

IND560

Terminal Installation Manual

© METTLER TOLEDO 2005

No part of this manual may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, for any purpose without the express written permission of METTLER TOLEDO.

U.S. Government Restricted Rights: This documentation is furnished with Restricted Rights.

Copyright 2005 METTLER TOLEDO. This documentation contains proprietary information of METTLER TOLEDO. It may not be copied in whole or in part without the express written consent of METTLER TOLEDO.

METTLER TOLEDO reserves the right to make refinements or changes to the product or manual without notice.

COPYRIGHT

METTLER TOLEDO® is a registered trademark of METTLER TOLEDO. All other brand or product names are trademarks or registered trademarks of their respective companies.

METTLER TOLEDO RESERVES THE RIGHT TO MAKE REFINEMENTS OR CHANGES WITHOUT NOTICE.

FCC Notice

This device complies with Part 15 of the FCC Rules and the Radio Interference Requirements of the Canadian Department of Communications. Operation is subject to the following conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his or her own expense.

◀ Declaration of conformity is located on the documentation CD.



PRECAUTIONS

- READ this manual BEFORE operating or servicing this equipment and FOLLOW these instructions carefully.
- SAVE this manual for future reference.

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

 CAUTION
BEFORE CONNECTING/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 DISCONNECTIONS ARE MADE. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT AND/OR BODILY HARM.

 CAUTION
OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

	 WARNING!
	A. NOT ALL VERSIONS OF THE IND560 ARE DESIGNED FOR USE IN HAZARDOUS (EXPLOSIVE) AREAS. REFER TO THE DATA PLATE OF THE IND560 TO DETERMINE IF A SPECIFIC TERMINAL IS APPROVED FOR USE IN AN AREA CLASSIFIED AS HAZARDOUS BECAUSE OF COMBUSTIBLE OR EXPLOSIVE ATMOSPHERES.

	 WARNING!
	WHEN THIS EQUIPMENT IS INCLUDED AS A COMPONENT PART OF A SYSTEM, THE RESULTING DESIGN MUST BE REVIEWED BY QUALIFIED PERSONNEL WHO ARE FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF ALL COMPONENTS IN THE SYSTEM AND THE POTENTIAL HAZARDS INVOLVED. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

Contents

Chapter 1.0	Introduction	1-1
	IND560 Terminal Versions	1-1
	Warnings and Precautions	1-2
	Operating Environment	1-3
	Inspection and Contents Checklist	1-3
	Model Identification	1-4
	Physical Dimensions	1-5
	Specifications	1-7
	Main PCB	1-8
	Options	1-9
	Scale Bases	1-9
	Discrete I/O	1-9
	Ethernet/Serial Ports	1-10
	PLC Interfaces	1-10
	Fill-560 (Application Software)	1-11
	InSite™ Configuration Tool	1-11
Chapter 2.0	Installation	2-1
	Opening the Enclosures	2-1
	Panel-Mount Enclosure	2-1
	Harsh Enclosure	2-2
	Mounting the Terminal	2-2
	Panel-Mount Enclosure	2-3
	Harsh Enclosure	2-4
	Installing Cables and Connectors	2-7
	Ferrites	2-7
	Harsh Enclosure Cable Glands	2-7
	Main Board Wiring Connections	2-8
	Wiring Connections for Options	2-13
	PCB Switch Settings	2-19
	Main PCB Switches	2-19
	Discrete I/O (Relay) Switch	2-20
	PCB Jumper Positions	2-21
	Main PCB Jumper	2-21
	Sealing the Enclosure	2-22
	External Sealing of the Panel-Mount Enclosure	2-22
	External Sealing of the Harsh Enclosure	2-23
	Internal Sealing of Both Enclosure Types	2-24

METTLER TOLEDO

For your notes

Chapter 1.0

Introduction

This chapter covers

- IND560 Terminal Versions
- Warnings and Precautions
- Operating Environment
- Inspection and Contents Checklist
- Model Identification
- Physical Dimensions
- Specifications
- Main PCB
- Options

Thank you for purchasing the IND560 industrial terminal—the latest in METTLER TOLEDO technology and the most versatile weighing terminal available today. The IND560 terminal is a high-performance single- or multiple-range weighing terminal for use with analog load cells or high-precision IDNet scale interfaces used in industrial automation applications.

For information about operation, configuration, service and maintenance, and other technical specifications, refer to the IND560 Technical Manual. For information about typical IND560 terminal operation, refer to the IND560 User's Guide.

IND560 Terminal Versions

The IND560 terminal is available in the following versions:

- Harsh enclosure with analog load cell connection
- Harsh enclosure with high-precision (IDNet) base connection
- Panel-mount enclosure with analog load cell connection
- Panel-mount enclosure with high-precision (IDNet) base connection

Standard IND560 Features

- Basic weighing terminal used in safe areas
- Panel-mount or harsh desk/wall-mount enclosures
- Connect one analog load cell scale base (or up to eight 350 ohm load cells) or an IDNet base depending upon the version of the IND560
- 128 × 64 dot-matrix graphic vacuum fluorescent display (VFD) with 21mm-high weight display
- Real-time clock (battery backup)
- One serial port for asynchronous, bidirectional communication and print output
- 85–264 VAC power input range

- Support of the following option boards:
 - Analog Output interface
 - Ethernet and dual serial ports
 - Allen Bradley RIO interface
 - PROFIBUS-DP interface
 - Discrete I/O interface
- Basic weighing functions including zero, tare, and printing
- Selectable over/under classifying mode of operation with graphics
- Selectable material transfer mode for simple filling or dosing
- SmartTrac™ graphical display
- Two memory tables—25 tare memories and 25 target memories
- Unit switching between three different units including custom units
- Alibi memory storage for up to 60,000 records
- Grand total and subtotal registers for accumulating weight
- Five customizable print templates and report printing
- TraxDSP™ digital filtering for analog load cells
- TraxEMT™ performance monitoring and recording
- CalFREE™ calibration without test weights

For information regarding METTLER TOLEDO Technical Training contact:

METTLER TOLEDO US

1900 Polaris Parkway

Columbus, Ohio 43240

Phone (US and Canada): (614) 438-4511

Phone (International): (614) 438-4888

www.mt.com

Warnings and Precautions

Please read these instructions carefully before putting the new terminal into operation.

Before plugging in the terminal, make sure that the voltage stated on the terminal's label matches the local power supply voltage. If this is not the case, do not connect the terminal under any circumstances.

Although the IND560 is ruggedly constructed, it is nevertheless a precision instrument. Use care in handling and installing the terminal.

Operating Environment

When selecting a location:

- Choose a stable, vibration-free surface
- Ensure there are no excessive fluctuations in temperature and no direct exposure to sunlight
- Avoid drafts (for example, from fans or air conditioning)
- Readjust (calibrate) the terminal after any major change of geographical position

Temperature and Humidity

The IND560 can be operated at temperatures and relative humidity conditions as listed under Operating Environment in Table 1-2. The terminal can be stored at temperatures ranging from -20° to 60° C (-4° to 140° F) at 10 to 95% relative humidity, non-condensing.

Environmental Protection

Panel-mount front panel sealing provides type 4 and type 12 protection—comparable to IP65 rating (UL approval pending). The harsh enclosure meets IP69K requirements (approval pending).

Hazardous Areas

Not all versions of the IND560 can be operated in areas classified as Hazardous by the National Electrical Code (NEC) because of the combustible or explosive atmospheres in those areas. Contact an authorized METTLER TOLEDO representative for information about hazardous applications.

Inspection and Contents Checklist

Verify the contents and inspect the package immediately upon delivery. If the shipping container is damaged, check for internal damage and file a freight claim with the carrier if necessary. If the container is not damaged, remove the IND560 terminal from its protective package, noting how it was packed, and inspect each component for damage.

If shipping the terminal is required, it is best to use the original shipping container. The IND560 terminal must be packed correctly to ensure its safe transportation.

The package should include:

- IND560 Terminal
- Installation manual
- Documentation CD (includes all manuals)
- InSite CD (PC configuration tool)
- Bag of miscellaneous parts

Model Identification

The IND560 model number is located on the data plate on the back of the terminal along with the serial number. Refer to Figure 1-1 to verify the IND560 that was ordered.

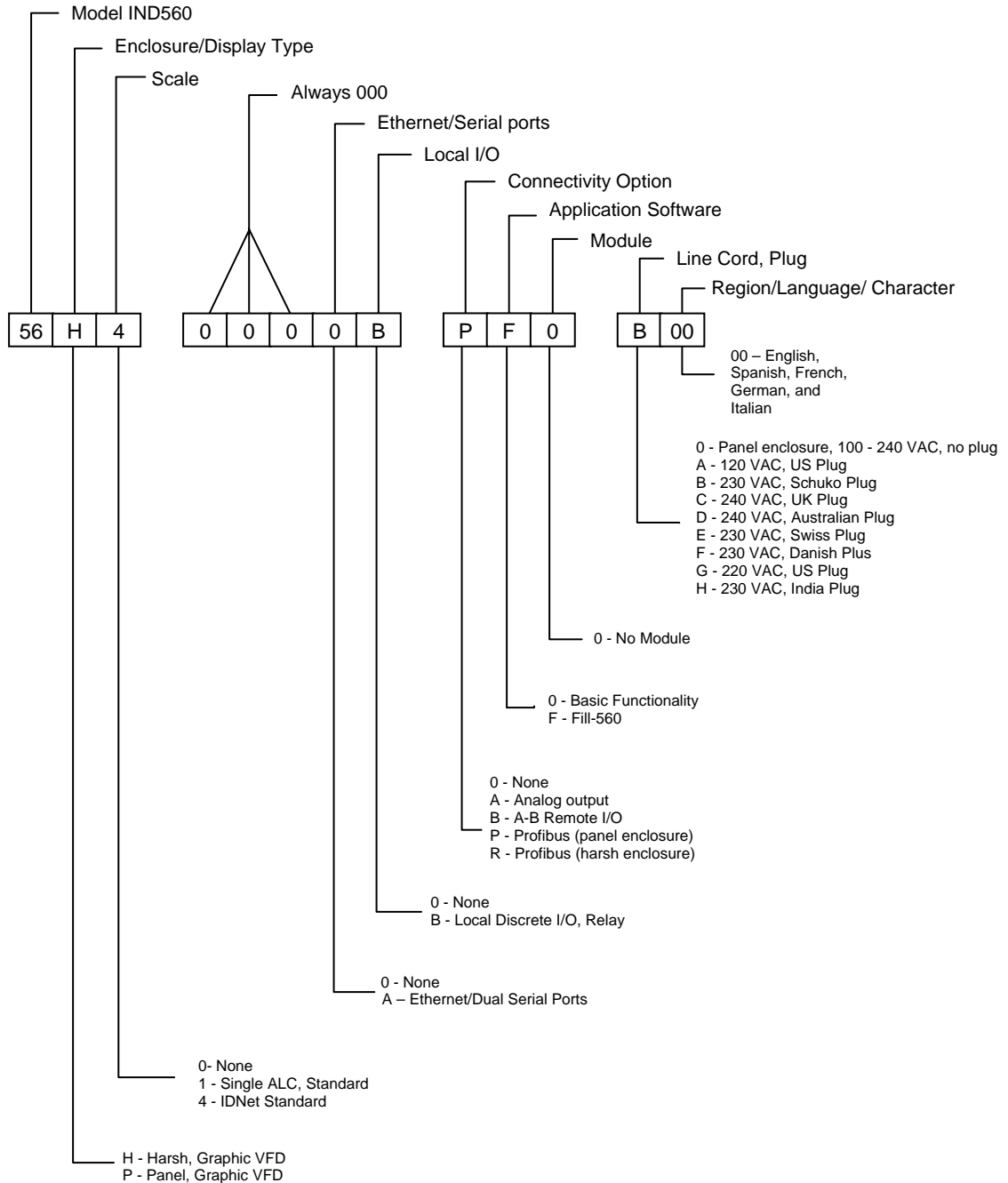
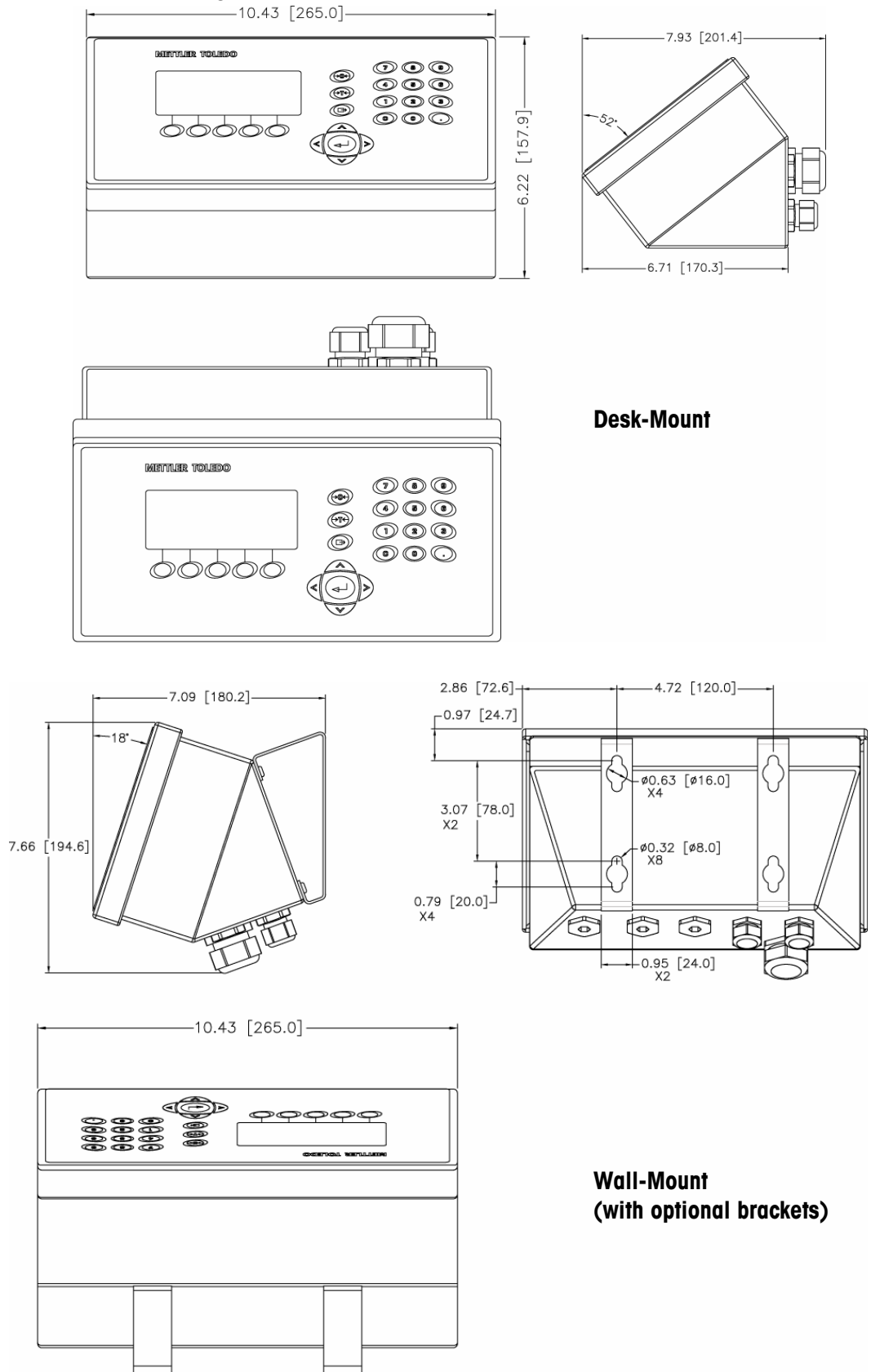


Figure 1-1: IND560 Model Identification Numbers

The IND560 terminal physical dimensions for the harsh desk/wall-mount enclosure are shown in Figure 1-4 in inches and [mm].



Desk-Mount

**Wall-Mount
(with optional brackets)**

Specifications

The IND560 terminal conforms to the specifications listed in Table 1-2.

Table 1-2: IND560 Specifications

IND560 Specifications	
Enclosure Type	Panel-mount stainless steel front panel with an aluminum frame
	Harsh environment desk/wall/column-mount type 304L stainless steel enclosure
Dimensions (l × w × d)	Panel Mount: 265 mm × 160 mm × 92 mm (10.4 in. × 6.3 in. × 3.6 in.)
	Harsh Environment: 265 mm × 160 mm × 170 mm (10.4 in. × 6.3 in. × 6.7 in.)
Shipping Weight	3.5 kg (8 lb)
Environmental Protection	Panel-mount front panel sealing provides type 4 and type 12 protection—comparable to IP65 rating (UL approval pending).
	Harsh Environment meets IP69K requirements (UL approval pending)
Operating Environment	The terminal (both enclosure types) can be operated at temperatures ranging from -10° to 40° C (14° to 104° F) at 10% to 95% relative humidity non-condensing.
Hazardous Areas	Not all versions of the IND560 can be operated in areas classified as Hazardous by the National Electrical Code (NEC) because of the combustible or explosive atmospheres in those areas. Contact an authorized METTLER TOLEDO representative for information about hazardous applications.
Power	Operates at 85–264 VAC, 49–61 Hz, 750 mA (both enclosure types).
	Panel-mount version provides a terminal strip for AC power connections.
	Harsh environment version includes a power cord configured for the country of use.
Display	128 × 64 dot-matrix graphic VFD display, 21 mm Display Update Rate: 10/second
Weight Display	Displayed resolution of 100,000 counts for analog load cell scales Display resolution for high-precision IDNet bases is determined by the specific base used

IND560 Specifications	
Scale Types	Analog load cells or IDNet, High-Precision K Line (T-Brick type standard)
Number of Cells	Eight 350-ohm load cells (2 or 3 mv/V)
Number of Scales	Interface for one analog or one IDNet scale
Analog/Digital Update Rates	Internal: Analog: >366 Hz; IDNet: determined by base; Target Comparison: 50 Hz; PLC Interface: 20 Hz
Load Cell Excitation Voltage	10 VDC
Minimum Sensitivity	0.1 microvolts
Keypad	25 keys; 1.22-mm thick polyester overlay (PET) with polycarbonate display lens
Communications	<p>Serial Interfaces Standard: One serial port (COM1) RS-232/RS-422/RS-485, 300 to 115,200 baud Optional Ethernet/Serial Ports: Ethernet 10 Base-T with two additional serial ports (COM2 and COM3)</p> <p>Protocol Serial Inputs: ASCII characters, ASCII commands for CTPZ (Clear, Tare, Print, Zero), SICS (most level 0 and level 1 commands) Serial Outputs: Continuous or Demand with up to five configurable print templates or SICS host protocol, report printing, interfaces with external ARM100 Input/Output modules and DeviceNet Bridge</p>
Approvals	<p>Weights and Measures USA: NTEP Class II, 100,000 d; Class III/IIIL, 10,000 d, CoC #05-057 Canada: Class III, 10,000 d, approval pending Europe: OIML; Class II, III, 7,500 e, TC 6812</p> <p>Product Safety UL, cUL, CE</p>

Main PCB

The IND560 terminal's main printed circuit board (PCB) provides the scale interface for analog load cell or IDNet.

The main board also contains the COM1 serial port that provides RS-232, RS-422, or RS-485 communication. The port is bidirectional and can be configured for various functions such as demand output, SICS host communications, continuous output, ASCII command input (C, T, P, Z), ASCII character input, report printing, totals printing, or connection to a remote ARM100 module.

The main board also contains the AC power input connections, keyboard interface and bus connectors for the option boards.

Scale Bases

The IND560 supports two types of scale bases: Analog or IDNet.

Analog Load Cell Scale Base

The IND560 supports this scale type by an analog load cell interface. The terminal can drive up to eight 350-ohm analog load cells.

IDNet™ Scale Base

The IND560 supports the newer T-brick style of high-precision base through the main board IDNet port. This port provides the +12 volts and communication required to operate this newer style base. The older K module and Pik-brick cells require the addition of an adapter board and new power supply (to support the +32 volt requirement) to the IND560. The adapter board and power supply are available as an option.

Options

The following options are available for the IND560:

- Discrete I/O
 - Internal, high-level discrete I/O (4 inputs and 6 outputs)
 - Remote discrete I/O via ARM100 module
- Ethernet/Dual Serial Ports
- Programmable Logic Control (PLC) interfaces, including:
 - Analog Output
 - Allen-Bradley® (A-B) RIO
 - PROFIBUS® L2DP
- Fill-560 (application software)
- Installation kit for older pre-2003 high-precision bases using a Pik-Brick weigh cell
- InSite™ Configuration Tool
- Various brackets for wall and column mounting of the harsh enclosure

Discrete I/O

The discrete I/O interface options include both internal and remote I/O.

- The internal version is available with dry-contact relay outputs. The relay contacts will switch up to 30 volts DC or 250 volts AC. The inputs are switch selectable as either active (for simple pushbutton control) or passive (for connection to PLCs or other devices that supply their own power for the I/O).

- The remote I/O is supported with the ARM100 remote module that provides dry-contact outputs. The inputs are passive on the ARM100. An external 24-volt DC supply is required to operate the ARM100.
- A total of 12 inputs and 18 outputs are supported through a maximum of three options.

Ethernet/Serial Ports

The Ethernet port can be used for FTP transfer of tare and target tables and complete setup files. It also provides a TCP/IP port to transmit a demand template or continuous data for remote configuration using the METTLER TOLEDO InSite™ program, and for direct access to data via a shared data server.

COM2 provides RS-232 communication at rates from 300 to 115.2k baud. COM 3 supports the same baud rates and provides an RS-232, RS-422, or RS-485 connection.

PLC Interfaces

The IND560 PLC interface options include Analog Output, A-B RIO, and PROFIBUS L2DP.

Analog Output

Analog Output refers to the representation of an internal system variable using a proportional electrical signal. Analog Output can be used to transmit a measured value, such as the gross or net weight. Another use for Analog Output is as a control signal for some external device, such as a control valve, where the amount of valve opening is proportional to the analog signal commanding its operation. Such outputs are used to control the flow rate of material into or out of a vessel.

Both 0-10 volt DC and 4-20 mA signals are provided.

A-B RIO

The A-B RIO option enables data exchange by bi-directional communications using the Discrete Data Transfer or Block Transfer mode. The IND560 Terminal initiates a communication exchange with the PLC approximately 20 times per second utilizing the Allen-Bradley Discrete Data Transfer protocol. This communication is a high-speed, real-time message interface between the IND560 Terminal and the PLC for process control. Division, integer, and floating point values are supported.

The IND560 A-B RIO interface also supports Block Transfer mode for transmission of larger amounts of data. Additional details of this interface can be found in the IND560 PLC Interface Manual on the documentation CD.

PROFIBUS L2DP

The IND560 Terminal communicates to a PROFIBUS-DP master according to DIN 19 245. The PROFIBUS option consists of a module and software that resides in the IND560 Terminal, which implements the data exchange.

Fill-560 (Application Software)

The Fill-560 is a special application that can be added to the IND560 terminal to provide additional filling and dosing control. It provides control for the following combinations of weigh-in and weigh-out sequences.

- Fill only
- Blend only
- Fill and dump
- Blend and dump
- Dose out only
- Blend and dose out
- Fill and dose out

Additional information can be found in the Fill-560 Manual on the documentation CD.

InSite™ Configuration Tool

The IND560 terminal can connect to a PC running InSite via the IND560 COM1 or optional Ethernet ports to provide the following:

- Viewing and/or changing configuration from a remote PC
- Enabling device-free configuration work before hardware installation
- Saving configuration information locally on the PC, loading a saved configuration file into other devices, or restoring to a known state for service purposes
- WYSIWYG editing tool with expanded viewing area, cut/paste functions, stored clipboard library (MyData items), and template space usage display
- Printing documentation of configuration for users' records
- Performing firmware upgrade services for the IND560

Display and Keyboard

The IND560 terminal has a Vacuum Fluorescent Display (VFD), 128 × 64 dot matrix graphic type display.

The display shows a system line at the top of the display for system messages and data; application area with weight display, legends, data entry, and other information in the middle; and softkey labels (icons) across the bottom.

The display layout is designed with a system line reserved at the top to show system messages and any asynchronous errors. The middle portion of the display is reserved for the weight display and/or SmartTrac display. Random data entry is shown in the bottom of this area. The bottom of the display is reserved for showing the graphic labels (icons) for the softkeys. Display positions for up to five softkey icons are provided.

To the right of the softkey icon area is a reserved space for a MORE UP (▲) or a MORE DOWN (▼) indicator. If present, these indicate additional softkey selections are available by pressing either the UP or DOWN navigation keys. A total of 15 softkeys are programmable for the home position depending upon the weighing options and terminal functions enabled. These are presented in three sets of five softkeys. The softkey setup and key mapping capabilities of the terminal determine the positioning of the softkeys and locations where they display.

Three dedicated scale function keys are located to the right of the display. These provide the interface to zero or tare the scale and to initiate a print.

The terminal's 12-key numeric keypad is used to enter data and commands. The numeric keys are located on the upper-right side of the terminal front panel.

Five navigation keys are located below the three scale function keys. These keys enable the operator to navigate through setup options in the menu tree and within setup and application screens.

Figure 1-5 shows the IND560's display and keyboard layout.



Figure 1-5: The IND560 Display and Keyboard Layout

Chapter 2.0

Installation

This chapter covers

- Opening the Enclosures
- Mounting the Terminal
- Installing Cables and Connectors
- PCB Switch Settings
- PCB Jumper Positions
- Sealing the Enclosure

This chapter provides installation instructions for the IND560 terminal panel-mount and harsh enclosures. Please read this chapter thoroughly before beginning installation.

Opening the Enclosures

Procedures for opening the IND560 terminal panel-mount and harsh enclosures differ and are described in the following sections.

Panel-Mount Enclosure

The panel-mount version of the IND560 is opened by removing the three Phillips-head screws on the back panel (see Figure 2-1). The rear panel can then be removed to gain access to the internal workings of the terminal.



Figure 2-1: Opening the Panel-Mount Enclosure

Harsh Enclosure

The front panel of the harsh enclosure IND560 terminal is locked in place by four spring clips attached to the enclosure body. To gain access to the terminal's PCB for internal wiring and setting switches, separate the front panel from the enclosure as follows:

1. Insert the tip of a flat-blade screwdriver into one of the two slots located on the bottom of the front panel assembly (see Figure 2-2) and gently push in toward the enclosure. A "pop" sound is made when the cover is released.

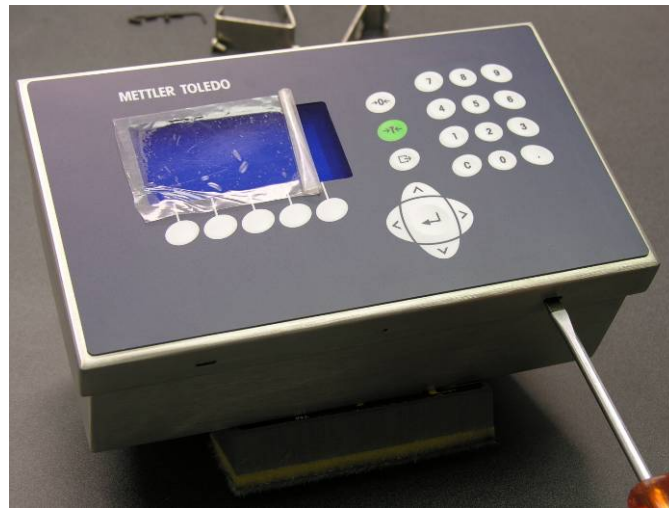


Figure 2-2: Opening the Harsh Enclosure

2. Repeat Step 1 for the other slot.
3. After releasing the front panel, lift the bottom of the front panel firmly up and out until it completely clears the top edge of the bottom enclosure.
4. Squeeze the top of the front panel to the enclosure slightly and push upward to unsnap the top two clips, then lift it to clear the two top clips. The cover will swing down and is hinged by two wire cables at the bottom.

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. Observe location and environment considerations as described in Chapter 1.0, Introduction.

Panel-Mount Enclosure

The panel-mount enclosure includes aluminum clamping brackets at the side of the extrusion. Two Allen-head set screws are used to tighten the brackets against the panel surface. The enclosure will mount and seal properly on panel thicknesses from 16 GA to 11 GA.

Install the panel-mount enclosure by following these steps:

1. Loosen and remove the four Allen-head screws that secure the clamping brackets to the side of the housing (see Figure 2-3). Use the 2mm Allen wrench included with the terminal.

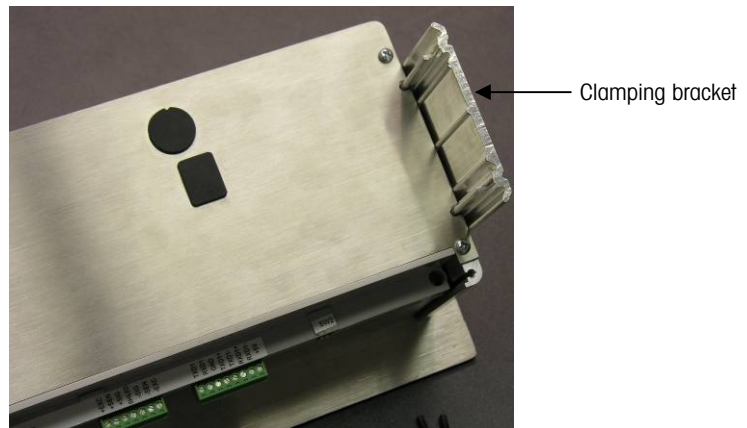


Figure 2-3: Clamping Brackets

2. Remove the two clamping brackets from the housing.
3. Locate the front panel mounting gasket included with the terminal and remove the protective paper to expose the adhesive. Adhere the gasket to the rear of the front panel of the terminal as shown in Figure 2-4, ensuring that the gasket is flat and spaced evenly on all sides.



Figure 2-4: Front Panel Gasket

4. Cut an opening in the panel or industrial enclosure per the panel cutout dimensions shown in Figure 2-5.

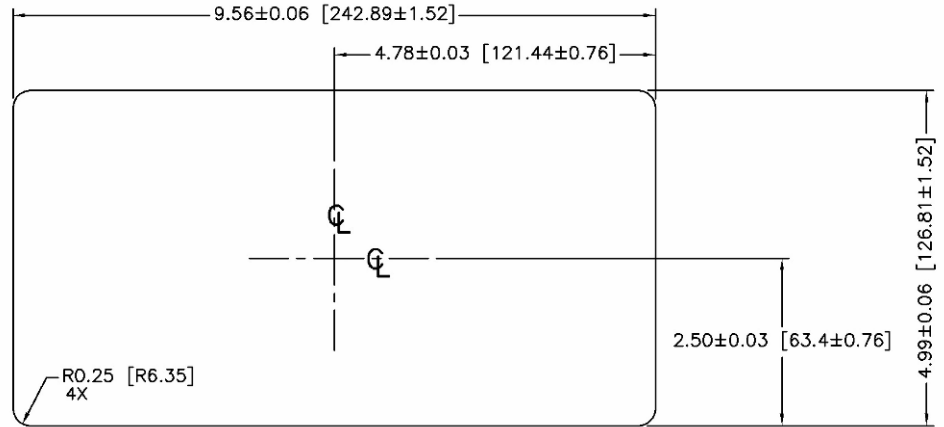


Figure 2-5: Panel Cutout Dimensions

5. Place the terminal through the cutout from the front and secure with the clamping brackets and Allen-head screws.

Harsh Enclosure

The harsh enclosure is made of stainless steel with a front panel angle of approximately 38 degrees. The harsh enclosure is designed to rest on a flat surface such as a table or desk top, or it can be mounted to a vertical surface with optional mounting brackets.

Desktop Mounting

When the IND560 terminal will 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. Locate the four rubber feet, remove the protective paper from the adhesive, and press the feet onto the corners of the bottom of the enclosure as shown in Figure 2-6.

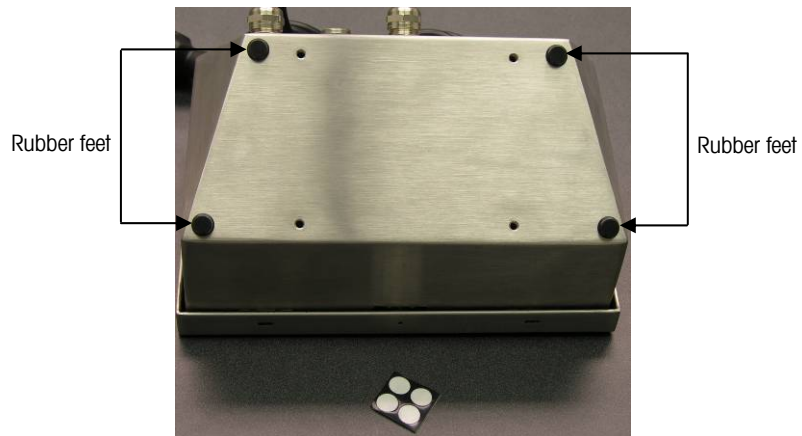


Figure 2-6: Rubber Feet

Wall Mounting

There is an optional wall mounting bracket kit available for wall mounting the IND560 harsh enclosure to a vertical surface. To wall mount the enclosure, follow these steps:

1. Bolt the two brackets to the bottom of the enclosure using the four M5 screws included with the terminal. The brackets should be attached as shown in Figure 2-7.

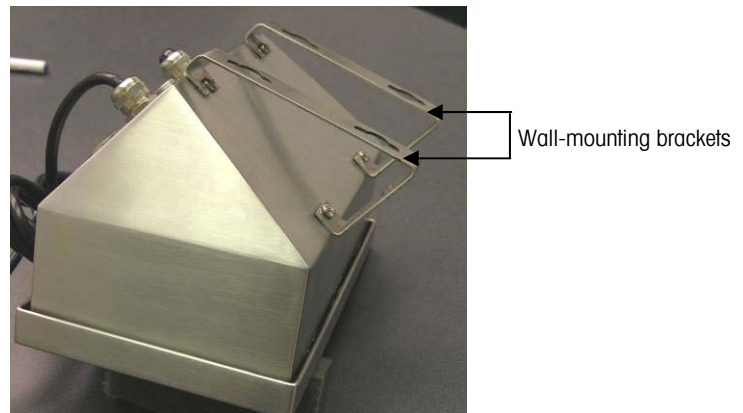


Figure 2-7: Attaching the Wall-Mounting Brackets

2. If the enclosure will be mounted above eye level, proceed to step 4.
3. If the enclosure will be mounted at or below eye level, it will be necessary to reverse the front cover 180 degrees. Note that reversing of the cover is not possible with the PROFIBUS PLC interface installed. If the PROFIBUS option is installed, proceed to step 4. To reverse the front cover, perform the following steps:
 - A. Open the enclosure per the instructions provided in the Opening the Enclosures section.
 - B. Loosen and remove the two nuts securing the two grounding straps (that also operate as hinges for the front cover) to the rear housing. See Figure 2-8.

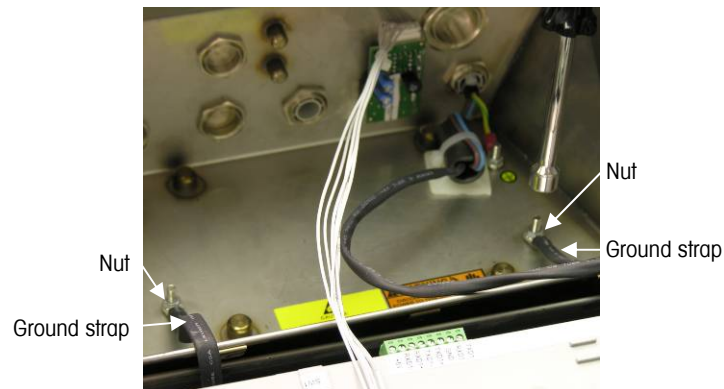


Figure 2-8: Loosening the Ground Straps

- C. 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 as shown in Figure 2-9. Tighten the two nuts.

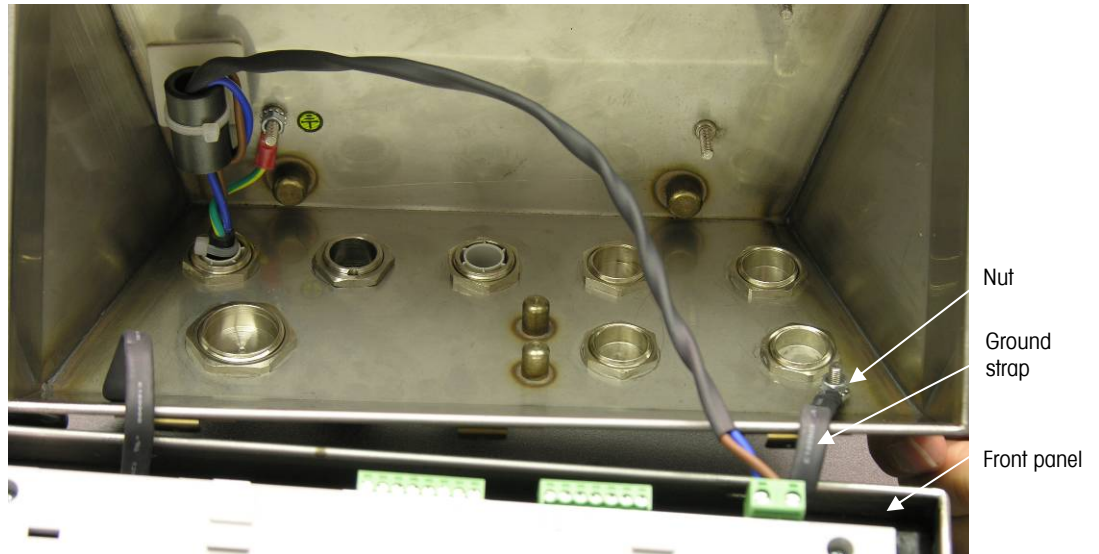


Figure 2-9: Reversing the Cover

4. Mark the position of the mounting holes on the vertical surface per the dimensions shown in Figure 2-10 or by holding the terminal up to the surface and marking through the bracket holes.

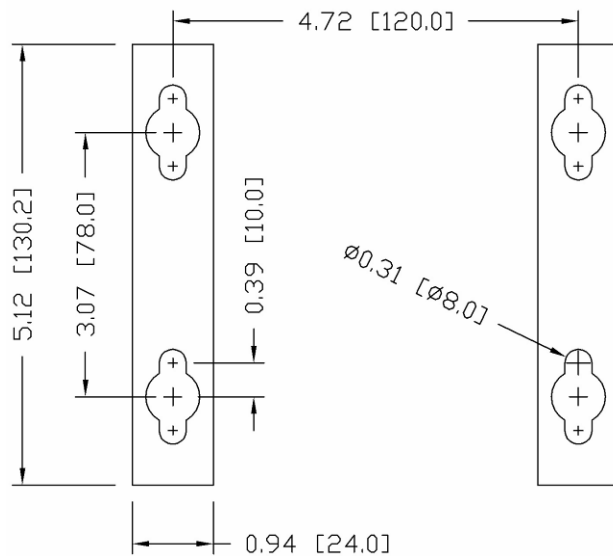


Figure 2-10: Mounting Hole Pattern

5. 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 3.5 kg (8 lb). Using the locally supplied hardware, mount the terminal to the vertical surface.

Installing Cables and Connectors

Information for installing cables and connectors for the IND560 terminal is provided in this section, including:

- Ferrites
- Harsh Enclosure Cable Glands
- Main Board Wiring Connections
- Wiring Connections for Options

Ferrites

In order to meet certain electrical noise emission limits and to protect the IND560 from external influences, it is necessary to install a ferrite core on each cable connected to the terminal. There are two ferrite cores included with the basic terminal and additional ferrites are supplied with each of the options.

To install ferrites, simply route the cable through the center of the core and then take one wrap around the outside of the core and route the cable through again. Either the complete cable or the individual wires can be wrapped through the ferrite. This should be done as close to the enclosure as possible. See Figure 2-11.



Figure 2-11: Installing the Ferrite Cores

Harsh Enclosure Cable Glands

The IND560 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:

- Pass the cables through an appropriately sized cable grip before connecting the wires. For example, the load cell cable goes through the cable gland next to the AC power cord (see Figure 2-12).



Figure 2-12: Cable Glands

- Depending upon the diameter of the load cell cable used, select one of the two different sized rubber grommets (if required) to properly seal around the cable.

Table 2-1: Grommet Cable Sizes

Grommet	Cable Diameter
None	7–10 mm (0.28–0.39 in.)
Larger size hole	5– 6 mm (0.20–0.24 in.)
Smaller size hole	3–4 mm (0.12–0.16 in.)

- 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.
- After making the wiring connections as described in the next section, ensure the nut on the cable gland is tightened properly to seal around the cable. Ensure that this seal is watertight.

Main Board Wiring Connections

Once the IND560 terminal harsh enclosure is open, connections can be made to the terminal strips on the main board as shown in Figure 2-13. It is not necessary to open the panel-mount enclosure to make these connections as shown in Figure 2-14.

- ▀ The integrity of the power ground for equipment is important for both safety and dependable operation of the terminal and its associated scale base. A poor ground can result in an unsafe condition should an electrical short develop in the equipment. A good ground connection minimizes extraneous electrical noise pulses. The IND560 should not share power lines with noise-generating equipment. To confirm ground integrity, use a commercial branch circuit analyzer. If adverse power conditions exist, a dedicated power circuit or power line conditioner might be required.

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

Power Requirements

The terminal requires 85 to 264 VAC (at 750 mA maximum) with a line frequency of 49 to 61 Hz of power and is internally fused at 1.6 amp, 250 volts. The fuse is located adjoining the main power connection on the main board as shown in Figures 2-12 and 2-13. Should the fuse blow, always replace the fuse with the same voltage and amperage as specified and have a qualified electrician test the power supply for correct operation as described in the IND560 Technical Manual, Chapter 4.0, Service and Maintenance, the troubleshooting section.

Analog Load Cell Connections

 WARNING!
TO AVOID DAMAGE TO THE PCB OR LOAD CELL, REMOVE POWER FROM THE IND560 TERMINAL AND WAIT AT LEAST 30 SECONDS BEFORE CONNECTING OR DISCONNECTING ANY HARNESS.

When using an analog load cell version of the IND560, load cell connections are made to the connector located on the main board as shown in Figure 2-13.

The IND560 terminal is designed to power up to eight 350-ohm load cells (or a minimum resistance of approximately 43 ohms). To confirm that the load cell load for this installation is within limits, the total scale resistance (TSR) must be calculated. To calculate TSR:

$$\text{TSR} = \frac{\text{Load Cell Input Resistance (Ohms)}}{\text{Number of Load Cells}}$$

Ensure that the TSR of the load cell network to be connected to the IND560 has a resistance greater than 43 ohms before connecting the load cells. If the resistance is less than 43 ohms, the IND560 will not operate properly.

In addition, the maximum cable distance must be reviewed. Table 2-2 provides recommended maximum cable lengths based on TSR and cable gauge.

Table 2-2: Recommended Maximum Cable Lengths

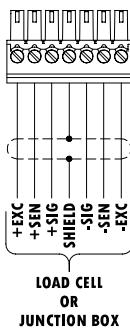
TSR (Ohms)	24 Gauge (meters/feet)	20 Gauge (meters/feet)	16 Gauge (meters/feet)
350	243/800	610/2000	1219/4000
87 (4-350 Ω cells)	60/200	182/600	304/1000
43 (8-350 Ω cells)	30/100	91/300	152/500

A jumper is provided that adjusts the gain of the analog section for 2 mV/V or 3 mV/V load cells. The factory default position of this jumper is 3 mV/V. Normally this position will work well for both 2 mV/V and 3 mV/V load cells. If 2 mV/V load cells are used, the jumper can be changed to the 2 mV/V position. Refer to Figure 2-34 for the jumper position. Removal of the plastic cover over the main board is necessary to gain access to this jumper.

Figure 2-15 shows the terminal definitions on the analog load cell terminal strip. Note that when using four-wire load cells, jumpers must be placed between the +Excitation and +Sense terminals and between the –Excitation and –Sense terminals.

ANALOG LOAD CELL TERMINATION

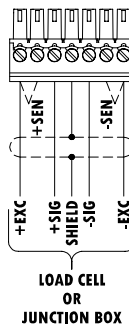
6 WIRE CELLS



- NOTES:**
 1. USE SIX CONDUCTOR SHIELDED CABLE.
 2. WIRE SIZE: 18 AWG (0.823 mm²) MAXIMUM
 24 AWG (0.205 mm²) MINIMUM

ANALOG LOAD CELL TERMINATION

4 WIRE CELLS



- NOTES:**
 1. USE SIX CONDUCTOR SHIELDED CABLE FOR HOME RUN CABLE.
 2. SINGLE 4 WIRE CELLS: JUMPER + EXE TO +SEN AND JUMPER -EXE TO -SEN AT IND560 TERMINALS.
 3. MULTIPLE 4 WIRE LOAD CELLS: JUMPER +EXE TO +SEN AND JUMPER -EXE TO -SEN AT JUNCTION BOX INPUT TERMINALS.
 4. WIRE SIZE: 18 AWG (0.823 mm²) MAXIMUM
 24 AWG (0.205 mm²) MINIMUM

Figure 2-15: Load Cell Termination

Note for the standard four-wire cable: If an increase in load results in a decrease in weight display, reverse the signal wires (+SIG and –SIG).

IDNet Connections

The IND560 terminal supplies 12 V for the new T-Brick type cell of the IDNet base. Some older types of bases (known as Pik-Brick) required both a 12 V and a 32 V supply. In order to connect the older type of IDNet base to the IND560, it is necessary to install an optional kit, which contains a different power supply and an IDNet power converter board. If connecting one of the older cell bases, install the new power supply and converter board first, following the instructions in the kit.

When using an IDNet version of the IND560 terminal, the cable connection from the base is made to a connector on the rear of the housing. The IDNet bases are supplied with a length of cable and a connector that mates to the connector on the IND560 terminal. The connector positions for the harsh and panel-mount enclosures are shown in Figures 2-16 and 2-17.



Figure 2-16: IDNet Connector Location on the Harsh Enclosure

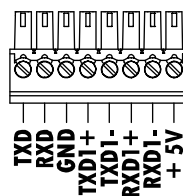


Figure 2-17: IDNet Connector Location on the Panel-Mount Enclosure

COM1 Serial Port Connections

The COM1 port includes connections for RS-232, RS-422 and RS-485. There is a setup parameter that must be selected to match the hardware connection used. This parameter controls how the transmit and receive lines are controlled.

Figure 2-18 indicates which terminal is which signal on the COM1 port. Make the connections as necessary.



Terminal	Signal	Notes
TxD	Transmit RS-232	
RxD	Receive RS-232	
Gnd	Logic Ground	
TxD1+	+Transmit RS-422, RS-485	Jumper to RxD1+ for RS-485
TxD1-	-Transmit RS-422, RS-485	Jumper to RxD1- for RS-485
RxD1+	+Receive RS-422, RS-485	Jumper to TxD1+ for RS-485
RxD1-	-Receive RS-422, RS-485	Jumper to TxD1- for RS-485
+5V	+ 5 Volts DC	170mA Maximum

Figure 2-18: COM1 Port Signals

Some examples of connecting external equipment are shown in Figure 2-19.

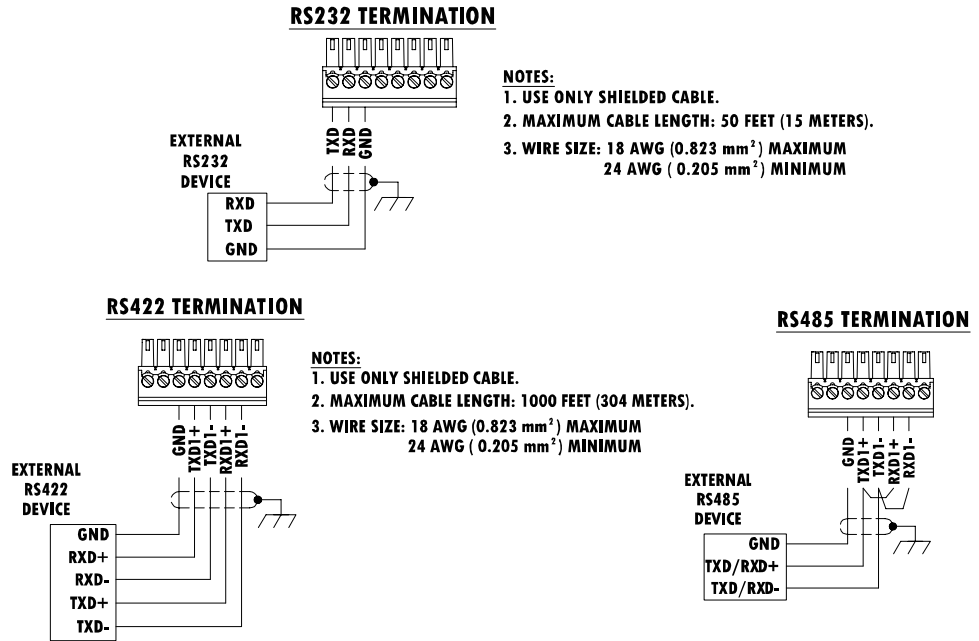


Figure 2-19: Sample Connections

Wiring Connections for Options

Options available for the IND560 terminal that require external connections include the following:

- Analog Output
- Ethernet and Data Ports (COM2 and COM3)
- Discrete I/O (Relay)
- PROFIBUS (Harsh Enclosure)
- PROFIBUS (Panel-Mount Enclosure)
- Rockwell (Allen-Bradley) RIO

Figure 2-20 shows where each of these options is located in the harsh enclosure and Figure 2-21 shows where they are located in the panel-mount enclosure. The connections for each of these options are described in the following sections.

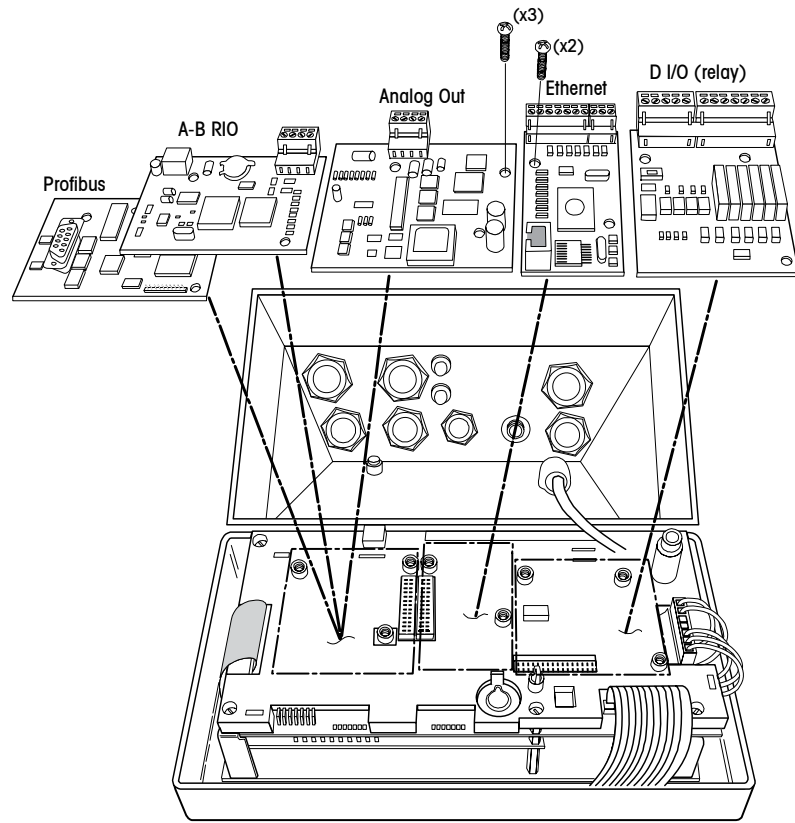


Figure 2-20: Option Locations for Harsh Enclosure

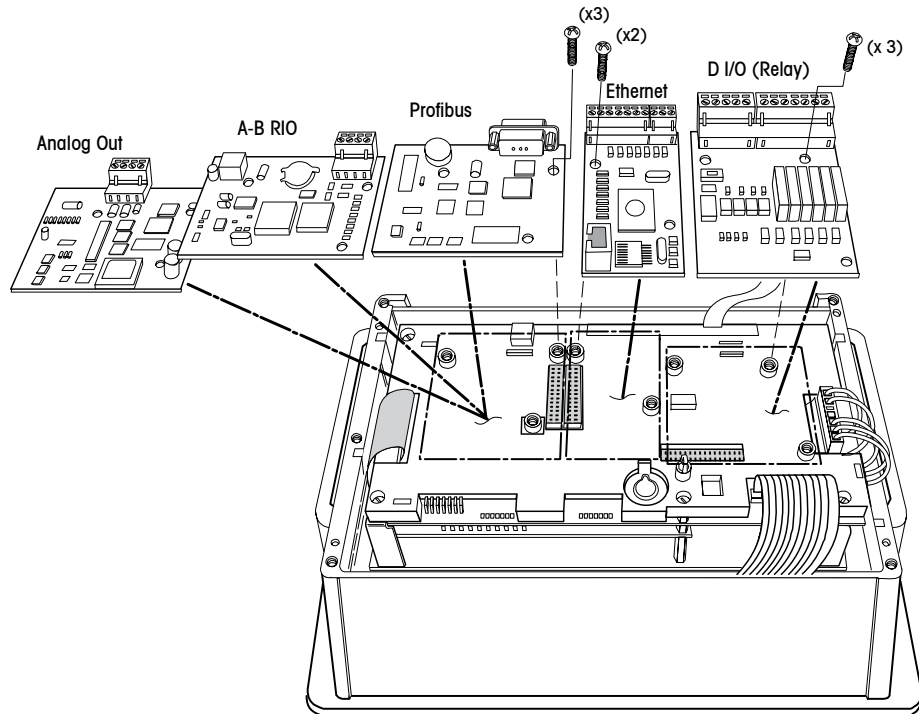


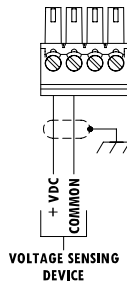
Figure 2-21: Option Locations for Panel-Mount Enclosure

Analog Output Connections

The analog output option fits into the PLC interface slot on the Main board. It provides either 0-10 VDC or 4-20mA (only one) analog signal proportional to the weight applied to the scale. Connections should be made per Figure 2-22.

ANALOG OUTPUT TERMINATION

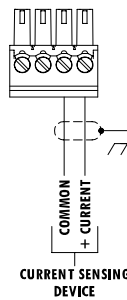
0 - 10 VDC



- NOTES:
1. USE TWO CONDUCTOR SHIELDED CABLE.
 2. MINIMUM RESISTANCE OF DEVICE LOAD: 500 OHMS.
 3. WIRE SIZE: 18 AWG (0.823 mm²) MAXIMUM
24 AWG (0.205 mm²) MINIMUM

ANALOG OUTPUT TERMINATION

0 - 20 mA.



- NOTES:
1. USE TWO CONDUCTOR SHIELDED CABLE.
 2. MINIMUM RESISTANCE OF DEVICE LOAD: 500 OHMS.
 3. WIRE SIZE: 18 AWG (0.823 mm²) MAXIMUM
24 AWG (0.205 mm²) MINIMUM

Figure 2-22: Wiring the Analog Output

Ethernet, COM2, and COM3 Connections

The Ethernet/dual COM port option is positioned in the center option slot on the Main board. This port provides a 10 Base-T connection (10 Mb) connection for Ethernet and two serial ports labeled COM2 and COM3. The Ethernet connection is made via a standard RJ45 connector on the option board. The connector is shown in Figure 2-23.



Figure 2-23: Ethernet Connection

COM2 provides only RS-232 and should be connected as shown in Figure 2-24.

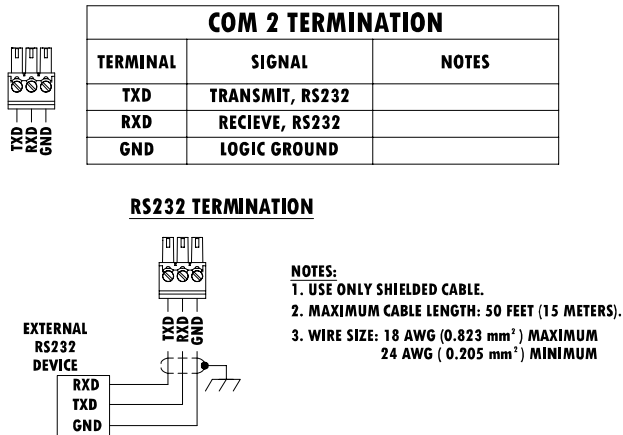


Figure 2-24: Wiring to COM2

COM3 provides RS-232, RS-422 or RS-485 connections, which is identical to COM1 on the Main board except the +5 VDC supply on the last terminal is not provided. Refer to the COM1 connection section described previously for instructions for wiring to this port. Review Figure 2-18 and Figure 2-19 for additional details.

Important: Adhere the Ethernet label from the kit to the rear panel of the panel-mount unit near the Ethernet connector (Figure 2-25). On the harsh enclosure, adhere the Ethernet label to the Main board near the Ethernet connector (Figure 2-26).



Figure 2-25: Ethernet Label on the Panel-Mount Unit



Figure 2-26: Ethernet Label on the Harsh Enclosure

Discrete I/O (Relay) Connections

The relay output version of the Discrete I/O option provides four isolated inputs and six dry-contact normally open relay outputs. The inputs can be selected as either active or passive based on the position of the slide switch on the board.

Active Input

Selecting the inputs as active (Figure 2-31) enables connection of switches or other simple devices to trigger an input. No voltage is supplied by the external simple device. An example of how to wire to the active inputs is shown in Figure 2-27.

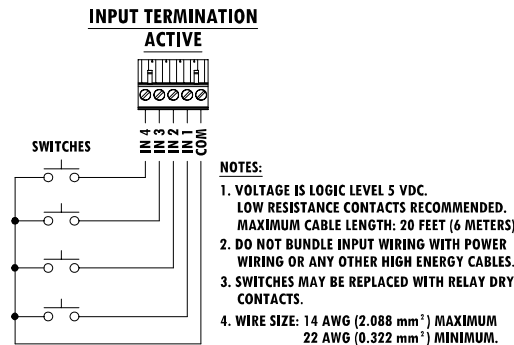


Figure 2-27: Active Input Connections

Passive Input

Selecting the inputs as passive (Figure 2-33) enables other devices such as PLCs to provide the trigger voltage (typically 24 VDC, maximum 30 VDC) to turn the IND560 inputs "on". The logic ground from the external device must be connected to the common of the IND560 inputs. An example of wiring to the passive inputs is shown in Figure 2-28.

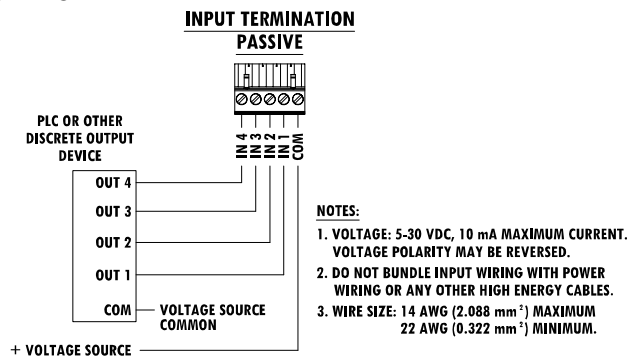


Figure 2-28: Passive Input Connections

Relay Outputs

The relay outputs can switch up to 250 VAC or 30 VDC voltages at 1A maximum. The relay outputs are not polarity-sensitive since they are dry contact outputs. An example of wiring to the outputs is given in Figure 2-29.

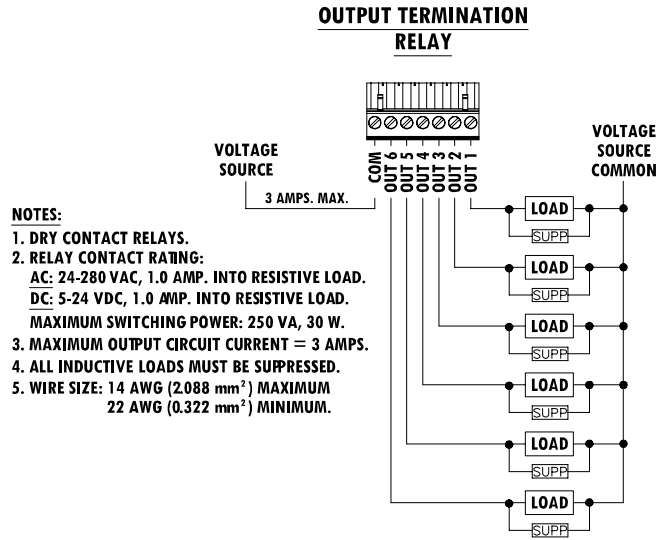


Figure 2-29: Relay Outputs

PROFIBUS (Harsh Enclosure)

The PROFIBUS connection to the harsh enclosure is made using a right-angle nine-pin connector inside the IND560 enclosure. This connector is a standard Siemens part # 6ES7 972-0BA41-OXA0 or equivalent (not supplied by METTLER TOLEDO). There are two nine-pin connectors on the PROFIBUS board—use the connector shown in Figure 2-30.



Figure 2-30: PROFIBUS Connection to Harsh Enclosure

Follow the wiring instructions included with the connector to terminate the wires.

PROFIBUS (Panel-Mount Enclosure)

The PROFIBUS connection to the panel-mount enclosure can be made using either a straight or a right-angle nine-pin connector. This connector (or an equivalent) is a standard METTLER TOLEDO part # 64054361 for the straight connector or Siemens part # 6ES7 972-0BA41-OXA0 for the right-angle connector. These connectors are not supplied by METTLER TOLEDO as part of the option. Attach the

nine-pin mating plug to the connector. The pin assignments are shown in Figure 2-31.

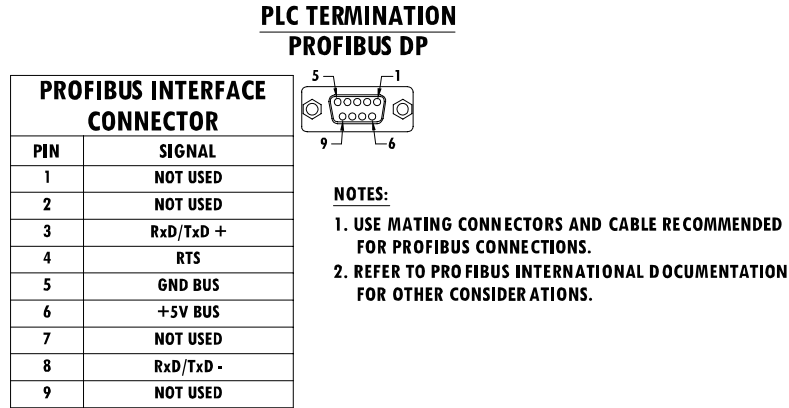


Figure 2-31: PROFIBUS Nine-Pin Connector Assignments

Follow the wiring instructions included with the connector to terminate the wires.

Rockwell (Allen Bradley) RIO

Connections to the Remote IO option are made using a three-pin terminal connector on the RIO option. The connection should be wired as shown in Figure 2-32.

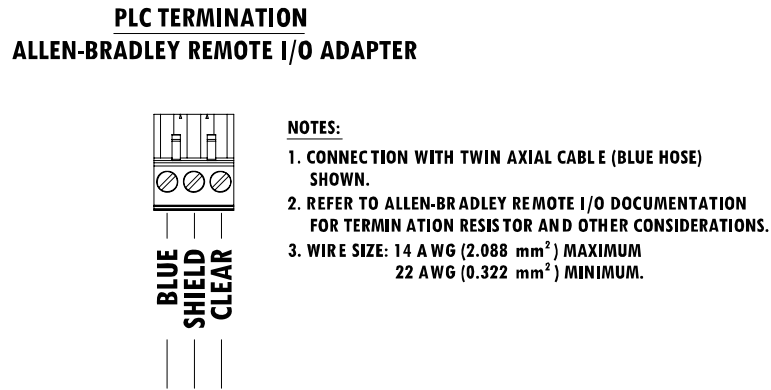


Figure 2-32: RIO Connection

The part number for the Remote IO cable is Belden 9463. It is sometimes referred to as "Blue Hose" cable.

PCB Switch Settings

PCB switch settings are described in this section, including settings for main PCB switches and the discrete I/O (relay) switch.

Main PCB Switches

There are four switches located on the main PCB as shown in Figure 2-13. Functions of the switches are listed in Table 2-3.

Table 2-3: Main PCB Switches Functions

Switch	Function
SW1-1	Metrology Security Switch (legal for trade) When in the ON position, this switch prohibits access to the Scale block in the menu tree and other metrologically significant areas
SW1-2	Flash Software Set in the ON position during software download Set in the OFF position during normal operation
SW2-1	Factory test Set in the OFF position at all times for normal weighing. This switch must be ON when connecting to the InSite program using the COM1 serial port of the IND560 terminal.
SW2-2	Factory test Set in the OFF position at all times

- When both SW1-1 and SW1-2 are positioned ON and AC power is applied to the terminal, a Master Reset function will be initiated. This procedure will erase all programming in the terminal and return all settings back to factory default values. This process is described in the IND560 Technical Manual, Chapter 4.0, Service and Maintenance.

Discrete I/O (Relay) Switch

There is a switch on the Relay Discrete I/O board that selects if the inputs will be active or passive. An explanation of these two modes and sample wiring diagrams were provided earlier in this chapter. Ensure that the switch is set properly before wiring to the inputs. The location of the switch and the active/passive positioning are shown in Figure 2-33.

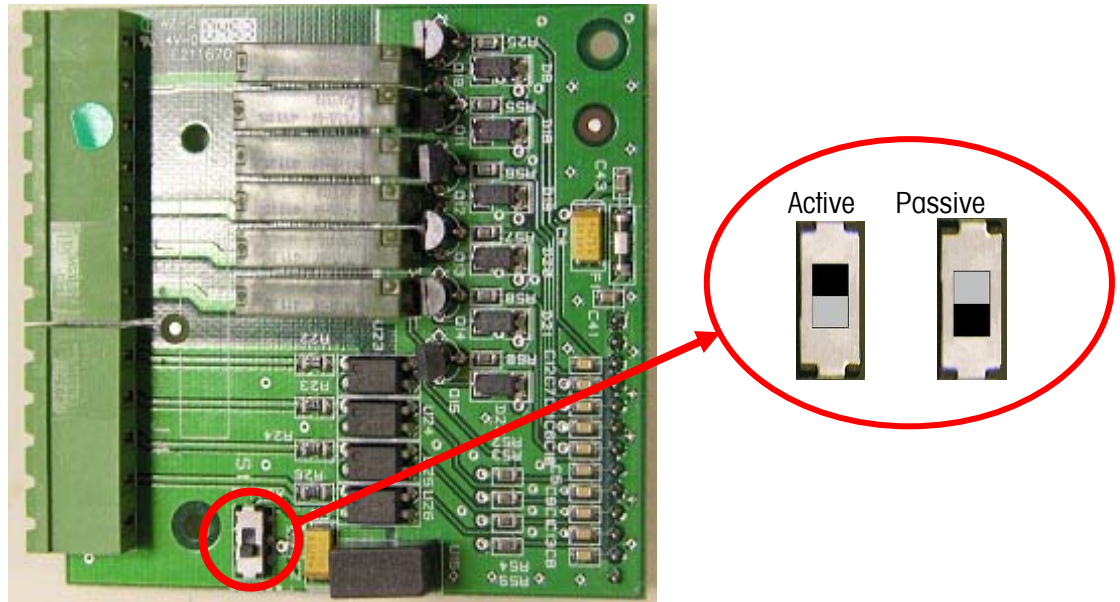


Figure 2-33: Location and Switch Settings for the Relay Discrete I/O Input Switch

PCB Jumper Positions

Only the analog version of the Main board has a jumper on it. This section provides the details for this jumper.

Main PCB Jumper

The IDNet version of the IND560 main board has no jumpers. There is one jumper on the IND560 analog scale main board (W1). This jumper selects either 2 mV/V or 3 mV/V operation of the analog circuitry. Refer to Figure 2-34 for the jumper position.

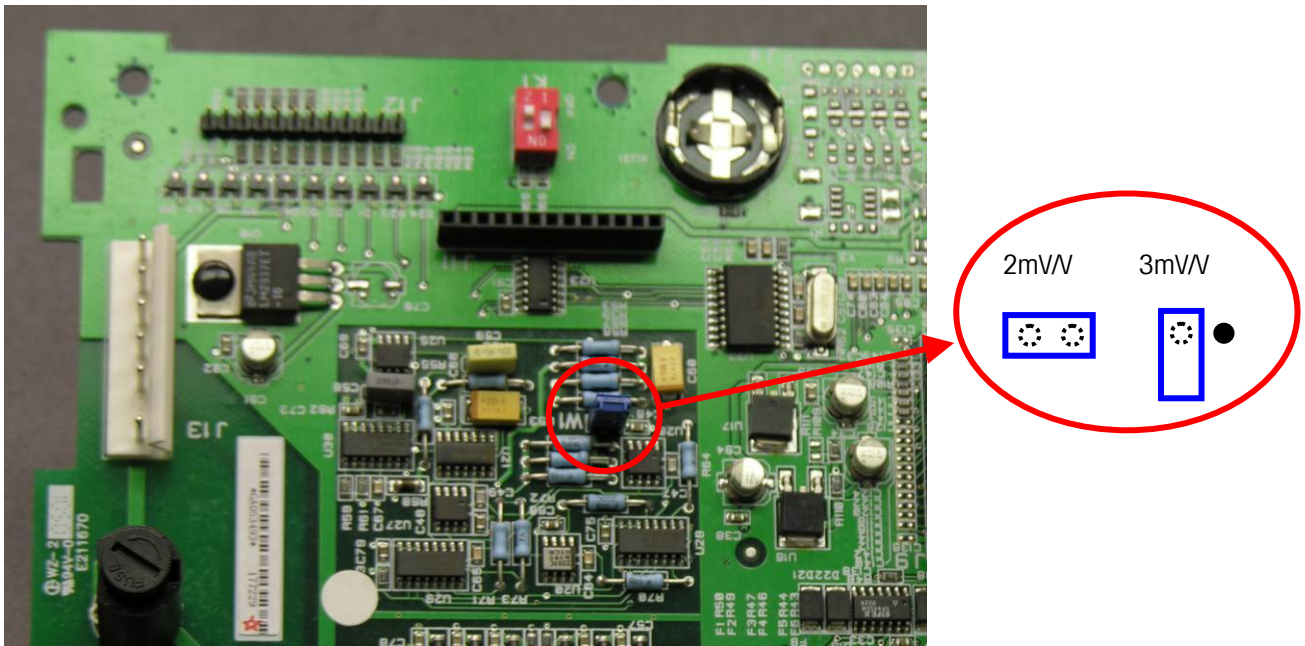


Figure 2-34: Millivolt Jumper Selection

- When removing the W1 jumper for 3mV/V operation, reposition it on just one of the pins as shown in Figure 2-34. If this jumper is not positioned properly, the plastic cover over the Main board will not fit properly. If this occurs, do not force the plastic cover down. Remove the cover and position the jumper as shown.

The 2 mV/3 mV jumper settings are described in Table 2-4.

Table 2-4: Millivolt Jumper Description

Jumper	On	Off	Description
W1	X		This jumper sets the connected scale's load cell setting to 2 mV/V.
W1		X	No jumper sets the connected scale's load cell setting to 3 mV/V

Sealing the Enclosure

When the IND560 terminal is used in a metrologically “approved” application, it must be protected from tampering by use of seals. There is an optional sealing kit available from METTLER TOLEDO that contains all the required hardware (Part number 71209388). The method used for sealing will vary depending upon the local requirements. The IND560 supports two methods of sealing—external and internal.

External sealing is approved in the United States and Canada; however, when the terminal is sealed externally, non-metrological components cannot be serviced without breaking the seal. In Europe, internal sealing is possible, which permits access to non-metrological components without breaking the seal. Check with local authorities to determine which sealing method is appropriate.

External Sealing of the Panel-Mount Enclosure

The panel-mount enclosure supports both two- and three-screw external sealing for the United States and Canada. For external sealing of the panel-mount enclosure, refer to Figures 2-35, 2-36, and 2-37 and follow these steps:

1. Ensure that the appropriate approval region has been selected in setup under Scale, Type, Approval and that the Metrology security switch SW1-1 is in the “on” position.
2. Replace the three Phillips-head screws that secure the rear panel to the enclosure with the three through-hole screws provided in the sealing kit.
3. Thread the wire cable and plastic seal included with the kit through the holes in the new screws. The U.S. requires use of only two of the screws (Figure 2-36), Canada requires use of all three (Figure 2-37).
4. Thread the end of the wire cable through the plastic seal and snap the seal shut.



Figure 2-35: External Sealing Wire



Figure 2-36: External Sealing for United States



Figure 2-37: External Sealing for Canada

External Sealing of the Harsh Enclosure

For external sealing of the harsh enclosure, refer to Figures 2-35 and 2-38 and follow these steps:

1. Ensure that the appropriate approval region has been selected in setup under Scale, Type, Approval and that the Metrology security switch SW1-1 is in the "on" position.
2. Thread the end of the wire seal through the hole in the bottom edge of the IND560 front panel.
3. Thread the end of the wire seal through the hole in the center clip of the IND560 front panel.
4. Remove the slack in the wire seal and snap the front panel down to the enclosure so that it snaps in place in all four corners.
5. Remove any remaining slack in the wire cable.
6. Thread the end of the wire cable through the plastic seal and snap the seal shut.



Figure 2-38: External Sealing of the Harsh Enclosure

Internal Sealing of Both Enclosure Types

Both the panel-mount and harsh enclosures are sealed the same way when sealed internally. Refer to Figures 2-39, 2-40, and 2-41 and follow these steps:

1. Ensure that the appropriate approval region has been selected in setup under Scale, Type, Approval and that the Metrology security switch SW1-1 is in the "on" position.
2. On the panel-mount terminal, remove AC power and remove the main board to apply the internal seal. This step is not necessary for the harsh enclosure.
3. Attach the plastic bottom sealing plate to the Main board as shown in Figure 2-39.



Figure 2-39: Attaching the Plastic Bottom Sealing Plate

4. Place the small metal sealing plate from the sealing kit over the plastic standoff beside the metrology security switch as shown in Figure 2-40.



Figure 2-40: Metal Sealing Plate

5. Screw the long sealing screw through the hole in the small metal plate through the main board and into the plastic locking plate beneath the board.
6. Thread the wire cable through the hole in the sealing screw and the plastic post as shown in Figure 2-41.



Figure 2-41: Sealing Wire

7. Remove any slack in the wire and snap the seal shut.
8. Reinstall the main board in the panel-mount enclosure.
9. When using analog load cells, remove the backing paper from the paper seal included in the sealing kit and place it over the load cell terminal strip connector so that it covers the heads of the terminal screws and also secures the connector to the plastic plate of the IND560. See Figure 2-42.



Figure 2-42: Analog Load Cell Paper Seal

10. When using IDNet bases, the IDNet connector board must be removed from the rear panel in order to apply the paper seal. Remove the backing paper from the two paper seals included in the sealing kit and place the seals over both ends of the internal IDNet harness in the IND560. See Figure 2-43.



Figure 2-43: IDNet Paper Seals

11. For IDNet bases in Europe, the plastic Ident card kit (Part number 22000386) must be used to secure the IDNet cable to the IND560 terminal. Follow the instructions with that kit for proper installation. The Ident code for the base is viewed on the Metrology Recall display of the terminal.

METTLER TOLEDO

For your notes