulas provided in the previous section of this chapter and determine if all three criteria pass or fail. Note that the field circuit parameters for capacitance of the load cell must be multiplied by the quantity of load cells used. Also note that the field circuit parameters for the load cell cable must be multiplied by the total load cell cable length.

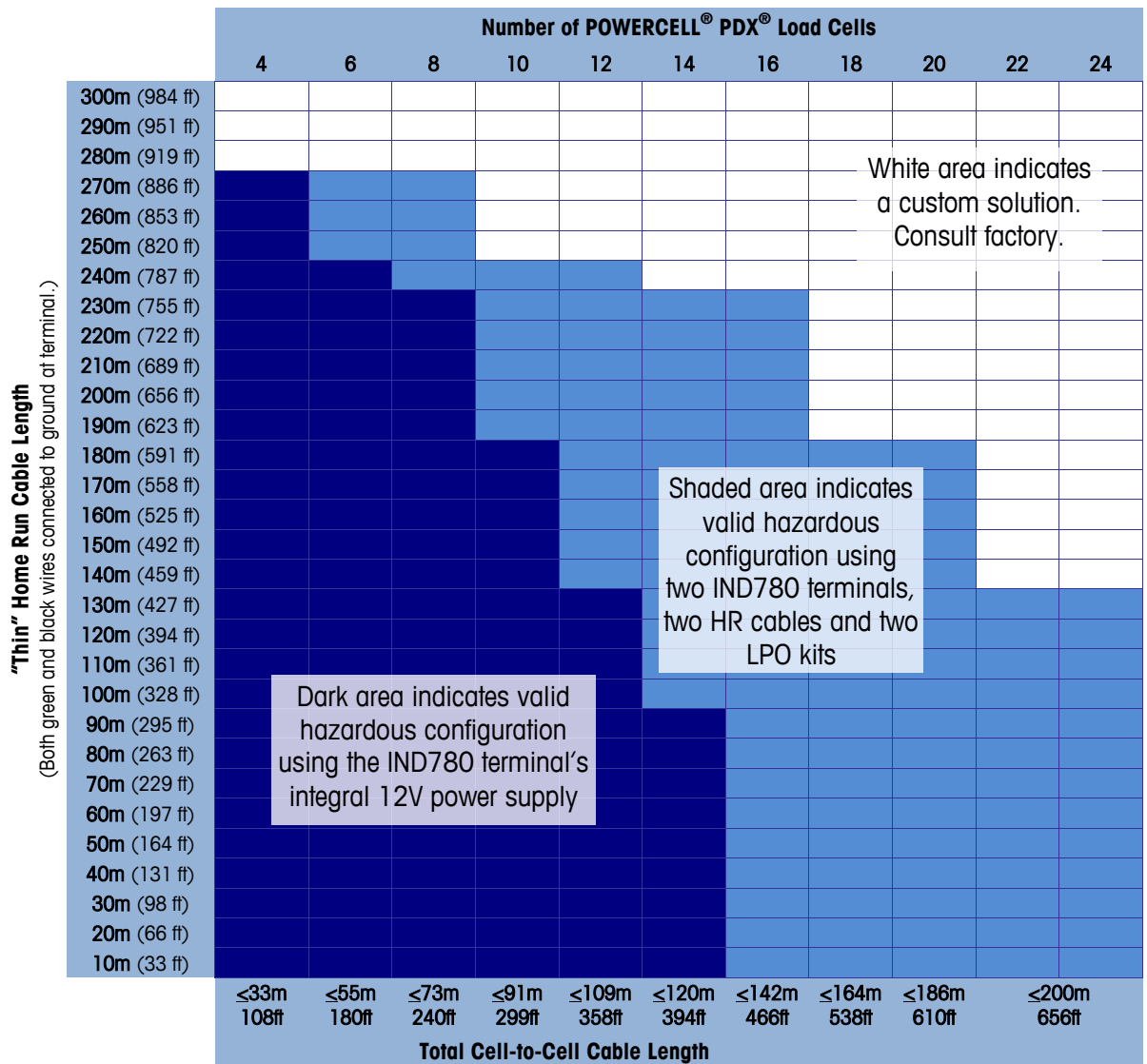
Formula	Pass or Fail
$V_{\text{max}} \text{ or } U_i \text{ must be } \geq V_{\text{sc}} \text{ or } U_o$ $25 \text{ VDC} \geq 10.0 \text{ VDC}$	PASS
$C_i + C_{\text{cable}} \leq C_a \text{ or } C_o$ $C_i = 0 \text{ } \mu\text{F} * 4 \text{ cells} = 0 \text{ } \mu\text{F} \text{ (load cells)}$ $C_i = 0 \text{ } \mu\text{F} \text{ (junction box)}$ $C_{\text{cable}} = 60 \text{ pF / foot} * 50 \text{ feet} = 3000\text{pF} = 0.003 \text{ } \mu\text{F}$ $(0 \text{ } \mu\text{F} + 0 \text{ } \mu\text{F} + 0.003 \text{ } \mu\text{F}) \leq 100 \text{ } \mu\text{F}$	PASS
$L_i + L_{\text{cable}} \leq L_a \text{ or } L_o$ $L_i = 29 \text{ } \mu\text{H} \text{ (load cells)}$ $L_i = 0 \text{ } \mu\text{H} \text{ (junction box)}$ $L_{\text{cable}} = 0.2 \text{ } \mu\text{H / foot} * 50 \text{ feet} = 10 \text{ } \mu\text{H}$ $(29 \text{ } \mu\text{H} + 0 \text{ } \mu\text{H} + 10 \text{ } \mu\text{H}) \leq 1.2 \text{ mH}$	PASS

In addition to the formulas above, the temperature rating of the IND780 terminal must be checked against the AIT (Auto Ignition Temperature) of the hazardous product. For this example, the hazardous product has an AIT of 200°C (393°F), which is higher than the rating of the IND780 terminal UL approval value of 135°C (271°F). This indicates the temperature comparison test passes.

Since all three field circuit parameters compare favorably and pass the formula evaluation and the temperature comparison test passes, the products listed in this example may be safely installed into a Division 2 area. They must be installed according to the IND780 control drawing 64069877 using all pertinent local and national standards.

2.7. Hazardous Area Configuration for POWERCELL PDX Load Cells

Table 2-1: Hazardous Area Configuration Table for Div 2, Zone 2/22 (IND780, POWERCELL PDX, no I/O or comm. board options)



■ The configurations indicated in Table 2-1 are confirmed for operation up to 50°C (122°F).

Applications that use two terminals require each terminal to be connected to an independent scale platform. Both IND780 terminals must have a POWERCELL PDX option card.

One terminal operates as a secondary terminal, associating a SICS COM port connection with its PDX scale.

The other (primary) terminal receives the SICS data from the secondary terminal and adds it to the output of its own PDX scale, using SUM scale. The SUM scale result gives the total weight recorded by all PDX cells.

2.7.1. Example Configuration

24 load cell system with 12 cells on platform 1, 12 cells on platform 2

- The two terminal system is always bound to the same rules as the single scale system shown in dark blue in Table 2-1. In this example, for 12 cells each home run cable must be no longer than 130m (427ft) in length and the cell-to-cell cable length for each terminal network must be no longer than 109m (358ft). For each PDX network, from each terminal the total cable length (home run cable plus cell-to-cell cables) must be no longer than 303m (994ft).

2.7.1.1. Secondary IND780 connected to platform 2

- Scale 1 is configured as a PDX scale
- Com1 is configured under CONNECTIONS as a SICS output associated with Scale 1

2.7.1.2. Primary IND780 connected to platform 1

- Scale 1 is configured as a PDX scale
- Scale 2 is configured as a SICS scale associated with a COM1; the serial cable from the secondary terminal must be attached to the primary terminal's COM1 port
- Configure a SUM scale to add Scale 1 and Scale 2. The primary terminal displays the result of the sum of all PDX cells

2.8. Division 2 Application Example Using POWERCELL PDX Load Cells

The following is an example of applying the IND780 terminal with PDX Option in a Division 2 application connecting a scale based on model SLC820 POWERCELL PDX digital load cells with 50 feet of load cell cable. The field circuit parameters for all devices and cables in the load cell line must be known.

Terminal model: IND780 terminal PDX Option (Division 2 approved)

Base model: VTC221 Concrete Deck (with approved cells)

Load cell model: METTLER TOLEDO SLC820 POWERCELL PDX

N of load cells: 10

Load cell cable length: 600 feet

IND780 PDX digital load cell field circuit parameters from control drawing 64069877:

Power
V_{oc} or $U_o = 12.6$ VDC
I_{sc} or $I_o = 1181$ mA
$P_o = 14.9$ W
C_a or $C_o = 59.4$ μ F
L_a or $L_o = 200$ μ H

CANBus	
Listening	Talking
V_{max} or $U_i = 26.8$ VDC	V_{oc} or $U_o = 5.277$ VDC
I_{max} or $I_i = 4$ mA	I_{sc} or $I_o = 200$ mA
	$P_o = 1.06$ W
$C_i = 0.602$ nF	$C_a = 1000$ μ F
$L_i = 0$ μ H	$L_a = 2$ mH

Load cell field circuit parameters from model SLC820 POWERCELL PDX load cell control drawing:

Power
V_{max} or $U_i = 26.4$ VDC
I_{max} or $I_i = 60$ mA
$C_i = 11$ nF
$L_i = 0$ μ H

CANBus	
Listening	Talking
V_{max} or $U_i = 26.8$ VDC	V_{oc} or $U_o = 5.277$ VDC
I_{max} or $I_i = 4$ mA	I_{sc} or $I_o = 200$ mA
	$P_o = 1.06$ W
$C_i = 0.602$ nF	$C_a = 1000$ μ F
$L_i = 0$ μ H	$L_a = 2$ mH

Default load cell cable values from IND780 terminal control drawing 64069877:

$$C_{cable} = 60 \text{ pF / foot}$$

$$L_{cable} = 0.2 \text{ } \mu\text{H / foot}$$

Now, compare these values using the formulas provided in the previous section of this chapter and determine if all three criteria pass or fail. The values for the Power, CANBus listening, and CANBus

talking must be evaluated. Note that the field circuit parameters for capacitance of the load cell must be multiplied by the quantity of load cells used. The inductance value is the same for 1 through 24 load cells since the inductance is in parallel. Also note that the field circuit parameters for the load cell cable must be multiplied by the total load cell cable length.

Formula Power evaluation	Pass or Fail
V_{max} or $U_{i (I/c)}$ must be $\geq V_{oc}$ or $U_o (PDX)$ $26.4 \text{ VDC} \geq 12.6 \text{ VDC}$	PASS
$C_{i (I/c)} + C_{cable} \leq C_a$ or $C_o (PDX)$ $C_{i (I/c)} = 11 \text{ nF} * 10 \text{ cells} = 110 \text{ nF} = .110 \mu\text{F}$ $C_{cable} = 60 \text{ pF} / \text{foot} * 600 \text{ feet} = 36,000 \text{ pF} = 0.036 \mu\text{F}$ $(.110 \mu\text{F} + 0.036 \mu\text{F}) = 0.146 \mu\text{F} \leq 59.4 \mu\text{F}$	PASS
$L_{i (I/c)} + L_{cable} \leq L_a$ or $L_o (PDX)$ $L_{i (I/c)} = 0 \mu\text{H}$ $L_{cable} = 0.2 \mu\text{H} / \text{foot} * 600 \text{ feet} = 120 \mu\text{H}$ $(0 \mu\text{H} + 120 \mu\text{H}) = 120 \mu\text{H} \leq 200 \mu\text{H}$	PASS

Formula CANBus talking	Pass or Fail
V_{max} or $U_{i (I/c)}$ must be $\geq V_{oc}$ or $U_o (PDX)$ $26.8 \text{ VDC} \geq 5.277 \text{ VDC}$	PASS
$C_{i (I/c)} + C_{cable} \leq C_a$ or $C_o (PDX)$ $C_{i (I/c)} = .602 \text{ nF} * 10 \text{ cells} = 6.02 \text{ nF} = .00602 \mu\text{F}$ $C_{cable} = 60 \text{ pF} / \text{foot} * 600 \text{ feet} = 36,000 \text{ pF} = 0.036 \mu\text{F}$ $(.00602 \mu\text{F} + 0.036 \mu\text{F}) = 0.04202 \mu\text{F} \leq 1000 \mu\text{F}$	PASS
$L_{i (I/c)} + L_{cable} \leq L_a$ or $L_o (PDX)$ $L_{i (I/c)} = 0 \mu\text{H}$ $L_{cable} = 0.2 \mu\text{H} / \text{foot} * 600 \text{ feet} = 120 \mu\text{H}$ $(0 \mu\text{H} + 120 \mu\text{H}) = 120 \mu\text{H} \leq 2.0 \text{ mH}$	PASS

Formula CANBus listening	Pass or Fail
V_{max} or $U_{i (PDX)}$ must be $\geq V_{oc}$ or $U_o (I/c)$ $26.8 \text{ VDC} \geq 5.277 \text{ VDC}$	PASS
$C_{i (PDX)} + C_{cable} \leq C_a$ or $C_o (I/c)$ $C_{i (PDX)} = .602 \text{ nF} * 10 \text{ cells} = 6.02 \text{ nF} = .00602 \mu\text{F}$ $C_{cable} = 60 \text{ pF} / \text{foot} * 600 \text{ feet} = 36,000 \text{ pF} = 0.036 \mu\text{F}$ $(.00602 \mu\text{F} + 0.036 \mu\text{F}) = 0.04202 \mu\text{F} \leq 1000 \mu\text{F}$	PASS

Formula CANBus listening	Pass or Fail
$L_i \text{ (PDX)} + L_{\text{cable}} \leq L_a \text{ or } L_o \text{ (I/c)}$ $L_i \text{ (PDX)} = 0 \mu\text{H}$ $L_{\text{cable}} = 0.2 \mu\text{H / foot} * 600 \text{ feet} = 120 \mu\text{H}$ $(0 \mu\text{H} + 120 \mu\text{H}) = 120 \mu\text{H} \leq 2.0 \text{ mH}$	PASS

In addition to the formulas above, the temperature rating of the IND780 terminal must be checked against the AIT (Auto Ignition Temperature) of the hazardous product. For this example, the hazardous product has an AIT of 200°C (393°F), which is higher than the rating of the IND780 terminal UL approval value of 135°C (211°F). This indicates the temperature comparison test passes.

Since all three field circuit parameters for power, CANBus listening, and CANBus talking pass the formula evaluations and the temperature comparison test passes, the products listed in this example may be safely installed into a Division 2 area. They must be installed according to the IND780 control drawing 64069877 using all pertinent local and national standards.

2.9. Installation Procedure

Once the information in this chapter and in all other suggested regulatory documents has been read and understood, the IND780 terminal may be installed. In addition to the information in this chapter, instructions, control drawings and details listed in the certificates found in the Appendix of this guide must be followed during the installation.

2.9.1. Mounting the Terminal

The Panel Mount enclosure is designed to mount into a cutout of a flat surface such as an instrument panel or industrial enclosure or door. The harsh enclosure is designed to be placed on a desktop or can be mounted to a vertical surface with the optional mounting brackets. Mount the terminal where viewing is optimal and the terminal keypad is easily accessible.

2.9.1.1. Panel Mount Enclosure

The Panel Mount enclosure comes with a gasket and a backing plate, used to mount the unit to a panel. The enclosure will mount and seal properly on panel thicknesses from 16 GA to 11 GA (1.52 mm to 3.04 mm).

Install the Panel Mount enclosure by following these steps:

Cut an opening and holes in the panel or industrial enclosure as indicated in the panel cutout dimensions shown in Figure 2-4 in inches and [mm].

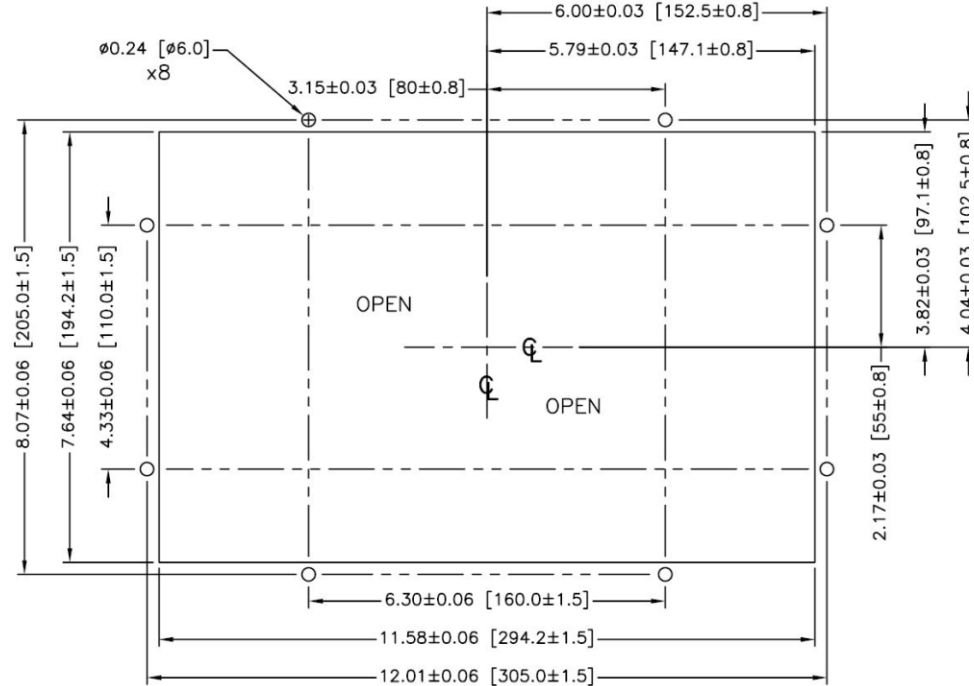


Figure 2-4: Panel Cutout Dimensions

Loosen and remove the eight, 8 mm shoulder nuts holding the backing plate to the enclosure. The gasket should remain in position on the terminal. Figure 2-5 shows two images of the enclosure, one with the backing plate removed to show the gasket, the other with the backing plate installed.

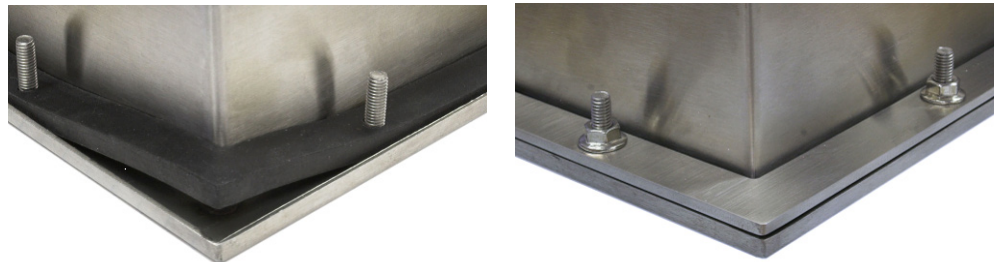


Figure 2-5: Gasket on Enclosure (left) and Backing Plate Installed (right)

Place the terminal through the cutout from the front and secure by fitting the backing plate over the back of the terminal, then installing and tightening the eight nuts until secure. Figure 2-6 shows a side view of a panel installation.

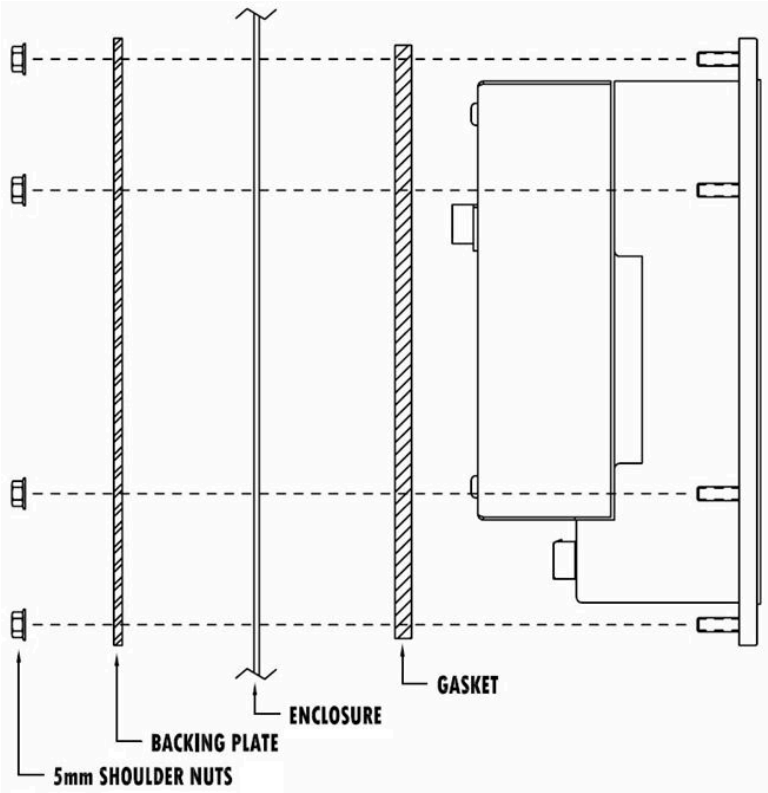


Figure 2-6: Panel Mounting, Side View

2.9.1.2. Harsh Enclosure

The harsh enclosure is made of stainless steel and designed to rest on a flat surface such as a table or desk top, or to be mounted to a vertical surface with optional mounting brackets. In desktop configuration, the front panel angle is approximately 70 degrees from vertical. In wall mount configuration, the front panel is approximately 40 degrees from vertical, and reversible (angled up or down).

2.9.1.2.1. Desktop Mounting

If the IND780 terminal is to be placed on a flat surface, the four rubber feet included with the terminal should be adhered to the bottom of the enclosure to prevent sliding. Peel each foot from the protective paper and press it onto one corner of the bottom of the enclosure, as shown in Figure 2-7.



Figure 2-7: Rubber Feet for Desktop Mounting

2.9.1.2.2. Preparation for Wall Mounting

An optional wall bracket kit is available for wall mounting the IND780 harsh enclosure to a vertical surface. To prepare the enclosure for wall mounting, follow these steps:

1. Establish orientation of enclosure (above or below eye level)
2. Install enclosure on brackets
3. Mark attachment points
4. Install mounting hardware
5. Mount terminal hardware

2.9.1.2.3. Setting Front Panel Orientation

Establish whether the terminal will be mounted above or below eye level. If it will be mounted at or below eye level, the orientation of the front panel must be reversed. Follow these steps:

1. Open the enclosure.
2. Loosen and remove the two nuts securing the two metal cables that hinge the front cover to the rear housing.

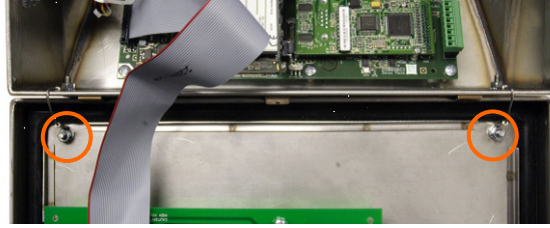


Figure 2-8: Ground Strap Attachment Locations

3. Carefully rotate the front cover 180 degrees and reattach the two grounding straps to the two studs near the grip bushings using the two nuts removed in the previous step. Figure 2-9 shows one of the studs. Tighten the two nuts.

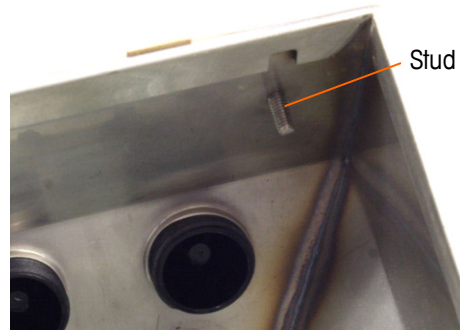


Figure 2-9: Stud for Attaching Reversed Front Panel

2.9.1.3. Attaching the Enclosure to the Brackets

Once the brackets are securely fastened to the wall surface, the enclosure can be mounted to them using the four supplied M5 screws. One bracket is shown in Figure 2-10, with the slotted holes indicated. The screws are tightened by fitting the screwdriver through the slotted holes.

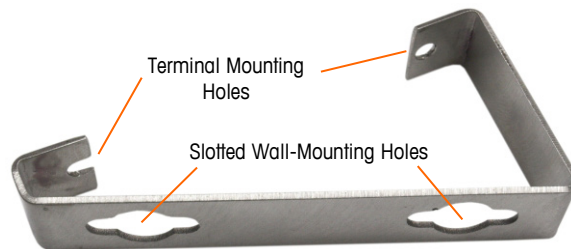


Figure 2-10: Wall-Mounting Bracket

Figure 2-11 shows the brackets attached to an enclosure. Note the orientation of the enclosure relative to the brackets.



Figure 2-11: Attaching the Wall-Mounting Brackets

2.9.1.3.1. Marking Mounting Hole Position

Mark the position of the mounting holes on the vertical surface per the dimensions shown in Figure 2-12 in inches and [mm], or by holding the terminal up to the surface and marking through the bracket holes.

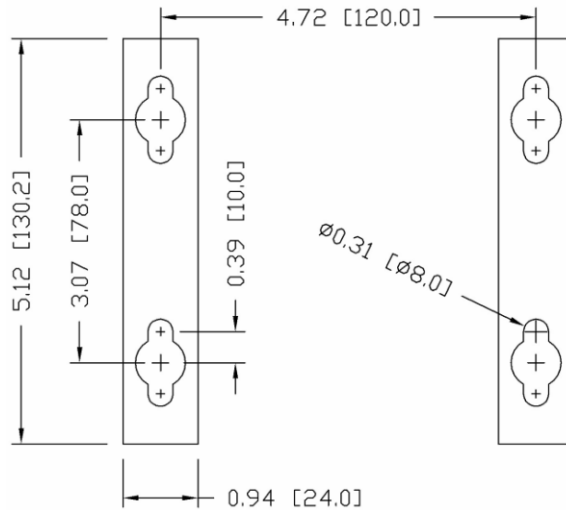


Figure 2-12: Mounting Hole Pattern

Once the mounting hole positions are established, perform one of the following procedures, depending on the type of wall surface.

■ **Note:** The hardware to mount the terminal to the vertical surface is not included with the terminal – it must be supplied locally. Ensure that the mounting hardware is capable of supporting the weight of the terminal, which is approximately 11 lb (5 kg).

CAUTION: When carrying out the following procedures, wear proper bodily protection, such as approved safety goggles, ear protectors and gloves.

2.9.1.3.2. Wall Mounting, Wallboard or Drywall

When mounting the IND780 on wallboard, drywall or a similar surface, the anchor should be sized according to the recommended bolt size of 1/4" (6 mm). The recommended mounting hardware is:

- Four Toggle Bolts, 1/4" (6 mm), minimum length 2-1/2" to 3" depending on wall thickness, with a pullout force of 900 lb (450 kg)
- Four flat washers, minimum 1/2" (12 mm) outside diameter

Figure 2-13 shows an example of mounting hardware.



Figure 2-13: Sample Mounting Hardware, Wallboard or Drywall

1. Drill a hole through each of the measurements/locations marked while preparing for wall mounting. Use a bit with the same size bit as anchor diameter (typically 5/8" (16 mm)). The depth of the hole should penetrate the wallboard.
2. Clean the holes with a cloth moistened with water.
3. Unthread each toggle bolt and add a 1/4" (6 mm) inside diameter, flat washer with an outside diameter of 1/2" (12 mm).
4. Push the washers to the inside of the heads of all four bolts.
5. Replace each toggle nut and thread onto each bolt approximately 1" (25 mm). Insure that the ends of the nut fold toward you when you squeeze them.
6. Press the toggle nuts through each opening you created in the wall. You should hear a "click" sound when each snaps open on the other side.
7. Tighten the bolts down until you feel the toggle nut contact the inside of the wall. Tighten each with a wrench (use a screwdriver for flat/round heads), approximately two or three full turns or until the toggle nuts are against the base material on the inside of the wall.
8. Back each bolt out enough to leave space for its head and the flat washer to engage the top center of one of the slotted holes in the mounting brackets (see Figure 2-10 and Figure 2-12).
9. Turn the screws, by hand, until they are snug against the mounting plate. Figure 2-14 shows the nut, washer and bolt installed.

2.9.1.3.3. Wall Mounting, Concrete and Cement Blocks

When mounting the IND780 to a cement block, poured concrete or similar wall, the recommended mounting bolt is:

- UL-listed concrete sleeve anchor, size 1/4" (6 mm), minimum embed 1/2" (12.7 mm), minimum pullout force of 500 lb (266 kg).

Figure 2-14 shows an example of mounting hardware.



Figure 2-14: Sample Mounting Hardware, Concrete or Cement

1. Drill a hole through each of the measurements/locations you marked in the Preparation for Wall Mounting section. Use a carbide bit conforming to ANSI B94, 12-77 with the same size bit as anchor diameter (typically 5/16" (8 mm)). The depth of the hole should be deeper than 1/2" (12 mm).
2. Clean the holes with a wire brush.
3. Make sure the head of the bolt is flush with the top threaded part of the anchor then insert the anchor assembly through the mounting holes and into the base material.
4. Push anchor assembly until washer is snug against the wall.
5. Tighten each bolt with a wrench (use a screwdriver for flat/round heads), approximately three or four full turns or until anchor is tightly secured to the base material.
6. Back the bolts out sufficiently to allow them and their washers to engage the top center of one of the slotted holes in the mounting brackets (see Figure 2-10 and Figure 2-12).

2.9.1.3.4. Wall Mounting, Wood Surface

When mounting the IND780 to a wooden wall or similar surface, use four #12 screws of at least 1 1/4" (30 mm) length, each with a flat washer of minimum 1/2" (12 mm) diameter.

Install the screw and washer, leaving sufficient gap to accommodate the slotted hole in the bracket – see Figure 2-10 and Figure 2-12.

Periodically inspect the terminal to insure that it is securely anchored to the wall. If not, remove the terminal and retighten the mounting anchor bolts.

2.9.1.3.5. Positioning Terminal on Fasteners

Place the holes in the terminal brackets over the fasteners, and slide the terminal down firmly so that each fastener and washer engages the slots in the bracket (see Figure 2-10).

For wallboard or drywall mounting, after engaging the brackets pull them away from the wall until the toggle nuts are felt to contact the inside of the wall. If necessary, unmount the terminal and tighten the bolts slightly. Figure 2-15 shows the relationship between bracket, hardware and wall.

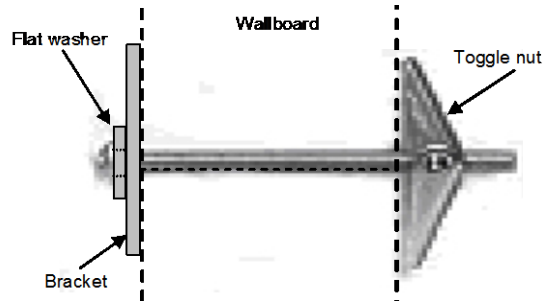


Figure 2-15: Wallboard or Drywall Installation

Periodically inspect the terminal to insure that it is securely anchored to the wall. If not, remove the terminal and retighten the mounting anchor bolts.

2.9.2. Ferrites and Option Board Cabling

2.9.2.1. Ferrites

In order to meet certain electrical noise emission limits and to protect the IND780 from external influences, it is necessary to install a ferrite core on each cable connected to the terminal. Two types of ferrites are supplied with the basic terminal, and additional ferrites may be supplied with each of the options.

- The large clamp ferrites can be attached to larger cables such as Ethernet, USB and some PLC cables.
- The large core ferrite is used with the panel mount power cable.
- The small clamp ferrite is to be used on the ground wire of the POWERCELL board. In this case, no wrap is required.

To install the large core ferrite on the panel mount power cord, remove the insulation and shielding from the end of the cable. Before attaching the power connector, route the blue and brown wires through the center of the core and take two wraps around the outside of the core, each time routing the cables through again. Note that the striped green and yellow ground wire does not pass through the core.

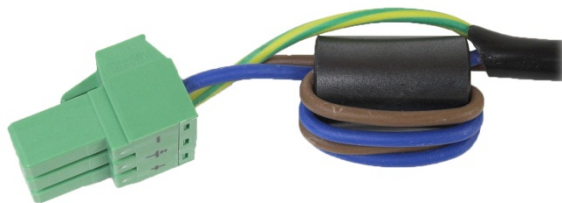


Figure 2-16: Ferrite Core on Panel Mount Power Cord

When using a clamp type ferrite, a loop can be made in the cable and the ferrite snapped over the spot where the cable overlaps itself. Either the complete cable or individual wires can be wrapped through the ferrite.



Figure 2-17: Installing Clamp Ferrite

Wrapping should be done as close to the enclosure as possible.

2.9.2.2. Option Board Cabling

In order to prevent electromagnetic interference when installing option boards (especially Analog Load Cell boards) in the terminal, twist the loose wires together, as shown in Figure 2-18, before attaching the green connector to the board.

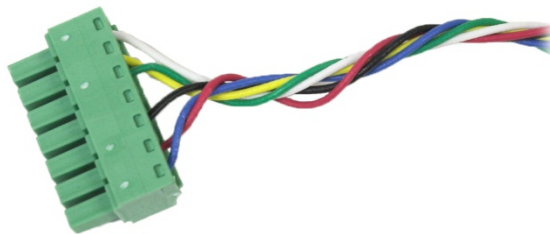


Figure 2-18: Option Board Wires Twisted

2.9.3. Harsh Enclosure Cable Glands and Cable Assignments

2.9.3.1. Harsh Enclosure Cable Openings

NOTICE

ORDER TERMINAL WITH PART NUMBER ENDING IN 96 FOR DIVISION 2, 97 FOR ATEX. ALL OTHER IND780 TERMINALS ARE NOT SUITABLE FOR USE IN HAZARDOUS AREAS

FOR TERMINALS MARKED FOR USE IN DIVISION 2 AREAS, THE ONLY SUITABLE CONNECTIONS VIA GLANDS ARE: PDX, ANALOG LOAD CELL AND FLOW METER.

FOR TERMINALS MARKED ATEX/IECEX, ANY CONNECTION IS ALLOWED USING CORD GRIPS MARKED Ex 'e.'

The standard glands and plugs provided with the IND780 Harsh Enclosure are **NOT** ATEX-certified for increased safety and therefore not suitable for installation in a Zone 2/22 environment. IND780 terminals supplied in Europe have ATEX plugs in their openings, and are shipped with a kit of ATEX glands. For IND780 terminals supplied elsewhere, METTLER TOLEDO supplies an optional ATEX Glands kit (#64063383) that has enough ATEX-certified glands and plugs for all connections to the harsh enclosure. Figure 2-19 and Table 2-2 show the uses and cable size limits of the various openings in the back of the harsh enclosure, installed using cable glands from KOP #64063383. The pattern code is included for ease of reference. It is important to use cables that are within the cable size limits specified for the glands to ensure proper sealing of the enclosure.

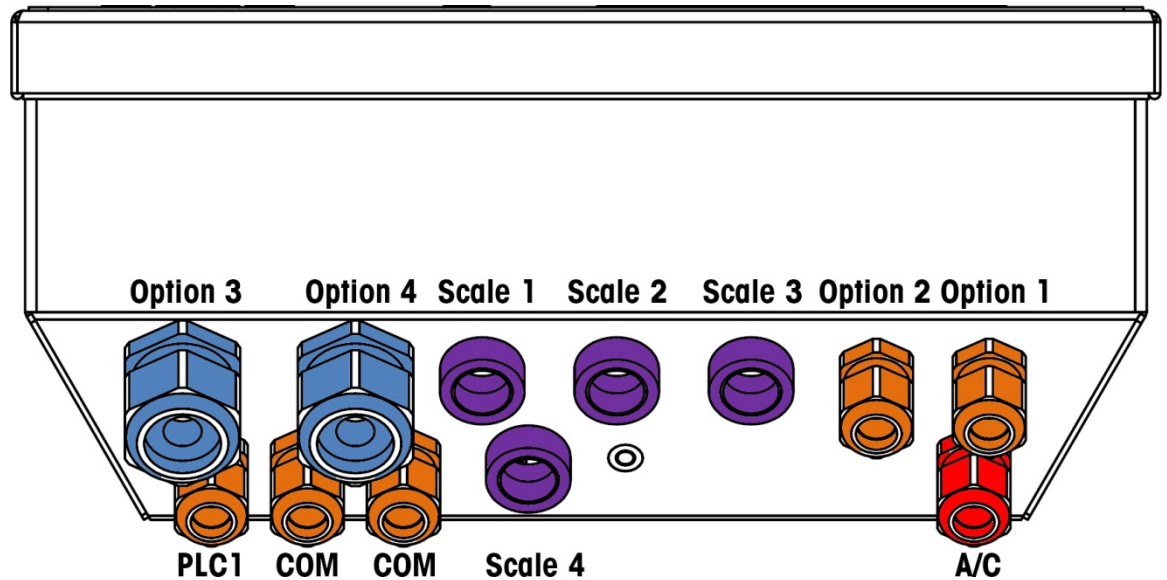













Figure 2-19: Harsh Enclosure Cable Opening Assignments

Table 2-2: Harsh Enclosure Cable Openings with ATEX Glads

Pattern	Description/Use	Cable Size Limits (mm)	Quantity
	 Plastic hole plugs, M25 for sealing unused cable openings	N/A	2
	 Analog Load Cell, 16 mm metal cable gland	6 - 8	4
	 PDX, 16mm metal cable gland	8-10	1
	 Hole reducer, M18 x 0.75 - M16 x 1.5, O-ring and hex nut for use with the 16 mm scale interface metal cable glands	N/A	4
	 Plastic hole plugs, M16 for sealing unused cable openings	N/A	9
	 Power cord, 16 mm metal cable gland	4 - 8	1
	 M4 hex nut and cable clamp for securing cables inside the enclosure and providing strain relief when necessary	N/A	2

2.9.3.2. Installing Cables

The IND780 harsh environment terminal is designed to withstand severe washdown environments. However, care must be taken when installing cables and/or connectors that enter the terminal enclosure. To ensure a watertight seal:

1. Disassemble an appropriately sized cable gland.

2. A metal cable gland is used with the Analog Load Cell, Flow Meter and PDX options. To further protect the IND780 from external influences, the cable's shield wire can be spread out and pressed into cable gland by the grommet, as shown in Figure 2-20.



Figure 2-20: Installing Metal Cable Gland with Shield Wire

3. Move the cable through the gland and grip to adjust its length within the enclosure. When making cable terminations inside the harsh enclosure, ensure that the cable length from the terminal strip/connector to the terminal housing is sufficient so that no strain is placed on the connector assembly when the housing is in the fully open position.
4. Finally, tighten the nut onto the body of the cable gland. Figure 2-21 shows the assembled cable gland.



Figure 2-21: Cable Gland Assembled

5. After making the wiring connections inside the enclosure, check that the nut on the cable gland is tightened properly to seal around the cable. Ensure that this seal is watertight.

2.9.3.2.1. IDNet Cabling for ATEX Applications

Up to three IDNet scale interfaces can be installed as scales 1, 2 and 3 (see Figure 2-19). A bracket (part number 30091329, included with unit) must be installed to protect the connector from a direct impact. This bracket must remain intact to properly protect the IDNet connector and maintain the ATEX approval. Refer to Figure 2-22 for an example of the IDNet bracket installed.



Figure 2-22: IDNet Protective Bracket

To install the protective bracket, remove the nut that secures the IDNet connector and PCB to the enclosure, slide the bracket over the connector, and position it as shown in Figure 2-22. Reinstall the nut to secure the bracket, connector and PCB, and torque the nut to 8 Nm (70 lbf-in).

2.9.3.2.2. Ethernet Cabling

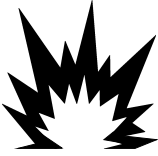

For Ethernet connections, route an open end Ethernet cable without the RJ-45 connector through the 16mm ATEX plastic cable gland (see Table 2-1) and into the IND780 harsh enclosure. Use appropriate crimping tools to strip, crimp and attach the RJ-45 connector to the end of the Ethernet cable.

3 Special Requirements

When an IND780 terminal is installed inside an area classified as Division 2 or Zone 2/22, some special requirements must be considered. This chapter discusses these items. The METTLER TOLEDO control drawing 64069877 and the ATEX approval certificate must also be reviewed for any special requirements.

3.1. Enclosure

Only IND780 terminals that are factory-labeled as Category 3 or approved for Division 2 may be installed into a Division 2 or Zone 2/22 hazardous area. Also note that a Nationally Recognized Test Laboratory approved dust tight enclosure is also required for proper installation of the panel-mount terminal in the U.S. and Canada. This note is on the METTLER TOLEDO control drawing 64069877.

	 WARNING
	IND780 TERMINALS THAT ARE NOT FACTORY-LABELED AS DIVISION 2 APPROVED OR MARKED AS EUROPEAN CATEGORY 3 MUST NOT BE INSTALLED INTO A DIVISION 2 OR ZONE 2/22 ENVIRONMENT.

3.2. Areas with Different Classifications

Only properly marked IND780 terminals are approved for use in an area classified as Division 2 or as Zone 2 or Zone 22. This approval **DOES NOT** mean that the IND780 terminal can be used in Division 1 or Zone 0/1 areas. Different precautions must be taken when installing equipment into these areas. METTLER TOLEDO offers other terminals for use in Division 1 or Zone 0/1 areas.

If any portion of the installation involves an area classified as Division 1 or Zone 0/1, then the complete system should be configured to be compatible with a Division 1 or Zone 0/1 classification. For instance, if the IND780 terminal will be installed in a Division 2 area but the load cells will be located within a Division 1 area, a load cell barrier is required. These barriers are available through METTLER TOLEDO.



Some IND780 options are not approved for all areas. Please consult the METTLER TOLEDO control drawing 64069877 for specific details. Applications involving a mixture of Division ratings or a mixture of Zone ratings should be discussed with METTLER TOLEDO. Please consult your local METTLER TOLEDO representative regarding these types of applications.

3.3. Replacement Parts

	 WARNING
	DO NOT INSTALL, DISCONNECT OR PERFORM ANY SERVICE ON THIS EQUIPMENT BEFORE POWER HAS BEEN SWITCHED OFF OR THE AREA HAS BEEN SECURED AS NON-HAZARDOUS BY PERSONNEL AUTHORIZED TO DO SO BY THE RESPONSIBLE PERSON ON-SITE.

If a failure occurs in an IND780 terminal that is installed in a Division 2 or Zone 2/22 area, note that only some components may be used as replacement parts. The following parts are appropriate for installation on a Division 2 approved or Category 3 marked IND780 terminal.

Part Description	Part Number	KOP Number
Analog Load Cell Option Board	64062179	64063330
Keypad assembly	22009012	N/A

	 WARNING
	IF THE KEYBOARD, DISPLAY LENS OR ENCLOSURE IS DAMAGED ON A DIVISION 2 OR ZONE 2/22 MARKED IND780 TERMINAL THAT IS USED IN A DIVISION 2 OR ZONE 2/22 AREA, THE DEFECTIVE COMPONENT MUST BE REPAIRED IMMEDIATELY. REMOVE AC POWER IMMEDIATELY AND DO NOT REAPPLY AC POWER UNTIL THE DISPLAY LENS, KEYBOARD OR ENCLOSURE HAS BEEN REPAIRED OR REPLACED BY QUALIFIED SERVICE PERSONNEL. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

3.4. Main Board Battery

Note that a Lithium battery #22009188 is used for memory backup on the main printed circuit board assembly. This battery has a nominal voltage of 3.0 volts DC and a nominal capacity of 180 mAh (milliamp hours).

3.5. Special Conditions of Use

Note that the ATEX Category 3 and IECEx marked IND780 terminals have seven special conditions for safe use.

- Both versions of the IND780 terminal shall be used only in environments where UV light cannot influence the non-metallic parts.
- The panel-mount IND780 terminal shall be installed in an enclosed panel or rack, suitable for the environment per the procedure described in Chapter 2 of this manual.

The IND780 panel model shall be mounted in an ATEX/IECEx-certified enclosure with a minimum ingress protection of at least IP65 when installed in a Zone 2/22 location.

When the environmental conditions are such that a higher degree of ingress protection is required, this shall be taken into account.

3. The IND780 is not to be used in an area with more than pollution degree 2 as defined in IEC60664-1.
4. To meet ATEX and IECEx requirements, all cable entry devices and blanking elements shall be certified in type of explosion protection increased safety 'e', suitable for at least IP65 and correctly installed.
5. The grounding connection at the rear of the unit shall be connected to the potential equalizing system within the explosive atmosphere.
6. When wiring to the panel mount terminal, protective power ground shall be a minimum of 4.5mm² or size 10 awg stranded wire. Phased conductors (neutral & line) shall be minimum of .9mm² (size 18awg) and maximum of 3.6mm² (size 12 awg) stranded wire.
7. When wiring to the harsh terminal, the gage (or cross-sectional area) of the protective power ground must be equal to or greater than the gage (or cross-sectional area) of the power phased connectors. The power phased connectors (neutral and line) shall be a minimum of .9mm² (size 18awg) and a maximum of 3.6mm² (12awg) stranded wire.
8. Provision shall be made to prevent transient disturbances from exceeding 140% of the rated voltage.

	 WARNING
	THE IND780 TERMINAL MUST BE INSTALLED AND MAINTAINED PER THE ABOVE SPECIAL CONDITIONS WITHOUT EXCEPTION. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

METTLER TOLEDO Service

To protect your product's future:

Congratulations on choosing the quality and precision of METTLER TOLEDO. Proper use according to these instructions and regular calibration and maintenance by our factory-trained service team ensure dependable and accurate operation, protecting your investment. Contact us about a service agreement tailored to your needs and budget.

We invite you to register your product at www.mt.com/productregistration so we can contact you about enhancements, updates and important notifications concerning your product.

www.mt.com/IND780

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