Technical Manual

IND780

Weighing Terminal

METTLER TOLEDO

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.
    e. **InTouch℠ Remote Services**: Confidently and securely improve the performance and uptime of your weighing systems, with InTouch Remote Service, only available from METTLER TOLEDO. Working within your existing IT security policies, IND570 with embedded InTouch connectivity actively monitors system performance. Proactive alerts to remote service technicians allow a real-time response to performance issues, increasing uptime, overall asset utilization and reduction of unforeseen expenses.

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 expense.

- Declaration of Conformity may be found at http://glo.mt.com/us/en/home/search/compliance.html/compliance/.

Note on Firmware Revisions

This manual describes features and functions of the IND780 terminal with version 6.4.xx firmware. Terminals with version 6.3.xx firmware or lower will differ in some areas. The following lists indicate the key differences between versions:

- New in version 5.1 – Continuous Extended Output; enhanced SICS scale interface to support WM/WMH, 4-Series and Excellence bases; Ethernet Terminal Clustering; ID and Prompt sequences; serial input for text entry; remote SQL Server Database Access; Modbus TCP interface; DeviceNet™ interface; Chinese language support; support for Axle-780 and Com-780.
- New in version 6.1.01 – Support for SICS levels 2 and 3; revised CalFREE™ functionality; additional display and keyboard language options; DHCP option added for Ethernet/IP and Modbus TCP interfaces; External Diagnostics Load Cell Symmetry page; addition of Watchdog Timer function.
- New in version 6.1.08 – Support for POWERCELL PDX load cells, MT Service View for PDX Diagnostics, PDX Performance Log.
- New in version 6.3.03 – Support for Dual-Channel Analog Output option board.
- IND780 terminals now equipped with faster, new-generation ETX board. The IND780 main PCB is compatible with both types of board, but the terminal must use firmware versions as follows:

  Original ETX board – version 6.x or earlier

  New ETX board – version 7.x or later
- New in version 7.x – Support for Flow Meter boards
- New in version 8.0.05 – Support for PowerMount and PowerDeck

Statement regarding harmful substances

We do not make direct use of harmful materials such as asbestos, radioactive substances or arsenic compounds. However, we purchase components from third party suppliers, which may contain some of these substances in very small quantities.

Warnings and Cautions

- 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.**
	⚠ WARNING **NOT ALL VERSIONS OF THE IND780 ARE DESIGNED FOR USE IN HAZARDOUS (EXPLOSIVE) AREAS. REFER TO THE DATA PLATE OF THE IND780 TO DETERMINE IF A SPECIFIC TERMINAL IS APPROVED FOR USE IN AN AREA CLASSIFIED AS HAZARDOUS BECAUSE OF COMBUSTIBLE OR EXPLOSIVE ATMOSPHERES**
	⚠ WARNING **IN ORDER TO INSTALL THE DIVISION 2 APPROVED IND780 TERMINAL UTILIZING THE U.S. APPROVAL, METTLER TOLEDO CONTROL DRAWING 64069877 MUST BE FOLLOWED WITHOUT EXCEPTION. IN ORDER TO INSTALL THE CATEGORY 3 MARKED IND780 UTILIZING THE EUROPEAN APPROVAL, THE DEMKO APPROVAL CERTIFICATE 07ATEX0520819X AND ALL LOCAL REGULATIONS MUST BE FOLLOWED WITHOUT EXCEPTION. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE. REFER TO THE IND780 DIVISION 2 AND ZONE 2/22 INSTALLATION GUIDE 64063214 FOR ADDITIONAL INFORMATION.**
	⚠ WARNING **IF THE KEYBOARD, DISPLAY LENS OR ENCLOSURE IS DAMAGED ON A DIVISION 2 APPROVED OR CATEGORY 3 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.**
	⚠ 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.**
	⚠ CAUTION **GROUNDING MUST BE PERFORMED ACCORDING TO LOCAL ELECTRICAL CODE.**

	⚠ **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.
	NOTICE
	OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

Disposal of Electrical and Electronic Equipment

In conformance with the European Directive 2012/19/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

DIV 2 AND ZONE 2/22 INSTALLATION

IF YOU WISH TO INSTALL THE IND780 IN A DIVISION 2 OR ZONE 2/22 AREA, REFER TO THE DIVISION 2 AND ZONE 2/22 INSTALLATION INSTRUCTIONS INCLUDED ON THE RESOURCE CD PROVIDED WITH THE TERMINAL. FAILURE TO COMPLY WITH THE INSTRUCTIONS PROVIDED THERE COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

Thank you for purchasing the IND780 industrial terminal. The IND780 combines the cumulative experience of over 100 years of industrial weighing experience and the innovation of the original manufacturer of electronic weighing solutions, with the latest in METTLER TOLEDO technology to provide you with a versatile weighing terminal that can be configured to meet your specific requirements. The IND780 terminal is a high-performance, single- or multiple-range weighing terminal for use with analog load cells, high-precision IDNet, SICS, POWERCELL® MTX® or POWERCELL® PDX®/PowerMount scale interfaces used in industrial weighing applications. The IND780 is capable of supporting up to four measurement channels and can provide a metrologically correct Sum Scale.

1.1. IND780 Terminal Versions

The IND780 terminal is available with the following capabilities and versions:

- Basic weighing terminal used in non-hazardous areas and in certain hazardous locations
- Panel Mount or harsh desk/wall-mount enclosures
- Connection for up to four scale channels and a metrologically correct sum
- Support for up to sixteen 350Ω analog load cells per terminal, with up to eight 350Ω analog load cells per scale channel
- 320 x 240 pixel backlit, active TFT, color LCD with the capability of displaying weight with characters as large as 34 mm high; alternate multiple channel display
- Real-time clock with battery backup
- Two serial ports (RS232 and RS232/422/485) for asynchronous, bidirectional communication and print output
- 10/100 Base-T Ethernet port
- USB Master
- 100–240 VAC power input range

- Support for the following option boards:
  - Analog Load Cell interface
  - POWERCELL® MTX® interface
  - POWERCELL® PDX® interface
  - Flow Meter Interface
  - Discrete I/O interface
  - PROFIBUS-DP interface
  - PROFINET interface
  - DeviceNet™ interface
  - IDNet Scale interface
  - Serial communications
  - Allen Bradley® RIO interface (Discontinued, January 2021)
  - ControlNet™ interface
  - EtherNet / IP® (also for Modbus TCP)
  - Analog Output interface
- Basic weighing functions including scale selection, zero, tare, and printing
- Single or multiple range or interval weighing
- Rate calculation for each scale channel with selectable weight and time units
- Selectable over/under classifying mode of operation with graphics
- Selectable material transfer mode
- Comparators – simple targets for comparison of weight or rate with target values or ranges
- ID mode for prompted transaction sequencing
- SmartTrac™ graphical display
- Two memory tables for storage of Tare and Target values
- Unit switching, including custom units
- Alibi memory storage for up to 256,000 records
- Grand total and subtotal registers for accumulating weight
- Ten customizable print templates and report printing
- TraxDSP™ digital filtering for analog load cells
- TraxEMT™ performance monitoring and recording, including web-based tools
- Traditional Calibration with 5-point linearization
- CalFree™ calibration without test weights
- Step Calibration procedure
- Ethernet network clustering, up to 20 terminals for remote console, data and interface sharing
- InSite™ SL Configuration Tool (PC based software for backup and restore)

1.2. 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 IND780 is ruggedly constructed, it is nevertheless a precision instrument. Use care in handling and installing the terminal.

1.3. 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

1.3.1. Temperature and Humidity

The IND780 can be operated at temperatures and relative humidity conditions as listed under Operating Environment in Table 1-1. The terminal can be stored at temperatures ranging from –40° to 60° C (–40° to 140° F) at 10 to 95% relative humidity, non-condensing.

1.3.2. Environmental Protection

The harsh enclosure meets IP69K requirements. The Panel Mount front panel sealing provides type 4x and type 12 protection—comparable to IP65 rating.

1.3.3. Hazardous Areas

⚠ WARNING!

THE STANDARD IND780 IS NOT INTRINSICALLY SAFE! DO NOT USE IN AREAS CLASSIFIED AS HAZARDOUS BY THE NATIONAL ELECTRICAL CODE (NEC) BECAUSE OF COMBUSTIBLE OR EXPLOSIVE ATMOSPHERES.

Not all versions of the IND780 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. When an approved IND780 is installed in an area classified as Division 2 or Zone 2/22, special AC wiring requirements must be met. See document 64063214, IND780 Division 2, Zone 2/22 Installation Guide.

1.4. 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 IND780 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 IND780 terminal must be packed correctly to ensure its safe transportation.

The package should include:

- IND780 Terminal
- Installation manual
- Documentation CD (includes all manuals)
- Bag of parts including ferrites, grommets, etc., depending on terminal configuration

1.5. Model Identification

The IND780 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 IND780 that was ordered.

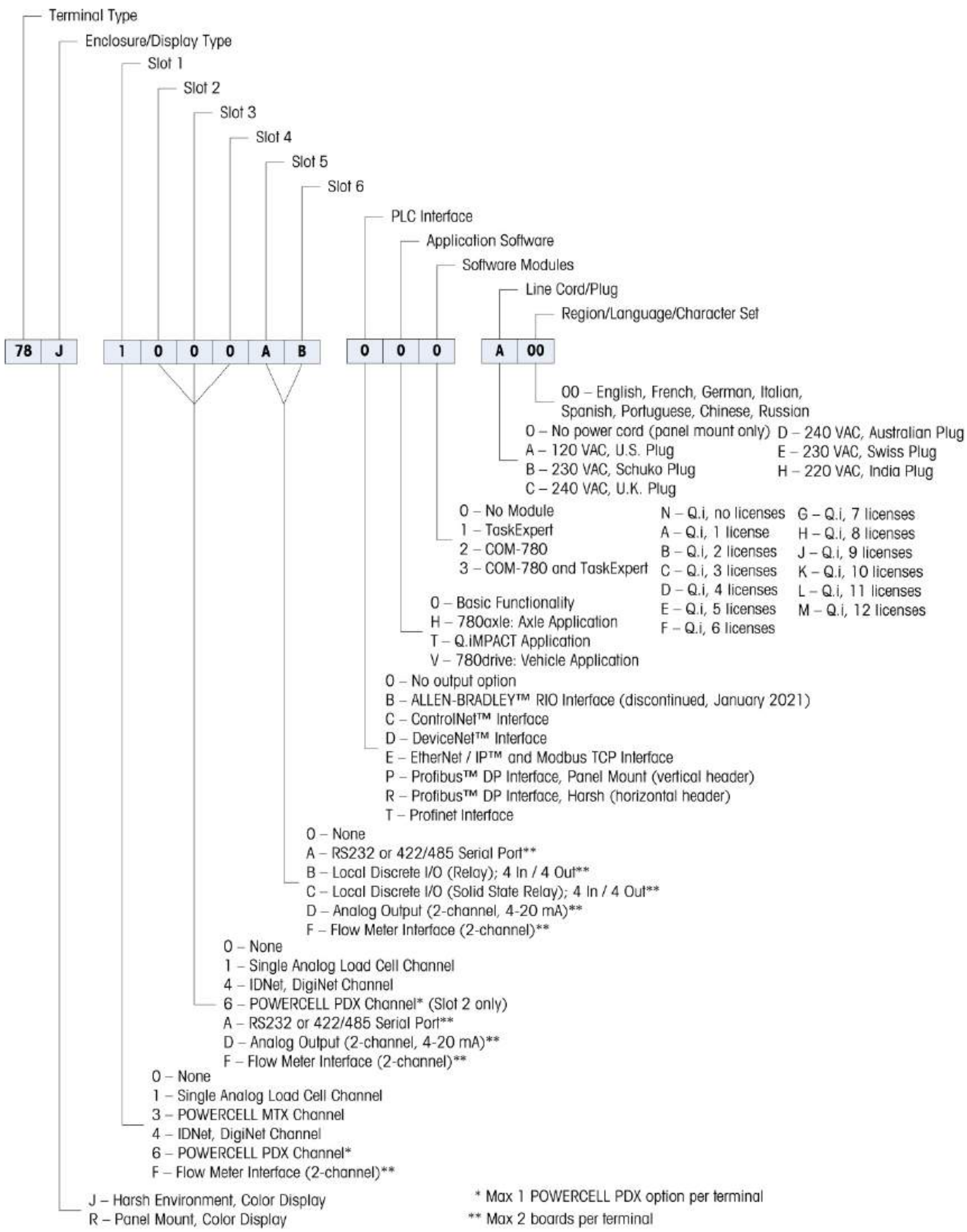


Figure 1-1: IND780 Model Identification Numbers

1.6. Physical Dimensions

The IND780 terminal physical dimensions for the Panel Mount enclosure are shown in Figure 1-2 in inches and [mm].

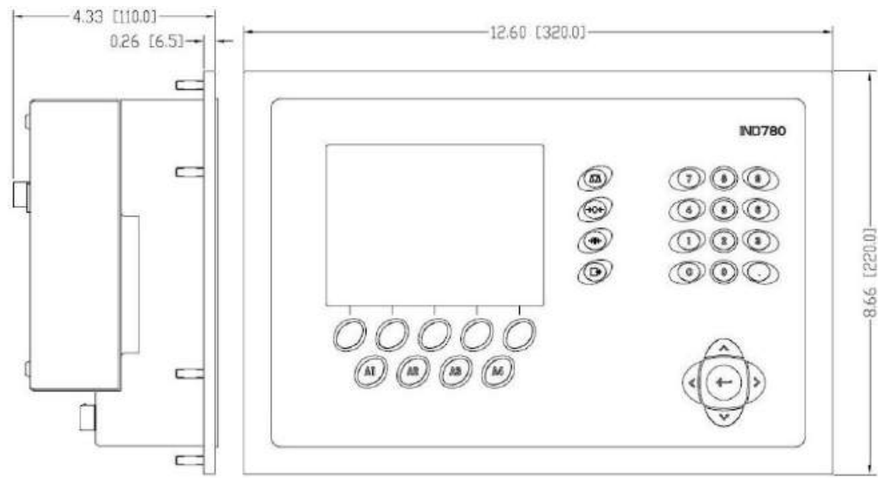


Figure 1-2: IND780 Panel Mount Enclosure Dimensions

The IND780 terminal physical dimensions for the harsh desk/wall-mount enclosure are shown in Figure 1-3 and Figure 1-4 in inches and [mm].

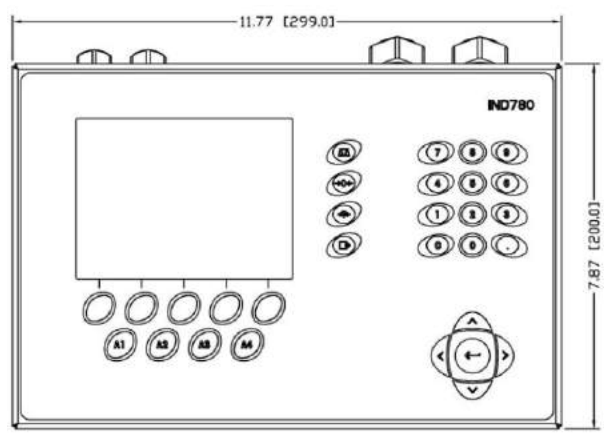


Figure 1-3: Harsh Environment Enclosure Dimensions, Front

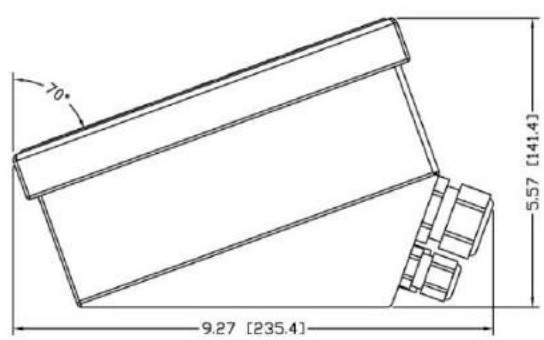


Figure 1-4: Harsh Environment Enclosure Dimensions, Side

1.7. Specifications

The IND780 terminal conforms to the specifications listed in Table 1-1.

Table 1-1: IND780 Specifications

IND780 Specifications	
Enclosure Type	Panel Mount stainless steel front panel
	Harsh environment desk/wall/column-mount type 304 L stainless steel enclosure
Dimensions (l × w × d)	Panel Mount: 320 mm × 220 mm × 110 mm (12.6 in. × 8.7 in. × 4.3 in.)
	Harsh Environment: 299 mm × 200 mm × 141 mm (11.8 in. × 7.9 in. × 5.6 in.)
Shipping Weight	5 kg (11 lb)
Environmental Protection	Panel Mount front panel sealing provides Type 4x and Type 12 protection – comparable to IP65 rating
	Harsh Environment meets IP69K requirements
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 IND780 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 100–240 VAC, 49–61 Hz, 400 mA (both enclosure types) Power system must be a single phase TN (grounded neutral) system limited to 20A with protective Earth.
	Panel Mount version provides a terminal strip for AC power connections
	Harsh environment version includes a power cord configured for the country of use
	Note: When an IND780 is installed in an area classified as Division 2 or Zone 2/22, special AC wiring requirements must be met. See document 64063214, **IND780 Division 2, Zone 2/22 Installation Guide**.
Display	320 x 240 pixel backlit graphic, active, TFT color LCD with the capability of displaying weight in 34-mm high characters; alternate multiple channel display
Weight Display	Displayed resolution of 1,000,000 counts for analog load cell scales Display resolution for high-precision IDNet bases is determined by the specific base used
Scale Types	Analog load cells or IDNet, High-Precision K Line, POWERCELL MTX, POWERCELL PDX/PowerMount, SICS
Number of Cells	Eight 350-ohm load cells (2 or 3 mV/V) per analog channel; (16) 350Ω per terminal

<table>
<tr><th colspan="3">IND780 Specifications</th></tr>
<tr><td>Number of Scales</td><td colspan="2">Interface for up to four scale channels plus a sum</td></tr>
<tr><td>Flow Meters</td><td colspan="2">Up to four flow meter channels, for a maximum of four devices (scales or flowmeters)</td></tr>
<tr><td>Analog/Digital Update Rates</td><td colspan="2">Internal Analog: >366 Hz
IDNet: determined by base
POWERCELL MTX, POWERCELL PDX/PowerMount: determined by cell
Target Comparison: 50 Hz
PLC Interface: 20 Hz</td></tr>
<tr><td>Load Cell Excitation Voltage</td><td colspan="2">10 VDC</td></tr>
<tr><td>Minimum Sensitivity</td><td colspan="2">0.1 microvolts</td></tr>
<tr><td>Keypad</td><td colspan="2">30 keys; 1.22-mm thick polyester overlay (PET) with polycarbonate display lens</td></tr>
<tr><td>Communications</td><td colspan="2">Serial Interfaces
Standard: Two serial ports COM1 (RS-232) and COM2 (RS-232/RS-422/RS-485), 300 to 115,200 baud; Ethernet 10/100 Base-T 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 ten configurable print templates or SICS host protocol, report printing, interfaces with external ARM100 Input/Output modules, and DeviceNet Bridge</td></tr>
<tr><td rowspan="7">Approvals</td><td colspan="2">Weights and Measures
USA: NTEP CoC # 06-017
Class II, 100,000d
Class III, IIIL, 10,000d
Canada: AM-5592
Class II 100,000d
Class III 10,000d and Class IIIHD 20,000d
Europe: TC6944
Class II, approved divisions determined by platform
Class III, IIII, 10,000e</td></tr>
<tr><td colspan="2">Hazardous Areas</td></tr>
<tr><td>UL</td><td>Class I,II,III; Div 2; GP C, D, F, G T4</td></tr>
<tr><td>ATEX</td><td>Zone 2 - II 3 G Ex ic nA [ic] IIB T4 Gc
Zone 22 - II 3 D Ex tc IIIC T85°C Dc
-10°C ≤ T amb ≤ +40°C</td></tr>
<tr><td>IECEx</td><td>Zone 2 - Ex ic nA [ic] IIB T4 Gc
Zone 22 - Ex tc IIIC T85°C Dc
-10°C ≤ T amb ≤ +40°C</td></tr>
<tr><td colspan="2">Certificate Numbers</td></tr>
<tr><td>UL – US/Canada
ATEX
IECEx</td><td>UL E152336
DEMKO 07ATEX0520819X
IECEx UL 10.0014X</td></tr>
</table>

1.8. Main PCB

1.8.1. Overview

The IND780 terminal's main printed circuit board (PCB) includes provisions for the microprocessor, main memory, battery, application module key, Ethernet, USB and serial communications, and mounting of option boards.

The main board contains the COM1 and COM2 serial ports. COM1 provides RS-232 communication, while COM2 supports RS-232, RS-422, or RS-485 communication. These ports are 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.

When InTouch™ Remote Services are enabled in the IND780, the Ethernet port provides a secure connection for transmission of terminal status information to the InTouch Enterprise Server.

1.8.2. ETX Board, HMI and LCD Updates

Newer IND780 terminals are equipped with an updated ETX processor, a new color LCD, and a new HMI board. These updates provide an overall improvement in system performance of 25 to 30%, and a power-saving LED backlight that provides better display readability at all angles.

- The new ETX board (PXA270) is compatible with the existing main PCB. However, in order to use the updated ETX, the terminal must use firmware version 7.x or above. The existing ETX board (PXA255) is **not** compatible with this firmware, and must be used with version 6.x or below.
- The new HMI board and LCD must be used together – neither is compatible with the previous version of the other. If it is necessary to replace either component in a system currently using the original HMI and LCD, **both** must be replaced.

1.9. Scale Bases

The IND780 supports Analog, IDNet, SICS, POWERCELL MTX, POWERCELL PDX and PowerMount bases.

1.9.1. Analog Load Cell Scale Base

The IND780 supports this scale type through an analog load cell interface. The terminal can drive up to sixteen 350-ohm analog load cells, with up to eight 350-ohm load cells on one channel.

1.9.2. IDNet™ Scale Base

The IND780 supports both the newer T-brick style of high-precision base and the older "PIK-brick" transducers, through the IDNet scale interface. For T-brick bases, the interface provides the +12 volts and communication required to operate this newer style of base. The port also provides +30 volts, to support PIK-brick high-precision bases. The base's cable determines which voltage is used.

1.9.3. SICS Scale Base

The IND780 supports Mettler Toledo high precision scales and balances that utilize the SICS communications protocol. These scales and balances are branded as the Mettler Toledo Excellence balances, X-bases/platforms, WM/WMH and 4-series scales (BBx4xx, IND4xx). The SICS scales are connected to the IND780 via the serial interfaces. Four SICS scales can be supported per terminal, when optional Serial boards are installed. Depending on the type of SICS scale connected, different configuration settings will be available in the IND780 terminal setup screens.

1.9.4. POWERCELL® MTX® Scale Base

The IND780 supports scales that use the POWERCELL MTX communications network found in large hopper / tank applications as well as vehicle scales that use the MTX load cell. This interface also supports the use of the RAAD Box, which converts analog load cell signals into digital ones.

1.9.5. POWERCELL® PDX® Scale Base

The IND780 supports scales that use the POWERCELL PDX communications network, typically found in vehicle scale and large tank weighing applications that use the PDX load cell. When used with an external power supply, the IND780 PDX interface can support as many as 24 cells. Up to four independent scale bases can be logically addressed by the terminal. When used in combination with a PDX network, the IND780 provides several diagnostic features such as predictive failure, automated alerts and cell performance monitoring. These features help lower maintenance costs and minimize downtime.

1.9.6. PowerMount™ Scale Base

PowerMount scales incorporate POWERCELL PDX load cells, and have the same interface and network features as those cells. Minor cabling differences in cabling for PowerMount are described in the **Installation** section of this manual.

1.10. Flow Meter Interface

The Flow Meter Interface Board is a two-channel isolated Counter/Flow Meter board for use in the IND780batch terminal. It is intended to provide a flow-meter totalizer target comparison to directly control on-board discrete outputs. The module is capable of counting input pulses at up to 50 kHz on each of two isolated input channels, as well as measuring the frequency of the input signal. A jumper-selectable switching threshold for each input channel is available, as well as a jumper-selectable 15 kHz analog filter. The input level range for the AC mode is 50mV to 50Vrms. The input level range for DC mode is 2.5 volts to 42 volts.

The outputs are 7407 open-collector drivers. Each module provides 150 mA of 5V power to drive opto-22 or similar devices. A total of two flow meters may be connected to a single flow meter card. Each terminal can connect to as many as 4 flow meters.

1.11. Options

The following additional options are available for the IND780:

- Discrete I/O
- Internal, high-level discrete I/O (4 inputs and 4 outputs)
- Remote discrete I/O via ARM100 module (4 inputs and 6 outputs)
- Serial Communications
- Programmable Logic Control (PLC) interfaces, including:
  - Allen-Bradley® (A-B) RIO (Discontinued, January 2021)
  - Analog output
  - Allen-Bradley ControlNet™
  - DeviceNet™
  - EtherNet / IP®
  - Modbus TCP
  - PROFIBUS® DP
  - PROFINET
- Axle-780 (application software)
- Drive-780 (application software)
- COM-780 (communications module)
- Task Expert™
- InSite™ SL Configuration Tool for users
- InSite™ CSL Configuration Tool for technical support
- Various brackets for wall and column mounting of the harsh enclosure

The scale measurement channel, serial and discrete I/O options are connected to the IND780 through six internal option slots. Various combinations of options may be ordered to match the application solution requirements.

1.11.1. 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 or solid state relay outputs. Both types will switch up to 30 volts DC or AC and up to 1 amp of current. 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). Each internal board supports four inputs and four outputs.

- The remote I/O is supported with the ARM100 remote module that provides dry-contact outputs. The inputs are passive on the ARM100. Each ARM100 supports four inputs and six outputs. An external 24-volt DC supply is required to operate the ARM100.
- A total of two internal Discrete I/O boards (8 inputs and 8 outputs) are supported and an additional 32 inputs and 48 outputs through a maximum of eight remote I/O modules.

1.11.2. Serial Ports

Additional communications cards provide RS-232, RS-422 or RS-485 communication at rates from 300 to 115.2k baud. A maximum of two serial communications cards may be installed in the IND780.

1.11.3. PLC Interfaces

The IND780 PLC interface options include analog output, A-B RIO (discontinued, January 2021), ControlNet™, DeviceNet™, EtherNet/IP®, Modbus TCP, PROFIBUS DP and PROFINET.

1.11.3.1. Analog Output

The Analog Output option kit includes a dual-channel option board. This board provides two channels of an isolated 4-20 mA analog signal output for displayed weight, gross weight, rate or application variables (selected in setup). One or two boards can be installed in the IND780, for a maximum of four output channels.

The analog option uses a 16-bit D/A converter for a very precise output. The output signals will be at the lower limit (4 mA) when the value represented is at zero. When the value reaches its maximum limit, the output signal will increase to the higher limit (20 mA). Any value between zero and the maximum limit will be represented as a percentage of the output proportional to the percentage of the value.

1.11.3.2. A-B RIO

- The Allen Bradley RIO interface was discontinued in January 2021. Information provided in this manual is for the purpose of legacy installation support only.

The A-B RIO option enables data exchange by bi-directional communications using the Discrete Data Transfer or Block Transfer mode. The IND780 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 IND780 Terminal and the PLC for process control. Division, integer, and floating point values are supported.

The IND780 A-B RIO interface also supports Block Transfer mode for transmission of larger amounts of data. Additional details about this interface can be found in the IND780 PLC Interface Manual on the documentation CD.

1.11.3.3. ControlNet and EtherNet IP

The IND780 supports ControlNet communications or EtherNet / IP interface options and the appropriate driver software.

1.11.3.4. DeviceNet

DeviceNet is an RS-485 based network using CAN chip technology. This network was created for bit- and byte-level devices. The network can be configured to run up to 500kbits per second depending on cabling and distances. Messages are limited to 8 unfragmented bytes. The network can include up to 64 nodes including the master, which is commonly called the scanner.

1.11.3.5. Modbus TCP

Modbus TCP is used to establish master-slave/client-server communication between intelligent devices. It is an open standard network protocol, widely used in the industrial manufacturing environment. The Modbus TCP protocol takes the Modbus instruction set and wraps TCP/IP around it. The Modbus TCP protocol is supported by the Ethernet / IP interface board, version 1.32 or higher.

1.11.3.6. PROFIBUS DP

The IND780 Terminal communicates to a PROFIBUS-DP master according to DIN 19 245. The PROFIBUS option consists of a module, together with firmware that resides in the IND780 Terminal to implement the data exchange.

1.11.3.7. PROFINET

The PROFINET option allows the IND780 terminal to communicate with PROFINET-enabled Programmable Logic Controllers (PLCs) at 100 Mbps speed, via a direct connection to the PROFINET network. The option consists of an internal module and internal software to implement the data exchange.

1.11.4. Application Software

The following application software modules can be added to the IND780 terminal to provide additional functionality for specific workplaces and industries.

1.11.4.1. Axle-780

The Axle-780 application supports vehicle weighing on a single-platform axle scale. It can be operated in automatic (unattended) or manual (attended) modes, and features the following:

- Weighs vehicles with up to 12 axles
- Transaction ID enterable via keyboard or RFID (badge) reader
- Configurable to flag overloads and control ticket printing for overloaded trucks
- Integrates use of traffic lights to instruct driver when to move

1.11.4.2. Drive-780

Drive-780 provides additional inbound / outbound vehicle weighing and control of traffic lights or gates associated with a truck scale. It includes the following:

- One-pass weighing using stored tare weights
- Two-pass weighing using temporarily stored tare weights
- Transient vehicle weighing
- Commodity conversion
- Traffic light and gate control
- Tare expiration

1.11.4.3. COM-780

The COM-780 option is a specialized software module focused on the needs of users utilizing legacy communication protocols. The IND780com maintains all of the standard features and functions of the IND780 in addition to the specific features and functions of the COM-780. COM-780 allows the IND780 to communicate using the following protocols:

- 8142
- 8530
- PT6S3
- SMA

Additional information can be found in the **COM-780 Technical Manual** on the module's document CD.

1.11.5. TaskExpert™

TaskExpert functionality provides a way to modify the standard capabilities of an IND780 so that it more closely aligns with the application requirements. TaskExpert is a combination of a programming visualization tool, an execution engine and the basic functionality of the terminal. Modifications may be made to the sequence of operation and additional functionality added to the basic operation of the terminal. In addition, pre-configured application software such as drive-780 can be used as the starting point.

1.11.6. InSite™ SL Configuration Tool

The IND780 terminal can connect to a PC running InSite SL (version 2.01 or higher) via Ethernet to:

- Save configuration information locally on the PC
- Load a saved configuration file into other devices
- Restoring to a known state for service purposes

InSite SL cannot be used to upgrade the terminal's firmware.

1.12. Display and Keyboard

The IND780 is available with a backlit, active TFT, graphic color LCD. Weight information may be displayed in a variety of formats, including single or multiple channel displays and with or without a tare or rate window.

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. Directly entered data 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 are provided for up to five softkey icons.

Three sets of five softkeys can be configured to activate a wide variety of built-in capabilities of the IND780, ranging from setting time and date, to accessing specific memory tables, to controlling the IND780's operation. Your installation technician will work with you to determine the appropriate mix of softkey functionality to suit your specific needs.

Four Application keys (A1-A4), located below the softkeys, can be defined to perform a variety of functions, including display adjustments, calibration testing, triggering custom outputs, and switching between units.

The terminal's 12-key numeric keypad is used to enter data and commands. The numeric keys are located on the right side of the terminal front panel. Alphanumeric data may be entered using the softkeys, through the use of an external USB keyboard, or scanned in from a bar code or other external device.

Five navigation keys are located below the numeric keypad. 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 IND780's display and keyboard layout.

Figure 1-5: The IND780 Front Panel Layout

2 Operating Instructions

The IND780 Terminal is simple to use yet sophisticated, with flexibility of configuration to meet a variety of operating requirements. The setup menu system provides the power of configuration in a user-friendly operational environment.

While reading this manual and operating the terminal, keep in mind that various functions may or may not have been enabled for your installation, and that the screens shown in this manual may vary from terminal to terminal, depending on how it is set up and configured.

This document provides instructions for performing typical weighing operations on the IND780 terminal.

2.1. Security

The IND780 supports the use of username/password for setup security at four levels.

- **Administrator**—An Administrator account has unlimited access to all areas of the operating and setup system. There can be multiple Administrator accounts. There is a Primary Administrator account, which can be changed but never deleted. The terminal is pre-configured at the factory with the Primary Administrator account with no password. The unit as configured at the factory requires no login or password entry to enter the setup mode. All functions of the terminal are available to all users until a password for the Primary Administrator account is set up.

  When the Metrology switch is turned "on" (refer to the next section of this chapter), all users with Administrator rights are reduced to the Maintenance level. This is done to protect metrologically significant parameters that cannot be changed when the terminal is "approved." Refer to Appendix B, **Default Settings** for the security level of each setup parameter.

Once a password is set up, be sure to remember it. If the password is changed or forgotten, access to the setup menu will not be available. Be sure to protect the password from access by unauthorized personnel. The password provides access to the entire setup menu. However, if the metrology switch is placed in the approved position, metrologically significant settings cannot be modified.

- **Maintenance**—Access is generally the same as the Administrator level with the exception of access to metrologically significant areas of the setup.
- **Supervisor**—Access is generally limited to editing tables and setting time and date.
- **Operator**—One default operator account is provided. Sites with validation requirements might create many operator accounts, each with a username and password entry requirement. The Operator-class of security is the most restrictive, allowing the user to use and view, but not change records within tables.

If a password has been programmed for the default Administrator username in Setup, and all other users have a password assigned, a login screen is presented whenever the Setup softkey is pressed. A valid username and password must be entered. Depending on the access level of the user logged in, setup screens may be visible only, or visible and available for modification.

If a login fails, the display exits the login page and returns to the home screen.

2.1.1. Metrology Switch

If the metrology switch (S1) is placed in the approved position (On), changes to the Scale branch of setup and other metrologically significant areas are not permitted. Access to the metrology switch may be sealed in conformity with local regulations in "legal-for-trade" applications. Figure 2-1 shows the location of the metrology switch, immediately adjacent to the Compact Flash card and PLC module location.

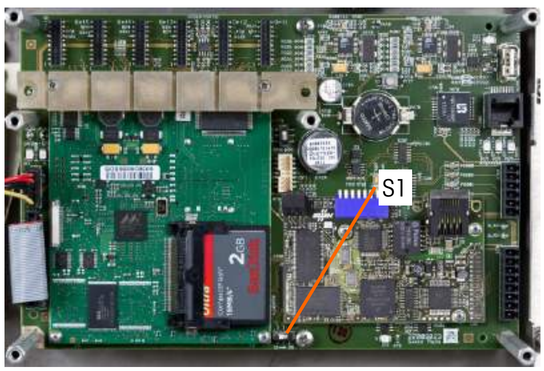


Figure 2-1: Metrology Switch, Location (left), shown in its OFF position (right)

2.2. Display Operation

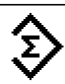
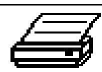
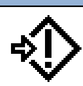
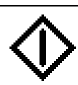
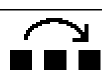
Key names and commands are identified in this manual by upper- and lower-case letters. Key names, such as ENTER, are in all upper-case letters, and commands, such as "select," are in lower-case (unless they begin a sentence, in which case the first initial is upper-case). For example:

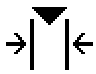
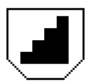
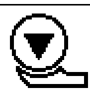
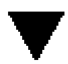
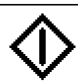
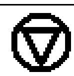
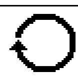
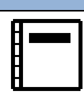
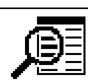
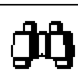
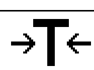
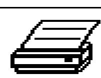
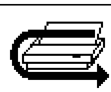
- "Press START..." means to press the START softkey.
- "Select an option..." means to use the UP or DOWN navigation keys to select a setting, then press ENTER.

2.2.1. Softkeys and Icons

Softkeys and application displays use graphic icons for identification. Table 2-1 shows graphic icons and their functions, categorized by where they are used. An asterisk (*) in the Softkey column indicates that this icon can be assigned to a softkey position. The Setup and Information Recall softkeys are always present – they can be moved, but not deleted.

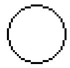
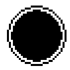
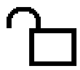
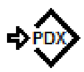
Table 2-1: Icons and Functions

Icon	Softkey	Function	Explanation
System Recall			
	*	Information Recall	Provides access to the Recall Screens: Weight, System Info, Metrology, Totals
		Weight Recall	Shows the current gross, tare, net values
i		System Information Recall	Shows the model, serial number, IDs, software versions, and installed hardware
M		Metrology Recall	Shows the firmware version number and the time and date of the last calibration
		Totals Recall	Provides access to the subtotal and grand total accumulations
		Print	Prints the selected memory to an attached peripheral
		Clear a Subtotal	Clears the subtotal and grand total registers from the Totals Report
C		Clear All	Clears both the subtotal and grand total registers from the totals memory
Icon to Enter Setup			
	*	Setup	Provides access to the setup parameters and procedures of the instrument
Softkey Menu Icons			
^ v		Up and Down	View the first or last five softkeys
v		More Down	View the next lower row of softkeys
^		More Up	View the next higher set of softkeys
Calibration Test Icons			
	*	Calibration Test	Provides access to the defined technician to perform the calibration test
		Calibration Test Weight Sequence	Provides access to the test weight sequence for the calibration test
		Start	Begins the defined sequence
		Skip	Skips a failed step of the Calibration Test
		Internal Calibration Test	Initiates an internal calibration test of a SICS scale

Icon	Softkey	Function	Explanation
Calibration Icons			
		Capture Zero	Resets the zero condition of the scale
		Capture Span	Resets the span value with known test weights
		Step Calibration	Calibrates the scale using a substitution method with a known weight and a substitution mass
Cal FREE		CalFREE	Adjusts span to precalibrate a scale without test weights
Service Mode		Service Mode	Service Mode (access the IDNet service mode)
		Internal Calibration	Initiates an internal calibration of a SICS scale
		Manual Calibration	Initiates a manual calibration of a SICS scale
		Initial Adjustment	Starts an initial adjustment of a SICS scale
		Start	Begins the defined calibration sequence
		Stop / Abort	Stops or aborts the calibration sequence
		Reset	Resets the SICS scale to factory defaults
Table and Memory Icons			
	*	Reports	Provides access to the enabled tables – Alibi, Tare or Target
		Table Search	Provides search capabilities for the selected tables – Alibi, Tare or Target
		Search/ View	Locates and displays a record specified by the user's selected parameters
		Capture Tare	Captures the current weight as a Tare weight
C		Clear All	Clears both the subtotal and grand total registers from the totals memory
C✱		Clear Totals	Clears all totals from the Tare table
		Print	Prints the selected memory to an attached peripheral – Tare or Target
	*	Repeat Print	Reprints the most recent transaction or Custom Print output, with heading "DUPLICATE"

Icon	Softkey	Function	Explanation
	*	Tare Table	Provides access to stored tare values
Alibi	*	Alibi Memory	Provides access to stored transactional data
	*	Target Table	Provides access to stored target values
	*	Custom Trigger 1	When configured in Setup at **Communication > Connections** and assigned as a softkey, triggers associated output.
	*	Custom Trigger 2	
	*	Custom Trigger 3	
	*	Custom Trigger 4	
	*	Custom Trigger 5	
123	*	Counter Reset	Recalls and/or resets the next scale sequential number and transaction counter number
		Reset	Resets (clears) the currently selected log – Change, Maintenance or Error
Task Selection Icons (only when TaskExpert™ is installed)			
	*	Task List	Displays list of assigned TaskExpert applications
1	*	Task 1	Starts TaskExpert application designated as Task 1
2	*	Task 2	Starts TaskExpert application designated as Task 2
3	*	Task 3	Starts TaskExpert application designated as Task 3
ID Mode Icons			
ID1	*	ID1 Sequence	Initiates ID1 programmed transactional prompt sequence
ID2	*	ID2 Sequence	Initiates ID2 programmed transactional prompt sequence
Target Action Icons			
	*	*Comparators*	Access Comparators table to permit selection of simple setpoint
	*	Target	Defines the current target, spill, fine feed, tolerance, and description

Icon	Softkey	Function	Explanation
	*	Target Control	Provides start, stop, pause, abort control of the current target
	*	Start	Begins the defined sequence
		Pause	Pauses the defined sequence
		Stop / Abort	Stops or aborts the defined sequence
Display Icons			
Min-Weigh		MinWeigh	Defines the Minimum weight value, below which a sign appears beside the displayed weight, and the weight display appears in red
x10	*	Times Ten (x10 Display)	Expands the displayed weight by a power of ten
	*	Unit Switching	Toggles between the defined units of weighment
Smart-Trac	*	SmartTrac toggle	Toggles the SmartTrac display on or off
	*	Time and Date	Provides access to edit the hour, minutes, day, month, year
	*	Select Terminal	Switches between clustered IND780 terminals
Editing Icons			
		Exit	Exits a screen or parameter saving the values
		Edit	Modifies the parameters of the selected object
		New	Creates or inserts a new object containing information that can be presented to the user
		Delete	Clears an object
		Print	Prints the selected memory to an attached peripheral
OK		OK / Accept	Accepts or stores the new object parameter
		Cancel	Skips or ignores a setting or parameter
Esc		Escape	Leaves a screen or parameter without saving
		Copy	Makes a copy of the currently selected item
		Email Alert Test	When pressed, sends test message to recipient currently in focus.

Icon	Softkey	Function	Explanation
Discrete I/O Icons			
		Output Off	Toggles the output off in the discrete I/O test
		Output On	Toggles the output on in the discrete I/O test
PDX Service Icons			
		Sort And Address	Sort and readdress cells in an ascending order corresponding to the cells' S/N
		Unlock	Initiates MT Service Security unlock process
		Lock	Locks MT Service Security and inhibits MT Service View
	*	PDX Performance Log	Trigger a log record in the PDX Performance Log

2.3. Understanding the Navigational Interface

Navigate in the applications and configure the IND780 using

- Navigation keys
- Softkeys
- Application Keys
- Scale function keys
- Alpha keys (that appear on-screen when a field requiring alphanumeric data entry is selected)
- Numeric keys
- Optional external keyboard

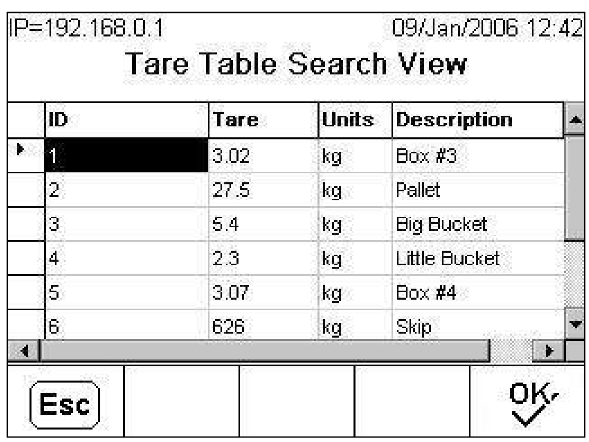
The locations of these keys and the display screen area are shown in Figure 2-2.

Figure 2-2: Front Panel Components and Key Locations

2.3.1. Navigation Keys

Navigation keys (see Figure 2-2) enable navigation within the setup menu tree, setup screens, and application screens.

These keys are used to move the focus to different setup options within the menu tree (focus is indicated by highlighted text); to select different fields within a setup page; and to switch to another page of available softkeys in the Home screen. The UP and DOWN and LEFT and RIGHT navigation keys are also used to move the view up, down, left or right when a scroll bar indicates that more information is available than can be shown in one screen. The example in Figure 2-3 shows a view of a table with scroll bars visible. The bars indicate the position of this view relative to all available information.



ID	Tare	Units	Description
1	3.02	kg	Box #3
2	27.5	kg	Pallet
3	5.4	kg	Big Bucket
4	2.3	kg	Little Bucket
5	3.07	kg	Box #4
6	626	kg	Skip

Figure 2-3: Tare Table Screen Showing Scroll Bars

Press the DOWN navigation key to move the focus down the rows. When the focus reaches the second to last row the screen moves up to reveal the next row. Press the RIGHT navigation key to move the highlight sideways and view additional columns.

- LEFT and RIGHT navigation keys
- Expand (RIGHT) the setup options in the menu tree
- Collapse (LEFT) the setup options in the menu tree
- Move the cursor position to a specific character in text areas
- Enable left and right scrolling to view all information available on a screen
- UP and DOWN navigation keys
- Move up and down through menu tree branches
- Move field focus up and down on menu screens
- Scroll up and down through tables to display additional rows-
- ENTER key
    - Opens the selected setup page for viewing and editing setup parameters
    - Moves the focus from a field label to a setup value for that field
    - Accepts new values entered in a field and moves the focus to the next field label

2.3.2. Softkeys

A softkey setup screen (Figure 2-4), accessed at **Setup > Terminal > Softkeys**, is used to add and remove softkey assignments and change softkey positions. Softkeys assignments can be modified only by users with Maintenance or Administrator level access.

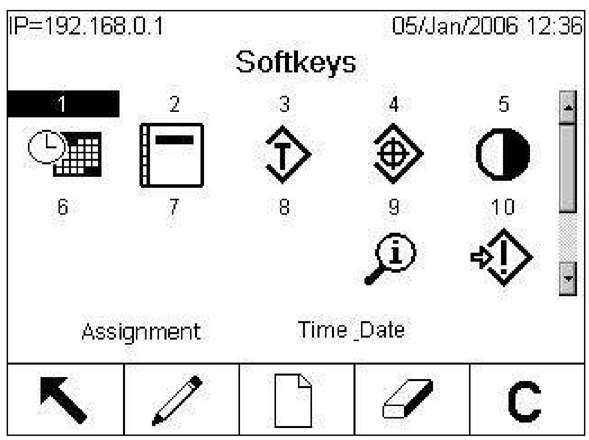


Figure 2-4: Softkey Setup Screen

Icons that can be assigned as softkeys are indicated in Table 2-1.

Five softkeys are located along the bottom of the display screen (see Figure 2-2). Some installations might have up to three rows of softkey icons for a total of 15 possible functions. A MORE DOWN or MORE UP symbol (V or Λ) displayed at the lower-right corner of the Home screen (to the far right of the softkey icons) indicates that more softkey selections are available. Press the DOWN navigation key to display additional softkey icons. Press the UP navigation key to display the previous softkey set of icons.

Appendix E, **Softkey Mapping and Application Key Configuration**, explains in detail how the softkeys can be assigned and edited in Setup.

2.3.3. Application Keys

The four application keys, A1 through A4, are indicated in Figure 2-2. These may be assigned (via **Setup > Terminal > Application Keys**) to give direct access to features such as the Tare Table or SmartTrac, or to functions in specialized applications such as Task Expert modules. Each application key can be assigned a custom label.

2.3.4. Scale Function Keys

The four scale function keys (see Figure 2-2) are explained in Table 2-2.

Table 2-2: Scale Function Keys

Icon	Function	Explanation
	Select Scale	When multiple scales are connected to the indicator, this button permits the user to switch between them, including the Sum Scale if one is configured. To select a specific scale, enter the scale number using the numeric keys and press the Select Scale function key.
	Zero	When the scale platform or weighbridge is empty, the terminal should indicate zero. The gross zero reference is recorded during calibration. Press the ZERO key to capture a new gross zero reference point if pushbutton zero is enabled in configuration and the weight is within the zero range. Pressing ZERO when a Tare has been taken and the scale is in Net mode will cause an error message to display – "Zero Failed – Scale in Net Mode. Press ENTER to continue."
	Tare	Tare is the weight of an empty container. Tare is normally used to determine the net weight of the contents of a container. Press the TARE key when an empty container is on the scale. The terminal then captures the tare value and displays a net weight of zero. The B/G display changes to read NET, and a box appears at upper right in the display (Figure 2-14), showing the tare value and units. As the container is loaded, the terminal will display the net weight of the contents. Pushbutton tare must be enabled to use the key in this manner. When the empty weight of the container is a known value enter the tare directly using the numeric keys, then press the TARE scale function key. The terminal will display the net weight of the contents of the container. Keyboard tare must be enabled in order to use this key in this manner. To return to B/G (gross) mode after the TARE key has been pressed, press  (clear) on the keypad.

Icon	Function	Explanation
	Print	Press the PRINT key to initiate a demand print of an assigned print template. A printer must be connected to a serial port and the terminal must be configured to match the serial port setting of the printer. Configuration is necessary to connect a template or report to the selected serial or Ethernet port, and to define the selected template or report. When a demand print command is issued, "Printing" appears in the system line for 3 seconds.

2.3.5. Alpha Keys

On some screens permitting data entry, when field requiring non-numeric input (such as a password) is selected, softkeys and application keys function as alpha keys used to enter alphabetic characters. Figure 2-5 shows an example of the initial alpha key screen, with the softkeys shown to indicate their relationship to the display.

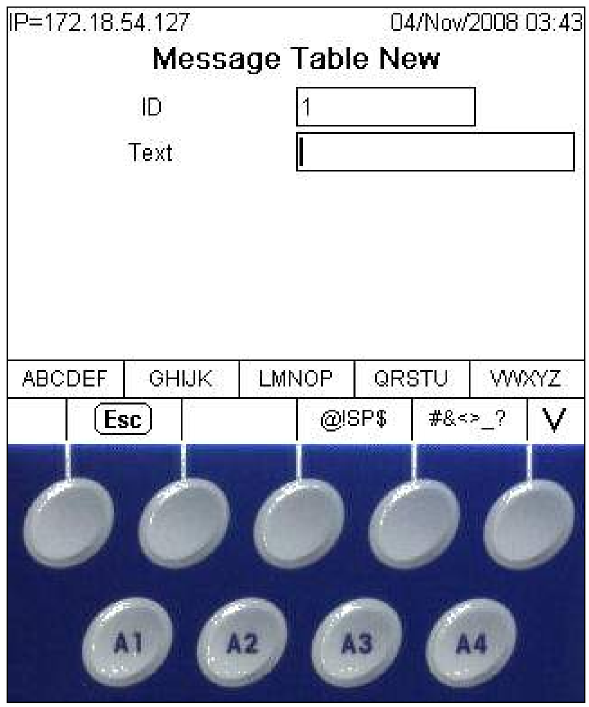


Figure 2-5: Alpha Keys and Softkeys

The alpha keys are automatically displayed when the cursor is moved into a data entry box that supports alpha entry. The first set of softkeys shown is groups of upper-case letters (Figure 2-5). Press the MORE DOWN key to view lower-case groups (Figure 2-6).

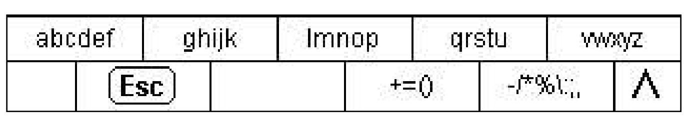


Figure 2-6: Lower Case Alpha Key Groups

In addition to those accessed via softkeys, additional sets of characters are accessible using the A3 and A4 keys. A1 functions as an ESCAPE key, which takes the display back one level, either to the previous set of alpha keys or, if the display is currently on the first set of alpha keys, out of alpha key mode, returning focus to the currently selected input field. Other assignments include a variety of symbols. For each of these sets of characters, a group of four to six letters is shown per softkey.

To enter a character, press the softkey under the group that includes the required character. If the set of keys shown does not include the required character, press the DOWN navigation key to view the next set. Press the DOWN navigation key and UP navigation key as required until the set of keys shows the required character. Note the MORE UP and MORE DOWN symbol to the right of the softkeys (visible at right in Figure 2-5 and Figure 2-6), indicating that additional sets of characters are available.

After pressing the softkey associated with the group of characters that contains the required character, the characters above the softkey will change to show one character per softkey (in the upper row) and application key (in the lower row). Examples of the possible displays are shown in Figure 2-7, with the lower-case letter screen associated with the first softkey at the top, and all the symbol screens below it. Further rows of characters may be accessed using the MORE UP and MORE DOWN (arrow) keys. In the case of the A-Z/a-z characters, these arrows toggle between upper and lower case.

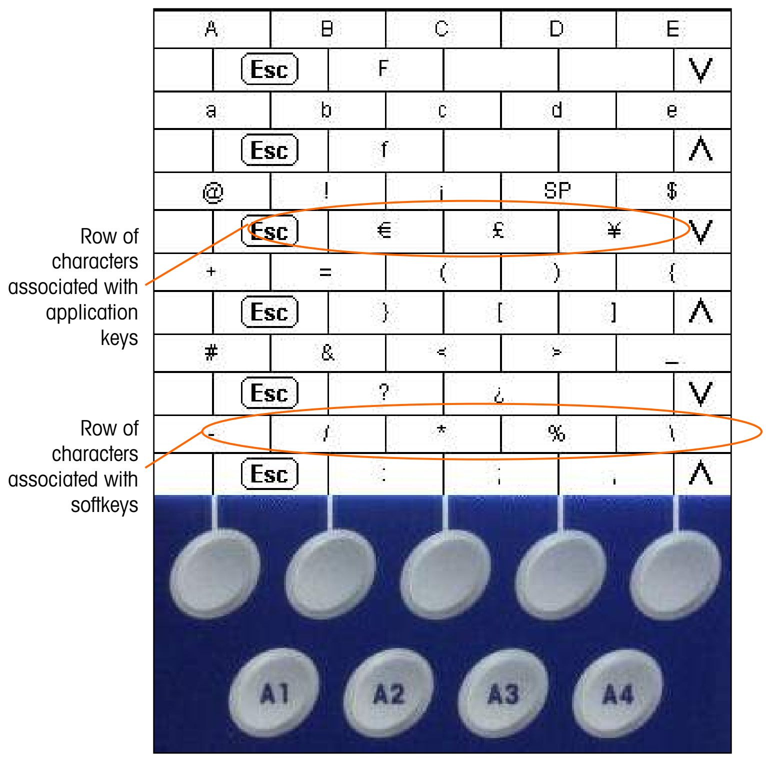


Figure 2-7: One Character per Key

Now, press the softkey or application key that corresponds to the required character; the character will appear in the selected alpha input field.

Each group includes an ESC softkey Esc, assigned to A1, that steps back in the entry sequence in case the wrong group of characters was selected.

Repeat this process until all alpha characters have been entered (Figure 2-8). The CLEAR key on the keypad can be used to backspace and delete unwanted characters in the entry box.

To save the entry once all alpha characters have been entered, press the ENTER key on the keypad to accept the entry, exit the text field and return to the initial entry screen (Figure 2-8). Then press the OK softkey to save the changes and exit the screen.

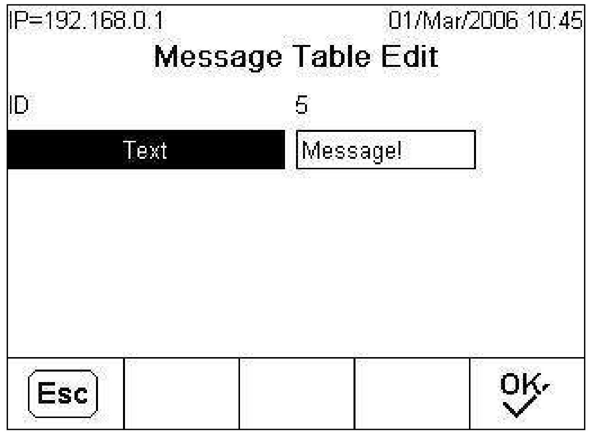


Figure 2-8: Entry Complete—Escape and OK Softkeys Showing

To void the entry, press A1 (the Alpha ESCAPE key Esc) to exit alpha key mode, and then press the ESCAPE softkey Esc to return to the initial entry screen. The entry field will revert to its original state, containing the data displayed in the text field before the entry was initiated. Press ESCAPE again to leave the editing screen without making any changes.

2.3.6. Numeric Keys

Use the terminal's 12-key numeric keypad (see Figure 2-2) to enter data and commands.

To use numeric keys, position the cursor in the field (see Navigation Keys) and press the numeric keys to enter the appropriate data. Press the DECIMAL key to enter decimal points where necessary.

The CLEAR key functions like a backspace key. Position the cursor at the end of data to be deleted and press the CLEAR key once for each character to be deleted. When a data entry box is first selected by pressing ENTER, the previous entry will be in focus (white text on a black background). Pressing CLEAR at this point will clear the entire entry.

2.4. Home Screen

The Home screen displays when the terminal is idle (an example is shown in Figure 2-9). The Home screen is the only screen that provides operator access to the programmable softkeys. Except when the setup menu tree is accessed, or one of the programmable softkeys or application keys has been pressed, the Home screen displays.

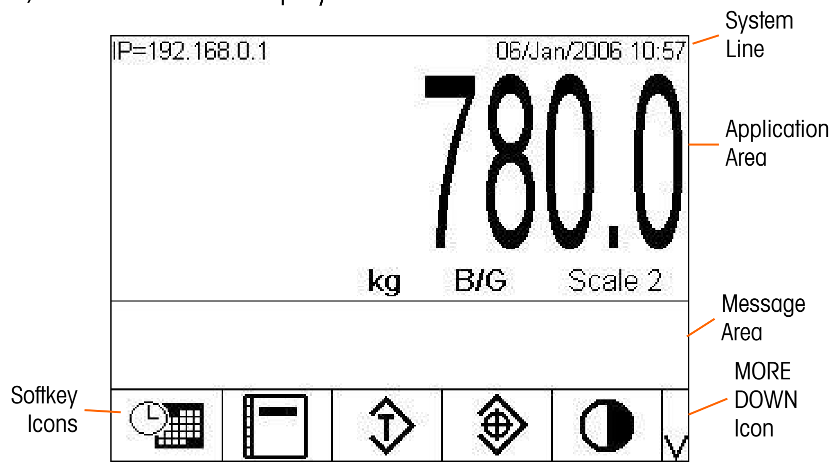


Figure 2-9: Weighing Operation Home Screen

The Home Screen includes:

- System Line—System messages and application data
- Application Area—Weight, units, tare and other application-specific weighing data
- Message Area—Messages and SmartTrac display
- Softkey Icons—Icons for the active softkey functions. A MORE DOWN ⋁ symbol or a MORE UP ⋀ symbol indicates that more softkey selections are available.

2.5. Screen Backlight Timeout and Screen Saver Operation

The screen backlight will turn off and a screen saver will appear after independently set periods of inactivity. These delays are configured in Setup at **Terminal > Display**.

To exit the Screen Saver and/or restore the Backlight, press any key on the terminal or on an optional external keyboard. The key press will not perform the function normally associated with that key.

2.6. Basic Functionality

This section provides information about the IND780's basic functionality. Configuration of these areas of functionality can be accessed through the different areas of the setup menu tree – an example view is shown in Figure 2-10. Additional areas of functionality specific to application software available for the IND780 are addressed in the specific application manuals. Basic functions addressed in this section include:

- Select Scale
- Sum Scale
- Zero
- Tare
- Unit Switching
- IDNet Class II
- Expand By 10
- Print
- MinWeigh
- Information Recall
- Target Comparison
- Comparators
- ID Mode
- SmartTrac
- Display Sizes
- Display Colors
- Bar Graph Mode
- Over/Under Mode
- Cross Hairs Mode
- Clustering
- Time and Date
- Reports
- Calibration Test

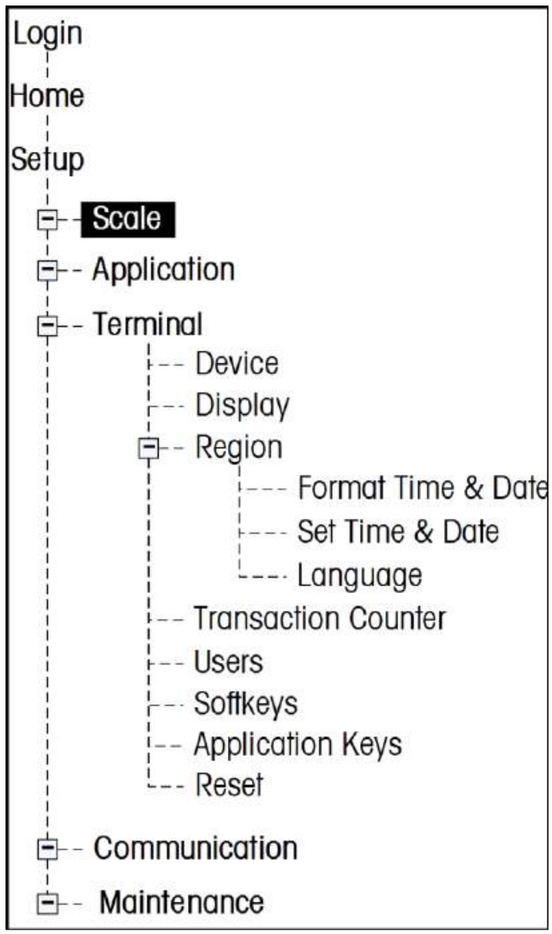


Figure 2-10: Setup Menu Tree Example

2.6.1. Select Scale

The Select Scale function button is used to switch between scale bases when multiple platforms are configured for the IND780, including the Sum Scale. It determines which scale is shown on the display and controlled from the keypad. It is possible to have multiple scales displayed on the screen simultaneously, in which case front keypad functions (tare, zero, etc.) affect the selected scale.

Pressing the Select Scale button switches between the scale bases in sequence. To select a scale directly, entering its number using the numeric keys, then press the Select Scale button. Figure 2-11 shows a home screen with three scales plus a Sum Scale, with a highlight indicating that Scale 3 is selected.

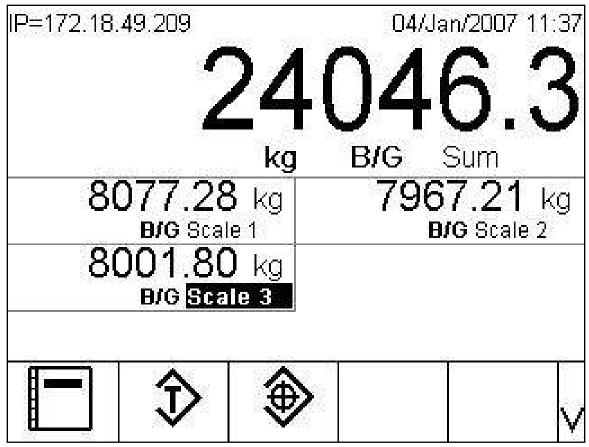


Figure 2-11: Scale Selection

2.6.2. Sum Scale

When configured in Setup (at **Scale > Sum Scale > Type**), the Sum Scale allows for a logical measurement channel that works from the arithmetic sum of the weight values from two or more scales. Each scale may have a different capacity and increment size, but they must all be configured with the same units.

In general, the Sum Scale display behaves like any other independent physical scale channel. However, any zero command issued to the Sum Scale is redirected to each of its component scale channels. With regard to the weight display, if one scale included in the Sum Scale is over-capacity, both its display and the Sum Scale will show "^ ^ ^ ^ ^". If a component scale is under range, the display will also show "v v v v v". These conditions are shown in the screen images in Figure 2-12. In both cases, the Sum Scale is selected.

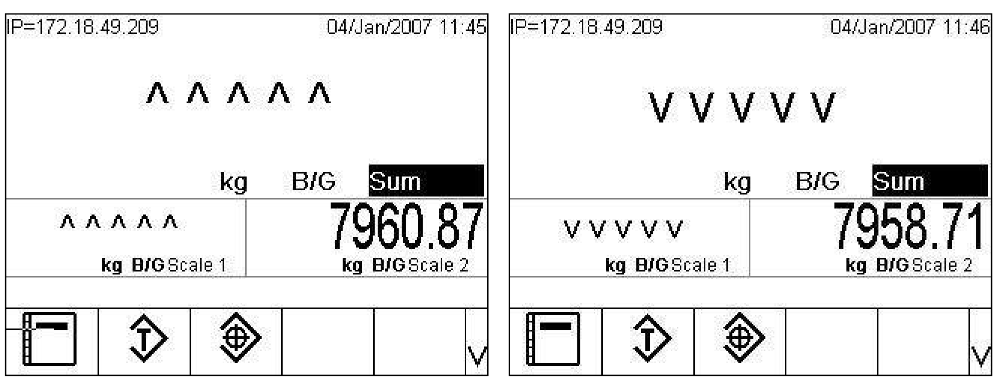


Figure 2-12: Summed Scales Over Capacity (left) and Under Range (right)

If one scale included in the Sum Scale is over-capacity and another is under range, the respective scales will indicate their conditions accordingly, and the Sum Scale display will show "----------", indicating an invalid weight value. This condition is shown in Figure 2-13.

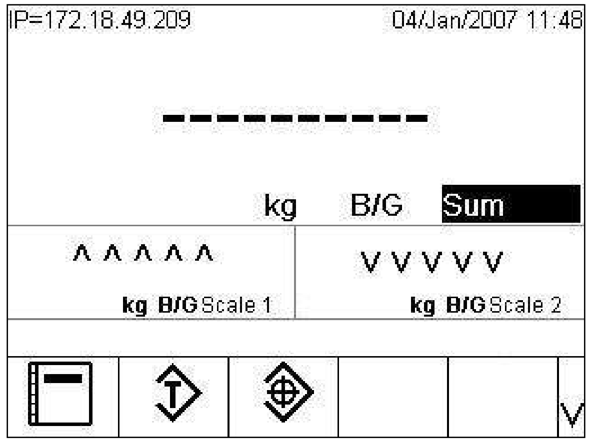


Figure 2-13: Summed Scales Simultaneously Over Capacity and Under Range

2.6.3. Zero

The Zero function is used to set or reset the initial zero reference point of the IND780. There are three types of zero setting modes:

- Automatic Zero Maintenance (AZM)
- Power-Up
- Pushbutton

2.6.3.1. Automatic Zero Maintenance

Automatic Zero Maintenance (AZM) enables the IND780 to compensate for the buildup of small amounts of weight and track itself back to the center of zero. Within the AZM operating range (programmable from 0.0 to 9.9 divisions), when the terminal is in a no motion condition it makes small adjustments to the current zero reading to drive the weight reading toward the true center-of-zero. When the weight is outside of the programmed AZM range, this feature is not functional.

2.6.3.2. Power-Up Zero

Power-Up Zero enables the IND780 terminal to capture a new zero reference point after power is applied. If there is motion during a power-up zero capture function, the terminal will continue to check for a no-motion condition until zero is captured.

Power-up zero can be disabled (RESTART on power up) or enabled (Reset on power up), and a range above and below calibrated zero can be configured. The range is programmable from 0% to 100% of capacity and can include a positive range and also a range below calibrated zero.

2.6.3.3. Pushbutton Zero

The pushbutton (semi-automatic) zero function can be accomplished by pressing the ZERO  scale function key, by programming a discrete input, by a PLC or serial command, or by an application.

The range for all types of semi-automatic zero is selectable (0% to 100%) plus or minus from either the calibrated zero point (if power-up zero is disabled) or from the initial zero setting point (if power-up zero is enabled).

Remote initiation of the semi-automatic Zero command is possible via a discrete input, an ASCII 'Z' command sent serially (CPTZ and SICS), a command initiated by the PLC interface, or from an application.

2.6.4. Tare

- For detailed information about tare functionality when using SICS balances, please refer to the SICS section in Appendix D, **Communication**.

Tare is the weight of an empty container. A tare value subtracts from the gross weight measurement, providing the computation of the net weight (material without the container). The tare function can also be used to track the net amount of material being added to or removed from a vessel or container. In this second case, the weight of the material in the container is included with the tare weight of the container as tare. The display then reflects the net amount being added to or removed from the vessel.

The tare value can be displayed with the net weight. The operation of this secondary display is determined in Setup at **Terminal > Display**.

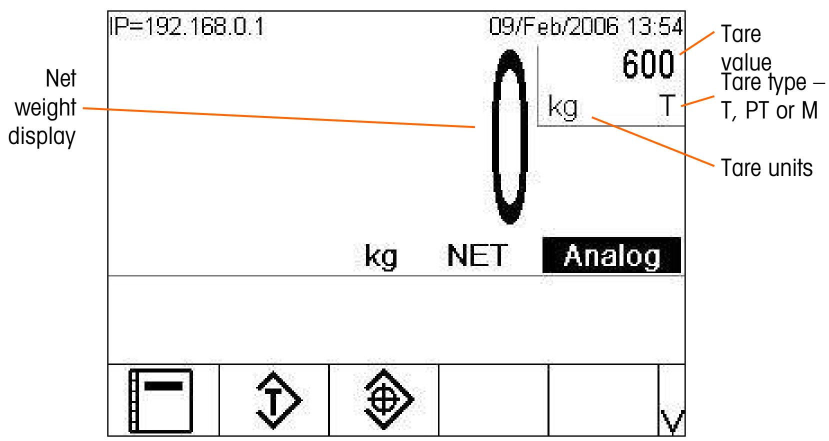


Figure 2-14 Screen Displaying Captured Tare

Tare types and associated operations available on the IND780 include:

- Pushbutton Tare
- Keyboard Tare (Preset Tare)
- Table Tare
- Net Sign Correction
- Auto Tare
- Clearing Tare
- Manual Clear
- Auto Clear

2.6.4.1. Pushbutton Tare

Pushbutton tare can be configured in Setup as enabled or disabled. When this feature is disabled, the TARE scale function key  cannot be used to obtain a tare.

If pushbutton tare is enabled, pressing the pushbutton TARE scale function key initiates a semi-automatic tare. The IND780 will attempt to perform a tare process. If it is successful, the display changes to a zero net weight indication and the previous weight on the scale is stored as the tare value. The net mode will be indicated on the display.

Several conditions could inhibit the pushbutton tare function:

- **Motion**—Pushbutton tare cannot be taken when the scale is in motion. If motion is detected when a pushbutton tare command is received, the IND780 will wait up to three seconds for a no-motion condition. If a stable (no motion) weight condition occurs before the three seconds expire, the pushbutton tare command is executed.

- If there is still motion at the end of three seconds, the command is aborted and a "Tare Failure – In Motion" error displays.

- **Pushbutton Tare Disabled**—If pushbutton tare is configured as disabled, the TARE scale function key will not initiate a semi-automatic tare.
- **Negative Gross Weight**—Any pushbutton tare attempted when the gross weight is at or below zero is ignored and a "Tare Failed–Too Small" error displays. Ensure that the gross weight is above zero.

2.6.4.2. Keyboard Tare

A keyboard (preset) tare is a numeric tare that is entered manually through the numeric keypad, received serially from a peripheral, or retrieved from the Tare Table memory. The preset tare value cannot exceed the capacity of the scale. Data entered is interpreted to have the same units as the current displayed value. Motion does not impact the entry of preset tare values.

Keyboard tare can be configured in Setup as enabled or disabled. When disabled, the numeric keypad and the TARE scale function key cannot be used to obtain a tare.

To manually enter a preset tare value, use the numeric keypad to enter the tare value (the entry will display above the softkey icons) and press the TARE scale function key . The tare display box will include PT to indicate that a preset tare is in use.

If configured in Setup, remote equipment can enter a preset tare value using a serial command or PLC command. (For further information, refer to the Serial and PLC Interface sections of chapter 3, **Configuration**.)

If the preset tare is successful, the display changes to a net weight indication, and the entered preset tare value is stored as the tare value in the Tare Table.

Several conditions could inhibit the preset tare function:

- **Keyboard Tare Disabled**—If keyboard tare is configured in Setup as disabled, the numeric keypad and the TARE scale function key cannot be used to obtain a tare.
- **Over-Capacity or Under-Zero Condition**—Preset tare is not allowed when the weight display indicates over capacity or under zero conditions. Any preset tare attempted when the scale is over capacity is ignored and a "Tare Failed – Over Cap" error displays. Any preset tare attempted when the weight display indicates an under zero condition is ignored and a "Tare Failure – Below Zero" error displays.

Preset tare can be entered in free format. If the entered value does not match the displayed weight decimal point location or display interval, the entered tare value is rounded to the nearest display interval and the decimal point adjusted to match the gross weight. The rounding method is that 0.5 or more of a display interval (d) is increased to the next display interval and 0.49 or less of a display interval is decreased to the next lower display interval.

When entering a preset tare value less than 1.0, the operator can enter the data without the leading zero (left of the decimal point), but all subsequent display, storage, or printing of this value will include the leading zero. For example, a preset tare entry of .05 will display as 0.05.

If a preset tare has already been established and another preset tare is entered, the second preset tare replaces the previous value (it does not add to the previous value). The replacement tare can be larger or smaller than the original tare value.

2.6.4.3. Tare Table

The IND780 terminal contains a tare table for storing tare weights that can be recalled by the operator for use instead of manually entering them for each transaction. This is especially useful when certain tare values are used repeatedly.

A description up to 40 characters long can be included with each record. This can be used to help distinguish one tare record from another. Each tare record in the tare table also contains a totalization field. When totalization is enabled for the tare table, each time a transaction is completed using a specific tare ID, the selected weight value (gross or net weight) will be added to the total and the corresponding counter will be incremented by one.

A tare memory can be recalled by picking from a list of all available records (accessed using the Tare Table softkey). If the ID for the tare value is known it can be recalled directly by entering the ID (note that ID entry is not case-sensitive) and pressing the Tare Table softkey. Unless the tare ID is set as a number, an external keyboard is required to access a tare memory directly.

A printed report of the records in the Tare Table is also available. Additional details about the tare table are explained in Appendix C, **Table and Log File Structure**.

2.6.4.4. Net Sign Correction

Net sign correction enables the terminal to be used for both shipping (inbound empty) and receiving (inbound loaded) operations. Net sign correction can be either disabled or enabled on the IND780. Refer to Chapter 3, **Configuration**, the Scale section, for further information about disabling and enabling net sign correction.

If net sign correction is disabled in Setup, any stored weight value in the tare register is assumed to be a tare regardless of the gross weight present on the scale at the time of the final transaction and net values can be negative.

If net sign correction is enabled, the terminal will switch the gross weight and tare weight fields when necessary, so that the larger weight is the gross weight, the smaller weight is the tare weight, and the difference is always a positive net weight. Net sign correction affects the display, stored data, weight recall, and printed data.

Net sign correction will operate with pushbutton tare, preset tare, or tare memories. An example of weight values with and without net sign correction is shown in Table 2-3. In this example, the tare register value is 53 kg and the live weight on the scale is 16 kg.

Table 2-3: Weight Values With and Without Net Sign Correction

	Net Sign Correction	
Printed and Displayed	**Disabled**	**Enabled**
Gross	16 kg	53 kg
Tare	53 kg	16 kg
Net	–37 kg	37 kg

- When net sign correction has been enabled, the tare weight field in the recall display will be labeled with the letter "M" to indicate "Memory" instead of "T" or "PT." Performing a transaction switches the label to "PT."

2.6.4.5. Auto Tare

The IND780 can be configured so that tare is automatically taken (auto tare) after the weight on the scale exceeds a programmed tare threshold weight. Auto tare can be configured in Setup as enabled or disabled. When auto tare is enabled, the display changes to a zero net weight indication after the weight exceeds the threshold value. The previous weight on the scale is stored in the Alibi Table as the tare value. Auto tare operations involve:

- **Tare Threshold Weight**—When weight on the scale platform exceeds the tare threshold value, and there is no motion, the terminal automatically tares.
- **Reset Threshold Weight**—The reset threshold weight must be less than the tare threshold weight. When the weight on the scale platform falls below the reset threshold value, such as when a load has been removed, the terminal automatically resets the auto tare trigger.
- **Motion Check**—A motion check is provided to control the re-arming of the auto tare function. If disabled, the auto tare trigger will be reset as soon as the weight falls below the reset value. If enabled, the weight must settle to no-motion below the reset threshold before the next auto tare can be initiated.

Several conditions could inhibit the auto tare function:

- **Motion**—Auto tare cannot be taken when the scale is in motion. If motion is detected after the weight on the scale exceeds a preset tare threshold weight, the IND780 will wait for a no-motion condition. If a stable (no motion) weight condition occurs within three seconds, the auto tare command is executed.
- **Auto Tare Disabled**—Auto tare can be configured in Setup as enabled or disabled.

2.6.4.6. Clearing Tare

Tare values can be cleared manually or automatically.

2.6.4.6.1. Manual Clear

Manually clear tare values by pressing the CLEAR key on the numeric keypad when the IND780 is in the net mode and has completed the weighing operation. Motion on the scale will not impact a manual clear.

If configured in Setup, pressing the ZERO scale function key will first clear the tare before issuing a zero command (refer to Chapter 3, **Configuration**, the Scale section, Auto Clear).

2.6.4.6.2. Auto Clear

The IND780 can be configured to automatically clear tare when the weight returns to a value below a programmable threshold or by the print command. Once the tare is cleared, the display returns to the gross weighing mode.

Auto clear is disabled or enabled in Setup. If auto clear is enabled, the following parameters as configured in Setup affect the auto clear operation:

- **Clear Threshold Weight**—The clear threshold weight is the gross weight value below which the IND780 will automatically clear a tare after settling to a value.
- **Motion Check**—A motion check is provided to control the automatic clearing of tare. If the motion check is disabled, the tare value is cleared as soon as the weight drops below the threshold weight (auto clear threshold), regardless of the motion status.

  If Auto Clear and Motion Check are enabled in the Tare Auto Clear screen, once the Auto Clear Threshold Weight value is passed and the then weight falls below the threshold (i.e. a load to be weighed is placed on the scale and then removed), the IND780 will wait for a no-motion condition then automatically clear the tare.

- **Clear After Print**—If enabled, tare is automatically cleared and the scale returned to the gross mode after data has been transmitted by pressing the PRINT scale function key or from a remote source.

Refer to Chapter 3, **Configuration**, the Scale section, Auto Clear for further information about configuring auto clear.

2.6.5. Unit Switching

In order to support locations and applications that utilize multiple measurement units, the IND780 supports unit switching. The UNIT SWITCHING softkey enables switching between primary units (the main unit of measure) and alternate (primary or secondary) units. (For further information, refer to chapter 3, **Configuration**, the Serial and PLC Interface sections.)

When the UNIT SWITCHING softkey is pressed, the display changes from the primary unit to the secondary unit. The secondary unit may be a standard unit of measure or a custom unit. Custom conversions support a division factor, a name and an increment size. An international standard unit of measure should not be used as a conversion unit.

When units are switched, the units value changes to the correspondingly selected units, and the conversion of the display value occurs. The display division changes to an equivalent weight value in the switched unit (for example, from 0.02 lb to 0.01 kg) and the decimal location switches to accommodate the conversion.

Figure 2-15 shows the Home screen with primary units (kilograms) displayed.

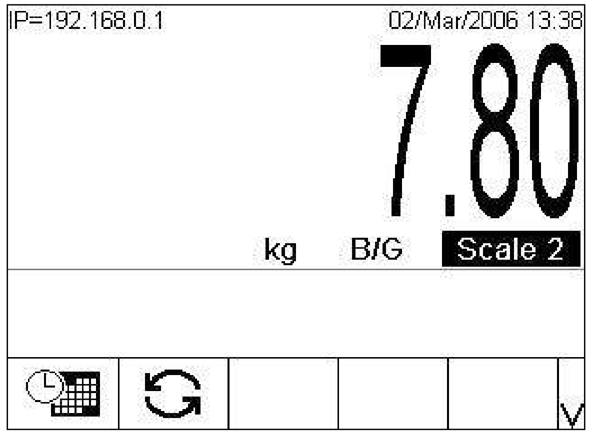


Figure 2-15: Home Screen With the Primary Units Displayed

Figure 2-16 shows the Home screen after the Unit Switching softkey has been pressed, displaying the gross weight in pounds.

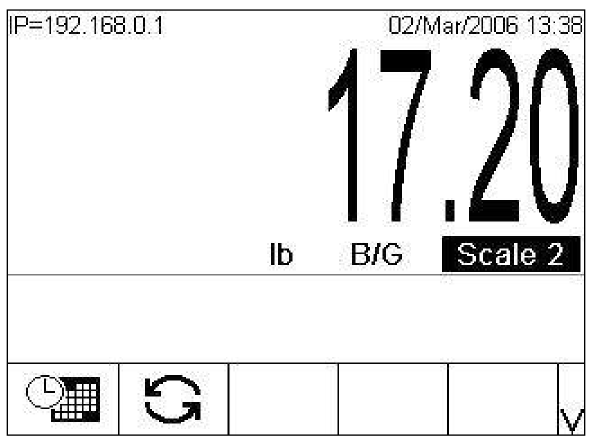


Figure 2-16: Home Screen After the Unit Switching Softkey has Been Pressed

2.6.6. IDNet Class II

If an IDNet scale base is set up as a Class II W&M approved scale with the appropriate capacity and increment size, the IND780 will show a weight display with the last digit in a smaller size (Figure 2-17).

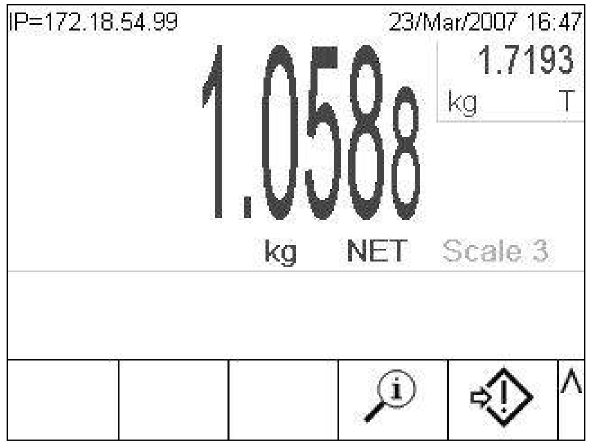


Figure 2-17: Class II-Approved IDNet Base Weight Display

A demand print of weight data in this case will include parentheses around the last digit of each weight field, to indicate the Class II approval condition.

Example:

Gross:	2.767(8) kg
Tare:	1.719(3) kg T
Net:	1.048(5) kg

2.6.7. Expand By 10

The EXPAND BY 10 softkey **x10** is used to increase the selected weight display resolution by one additional digit. For example, a weight display of 40.96 could increase by one additional digit to display as 40.958. When the EXPAND BY TEN softkey **x10** is pressed again, the display reverts to the normal display of weight.

If programmed as approved with the metrology switch ON, the Expand By Ten mode is displayed for five seconds then automatically returns to normal resolution. When the weight is expanded and the terminal is programmed as approved printing is disabled.

If an IDNet scale base is set up as a Class II W&M approved scale via the IDNet Service Mode, the EXPAND BY 10 mode is unavailable, and will not display when the softkey **x10** is pressed.

2.6.8. Print

The print function (demand print) can be initiated by pressing the PRINT function key or by automatic print. Demand printing of data may also be initiated as part of a particular sequence of operation or special application software. A "Printing" message appears in the system line for 3 seconds when the terminal is carrying out a demand print command.

2.6.8.1. Print Interlock

Print Interlock is designed to enforce a single print output per transaction. Print Interlock can be disabled or enabled. If enabled, the print command is ignored until the measured gross weight exceeds the print interlock threshold. After the first print command is executed, subsequent print commands are ignored until the gross weight indication falls below the print interlock reset threshold. If a print command is blocked by print Interlock, a synchronous "2nd Print Prohibited" error is generated.

2.6.8.2. Automatic Print

A demand print is automatically initiated when gross weight exceeds the minimum threshold and there is no motion on the scale. After initiation, gross weight must return below the reset threshold before a subsequent automatic print can occur.

If Automatic Print is enabled, it can be triggered and reset by weight exceeding thresholds, or by weight deviation from a previously stable reading.

2.6.8.3. Repeat Print

The Repeat Print softkey permits the output of the most recent transaction, or of a Custom Print from an application, to be printed again with a DUPLICATE header or footer to distinguish it from the original print.

Output templates can be flagged with a DUPLICATE header or footer to indicate that the data in the output template was generated as a repeat of a previous print transaction.

In firmware versions 6.5xx and above, the last printed data used for the Repeat Print function is not retained during a power loss so the Repeat Print function will not be available after power is cycled until after a print is generated.

2.6.9. MinWeigh

Certain industries such as pharmaceuticals and food require a guarantee that the weighing equipment selected for a particular measurement is adequate for the task. One way to ensure that appropriate weighing equipment is selected is by creation and use of a minimum weighment value (MinWeigh), below which a particular piece of weighing equipment cannot be used.

When the MinWeigh function is enabled, the MINWEIGH softkey Min-Weigh allows modification of the MinWeigh value without entering Setup. If security has been enabled, a valid user must log in before a change can be made.

The IND780 compares the current net weight with the programmed MinWeigh value. If the net weight is greater than or equal to MinWeigh, all equipment functions behave normally. If the absolute value of the net weight is less than MinWeigh, the weight display includes an icon () to the left of the weight, and the weight display appears in red. If the user attempts to record the weight while in this condition, the printout includes an asterisk (*).

For specific step-by-step instructions on how to setup MinWeigh, refer to the Scale | MinWeigh section of Chapter 3, **Configuration**.

2.6.10. Information Recall

Press the INFORMATION RECALL softkey to access the Recall screen where the softkeys shown in Table 2-4 appear:

Table 2-4: Recall Screen Softkeys

Icon	Explanation
	**Weight Recall**—Displays ID, Gross, Tare, and Net active weight readings for each scale.
i	**System Information Recall**—Displays system information, including the model and serial number, Terminal ID #1, Terminal ID #2, Terminal ID #3, and software and hardware information. This ID information is entered in the Setup mode. Chapter 3, **Configuration**, Terminal, Device, gives details on entering Terminal ID information.
M	**Metrology Recall**—Displays the terminal metrology controlled firmware version number, whether the terminal is programmed as approved or not, and the last calibration time and date for each scale. On the high-precision IDNet version, the Ident Code (calibration tracking) is also displayed.
	**Totals Recall**—Displays the sub-total and grand-total transaction count and total weight for the terminal. Press the CLEAR SUBTOTAL softkey C◊ to clear the sub-total amounts. Press the CLEAR softkey C to clear both the grand-total and sub-total amounts. Press the PRINT softkey to print a report of the totals. Note that, if Clear Total or Clear Subtotal After Print are enabled in Setup, these values will clear after printing.

2.6.11. Target Comparison

Target comparison is used to compare either the gross or net weight on the scale to a predetermined target value. This feature can be useful in both automatic and manual processes. As an example, an automatic filling system using target comparison could provide a Start signal to the IND780 and the IND780 could control the feeder system to fill a container to a desired target.

An example of a manual process could be a checkweighing station where an operator is checking net weight of packages. The IND780 can use its target comparison feature to provide a graphical **Over - OK - Under** indication to help the operator determine if the weight of each package is acceptable or not compared to an ideal weight.

Target (setpoint) comparison is most often used in two types of applications:

- **Material transfer applications**—Requires that a control device deactivate when a target value is achieved
- **Over/Under applications**—Classify a load placed on the scale platform as above or below the target value or within the target tolerance range

The IND780 target comparison rate (for analog load cell scales) is 50 comparisons per second. The comparison rate for high precision IDNet bases depends on the module in the base.

Refer to Chapter 3, **Configuration**, the Application section, Memory, Target Table and Operation, Target for further information about configuring parameters for target comparison operations.

2.6.11.1. Material Transfer Applications

If the target comparison of the IND780 will be used to control the flow of material, the application can be classified as a Material Transfer application. These types of applications are usually automated but can also be manual. A single or two-speed feeding system is used to either add weight to or remove weight from the scale. The terminal monitors the change in weight and compares it to a previously entered target and other control parameters.

Table 2-5 defines some terms used in Material Transfer applications.

Table 2-5: Terms used in Material Transfer applications

Term	Explanation
Abort	After a target comparison process has been paused, it can be totally stopped by pressing the Abort softkey under the Target Control softkey or by triggering a Target Pause discrete input. If abort is selected, the target comparison process is aborted.
Coincidence Outputs	A coincidence output is always active and does not require a start or stop signal. If the weight on the scale is below the target minus the spill value, the outputs are "on". If the weight is above the target minus the spill value, the outputs are "off". This type of output typically requires external logic to provide the required control for feeding systems.
Concurrent Outputs	This describes the operation of the feed output in a 2-speed feeding system. If the feeder type is programmed as concurrent, both the fast feed and feed outputs are active at the beginning of a target comparison. When the weight reaches the point at which a slower feed is to occur, the fast feed output is turned off.
Fast Feed Output	This refers to the physical output connection that is used for the faster feed in a 2-speed feeding system. This output is not used in a single speed feeding system.
Feed Output	This refers to the physical output connection that is used for the slower feed in a 2-speed feeding system or the only feed output in a single speed feeding system.
Fine Feed	The value entered for the amount of material that will be fed in the slower rate of feed in a 2-speed feeding system. This value and the spill value are subtracted from the target to determine the point that the fast feed output turns off.
Independent Outputs	This describes the operation of the feed output in a 2-speed feeding system. If the feeder type is programmed as independent, the feed output does not turn on until the fast feed output turns off. Only one feeder output is active at a time. It is the opposite of concurrent outputs.
Latched Outputs	Latched outputs turn off at the target weight minus the spill value and remain off (regardless of additional plus or minus weight changes) until a "start" signal is received. These types of outputs do not usually require external logic to perform standard weigh-in or weigh-out sequences.
Material Transfer Mode	The target comparison mode that provides control for delivering a measured amount of material from one container or vessel to another. The transfer can apply to material entering or leaving a container or vessel. It covers applications traditionally using terms such as weigh-in, weigh-out, filling, and dosing.

Term	Explanation
Pause	A pause function is provided in target comparison control in case a target comparison must be temporarily paused. This can be done by pressing the Pause softkey under the Target Control softkey or by triggering a discrete input programmed as Target Pause. When paused, power is removed from the Feed and Fast Feed (if used) discrete outputs. After a target comparison has been paused, the process can either be resumed or aborted.
Resume	After a target comparison process has been paused, it may be resumed by pressing the Resume softkey or by triggering a discrete input programmed as Target Resume. When a target comparison is resumed, it continues to use the original target values.
Spill	The amount of material that will be added (on a weigh-in) or removed (on a weigh-out) from the scale after the final feed is turned off. In a weigh-in process, this is the material in suspension that will still fall onto the scale when the feed is turned off. This value is subtracted from the target value to determine when the feed output turns off.
Start	When using latched targets, the default condition is with the latch set or in the "off" condition. To turn any outputs "on", a start signal is required. This could be the Start softkey , a discrete input programmed as Target Start, or via the Target Control softkey .
Target	The target is the weight value that is the end goal of the material transfer process. If a container should be filled with 10 kg of material, the target value is 10 kg.
Tolerance	The weight range above and below the target value that will be acceptable as an "in tolerance" target comparison. The tolerance can either be entered as a weight deviation from the target or a percentage deviation from the target, depending upon setup.

2.6.11.1.1. Target Control

Two different levels of target control are provided by the terminal for the Material Transfer mode. Latching outputs must be enabled to utilize either type of automated control. For simple applications, no control is provided. The comparison runs at all times. Whenever the scale weight is less than the target value, the output is True/enabled.

For those applications where latching outputs are used or more control is needed for an occasional pause or to abort a comparison process, the TARGET CONTROL softkey is used. Pressing the TARGET CONTROL softkey provides a dedicated display for the target comparison with the comparison status and appropriate softkeys shown. Possible status modes are "Ready", "Running" or "Paused". The appropriate control softkeys include START , PAUSE , and STOP . Target control functionality does not work when coincidence targets are configured.

When the weight data is invalid (e.g. under zero, over capacity), the Target Control screen will show a status with dashes (- - - - -) and only the BACK softkey will be available.

An example of each target control display is shown in Figure 2-18, Figure 2-19 and Figure 2-20.

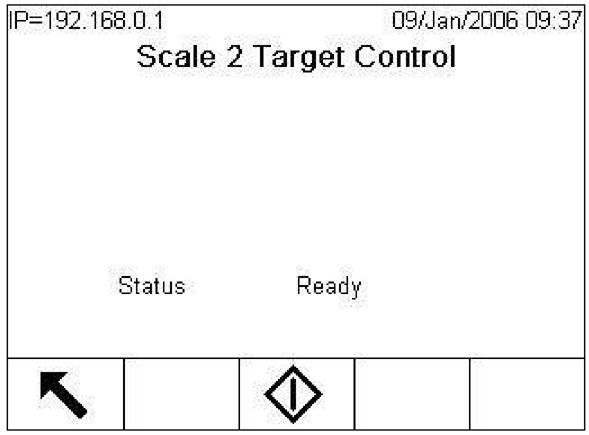


Figure 2-18: Example of Ready State in Target Control

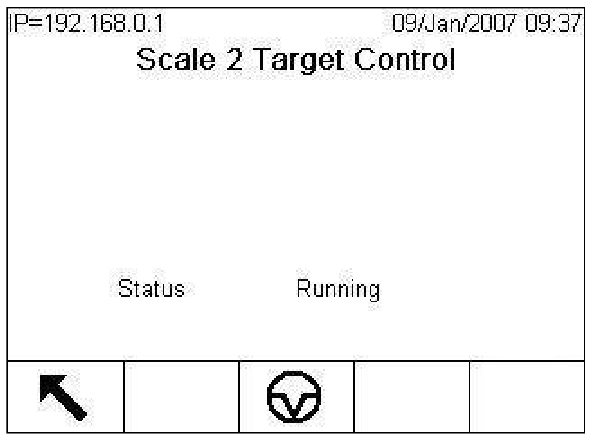


Figure 2-19: Example of Running State in Target Control

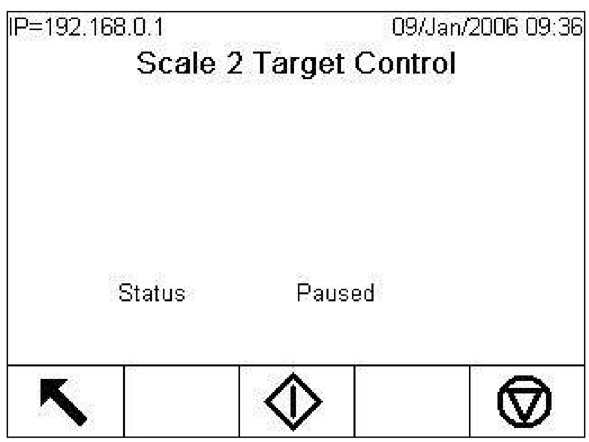


Figure 2-20: Example of Paused State in Target Control

2.6.11.2. Over/Under Applications

If the target comparison of the IND780 will be used to checkweigh the weight of a product, the application can be classified as an Over/Under application. These types of applications are usually manual processes but can also be automated. The SmartTrac display indicates the classification of the weight placed on the scale and discrete I/O can be used to trigger external lights or other controls. The terminal compares the current weight to a previously entered target with tolerance values, or to zone limits; it then indicates the results. In Table 2-6 definitions will explain some terms used in Over/Under applications, and are specific to those applications:

Table 2-6: Over/Under Applications Terms

Term	Explanation
Over Limit	If a tolerance mode of "Weight value" is selected in Setup, the IND780 does not require the entry of a target value. In this mode, only the upper and lower limits for the OK zone are entered. When programmed for this mode, the over limit value is the maximum weight that will be classified as OK. Any weight above this value will be classified as Over.
Over/Under Mode	This target comparison mode provides three zone classifications for weight placed on the scale. The classification can be Under if the weight is below the target minus the -tolerance, OK if within the tolerance range or Over if the weight is above the target plus the +tolerance.
Target	The target is the ideal weight value for the product being tested. If a container should weigh exactly 10 kg, the target value is 10 kg.
Tolerance	The weight range above and below the target value that will be accepted as "OK" in the target comparison. The tolerance can either be entered as a weight deviation from the target, a percentage deviation from the target or as absolute weight (zone edges) depending upon setup.
Under Limit	If a tolerance mode of "Weight value" is selected in Setup, the IND780 does not require the entry of a target value. In this mode, only the upper and lower limits for the OK zone are entered. When programmed for this mode, the under limit value is the minimum weight that will be classified as OK. Any weight below than this value will be classified as Under.
Zones	The IND780 provides 3 different classifications or "zones" in the Over/Under mode. The zones are Under, OK and Over.

2.6.11.3. Target Comparison Parameter Entry

The active record is the record currently in use by the terminal.

2.6.11.3.1. Direct Editing of Active Records

To directly edit an active record:

1. Press the TARGET softkey . (Refer to Appendix E, **Softkey Mapping and Application Key Configuration**, for information about how to set up softkeys.) The Edit Target screen displays. The example shown in Figure 2-21 shows the fields available in Material Transfer mode.

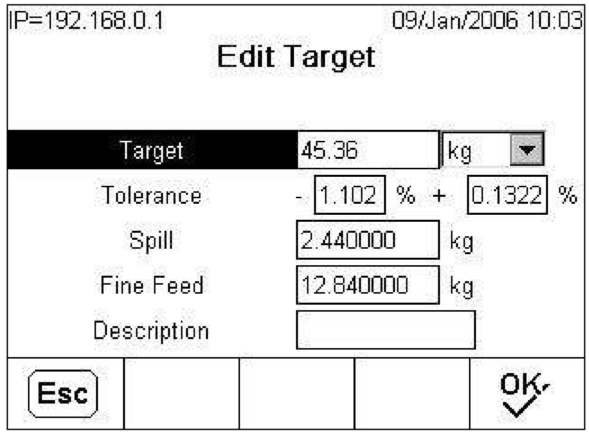


Figure 2-21: Edit Target Screen

2. Use the UP and DOWN navigation keys to scroll through the fields available for editing.
3. Press the ENTER key to select a field to edit.

- Depending whether material transfer or over/under mode was selected and the type of tolerance selected, the active target record will show different fields to edit. Use the navigation and numeric keys to enter values for all of the fields as needed (Table 2-7).

Table 2-7: Target Record Fields by Mode and Tolerance

Material Transfer Mode Tolerance – Either Mode	Over/Under Mode Tolerance – Weight Deviation or % of Target	Over/Under Mode Tolerance – Weight Value
Target	Target	Over Limit
+ Tolerance	+ Tolerance	Under Limit
- Tolerance	- Tolerance	
Spill		
Fine Feed		

4. Use the alpha keys to enter a description. Refer to the Alpha Keys section of Understanding the Navigational Interface.
5. Press the OK softkey to accept the edits to the active record, or Press the ESCAPE softkey Esc to return to the weighing operation screen without saving the active record edits.

2.6.11.3.2. Loading Records from the Target Table

The Target Memory softkey can be used in two ways to load records from the Target Table: Quick Access and List Selection.

2.6.11.3.3. Quick Access

Use the Quick Access mode when the ID of the Target Table record to be loaded is known. Use the numeric keypad to enter the ID and then press the Target Memory softkey to load the record. If the record is available, the data is loaded. If the record is not found, an "ID not found" error displays and the currently loaded target is retained.

2.6.11.3.4. List Selection

Use the List Selection mode when the ID of the Target Table record is unknown. To use the List Selection mode:

1. Press the Target Memory softkey without any preceding data entry. The Target Search screen displays.
2. Enter any search restrictions required or leave selections as they are to retrieve all records.
3. Press the SEARCH softkey to view the selected records in the table.
4. Use the UP and DOWN navigation keys to scroll through the list until the desired record is highlighted.
5. Press the OK softkey to load the selected record from the list and return to the weighing operation screen, or Press the EXIT softkey to return without loading the record.

2.6.12. Comparators

Comparators are simple targets, twenty of which can be configured in setup. They are controlled either by coincidence or by comparison with a target or range. The source for comparison can be the Gross Weight, Displayed Weight, Rate or assigned by a custom TaskExpert application. When assigned to the home screen, the Comparator softkey permits direct access to the Comparators for the current selected scale. As seen in Figure 2-22, this screen displays each Comparator's ID, Description, Limit, Units, High Limit (if applicable) and Active operator, provided that they have been configured in setup.

To make changes to a Comparator directly from the home screen, if the Comparator ID is known, press the ID number and then the Comparator softkey. If the ID is not known, press the Comparator softkey, use the UP/DOWN keys to select the desired Comparator from the list, and press the Edit softkey. Only the limit value/s can be edited. To edit parameters other than limits, the Comparator configuration screen must be accessed in setup.

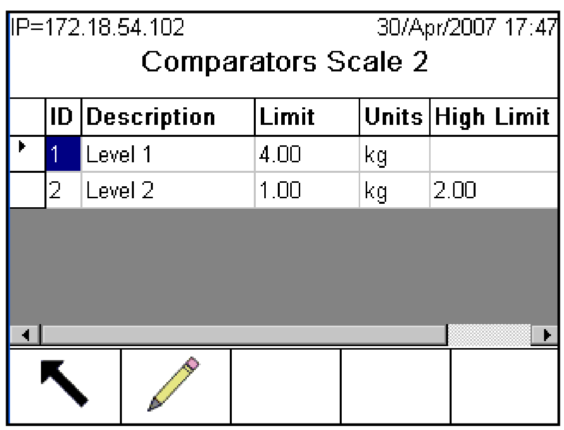


Figure 2-22: Comparators List for Scale 2

When the Active operator value is <, <=, =, < >, >= or >, the selected source is compared to a target weight. When the Active value is within (>_ _<) or outside (_< >_) a range, the selected source is compared to a range defined by the Limit and High Limit values.

2.6.12.1. Using Comparators

To use a Comparator, it must be assigned to a discrete output. Comparators are not associated with SmartTrac.

2.6.12.1.1. Target Value Comparators

In this case, the output will be triggered depending on the Active setting. For example, if the Active operator is < (less than) and the Limit is 1000 kg, the output will turn OFF when the measured value reaches 1000 kg.

2.6.12.1.2. Range Comparators

In the case of a Range mode Comparator, the Limit value sets the lower of the two limits that define the range, within or outside (depending on the operator) which the output is active. For example, if the Active operator is Within (**>_ _<**), the Limit is 3.0 kg/sec and the High Limit is 8 kg/sec, the output will be active provided the rate remains between 3 and 8 kg/sec. If the rate falls below 3 or exceeds 8 kg/sec, the output will turn OFF.

Note that comparisons using a Rate source require the rate calculation to be enabled and the Rate display to be turned on. The Rate value configured in setup at **Scale > Rate** permits weight and time units to be defined, together with the period between individual measurements and the period over which the measurements are averaged to generate the output value.

A Range Comparator can also use Displayed or Gross weight as its source. For example, if displayed weight (possibly a net value, allowing for the weight of a hopper) is the source, the Active operator is Outside, and the Limit and High Limit are 1000 kg and 1500 kg respectively, the output will remain active as long as the source value is below 1000 kg or above 1500 kg. In this case a large enough value for the High Limit should be set to ensure that, once the Limit is reached and the output turned off, there is not sufficient spill to reach the High Limit and reactivate the output.

2.6.13. ID Mode

The ID function provides a convenient and simple way to ensure that a specific sequence of operation is carried out the same way each time. Each step can include an on-screen message that instructs the operator to perform an action, or a prompt asking the operator to enter some information for a transaction printout. These steps may include data entry (using the numeric keypad, alphanumeric keys, or some other input such as a barcode scanner) and actions (such as placing a package on the scale, taking a tare, or printing a ticket for the transaction). When a step is completed, depending on the type of step it will either automatically advance or pressing the ENTER key moves it to the next step.

The following list shows the types of steps that are programmable in a sequence.

- Alphanumeric prompt input
- Clear Tare
- Numeric prompt input
- Print
- Select Scale
- Select Tare ID
- Select Target ID
- Start Sequence
- Tare Automatically
- Tare Preset

The ID function can be used in combination with the Material Transfer Control function and latched outputs to perform a simple semi-automatic filling sequence. To allow for this operation, the use of Target -Start, Target-Pause and Target-Resume discrete inputs is also necessary. An example of an operator guided container fill sequence is shown in Table 2-8.

Table 2-8: Container Fill Sequence ID Example

Sequence Steps	Type
Enter Batch No.	Alphanumeric Prompt
Load container	Alphanumeric Prompt
Scale is tared automatically	Tare-Auto
Select Material ID	Select Target ID
Press target start. Feed finished? (Target-Start discrete input is triggered, and wait for feed to complete, then acknowledge prompt).	Alphanumeric Prompt
Information is printed automatically	Print
Remove container	Alphanumeric Prompt
Tare is cleared automatically	Clear Tare

The IND780 supports two separate ID sequences, ID1 and ID2. As many as 20 steps may be programmed in each sequence, and the sequence can be triggered in one of two ways:

- **Manually**, using the ID softkeys ID1 or ID2, application keys A1-A4, discrete input or shared data triggers xc0149 (ID1) and xc0150 (ID2).
- **Automatically**, by threshold and reset weight readings from the pre-defined scale.

If the sequence is triggered **manually**, it may be programmed to continuously loop using the Start Sequence step, repeating all steps until **either** the EXIT softkey is pressed **or** an ESC softkey Esc is pressed while an alphanumeric entry field is selected.

When ID mode is set to function **automatically**, placing on the pre-defined scale a weight that exceeds a pre-configured threshold value initiates the respective sequence. When all the steps have been performed or the sequence is exited and the weight is removed, the reading from the scale falls below a user-defined reset value. At this point the terminal is ready to begin the next ID sequence.

Only one ID sequence can be triggered to run at a time. Starting an ID sequence while one is currently running will generate a system line message indicating that the ID sequence is busy. If a step fails to execute due to an invalid operation (eg. print connection not found, or tare too small), the ID sequence will be exited automatically and will need to be restarted.

Typically the step's number, prompt and operator data entry box (if applicable) appear together for each step in the Message Area below the weight and SmartTrac display (if enabled). Considering space restrictions, the terminal will attempt to resize resize its on-screen objects to fit the prompts and data entry box, as shown in Figure 2-23 below. If an automatic resize is not possible, the prompts and entry box will be superimposed on the existing screen objects (see Figure 2-24). When the sequence is completed or exited, the display objects will return to their original sizes.

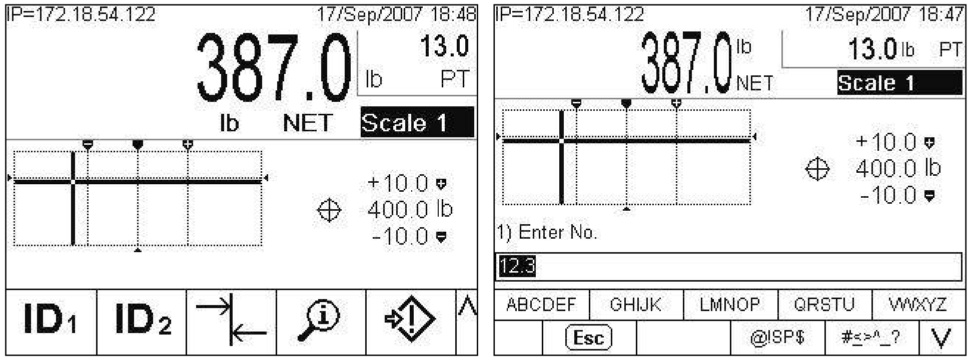


Figure 2-23: Single Scale with SmartTrac and ID Sequence Display

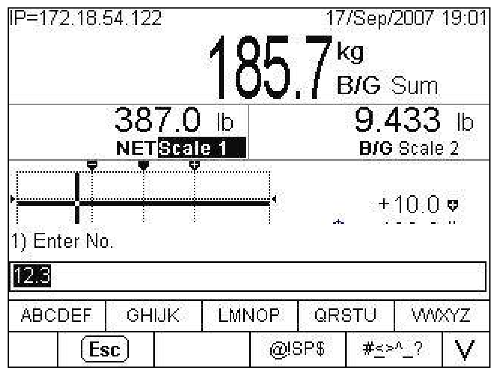


Figure 2-24: Two Scales plus Sum with SmartTrac and ID Sequence Display

For details on ID mode configuration, refer to Chapter 3, **Configuration**.

2.6.14. SmartTrac™

SmartTrac is a graphical display visualization of either the displayed weight or gross weight as selected in Setup. The visualization may be a bar graph, cross hairs, or an over/under display. The following conditions allow SmartTrac to display:

- A Target must be defined and selected.
- A SmartTrac size other than none must be selected at **Setup > Terminal > Display**.
- A SmartTrac graphic display type must be selected for the scale at **Setup > Application > Operation > Target > Scale #**.

Refer to Chapter 3, **Configuration**, for details about these settings.

2.6.14.1. Display Sizes

Figure 2-25 shows a small size SmartTrac bar graph. Figure 2-26 shows an over/under display in medium size and Figure 2-27 a cross hairs display in large size. Note the effect on the main weight display area. In each of these examples, the display shows the weight on target. The small bar graph does not include target weight, description and tolerance information; with a medium or large bar graph, the target description appears above the bar and target and tolerance below it (see Figure 2-28).

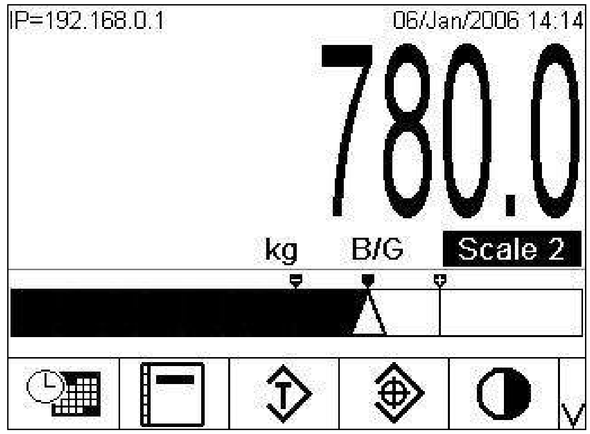


Figure 2-25: Small Size SmartTrac, Bar Graph

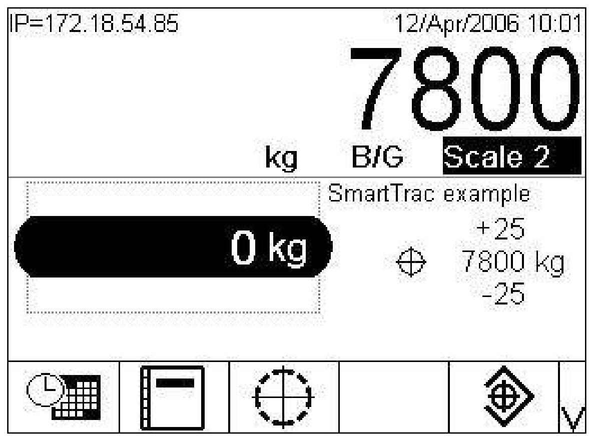


Figure 2-26: Medium Size SmartTrac, Over/Under

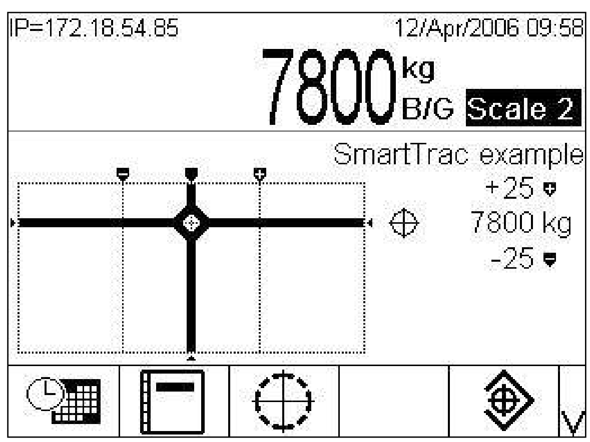


Figure 2-27: Large Size SmartTrac, Cross Hairs

2.6.14.2. Display Colors

- **Red**—Over tolerance
- **Green**—Within tolerance
- **Blue**—Under tolerance

In cross hairs mode, the colors listed above are used as background fill. In this case, the cross hairs appear in white when within tolerance (see Figure 2-27), and yellow when over or under tolerance.

2.6.14.3. Bar Graph Mode

The operator adds material until the measured value is within an acceptable tolerance limit. Normally an operator will add material quickly when the container is not nearly full and more slowly as the target value approaches. Figure 2-28 shows a SmartTrac bar graph with a displayed value below the lower tolerance limit.

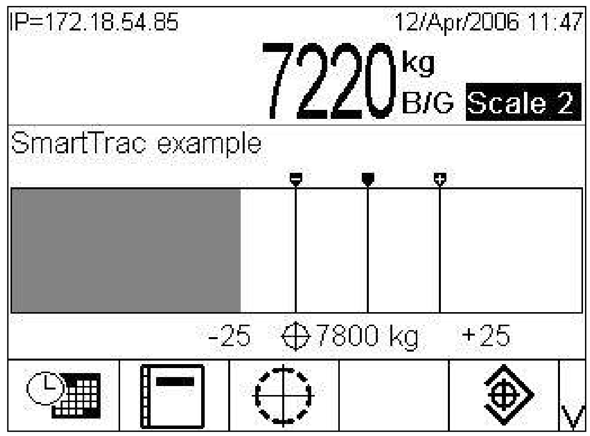


Figure 2-28: Bar Graph, Large SmartTrac Display

While the display appears to be one continuous bar graph, it can actually be broken into four separate sections or ranges. Depending upon the target and tolerance values used, there could be one, two, or three speeds at which these graphical sections are filled in. Figure 2-29 illustrates the ranges, and includes the numerical display of the target and tolerance values. Note the white triangle, indicating that in this case the measured weight is precisely on target.

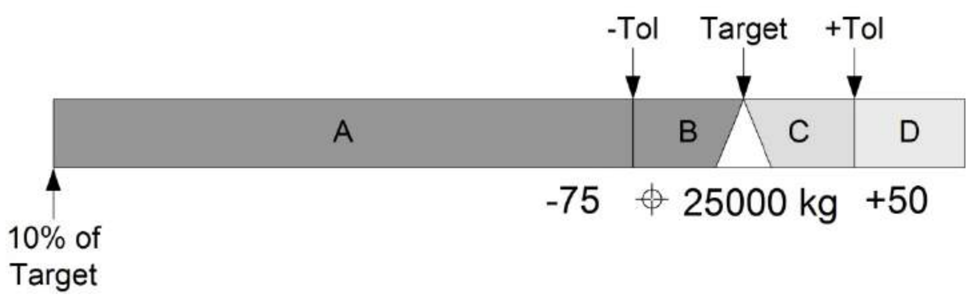


Figure 2-29: Medium Size SmartTrac Bar Graph With Display Ranges

2.6.14.3.1. Under Tolerance

The Under Tolerance range is labeled "A" in Figure 2-29, and represents the amount of material between 10% of the target value and the target minus the negative tolerance value. The bar graph begins to populate the "A" range when more than 10% of the target has been added. Until the 10% point is reached, no fill is shown.

2.6.14.3.2. Acceptable Tolerance Under Target

Region B in Figure 2-29 represents the zone of acceptable tolerance below the target value.

2.6.14.3.3. On Target

When the measured value exactly equals the target value, an unfilled triangle indication displays, as shown in Figure 2-29.

2.6.14.3.4. Acceptable Tolerance Over Target

Region C in Figure 2-29 represents the zone of acceptable tolerance above the target value.

2.6.14.4. Over Tolerance

Region D in Figure 2-29 represents the zone of unacceptable tolerance above the target value. In Region D, the fill rate reverts to the same rate as used in Region A. If the measured value is large enough that the number of dot columns required for display exceeds the number available, the display saturates. Further increases in the measured value do not affect the graphical display.

2.6.14.5. Over/Under Mode

The Over/Under SmartTrac visualization may be displayed in medium or large sizes. If the Target Table's Tolerance Type is Target Deviation or % of Target, the target value and the amount of deviation from it are shown, together with a graphic indicating the direction of deviation (Figure 2-31 and Figure 2-32). If the Target Table's Tolerance Type is Weight Value, only the graphic display appears indicating whether the current value is above, within or below the acceptable range (Figure 2-34). In either case, a black oblong indicates that the current weight is within the acceptable range.

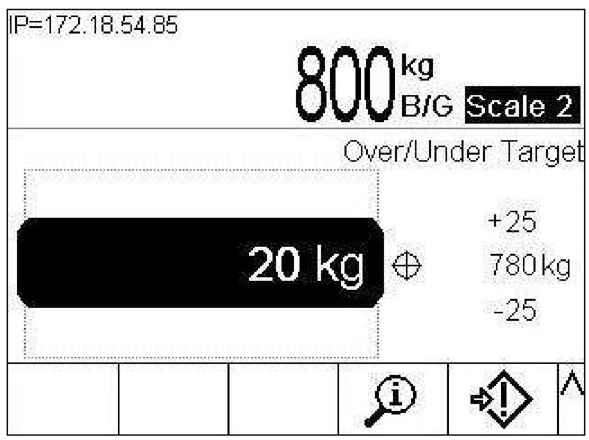


Figure 2-30: Example of Over/Under Display

Figure 2-31 shows the Over/Under portion of the display, indicating weights above the high tolerance limit (top) and below the low tolerance limit (bottom).

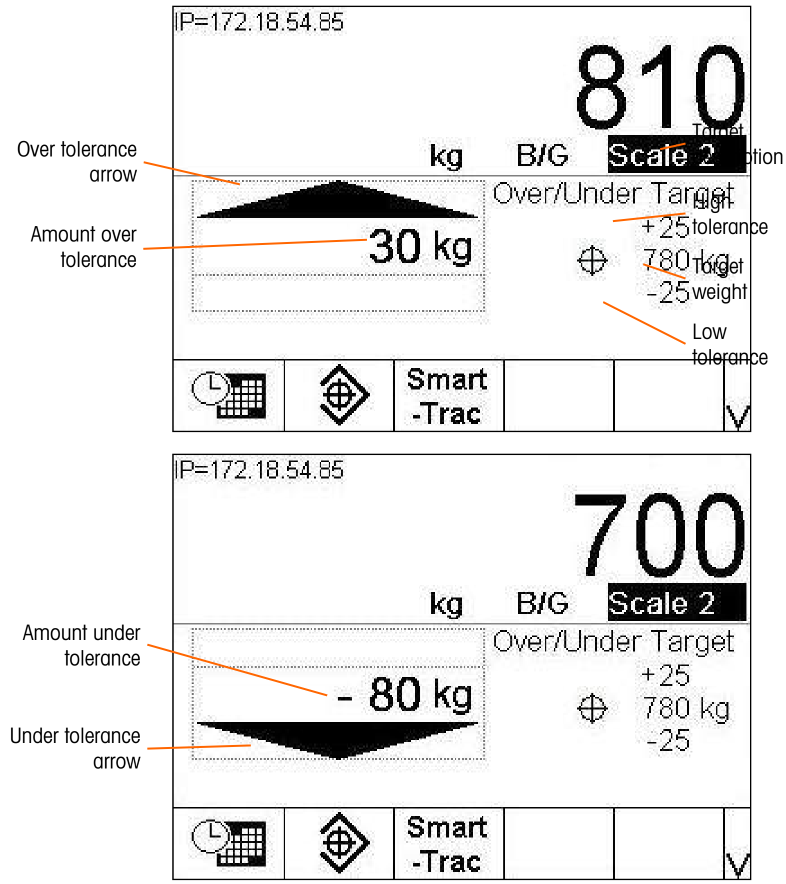


Figure 2-31: Elements of the Over/Under SmartTrac Display

In the Over/Under Mode, when Tolerance Type is set to Weight Value, the graphic displays as shown in Figure 2-32. When Tolerance Type is set to either of the other two values, the table requires a target value to be entered. From top to bottom are graphics for over tolerance, under tolerance and in tolerance.

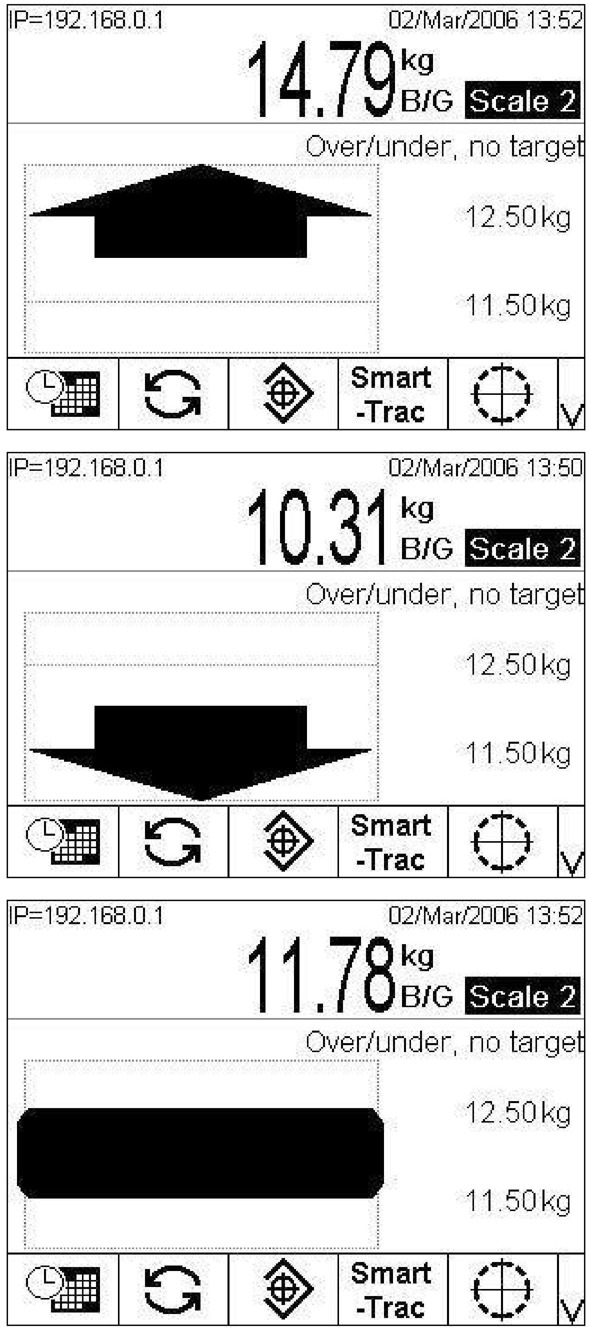


Figure 2-32: Over/Under SmartTrac Displays, No Target Weight

2.6.14.6. Cross Hairs Mode

The cross hairs SmartTrac visualization may be displayed in medium or large sizes. Figure 2-33 shows a large size display indicating that the measured weight has been reached. The cross hairs become an expanded "eye" to indicate that the weight is precisely on target. The target weight and tolerance values display to the right of the screen.

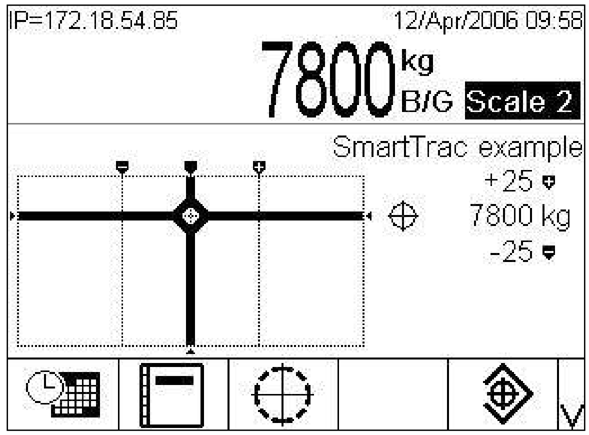


Figure 2-33: Cross Hairs SmartTrac Display, On Target

Figure 2-34 shows three cross hairs displays. From top to bottom, they are above high tolerance; in tolerance range but below target; and below low tolerance. The horizontal bar moves vertically as the measured weight approaches the tolerance range, giving a coarse indication of the relationship between current weight and target weight. The vertical bar begins to move when measured weight approaches the lower tolerance line, giving a fine indication of the relationship between current weight and target weight. The intersection of these bars indicates the current weight.

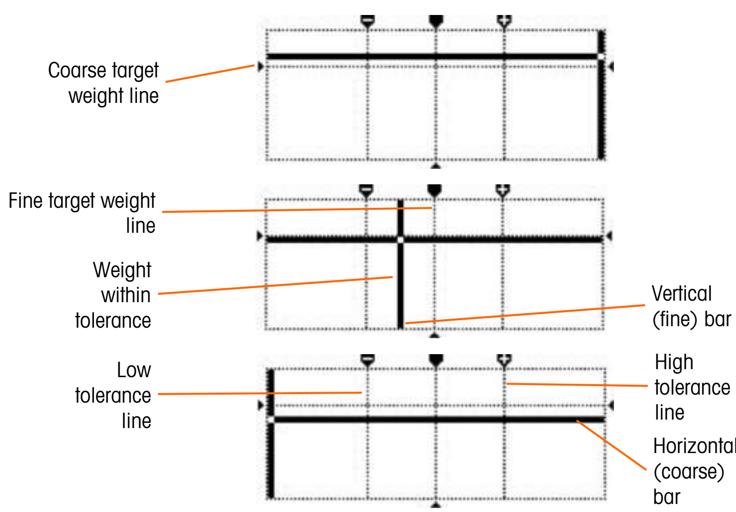


Figure 2-34: Cross Hairs SmartTrac Displays, Off Target

2.6.15. Clustering

2.6.15.1. Overview

Clustering is a means of networking up to 20 individual IND780 terminals together in a peer-to-peer Ethernet network. This is accomplished by assigning each IND780 terminal a unique IP address and a terminal number. Within a cluster, terminals can share Shared Data, operator consoles, printers, and PLC interfaces. The IND780 also extends its clustering services to host PCs or file servers on an Ethernet LAN for data exchange.

An IND780 terminal can operate as a remote operator console to any clustered IND780. A dedicated SELECT TERMINAL softkey, assigned to the home screen, can be pressed to open a list of names of clustered terminals. Once a terminal is selected, pressing OK allows the local terminal to access the display, keypad and setup configuration of the remote terminal. The local terminal's display is replaced with that of the selected remote terminal. All front panel keys now function as if they belonged to the remote terminal, and softkeys assigned on the remote terminal appear on the home screen. The local terminal will not lock out the controls for the remote terminal during this remote connection.

2.6.15.2. Viewing a Clustered Terminal Remotely

To select a clustered terminal to view from the home screen, press the SELECT TERMINAL softkey. A screen like the one in Figure 2-35 appears, with a drop down list including all clustered terminals.

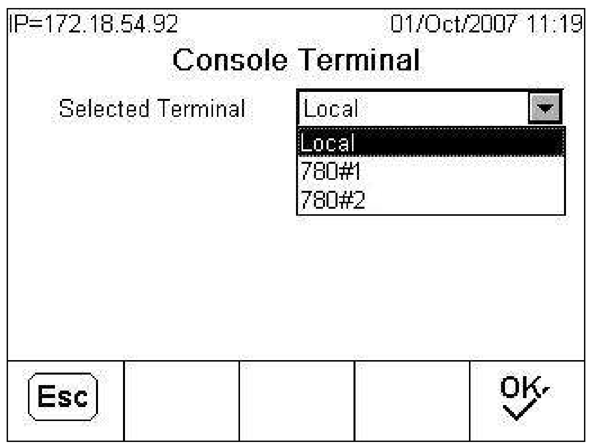


Figure 2-35: List of Clustered Terminals

Select the desired terminal and press ENTER, then press the OK softkey to confirm the choice. If the selected terminal is already being viewed by another terminal, a message will appear:

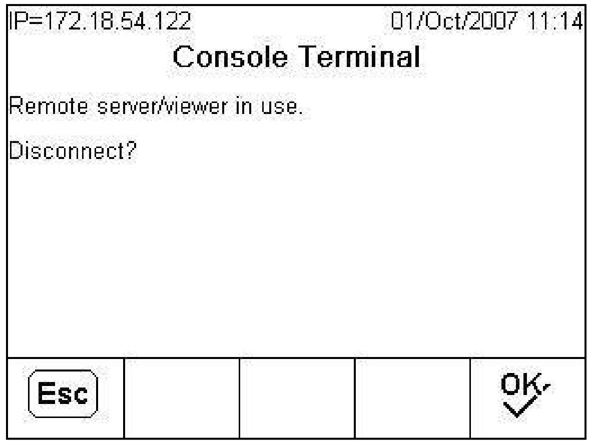


Figure 2-36: Remote Viewer Disconnect Screen

Press OK to confirm the disconnection, or ESC to return to the home screen without disconnecting. Once the remote view connection has been closed, the clustered terminal is again available to be selected for remote viewing.

If the connection to the remote terminal is successful, after a brief delay the current home screen display from that terminal will appear. If the connection is unsuccessful, an error message might appear (Figure 2-37) indicating that the remote terminal's network/view server is disabled in setup.

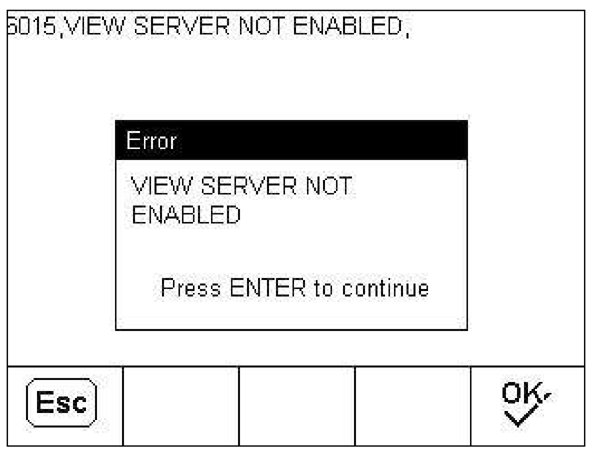


Figure 2-37: Remote Viewer Not Enabled Error Message

To disconnect from the remote viewer, press the SELECT TERMINAL softkey and follow the screen instructions as shown in Figure 2-36.

2.6.16. Time and Date

Time and date are used for reporting, error and transaction log timestamps, and triggering service events. The Time & Date softkey accesses the Set Time & Date screen where the user can set the time and date, including the hours, minutes, day, month, and year. When the time is set, seconds are set to 0. The portion of the system line which displays date and time can be enabled or disabled (the default setting) from the Format Time & Date screen.

Although the format for the time and date can be selected according to local preferences, the use of a timestamp in log files is not selectable. Timestamp formats are always fixed as:

- **Date**: YYYY/MM/DD (for example, July 23, 2005 becomes the fixed format date 2005/07/23)
- **Time**: HR:MM:SS stored in 24 hour format (for example, 10:01:22 PM becomes the fixed format time 22:01:22). Seconds are not displayed on the screen.

2.6.17. Reports

Reports may be generated, viewed, and printed from database tables including:

- Alibi Memory
- Tare Table
- Target Table

The REPORTS softkey must display as a softkey or be assigned to an Application key (A1—A4) to generate table reports. Otherwise, table reports can only be generated from within Setup.

2.6.17.1. Generating a Report

1. Press the REPORTS softkey . The Reports Run screen appears.
2. While the report is printing, the CANCEL softkey displays. Pressing it will cancel the print operation.
3. To select a sub-set of records from the table, press the TABLE SEARCH softkey . The Search Screen for the selected report type displays (see Figure 2-38).

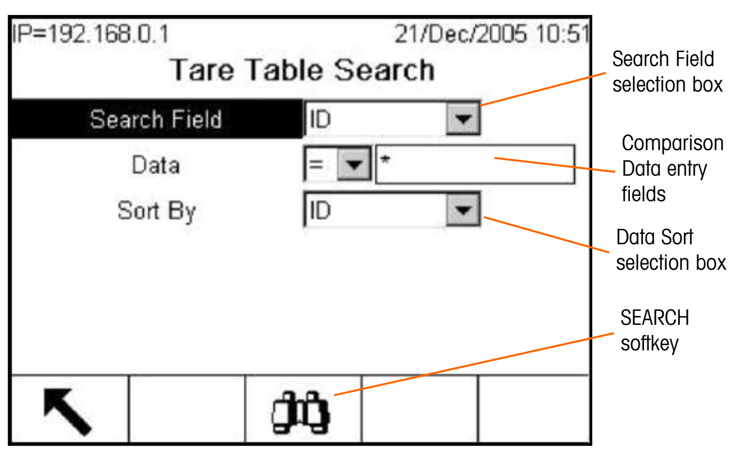


Figure 2-38: Tare Table Search Screen

- When Alibi is selected in the Report Type field and the Table Search softkey is pressed, allow some time for the Alibi Search View table to populate.

4. When the table Search View is on screen, the PRINT softkey displays again. Pressing PRINT will print the entire contents of the table, and a "Printing" system line message appears for 5 seconds.

2.6.18. Calibration Test

The IND780 terminal provides a programmable Calibration Test sequence that can contain up to 25 individual steps. The Calibration Test is designed to lead the tester through a set of predetermined steps and compare the terminal calibration with known test weights.

The test is accessed by pressing the CALIBRATION TEST softkey on the home page or as an Application key (A1—A4). A screen (Figure 2-39) displays, including a field for the name of the tester.

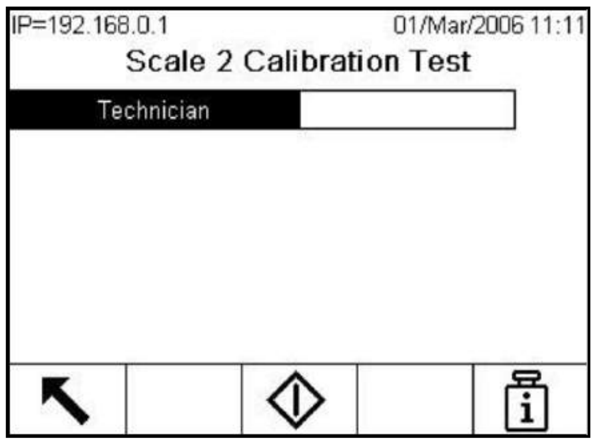


Figure 2-39: Calibration Test Name-Entry Screen

Once the technician's name has been entered, press the Test Weight Information softkey. The screen shown in Figure 2-40 opens.

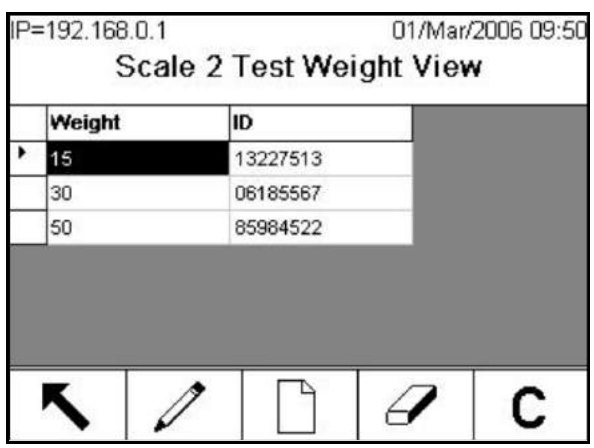


Figure 2-40: Calibration Test Weight View

Use the NEW and EDIT softkeys to enter the weight and serial number of each test weight to be used. The weights and weight units should match those programmed for the Calibration Test. This information provides a traceable record for the calibration test.

Once the test weights are entered, return to the Calibration Test screen by pressing the EXIT softkey .

The calibration test is started by pressing the START softkey . A display is shown (Figure 2-41) that provides the active scale weight, the target and tolerance weight values and, at the bottom, instructions (as to where to place the weights).

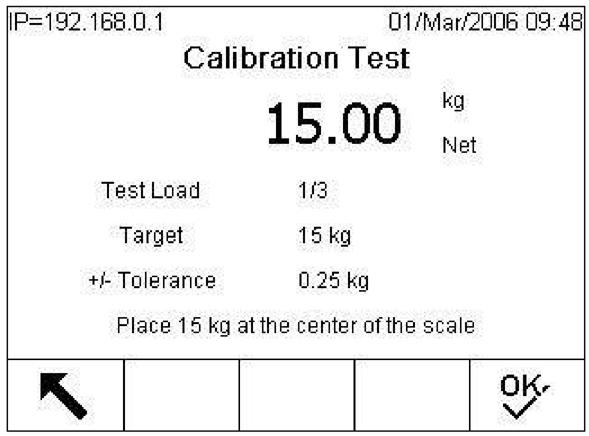


Figure 2-41: Calibration Test Step

When the tester has carried out these instructions, he or she presses the OK softkey , and the terminal compares the actual weight on the scale to the programmed target weight for this step. If the comparison passes, the test continues to the next step. If it fails, a message (Figure 2-42) displays indicating that the result is out of tolerance.

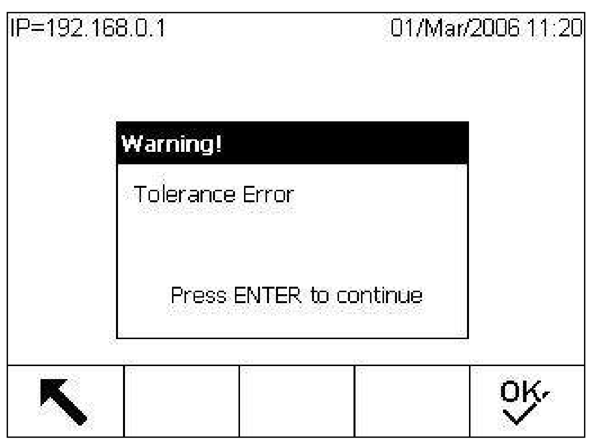


Figure 2-42: Tolerance Error Message

After the error is acknowledged, the screen shown in Figure 2-43 displays, and the tester can abort the test (by pressing the EXIT softkey), retest this step (by pressing the OK softkey), or skip this step (by pressing the SKIP softkey) knowing that it failed.

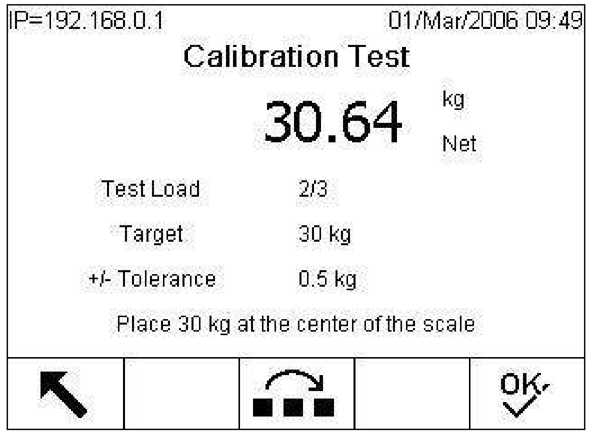


Figure 2-43: Skip Calibration Test Step

After progressing through all the steps in the calibration test procedure, a Test Complete message displays, along with a status message of either pass or fail (Figure 2-44). Pressing the PRINT softkey generates a printout of the calibration test report.

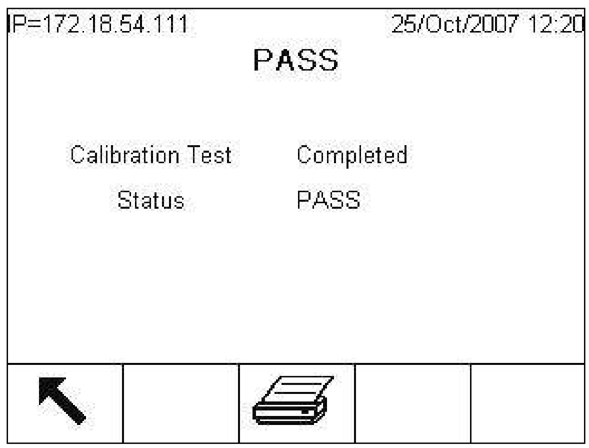


Figure 2-44: Calibration Test Complete Screen

A full description of how to program the calibration test can be found in Chapter 3 of this manual, **Configuration**, in the **Maintenance > Configure/View > Calibration Test** section.

If a SICS scale is present, an internal calibration test function is also available, provided the base supports the 'TST3' SICS function. The tester can initiate the internal calibration test by pressing the INTERNAL CALIBRATION TEST softkey from the Calibration Test screen. The Internal Calibration Test screen displays with a tolerance weight value and a status message directing the tester to empty the scale and to press the START softkey (Figure 2-45).

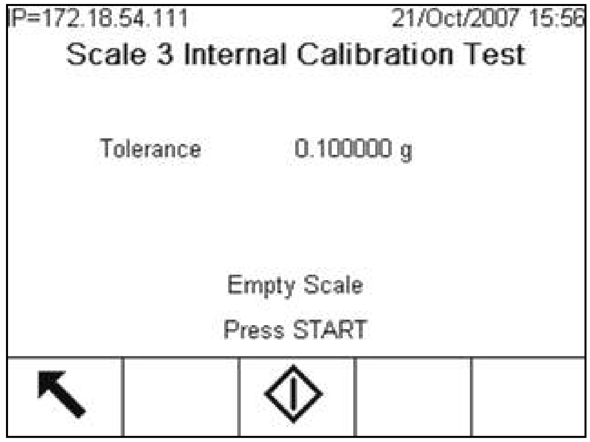


Figure 2-45: Internal Calibration Test Screen

The tolerance value indicated can be programmed only in the setup mode. It is used as the pass/fail criterion of the calibration test.

The test process is started by first emptying the scale and then pressing the START softkey . A "Testing" message displays, to indicate the status of the internal calibration operation.

When the test operation is completed, a Test Complete message displays along with a Status message of either Pass or Fail (Figure 2-46). The weight deviation since the last calibration is also indicated. The calibration test report can be printed using the PRINT softkey .

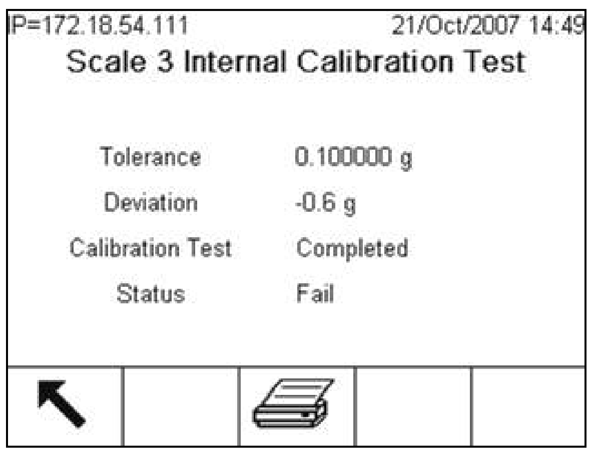


Figure 2-46: Internal Calibration Test Screen, Complete

2.7. InTouch^{SM} Remote Services

IND780 supports an embedded InTouch communication agent that, when enabled, will monitor the weighing system for performance anomalies, and in the event of a performance issue, will securely transmit encrypted information to a cloud-based InTouch Enterprise server. The encrypted data can include system information, alarm conditions and diagnostic files. METTLER TOLEDO remote service technicians actively monitor the InTouch Enterprise server, allowing for real-time and proactive response to performance issues.

Activation and configuration of the embedded InTouch Remote Service communication agent is not carried out without express permission from the user. Please contact a METTLER TOLEDO service provider for more information on the benefits of incorporating InTouch Remote Services into your location's service strategy. Please refer to the METTLER TOLEDO Services page at the front of this manual.

2.8. Alibi Memory Direct Access

The Alibi Memory stores transaction data that can be retrieved in order to verify transaction information.

The information stored in the Alibi Memory includes:

- Transaction counter value
- Date and time of transaction
- Gross, net, and tare weights including units of measure

2.8.1. Viewing Alibi Memory

1. Depending which is programmed as one of the home page softkeys, press the Alibi softkey **Alibi**, or press the REPORTS softkey and select Alibi Memory from the report selection box.
2. Press the VIEW TABLE softkey . The Alibi Search View screen displays, with two Search Fields and associated Data limiting boxes.
3. To limit the data:
   a. Use the Search Field selection box to select a desired search field. The Alibi Search screen has two sets of limiting fields, allowing the search to be further limited. Table 2-9 lists the options by Table, with default values indicated with an asterisk.

Table 2-9: Table Search Field Options

Table	Search Field Options
Alibi	None*, Date (2005/08/21), Time (18:27:44), Transaction Counter
Tare	ID*, Description, Tare
Target	ID*, Description, Target, +Tol, -Tol

   b. Use the Comparison selection box to select how the data will be limited. Table 2-10 shows the options offered in this selection box.

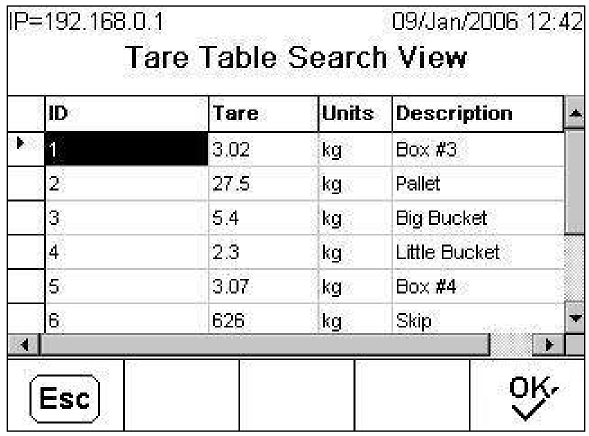
Table 2-10: Table Comparison Field Options

Symbol	Comparison	Symbol	Comparison
<	Is less than	<>	Is not equal to
<=	Is less than or equal to	>=	Is greater than or equal to
=*	Is equal to (default)	>	Is greater than

c. Use the numeric keypad to enter the limiting factor in the text box (the * character is the "wild-card" character and returns all results).

d. For the Tare and Target Tables, select the Sort By method. Sort By offers the same choices (Table 2-10) as the Search Field.

e. Press the SEARCH softkey to view the limited data in the table. Unless specified otherwise in the Sort By field of the Search screen, Tare and Target records are always listed in order by ID, lowest to highest, Alibi records in order by date and time, oldest first. Figure 2-47 shows an example of search results for a Tare Table. The UP, DOWN, LEFT and RIGHT arrows can be used to scroll around this view in order to see more rows and columns of data.



IP=192.168.0.1 09/Jan/2006 12:42

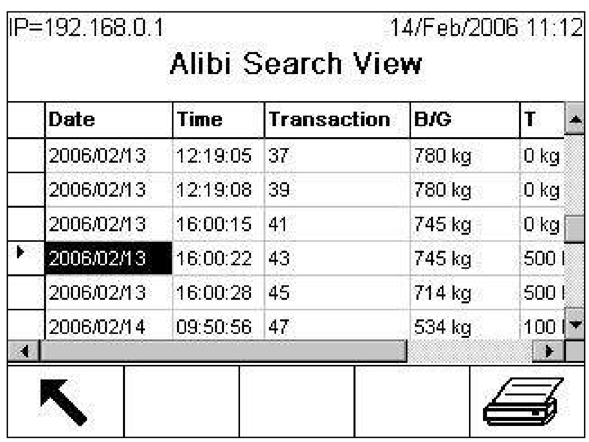
Tare Table Search View

ID	Tare	Units	Description
1	3.02	kg	Box #3
2	27.5	kg	Pallet
3	5.4	kg	Big Bucket
4	2.3	kg	Little Bucket
5	3.07	kg	Box #4
6	626	kg	Skip

Figure 2-47: Tare Table Search View

f. The PRINT softkey can be used to print a report of the selected data.

4. Press the SEARCH softkey. The Alibi Search View screen displays the search results. Records are ordered by date and time, with the most recent record shown last.



IP=192.168.0.1 14/Feb/2006 11:12

Alibi Search View

Date	Time	Transaction	B/G	T
2006/02/13	12:19:05	37	780 kg	0 kg
2006/02/13	12:19:08	39	780 kg	0 kg
2006/02/13	16:00:15	41	745 kg	0 kg
2006/02/13	16:00:22	43	745 kg	500 l
2006/02/13	16:00:28	45	714 kg	500 l
2006/02/14	09:50:56	47	534 kg	100 l

Figure 2-48: Alibi Search View

2.9. Table Searches

Table searches can be accessed by various methods including the TARE TABLE softkey, TARGET TABLE softkey, ALIBI softkey Alibi, REPORTS softkey, and from the setup menu tree.

2.9.1. To Search a Table

1. Access the table to be viewed using one of the methods noted above. Refer to Appendix C, **Table and Log File Structure** for more information about how to access specific tables.
2. If accessing the table from the Reports Run screen, press the TABLE SEARCH softkey. The Search View screen displays. If a table is accessed from its dedicated softkey, the Search View screen displays directly.
3. Use the Search Field, Data entry and Sort By boxes to enter specific search information to limit the search, or accept the default * (the "wild-card" character) to view all table information. Options in the search screens are as described in Table 2-9 and Table 2-10.
4. Press the SEARCH softkey. The Search View screen displays with the search results.

3 Configuration

Depending on the configuration of Users, login security behaves as follows:

- In the IND780's default configuration (i.e. with no passwords set), all screens in Setup can be accessed, parameter changes made and data entered.
- If a password has been assigned to the default Administrator (admin) and to any additional operators defined in Setup at **Terminal > Users**, but **not** to the default Operator (anonymous), and no login is in effect, Setup can be accessed and all screens viewed. However, attempts to modify a field will result in an error message. Visit the Login branch of the Setup menu tree to log in at the appropriate level in order to make changes.
- If a password has been assigned to the default Administrator (admin) **and** to the default Operator (anonymous), and the Setup softkey is pressed, a Login screen (Figure 3-1) displays. Use the correct username and password to Log in either as Administrator (to make changes) or Operator (to view setup parameters).

3.1. Entering Setup Mode

The configuration of the IND780 terminal is accessed through the SETUP softkey . If password security has been enabled, a login screen (Figure 3-1) displays and the user must enter the correct password in order to advance into setup. (See the Security section in Chapter 2, **Operation**, and the Configuration Options, Terminal, Users section of this chapter for further information about password setup and security.) To exit back to the home screen without entering any login information, press the ESCAPE softkey Esc twice.

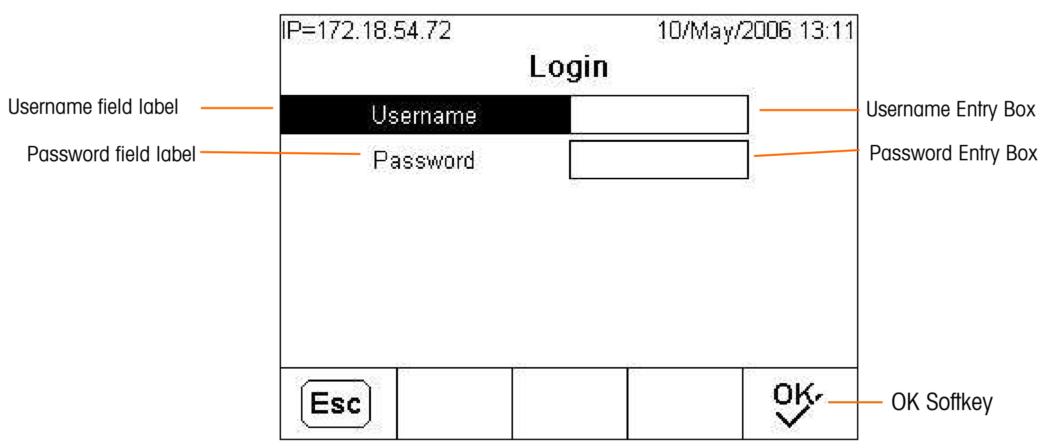


Figure 3-1: Login Screen

To enter a username:

1. Press the ENTER key to change the focus and access the Username entry box. The softkeys change to alpha keys (see Figure 3-2).

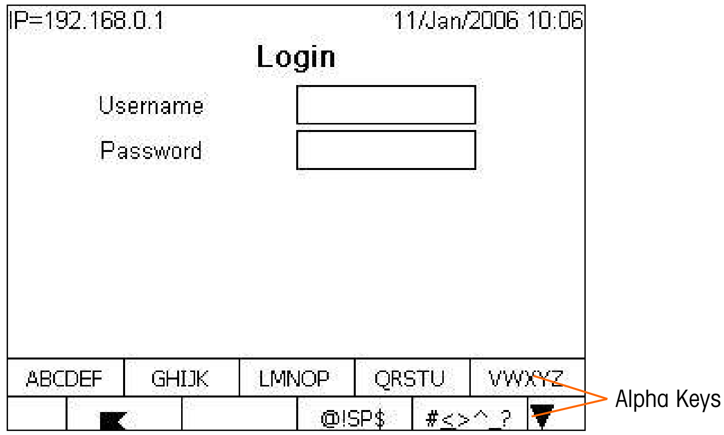


Figure 3-2: Login Screen (Alpha Keys)

2. Use the alpha and/or numeric keys to enter the username in the username entry box.
3. Press the ENTER key. The alpha keys no longer display.

To enter a password:

1. With focus on the Password field label, press the ENTER key. The softkeys change to alpha keys (see Figure 3-2) and focus moves to the Password entry box.
2. Use the alpha and/or numeric keys to enter the password in the password entry box.
3. Press the OK softkey OK. If the username and password are correct, the terminal goes into setup mode. Once the terminal is in setup mode, the setup menu tree displays.

3.2. Exiting Setup Mode

To exit the setup mode, select Home from the setup menu tree and press ENTER, or press softkey one (furthest to the left). The home screen displays.

3.3. Setup Menu Tree

Each line of the setup menu tree is referred to as a branch (see Figure 3-3). Some branches have additional branches that become visible when the view of the main branch is expanded. If a branch has additional branches under it, the collapsed symbol (⊞) initially displays in front of the branch name. After the branch view has been expanded, the expanded symbol (⊟) displays in front of the branch name and the additional branches become visible. Any branch that is not expandable is called a leaf node.

Figure 3-3 shows the Scale branch of the setup menu tree in focus (highlighted) but not expanded.

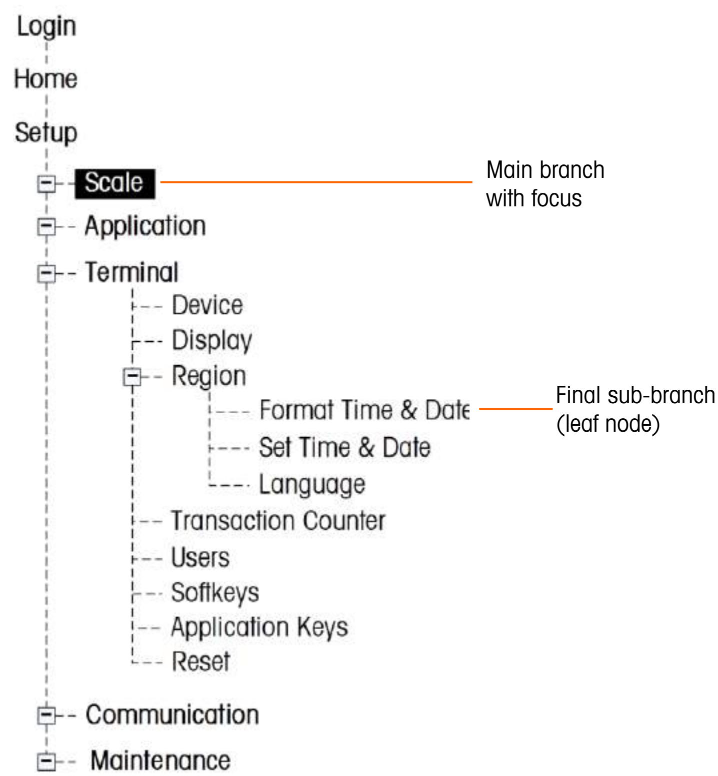


Figure 3-3: Setup Menu Tree

Use the UP and DOWN navigation keys to move focus through the branches of the setup menu tree.

Press the RIGHT navigation key to expand a branch and the LEFT navigation key to collapse a branch. When the focus is on a sub-branch, focus can quickly be moved back to the main branch by pressing the LEFT navigation key. The first (left-most) softkey collapses all expanded branches and restores the initial view of the menu tree.

When a leaf node (singular, non-expandable) branch such as Device or Display is in focus, press the ENTER key to display the setup screen for that function.

3.3.1. Setup Screens

Setup screens enable access to data fields where parameters can be viewed, entered, or modified to configure the terminal to meet specific application function needs.

3.3.1.1. Navigation

Press the UP and DOWN navigation keys to move through the field labels displayed on each setup screen.

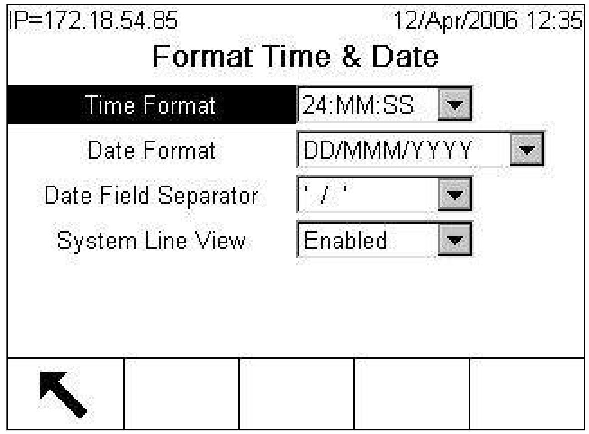


Figure 3-4: Setup Screen (Format Time & Date)

3.3.1.2. Data Entry

Press the ENTER key to move the focus from the field label to either the selection box or data entry box where data is to be entered or edited (see Figure 3-5).

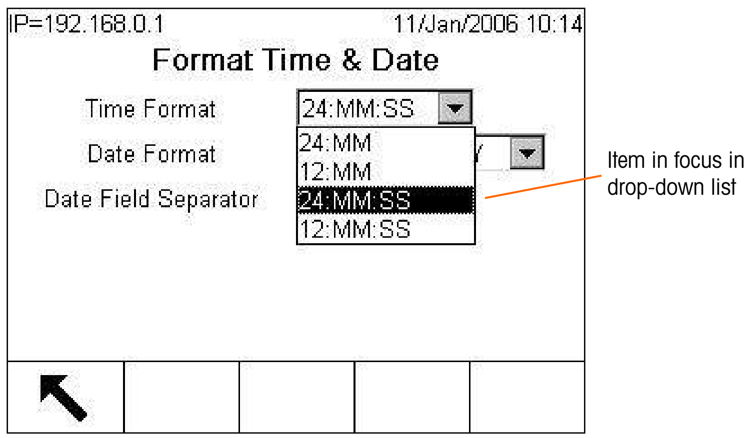


Figure 3-5: Setup Screen

If the field values are presented in a selection box, the current selection will have focus when the ENTER key is pressed.

To change the field value in a selection box:

1. Press the UP and DOWN navigation keys to scroll through the list and place the focus on the value to be selected.
2. Press the ENTER key to accept the selection as the value for the field. The selection displays as the value for the field and the focus moves to the next field label.

If the field value is for a data entry box and alpha/numeric character entry is possible, the alpha keys will display. See Operating instructions for details on using alpha keys.

To change the field value using alpha/numeric characters:

1. When a data entry box is first entered, the previous data (if present) is in focus. To replace previous data, use the alpha keys and the numeric keypad to enter the desired value.

OR

2. Press the LEFT and RIGHT navigation keys to move the cursor into position if the value needs to be edited from a specific point rather than replaced. Position the cursor at the end of the data to be deleted and press the C key once for each character to be deleted.
3. Press the ENTER key to accept the entered alpha/numeric characters for the field. The entry displays as the value for the field and the focus moves to the next field label.

To exit a setup screen, press the EXIT softkey , which is in the first softkey position. The setup menu tree displays with the focus on the branch for the setup screen that was exited.

An optional external keyboard may also be used for data entry. The arrow keys and Enter key on a keyboard function in the same way as the terminal's navigation keys. In addition, the Page UP and Page Down keys may be used to move up and down through one screen of menu tree at a time.

3.3.2. External Keyboard

An external keyboard may be connected to the IND780's USB port to facilitate Setup navigation and the entry of data. By default, the keyboards NUMLOCK is enabled, supporting use of the numeric keypad. Keyboard keys emulate buttons on the IND780's keypad as shown in Table 3-2.

The external keyboard's ESC key has a variety of functions, depending on the state of the IND780. These are detailed in Table 3-1.

Table 3-1: External Keyboard ESCAPE Key Functions

Current Focus	Function
Home screen	Moves cursor into quick access entry mode
Setup menu tree	Returns to home screen
Setup screen, no field in focus	Returns to setup menu tree
Setup screen, alphanumeric entry field in focus	Closes alpha key display, field remains in focus
Setup screen, list box item in focus	Leaves previous list selection in place, moves focus to next field label

Table 3-2: Keyboard Mapping

Keypad	External Keyboard	Keypad	External Keyboard
A1	F10 / ALT and F1	7	Numeric keypad 7
A2	F11 /ALT and F2	8	Numeric keypad 8
A3	F12 / ALT and F3	9	Numeric keypad 9
A4	APPS Key / ALT and F4	0	Numeric keypad 0
SK1	F1	.	Decimal
SK2	F2	C (Clear)	Backspace
SK3	F3	Enter	Enter
SK4	F4	Left Arrow	Left arrow

Keypad	External Keyboard
SK5	F5
1	Numeric keypad 1
2	Numeric keypad 2
3	Numeric keypad 3
4	Numeric keypad 4
5	Numeric keypad 5
6	Numeric keypad 6

Keypad	External Keyboard
Right Arrow	Right arrow
Up Arrow	Up arrow
Down Arrow	Down arrow
Scale Select	F6
Zero	F7
Tare	F8
Print	F9

3.4. Overview of Configuration

The setup menu tree can be expanded to show every branch and leaf node in the terminal's configuration. Use the navigation keys to select the desired setup screen.

There are 6 major branches in the setup menu:

- Scale
- Application
- Communication
- Flow Meter
- Terminal
- Maintenance

■ The flow meter branch appears only if a flow meter is installed in the terminal.

Details for each branch are provided in the Configuration Options section starting on page 3-8. Figure 3-6, on the next page, shows the setup menu tree with all branches expanded and leaf nodes visible.

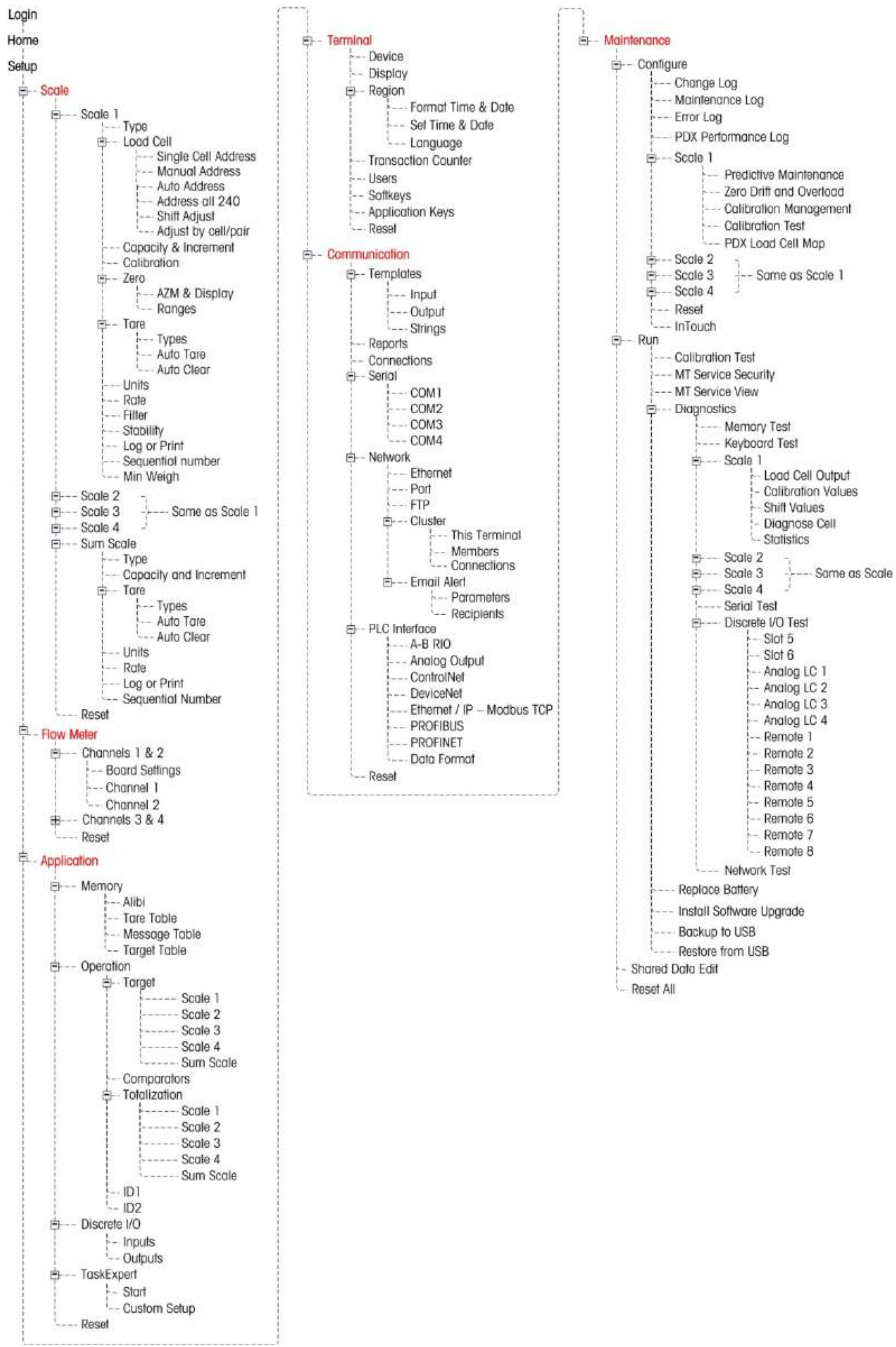


Figure 3-6: The IND780 Menu Tree, All Branches Expanded

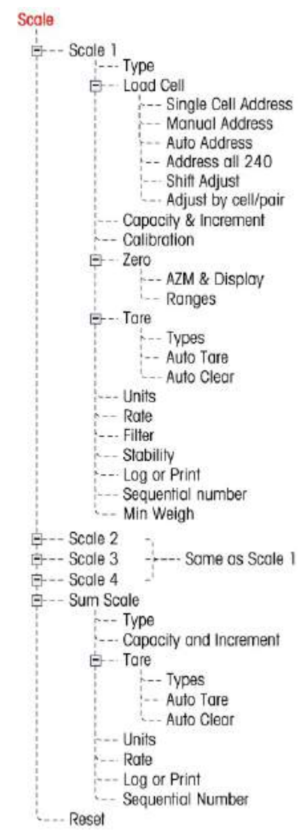
3.4.1. Configuration Options

Configure terminal options on the setup screens that are available under the 5 major branches of the setup menu.

- If the metrology switch is in the approved position (S1 = ON), metrologically significant settings in the Scale branch cannot be modified. Values may be viewed, but not changed.

3.5. Scale

The Scale branch provides the following access to the configuration of the connected scales:



- Scale 1 – 4 and Sum Scale
- Type*
- Load Cell*
- Capacity and increment values*
- Calibration*
- Zero parameters*
- Tare parameters*
- Units
- Rate
- Filter parameters*
- Stability parameters*
- Log or print threshold parameters
- Sequential Number
- Minimum weight parameters

- Leaf nodes that are marked with an asterisk (*) above will have different parameters depending on the connected scale type.

A Reset is present at the end of the branch to enable a limited reset to the factory default settings for the Scale parameters.

3.5.1. Scales 1, 2, 3 and 4

3.5.1.1. Type

The Scale Type screen allows the scale to be given a Name, and permits selection of the type of scale. It also provides a selection list for Approval mode. The EXIT softkey ↖ will return the display to the menu tree.

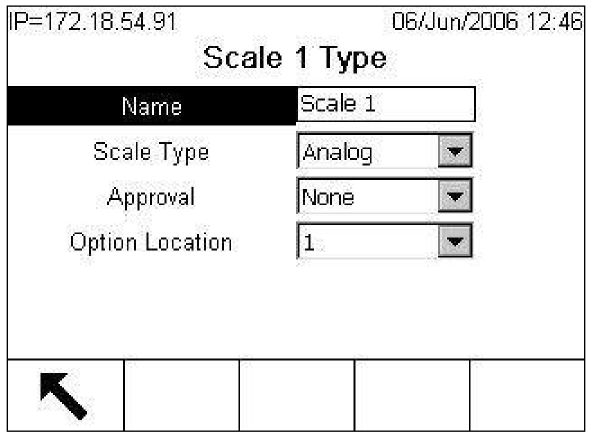


Figure 3-7: Scale Type Screen

3.5.1.1.1. Name

Enter the scale name (an alpha-numeric string of up to 20 characters) in the Name entry box. This is the identifier that will appear on the home screen. Only a limited space is allocated to these characters, however. Depending on the type of characters used, a maximum of 7 or 8 characters will appear on-screen.

3.5.1.1.2. Scale Type

The Scale Type field allows you to choose the type of scale connected:

- None
- Analog
- POWERCELL MTX
- IDNet
- digiNet
- SICS
- POWERCELL PDX

- When a PowerMount scale is connected, use the POWERCELL PDX setting. The two types are identical in operation, from the point of view of the IND780's menu options.

- Refer to Appendix D, **Communication**, for SICS-specific information and a list of supported SICS scales.

3.5.1.1.3. Approval

Approval refers to the metrological (weights and measures) approval configuration for the specific scale. The selection list can be set to:

- None – no approval is required
- USA
- OIML
- Canada
- Australia

If an approval (USA, OIML, Canada, or Australia) is configured, the metrology switch must be in its on position, or an error message (Switch Unsecured) will appear when an attempt is made to exit Setup. Once the switch is secured, Setup can be exited and thereafter access to the Scale setup branch of the menu tree will be limited.

Setting the approval mode for an IDNet base requires setting the approval option both in the selection field described above and in the Service Mode of the base itself.

3.5.1.1.4. Option Location (non-POWERCELL only)

If there are multiple cards of the same type installed in the terminal, you may choose which of the PCB card locations to apply to the currently selected scale. For example, if there are 3 analog load cell cards installed in slots 1 through 3 and you would like the slot 2 PCB card to display as Scale 1 on the indicator, you can choose option location 2 under the Scale 1 type configuration.

3.5.1.1.5. COM Port (SICS only)

When a SICS scale is installed, in addition to Name, Scale Type and Approval, a COM port selection box appears. This represents the COM port through which the SICS scale is connected (see Figure 3-8). Ensure that the terminal's COM port is available and does not have any other communication connections configured.

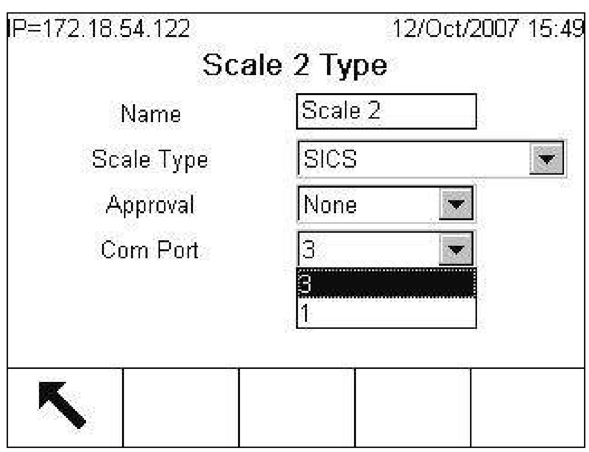


Figure 3-8: Scale Type Screen, SICS

If COM 3 or COM 4 port is installed but does not appear in the selection list, access **Setup > Communication > Serial > COM 3** or **COM 4** and select the appropriate option location for the port (see Figure 3-9). Also select the type of interface (RS-232, RS-422 or RS-485) to be used by the scale interface. It is not necessary to configure the IND780 serial port's Baud, Data Bits/Parity, Flow

Control and Character Set, as this is automatically pre-configured by the terminal when the scale type is SICS. However, it is important that the interface port settings on the scale base are set to either 9600 baud, 8 bits, no parity or 19200 baud, 8 bits, no parity.

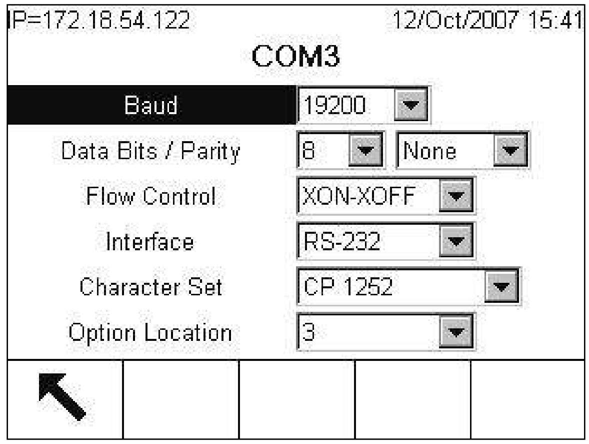


Figure 3-9: Communication > Serial > COM Settings

3.5.1.1.6. Address Range (POWERCELL MTX, POWERCELL PDX and PowerMount only)

This option appears when Scale Type is POWERCELL MTX or POWERCELL PDX, as seen in Figure 3-10. This defines the set of MTX or PDX cells within a network that the IND780 will treat as a scale.

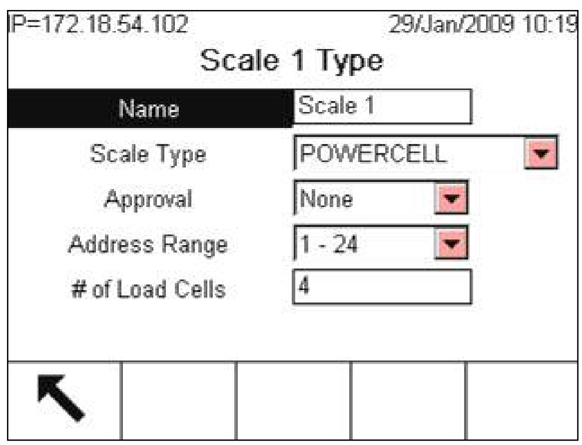


Figure 3-10: Scale Type Screen, POWERCELL

Each scale's MTX or PDX Address Range can be made up as follows with the restriction that the total number of Load Cells specified is limited to 24 cells per terminal:

Load Cell Addresses
1 - 24
31 - 54
61 - 84
91 - 114

Load Cell Addresses
125 (for POWERCELL PDX cells only)

Once an Address Range is selected and the number of Load Cells specified (using the # of Load Cells entry field, below), the IND780 is set up to recognize the cells starting with the first address in the range. For example if Load Cell Address Range 61 – 84 is selected, and ten load cells are specified, then the load cells addressed 61 through 70 will be polled by the terminal, and these are the addresses that will appear at **Maintenance > Run > Diagnostics > Scale *n* > Load Cell Output** (see below).

The Address Range selection of 125 is available for a POWERCELL PDX scale type only. This selection is used for online testing of a single PDX cell with a factory default address.

3.5.1.1.7. # of Load Cells (POWERCELL MTX, POWERCELL PDX and PowerMount only)

For POWERCELL, POWERCELL PDX and PowerMount scales, the number of connected load cells within the address range must be specified here. Valid values range from 1 to 24 cells. If the address range of 125 is selected for a PDX/PowerMount scale, the number of load cells is automatically set to 1, and this value cannot be modified.

3.5.1.2. Load Cell

When POWERCELL MTX, POWERCELL PDX or PowerMount load cells are connected to the terminal, use the load cell branch to address and shift adjust cells.

- In the screens that display during these procedures, the line at the center of the screen is an informative status line. Prompts for input from the operator and messages about current activity appear immediately above the softkey row.

The following procedures are only applied to the cells designated to be part of that scale's portion of the network. If additional cells exist in the network and are part of another scale channel, these procedures may be repeated for those scale channels.

3.5.1.2.1. Single Cell Address, Manual (POWERCELL PDX and PowerMount only)

Use Single Cell Address to set the node address of each load cell used in a network one by one. Typically, this procedure is used during cell replacement, off-site testing or pre-installation when there is no cell-to-cell cable available. It could also be used to diagnose a single connected cell's serial number and node address. During an actual on-site installation when many new load cells are being connected in the network, or when installing a new scale, follow the Manual or Auto Address procedure.

Follow this procedure to perform a single cell address:

1. The initial screen indicates to Connect the Load Cell, and prompts (Figure 3-11):

   Connect Load Cell

   Press Start

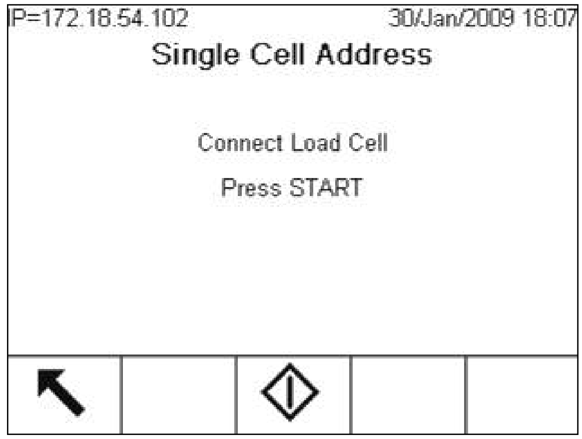


Figure 3-11: Single Cell Address Start Screen, PDX

2. Connect the PDX cell that needs to be addressed and press the START softkey to begin the process. The status line indicates that load cell discovery process has begun, and a message appears briefly:

   Discovering load cells…

   The addressing operation can be aborted by pressing the ABORT softkey during the discovery process.

3. After the IND780 detects the load cell, the cell's serial number and current node address are displayed (Figure 3-12). If no cell is found the display reads:

   Search Failed

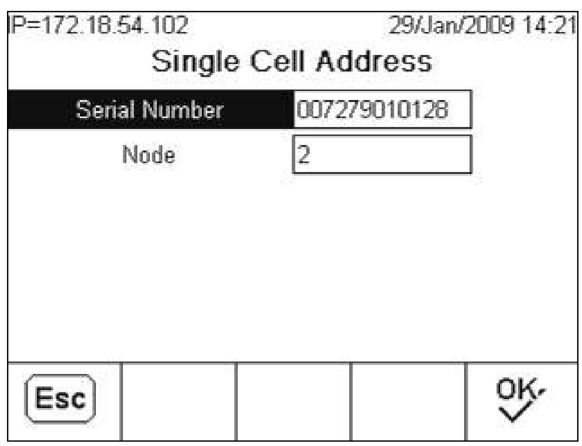


Figure 3-12: Single Cell Address Screen, PDX

- If more than one load cell is connected to the network when this discovery process is executed, the terminal will display the serial number and node address of the first cell it discovers.

4. Before editing the node address of the cell, make sure that the serial number matches that of the cell you are trying to address. If it is not the correct cell, then select the correct one by entering its serial number.

5. To quit the addressing process or return to the Single Cell Address Start screen, press the ESCAPE softkey Esc. Otherwise, enter the required address in the Node entry box and press the OK softkey OK to start the addressing process.

6. The status line indicates that addressing is in progress and briefly displays a message:

   - - Addressing Load Cell - -

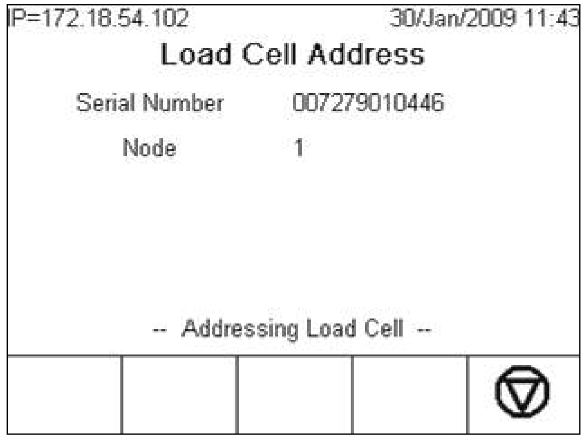


Figure 3-13: Single Cell Addressing Screen, PDX

7. Once the load cell has been successfully assigned an address, a message will appear:

   Address Load Cell Complete

8. Press the BACK softkey to return to the Single Cell Address Start screen.

9. Repeat these steps to address another cell, or press the BACK softkey to return to the setup menu tree.

3.5.1.2.2. Manual Address (POWERCELL MTX only, for POWERCELL PDX/PowerMount see next)

Use Manual Address to set the address of each load cell in a network one by one. Typically, this procedure is used when one or two load cells must be replaced as a maintenance procedure. If many load cells are being replaced, or when installing a new scale, follow the Auto Address procedure.

Figure 3-14 shows the sequence of operations in graphical form.

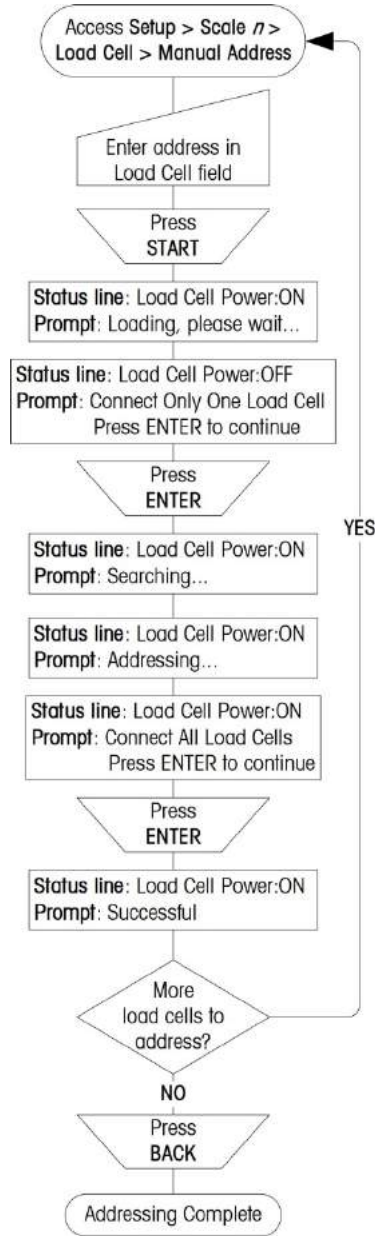


Figure 3-14: Manual Load Cell Addressing Procedure

To address load cells manually, follow this procedure:

1. In the Load Cell field, enter the address to be assigned to the first load cell, then press the START softkey to begin the process. The prompt at bottom of screen reads

   Loading, please wait…

2. The status line changes to indicate that load cell power has been turned off, and the prompt reads

Connect Only One Load Cell
Press ENTER to continue

3. Disconnect all load cells except the one that is to be addressed.

4. Press ENTER.

5. The center status line changes to show that load cell power has been turned on, and the prompt reads

   Addressing…

6. Once addressing has occurred, the prompt reads

   Connect All Load Cells
   Press ENTER to continue

   This process may take several minutes.

7. Press ENTER. The prompt changes to read

   Successful

8. Press the EXIT key to return to the setup menu tree.

3.5.1.2.3. Manual Address (POWERCELL PDX and PowerMount Scales)

Use Manual Address to set the address of every load cell connected in a network. Typically, this procedure is used when installing a new scale with load cells that have the factory default node address. In order to use this procedure, before starting the addressing process it is important to know the cell's serial number and where each cell is arranged on the scale. To address the PDX cells manually, follow this procedure:

1. The initial Manual Address Start screen prompts (Figure 3-15):

   Press Start to discover load cells

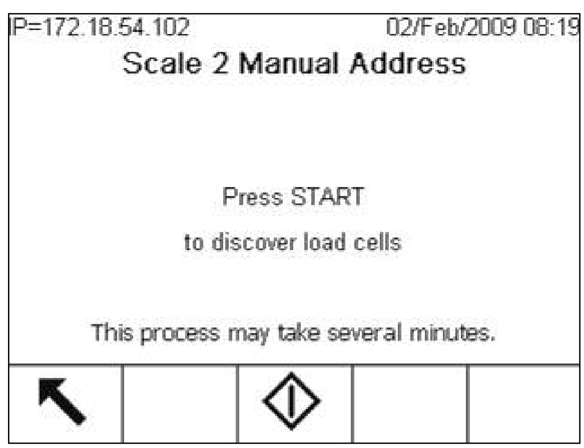


Figure 3-15: Manual Address Start Screen, PDX

2. Make sure all the PDX cells are connected to the network and press the START softkey to begin the process. This process will take several minutes as the terminal performs the load cells discovery process.
3. The status line indicates that the load cell discovery process has started, and a message appears:

   Discovering load cells…

   The addressing operation can be aborted by pressing the ABORT softkey during the discovery process.
4. While the discovery process is ongoing, the terminal will also arbitrarily set unique addresses to the cells automatically. Once this process is complete, a table indicating each cell's serial number and node address is displayed (Figure 3-16).

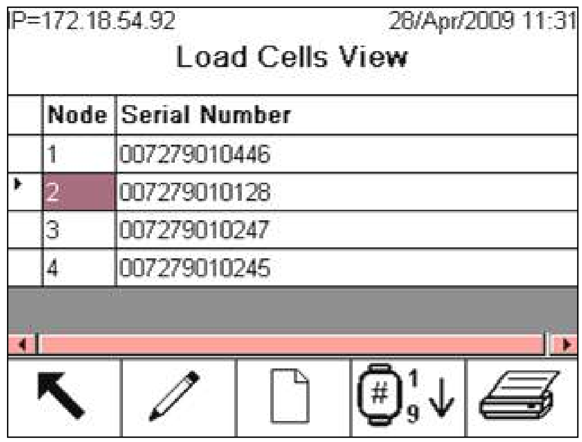


Figure 3-16: Manual Address Load Cells View Screen, PDX

5. If the node address preset by the terminal is not appropriate for a particular cell, select the cell and press the EDIT softkey to change the node address.
6. After pressing the EDIT softkey, the Load Cell Edit screen will appear as shown in Figure 3-17.

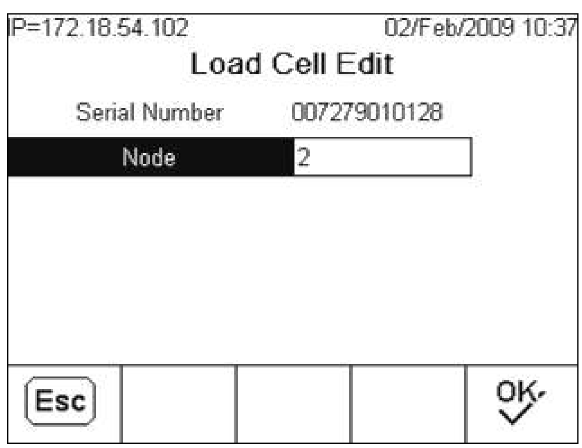


Figure 3-17: Manual Address Load Cell Edit Screen, PDX

7. Press the ESCAPE softkey Esc to return to the previous screen if no changes are required. Enter the required address in the Node entry box and press the OK softkey OK to start the addressing process.
8. The status line indicates that addressing is in progress and briefly displays a message:

   - - Addressing Load Cell - -

9. Once the load cell has been successfully assigned an address, a message will appear:

   Address Load Cell Complete

- If the node address entered by the user is an existing address already used by another load cell, the terminal will still complete the addressing as requested, but will resolve any conflicts by swapping the addresses between the cells.

10. Press the BACK softkey to return to the Load Cells View screen.
11. Repeat steps 5 – 10 to address another cell or press the BACK softkey to return to the setup menu tree.
12. To print the details shown on the Load Cells View screen, press the PRINT softkey.

- The SORT AND ADDRESS softkey causes the terminal to sort the cells automatically in ascending order of serial number, and assign node addresses in that order – i.e. the cell with the lowest serial number is assigned the lowest node address. This feature provides a simple one-step readdressing process, provided the load cells are positioned in the scale in ascending serial number order.

- To address a newly added cell into the network, simply press the NEW softkey from the Load Cells View Screen. Enter the cell's serial number and the required node address into the entry boxes shown in the Load Cell New screen (Figure 3-18) then press the OK softkey to complete the new cell addressing.

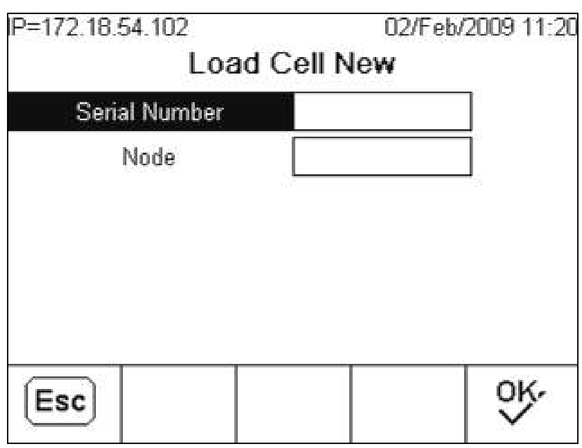


Figure 3-18: Manual Address Load Cell New Screen, PDX

3.5.1.2.4. Auto Address (POWERCELL MTX only; for POWERCELL PDX or PowerMount see next)

Use the auto address option to set the address of all the load cells automatically. Load cells must be found and addressed one by one. Follow this procedure:

- Note that for a new installation (multiple load cells to be addressed), POWERCELL MTX addresses must be reset to 240 before Auto Address is used. When only one or two load cells are replaced with new cells having the factory default address of 240, Manual Address may be used.
- Before beginning the auto address process, disconnect all load cells in the network from the IND780.

Figure 3-19 shows the sequence of operations in graphical form. In this flow chart, "load cell *n*" refers to the next load cell in sequence.

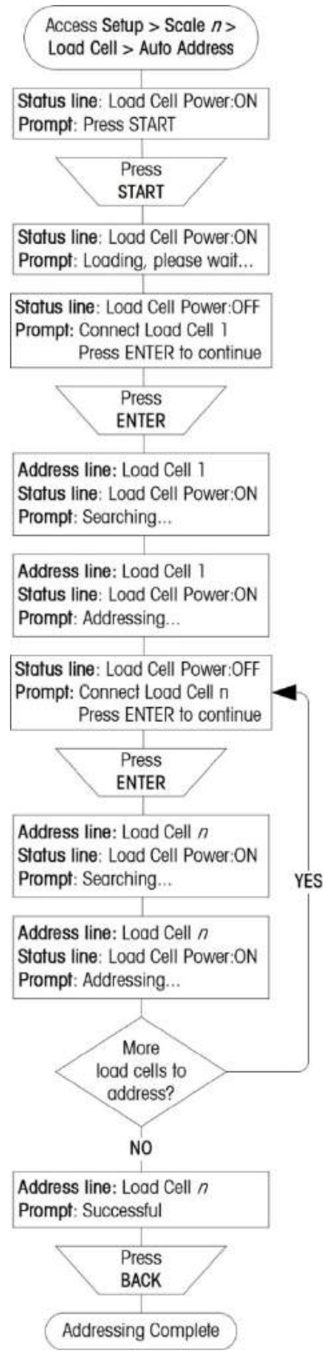


Figure 3-19: Automatic Load Cell Addressing Procedure

1. The initial screen indicates that load cell power is on, and prompts:

   Press START.

2. Press the START softkey to begin the process. The status line indicates that load cell power has been turned on, and a message appears briefly:

   Loading, please wait…

3. The IND780 turns off electrical power to the network, confirms this in the status line, and displays a prompt:

   Connect Load Cell 1
   Press ENTER to Continue

4. Connect the first POWERCELL MTX to the network and press ENTER. The address currently being assigned appears at the top of the screen:

   Load Cell 1

5. The terminal indicates that load cell power is on, and displays a message:

   Searching….

6. Once the terminal finds the load cell, the message changes to

   Addressing…

- Do not disconnect load cells that have already been addressed.

7. Once the cell is addressed, the terminal turns load cell power off and prompts for the next load cell to be connected:

   Connect Load Cell 2
   Press ENTER to Continue

8. Repeat steps 4 through 7 until all cells are addressed.
9. Once all load cells have been assigned addresses, a message will appear:

   Successful

10. Press the BACK softkey ↖ to return to the setup menu tree.

3.5.1.2.5. Auto Address (POWERCELL PDX and PowerMount Scales)

Use Auto Address to set the address of every load cell connected in a network automatically. Typically, this procedure is used when installing a new scale with load cells that have the factory default node address. Unlike the Manual Address procedure, when Auto Addressing it is not necessary to know the cell's serial number or where each cell is located on the scale prior to starting the addressing process.

To address the PDX cells automatically, follow this procedure:

1. The initial Auto Address Start screen prompts for an empty scale and displays the message (Figure 3-20):

   Empty Scale

   Press Start to discover load cells

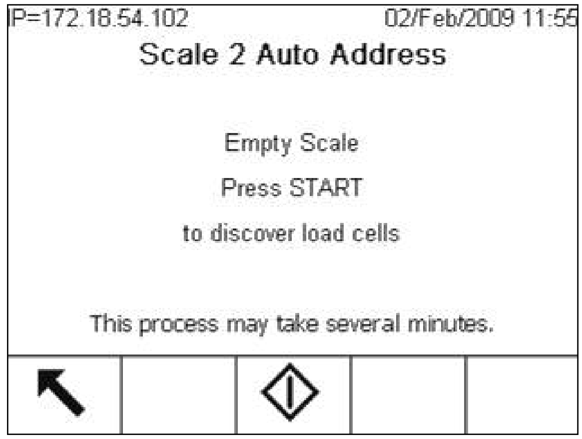


Figure 3-20: Auto Address Start Screen, PDX

2. Make sure all the PDX cells are connected to the network and the scale is empty. Press the START softkey to begin the process. This process will take several minutes as the terminal performs the load cells discovery process.
3. The status line indicates that the load cell discovery process has started, and a message appears:

   Discovering load cells…

   The addressing operation can be aborted by pressing the ABORT softkey during the discovery process.
4. Once the discovery process is completed, the IND780 will prompt:

   Place Test Load

   Load Cell 1

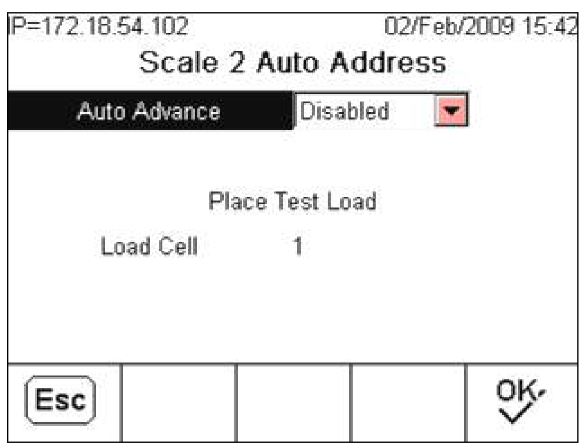


Figure 3-21: Auto Address Place Load Screen, PDX

5. Place a suitable amount of test weights over the cell that would be set with node address 1. Press the OK softkey to proceed or press the ESCAPE softkey to stop the procedure and return to the setup menu tree.

- For PDX cells, at least 400 kg or 882 lbs of test weight is required to perform this procedure.

6. After pressing the OK softkey, the status line indicates that addressing is in progress and briefly displays a message:

   - - Addressing Load Cell - -

   Load Cell 1

   If insufficient test weight is used, an error message will be displayed on the screen. Press ENTER to continue and add the correct test weight.

7. If the Auto Advance selection is **disabled** (default) and the load cell has been successfully set to node address 1, a prompt for the next load cell will appear:

   Place Test Load

   Load Cell 2

8. Move the test weights over to the cell that will be assigned node address 2, then press the OK softkey.

- If the Auto Advance selection is enabled, the Auto Address procedure will not require the user to press the OK softkey at each step to acknowledge the placement of the test weights on the cells. The terminal will automatically advance through each step by detecting the change in weight, and will only prompt the user to load or unload each cell in turn.

9. Repeat steps 6 through 8 until all cells are addressed for the scale.
10. Once all load cells have been assigned addresses, a message will appear:

    Complete

11. Press the BACK softkey to return to the setup menu tree.

3.5.1.2.6. Address All 240 (POWERCELL MTX only, not applicable for POWERCELL PDX or PowerMount)

This procedure resets the address of all connected POWERCELL MTX cells to 240.

1. The initial screen indicates that load cell power is on, and prompts:

   Press START.

2. Press the START softkey to begin the process.
3. The terminal indicates that load cell power has been turned off (**Load Cell Power:OFF**), and prompts:

   Connect All Load Cells
   Press ENTER to continue.

4. Connect all the load cells to be re-addressed, then press ENTER to start the process.
5. The IND780 will search through every address and display the message

   Searching…

6. The Load Cell number currently being searched appears toward the top of the screen:

   Load Cell 164

7. Depending on the number and current addresses of load cells attached, this process may take one or two minutes.
8. Once all load cells have been assigned address 240, a message will display:

   Successful

9. The process is now complete, and all connected load cells have the address 240. Press ENTER to return to the setup menu tree.

3.5.1.2.7. Shift Adjust

Small mismatches in mechanical and electronic gain of the load sensing paths can cause the same test weight to produce slightly different readings, depending on the location of the test weight on the scale. The IND780 permits two kinds of adjustment – by pairs, and by individual cells.

Adjustment by pairs ensures a constant reading from the scale regardless of where the load is placed on the long axis between pairs of cells – for instance, in vehicle weighing applications.

Adjustment by cells adds a factor to each load cell output to compensate for the slight differences between them. The scale will then output the same weight value regardless of the physical location of the weight on the scale.

- Shift Adjust is not available on a scale with only a single load cell configuration.

3.5.1.2.8. To adjust cells by pairs

Figure 3-22 shows the sequence of operations in graphical form.

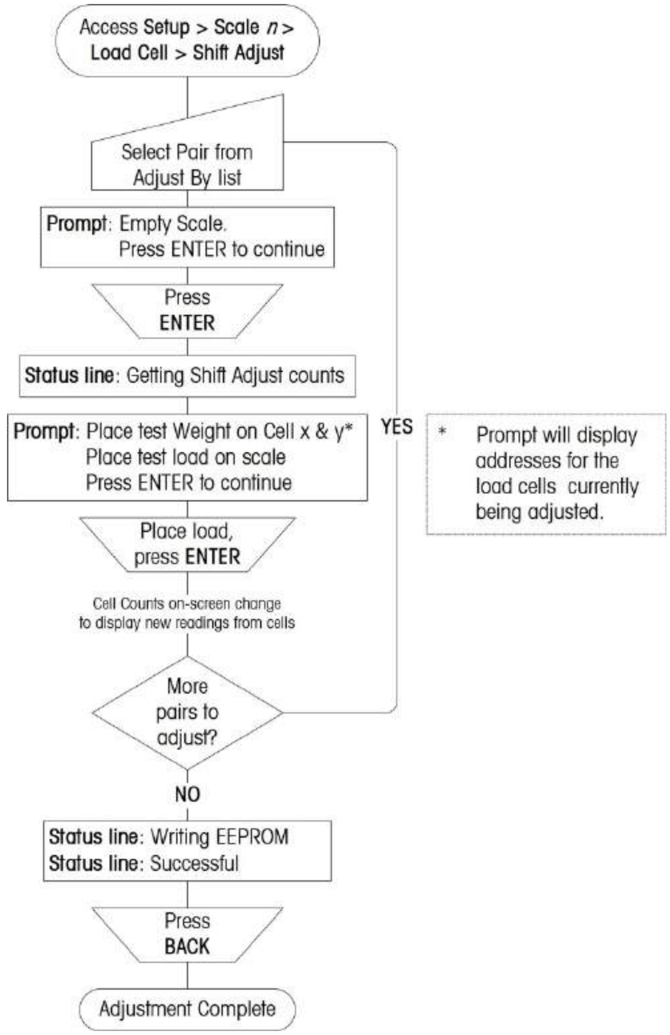


Figure 3-22: Procedure for adjusting cells by pairs

1. In the Adjust By list, select Pair.
2. The on-screen prompt reads

   Empty Scale
   Press ENTER to continue

3. Press Enter.
4. While the terminal is reading the zero point of each cell, the on-screen status line reads:

   Getting Shift Adjust Counts

5. The screen will then display two rows of cell counts, one for each of the pair of load cells. An on-screen prompt will appear:

Place test Weight on Cell 1 & 2 (or the addresses of the current cell pair)
Place test load on scale
Press ENTER to continue

6. Place a load at the center of the platform, then press ENTER.
7. An on-screen message will indicate that the terminal is getting shift adjust counts. The Cell Counts lines will change to reflect the new readings from the load cells, and then a prompt will appear:

   Place test Weight on Cell 3 & 4 (or the addresses of the next cell pair)
   Place test load on scale
   Press ENTER to continue

8. Press ENTER. Once again, the Cell Counts lines will change to reflect the new readings. This process will continue until all cell pairs have been adjusted, and then an on-screen message will appear:

   Writing EEPROM

9. Once the adjustments have been saved, the message will change to read:

   Successful

10. Press the BACK softkey ↖ to return to the setup menu tree.

The Adjust By Cell procedure follows the same sequence, but only one cell is read and adjusted at a time.

3.5.1.2.9. Shift Adjust Cell / Pair

This procedure allows you to quickly adjust the shift values for a single pair or cell when a single cell has been replaced on the scale. A complete shift adjust is more accurate and should be used if more than one POWERCELL or RAAD box is being replaced on the scale.

- Shift Adjust Cell/Pair is not available on a scale with only a single load cell configuration.

Based on the selection made in the **Shift Adjust > Shift By** settings, the terminal allows to perform an Adjust Cell or Adjust Pair procedure.

3.5.1.2.10. To adjust a specific cell (eg. Cell 1)

1. Select Adjust Cell 1 from the list and press the START softkey to begin.
2. The on-screen prompt reads

   Empty Scale
   Press ENTER to continue

3. Press Enter.
4. While the terminal is reading the zero point of each cell, the on-screen status line reads:

   Getting Shift Adjust Counts

5. The screen will then display Cell Counts 1. An on-screen prompt will appear (Figure 3-23):

Place test Weight on Cell 1
Place test load on scale
Press ENTER to continue

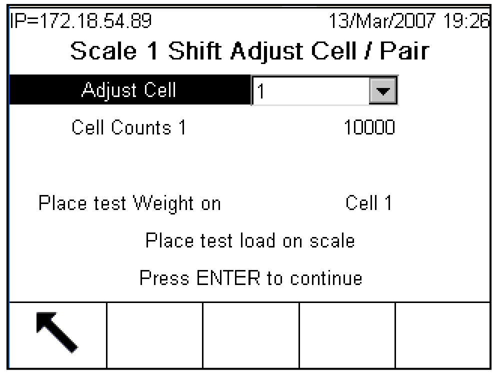


Figure 3-23: Shift Adjust Cell / Pair

6. Place a load over that load cell, and then press ENTER.
7. An on-screen message will indicate that the terminal is getting shift adjust counts. The Cell Counts lines will change to reflect the new readings from this load cell, and then a prompt will appear:

   Place test Weight on Cell 2 (or the address of the next cell)
   Place test load on scale
   Press ENTER to continue

8. Press ENTER. Once again, the Cell Counts lines will change to reflect the new readings of this cell and an on-screen message will indicate that the terminal is getting shift adjust counts. No other cells will need to be adjusted, and then an on-screen message will appear:

   Writing EEPROM

9. Once the adjustments have been saved, the message will change to read:

   Successful

10. Press the BACK softkey ↖ to return to the setup menu tree.
11. The Adjust Pair procedure follows the same sequence, but only two pairs are read and they are adjusted at a time.

- If the last addressed cell or pair on the scale is selected for Shift Adjust, the previous cell or pair is read first prior to the selected cell or pair.

3.5.1.3. Capacity and Increment

When IDNet scale bases are installed, the Capacity & Increment setup screen does not display, but is part of the Service Mode of the base.

Use the Capacity and Increment setup screen to select primary units, set the number of ranges or intervals, and over-capacity blanking.

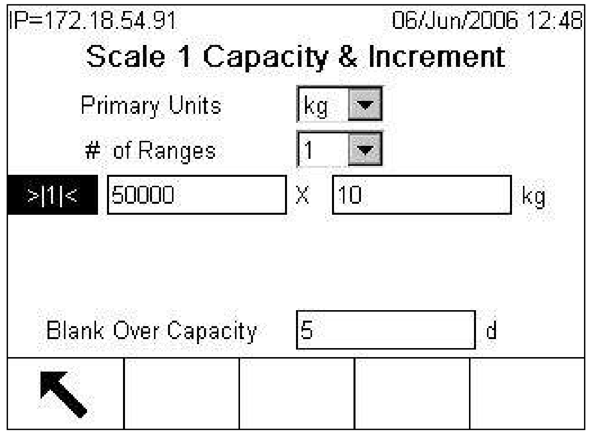


Figure 3-24: Capacity and Increment Setup Screen

3.5.1.3.1. Primary Units

Set the primary units from the selection box choices, which include:

- Pounds (lb)
- Grams (g)
- Tons (ton)
- Kilograms (kg)
- Tonnes (t)

If the scale type is SICS, the primary units are retrieved from the scale base, and are displayed but cannot be modified.

3.5.1.3.2. # of Ranges

The number of ranges settings are available for analog and POWERCELL bases only. Set the number of ranges from 1 to 3 in the selection box. Specify the capacity and increment size for each range.

For SICS scales, only one range is available (Figure 3-25). The capacity value is retrieved from the scale and displayed here. An increment size selection is provided for certain SICS scales like the WM/WMH modules that support this function. The increment size is set by selecting the number of decimal places. The selection range is from zero to four decimal places. The terminal will show an invalid value error message if the selection made is not accepted by the scale.

For other types of SICS scales that do not support this form of increment size selection over the SICS interface, the terminal will simply display the current scale increment size.

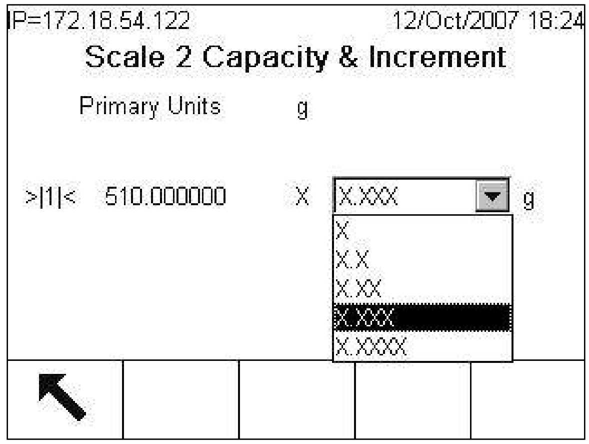


Figure 3-25: Capacity and Increment Setup Screen, SICS

3.5.1.3.3. Blank Over Capacity

Over capacity blanking is available for analog and POWERCELL bases. Blanking of the display is used to indicate an over-capacity condition. Set the blank over capacity for the divisions (d) (display increments) that the terminal is permitted to go over capacity. For example, if capacity is set at 500 kg by 0.1 kg increments and the blank over capacity setting is 5 d, the terminal can display weights up to 500.5 kg. At weights over 500.5 kg, carets (^^^^^) will display instead of a weight.

Over-capacity blanking for a SICS scale is not configurable in the terminal. The terminal simply reports the scale's over-capacity status.

3.5.1.4. Calibration

The Calibration screen enables entry of a Geo code adjustment value, the base serial number, calibration units, linearity adjustment, and analog gain jumper setting. For SICS scales, the options are as shown in Figure 3-27.

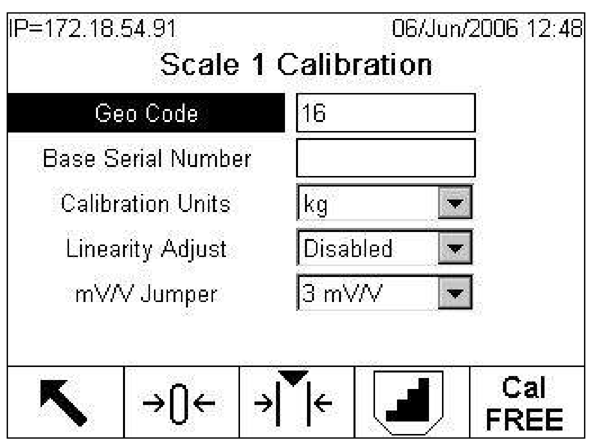


Figure 3-26: Calibration Screen, Analog

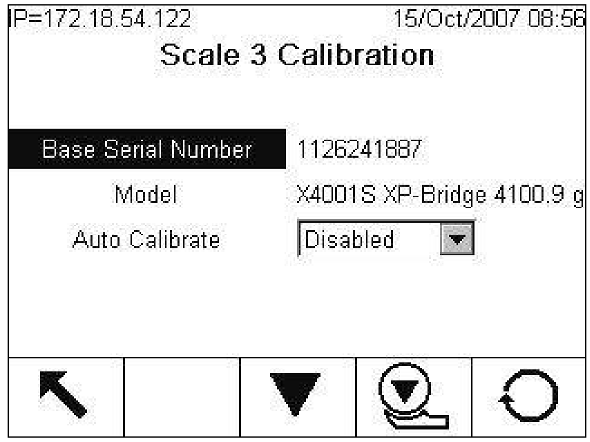


Figure 3-27: Calibration Screen, SICS

3.5.1.4.1. Geo Code

Enter the Geo code of the gravity adjustment value appropriate for the current geographical location. Geo codes are numbered 0–31. (Refer to Appendix F.)

The Geo code field does not display when the IDNet and SICS scale bases are used.

3.5.1.4.2. Base Serial Number

Enter the scale base serial number in this field. Up to 14 characters may be entered. The base serial number for a SICS scale is retrieved directly from the scale, and cannot be configured in the terminal.

3.5.1.4.3. Model

Model is displayed for SICS scales only. The scale model connected to the terminal is retrieved directly from the scale, and shown in this field.

3.5.1.4.4. Calibration Units

The Calibration Units setting is available for analog and POWERCELL load cells only. The calibration units selected must be either the primary or secondary units of the channel being calibrated. Units listed in the selection box are the same as the primary unit selections.

- If the calibration units selection is changed, a full calibration, including capture zero and capture span, is required for proper weight performance.

- Pounds (lb)
- Kilograms (kg)
- Tonnes (t)
- Tons (ton)
- Grams

3.5.1.4.5. Linearity Adjust

The Linearity Adjustment setting is available for analog and POWERCELL load cells only. Select the linearity adjustment from the selection box. Selections are as follows:

- Disabled – Use only zero and highpoint
- 3 point – Use zero, midpoint, and highpoint
- 4 point – Use zero, lowpoint, midpoint, and highpoint

- 5 point – Use zero, lowpoint, midpoint, mid-highpoint, and highpoint

3.5.1.4.6. Analog Gain Jumper

The Analog Gain Jumper Setting is available for analog load cells only. The analog gain jumper setting on the Main PCB can be either 2 mv/V or 3 mv/V. The terminal is shipped from the factory in the 3 mv/V setting. In order for the CalFree™ feature to operate properly, this parameter must indicate the position of the jumper on the Main board. The jumper settings are:

- 2 mv/V – Jumper installed on both pins
- 3 mv/V – Jumper removed

3.5.1.4.7. Auto Calibrate

The Auto Calibrate setting is only provided for certain SICS scale bases (eg. Excellence balances) that support the 'C0' SICS command for fully automatic calibration. When this is set to enabled, the SICS scale will automatically perform an internal weight calibration when considerable changes in the ambient condition are detected. These conditions are defined separately in the scale base. When this setting is disabled, automatic calibration is turned off.

3.5.1.4.8. Calibration Softkeys

The Calibration setup screen displays softkeys that can be used for calibration procedures, including:

→0←	Capture Zero
→|▼|←	Capture Span
	Step Calibration
Cal FREE	CalFree
Service Mode	Service Mode (IDNet scales)
	Internal Calibration (SICS scales)
▼	External Calibration (SICS scales)
	Initial Adjustment (SICS scales)
	Reset (SICS scales)

Capture Zero

The Capture Zero function in the Calibration setup screen is available for analog and POWERCELL bases only. The CAPTURE ZERO softkey →0← triggers an independent operation to reset the zero condition of the scale. A status message displays when this softkey is pressed that directs the user to empty the scale and press the START softkey ◊. The display indicates when the capture zero process is executing. When the operation is complete, a final status message displays that verifies the completion of the capture zero operation. Press the Exit softkey ↖ to return to the Calibration window.

- If motion is detected during the Capture Zero procedure, a screen appears (Figure 3-28) asking the operator whether to accept or reject the captured value. Press the OK softkey OK to accept the value, or ESC Esc to reject the value and return to the scale calibration screen.

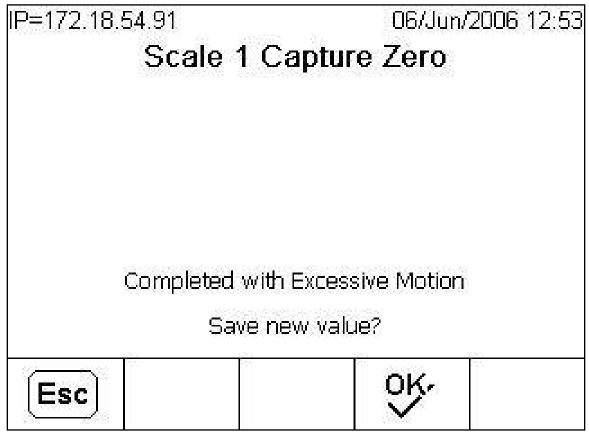


Figure 3-28: Motion While Capturing Zero

Capture Span

The Capture Span function in the Calibration setup is available for analog and POWERCELL bases only. The CAPTURE SPAN softkey initiates a sequence to capture span that can be performed independently of capturing zero.

Notes on Capturing Span in IND780

In the IND780, span capture is based on the number of counts above the number of captured zero counts. To capture a span successfully, the IND780 requires a minimum of **one internal count for each displayed increment**. For example:

Capacity and increment = 25,000 kg x 1 kg = 25,000 display increments

Total L/C output counts at captured Zero = 100,000 counts

Total L/C output counts required for successful *full* 25,000 kg span capture = 125,000 counts

- 125,000 counts is 25,000 counts greater than the captured zero counts

For calibrations using less than the full span, the IND780 requires a minimum of 1% of the counts that would define the full span. Thus, in a 25,000 kg x 1 kg scale setup, the following is true:

Capacity and increment = 25,000 kg x 1 kg

Total L/C output counts at captured Zero = 100,000 counts

Total L/C output counts required for *minimum* successful span capture = 100,250 counts

- The 250 count differential is 1% of the total 25,000 counts required for a full span capture
- These 250 counts equals a 250 kg test load in this scale setup

An additional test example is given below:

Capacity and increment = 5,000 kg x 0.5 kg = 10,000 display increments

Total L/C output counts at captured Zero = 100,142 counts

Total L/C output counts required for successful 5,000 kg span capture = 110,142 counts

Total L/C output counts required for minimum successful span capture = 110,242 counts

- This 100 count differential represents 1% of the total 10,000 counts required for a full span capture
- These 100 counts represent a minimum 50 kg test load

To capture span:

1. Press the CAPTURE SPAN softkey. The Capture Span setup screen displays.
2. Enter the weight for test load 1 and all other test loads if linearity has been enabled. Press the ENTER key. Once a value has been entered into the Test Load field, pressing START will use that value even if ENTER has not been pressed to exit the field. Once the operation is completed, the value used will be saved and will appear as the default value the next time the Capture Span screen is accessed. If the EXIT softkey is pressed without pressing START, the modified value will not be saved and the previous (existing) default will appear the next time the screen is accessed.

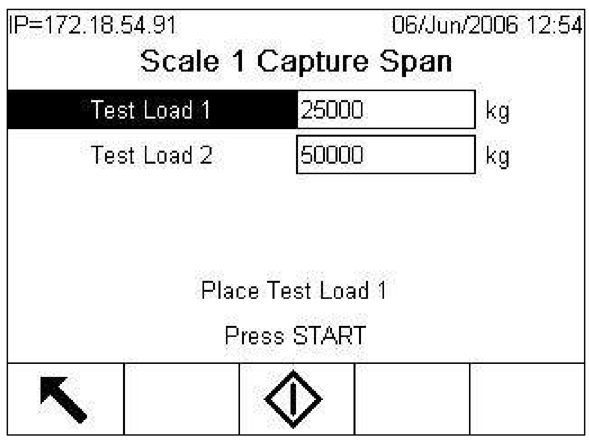


Figure 3-29: Capture Span Screen

3. Place test load weight 1 on the scale.
4. Press the START softkey. The status of the weight capture operation displays. When the operation is complete, a status message displays that verifies the completion of the weight capture.
5. After the first calibration step has completed, the menu will either display a prompt for the next calibration weight to be added (if 2, 3, or 4 test load steps are enabled by the linearity adjustment parameter) or will show a successful or failed calibration sequence.

- If motion is detected during the Capture Span procedure a screen appears, similar to the one shown in Figure 3-28. The operator can decide to use the captured value, or to abort the Capture Span operation and return to the scale calibration screen.

6. Repeat steps 3–4 for test loads 2, 3, and 4 if enabled by linearity adjustment.
7. If the capture span operation was successful, a verification message that reads "Capture Span OK" displays. If the capture span operation was not successful, an error message that reads "Calibration Failure" displays. If the calibration fails, repeat the capture span procedures. If the calibration continues to fail, contact a local METTLER TOLEDO representative for assistance.
8. Press the EXIT softkey to return to the Calibration screen.

Step Calibration

The Step Calibration function in the Calibration setup is available for analog and POWERCELL bases only. The STEP CALIBRATION softkey initiates a procedure that enables a "build-up" calibration for tanks and hoppers. For step calibration, the same amount of test weight is added for each step of the calibration procedure.

To perform a step calibration:

1. Press the STEP CALIBRATION softkey . The Step Calibration setup screen displays.
2. Enter the target weight for the test load (the same amount of test load weight is used in each step).

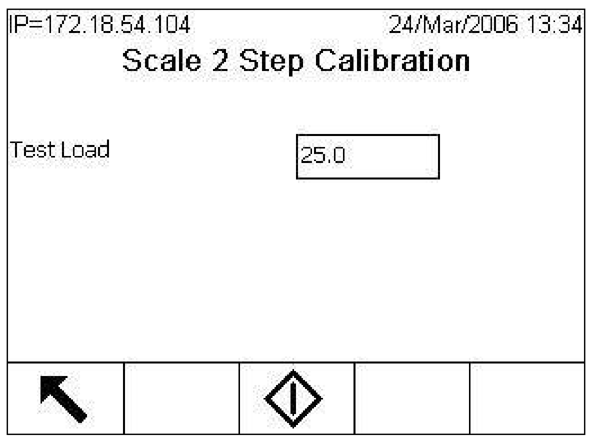


Figure 3-30: Step Calibration Setup Screen

3. Press the START softkey . The Step Calibration screen displays. This screen shows an active (live) weight display (using the current span factor), the intended target weight as entered on the previous screen, and the next step for the operator – "Place Test Load."

Figure 3-31: Step Calibration, First Step Prompt

4. Add test weight to the tank/hopper as prompted by the display. Each time test weight is added to the scale, the active display shows the weight.
5. When the full amount of test weight has been added, press the START softkey. The test load is captured, the span factors are saved, and the screen displays a message "Capture Span OK." During the time the weight is captured and the new span factor is being calculated, the display "Place Test Load" changes to "Capturing Test Load…" The display then changes to the next prompt "Remove Test Load Fill to Target."

Figure 3-32: Step Calibration, First Step Complete

6. Remove the test weight. The active display returns to zero.
7. Fill the tank/hopper with a substitute material up to the target weight.
8. Press the START softkey. The target weight value recalculates to show the substitute material weight plus the test weight load. The display changes to the next prompt "Place Test Load."
9. Add test weight to the tank/hopper. The active display shows the weight.
10. Press the START softkey. If the actual weight does not equal the target, a new span factor calculates and the display changes to "Capturing span." The active weight display changes to match the target weight value. The display changes to the next prompt "Remove Test Load Fill to Target."

11. Remove the test weight. The active display returns to the previous weight that displayed for the last test load.
12. The appropriate number of calibration steps will depend on critical points in the scale's span – for example, representing fill points for multiple containers on a pallet. The IND780 will use the end points (lowest and highest values) and three intermediate points to calibrate the scale.
13. Press the EXIT softkey at the end of any step in the procedure to stop the Step Calibration process and return to the Calibration screen.

CalFree

The CalFree procedure is applicable for analog and POWERCELL PDX load cells only. The CALFree softkey Cal FREE provides access to the span calculation screen for precalibration of a scale without test weights.

- High-precision scale bases are precalibrated at the factory so this feature is not used.

To perform precalibration of span using CalFree:

1. Press the CALFree softkey Cal FREE. The CalFree screen displays.

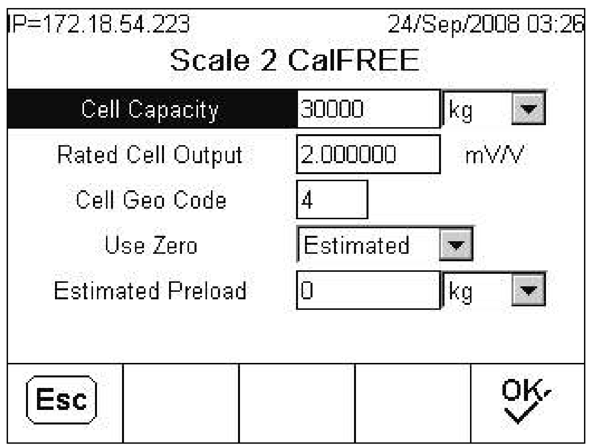


Figure 3-33: CalFree Screen, Analog

2. Enter the load cell capacity and rated load cell output values in the associated fields. These fields are present for analog load cells only.

- Be sure to enter the total load cell capacity in the field. For example, for a tank with (3) 5000 kg cells, the load cell capacity would be 3 x 5000 kg or 15000 kg.
- If multiple load cells are used, enter the average output of all cells.

3. Enter the load cell GEO value. Typically this value corresponds to the location where the cell was manufactured. This field is present for analog cells only.
4. Select either Estimated or Calibrated in the Use Zero selection box to require the terminal to use an estimated zero reference point or the zero reference point as captured with the normal zero calibration procedure.

- If a normal zero calibration procedure is performed after establishing CalFree, the terminal will automatically use the captured calibrated zero reference point instead.

5. If Estimated is selected, the Estimated Preload field will display. Enter an estimated preload value in the associated field. During calculation, the terminal tests for analog/digital (A/D) converter input saturation at full scale capacity. Estimated preload is included in this calculation if entered in this field. If the preload is unknown, leave this field as zero. The zero reference point can be captured using the normal zero calibration procedure.

- This preload value is also used to determine overload conditions. If the CalFree settings are not favorable to the A/D input saturation, an "Invalid Entry!" error message appears when an attempt is made to execute CalFree.

6. Press the OK softkey OK to execute CalFree. The span is calculated using the parameters entered.
7. If the calibration operation was successful, a message that reads "Please Wait" displays before the main Calibration screen reappears. If the calibration operation was not successful, an error message displays. If the precalibration fails, verify the settings and repeat the CalFree procedures. If the precalibration continues to fail, contact a local METTLER TOLEDO representative for assistance.
8. Press the ESCAPE softkey Esc to return to the Calibration screen.

Service Mode

Service Mode is available for IDNet bases only. This screen displays a single box that shows messages from the IDNet base up to 16 characters. When either the OK (Yes) or (No) softkeys are pressed, the terminal sends the respective response to the scale base and the next message to be displayed is transmitted back to the terminal from the base. This sequence remains constant during the complete service mode communication sequence. To view the exact sequence, refer to the Service Mode flow chart in the manufacturer's Service manual for the IDNet base in use. To view the exact sequence, refer to the Service Mode flow chart in the manufacturer's Service manual for the IDNet base in use. This information is provided in the Mettler Toledo Industrial Scales Handbook, at **Technical Data > Platforms > Bench and Floor > K-Line > Product Information > Service Mode**.

After the last communication from the scale base has been completed, the display returns to the Scale Type screen.

Internal Calibration

The Internal Calibration function in the Calibration setup is only available for certain SICS scale bases equipped with internal calibration weight (eg. Excellence, WM/WMH bases). The INTERNAL CALIBRATION softkey initiates an internal calibration sequence in the scale base, a process similar to using the 'C3' SICS command.

To perform Internal Calibration:

1. Press the INTERNAL CALIBRATION softkey . The Internal Calibration screen displays with a status message directing the user to empty the scale and to press the START softkey.

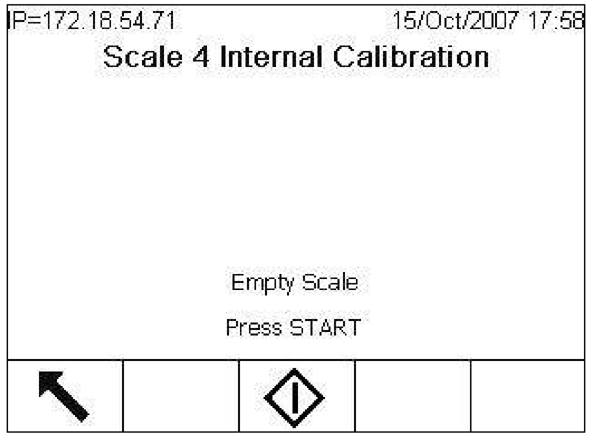


Figure 3-34: Internal Calibration Screen

2. Empty the scale and press the START softkey. A message "Calibrating…" displays, indicating the status of the calibration operation.
3. If the calibration operation was successful, a verification message that reads "Calibration OK" displays. If the operation was not successful, an error message that reads "Calibration Failed" displays. If the calibration fails, repeat the procedures.

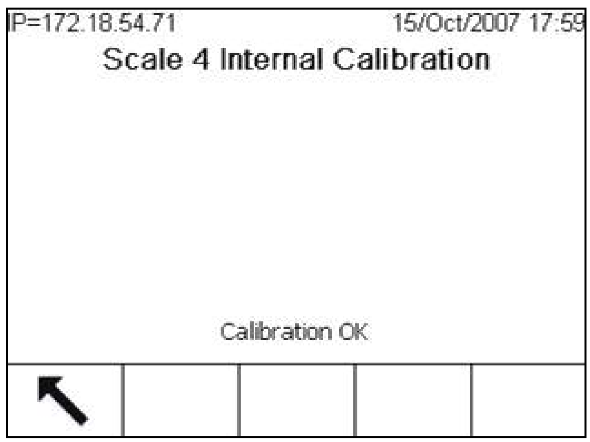


Figure 3-35: Internal Calibration OK Screen

4. Press the EXIT softkey to return to the Calibration screen.
   - If motion is detected during the calibration procedure, and stability cannot be achieved within the scale base's timeout period, the calibration operation will fail and has to be restarted. The timeout period depends on the type of SICS scale base.
   - The calibration operation can be aborted by pressing the ABORT softkey during the calibration sequence. This stops the procedure and returns to the scale calibration screen.

3.5.1.5. External Manual Calibration

The External Calibration function in the Calibration setup is only available for certain SICS scale bases (eg. Excellence, WM/WMH bases). The EXTERNAL CALIBRATION softkey initiates an external calibration sequence in the scale base, a process similar to using the 'C2' SICS command.

1. Press the EXTERNAL CALIBRATION softkey ▼. The External Calibration setup screen displays with a test load weight value and a status message directing the user to empty the scale and to press the START softkey.

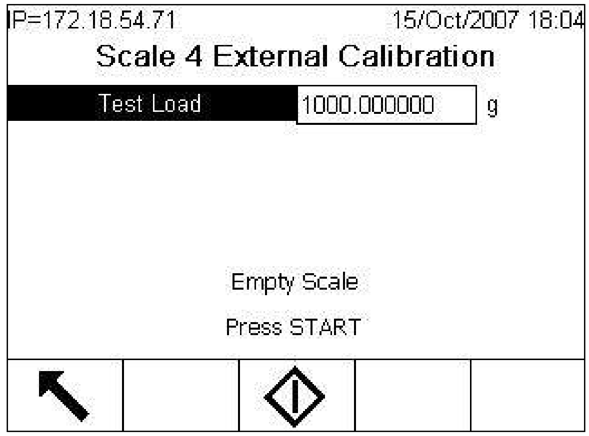


Figure 3-36: External Calibration Screen

2. For certain types of scale base, it is possible to enter the weight for test load. Once a value has been entered into the Test Load field, pressing START will use that value.
3. Empty the scale and press the START softkey. The status of the zero load capture operation displays.

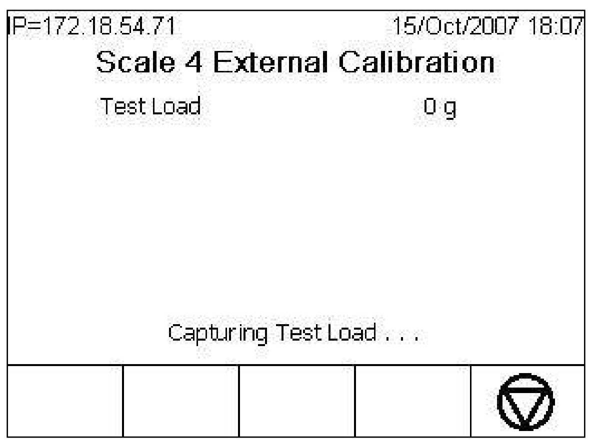


Figure 3-37: External Calibration, Capturing Zero Load

4. When the operation is completed successfully, a status message displays to prompt for the calibration test load to be placed next. If the zero load capture operation was not completed successfully, a "Calibration Failed" error message will be displayed.

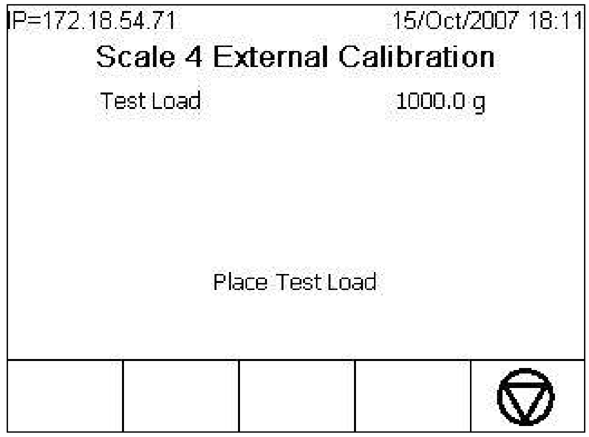


Figure 3-38: External Calibration, Place Test Load

5. Place the specified test load on the scale. The scale base will then attempt to capture span. If the capture load operation was successful, a message that reads "Empty Scale" displays. If the operation was not successful, an error message that reads "Calibration Failed" displays. If the load placed on the scale is not within the weight tolerance defined by the scale base, the calibration will fail.

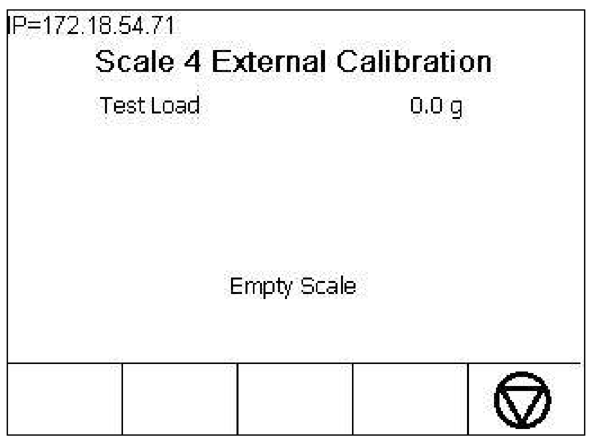


Figure 3-39: External Calibration, Empty Scale

6. As the final step in the calibration sequence, empty the scale when prompted. If the calibration operation was successful, a verification message that reads "Calibration OK" displays.
7. Press the EXIT softkey to return to the Calibration screen.

- If motion is detected during the calibration procedure, and stability cannot be achieved within the scale base's timeout period, the calibration operation will fail and must be restarted. The timeout period depends on the type of SICS scale base.
- The calibration operation can be aborted by pressing the ABORT softkey during the calibration sequence. This stops the procedure and returns to the scale calibration screen.

3.5.1.6. Initial Adjustment

The Initial Adjustment function in the Calibration setup is only available for certain SICS scale bases (eg. WM/WMH bases). An initial adjustment is a procedure that determines a new adjustment factor between the built-in weight used for internal calibration and an external test load. All internal calibration following this procedure will show the same weighing results as if the calibration were done with the external test load. Refer to the respective SICS scale technical manual for further details on this functionality. The INITIAL ADJUSTMENT softkey initiates an initial adjustment sequence in the scale base similarly to using the 'C4' SICS command.

3.5.1.6.1. To perform Initial Adjustment

1. Press the INITIAL ADJUSTMENT softkey . The Initial Adjustment setup screen displays, with a test load weight value and a status message directing the user to empty the scale and to press the START softkey.

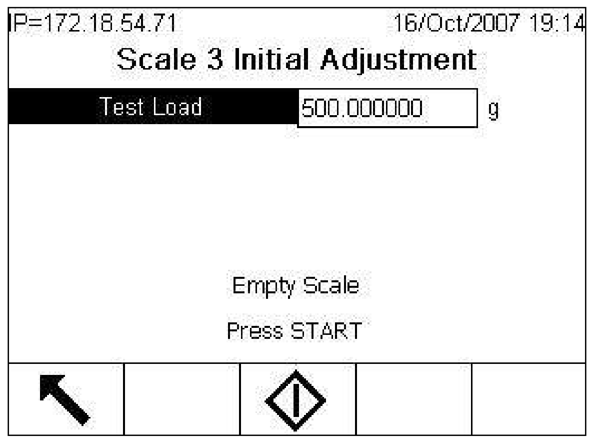


Figure 3-40: Initial Adjustment Screen

2. For certain types of scale bases, it is possible to enter the weight for test load. Once a value has been entered into the Test Load field, pressing START will use that value.
3. Empty the scale and press the START softkey . The status of the zero load capture operation displays.
4. When the operation is completed successfully, a status message displays to prompt for the test load to be placed next. If the zero load capture operation was not completed successfully, a "Calibration Failed" error message will be displayed.

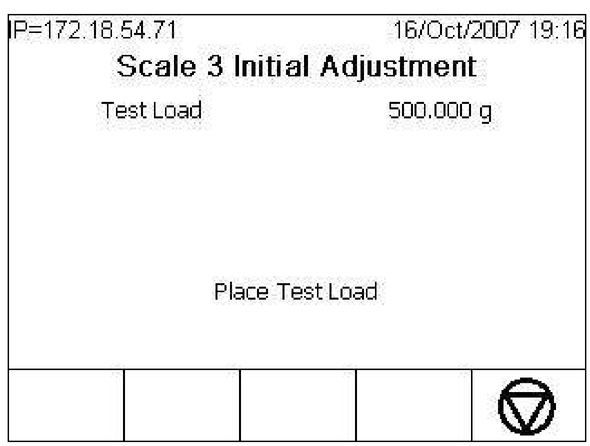


Figure 3-41: Initial Adjustment, Place Test Load

5. Place the specified test load on the scale. The scale base will then attempt to capture the test load weight. If the capture operation was successful, an "Empty Scale" instruction displays. If the operation was not successful, an error message that reads "Calibration Failed" appears. If the load placed on the scale is not within the weight tolerance defined by the scale base, the adjustment operation will fail.
6. As the final step in the adjustment sequence, empty the scale when prompted. If the adjustment operation was successful, a verification message that reads "Calibration OK" displays.
7. Press the EXIT softkey to return to the Calibration screen.

- If motion is detected during the adjustment procedure, and stability cannot be achieved within the scale base's timeout period, the adjustment operation will fail and has to be restarted. The timeout period depends on the type of SICS scale base.
- The adjustment operation can be aborted by pressing the ABORT softkey during the adjustment sequence. This stops the procedure and returns to the scale calibration screen.

3.5.1.7. Reset

The Reset function in the Calibration setup is only available for certain SICS scale bases (eg. Excellence, WM/WMH bases). Reset is a procedure that resets the SICS scale's internal settings to factory defaults, including calibration and adjustment settings. The RESET softkey initiates a reset to factory in the scale base similarly to using the 'FSET' or 'M38' SICS command.

3.5.1.7.1. To perform Reset:

1. Press the RESET softkey on the Calibration screen. The warning screen displays with a message requiring a confirmation to resetting of the scale and calibration settings.

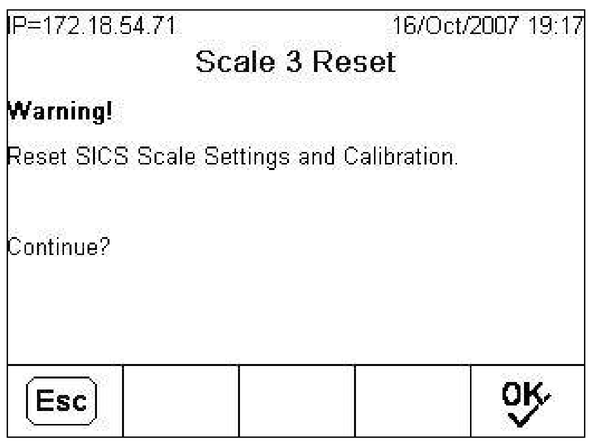


Figure 3-42: SICS Scale Reset Warning Screen

2. Press the OK softkey to proceed with the reset of the SICS scale, or the ESCAPE softkey Esc to return to the Calibration screen.

3. If the scale reset is initiated, upon completion the terminal will display a message that reads "Scale Reset OK" when the reset is successful. If the process fails, a "Scale Reset Failed" message is displayed.

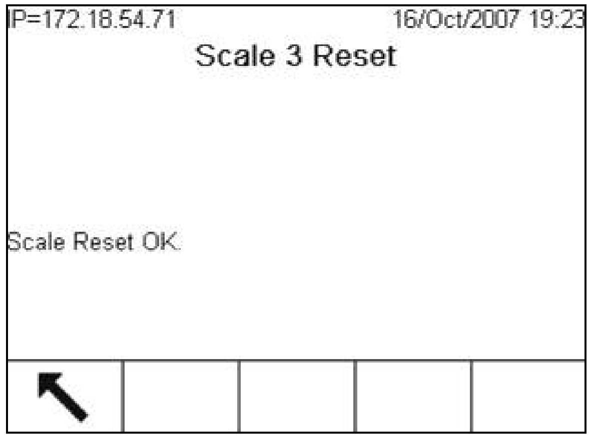


Figure 3-43: SICS Scale Reset, Reset OK

4. Press the EXIT softkey to return to the Calibration screen.

3.5.1.8. Zero

This section provides access to Auto Zero Maintenance (AZM) settings, under zero blanking, power-up zero, and pushbutton zero parameters.

3.5.1.8.1. AZM & Display

AZM is a means of tracking zero when the scale is empty. AZM compensates for conditions such as indicator or load cell drift or debris on a scale platform.

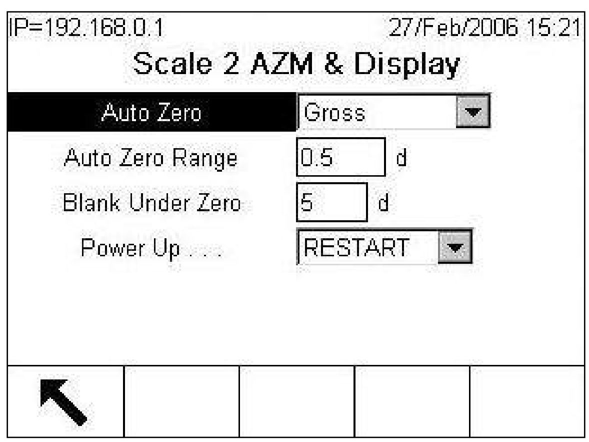


Figure 3-44: AZM and Display Screen

Auto Zero

Use the AZM & Display setup screen to enable auto zero for gross weighing or gross and net weighing, or to turn auto zero off. The Auto Zero function is not provided for SICS scale bases.

Auto Zero Range

- **Analog and POWERCELL load cells:** Set the auto zero range (0 - 9.9) for the number of divisions (d) around the current zero setting in which auto zero will operate.

- **IDNet load cells:** Either enable or disable the auto zero function.

Blank Under Zero

The Blank Under Zero function in the Zero setup is available for SICS scales, analog and POWERCELL load cells only. Blanking of the display is used to indicate an under-zero condition when the weight on the scale falls below the current zero reference. Set the under zero blanking for the number of divisions (d) that the terminal is permitted to go under zero before blanking.

- A value of 99 disables blank under zero and the terminal will display a weight as far under zero as possible given the factory limits of the load cell or scale base.

Power Up

The Power Up function is not provided for most SICS scale bases except WM/WMH types. A Power Up setting of Restart enables the terminal to save and reuse the last zero reference weight after a power cycle so it returns to the same gross weight value. If reset is selected, the last zero calibration value will be used as the zero reference point. Select either Reset or Restart from the Power Up selection box. Restart typically is selected when it is not possible to re-establish zero, as with tank scales that are usually filled with material.

3.5.1.9. Ranges

Use the settings on the Ranges screen to enable or disable Power Up Zero and Pushbutton Zero and to set the ranges around the original zero condition for the scale for applying these functions.

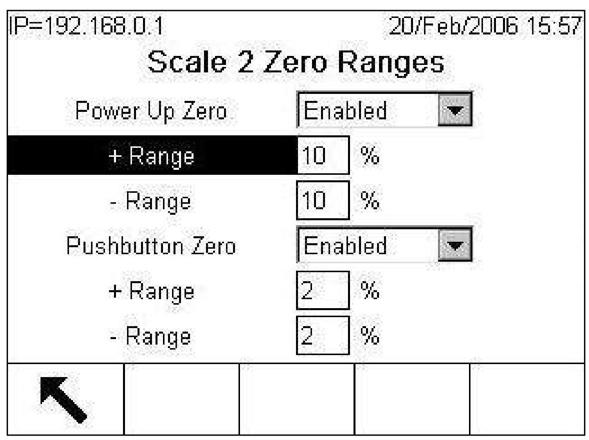


Figure 3-45: Ranges Screen

3.5.1.9.1. Power Up Zero

The Power Up Zero function in the Zero setup is available for certain SICS scale bases (e.g. WM/WMH bases),analog and powercell load cells only. If Power Up Zero is enabled, the terminal tries to capture zero upon power up.

Range

The Range setting for Power Up Zero is available for certain SICS scale bases (e.g. WM/WMH bases), analog load cells and POWERCELL bases only. If Power Up Zero is enabled, –Range and

+Range fields will display for setting the range around the original zero condition for the scale within which Power Up Zero can be applied. The range units are percent.

For example, if the +Range setting for Power Up Zero is set at 2%, Power Up Zero will only occur when the weight reading on the scale is at or below 2% of the original zero condition. If the –Range setting for pushbutton zero is set at 2%, Power Up Zero will only occur when the weight reading on the scale is at or above –2% of the original zero condition.

- If Power Up Zero capture is enabled and the weight on the scale is outside of the zero capture range, the display will indicate EEE until the weight is removed and zero is captured.

3.5.1.9.2. Pushbutton Zero

If Pushbutton Zero is enabled, the front panel ZERO pushbutton will operate to capture zero reference points.

Range

The Range setting for Pushbutton Zero is available for certain SICS scale bases (e.g. WM/WMH bases),analog and POWERCELL bases only. If Pushbutton Zero is enabled, –Range and +Range fields will display for setting the range around the original zero condition for the scale within which Pushbutton Zero can be applied. The range units are percent.

For example, if the +Range setting for Pushbutton Zero is set at 2%, the Pushbutton Zero can only be used when the weight reading on the scale is at or below 2% of the original zero condition. If the –Range setting for Pushbutton Zero is set at 2%, the Pushbutton Zero can only be used when the weight reading on the scale is at or above –2% of the original zero condition.

3.5.1.10. Tare

Tare is used to subtract the weight of an empty container from the gross weight on the scale to determine the net weight of the contents. Tare is inhibited if the scale remains in motion after the stability timeout period.

Three setup screens are available to configure tare:

- Tare Types
- Auto Tare
- Auto Clear

3.5.1.10.1. Tare Types

Use the Tare Types setup screen to enable or disable pushbutton tare, keyboard tare, net sign correction, and terminal tare (IDNet load cells and certain SICS scales only).

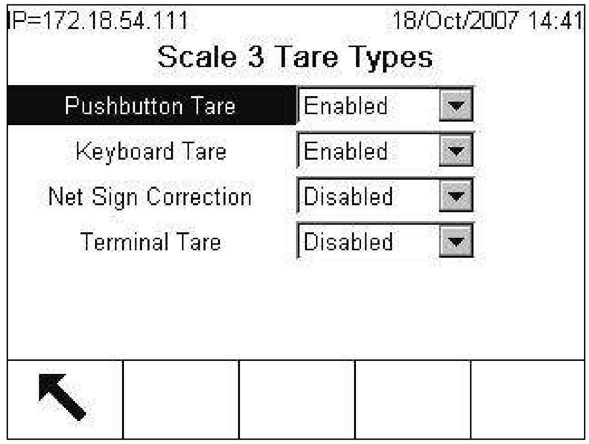


Figure 3-46: Tare Types Setup Screen

Pushbutton Tare

When pushbutton tare is enabled, the TARE scale function key →T← can be pressed when an empty container is on the scale to determine tare. The terminal displays a zero weight and net mode. When the container is loaded and placed back on the scale, the terminal displays the net weight of the contents.

Keyboard Tare

When keyboard tare is enabled, the known value for the empty weight of a container (tare) can be entered manually. The terminal will then display the net weight of the contents of the container. Keyboard tares are automatically rounded to the closest display division.

Net Sign Correction

Net sign correction enables the IND780 terminal to be used for both shipping (inbound empty) and receiving (inbound loaded) operations. If net sign correction is enabled, the terminal will switch the gross and tare weight fields on the printed ticket, if necessary, so that the larger weight is the gross weight, the smaller weight is the tare weight, and the difference is always a positive net weight. Net sign correction affects the printed data output, the recalled weigh display, and the displayed weight. Continuous data output will continue to show a negative net weight value. Table 3-3 provides a net sign correction example.

Table 3-3: Net Sign Correction Example

Data Output	Weight Displayed	Weight Printed
Gross weight	3510 lb	6408 lb G
Tare weight	6408 lb	3510 lb T
Net weight	–2898 lb	2898 lb N

Terminal Tare

The Terminal Tare field only displays for IDNet scale bases or certain SICS scale bases (e.g. Excellence and 4 Series bases). When terminal tare is enabled, tare and net weight values are calculated in the terminal and not in the high precision IDNet base or SICS scale. Terminal Tare should be disabled for approved (legal-for-trade) systems.

3.5.1.10.2. Auto Tare

Use the Auto Tare screen to enable or disable automatic tare and to set the tare and reset threshold weights, and enable or disable motion check.

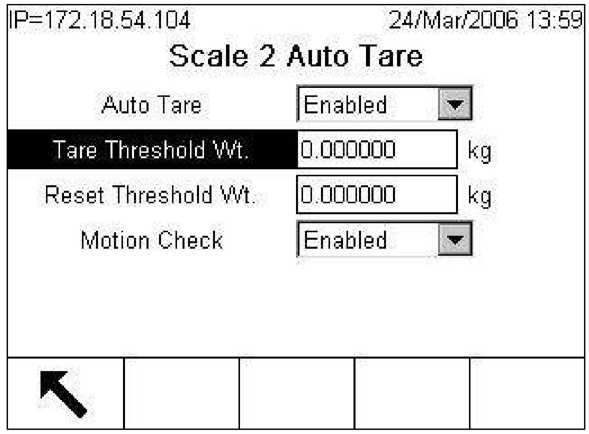


Figure 3-47: Scale 2 Auto Tare Screen

Auto Tare

When auto tare is enabled, the tare weight is taken automatically when a container above the threshold weight is on the scale and settles to no-motion.

Tare Threshold Wt.

When weight on the scale platform exceeds the tare threshold value and settles to no-motion, the terminal automatically tares.

Reset Threshold Weight

The reset threshold weight must be less than the tare threshold weight. When the weight on the scale platform falls below the reset threshold value, such as when a load has been removed, the terminal automatically resets the auto tare trigger, depending upon the programming of motion checking.

Motion Check

Enable the motion check setting to prevent auto tare reset rigger from occurring when the scale is in motion. When enabled, the scale must detect a non-motion condition below the reset value to reset the trigger.

3.5.1.10.3. Auto Clear

Use the Auto Clear screen to enable or disable auto clear tare, clear after print, to set the clear threshold weight, and enable or disable motion checking for auto clearing of tare.

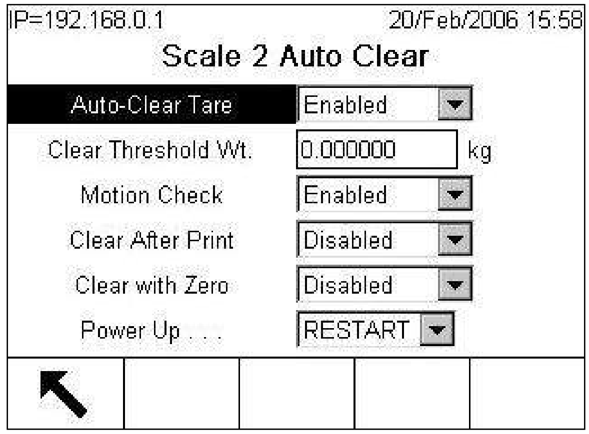


Figure 3-48: Auto Clear Screen

Auto-Clear Tare

To clear tare automatically when the scale returns to below the threshold weight, enable the auto clear tare setting.

Clear Threshold Wt.

When the gross scale weight exceeds then falls below the clear threshold weight value, the terminal automatically clears tare and returns to gross mode.

3.5.1.10.4. Motion Check

The Motion Check field displays only when Auto Clear Tare is enabled. Enable the motion check setting to prevent auto clear from occurring when the scale is in motion.

3.5.1.10.5. Clear After Print

The Clear After Print field displays only when Auto Clear Tare is enabled. To clear tare automatically after printing, enable the clear after print setting.

3.5.1.10.6. Clear With Zero

To clear tare automatically when capturing zero, enable the clear with zero setting.

3.5.1.10.7. Power Up

A Power Up setting of Restart enables the terminal to save and reuse the last tare weight after a power cycle. If Reset is selected, the terminal returns to gross mode upon power up and the last tare weight after the power cycle is cleared. Select either Restart or Reset from the Power Up selection box.

3.5.1.11. Units

This setup screen enables the selection of a secondary unit and power up units. If a secondary unit is selected, it may also be used as a calibration unit.

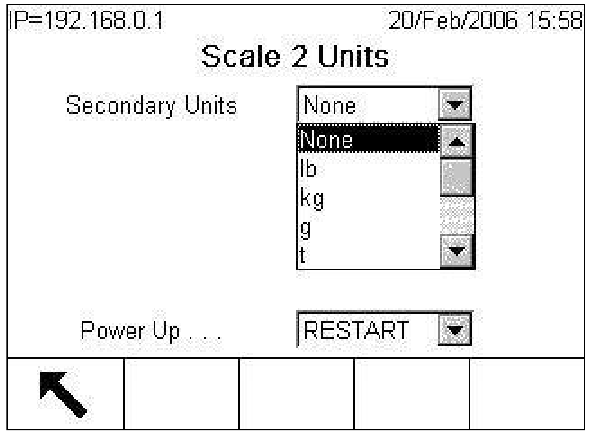


Figure 3-49: Units Setup Screen

3.5.1.11.1. Secondary Units

Use the Secondary Units selection box to select secondary weighing units, configure custom secondary units, or to select none. Only 1 custom unit is possible. For SICS scales, only the Custom unit is available.

Available weighing units are:

- Pounds (lb)
- Kilograms (kg)
- Grams (g)
- Tonnes (t)
- Tons (ton)
- Troy Ounces (ozt)
- Pennyweight (dwt)
- Ounces (oz)
- Custom

3.5.1.11.2. Power Up

Power up units defines the units the terminal defaults to after power up. Use the selection box to select either Primary Units or Restart, which makes the power up units those that were active when power was removed.

3.5.1.11.3. Custom Units

If Custom is selected for secondary units, 3 additional fields display for configuring custom units. The terminal displays the first 3 letters of the custom name in the units area of the display when custom units are in use.

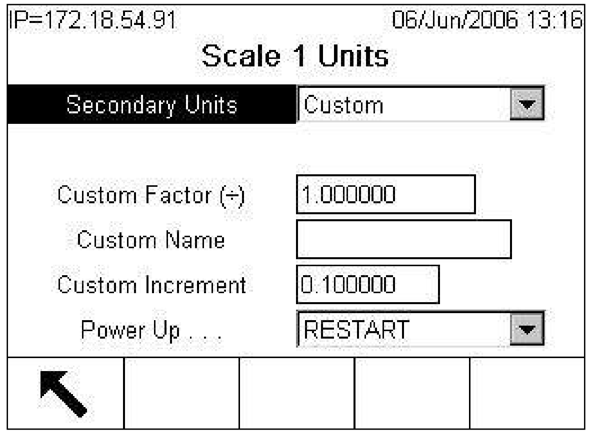


Figure 3-50: Custom Units Screen

Custom Factor

Enter a division factor for the custom unit in this field, such as 0.592 or 1.019. The primary unit is divided by the custom factor to obtain the custom value.

Custom Name

The softkeys turn into alpha keys when this field is selected. Use the alpha keys to enter the name for the custom unit. Up to 12 characters may be entered. A name that might be confused with a standard unit of measure should NOT be used (e.g. LB or lb or Lb all could be confused with a standard unit of measure).

Custom Increment

Enter a custom increment in this field, such as 0.1 or 0.5. This step controls both the decimal position and the increment size of the custom unit value.

3.5.1.12. Rate

Rate is the average of a measured value, usually gross weight, over time. Selections for Rate include Weight Units, Display Time Units, Measurement Period, and Output Average.

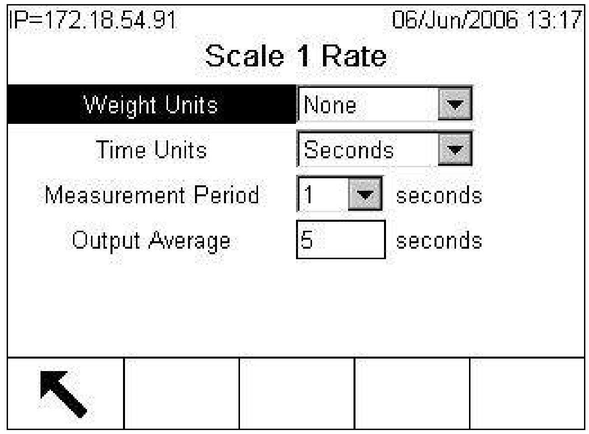


Figure 3-51: Rate Screen

3.5.1.12.1. Weight Units

Weight units for the Rate output include None, lb, kg, g, t, ton, ozt, dwt, oz and custom. The custom units selection is only available when Secondary Units are set to custom units in the Scale *n* > Units setup screen.

3.5.1.12.2. Time Units

- The displayed time units of measure for the Rate output include None, Second, Minute, and Hour. Rate calculation is disabled if Rate Time Units = "None".
- Press the ENTER key to move focus to the selection box and scroll using the arrow keys. Press ENTER again to select the value.

3.5.1.12.3. Measurement Period

The measurement period is the amount of time to collect (integrate) samples at the input filter. The Integration Period is always expressed in seconds.

- Press the ENTER key and scroll using the arrow keys. Press Enter again to select the value. Selections are: 1, 5, and 0.5.

3.5.1.12.4. Output Average

Output average the number of integration samples to use in a rolling average. The rate output period is unchanged. Output average is expressed as the time period over which to collect samples to average.

- Press ENTER and use the number key pad to enter in a number between 1 and 60.

3.5.1.13. Filter

The IND780 terminal has a low-pass, multi-pole noise filter that can be set for several conditions when using analog load cells. POWERCELL load cells include digital filtering, and do not usually require filtering in the terminal. If additional filtering is required for a POWERCELL system, 4 poles will usually be sufficient.

Note: The heavier the filtering, the slower the display settling time will be.

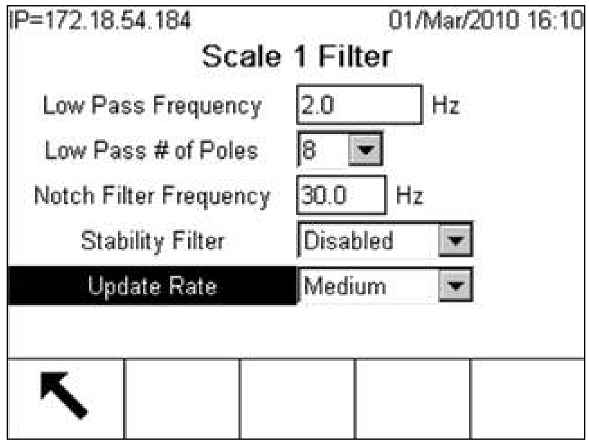


Figure 3-52: Filter Screen

3.5.1.13.1. Low Pass Frequency

Low pass frequency is the frequency above which all disturbances are filtered out. The lower the frequency, the better the disturbance rejection, but the longer the settling time required for the scale.

3.5.1.13.2. Low Pass # of Poles

The number of poles determines the slope of the filtering cutoff. For most applications, a slope value of 8 is acceptable; however, decreasing this number will improve settling time slightly.

3.5.1.13.3. Notch Filter Frequency

The notch filter setting is independent of the low pass frequency setting, but its principal function is to remove one specific frequency (noise source) below the low pass frequency. This enables a higher low pass filter setting, to filter out all but the single frequency the notch filter will handle. Since the low pass frequency is higher, settling time is faster.

Because a very high sampling rate must be available to make use of the notch filter, it is typically used with analog load cells. POWERCELL load cells transmit weight data digitally to the instrument at a slower rate, making use of the notch filter impractical.

Values from 0 (disabled) to 99 are possible.

3.5.1.13.4. Stability Filter

The stability filter works in conjunction with the standard low pass filter to provide a more stable final weight reading. The stability filter should only be used in transaction weighing applications, since the nonlinear action of the filter switching may cause inaccurate cutoffs in batching or filling applications. The stability filter can be enabled or disabled on this setup screen.

3.5.1.13.5. Update Rate

The update rate affects the continuous output rate of the serial port. Available settings are low, medium and high.

Values for serial port are determine the number of times a second the weight is sent from the port:

Low	5 Hz
Medium	10 Hz
High	20 Hz

Depending on the type of scale, the frequency at which weight data is recorded in the IND780's memory may also be affected by this setting:

Scale Type	Update Rates / Comments
Analog	Low 9 Hz Medium 19 Hz High 45 Hz
SICS	Low 9 Medium 19 High 38
IDNET	IDNET scales always run at their fastest rate. Older types ran at 6 Hz. A typical current value is 20 Hz.
POWERCELL MTX	Fixed update rate of 18.2 Hz
POWERCELL PDX	Not affected by this setting. POWERCELL PDX is controlled by the internal shared data memory variable, px0101. Refer to the Shared Data Reference manual for further information.

■ The continuous output cannot update faster than the scale itself. Therefore, a High setting for the serial port may be limited by the scale.

3.5.1.13.6. IDNet Filtering

Configuration for IDNet filtering parameters is performed on the Filter screen. Use the Vibration selection box to select a condition setting that reflects the specific location's conditions. Selections include:

- Ideal Conditions – The weighing platform operates very quickly, however it is very sensitive. This setting is suitable for a very calm and stable weighing location.
- Average Conditions – This is the factory default setting and is suitable for most normal environments.
- Extreme Conditions – The base reacts to changes in weight more slowly but is much more stable in unstable environments.

Use the Weighing Process selection box to select the specific weighing process in use. Selections include:

Fine Filling	Used when liquid or fine powders are being weighed

Universal Weighing For solid materials coarse filling or checkweighing

Static Weighing For solid materials and weighing under extreme conditions such as strong vibrations

Dynamic Weighing For weighing products in motion such as animals

3.5.1.13.7. SICS Scale Filtering

Configuration for SICS scale filtering parameters can be performed on the Filter screen for certain models of SICS scales (eg. Excellence and WM/WMH bases). Use the Weighing Mode selection box to select the specific weighing process in use. This function has similar parameters as given by the 'MO1' SICS command. Refer to the respective SICS scale technical manual for further details on this functionality. The Weighing Mode selections include:

MO1 Settings	Excellence Scale Base	WM/WMH Base
0	Universal Weighing	Universal Weighing (Weight control)
1	Dosing	Dispensing
2	Sensor Mode	Small Weights (only for WM bases)
3	Check Weighing	Custom

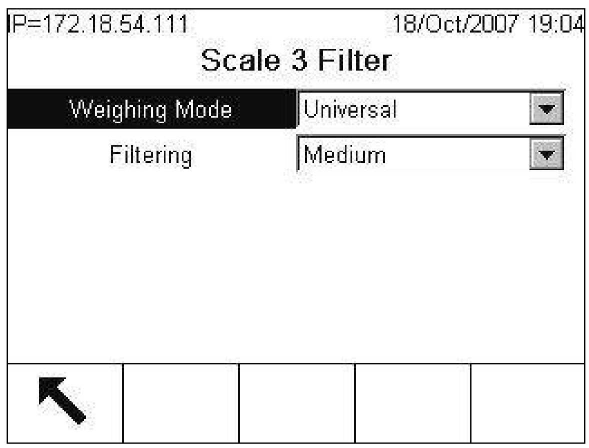


Figure 3-53: Filter Screen, SICS

Use the Filtering selection box to select a condition setting that reflects the specific location's conditions. This function has similar parameters as given by the 'MO2' SICS command. Selections include:

- **Very Light** – The weighing platform operates very quickly, but is very sensitive. This setting is suitable for a very calm and stable weighing location. This is only available for WM/WMH bases.
- **Light** – Filter suitable for conditions with only small disturbances.
- **Medium** – Filter suitable for most normal conditions with a medium attenuation for better reproducibility.
- **Heavy** – The base reacts to changes in weight more slowly but is much more stable in conditions with strong disturbances.

- **Very Heavy** – Filter suitable for conditions with very strong disturbances with the highest attenuation, for very good reproducibility. This is only available for WM/WMH bases.

If Weighing Mode is set for Custom in a WM/WMH base, then a Low Pass Frequency setting is available instead of the Filtering setting as shown in Figure 3-54. This setting represents the filter cutoff frequency. Values from 0.1 to 10 Hz are possible.

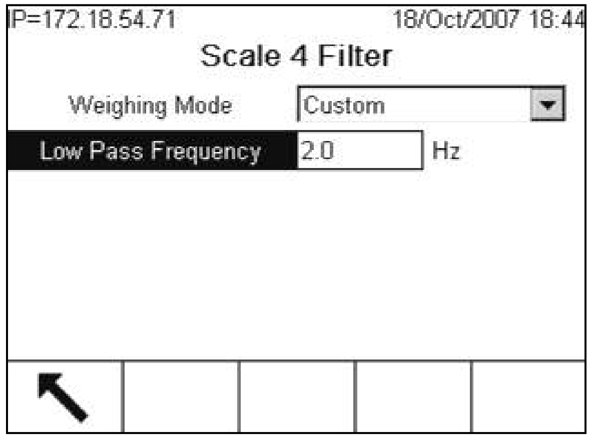


Figure 3-54: Filter Screen Custom Weighing Mode, SICS (WM/WMH)

3.5.1.14. Stability

The IND780 terminal includes a stability detector (weight in motion). The Stability setup screen enables setting a motion range, a no-motion interval and a stability timeout.

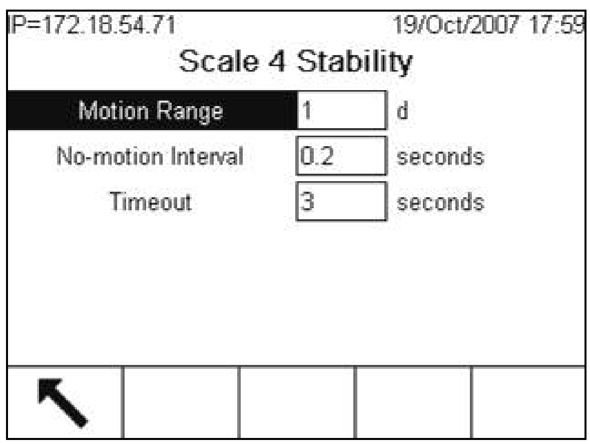


Figure 3-55: Stability Setup Screen

3.5.1.14.1. Motion Range

The Motion Range setting is available for WM/WMH SICS scales, analog load cells and POWERCELL bases only. Set the motion range to the weight value (in divisions) that the weight is permitted to fluctuate and still have a no-motion condition.

3.5.1.14.2. No-motion Interval

The No-motion Interval setting is available for WM/WMH SICS scales, analog load cells and POWERCELL bases only. The no motion interval defines the amount of time (seconds) that the scale weight must be within the motion range to have a no-motion condition.

3.5.1.14.3. Timeout

The Timeout setting defines the period (in seconds) after which the terminal stops attempting to perform a function that requires a no-motion condition (such as a zero, tare or print command) and aborts the function. This timeout is used regardless of the source of the command, such as the keypad, discrete input, PLC or serial input. Values from 0 to 99 are possible, the default value being 3. A smaller value means that less time will be spent checking for no-motion before the command is aborted.

3.5.1.14.4. IDNet Stability

When an IDNet (or DigiNet) scale is installed, a field labeled Stability appears in the Stability screen. Select 0 (disabled), 1 (fast display, good repeatability), 2 (slow display, better repeatability), 3 (slower display, better repeatability) or 4 (very slow display, best repeatability).

3.5.1.15. Log or Print

The Log or Print setup branch is where the thresholds to control how and when data is saved or output to a printer are defined. Normal demand mode printing occurs whenever a print request is made, providing there is no motion on the scale and zero has been captured (a negative gross weight will not be printed).

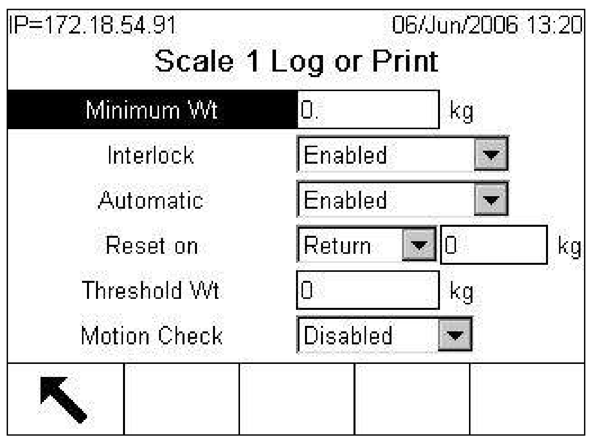


Figure 3-56: Log or Print Screen

The appearance of this screen depends on the Interlock and Automatic settings. Fields display as indicated in Table 3-4. Figure 3-56 shows the screen with all available options displayed.

Table 3-4: Log or Print Options Dependent on Settings

<table>
<tr><th>Interlock</th><th>Automatic</th><th>Fields Displayed</th></tr>
<tr><td>Disabled</td><td>Disabled</td><td>Minimum Wt, Interlock, Automatic</td></tr>
<tr><td>Enabled</td><td>Disabled</td><td>Minimum Wt, Interlock, Automatic, Reset on, Motion Check</td></tr>
<tr><td>Disabled</td><td>Enabled</td><td rowspan="2">Minimum Wt, Interlock, Automatic, Reset on, Threshold Wt, Motion Check</td></tr>
<tr><td>Enabled</td><td>Enabled</td></tr>
</table>

3.5.1.15.1. Minimum Weight

The minimum weight setting is the threshold below which log or print functions will not initiate. Primary units are displayed for this field.

3.5.1.15.2. Interlock

Interlock prevents repeat logging and printing. If enabled, interlock requires that the weight reading be reset per the Reset on parameter setting (see below) and then settle to a weight greater than the minimum print value before responding to the next log or print request.

3.5.1.15.3. Automatic

Enable the automatic setting to log data and send a print request every time the weight on the scale settles to a positive value that is larger than the minimum threshold weight value.

3.5.1.15.4. Reset on

The resetting of auto print can be based on weight threshold or weight deviation values. Select Return (the weight must return to below this value to reset) or Deviation (the weight must change more than this value to reset) from the selection box and enter the weight value in the "Reset on" field.

3.5.1.15.5. Threshold Weight

Enter the threshold weight value for automatic logging and printing of data in this field.

3.5.1.15.6. Motion Check

Enable the motion check setting to prevent interlock and automatic log and print functions from resetting when the scale is in motion beyond the Reset on point.

3.5.1.16. Sequential Number

The sequential number is a transaction number that the IND780 keeps separately for each scale. The setup screen includes 3 fields: Sequential Number, Number Reset, and Next Value.

You may enable or disable the sequential number function using the Sequential Number field. Enable or disable the number reset to reset the count. When a master reset is performed Sequential Number is changed to its default value, Disabled, and the number returns to zero. The COUNTER RESET softkey 123 can be assigned to the home screen, giving direct access to recall or reset the next sequential number value, provided the function is enabled in this screen.

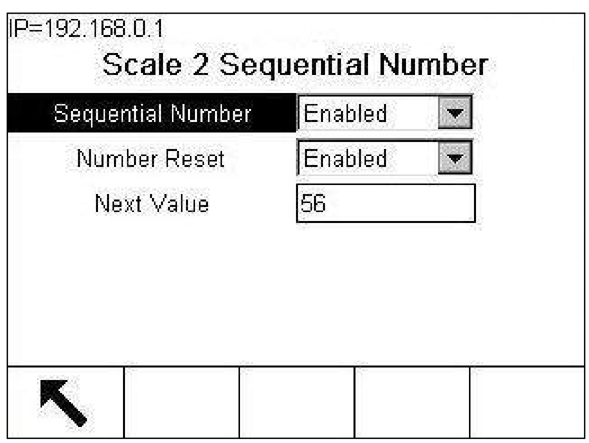


Figure 3-57: Sequential Number Screen

3.5.1.17. MinWeigh

Enable the MinWeigh function to compare the current net weight with a MinWeigh value.

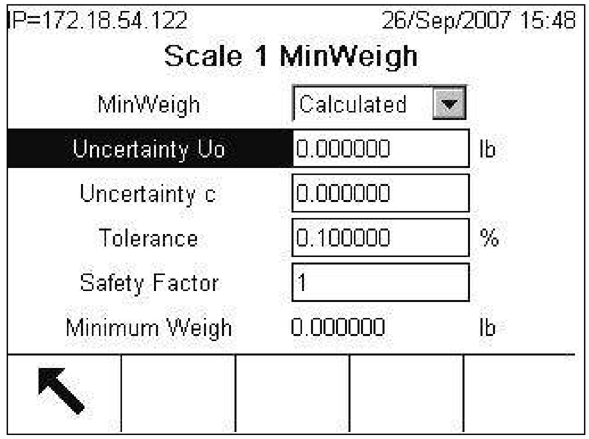


Figure 3-58: MinWeigh Screen

If the net weight is greater than or equal to the MinWeigh value, all terminal functions behave normally. If the absolute value of the net weight is less than the MinWeigh value, the MinWeigh symbol appears to the left of the weight display and the weight display appears in red. If it is desirable to allow the operator to manually edit the MinWeigh values, a softkey may be added to the selection screens.

If the user attempts to record the weight while in this condition, the printout includes an asterisk (*) immediately in front of the weight value.

3.5.1.17.1. MinWeigh

The MinWeigh value entry method can be either calculated by the IND780 or directly entered. The MinWeigh function can also be disabled.

Calculated

MinWeigh is composed of 4 factors, each determined independently:

$$\text{MinWeigh} = \frac{U_0 \times SF \times 100\%}{T - (c \times SF \times 100\%)}$$

Where:

U_0 = Uncertainty in measurement as the applied load approaches 0. U_0 is computed differently in each country and is entered in Primary units of measure.

T = Tolerance in percent, which reflects the tolerances required for the specific process and facility. The range is 0.1%–99.9%.

SF = Safety factor, which is another adjustment means. Usually SF = 1. The integer value range is 1–10.

c = Uncertainty factor related to the portion of uncertainty in measurement that is proportional to the applied load. For reference only, $c = (U_{MAX} - U_0) / Max$, where Max = maximum weighment and U_{MAX} = measurement uncertainty at maximum weight.

When calculated is selected, the user is prompted to enter the uncertainty U_0, c factor, tolerance percent, and safety factor in data entry boxes. The new MinWeigh value is then computed by the weighing equipment.

Direct Entry

For direct entry of a MinWeigh value, enter the desired value for MinWeigh directly into the MinWeigh data entry box. The MinWeigh value is entered in Primary units of measure.

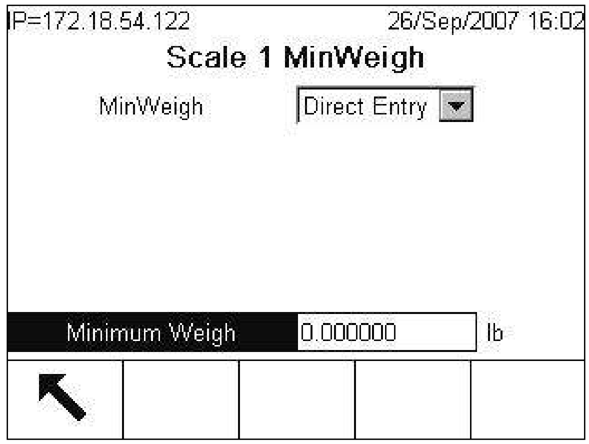


Figure 3-59: MinWeigh Screen

3.5.2. Sum Scale

The Sum Scale enables you to display the total of the values of selected scales.

3.5.2.1. Type

The Scale Type screen allows you to enable the sum scale, configure the scale Name, and view a selection list for Approval mode. You can choose which scales (1–4) to include in the sum. The EXIT softkey will return the display to the menu tree.

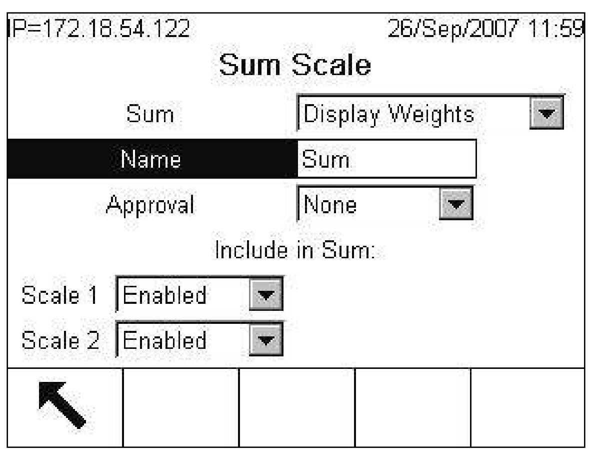


Figure 3-60: Sum Scale Screen

3.5.2.1.1. Sum

Enable the sum scale to show a summation of the scales connected to the indicator on the display. Fine Weights or Display Weights can be selected, to determine the summation method of the individual scale weights. Fine Weights provides an arithmetic summation based on the included scales' internal fine resolution weight values. Display Weights provides an arithmetic summation based on the included scales' displayed gross weight values.

3.5.2.1.2. Name

The Name field enables entry of the scale identification. Enter the scale name (an alphanumeric string of up to 20 characters) in the Name entry box.

3.5.2.1.3. Approval

Refer to the Approval Section under Scale 1-4.

3.5.2.1.4. Include in Sum

Select individually which of the 4 scales to include in the sum displayed on the indicator. Highlight which scale you would like to enable or disable using the arrow keys. Press enter and select either to enable or disable using the arrow keys. Press enter again to accept changes.

In general, the Sum Scale display behaves the same as the displays for the individual scales. If any scale included in the Sum Scale is over-capacity, both its display and the Sum Scale display will show "^^^^^^^". If any scale included in the Sum Scale is under range, the display will slow "v v v v v v".

However, if one scale included in the Sum Scale is over limit and another scale is below range, the respective scales will indicate this, and the Sum Scale display will show "----------", indicating an illegal value.

- Configuration and function of the following settings is exactly the same as for an individual scale. Options and values for these settings are described above.

3.5.2.2. Capacity and Increment

Refer to the Capacity & Increment section under Scale 1 – 4. The individual scale channels and Sum Scale do not have to have the same capacity and increment size. However, the units must be same.

3.5.2.3. Tare

Refer to the Tare section under Scale 1 – 4.

3.5.2.4. Units

Refer to the Units section under Scale 1 – 4.

3.5.2.5. Rate

Refer to the Rate section under Scale 1 – 4.

3.5.2.6. Log or Print

Refer to the Log or Print section under Scale 1 – 4.

3.5.2.7. Sequential Number

Refer to the Sequential Number section under Scale 1 – 4.

3.5.3. Reset

The Reset screen enables the scale setup values to be reset to factory default settings.

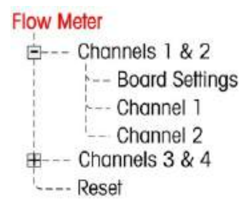
3.5.3.1. Scale Reset

To initiate a reset, select which scale (1-5, 5 representing settings under Sum Scale) to reset and press the OK softkey OK. If the reset was successful, a verification message that reads "Reset Successful" displays. If the reset was not successful, an error message that reads "Reset Failure" displays. If the reset fails, try to initiate the reset again. If the reset continues to fail, contact a local METTLER TOLEDO representative for assistance.

Press the ESCAPE softkey Esc to exit without resetting.

- Scale reset does NOT include the reset of scale type, approval, weight units, capacity, increment, or calibration data. This data is reset only by performing a Master Reset with switch S2 in its ON position.

3.5.4. Flow Meter



- If a flow meter is installed in the terminal, the Flow Meter branch will display in the setup menu tree.
- The Flow Meter option board counts pulses, and can be used with flow meters or any equipment that sends pulses.
- TaskExpert and C# applications for .Net can read the pulses counted by the Flow Meter option board directly.

3.5.4.1. Configuration Overview

- The Flow Meter Option Board hardware is described in Appendix A, **Installation**.

If the IND780 terminal is equipped with a Flow Meter Option Board (64068605), the Setup menu tree will display a new branch called "Flow Meter. Flow Meter Option board settings are configured here.

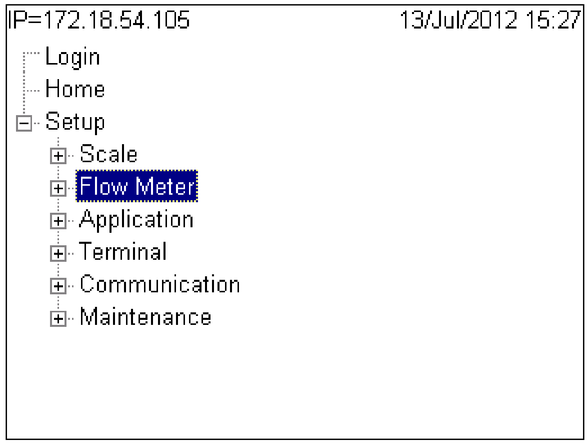


Figure 3-61: Flow Meter Branch in Setup Menu Tree

Press RIGHT arrow key to expand the tree and view the Channel Configuration branches.

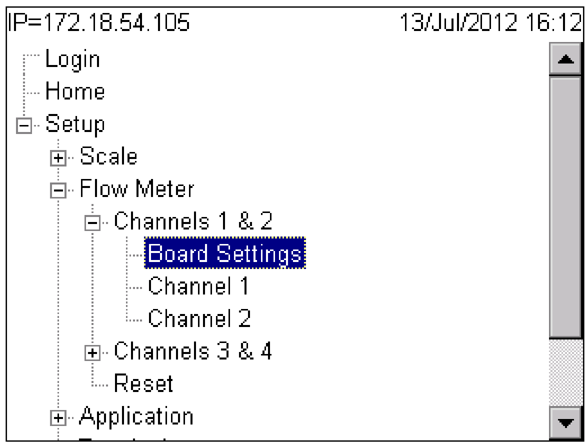


Figure 3-62: Board Settings Branch in Flow Meter Setup Menu

3.5.4.2. Board Settings

A Board Settings screen is shown in Figure 3-63.

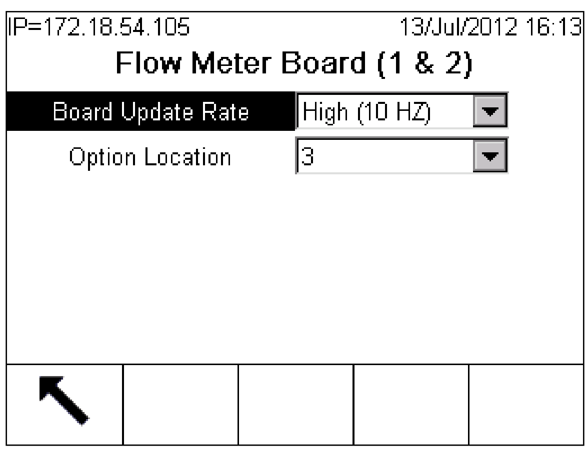


Figure 3-63: Flow Meter Board Settings Screen

Board Update Rate The name "Board Update Rate" can be confusing. It is **not** the update rate of the flow meter information; it is the **update rate of the IND780 LCD display**. The flow meter board can accept up to 50,000 pulses per second from the flow meter itself

Option Location Defines the Option card slot location where the Flow Meter Option board is installed in the IND780. In the example shown in Figure 3-63, the Flow Meter Option board for channels 1 & 2 is installed in slot 3. **Please Note: When this value is modified, as soon as the EXIT softkey is pressed, the terminal will restart to write the changes to its internal memory. This restart is normal.**

3.5.4.3. Channel 1 Configuration

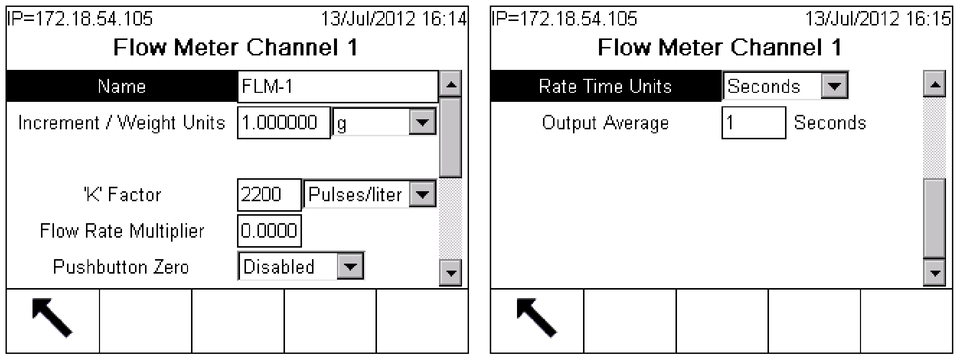


Figure 3-64: Flow Meter Channel Configuration Screen

Each flow meter board has two channels, and an IND780 terminal can be configured with any combination of scale and flow meter channels up to a maximum of four. If only one flow meter channel is used on a flow meter option board, it is only necessary to configure the channel in use.

3.5.4.3.1. Name

Enter a name to identify the Flow Meter channel.

3.5.4.3.2. Increment/Weight Units

Select the increments and units to be used by the flow meter card. Specify the required increment size just as for a scale. Take care with the selected size – just as one count per division is required in a scale base, the flow meter channel needs **at least one pulse per increment** to make the increment valid.

If too small an increment is selected, the IND780 will display a "Calibration Error" message. In the example below, an increment of 1g is correct, while 0.1g is not.

Example: Calculating a Valid Increment Value

The increment value can be calculated easily. The key is that the IND780 uses the density of water to calculate weight from liters. 1 liter of water weighs 1000g, and 1 gallon of water weighs 8.34 Lbs.

The increment size must be at least as large as the weight per unit of material divided by the number of pulses per unit:

$$\text{Increment} \geq \frac{\text{Weight per unit of water}}{}$$

$$\overline{\text{Pulses per unit}}$$

Knowing the weight of 1 liter of water, we can use the figure 2,200 pulses per liter from Figure 3-66 to calculate the required minimum increment size:

$$\frac{1{,}000 \text{ g/liter}}{2{,}200} = 0.45\text{g}$$

The increment size must be larger 0.45 g. Therefore, the 1.000000 g size shown In Figure 3-64 is an appropriate value.

Working in pounds, the calculation becomes

$$\frac{8.34 \text{ lb/gal}}{2{,}200} = 0.001 \text{ lb}$$

In this case, the increment must be larger than 0.001 lb.

Alternative Example: Calculating Pulses Per Increment

If the flow meter provides 2,200 pulses per liter, this can be understood as 2,200 pulses per 1,000g. To choose an increment size of 0.1g, solve the equation

$$\frac{2{,}200 \text{ pulses}}{1{,}000\text{g}} = \frac{x}{0.1 \text{ g}}$$

If 1,000g of water produces 2,200 pulses, the number of pulses produced by 0.1 g is easily calculated:

$$x = \frac{0.1 \times 2{,}200 \text{ pulses}}{1{,}000\text{g}} = .22 \text{ pulses per increment}$$

This increment cannot work, because there is **less than 1 pulse per increment**. A similar equation shows that 1g is a usable increment:

$$x = \frac{1.0 \times 2{,}200 \text{ pulses}}{1{,}000\text{g}} = 2.2 \text{ pulses per increment}$$

This increment value works because there is **at least** one pulse per increment.

Increment Units

The increment can be expressed as any of a number of units:

- **None** (disables the flow meter channel)
- **lb**
- **kg**
- **g**
- **oz**
- **t** (metric ton)
- **ton** (short ton)
- **Custom** (can be any unit not defined here, such as feet, meters, revolutions, etc.) Note that when a custom increment is selected, the K Factor (pulses per unit) will only display pulses/unit. Because the increment is a custom unit, the K Factor is now also a custom unit. When **Custom** is selected, an additional field will appear, allowing the name of the unit to be entered. This field

(Figure 3-65) is limited to 3 characters.

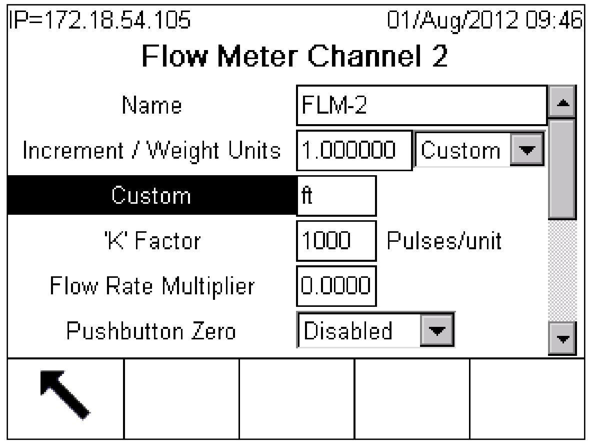


Figure 3-65: Flow Meter Channel Configuration Screen

3.5.4.3.3. 'K' Factor (Pulses Per Unit)

The **K Factor** specifies how many pulses from the flow meter will yield a certain volume or weight value. The K Factor value is always provided by the flow meter manufacturer on the flow meter data sheet. It is typically given in Pulses per Liter or Pulses per Gallon, but could also be in Pulses per gram, or some other weight unit. For every liter of material passing through the flow meter, the meter provides a fixed number of pulses. In the IND780 terminal, it is only necessary to enter the number of pulses and select pulses/liter. The terminal automatically calculates the equivalent weight of 1 liter of material. In this example the weight is in grams.

Figure 3-66 shows a chart from an Omega flow meter data sheet. It references the FTB2004 Flow Meter which gives 2200 pulses/liter. This chart was used to get the K Factor used in the examples used here.

Part Numbers	Flow Ranges				Pulses		
	Normal		Extended				Frequency
3/8″ NPT	GPM	LPM	GPM	LPM	Per Gallons	Per Liters	Output
FTB2001	.13-1.3	.5-5	.07-2.6	.25-10	26100	6900	58-575 Hz
FTB2002	.26-2.6	1-10	.07-2.6	.25-10	12500	3300	55-550 Hz
FTB2003	.26-4	1-15	.07-4	.25-15	17400	4600	76-1150 Hz
FTB2004	.26-4	1-15	.07-5.3	.25-20	8300	2200	37-550 Hz
FTB2005	.53-7.9	2-30	.13-7.9	.5-30	3800	1000	33-500 Hz

Figure 3-66: Example of K Factor Chart for a Flow Meter

Use the chart provided with your flow meter to find the correct factor. In this example, enter **2200** for the **K Factor** and then enter **Pulses/liter** for the unit. Options are Pulses/liter, Pulses/cc, Pulses/gal, Pulses/fl.oz, Pulses/lb, Pulses/kg, Pulses/g, and Pulses/oz. The IND780 will automatically calculate the correct weight value as the material is filled.

3.5.4.3.4. Flow Rate Multiplier

This parameter provides a means to adjust the flow meter's measurements for materials whose density is different from water's. Thus:

$$\text{Flow Rate Multiplier} = \frac{\text{Weight of water per unit volume}}{\text{Weight of material to be measured per unit volume}}$$

Note that, since the multiplier expresses a relationship between two values, it is the same regardless of unit of measure or increment.

If the material is water, set the Flow Rate Multiplier to"0.000" to disable the multiplier. If the material is not water, then the Flow Rate Multiplier provides a correction factor for the new material density.

- In most cases, it is not necessary to enable the multiplier, and its value can be left at 0.000.
- Some flow meters are calibrated on installation, and modify the pulse count per unit as required for the material being measured. In this case, the multiplier should be disabled (set to 0.000).

If the Flow Rate Multiplier is set to anything other than "0.000", it is enabled and the IND780 uses the multiplier in this equation:

$$\text{Pulses/g} = \frac{\text{2,200 pulses}}{\text{1 Liter}} \times \frac{\text{1 Liter}}{\text{1,000g}} \times \text{Flow Rate Multiplier}$$

3.5.4.3.5. Example: Calculating a Flow Rate Multiplier

This example shows how the Flow Rate Multiplier is used to adjust the flow meter to provide accurate measurements of a material with a different density from water:

If 1 liter of water = 1,000g

And 1 liter of isopropyl alcohol (IPA) = 785.4g

$$\text{then} \quad \text{Flow Rate Multiplier} = \frac{1{,}000}{785.4} = 1.27$$

Since we know that (in the flow meter shown in the examples above) 2.2 pulses represent one gram of water, to find the pulses per gram for IPA we must multiply 2.2 by 1.27:

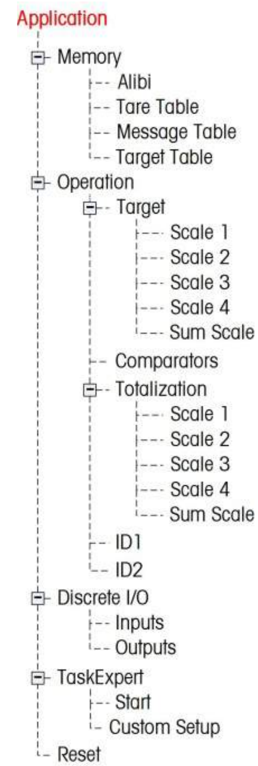
2.2 * 1.27 = 2.8 pulses per gram

3.5.4.3.6. Setting the Pulse Count to Zero

If **Pushbutton Zero** is enabled, the user can reset the pulse count to zero by pressing the ZERO key on the IND780. Otherwise, the IND780 will reset the pulse to zero at the start of the next feed for the selected flow meter.

The **Rate Time Units** should be set to "Seconds" and the **Output Average** should be "1".

3.6. Application



Use Application Setup screens to configure:

- Memory and tables
- Operation of targets, comparators, totalization and the ID function
- Discrete I/O
- TaskExpert

3.6.1. Memory

Memory Setup screens include:

- Alibi
- Tare Table
- Message Table
- Target Table

3.6.1.1. Alibi

The Alibi Memory can be enabled or disabled in the selection box. Alibi memory is configured as a "ring" buffer that overwrites the oldest record when it reaches its memory limit. Alibi memory can hold approximately 256,000 transactions before it reaches its limit and begins overwriting old transactions. More detailed information about Alibi memory can be found in Appendix C, **Table and Log File Structure**.

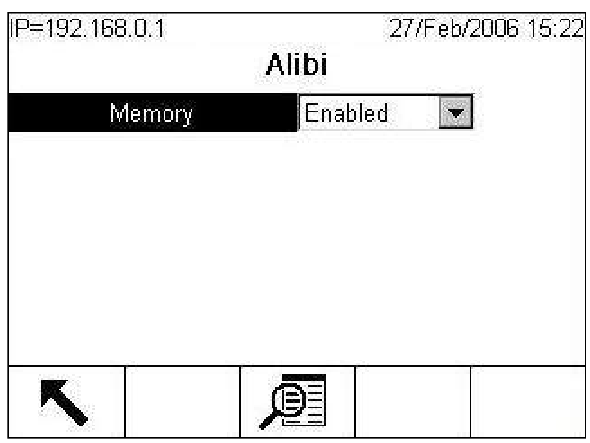


Figure 3-67: Alibi Memory Screen

The Alibi Memory table stores basic transaction information that is not user-definable. This information always includes:

- Date and time stamp
- Transaction counter value
- Gross, tare, and net weights and weight unit. The Alibi Memory may be searched and viewed by

accessing it from Setup, or by using the Reports of Alibi softkey.

- If the IND780 terminal has been configured as "approved", the Alibi Memory enabling or disabling is only accessible if the security switch (S1) is in the OFF position.

An Alibi Memory record is created by one of the following:

- Pressing the PRINT key
- An Automatic Print
- A Discrete Print input
- A PLC Print request

- Demand connection must be present, and a print to FILE connection programmed if a printer is not used.

3.6.1.2. Tare Table

The Tare Table displays stored tare records, including:

- Tare record ID
- Tare weight value and unit
- Description
- Total number of transactions using each stored tare record
- Total (accumulation of tare weights for each stored tare record)

More detailed information about the tare table memory can be found in Appendix C, Table and Log File Structure.

Use the Tare Table setup screen to configure totalization.

3.6.1.2.1. Totalization

Totalization is a field that tracks the total weight for all transactions involving each tare in the table. Use the Totalization selection box to select None, Displayed Weight, or Gross Weight for totals in the Tare Table structure.

Press the CLEAR softkey C to reset the table.

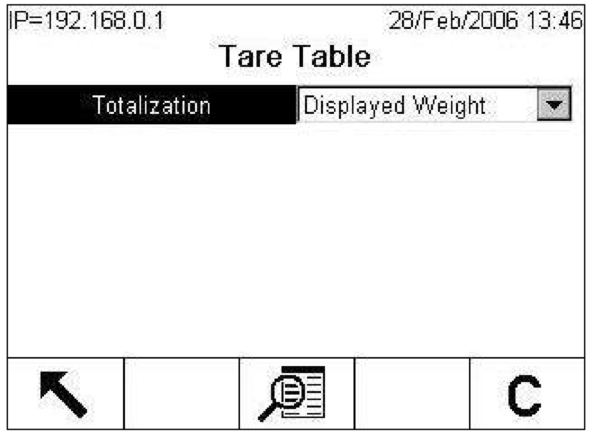


Figure 3-68: Tare Table Screen

To view Tare Table records:

1. Press the VIEW TABLE softkey. The Tare Table Search screen displays.

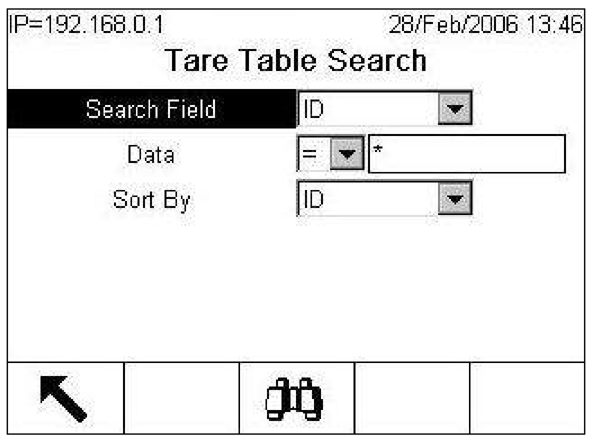


Figure 3-69: Tare Table Search Screen

2. Use the selection boxes and associated fields to enter specific search information to limit the search, or enter * (the "find all" character) to view all Tare Table information.
3. Press the START SEARCH softkey. The Tare Table Search View screen displays with the search results. Only records with non-null tare values display. Records are ordered by ID, with the lowest ID number shown first.
4. Press the UP, DOWN, LEFT, and RIGHT navigation keys to scroll up and down and across the screen in order to view all data and all records listed.

To modify or add Tare Table records:

1. Modification or addition of Tare Table records may only be done through Setup. Access the Tare Table from within the Application-Memory sub-block. A search of the table must be initiated to recall a record or set of records from memory.

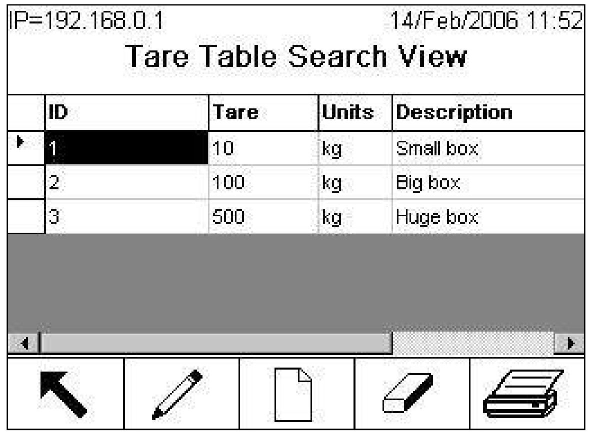


Figure 3-70: Tare Table Search View Screen

2. Press the UP and DOWN navigation keys to select (highlight) a record in the table.
3. Press the EDIT softkey to open the setup screen for editing a record (Figure 3-71) or press the NEW softkey to open the setup screen to create a new table record.

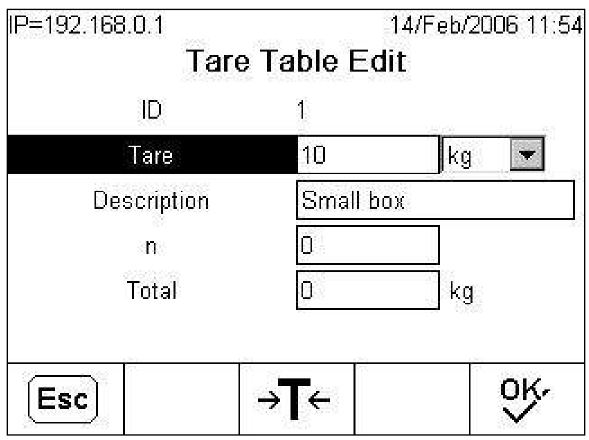


Figure 3-71: Tare Table Edit Screen

4. Press the UP and DOWN navigation keys to move the focus to the field name to be edited or inserted.
5. Press the ENTER key to select a field value to edit or insert. The alpha keys display for fields allowing an alphanumeric entry.
6. Use the alpha keys and the numeric keypad to edit or enter the desired value.

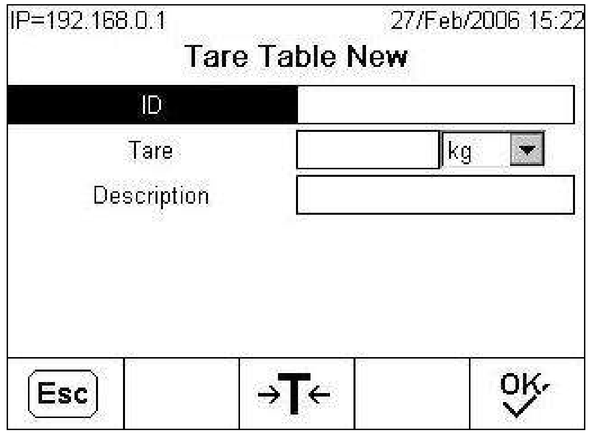


Figure 3-72: Tare Table New Screen

7. The ID can be an alphanumeric value. Note that using a number supports the quick access function without the need for an external keyboard.
8. Press the TARE softkey →T← to capture the current (scale in focus) live scale gross weight, as the value which will be displayed in the Tare field. Alternatively, use the numeric keypad to enter a value, then select the units to be stored.
9. Press the OK softkey to accept the modifications or additions to the Tare Table.
10. Press the ESCAPE softkey Esc to return to the Tare Table Search View screen without saving modifications or additions.
11. Press the DELETE softkey to delete a tare record in the list.
12. Press the PRINT softkey to print the list.
13. Press the EXIT softkey to return to the Tare Table Search Screen.

3.6.1.3. Message Table

The Message Table displays stored text messages and corresponding ID numbers that can be used to print templates. Only message records with non-null values display.

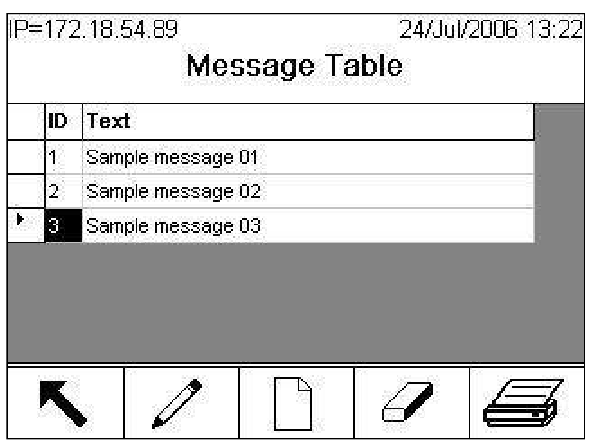


Figure 3-73: Message Table Search View Screen

Press the CLEAR softkey in the Message Table Search screen to clear the entire table.

3.6.1.3.1. To view Message Table records

1. Use the selection boxes and associated fields to enter specific search information to limit the search, or do not enter any search limits to view all Message Table information.

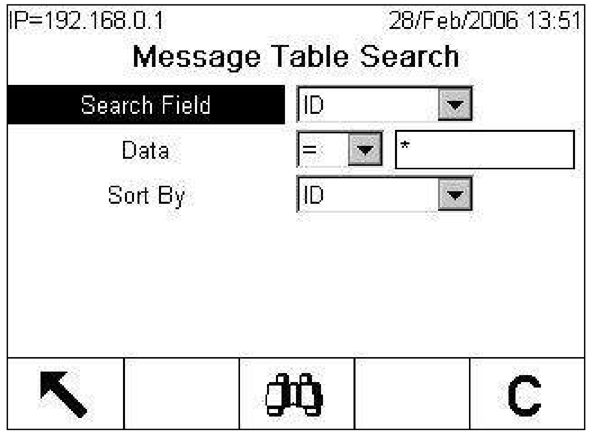


Figure 3-74: Message Table Search Screen

2. Press the START SEARCH softkey . The Message Table Search View screen displays with the search results. Records are ordered by ID, with the lowest ID number shown first.
3. Press the UP and DOWN navigation keys to scroll up and down the screen in order to view all data and all records listed.

   Modify or add Message Table information by editing, inserting, or deleting information as described previously under Tare Table.

4. Press the PRINT softkey to print the list.
5. Press the EXIT softkey to return to the Message Table Search Screen.

3.6.1.4. Target Table

Target comparison can be used in 2 types of applications: material transfer and over/under. Material transfer applications require that a control device deactivate when a target value is achieved. Over/Under applications classify a load placed on the scale platform as above or below the target value.

The IND780 compares target and tolerance values with either the gross or displayed weight from a specific scale channel. These values are stored in an active target record. The active target record can be entered directly, values recalled from the target table, or modified values originally sourced from one of the above.

Use the Target Table Setup screen to select the Mode, Tolerance Type, and Output Type for use in target comparison.

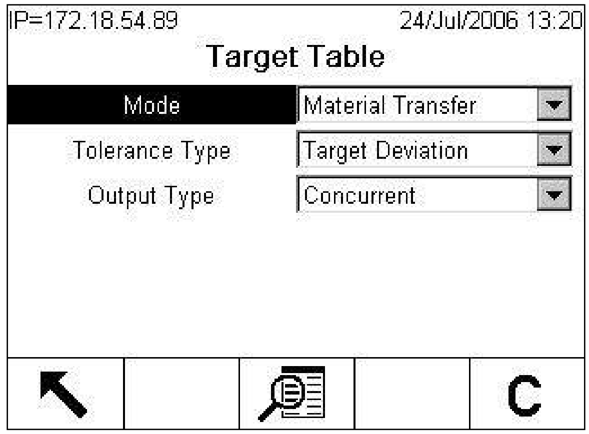


Figure 3-75: Target Table Setup Screen

More detailed information about the target table can be found in Appendix C, Table and Log File Structure.

3.6.1.4.1. Mode

Use the Mode selection box to select the type of application for target comparison. Selections include:

- None
- Material Transfer
- Over/Under

3.6.1.4.2. Tolerance Type

Use the Tolerance Type selection box to select the type of tolerance to be used for target comparison. Selections include:

- Target Deviation
- % of Target

Positive tolerance and negative tolerance values can be entered as a deviation weight value in the same units as the target (Target Deviation) or as a percent of the target value (% of Target).

When Over/Under mode is selected, a Weight Value choice is available as a Tolerance Type. In this mode, there is no target value used – only under limit and over limit values are used as zone edges for an acceptable weight.

3.6.1.4.3. Output Type

The Output Type field is available only when the Material Transfer mode is selected. Use the Output Type selection box to select the type of 2-speed output to be used in the target application. Selections include:

- Concurrent – Both outputs operate at the same time
- Independent – One output operates at a time (Fast Feed then Feed)

Press the CLEAR softkey  to reset the entire target table.

To view Target Table records:

1. Press the VIEW TABLE softkey. The Target Table Search screen displays.

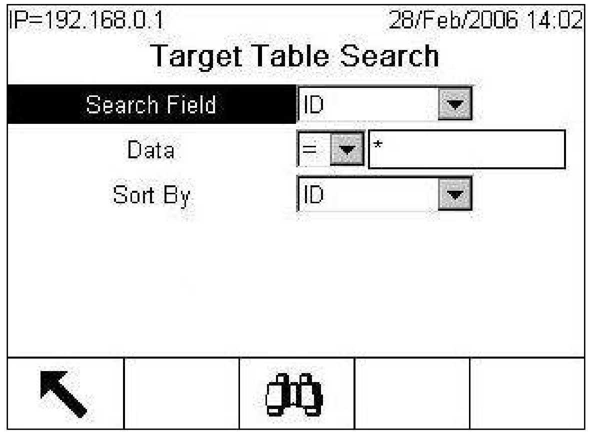


Figure 3-76: Target Table Search Screen

2. Use the selection boxes and associated fields to enter specific search information to limit the search, or do not enter any search limits to view all Target Table records.

- Search fields that display in the Search Field selection box vary depending on the selections made on the Target Table Setup screen.

3. Press the START SEARCH softkey. The Target Table Search View screen displays with the search results. Only records with non-null values display. Records are ordered by ID, with the lowest ID number shown first. Figure 3-77 shows a search view for the Over/Under mode with Target Deviation Tolerance Type.

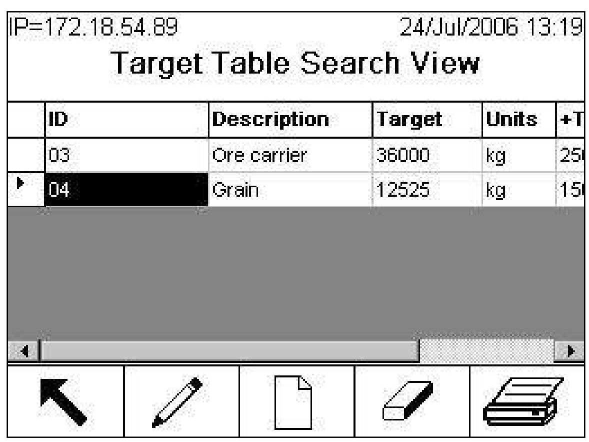


Figure 3-77: Target Table Search View, Over/Under

4. Press the UP, DOWN, LEFT, and RIGHT navigation keys to scroll up and down and across the screen in order to view all data and all records listed.

5. Target Table records include different information, depending on the selections made on the Target Table Setup screen. For example, Over Limit and Under Limit data displays only when the Over/Under mode is selected with Weight Value Tolerance Type.

Depending on the Mode and Tolerance Type selected, Target Table records can include the following fields.

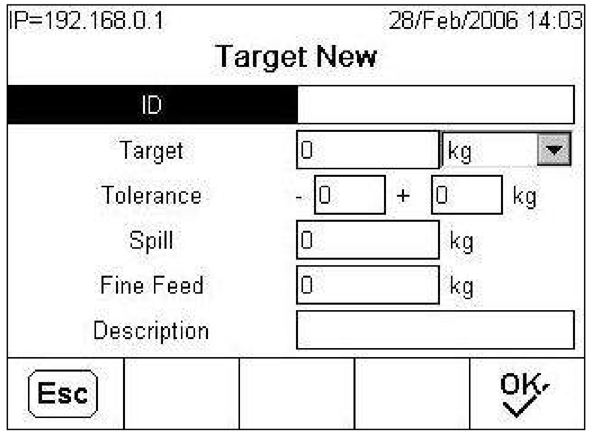


Figure 3-78: Target New Screen

- ID – Identification number for the active record
- Target
- Target – The desired measured value for a weighment
- Target Units – The units of measure for the target weight (units must be the same for the target and the comparison)
- Tolerance
- Positive Tolerance – The highest acceptable tolerance above a target value
- Negative Tolerance – The lowest acceptable tolerance below a target value
- Spill – The amount of material delivered after the control device is signaled to stop
- Fine Feed Value – For 2-speed applications, the Fine Feed value determines when the Fast Feed output turns off.
- Description – Descriptive identification for the active record

Modify or add Target Table information by editing, inserting, or deleting information as described previously under Tare Table.

Press the PRINT softkey to print the list.

Press the EXIT softkey to return to the Search Screen.

3.6.2. Operation

Operation Setup screens include:

- Target
- Comparators
- Totalization

- ID1 and ID2

3.6.2.1. Target

Expand the target branch in the menu tree to select which scale to configure. Press ENTER to enter setup. Use this setup screen to select which live measurement data stream (source) to use as input for target comparison and to enable or disable latching. The type of SmartTrac to display for the selected scale is also set here.

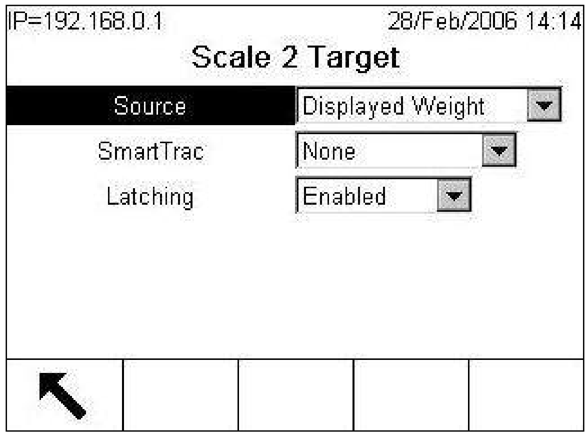


Figure 3-79: Target Setup Screen

3.6.2.1.1. Source

Select the type of source to use as input for target comparison in this setup screen. Selections include:

- Displayed Weight
- Gross Weight

3.6.2.1.2. SmartTrac

Select the type of SmartTrac graphic to display for the selected. Selections include:

- Bar Graph
- Cross Hairs
- Over/Under

3.6.2.1.3. Latching

If the Target Table mode selection is Material Transfer, output latching is provided. When output latching is enabled, the target comparison outputs remain latched (false) after the output switching threshold is exceeded until the latch is reset by a start input (softkey or discrete input).

If latching is disabled, the outputs will operate as coincidence-type outputs with no interlocks.

3.6.2.1.4. Motion Check

If the Target Table Mode is set to Over/Under, then the Scale Target screen will appear as shown in Figure 3-80. Motion Check is Disabled by default. When Motion Check is set to Enabled, the three discrete outputs – Over Zone, Tolerance-OK and Under Zone – will only turn on when there is no motion on the scale.

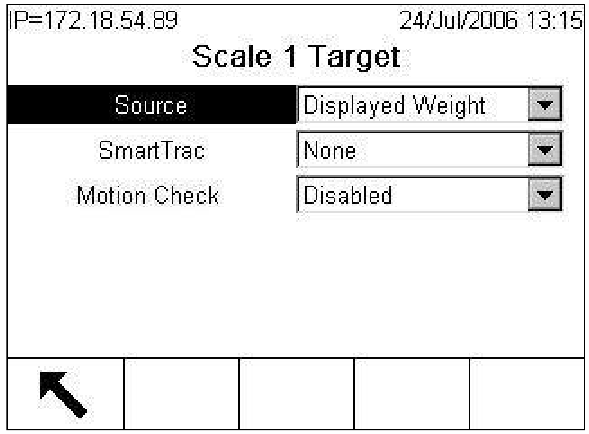


Figure 3-80: Scale Target Screen, Over/Under Mode

3.6.2.2. Comparators

Comparators are simple targets, twenty of which can be configured in setup and used as an assignment for Discrete I/O outputs. Comparators are controlled either by coincidence or by comparison with a target or range. The source for comparison can be the Gross Weight, Displayed Weight, Rate or assigned by a custom TaskExpert application. When assigned to the home screen, the Comparator softkey →|← permits direct access to the Comparators for the current selected scale. This screen (Figure 3-81) displays each Comparator's ID, Description, Limit, Units, High Limit (if applicable) and Active operator, provided that they have been configured in setup.

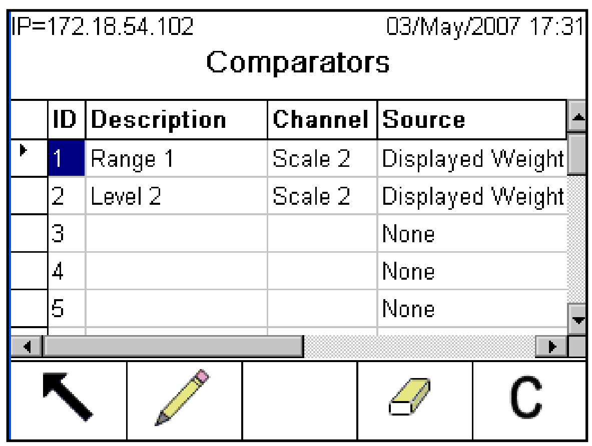


Figure 3-81: Comparator List for Scale 2

When the Active operator value is <, <=, =, < >, >= or >, the selected source is compared to a target weight. When the Active value is within (>_ _<) or outside (_< >_) a range, the selected source is compared to a range defined by the Limit and High Limit values.

3.6.2.2.1. Setting up Comparator Assignments

To edit Comparators:

1. Press the UP and DOWN navigation keys to select (highlight) a comparator in the list.
2. Press the EDIT softkey to open the screen for editing a specific comparator.

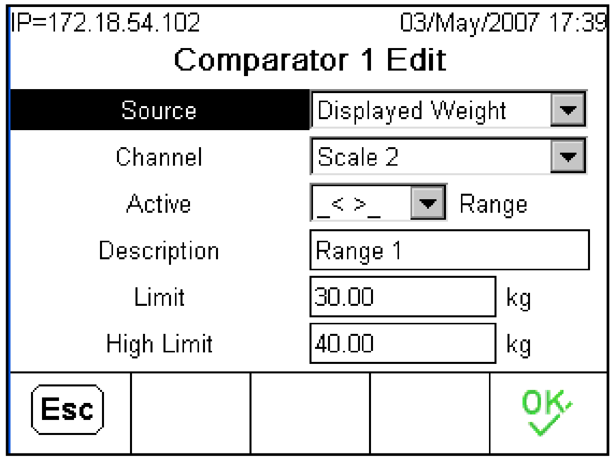


Figure 3-82: Comparator Editing Screen

3. Press the UP and DOWN navigation keys to move the focus to the fields to be edited or added.
4. Press the ENTER key to select a field to edit or add.
5. Use the selection boxes for each field to select the Source, Channel and Active operator. Enter the Description and the Limit/s desired for the comparator.

Once parameters have been set in the Comparator Edit screen, they can be saved by pressing OK, or discarded by pressing ESCAPE Esc. In either case, the view returns to the Comparators screen.

- The Comparator softkey can be assigned to the weight display home screen. It opens the Comparators view screen, which displays each Comparator assigned to the current selected scale. An EDIT softkey is provided to allow its Limit and High Limit values to be modified.

3.6.2.2.2. Source

The default value for Source is None, meaning that the comparator is disabled, and no other parameter fields are displayed. Other choices for the Source are Displayed Weight, Gross Weight, Rate and Application. If a weight field is selected as the Source, the weight unit will be the primary units of the assigned scale Channel.

If Rate is selected as the Source, then the unit will be the same as selected for Rate in the **Scale > Rate** setup branch. Note that comparisons to a Rate source require the rate calculation to be enabled and the Rate display to be turned on. If Application is selected, no other parameter fields are displayed. This selection allows a TaskExpert custom application to control the source assignment for the Comparators.

3.6.2.2.3. Channel

The Channel setting determines which measurement channel's Source is used for a particular comparator. Selections include Scales 1 - 4 and Sum Scale.

3.6.2.2.4. Active

The Active setting determines the range of other options available in the Comparator Edit screen. These options are summarized in Table 3-5.

When Active is set to less than (<), less than or equal to (<=), equal to (=),greater than or equal to (>=), greater than (>), or not equal to (< >), the output is active depending on the relationship between the current Source value and the Limit. When Active is set to within (>_ _<) or outside (_< >_) a range, the Source value is compared to the target value range set in the Limit and High Limit fields.

Table 3-5: Comparator Configuration

Source	None*, Displayed Weight, Gross Weight, Rate, Application	
Channel	Scale 1, Scale 2, Scale 3, Scale 4, Sum Scale	
Active	<, <=, =, >=, >, < >	>_ _< (within), _< >_ (outside)
Description	20 character alphanumeric string	
Limit	Target value	Lower target value for the comparison range
High Limit	n/a	Upper target value for the comparison range

3.6.2.2.5. Description

The description is an alphanumeric string used to identify the type and purpose of the comparator. This string appears, together with the comparator's ID number (1-20), in the list that displays when the Comparator softkey is pressed from the Home Screen.

3.6.2.2.6. Limit

The Limit either sets the target value to which the actual source value is compared, or the lower target value for the range to which the currently measured source value is compared. The limit value is expressed in the programmed rate or primary weigh units of the source Channel.

3.6.2.2.7. High Limit

The High Limit is available only for Range mode, and sets the upper target value for the range to which the currently measured source value is compared. Its value must be higher than the Limit – if a lower value is entered, the terminal will show an error message. The limit value is expressed in the programmed rate or primary weigh units of the source Channel.

3.6.2.3. Totalization

Knowing how many weighing transactions and how much material was processed during a particular period of time is useful information for many weighing applications. Totalization can be enabled and configured for each scale individually.

The IND780 terminal provides both grand total (GT) and subtotal (ST) registers and counters. Counters have a limit of 1,500,000 and registers will accumulate up to 11 digits of weight including any decimal places to the right of the decimal point. For example, a scale programmed for 500 x 0.1 kg will accumulate weight values up to 9999999999.9 (11 total digits). If either of these limits is exceeded, an error message will display and the totals must be reset before additional weights or counts will be added.

Use the Totalization setup screen to select parameters for totalization operations, including which source to use as input for totalization, settings for grand totals and subtotals, and to enable or disable the conversion of secondary unit weights for totalization. Figure 3-83 shows a screen with Totalization Mode set to Gross Weight.

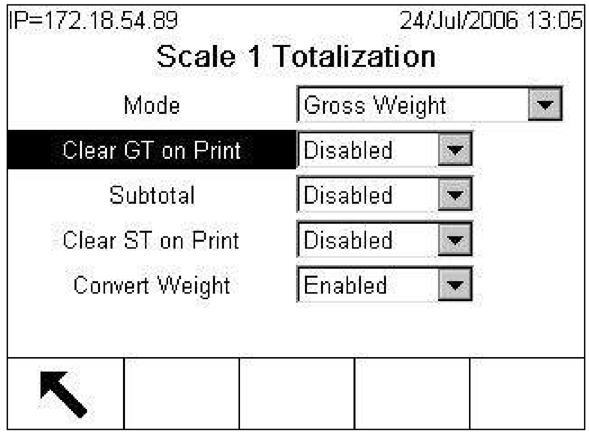


Figure 3-83: Operation Totalization Set

3.6.2.3.1. Mode

Select the type of source to use as input for totalization comparison. Selections include:

- None
- Displayed Weight
- Gross Weight

A selection of None disables totalization.

3.6.2.3.2. Clear GT on Print

Grand Total can be configured to clear automatically after printing the Totals report. If Clear GT on Print is enabled, the subtotal also automatically clears after printing the Totals report.

3.6.2.3.3. Subtotal

ST can be separately disabled while GT continues to accumulate weights. Choose to either enable or disable the subtotal register.

3.6.2.3.4. Clear ST on Print

Clearing the subtotal on print and not clearing the grand total on print allows the subtotal register to totalize sub-sets of weighments and to be reset while the grand total continues to track the grand total of weight. Choose to clear the ST on a print or not by selecting enabled or disabled in the selection box.

3.6.2.3.5. Convert Weight

The totals registers always store weights in primary units. If convert weight is disabled, scale weights other than primary units are not accumulated. If convert weight is enabled, then the weight is converted to primary units and then accumulated.

3.6.3. ID1 and ID2

3.6.3.1. Overview and Configuration

The ID function is a simple but powerful means of facilitating specific data input from the operator, or causing a specific action to take place. Two different sequences, ID1 and ID2, can be defined, each with a prompt list including up to 20 steps. Each step contains a command that determines the action the IND780 terminal will take when the step is executed. It is possible to chain both the sequences together to have one long continuous sequence of operation, using the Start Sequence step. For example, a step in the ID1 sequence could be configured to run the ID2 sequence.

The sequence can be programmed to run once (for example, when initiated by the pressing the **ID1** or **ID2** softkey) or to loop continuously until terminated (using the Start Sequence step). It can also be initiated and restarted automatically, triggered by weight input from the assigned scale. In either case, the operator works though a prompted series of actions or data entries. For example, the operator could place a package on the scale, be prompted to enter his or her name, enter a pre-set tare value, scan a bar code on the package, and generate an automatic print before finally removing the package from the scale. The printed data could include the net weight value, together with the scanned package information and the operator's name. The content and format of the printed information is determined by the template assigned to the demand output. Only one sequence can be initiated to run at a time.

3.6.3.1.1. ID Mode: Automatic

If Mode is set to Automatic, the ID prompt sequence is triggered when a weight above the Threshold weight value is placed on the assigned scale. The sequence trigger rearms again after the weight falls below the Reset weight value. Pressing the EXIT softkey exits the sequence.

3.6.3.1.2. ID Mode: Softkey

If Mode is set to Softkey, the ID prompt sequence is triggered by pressing the appropriate ID1 or ID2 softkey or application key from the home screen. The softkey or application key must be assigned for the trigger to be available to the operator. Discrete input triggers are also available to start the ID sequence. Pressing the EXIT softkey exits the sequence.

3.6.3.1.3. ID Configuration Options

Figure 3-84 shows the screen that appears when ID1 is selected from the setup menu tree. In this case Automatic Mode has been selected, and the screen displays additional fields. When Softkey Mode is selected, no other fields appear. When Mode is set to Disabled, the VIEW TABLE softkey does not appear.

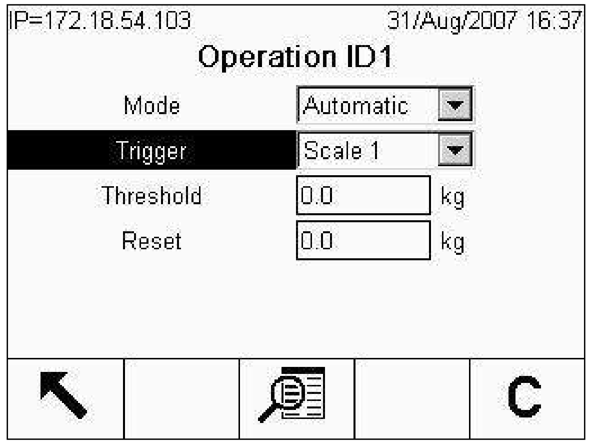


Figure 3-84: ID1 Configuration Screen, Automatic Mode Selected

The following table details options and functions available in the ID configuration screen. Default settings are indicated with an asterisk (*).

Setting/Softkey	Options/Function
Mode – Disabled*	ID mode disabled
Mode – Automatic	ID sequence initiates automatically when the weight threshold of the selected trigger is exceeded
Trigger	Scale 1*, 2, 3, 4 or Sum Scale
Threshold	0.0* kg – sets measured trigger weight above which ID sequence is initated
Reset	0.0* kg – sets measured reset weight below which ID sequence's trigger is rearmed, ready for next cycle
VIEW TABLE	Opens ID1 or ID2 List view, with access to softkeys for prompt creation, editing, deletion and printing
Mode – Softkey	No further parameters. ID1 and/or ID2 softkey must be assigned to home screen
CLEAR C	Displays warning "Clear All ID1 [or ID2] Prompts"; select ESC Esc to cancel or OK OK to confirm

3.6.3.2. Configuring ID Sequence Steps

Once the Mode parameters have been set, pressing the VIEW TABLE softkey will display the ID List view screen (Figure 3-85 shows the screen for ID1), from which prompts may be viewed, created, edited, deleted and printed. Note that the step number (#) value is automatically assigned, and each new step is added to the sequence immediately before the currently selected step. To change a step's position in the sequence, delete it, select the step that should appear immediately after it, and press the NEW softkey to re-create the step.

Softkey	Function
EXIT	Returns to Operation ID configuration screen
EDIT	Opens ID Edit screen for selected step
NEW	Opens ID New screen to create step immediately before selected step

Softkey		Function
	DELETE	Deletes selected step, without further prompting
	PRINT	If Report print connection is defined, prints the ID sequence

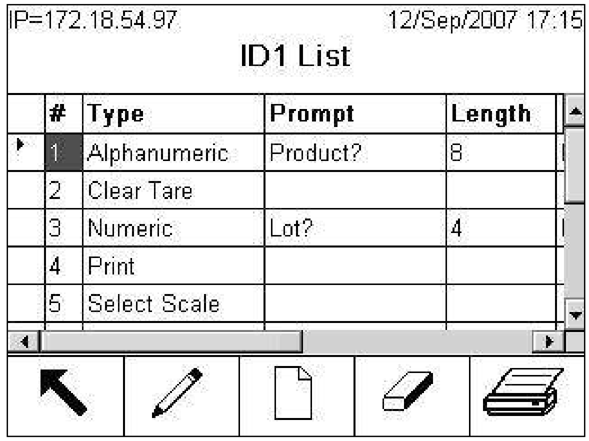


Figure 3-85: ID1 List View Screen, Initial View

Scrolling to the right in this screen displays additional columns, visible in Figure 3-86.

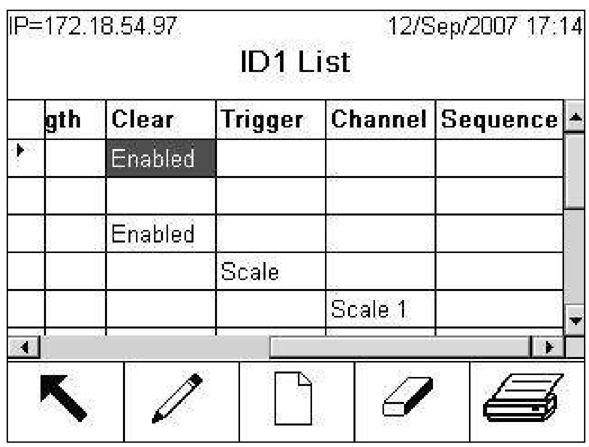


Figure 3-86: ID1 List View Screen, View Scrolled to the Right

With the exception of the step # value, columns in this view are filled according to the type parameters used by the step. Not all column fields will be used with every step – for example, the Channel column is used only when the step Type is set to Select Scale. Refer to Table 3-6 for a complete account of the characteristics of each type of step.

Figure 3-87 shows an ID New screen with the Type list box selected, showing some of the ten available types of step. The ID Edit screen offers the same options and functions, but can be used to modify existing steps.

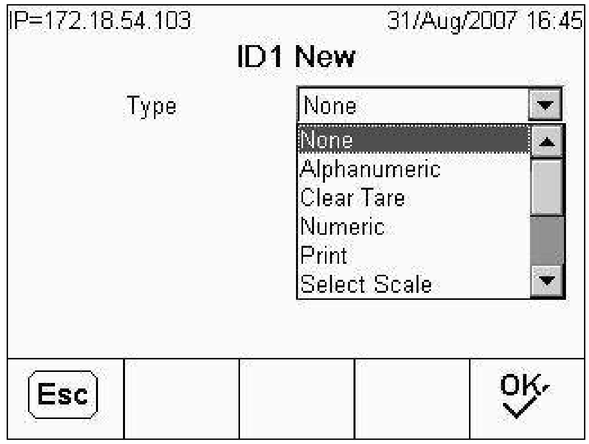


Figure 3-87: ID1 New Screen

Table 3-6 explains all the parameters available from the ID New and ID Edit screens. Default values are indicated with an asterisk (*). Each parameter appears on-screen only when it is used by the selected type.

Table 3-6: ID Sequence Options by Type

Type	Options	
None*	No step is assigned to the sequence list.	
Alphanumeric	Prompt	Enter up to 40 A/N characters as the text or prompt for the step to display on-screen during the ID sequence.
	Length	Enter numeric value (0 - 40) to constrain the length of the alphanumeric response input after the prompt If length of 0 is entered, the prompt is shown without an entry field. The step is then displayed as an instruction in the sequence. In this case, ENTER must be pressed to move to the next step. During entry, once the length value is met, the terminal will not accept further input; incorrect entries can be deleted using the CLEAR key
	Clear Data	Disabled*, Enabled. Permits the entered response (e.g., Operator's name) to be retained from one cycle to the next If disabled, the next time the field displays it contains the data entered during the previous cycle, and pressing ENTER accepts the value and moves to the next step If enabled, the entry field will be blank when viewed the next time
Clear Tare	No options. Step clears tare on the selected scale, returns terminal to gross weight display.	
Numeric	Prompt	Refer to Type: Alphanumeric, above
	Length	Similar to the settings for Type: Alphanumeric, except that the length value (0-40) constrains the length of the numeric response input after the prompt.
	Clear Data	
Print	Trigger	Scale*, Trigger 1, Trigger 2. Step executes a demand print for the current selected scale, or a custom print on trigger 1 or trigger 2. Connections must be configured.

Type	Options	
Select Scale	Channel	Scale 1*, 2, 3, 4 or Sum Scale. The terminal automatically selects the pre-defined scale when executing this step.
Select Tare	Prompt	Enter up to 40 A/N characters as the text or prompt for the step to display on-screen during the ID sequence. Step allows for a Tare ID recall.
Select Target	Prompt	Enter up to 40 A/N characters as the text or prompt for the step to display on-screen during the ID sequence. Step allows for a Target ID recall.
Start Sequence	Sequence	ID1*, ID2. Runs selected sequence from the start. Allows for sequence looping or linking to another sequence.
Tare - Auto	No options. Step causes terminal to take a semi-automatic tare on the selected scale.	
Tare - Preset	Prompt	Enter up to 40 A/N characters as the text or prompt for the step to display on-screen during the ID sequence. Step allows for a preset tare entry.
	Length	Enter numeric value (0 - 40) to constrain the length of the preset tare input value after the prompt.
ESC Esc	Abandon step definitions without saving, and return to List view screen.	
OK OK	Confirm step definitions and return to List view screen.	

3.6.4. Discrete I/O

Discrete I/O setup screens are used to configure Inputs and Outputs.

3.6.4.1. Inputs

The Discrete Inputs screen shows discrete input assignments, including the input assignment address, polarity, and function. Records with non-null values display.

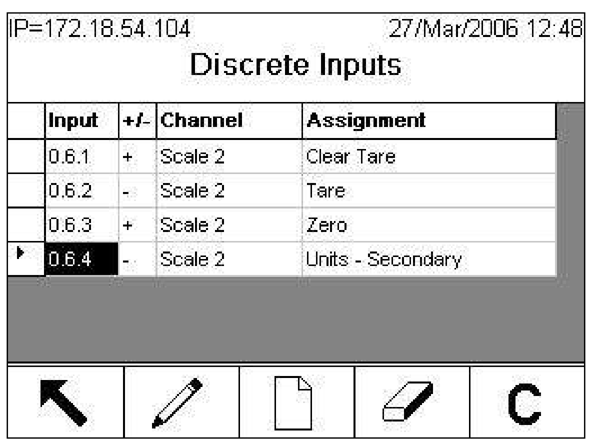


Figure 3-88: Discrete Inputs

Press the CLEAR softkey C to clear the entire table.

Press the UP and DOWN navigation keys to scroll up and down the screen in order to view all of the possible discrete input assignments.

3.6.4.1.1. To modify or add discrete inputs

1. Press the UP and DOWN navigation keys to select (highlight) a discrete input.
2. Press the EDIT softkey to open the setup screen for editing an input assignment or press the INSERT softkey to open the setup screen (Figure 3-89) to create a new input assignment.

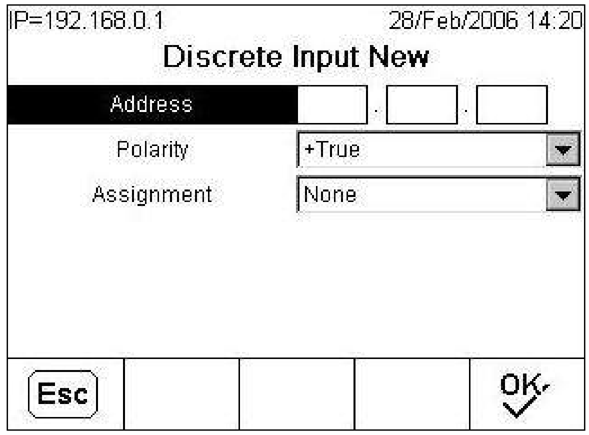


Figure 3-89: Discrete Input New Screen

3. Enter the input assignment address. The input address is shown as [x.y.z] where x indicates the input location, y indicates the slot address of the I/O option, and z indicates the input position. The input address digits are:
    - Location – The first digit represents whether the I/O is local (0) or remote (1–8).
    - Slot Address – The second digit will correspond to the slot where the internal I/O board is installed (Slot 5 or 6) for the IND780 internal I/O and a 0 for the remote I/O (ARM 100).
    - Position – The third digit refers to the position of the discrete input option that is being assigned to a function (1-4 for internal I/O, 1-6 for remote).

    Valid address numbers are:

    - Local – 0.5.1, 0.5.2, 0.5.3, 0.5.4, 0.6.1, 0.6.2, 0.6.3, 0.6.4
    - Remote #1 – 1.0.1, 1.0.2, 1.0.3, 1.0.4,
    - Remote #2 – 2.0.1, 2.0.2, 2.0.3, 2.0.4,
    - Remote #3 – *n*.0.1, *n*.0.2, *n*.0.3, *n*.0.4, where $1 \leq n \leq 8$.

    Examples:

    - Address 0.6.1 = Local discrete board, slot 6, position 1.
    - Address 1.0.3 = Remote address #1, position 3.
4. The inputs can be programmed to accept either a + True or – True polarity level as "ON". Use the Polarity selection box to select + True or – True.
5. Use the Assignment selection box to select an input assignment. Selections include:
    - None
    - Blank Display
    - Calibration Tests
    - SmartTrac
    - Tare
    - Target-Abort
    - Trigger 1
    - Trigger 2
    - Trigger 3

- Clear Tare
- Disable Keypad
- Disable Run Flat
- Disable Setup
- Enter
- ID1
- ID2
- Print
- Target-Pause
- Target-Resume
- Target-Start
- Task 1
- Task 2
- Task 3
- Task 4
- Task 5
- Trigger 4
- Trigger5
- Units-Primary
- Units-Secondary
- Units-Switch
- Zero

6. Press the OK softkey OK to accept the entry.
7. Press the ESCAPE softkey Esc to return to the Discrete Inputs screen without saving any changes.
8. Press the DELETE softkey to delete an input assignment.
9. Select the Channel box to assign which scale to apply the input to.

3.6.4.2. Outputs

The Discrete Outputs screen displays discrete output assignments, including the output assignment address and function. Only records with non-null values display.

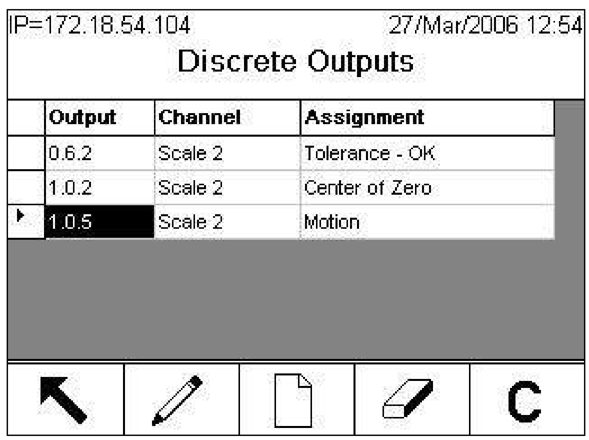


Figure 3-90: Discrete Outputs

Press the CLEAR softkey C to clear the entire table.

Press the UP and DOWN navigation keys to scroll up and down the screen in order to view all of the possible discrete output assignments.

Select the Channel box to assign the scale to which the output will apply.

- Local – 0.5.1, 0.5.2, 0.5.3, 0.5.4, 0.6.1, 0.6.2, 0.6.3, 0.6.4
- Remote #1 – 1.0.1, 1.0.2, 1.0.3, 1.0.4,
- Remote #2 – 2.0.1, 2.0.2, 2.0.3, 2.0.4,
- Remote #3 – *n*.0.1, *n*.0.2, *n*.0.3, *n*.0.4, where $1 \le n \le 8$.

Examples:

- Address 0.6.1 = Local discrete board, slot 6, position 1.
- Address 1.0.3 = Remote address #1, position 3.

To modify, add or delete discrete outputs, follow the same procedures described for inputs. Figure 3-91 shows the screen used to create a new discrete output.

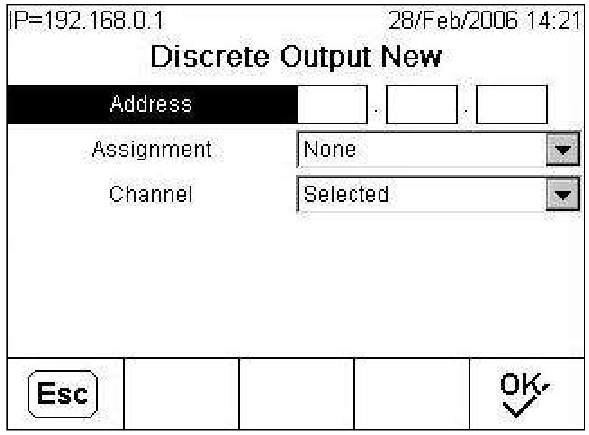


Figure 3-91: Discrete Output New Screen

The selections for output assignments include:

- None
- Center of Zero
- Fast Feed
- Feed
- Motion
- Net
- Over Capacity
- Over Zone
- Tolerance - OK
- Under Zero
- Under Zone
- Comparators 1-20

3.6.5. TaskExpert

The TaskExpert screens allow you to set up a TaskExpert program, and to access custom setup screens defined by your TaskExpert application. These setup screens are not accessible unless the TaskExpert option is enabled in the terminal.

3.6.5.1. Start

The TaskExpert Start screen (Figure 3-92) allows you to list your TaskExpert programs and associate each of them to a Task number. Each task can be set to run automatically on startup or after leaving Setup, or started manually using the Task List, Task 1, Task 2 or Task 3 softkeys or application keys.

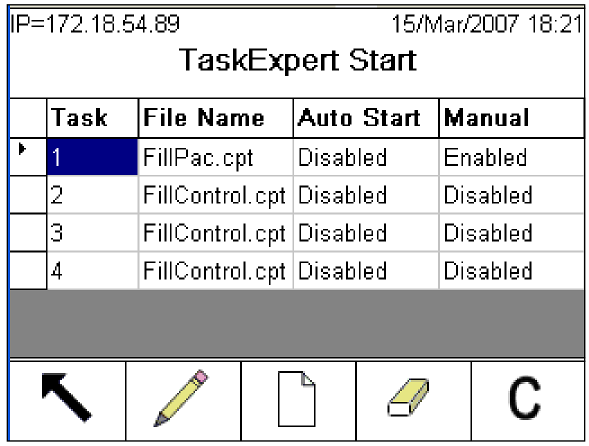


Figure 3-92: TaskExpert Start Screen

Press the CLEAR softkey C to reset the table.

To modify the TaskExpert Start list:

1. Use the arrow keys to select the task to be edited or deleted. With the record selected:
2. Press the EDIT softkey to modify a record. Note that the Task number cannot be modified.
3. Press the DELETE softkey to delete a record.
4. To create a new task press the NEW softkey. A screen like the one shown in Figure 3-93 will open.

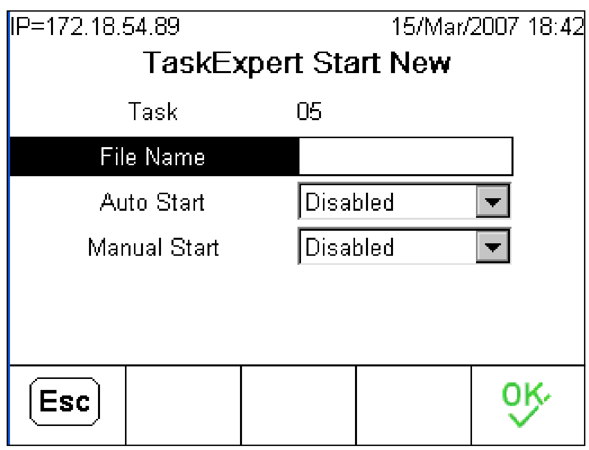


Figure 3-93: TaskExpert New Screen

5. The Task number will be assigned automatically. Enter the name of the TaskExpert file in the File Name field.
6. Set Auto Start to Enabled or Disabled. If Enabled is selected, the task will run each time the indicator is powered up or when Setup is exited.
7. Set Manual Start to Enabled or Disabled. This will cause the program to run when selected and started.
8. Press OK to save changes or Esc to exit without saving.

3.6.5.2. Custom Setup

The Custom Setup is defined by the TaskExpert application. For details, refer to the **TaskExpert Reference Manual**, provided with TaskExpert.

3.6.6. Reset

The Reset setup screen resets setup values to factory default settings for the application setup.

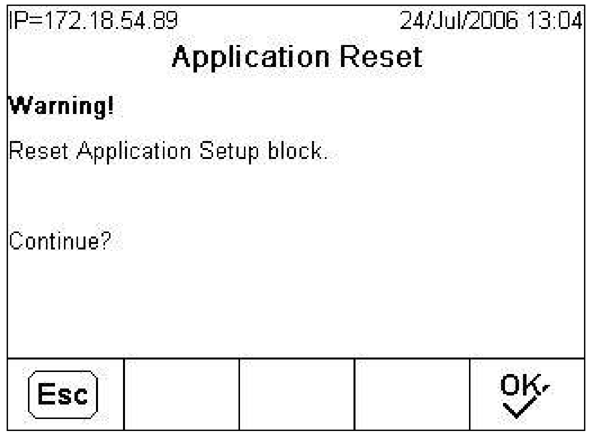
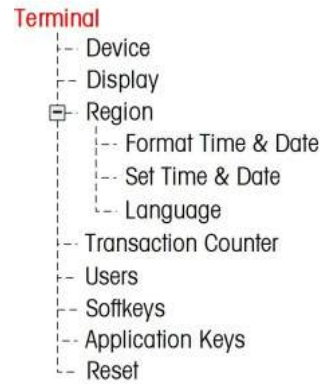


Figure 3-94: Application Reset Screen

To reset, press the OK softkey. If the reset was successful, a verification message that reads "Reset Successful" displays. If the reset was not successful, an error message appears ("Reset Failure"). In this case, try to initiate the reset again. If the reset continues to fail, contact a local METTLER TOLEDO representative for assistance. Press the ESCAPE softkey Esc to exit without resetting.

- Application reset does NOT include the reset of information in Alibi Memory or tables. This data can only be reset by selecting Maintenance, Reset All.

3.7. Terminal



Setup screens for Terminal setup include:

- Device
- Display
- Region
- Transaction counter
- Users
- Softkeys
- Application Keys
- Reset

Use these setup screens to configure:

- TraxEMT® ID fields
- SmartTrac display settings
- Time and date format and settings
- Language
- Transaction counter settings
- Users
- Softkeys
- Application Keys

3.7.1. Device

The Device setup screen enables the entry of 3 terminal IDs and the terminal serial number. It also allows you to enable and disable the audible alarm and the audible keypad beeper.

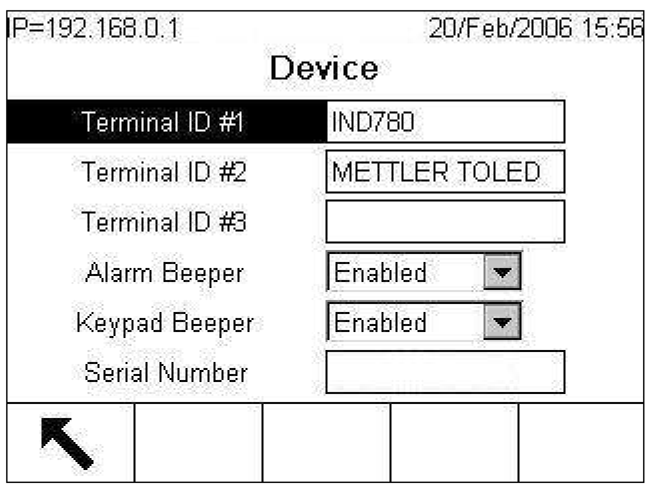


Figure 3-95: Device Setup Screen

3.7.1.1. Terminal ID

Up to 3 terminal IDs can be entered on the Device setup screen. When the Terminal ID text box is selected, the softkeys become alpha keys. ID1 and 2 can have a length of up to 20 characters. ID3 can accept a string of up to 160 characters. Press the ENTER key to accept the ID entered. These ID fields display in the information recall when the SYSTEM INFORMATION softkey is pressed after the RECALL softkey.

3.7.1.2. Alarm Beeper

Select this option to enable or disable the audible alarm beeper. Highlight the Alarm Beeper option and press ENTER. Select enabled or disabled and press ENTER.

3.7.1.3. Keypad Beeper

Select this option to enable or disable the audible keypad beeper. Highlight the Keypad Beeper option and press ENTER. Select enabled or disabled and press ENTER.

3.7.1.4. Serial Number

The default serial number is 000000000000. The value is set at the factory to match the serial number on the terminal's label. The field can be edited so that, if the main PCB is replaced or a Master Reset is performed (restoring the default), the correct serial number can be entered. The Serial Number field permits the terminal's serial number to be re-entered in case the main PCB is replaced.

3.7.2. Display

Use the Display setup screen to set the backlight timeout, the screen saver timeout, the weight display options, the tare display options, the SmartTrac™ size settings, and the rate display settings.

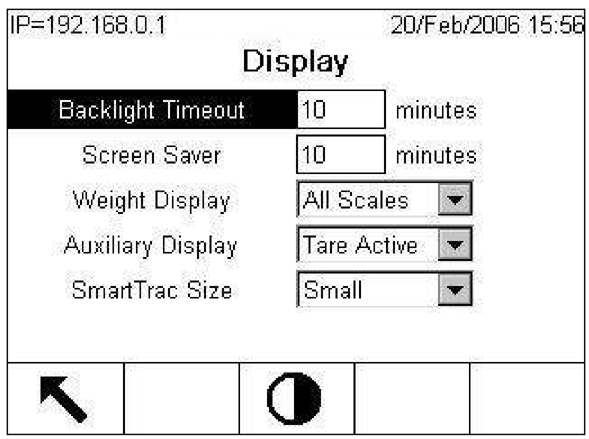


Figure 3-96: Display Setup Screen

3.7.2.1. Backlight Timeout

Enter the number of minutes (up to 2 digits) that must elapse with no scale motion and no keypad activity before the backlight is shut off. If motion is detected or any key is pressed, the backlight automatically turns on and its time is reset. A keystroke used to exit the backlight mode is ignored for all other purposes.

Setting the Backlight Timeout field to 0 will cause the backlight to remain on all the time.

3.7.2.2. Screen Saver Timeout

Enter the number of minutes (up to 2 digits) that must elapse with no scale motion and no keypad activity before the screen saver is shown (replaces the view on the display screen). If motion is detected or any key is pressed, the screen saver automatically exits and its time is reset. A keystroke used to exit the screen saver mode is ignored for all other purposes.

Setting the Screen Saver field to 0 will disable the screen saver.

3.7.2.3. Weight Display

Select either All Scales or One Scale to display either all scale outputs at the same time or to show 1 at a time on the display and allow the user to toggle through each.

3.7.2.4. Auxiliary Display

Select Never, Active, Always, or Rate to determine how the Auxiliary Display operates.

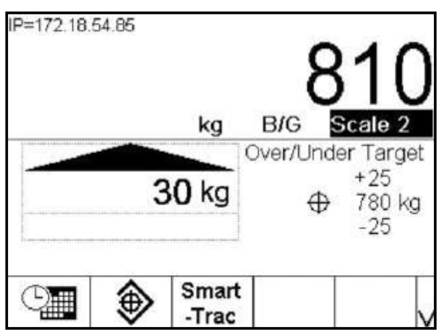
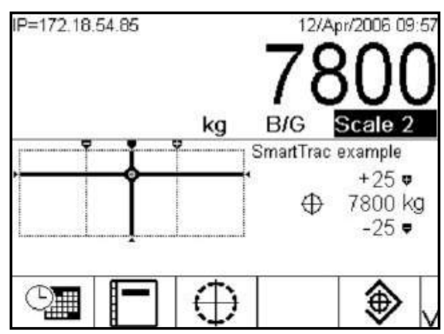
- Selecting Never means that the Tare is never displayed.
- Selecting Active means the Tare is displayed when a tare is active.
- Selecting Always means the Tare will be displayed at all times.
- Selecting Rate means the rate of flow of material will be displayed.

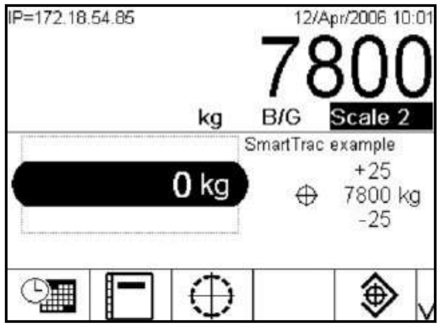
3.7.2.5. SmartTrac Size

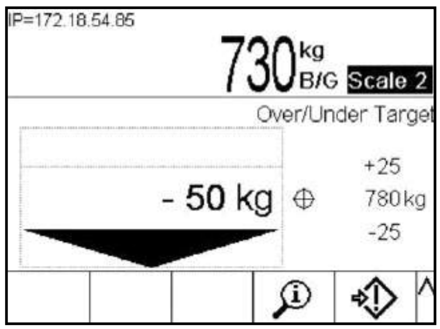
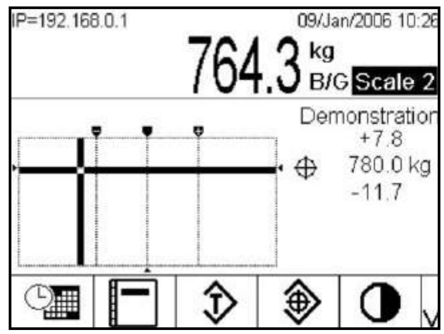
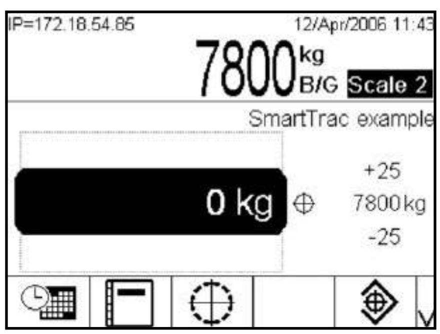
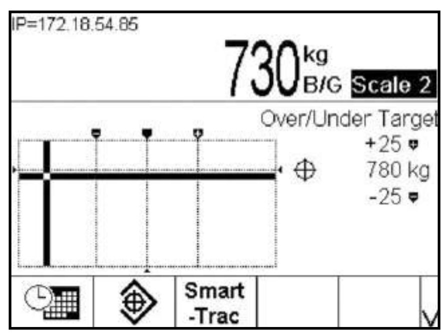
SmartTrac refers to a graphical display visualization used to represent measured values. The display is either a bar graph, cross hairs, or an over/under display.

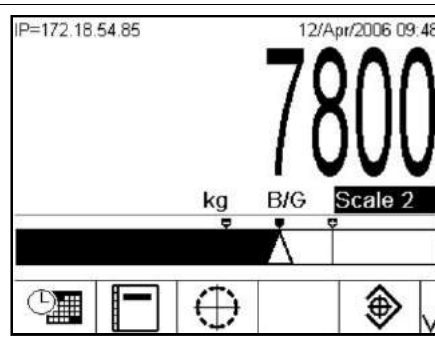
The size of the SmartTrac graphical display impacts how the rest of the data shown on the operational screens displays. The larger the SmartTrac display size, the smaller the amount of screen available to display other data.

SmartTrac displays can be sized as follows:

	Over/Under Mode	**Cross Hairs**
	High	On Target
Medium		

Over/Under Mode	Cross Hairs
On Target	
	

	Over/Under Mode	Cross Hairs
	Low	Low
Large		
	On Target	Under
Large		

	Bar Graph (on target)
Small	

Bar Graph (on target)

Medium

Large

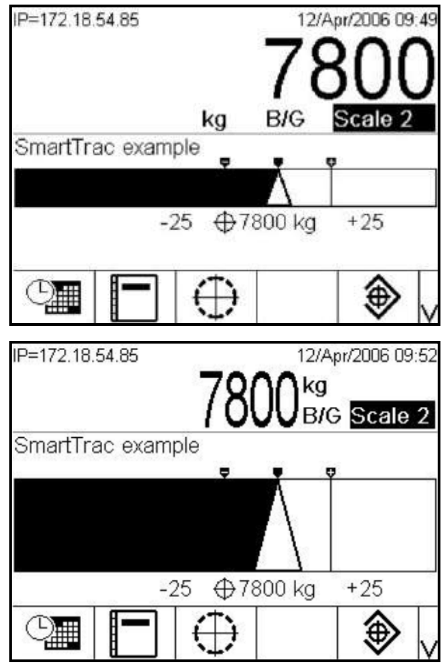


Figure 3-97: Examples of Different Sizes of SmartTrac Displays

Use the SmartTrac Size selection box to select a setting for the SmartTrac graphical display. Selections include None, Large, Medium, and Small. Note that only the Bar Graph can be displayed at small size. If SmartTrac is configured as small size and either Over/Under or Cross Hairs type, SmartTrac will not display.

3.7.3. Region

The region setup screens enable configuration of:

- Time and date format
- Time and date settings
- Language
- System line view

3.7.3.1. Format Time & Date

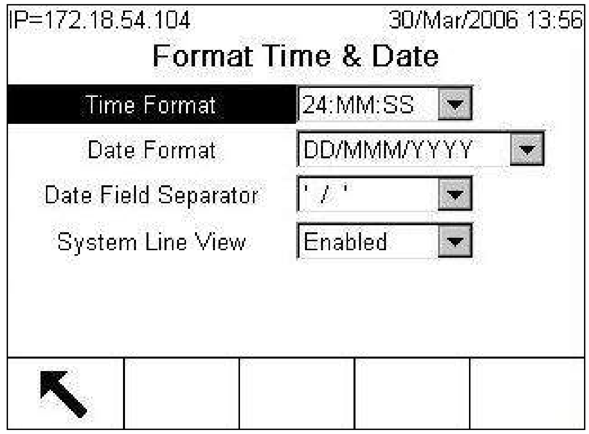


Figure 3-98: Format Time & Date Setup Screen

3.7.3.1.1. Time Format

- 12:MM (12-hour clock with hour and minutes displayed)
- 12:MM:SS (12-hour clock with hour and minutes is displayed, and printed with seconds)
- 24:MM (24-hour clock with hour and minutes displayed)
- 24:MM:SS (24-hour clock with hour and minutes is displayed, and printed with seconds)

3.7.3.1.2. Date Format

- DD MM YY (Two-digit day, month, year)
- DD MMM YYYY (Two-digit day, three-character month, four-digit year)
- MM DD YY (Two-digit month, day, year)
- MMM DD YYYY (Three-character month, two-digit day, four-digit year)
- YY MM DD (Two-digit year, month, day)
- YYYY MMM DD (Four-digit year, three-character month, two-digit day)
- YYYY MM DD (Four-digit year, Two-digit month, day)

3.7.3.1.3. Date Field Separator

- / (slash)
- - (dash)
- . (period)
- (space)
- None

3.7.3.1.4. System Line View

- Enables or disables the date and time system line at top right of the run screen.

3.7.3.2. Set Time & Date

Enter the hour, minutes, day, month, and year on this setup screen's text fields and selection boxes. The terminal automatically adjusts the date for a leap year, and a battery backup maintains the time and date settings in the event of a power outage. Manual setting of the time is necessary for daylight savings time adjustments.

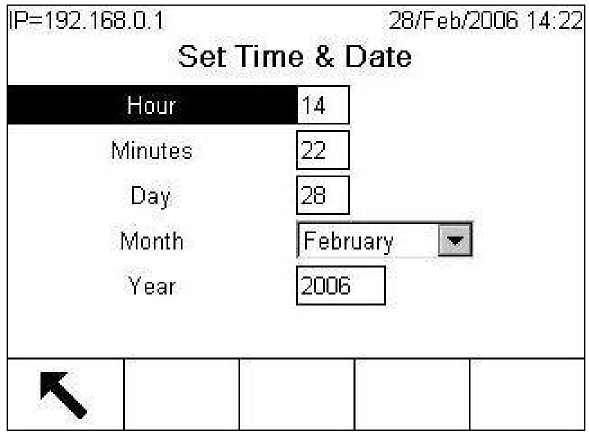


Figure 3-99: Set Time & Date Setup Screen

3.7.3.2.1. Hour

Use the numeric keypad to enter the hour in the Hour field text box. Use the AM/PM selection box to select AM or PM. The AM/PM selection box only displays if the time format is set to 12:MM or 12:MM:SS on the Format Time & Date setup.

3.7.3.2.2. Minutes

Use the numeric keypad to enter the minutes in the Minutes field text box.

3.7.3.2.3. Day

Use the numeric keypad to enter the day in the Day field text box.

3.7.3.2.4. Month

Use the Month selection box to select the month.

3.7.3.2.5. Year

Use the numeric keypad to enter the year in the Year field text box.

3.7.3.3. Language

Use the Language setup screen to specify the language for terminal operations.

Figure 3-100: Language Setup Screen

3.7.3.3.1. Display Messages

Use the Display Messages selection box to select the language for messages that display on the terminal. Choices are:

- English
- Spanish
- German
- French
- Italian
- Polish
- Portuguese
- Russian
- Chinese

Changing the language to and from Chinese will cause the terminal to perform a power cycle automatically upon exiting setup mode before changes to the display messages will take effect.

3.7.3.3.2. Keypad Selection

Use the Keypad Selection box to select the language for the keypad characters that display on the terminal. This selection determines which international characters are available in the alphabetic data entry softkeys. Choices are:

- Dutch
- English
- French/German
- Nordic/German
- Polish
- Russian
- Spanish/Italian/Portuguese

3.7.3.3.3. External Keyboard

Use the External Keyboard Selection box to select the language for the keyboard. Choices are:

- English
- French
- German
- Spanish
- Italian
- Polish
- Portuguese
- Russian

- If the Display Messages selection is Chinese, then the IND780 automatically allows for Chinese character data entry with the built-in virtual text editor and an external keyboard). The virtual text editor toolbar can be called up by pressing CTRL+SPACE on the external keyboard during data entry. For more information on the use of the virtual text editor, access the IND780 Web Server Help pages.

Figure 3-101: Virtual Text Editor, Chinese Text Entry

3.7.4. Transaction Counter

The transaction counter is a seven-digit register that tracks the total transactions that are completed on the terminal. When the value reaches 1,499,999, the next transaction causes a roll-over to 0000001. Use the Transaction Counter setup screen to configure transaction counter operations.

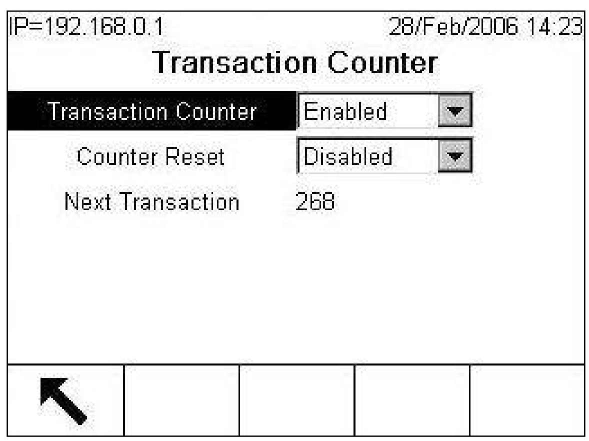


Figure 3-102: Transaction Counter Setup Screen

3.7.5. Transaction Counter

Use the Transaction Counter selection box to enable or disable the transaction counter.

3.7.5.1. Counter Reset

Use the Counter Reset selection box to enable or disable manual resetting of the counter.

3.7.5.2. Next Transaction

The value for the counter for the next transaction displays in the Next Transaction field. If the counter reset is enabled, the next transaction value can be edited. This value can be manually entered if Counter Reset is enabled. The COUNTER RESET Softkey 123 can be assigned to the home screen, giving direct access to recall or reset the Next Transaction counter value, provided the function is enabled in this screen.

3.7.6. Users

The IND780 terminal is pre-configured with 2 usernames: "admin" and "anonymous". Neither of these usernames has a password. Without passwords, there will be no security challenge for entering setup and making changes. If a password is entered for "admin", a login will be required before changes can be made in Setup. These 2 default usernames cannot be deleted but passwords may be entered for them. All functions of the terminal will be available to all users until a password is entered.

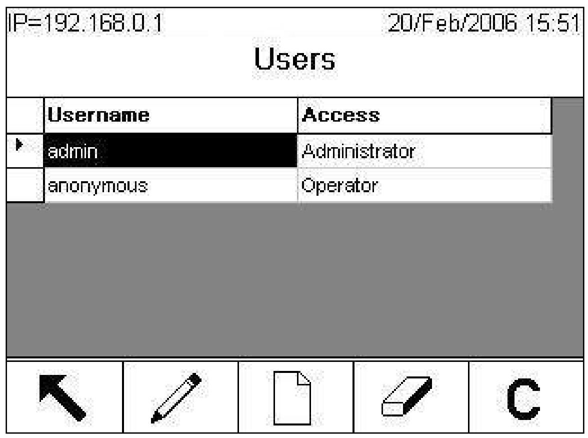


Figure 3-103: Users Setup Screen

To modify and/or enter a password for a username:

1. Move focus to the username to be edited.
2. Press the EDIT softkey to access the User Edit screen.
3. Press the DOWN navigation key to view the second screen, which displays the Password and Confirm Password fields.
4. Enter the desired password in the Password and Confirm Password fields.

- Passwords are case-sensitive. All numbers and all characters available in the alpha keys are valid for use in passwords. Be sure to store a record of the password in a safe place. Without the correct password access to the setup menu will not be possible.

5. Press the OK softkey OK to accept the password as entered.
6. Press the ESCAPE softkey Esc to exit without saving the password.
7. Press the DELETE softkey to delete a username from the table on the Users screen. Usernames "admin" and "anonymous" cannot be deleted.

8. Press the CLEAR softkey to restore the factory default setting, which deletes all users except the "Admin" and "Anonymous" users and restores the passwords to null.

To enter a new username and password:

1. Press the NEW softkey to access the User Edit screen.

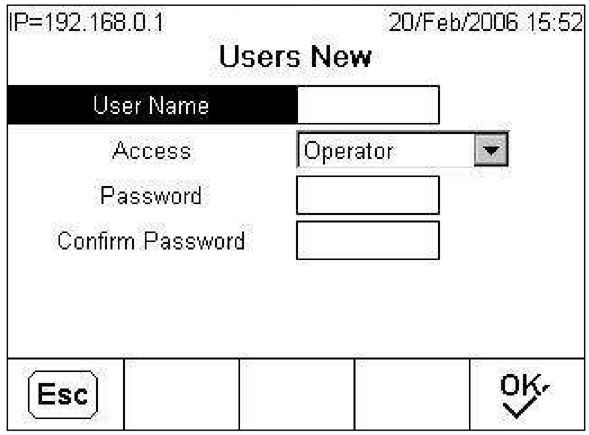


Figure 3-104: Users New Setup Screen

2. Use the alphanumeric keys to enter the desired username in the Username field.
3. Use the Access selection box to assign the appropriate access level to the user. The following Access levels are detailed in Chapter 2, **Operation**. Available levels are:

- Administrator
- Maintenance
- Supervisor
- Operator

4. Press the DOWN navigation key to view the second screen, which displays the Password and Confirm Password fields.
5. Use the alphanumeric keys to enter the desired password in the Password and Confirm Password fields.
6. Press the OK softkey to accept the username and password as entered.
7. Press the ESCAPE softkey to exit without saving the username and password.

3.7.7. Softkeys

Add or rearrange the softkeys on the terminal's main menu on the softkeys setup screen. Appendix E, Softkey Mapping and Application Key Configuration, provides a more detailed explanation of the softkeys.

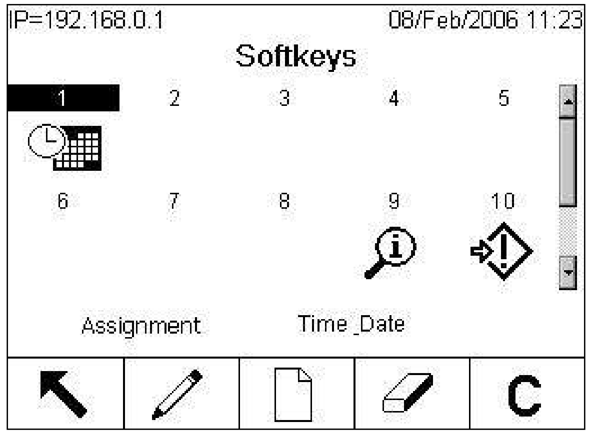


Figure 3-105: Softkeys Setup Screen

When the softkeys setup screen opens, focus is on the softkey position numbers located above the icons.

Three softkeys, INFORMATION RECALL, SETUP, and Date/Time are automatically placed in the softkey setup. The default setting for the placement of these softkeys is in positions 9, 10, and 1.

The INFORMATION RECALL and SETUP softkeys must always be assigned a position. They can be moved or multiple copies of them can exist but there must always be at least 1 of each assigned. Only duplicate assignments of these softkeys can be deleted. All other softkeys may be added or deleted as desired.

Adding a softkey to the home pages of the terminal does not automatically enable the softkey's function. Most softkeys must also be enabled in Setup too. For instance, adding the UNITS SWITCHING softkey does not automatically enable units switching – the units must also be enabled in the Scale branch of setup. If a softkey has been added in Setup but does not appear on the home page, check that the setup parameters for that function have been enabled.

The following softkeys are available for assignment to the home page:

- None
- Alibi Memory
- Calibration Test
- Comparators
- Counter Reset
- Custom Trigger 1
- Custom Trigger 2
- ID1
- ID2
- MinWeigh
- Recall Info
- Repeat Print
- Reports
- Select Terminal
- Target Table
- Tare Table
- Target
- Task 1*
- Task 2*
- Task 3*
- Task List*

- Custom Trigger 3
- Custom Trigger 4
- Custom Trigger 5
- Setup
- SmartTrac
- Target Control
- Target Start
- Time & Date
- Unit Switching
- x10 Display
- PDX Performance Log

* Only available when TaskExpert™ or an application is installed.

Press the UP, DOWN, LEFT and RIGHT navigation keys to navigate among the softkey position numbers. Softkeys can be added, removed, and positioned using the following softkeys:

Edit Changes the softkey in the selected position to another softkey or to none, which leaves the softkey position blank. Editing a blank position does not move the position of following softkeys. Figure 3-106 shows the Softkey Edit screen with the Assignment dropdown list in focus.

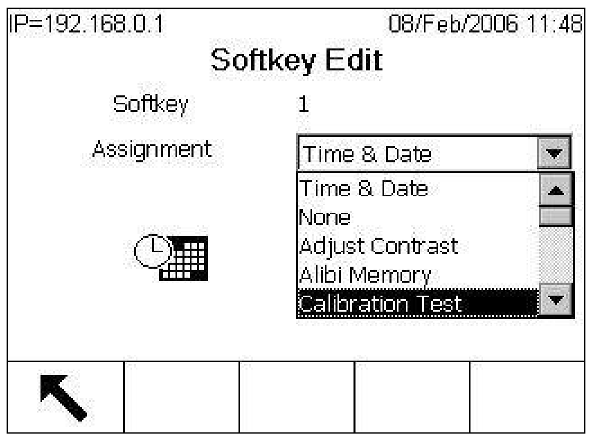


Figure 3-106: Softkey Edit Setup Screen

New Inserts a softkey into a selected position. All other softkeys located at or after that position increase position number by 1.

Delete Deletes a softkey in a selected position. All other softkeys located at or after that position decrease position number by 1.

Clear Clears all softkey assignments INFORMATION RECALL and SETUP softkeys. They will be shown in positions 9 and 10 respectively.

3.7.8. Application Keys

Add or rearrange the application keys on the terminal's main menu on the application keys setup screen. Keys A1 – A4 can be configured with different assignments for each key.

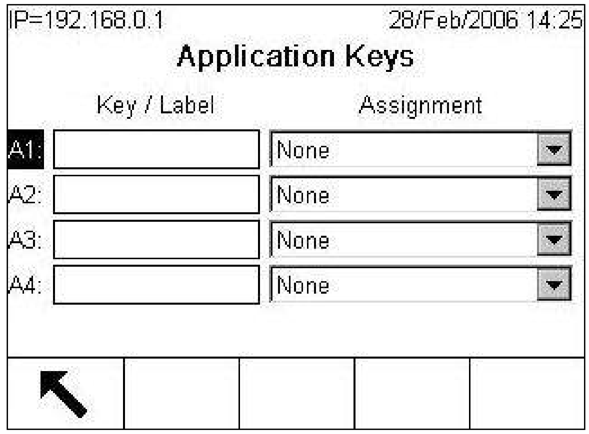


Figure 3-107: Application Keys Setup Screen

Select the key to edit. Press ENTER to input the key/label. The softkeys will change to alphanumeric data entry so that a label may be entered. Press ENTER when the label is complete. Scroll down through the assignments (listed below) and select what function to assign to the selected application key.

- None
- Alibi Memory
- Calibration Test
- Comparators
- Counter Reset
- Custom Trigger 1
- Custom Trigger 2
- Custom Trigger 3
- Custom Trigger 4
- Custom Trigger 5
- ID1
- ID2
- MinWeigh
- Recall Info
- Repeat Print
- Reports
- Select Terminal
- Setup
- SmartTrac
- Target Control
- Target Start
- Target Table
- Tare Table
- Target
- Task 1*
- Task 2*
- Task 3*
- Task List*
- Time & Date
- Unit Switching
- x10 Display
- PDX Performance Log

* Only if TaskExpert™ or an application is installed.

3.7.9. Reset

The Reset setup screen resets setup values to factory default settings for the Terminal branch of setup.

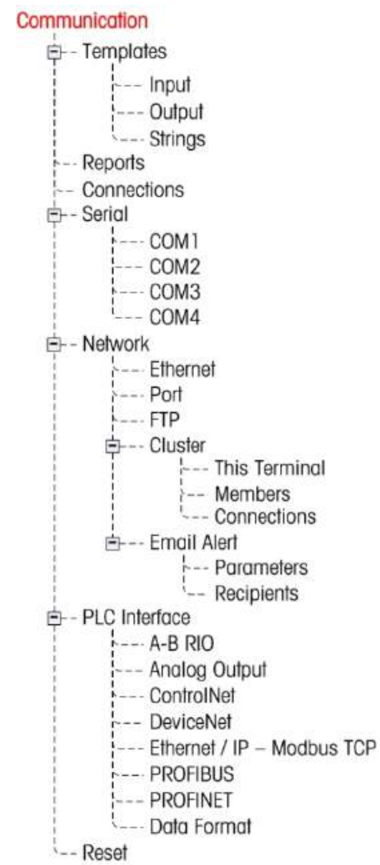
3.7.9.1.1. Terminal Reset

To initiate a reset, press the OK softkey. If the reset was successful, a verification message that reads "Reset Successful" displays. If the reset was not successful, an error message that reads

"Reset Failure" displays. If the reset fails, try to initiate the reset again. If the reset continues to fail, contact a local METTLER TOLEDO representative for assistance.

Press the ESCAPE softkey Esc to exit without resetting.

3.8. Communication



Setup screens for Communication setup include:

- Templates
- Reports
- Connections
- Serial
- Network
- PLC

Use these setup screens to configure:

- Input and Output Template Setup
- Report Structure
- Connection Assignments
- Serial Port Parameters
- Network Parameters
- Terminal Clustering
- PLC Interfaces

The Analog Load Cell and POWERCELL PDX cards include a TTL output. This output functions automatically as a feed control when target control is enabled. No configuration is necessary.

3.8.1. Templates

The IND780 terminal utilizes ten output templates (each 1,000 bytes in size) to define the format of data output following a weighing operation.

An input template is also available to receive a string input (such as from a bar code gun) and use it as data entry for application, tare, tare ID or target ID or keypad. The input template is used in combination with the ASCII Input connection.

A template strings setup screen is also available to configure strings of characters that are frequently used in templates.

The InSite™ CSL tool can be used to edit input and output templates in a WYSIWYG environment, permitting a preview of the format of each template and its output.

3.8.1.1. Input

Use the Input Template to remove extra characters from an input string of data. Setup parameters include:

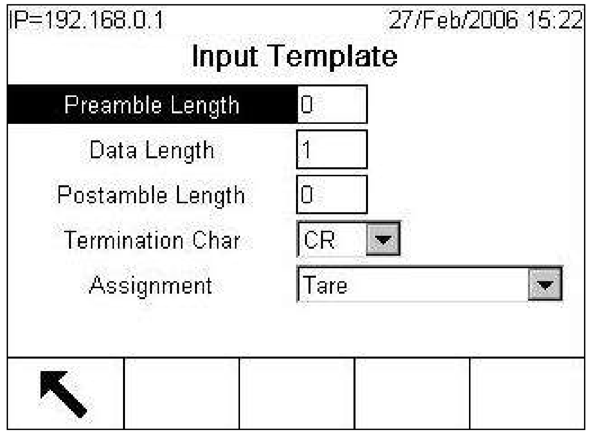


Figure 3-108: Input Template Setup Screen

- Preamble Length – Defines how many characters are skipped at the beginning of an input string before the desired data.
- Data Length – Defines the maximum length of a string. All characters beginning after the preamble through the data length selection are used as the input.
- Postamble Length – Defines the number of characters (before but not including the termination character) that will be stripped off the data string. All other data from the preamble length to the termination character minus the postamble length are used as the input string. When using an input that is always the same fixed length, this field remains blank.
- Termination Character – Used to signal the end of the string input. The termination character can be any ASCII control character. If None is selected, the ten-second timeout feature terminates the entry. In addition to None, selections available from the selection box include:

SOH	ACK	VT	DLE	NAK	SUB
STX	BEL	FF	DC1	SYN	ESC
ETX	BS	CR	DC2	ETB	FS
EOT	HT	SO	DC3	CAN	GS
ENQ	LF	SI	DC4	EM	RS

See Appendix G, Table G-1, for ASCII control character definitions and functions.

- Assignment – Determines how the input data should be used. Choices are:

Application	Input is assigned to the current application (TaskExpert)
Tare	Enters data as a preset tare value
Tare ID	Uses value as an ID lookup in the tare table
Target ID	Uses value as an ID lookup in the target table
Keypad	Enters data into an ID prompt sequence step or entry box

If no termination character is used, a ten-second timeout feature tracks the amount of time between characters. If more than ten seconds elapse without receipt of a character, the string is considered terminated.

3.8.1.2. Output

The Output Template setup screen enables configuration of the output data formats and the Repeat Print header or footer field. To add the "DUPLICATE" designation to a repeat print of the output templates, select either Footer or Header from the Repeat Print Field selection box.

To view elements in a template or create a new template, select the desired template from the Template selection box. Ten templates (Template 1 to Template 10) are available.

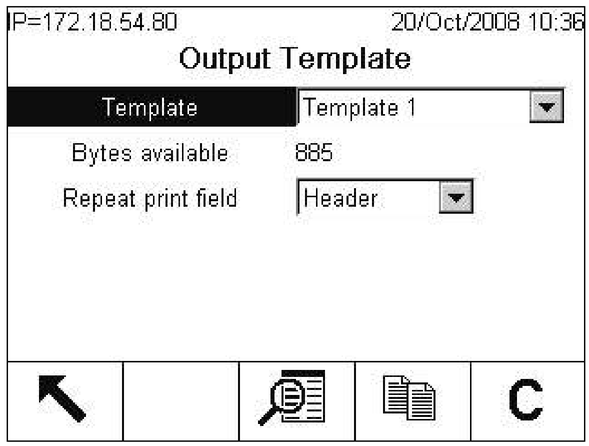


Figure 3-109: Output Template Screen

1. Press the VIEW TABLE softkey to access the selected template's view screen, which lists each element configured for the template.

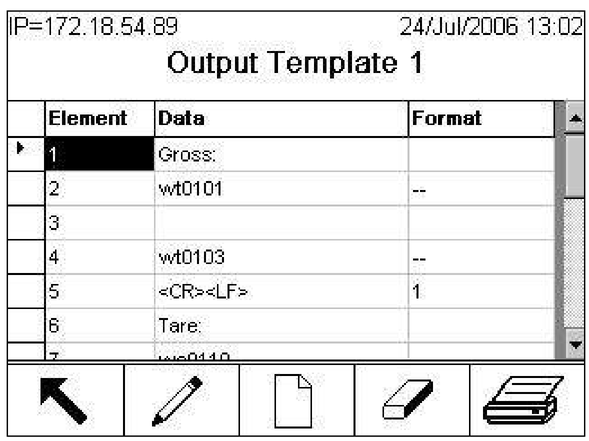


Figure 3-110: Output Template Screen

2. Press the COPY softkey to open the copy screen, which enables the elements from 1 template to be copied to another template.

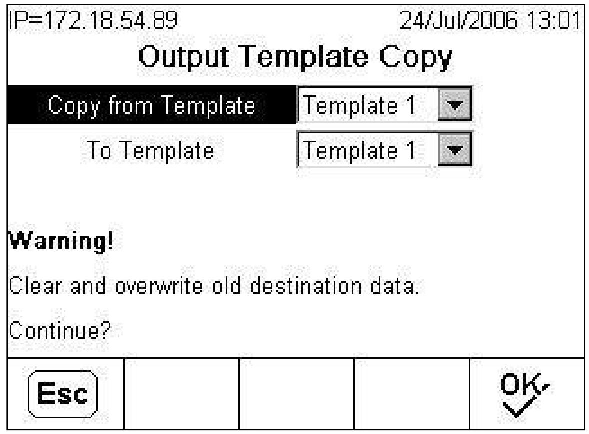


Figure 3-111: Output Template Copy Screen

3. Press the CLEAR softkey **C** to clear all elements from the selected template. A warning screen displays as a precaution.

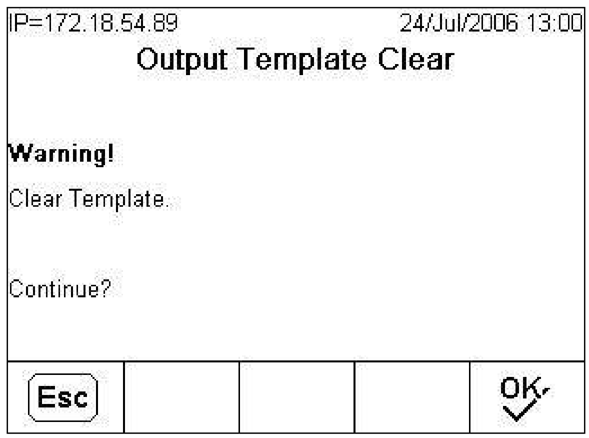


Figure 3-112: Output Template Clear Warning Screen

4. Press the EXIT softkey to return to the menu tree.

Each element is defined by the data type, actual data, justification, and length. Elements may be edited using the EDIT softkey, added (inserted) using the NEW softkey, or deleted individually using the DELETE softkey. A leading zero fill function is available for certain fields.

3.8.1.2.1. Editing

1. Select a record to edit by pressing the UP and DOWN navigation keys.
2. Press the EDIT softkey to op the editing screen for the selected records. A screen like the one shown in Figure 3-113 opens. Note that the element number cannot be edited.

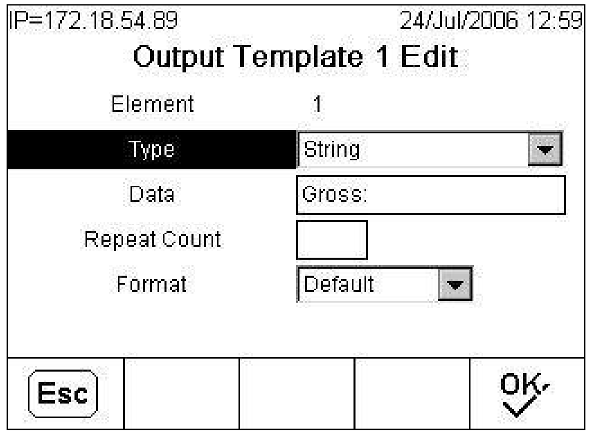


Figure 3-113: Output Template Edit Screen

3. Select the element Type from the selection box. The remaining options depend on the Type selected. Table 3-7 lists the options by Type. For the Special Character type, choose the character from the selection box.

- **CR/LF**
- **String** – A string of characters can be entered as the data to print
- **Special Character** – Provides a selection box that displays a list of special characters. These are the control characters from a standard ASCII chart.
- **SDName** – Accepts data fields from the terminal (shared data)

Table 3-7: Output Template Editing Options

Type	Data	Repeat Count	Format	Length
CR/LF	CRLF (fixed)	Numeric entry field	n/a	n/a
String	Alpha entry field	Numeric entry field	Center, Default*, Left, Right	Numeric entry field
SDName	Alpha entry field	n/a	Center, Default*, Left, Right	Numeric entry field

Type	Data	Repeat Count	Format	Length
Special Character	01H – SOH 02H – STX 03H – ETX 04H – EOT 05H – ENQ 06H – ACK 07H – BEL 08H – BS 09H – HT 0AH – LF 0BH – VT 0CH – FF 0DH – CR 0EH – SO 0FH – SI 10H – DLE 11H – DC1 12H – DC2 13H – DC3 14H – DC4 15H – NAK 16H – SYN 17H – ETC 18H – CAN 19H – EM 1AH – SUB 1BH – ESC 1CH – FS 1DH – GS 1EH – RS 1FH – US	n/a	n/a	n/a

4. Enter the data for the data type selected. Shared Data names are listed in Table 3-7. For String type, enter the actual string that should be printed. The Numeric Entry field permits the entered character or string to be repeated a set number of times when the template is printed. Special Characters, listed in Table 3-6, are standard ASCII control characters. Refer to Appendix G, **ASCII Standard and Control Characters**, for details.

Table 3-8: Shared Data Variable Available Names

IND780 Data Field	SDName	Length A/N = alphanumeric
Scale ID	csxx03	20 A/N
Terminal Serial Number	xs0105	13 A/N
Base Serial Number	ce0138	13 A/N
Terminal ID#1	xs0106	20 A/N
Terminal ID#2	xs0107	20 A/N
Terminal ID#3	xs0108	160 A/N

IND780 Data Field	SDName	Length A/N = alphanumeric
Current Time	xd0104	11 A/N
Current Date	xd0103	11 A/N
Transaction Counter Value	xp0101	9 A/N
Grand Total Value	tz0101	12 A/N
Grand Total Count	tz0102	9 A/N
Subtotal Value	tz0103	12 A/N
Subtotal Count	tz0104	9 A/N
Current Target Description	spxx01**	20 A/N
Current Target Value	spxx05**	12 A/N
Fine Feed	spxx10**	12 A/N
Spill Value	spxx09**	12 A/N
+ Tolerance Value (weight)	spxx11**	12 A/N
– Tolerance Value (weight)	spxx12**	12 A/N
+ Tolerance Value (%)	sp0xx14**	12 A/N
– Tolerance Value (%)	spxx15**	12 A/N
ID1 Prompt 1-20	pr0131-pr0150	40 A/N
ID2 Prompt 1-20	pr0231-pr0250	40 A/N
ID1 Prompt Response 1-20	pa0101-pa0120	40 A/N
ID2 Prompt Response 1-20	pa0201-pa0220	40 A/N
Message 01	aw0101	100 A/N
Message 02, etc.	aw0102, aw0103...	100 A/N
Template 1*	pt0101	As Programmed
Template 2*, etc.	pt0102, pt0103...	As Programmed
Template String 1	pt0111	50 A/N
Template String 2–20	pt0112–pt0130	50 A/N

* Using a template field code within another template will insert the entire template into the output.

** Where xx appears in a Shared Data name, it designates a channel (scale), 01, 02, 03, 04 or 05.

Table 3-9: Weight Data Field Available Names

Weight Data Field	SDName	Length A/N = alphanumeric
Tare Source Description	ws0xx09	2 A/N "T<space>", or "PT"
Scale Mode (Gross/Net)	wsxx01	1 A/N (G or N)
Displayed Gross Wt.	wtxx01	12 A/N

Weight Data Field	SDName	Length A/N = alphanumeric
Displayed Tare Wt.	wsxx10	12 A/N
Displayed Net Wt.	wtxx02	12 A/N
Displayed Wt. Units	wtxx03	3 A/N
Custom Unit Conversion Factor	cs0xx13	12 A/N
Custom Unit Name	csxx12	12 A/N

The remaining selections that display depend on the element type selected.

3.8.1.2.2. Special Character Type

There is only one other entry box for Special Character Type, which is Repeat Count. This setting determines how many times the control character will be repeated in the element. For example, if the data was selected as a LF (line feed), the repeat count value could be entered as 5 to repeat the LF character 5 times.

3.8.1.2.3. String Type

When a String Type is selected, the next entry box that displays is Repeat Count, which determines how many times the string will be repeated in the element.

For example, if the string data was an asterisk (*), the repeat count value could be entered as 20 to repeat the character 20 times. The same result could be reached by entering in a string data of 20 asterisks and a repeat count of 1.

The Format & Length selections display next. The choices for the Format selection box are Default, Centered, Left, and Right, which describe the justification of the data within the length of the field. After choosing the format, focus moves to the Length entry box. This value determines how long the element will be. The justification of the data will be positioned within the length entered.

- The ASCII character " (22 Hex) cannot be entered directly as a string type. If this character is required in the template, it should be set up separately as a template string first, and called up on the template as SDName field (pt0111 – pt0130).

3.8.1.2.4. SDName

The Format & Length selections display next for SDName. The choices for the Format selection box are Default, Centered, Left, and Right, which describe the justification of the data within the length of the field. After choosing the format, focus moves to the Length entry box. This value determines how long the element will be. The justification of the data will be positioned within the length entered.

The last selection for SDName is Leading Zero Fill. Normally, Leading Zero Fill will be disabled, which means spaces will be used to fill in leading non-significant data. If enabled, Leading Zero Fill will fill in any leading spaces of the data with zeroes.

Notes on Format & Length

If data for an element includes more characters than the numeric value entered, the output data will be cut off. For example, if the number of characters entered under format on the Output Template Edit Screen is 6, and data for a string that contains 8 characters is entered, only 6 of the characters from the data string will print. If data for a string that contains 4 characters is entered, all of the characters from the data string will print.

The characters that print and their locations are defined by justification selection, which can be Center, Left, or Right.

Example eight-character string of A B C D E F G H

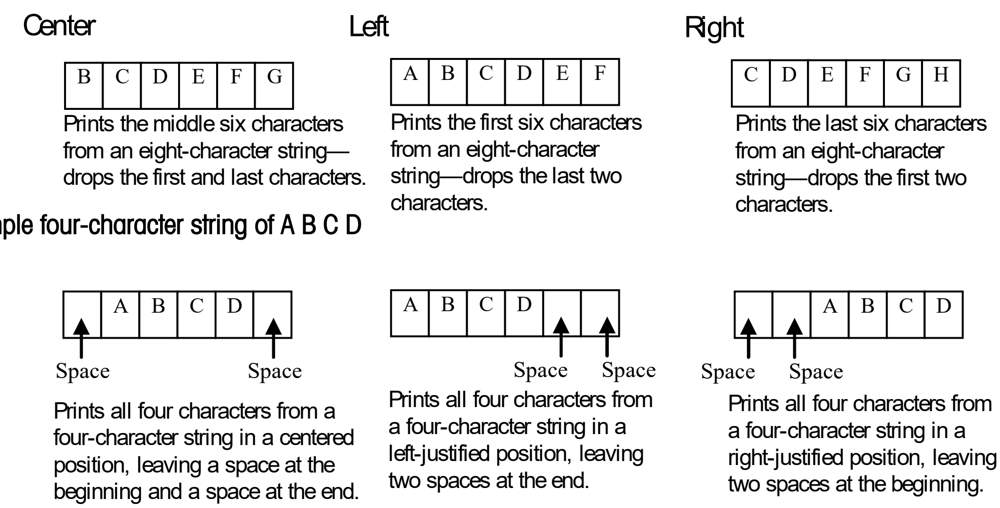


Figure 3-114: Examples of Justification Selections

- Default (Prints the entire string, with numeric fields right justified and alpha fields left justified.)

Press the OK softkey to return to the template setup screen when editing of the element is complete.

Press the ESCAPE softkey Esc to return to the template setup screen without saving the element edits.

Inserting

Press the UP and DOWN navigation keys to select a location in the list of elements to insert a new element. Press the NEW softkey to open the setup screen to create a new record. Configure the parameters as described under Editing. All following elements are moved down 1 position.

Deleting

Press the UP and DOWN navigation keys to select an element to delete. Press the DELETE softkey to delete the element.

Test Printing a Template

Press the PRINT softkey to perform a test print of the template being configured.

3.8.1.3. Strings

The Template Strings setup screen defines strings of characters that are frequently used in template messages. Template strings can be viewed, edited, inserted, deleted, or printed.

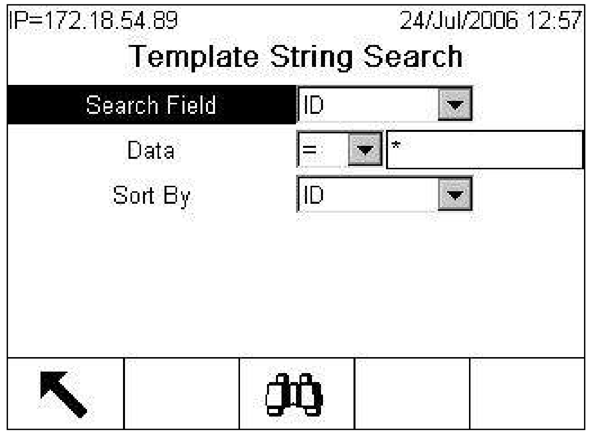


Figure 3-115: Template String Search Setup Screen

3.8.1.3.1. Viewing

To view template strings:

1. Use the Search Field selection box to select ID or String and enter information in the Data field to limit the search, or do not enter any search limits to view all template strings.
2. Press the START SEARCH softkey. The Template Strings Search View screen displays the search results. Records are ordered by ID, with the lowest ID number shown first.

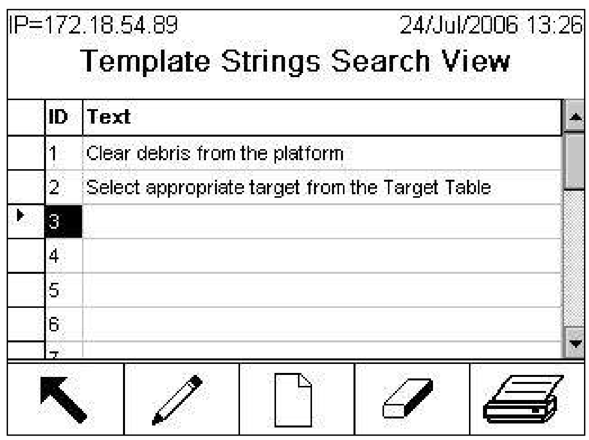


Figure 3-116: Template Strings Search View Screen

3. Press the UP and DOWN navigation keys to scroll up and down the screen in order to view all strings listed.

3.8.1.3.2. Editing

1. Press the UP and DOWN navigation keys to select (highlight) the string record to be edited.
2. Press the EDIT softkey to open the record for editing. The edit screen will be shown with focus on the "Text" label. This is the only editable field on the screen. The ID number cannot be changed.
3. Press ENTER to access the text field. The alpha keys will display.
4. Use the alpha keys and the numeric keypad to edit the string. A string can be a maximum of 50 characters

5. Press ENTER when complete.
6. Press the OK softkey to accept the edited record and return to the Template Strings Search View screen.
7. Press the ESC softkey Esc to return to the Template Strings Search View screen without accepting the changes to the string.

3.8.1.3.3. Inserting

1. Press the NEW softkey to create a new string. An edit screen will be shown with "ID" and "Text" labels.

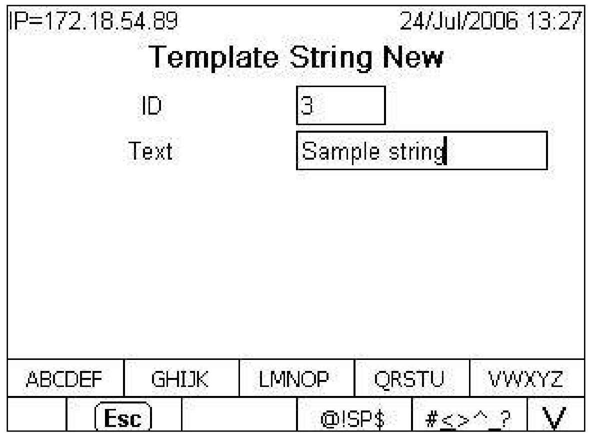


Figure 3-117: Template String New Screen

2. Press the UP and DOWN navigation keys to select the field to enter.
3. Press ENTER to access the field. When entering the ID field, the value shown is the first unused ID. A string's ID number cannot be changed once it is assigned, but the string can be deleted and re-created with a new ID.
4. Use the numeric keypad to enter an ID number from 1 to 20.
5. Press ENTER when complete. If the ID entered already exists, an error display will be shown. The error must be acknowledged and a new ID entered.
6. If the TEXT field is entered, the alpha keys will display. Use the alpha keys and the numeric keypad to edit the text string.
7. Press ENTER when complete.
8. Press the OK softkey to accept the new record and return to the Template Strings Search View screen.
9. Press the ESC softkey Esc to return to the Template Strings Search View screen without accepting the new record.

3.8.1.3.4. Deleting

Press the DELETE softkey to delete a template string from the list.

3.8.1.3.5. Printing

1. Press the PRINT softkey to print the list.

2. Press the EXIT softkey to return to the Template Strings Search Screen.
3. Press the EXIT softkey again to return to the menu tree.

3.8.2. Reports

The reports setup screens enable configuration of the structure of tare and target table reports that are generated by the IND780 terminal.

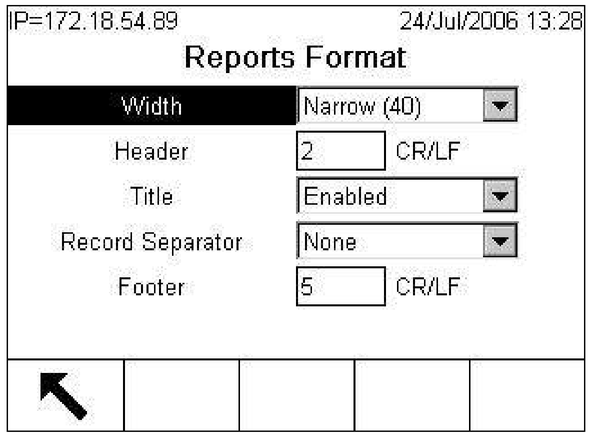


Figure 3-118: Reports Format Setup Screen

3.8.2.1. Width

The Width field determines the width of the report

- Narrow (40) – 40 character-wide reports
- Wide (132) – 132 character-wide reports

3.8.2.2. Header

The Header field specifies the number of blank lines (CR/LF) to be placed at the start of each report.

3.8.2.3. Title

The Title selection box enables a default title line to be printed at the top of the report.

3.8.2.4. Record Separator

A repeated character may be selected as a separator between printed records in the report. This step selects the character to be used. The character choices in the selection box are:

- None (no separator between records)
- * (asterisks)
- - (dashes)
- = (equal symbols)
- CR/LF (blank line)

For example, if * (asterisks) is selected, the resulting line separator will appear as follows:

****

3.8.2.5. Footer

The Footer field specifies the number of blank lines (CR/LF) to be placed at the end of each report.

3.8.3. Connections

The connections setup screen shows the physical port connections that have been programmed for the terminal. This includes the standard serial ports, COM1 and COM2, Ethernet, and USB ports. The optional COM3 and COM4 ports are only available if the options have been installed. This screen lists the defined connections. If no connections are programmed, nothing will be available on the COM ports or Ethernet.

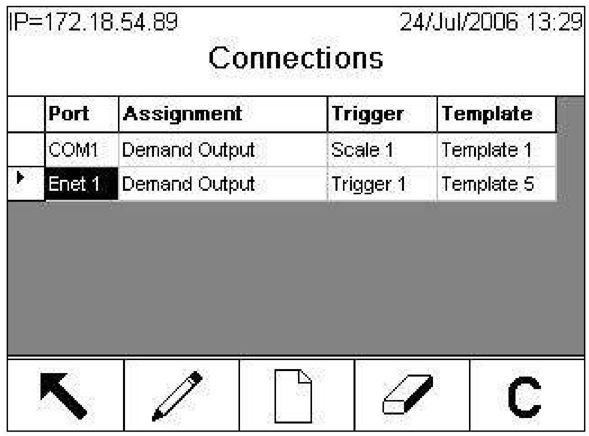


Figure 3-119: Connections Setup Screen

The following functions are available via softkeys on the connections screen:

- Editing
- Inserting
- Deleting
- Clearing

3.8.3.1. To edit or insert connection assignments

1. Press the UP and DOWN navigation keys to select (highlight) a connection assignment in the list.
2. Press the EDIT softkey to open the screen for editing a specific connection assignment or press the NEW softkey to create a new connection assignment.

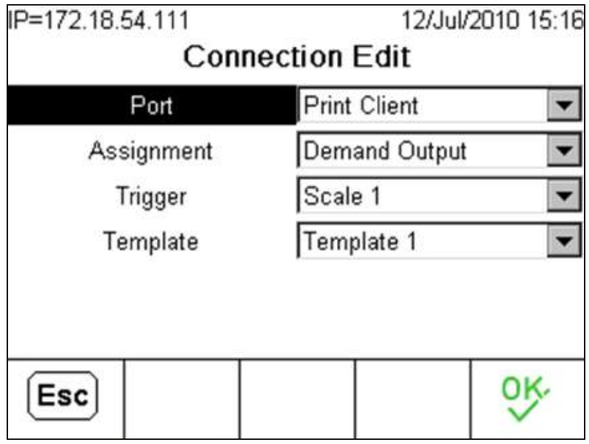


Figure 3-120: Connection Edit Setup Screen

Parameters that are configured in the connections screen include the port and the type of input or output assignment. Depending upon these selections, the remaining fields will vary but could include the trigger, the template to be sent, and whether the checksum will be sent or not.

3. Press the UP and DOWN navigation keys to move the focus to the fields to be edited or added.
4. Press the ENTER key to select a field to edit or add.
5. Use the selection boxes for each field to select the port, associated assignment, and desired settings for the connection. Available selections are as follows:

- Specific details of the different assignments can be found in Appendix D, **Communications**.
- A port may be used by more than one connection, but demand and continuous connections cannot share a port.

Table 3-10 shows the various options available when defining a connection. Options vary depending on the port type selected for the connection. Blank cells indicate settings that are not applicable to the assignment.

Table 3-10: Connection Options by Port Type

<table>
<tr><th>Port</th><th>Assignment</th><th>Trigger</th><th>Template</th><th># of Nodes</th><th>Node Address</th><th>Checksum</th></tr>
<tr><td>FILE</td><td>Demand Output</td><td>None*, Scale 1 – Scale 4, Sum Scale</td><td colspan="4"></td></tr>
<tr><td rowspan="8">COM1
COM2
COM3
COM4</td><td>None*</td><td colspan="5" rowspan="2"></td></tr>
<tr><td>ASCII Input</td></tr>
<tr><td>Continuous Output</td><td>None*, Scale 1 – Scale 4, Sum Scale</td><td colspan="3"></td><td rowspan="3">Disabled*, Enabled</td></tr>
<tr><td>Continuous – Multi 1</td><td colspan="4" rowspan="2"></td></tr>
<tr><td>Continuous – Multi 2</td></tr>
<tr><td>Continuous – Template</td><td rowspan="3">None*, Scale 1 – Scale 4, Sum Scale</td><td>Template 1* – Template 10</td><td colspan="3"></td></tr>
<tr><td>Continuous – Extended</td><td colspan="2"></td><td>1* - 9</td><td>Disabled*, Enabled</td></tr>
<tr><td>CTPZ Input</td><td colspan="4"></td></tr>
</table>

Port	Assignment	Trigger	Template	# of Nodes	Node Address	Checksum
	Demand Output	None*, Scale 1 – Scale 4, Sum Scale, Trigger 1 – Trigger 20	Default* Template 1 – Template 10			
	Keyboard Input					
	Remote I/O			1*		
	Reports					
	SICS	None*, Scale 1 – Scale 4, Sum Scale				
	Totals Report					
Enet1 Enet2 Enet3	Demand Output	None*, Scale 1 – Scale 4, Sum Scale, Trigger 1 – Trigger 20	Default* Template 1 – Template 10			
Enet4	Continuous Output	None*, Scale 1 – Scale 4, Sum Scale				
	Continuous - Template		Template 1* -- Template 10			
	Continuous - Extended				1* - 9	
	Continuous - Multi 1 Continuous - Multi 2					
EPrint	Demand Output	None*, Scale 1 – Scale 4, Sum Scale, Trigger 1 – Trigger 20	Template 1* -- Template 10			
	Continuous Output	None*, Scale 1 – Scale 4, Sum Scale				
	Continuous Template		Template 1* -- Template 10			
	Continuous - Extended				1* - 9	
	CTPZ Input					
	Continuous - Multi 1 Continuous - Multi 2					
Print Client	Demand Output	None*, Scale 1 – Scale 4, Sum Scale	Template 1* -- Template 10			

- Not all choices are available for all connection assignments. Only valid choices are shown in the selection boxes.
- If Port Type is set to FILE, the port is automatically assigned to Demand Output. A PRINT request made while the triggering scale is selected will add the transaction to the IND780's Alibi Memory, rather than sending the record to an external printer.

6. Press the OK softkey OK to accept the connection parameters and return to the Connections setup screen when editing or adding the connection assignment is complete.
7. Press the ESCAPE softkey Esc to discard the connection parameters and return to the Connections setup screen without saving the connection assignment edits or additions.
8. Press the DELETE softkey to delete a connection assignment from the Connections list.
9. Press the CLEAR softkey C to clear all connection assignments in the Connections list.
10. Press the EXIT softkey to return to the menu tree.

- The Trigger field sets the scale channel or trigger that is associated with the connection.
- By default, the IND780 has a COM1 connection set up for demand output, triggered by Scale 1. Pressing the terminal's PRINT key when Scale 1 is selected will cause a print via COM1 with output formatted by Template 1, as defined by this default connection. If more scales are installed, additional connections must be set up for each of them.
- When Port and Assignment selections are made that permit the use of a Trigger other than the scale or sum scale channels (as indicated in Table 3-10), then Triggers 1 through 20 appear in the Trigger list. These triggers may be associated with specific applications or, in the case of Triggers 1 through 5, with a Custom Trigger softkey assignment. When Continuous-Template is the Assignment the Template list appears, permitting the selection of a template used to format the output.
- The default template for the Totals Report is Template 5.
- The Checksum field is available for standard and multiple continuous outputs using COM1/2/3/4 only.
- The Continuous-Multi 1 and Continuous-Multi 2 outputs cannot be used concurrently. The terminal can support only one of them at a time, even if they are assigned to different ports.
- The SICS selection provides Levels 0, 1, 2 and 3 interface commands. Refer to Appendix D, Communications, for details on the SICS protocol.
- If a usage conflict occurs – for example, if no trigger is selected in a Continuous-Template assignment, or a trigger is selected that is already in use by another Connection – an error message displays.
- Demand and continuous output assignments are available through the Ethernet port. Demand output is available through Enet1-3 and continuous types of output are available through Enet4. Enet ports would require a client to register for the demand or continuous outputs through the Shared Data Server. Refer to Appendix D for further details on registering for demand and continuous data. Multiple connections, each with a different scale trigger, can be assigned to a single port with all the data readily available.
- Continuous - extended output connections can be used with COM1 through COM4, Enet4 and Eprint ports. They extend the standard 17-byte continuous output format to 24 bytes (an optional checksum is provided with COM1/2/3/4). The additional bytes provide a node address and, optionally, custom application bits. This format supports control of traffic lights in the ADI320 and ADI420 remote scoreboards.
- EPrint offers a method to access the demand or continuous output data directly through the Ethernet port. No Shared Data Server login and commands are required to register for the data. The data output string does not include any Shared Data Server response messages, and reflects only the configured template data or the continuous output string.
- When several continuous output connections with different scale triggers are assigned to the EPrint port, only the current selected scale's data will be output. The EPrint port is made available only through the Ethernet interface's secondary port, which can be set up in **Communication > Network > Port**.

3.8.4. Serial

Serial communication setup screens provide access to the communication parameters for the serial ports COM1, COM2, COM3, and COM4. The COM3 and COM4 ports are only shown if the option boards have been installed.

- For continuous output rates, please refer to page 3-53.

3.8.4.1. COM1, COM2, COM3, and COM 4

Use the COM1, COM2, COM3, and COM4 setup screens to configure the parameters for serial ports.

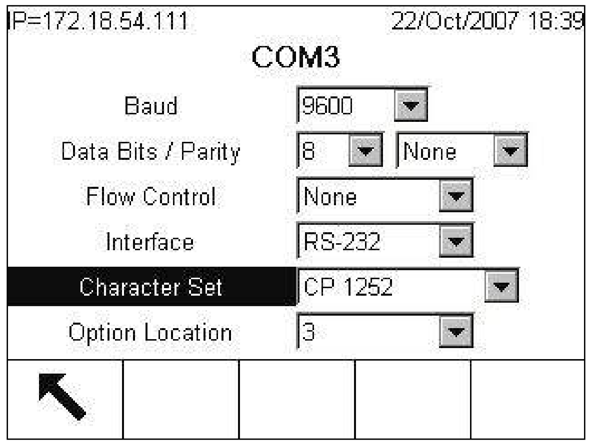


Figure 3-121: COM3 Setup Screen

3.8.4.1.1. Baud

Use the Baud selection box to set the baud rate for the serial port. Selections include:

300	4800	57600
600	9600	115200
1200	19200	
2400	38400	

3.8.4.1.2. Data Bits

Use the Data Bits selection box to set the data bits to either 7 or 8 for the serial port.

3.8.4.1.3. Parity

Use the Parity selection box to set the parity to None, Odd, or Even for the serial port.

3.8.4.1.4. Flow Control

Use the Flow Control selection box to set the flow control to either None or XON-XOFF (software handshaking).

3.8.4.1.5. Interface

Use the Interface selection box to select the serial port interface. Selections include:

- RS-232*
- RS-422
- RS-485

  * COM1 supports RS-232 only.

RS-232 can also be used if either RS-422 or RS-485 is selected.

3.8.4.1.6. Character Set

Use the Character Set selection box to chose the ASCII character set that the terminal's designated serial port will use. This functionality will allow the printing of region-specific characters corresponding to the respective ASCII character sets. Selections include:

- CP 1252 (default setting). Latin code page 1252 character set.
- CP 437. Latin code page 437 character set.
- CP 850. Latin code page 850 character set.
- Chinese GBK. Simplified Chinese code page 936 character set.
- CP 1251. Cyrillic code page 1251 character set.

3.8.4.1.7. Option Location

The Option Location selection box is available for COM3 and COM4 only. This setting allows you to choose which of the serial option PCB card locations to apply to the currently selected COM port.

3.8.5. Network

Network setup screens are used to configure Ethernet and FTP connections.

3.8.5.1. Ethernet

Ethernet is available for TCP/IP transfer of data, connecting to InSite, shared data server access, and FTP. The Medium Access Control (MAC) Address cannot be edited, and is shown for information only. Setup for Ethernet allows static Internet Protocol (IP) addressing only. If the Dynamic Host Configuration Protocol (DHCP) Client setting is enabled, the IP Address, Subnet Mask, and Gateway Address fields are assigned automatically by the network and become read-only items.

Use the UP/DOWN navigation keys to select a field to edit. Press the ENTER key to edit the field or selection choice. The Ethernet branch includes the following fields:

3.8.5.1.1. DHCP Client

The DHCP client is disabled by default. If disabled, the IP address must manually be assigned. If enabled, the terminal will be assigned an IP address by the network server, as seen in Figure 3-122

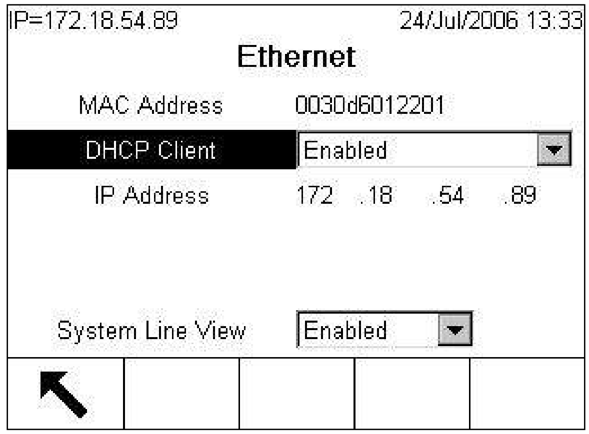


Figure 3-122: Ethernet Setup Screen, DHCP Client Enabled

A Windows CE error window may appear when DHCP Client settings do not match current network connections; this window can be dismissed by pressing the ENTER key on the front panel, or on the optional external keyboard.

3.8.5.1.2. IP Address

If DHCP Client is disabled, enter the IP address for the IND780 terminal. After each group of digits has been entered, press ENTER to proceed to the next group. The default value for the IP is 192.168.0.1.

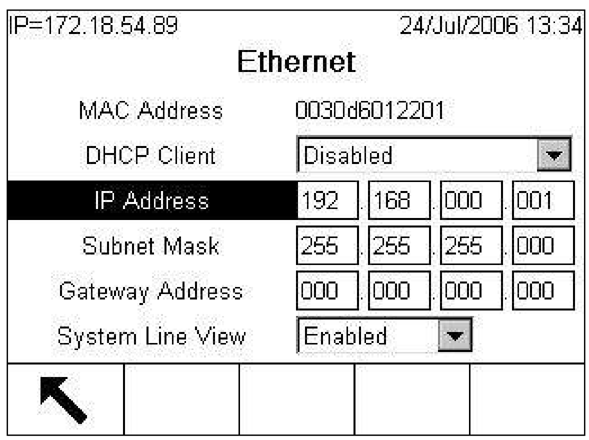


Figure 3-123: Ethernet Setup Screen DHCP Client Disabled

3.8.5.1.3. Subnet Mask

Enter the subnet mask (or view if DHCP Client is enabled) for the IND780 terminal. After each group of digits has been entered, press ENTER to proceed to the next group. The default value for the subnet mask is 255.255.255.000.

3.8.5.1.4. Gateway Address

Enter the gateway address (or view if DHCP Client is enabled) for the IND780 terminal. After each group of digits has been entered, press ENTER to proceed to the next group. The default value for the gateway is 000.000.000.000

After entry is complete, press the EXIT softkey ↖ to return to the menu tree

3.8.5.1.5. System Line View

This setting enables or disables the display of the terminal's IP address at top left in the run screen. The default value is disabled, meaning the IP address does not display.

3.8.5.2. Port

The Port setup screen displays the primary Ethernet port number and also allows a secondary port number to be configured for the same Ethernet interface. The primary port is reserved for the Shared Data Server access which is described in Appendix D, **Communications**. The secondary port allows for either Shared Data Server access or EPrint connections, if configured. The primary and secondary ports can be used concurrently.

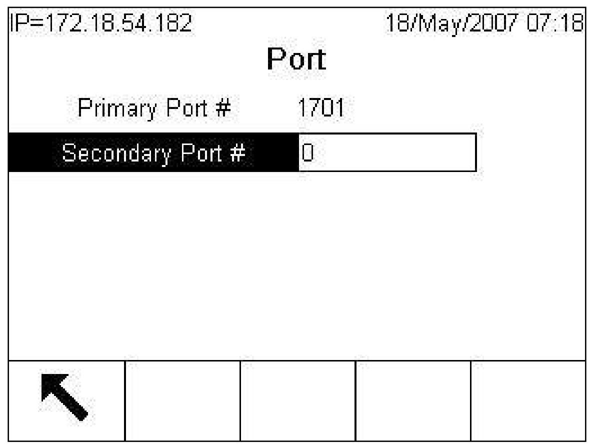


Figure 3-124: Port Setup Screen

3.8.5.2.1. Primary Port #

The Primary Port number for the Ethernet TCP/IP interface is fixed at 1701, and is displayed as a read-only field in the Port setup screen (Figure 3-124).

3.8.5.2.2. Secondary Port #

If a valid, user-defined Secondary Port number is entered, the Shared Data Server will also be accessible on a second TCP/IP port. However, if an EPrint connection is configured in setup at **Communication > Connections**, Shared Data Server will is no longer be available on this port, which will be used entirely for the EPrint demand or continuous types of output. A change to the Secondary Port number may require a manual power cycle of the terminal before the change becomes active.

3.8.5.3. FTP

The setup screen for FTP displays usernames and access levels for file download. Access levels for all parameters are shown in Appendix B, Default Settings. Usernames can be edited, inserted, or deleted.

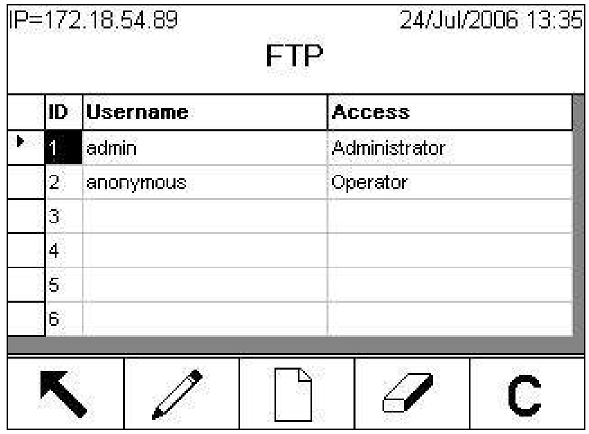


Figure 3-125: FTP Setup Screen

3.8.5.3.1. To edit or insert a username

1. Press the UP and DOWN navigation keys to select (highlight) a username in the table.
2. Press the EDIT softkey to open the setup screen for editing a username. To create a new username, press the NEW softkey.
3. Press the ENTER key to select the Username field. The alpha keys display.

- The Username field is accessible only when entering a new FTP user.

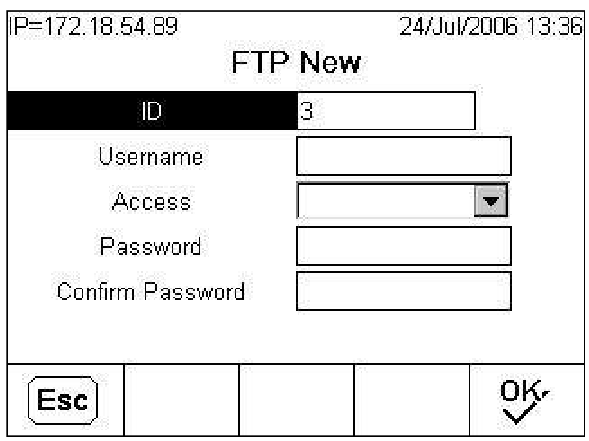


Figure 3-126: FTP New Setup Screen

4. Use the alpha keys to edit or enter the desired username.
5. Use the Access selection box to assign the appropriate access level to the user. The following access levels are available:

- Operator
- Supervisor

- Maintenance
- Administrator

6. Press the DOWN navigation key to view the second screen, which displays the Password and Confirm Password fields.
7. Enter the desired password in the Password and Confirm Password fields.
8. Press the OK softkey to accept the username and password as entered.
9. Press the ESCAPE softkey to exit without saving the username and password.
10. Press the DELETE softkey to delete a username from the table on the Users screen.
11. Press the CLEAR softkey to clear all usernames from the list and leave only the default username "admin".

3.8.5.4. Print Client

The Print Client connection allows the IND780 to send data to a network printer. In addition to the Print Client configuration, a print client connection must be created in setup at **Communication > Connections**.

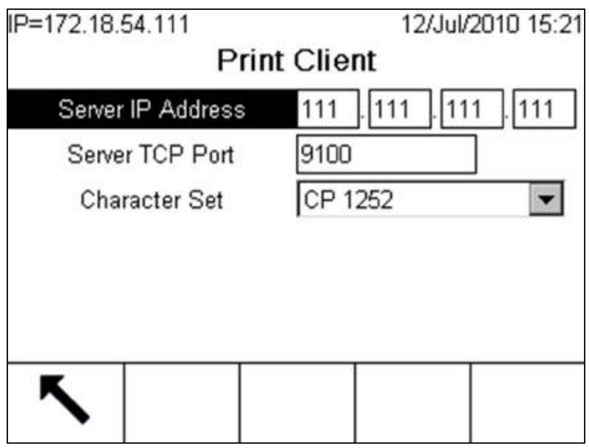


Figure 3-127: Print Client

The Server IP Address is the IP address of the printer where the IND780 is sending the print information. The Server TCP Port is the port number of the printer on the network.

3.8.5.5. Cluster

IND780 terminals may be connected into a cluster via the Ethernet TCP/IP Client Server architecture. Once clustered, terminals can share resources, such as printers, operator consoles and PLC interfaces. For further details on setting up and using clustering, refer to Appendix D, **Communications**.

3.8.5.5.1. This Terminal

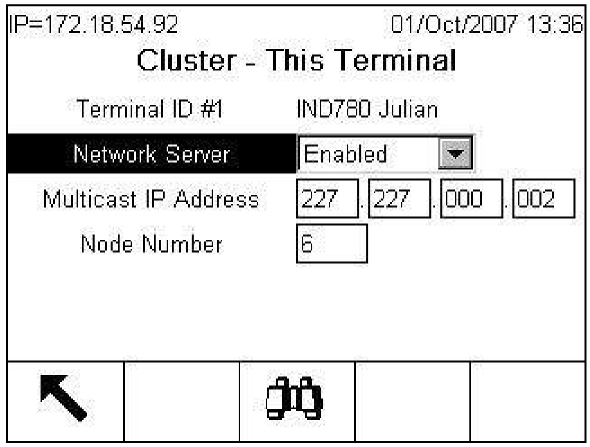


Figure 3-128: Cluster – This Terminal Setup Screen

The Cluster – This Terminal screen (Figure 3-128) shows the local terminal's ID #1 (set at **Terminal > Device**). If Network Server is set to Enabled, other terminals will be able to view this one remotely. This setting does not affect serial port and PLC sharing.

The multicast IP address must be the same for all terminals in a cluster. Multicast IP addresses are in a reserved set within the address range fom 224.0.0.0 through 239.255.255.255.

Enter an unused terminal node number ranging from 1 to 20. Each clustered terminal **must** have a unique node number. To select from a list of available node numbers, press the VIEW softkey . From this view, select an unused node number, indicated by an IP Address of 0.0.0.0, then press OK .

3.8.5.5.2. Members

The Cluster Members screen (Figure 3-129) displays all terminals currently included in the cluster. The Terminal number column indicates the terminal's node identifier. Rows showing an IP address of 0.0.0.0 represent nodes not yet assigned in the cluster.

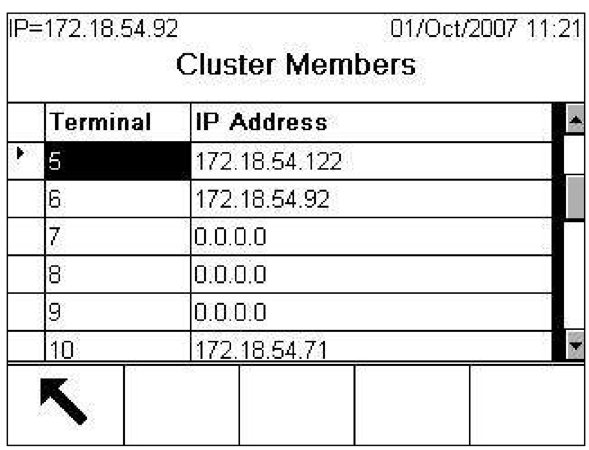


Figure 3-129: Cluster – Members View

3.8.5.5.3. Connections

Cluster connections allow a clustered terminal to redirect its Demand or Continuous output to another terminal's serial ports. The Cluster Connections screen (Figure 3-130) shows all currently defined connections.

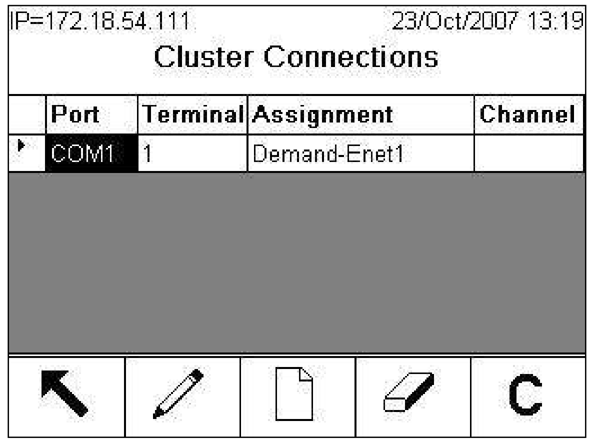


Figure 3-130: Cluster Connections Screen

From the Connections screen, existing connections can be edited, new ones created, and either selected or all connections deleted. Figure 3-131 shows the screen used to define a new cluster connection. The Connection Edit screen is functionally identical.

The Local Port setting selects the local terminal's COM port to use for the assigned output.

The Source Terminal identifies the remote terminal node that requires its output to be redirected to the local port. Enter the source terminal's node number as seen in the Cluster Members screen (Figure 3-129).

Assignment selects the type of output that is being redirected. Choices include:

- Continuous
- Demand-Enet1
- Demand-Enet2
- Demand-Enet3

The selection made here must correspond to the output connection configured in the source terminal. Demand, Standard Continuous and Continuous Template outputs are types of remote connection that are supported.

Note that a Continuous connection cannot be defined for a Local port that is already associated with a Demand output assignment. Furthermore, only one continuous output type connection can be redirected.

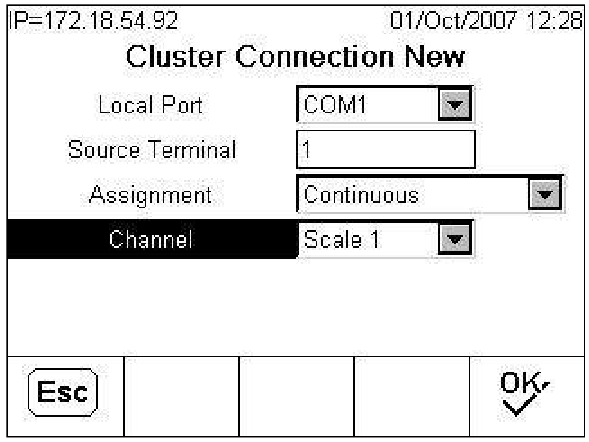


Figure 3-131: Cluster – Connection New Screen

The Channel selection box defines which scale channel on the remote terminal has its continuous output redirected. If a Demand connection is selected, the Channel parameter does not appear.

3.8.5.6. Email Alert

Email alert configuration is available for parameters and recipients.

- Depending on the configuration of alert recipients (see below), Email Alert will function only if the Maintenance Log is **enabled**. Refer to the Maintenance Log configuration section, below.

3.8.5.6.1. Parameters

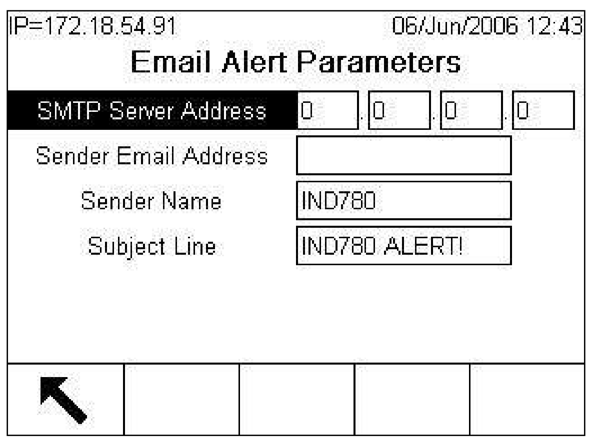


Figure 3-132: Email Alert Parameters Screen

- The IND780 will send alert emails for several different situations. This functionality requires a SMTP server IP address, a sender email address, a sender name, and a subject line.
- The SMTP Server Address is the IP address of the email server to be used by the indicator. You may need to contact your IT department to obtain this number.
- The sender email address is the full address of the sender. This address should include the @domainname.com.
- The sender name defaults to IND780, but can be set to any alphanumeric name. The softkeys change to alphanumeric characters when the sender name is selected by pressing ENTER.

- The Subject Line defaults to ALERT! But can be set to any alphanumeric name. The softkeys change to alphanumeric characters when the Subject Line is selected by pressing ENTER.

3.8.5.6.2. Recipients

Figure 3-133: Email Alert Recipients Screen

Set up each recipient of alert email messages from the IND780 terminal. To edit an already existing record, press the EDIT softkey . To enter a new recipient, press the NEW softkey . To erase a record, press the DELETE softkey . To test the function of the Email Alert feature, press the SEND EMAIL softkey . A test email will be sent to the recipient currently in focus.

Inserting or editing a record will open a window allowing you to enter the email address of the recipient and the level of trigger to initiate an email to this recipient. The email address must be in the format username@domainname.com. Figure 3-134 shows the Email Alert Recipients New screen.

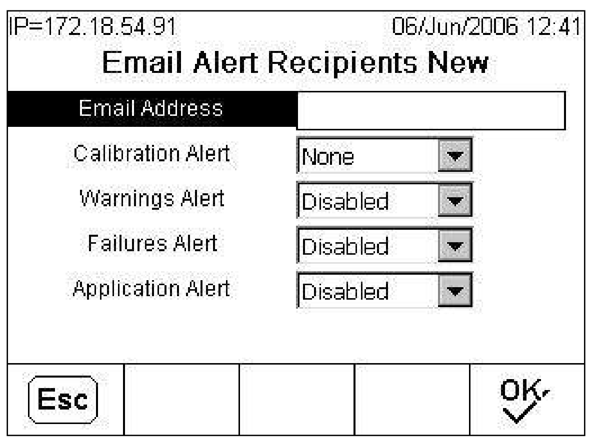


Figure 3-134: Email Alert Recipients New Screen

The alert trigger can be set to 4 different levels:

- None
- Calibration Alert (Maintenance Log must be enabled)
- Warnings Alert (Error Log must be enabled)

- Failures Alert (Error Log must be enabled)
- Application Alert (controlled by a custom application)

Press OK ✓ to accept recipient entry.

3.8.5.6.3. Structure and Content of Email Alert Message

The content of an email alert message appears in the subject line of the message. It is a comma- and colon-delimited string that includes information configured in the Email Alert Parameters screen, and reproduces information from a maintenance log record. For further details regarding the structure of the Maintenance Log and the range of possible event codes and statuses, refer to Appendix C, **Table and Log File Structure**.

A typical message would appear as follows – note that the string may be wrapped onto a second line because of its length:

IND780 ALERT!:IND780:23:MAINT.CALIBRATION TEST PASSED,01,000,SUCCESS,2008/04/08 10:50:12

Element	Explanation	Source
IND780 ALERT!	Subject Line	Email Alert Parameters
IND780	Sender Name	Email Alert Parameters
23	Event code	Maintenance Log: Event
MAINT.CALIBRATI ON TEST PASSED	Meaning of event code	n/a
01	Scale number	Maintenance Log: Channel
000	POWERCELL ID. [000 if POWERCELLs not in use]	Maintenance Log: Cell
SUCCESS	Event status	Maintenance Log: Status
2008/04/08 10:50:12	Date and time	Maintenance Log: Date and Time

3.8.6. PLC Interface

The PLC parameters are only available when a PLC option is installed.

PLC setup screens include:

- A-B RIO (Discontinued, January 2021)
- Analog output
- ControlNet
- DeviceNet
- Ethernet / IP
- Modbus TCP
- PROFIBUS
- PROFINET
- Data Format

3.8.6.1. A-B RIO

The Allen Bradley RIO interface was discontinued in January 2021. Information provided in this manual is for the purpose of legacy installation support only.

The Allen-Bradley Remote I/O (A-B RIO) network is an Allen-Bradley proprietary network that permits certain PLCs to communicate to additional racks of input and output devices or to other peripheral devices that implement the RIO interface.

Additional interface information and programming examples can be found in the **IND780 PLC Interface Manual**, which is included on the documentation CD.

The A-B RIO setup screen (Figure 3-135) is used to configure A-B RIO as a PLC interface option.

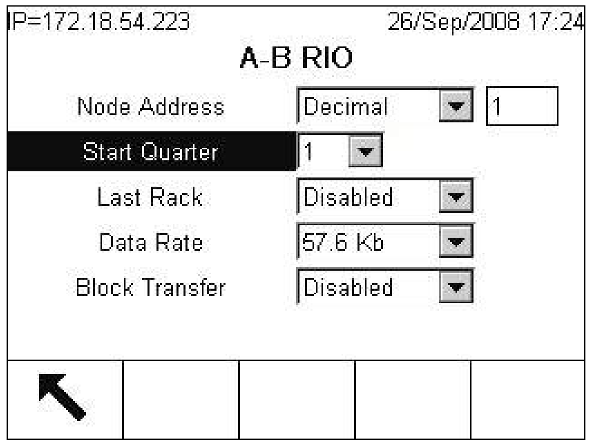


Figure 3-135: A-B RIO Setup Screen

3.8.6.1.1. Node Address

Each IND780 Terminal connected to the network represents 1 physical node; however, the addressing of the node is defined as a logical rack address. This address is determined by the system designer, then configured in the IND780 Terminal by selecting the Node Address text box and using the numeric keypad to enter the appropriate node address (0–59 Dec). The address entered in the IND780 terminal can be specified in decimal or octal, while the address entered in the PLC is octal.

3.8.6.1.2. Start Quarter (Group)

Each scale occupies a quarter rack (single group) in the RIO address space and the quarter (group) may be defined as the first (0), second (2), third (4), or fourth (6) quarter (group) of a rack. Designate the location of the PLC that is the highest quarter used in a logical rack by using the selection box to select the appropriate start quarter address 1–4 (group 0–6).

3.8.6.1.3. Last Rack

The IND780 configuration selections enable designation of the last rack. Use the selection box to select Disabled or Enabled for last rack designation.

3.8.6.1.4. Data Rate

Use the selection box to select the desired data rate. Selections available are:

- 57.6 Kb
- 115.2 Kb
- 230.4 Kb

3.8.6.1.5. Block Transfer

Use the Block Transfer selection box to either Disable or Enable the block transfer mode of operation.

3.8.6.2. Analog Output

The IND780 terminal automatically detects the presence of an Analog Output option board if one is installed. When an Analog Output option is detected, the IND780 enables the Analog Output parameters at **Setup > Communication > PLC Interface > Analog Output**.

To configure the Analog Output Kit Option:

1. With power to the IND780 terminal removed, connect a current meter to the appropriate 4-20mA output channel. If the customer's device is already connected, the meter is not necessary.
2. Apply power to the terminal and enter Setup. Navigate to **Communication > PLC Interface**.
3. Select the **Analog Output** branch and the respective Analog Output channel to configure. The Analog Output screen will appear, as shown in Figure 3-136.

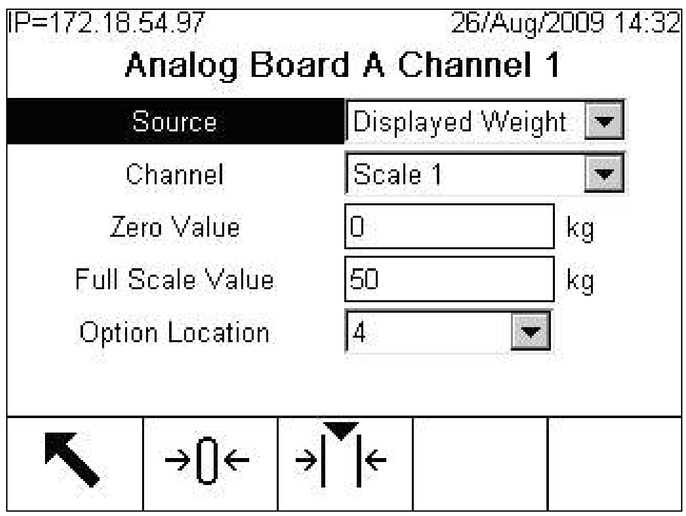


Figure 3-136: Analog Output 1 Screen

4. The following settings are made in this screen:

Parameter	Explanation and Settings
Source	Choices are **None**, **Displayed Weight** (the default), **Gross Weight**, **Rate**, **ABS Displayed Weight**, **ABS Rate**, and **Application**. None disables the analog output. **Displayed Weight** outputs an analog signal based on the displayed net or gross weight. When **Gross Weight** is selected, the analog signal is based on the gross weight regardless of what the net weight might be. In order to be available as a source, **Rate** must be configured at **Scale > Rate**. The **ABS Displayed Weight** and **ABS Rate** settings display absolute values, showing displayed weight and rate values, respectively, regardless of whether weight is being added or subtracted from the scale. The **Application** selection allows a TaskExpert program to assign an application variable as the source and to control the operation of the analog

Parameter	Explanation and Settings
	output. Refer to the **TaskExpert Reference Manual** (64060431) for details.
Channel	Options are Scale 1, Scale 2, Scale 3, Scale 4, or Sum Scale (if they are enabled). This selection refers to the source channel.
Zero Value	Enter the desired source value at which the analog output should be at 4 mA (zero) level. Typically this would be "0" in most applications; however, any valid value below the Full Scale value can be used.
Full Scale Value	Enter the desired source value at which the analog output should be at its 20 mA (high limit) level. For sources of weight, this would typically be scale capacity, but it could be lower. For rate, this should be the rate value that should provide a full analog output signal.
Option Location	Since up to two Analog Output option boards can be installed in the IND780, the Option Location selection specifies which of the option board slot locations to apply to the currently selected Analog Output channel. Choices include None, 2, 3, 4, 5 and 6.

5. After all these parameters have been entered, the analog output signal can be adjusted to meet the customer's specific requirements using the CAPTURE ZERO softkey →0← and the CAPTURE SPAN softkey →|←.
6. To adjust the zero reference analog signal, press the CAPTURE ZERO softkey →0←. Note that a display message is shown warning that during the adjustment, the analog output signal will change value indicating that it will not represent the source value. Press the ESCAPE softkey Esc to exit the zero adjustment process or press the OK softkey OK to continue the adjustment process.
7. At the **Analog Output - Calibrate Zero** screen (Figure 3-137), use the softkeys to adjust the analog output signal to be exactly zero on the attached device. The available softkeys are described in Table 3-11.

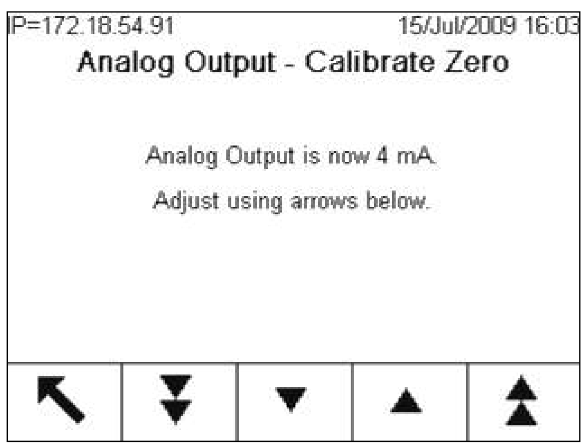


Figure 3-137: Analog Output – Calibrate Zero Screen

Table 3-11: Analog Output Calibrate Softkey Descriptions

	Coarse Down	Decreases the analog signal level in large steps.
	Fine Down	Decreases the analog signal level in small steps.

	Fine Up	Increases the analog signal level in small steps.
	Coarse Up	Increases the analog signal level in large steps.

8. When the zero adjustment is complete, press the EXIT softkey to return to the Analog Output screen.
9. Now, the full scale analog output value can be adjusted by pressing the CAPTURE SPAN softkey . A similar warning message will be shown indicating the analog output will change and will not monitor changes in the source. Press the ESCAPE softkey Esc to exit the span adjustment process or press the OK softkey OK to continue the adjustment process.
10. At the **Analog Output - Calibrate Full** screen (Figure 3-138), use the softkeys to adjust the analog output signal to be exactly what the customer's device requires for its high limit. The available softkeys are described in Table 3-11.

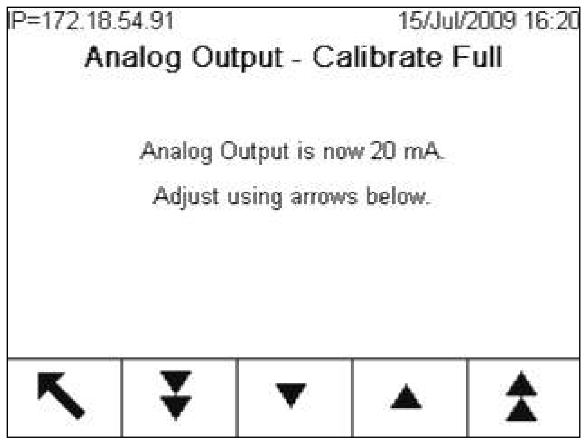


Figure 3-138: Analog Output – Calibrate Full Screen

11. When the full scale adjustment is complete, press the EXIT softkey to return to the Analog Output screen.

3.8.6.3. ControlNet

The ControlNet PLC interface enables the IND780 terminal to communicate to ControlNet Programmable Logic Controllers (PLCs) through direct connection to the ControlNet network. Figure 3-139 shows the ControlNet interface setup screen.

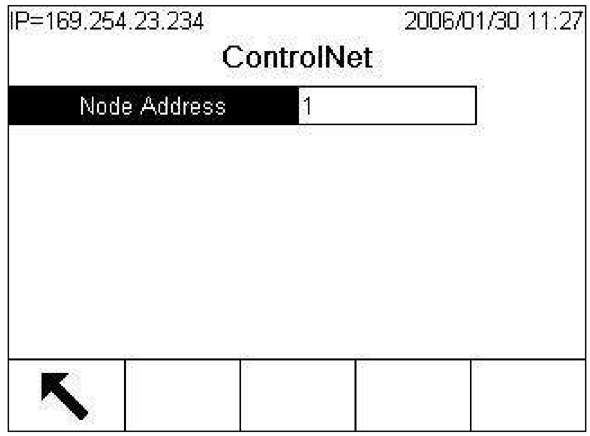


Figure 3-139: ControlNet PLC Interface Setup Screen

The ControlNet interface has the following features:

- User-programmable node (MAC ID) address.
- Capability for bi-directional discrete mode communications (Class 1 Messaging) of weight or display increments, status, and control data between the PLC and the IND780.

Additional interface information and programming examples can be found in the **IND780 PLC Interface Manual**, which is included on the documentation CD.

3.8.6.3.1. Node Address

Each IND780 Terminal connected to the network represents 1 physical node. This address is determined by the system designer, then configured in the IND780 Terminal by selecting the Node Address text box and using the numeric keypad to enter the appropriate node address (0–125).

3.8.6.4. DeviceNet

DeviceNet is an RS-485-based network utilizing CAN chip technology. This network was created for bit and byte-level devices. The network can be configured to run up to 500Kbits per second depending on cabling and distances. Messages are limited to 8 un-fragmented bytes. Any larger message must be broken up and sent in multiples. The IND780 implementation of DeviceNet does not support fragmented messages – all messages are 8 bytes or shorter. The network is capable of 64 nodes including the master, commonly called the scanner.

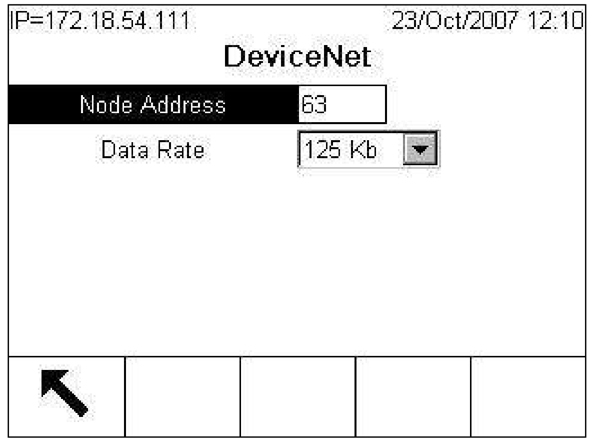


Figure 3-140: DeviceNet PLC Interface Setup Screen

3.8.6.4.1. Node Address

The IND780 can be assigned any valid DeviceNet node address. Typically 0 is reserved for scanner cards and 63 (the default value) for new devices.

3.8.6.4.2. Data Rate

The data rate may be set to 125, 250 or 500 Kb. Rate selection depends on cabling and distances in the DeviceNet network.

3.8.6.5. EtherNet / IP

EtherNet / IP, short for "EtherNet Industrial Protocol," is an open industrial networking standard that takes advantage of commercial, off-the-shelf EtherNet communication chips and physical media. This networking standard supports both implicit messaging (real-time I/O messaging) and explicit messaging (message exchange). The interface enables the IND780 terminal to communicate with EtherNet / IP Programmable Logic Controllers (PLCs) through direct connection to the EtherNet / IP network at either 10 or 100 MBPS speed.

EtherNet / IP interface has the following features:

- DHCP automatic network IP addressing or user-programmable IP addressing.
- Capability for bi-directional discrete mode communications (Class 1 Messaging) of weight or display increments, status, and control data between the PLC and the IND780.

Additional interface information and programming examples can be found in the **IND780 PLC Interface Manual**, which is included on the documentation CD. The ETHERNET / IP setup screen Figure 3-141 is used to configure this PLC interface option.

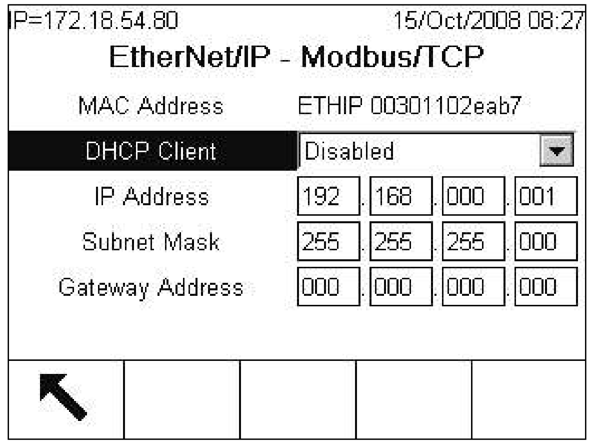


Figure 3-141: EtherNet / IP PLC Interface Setup Screen

3.8.6.5.1. MAC Address

The Terminal's MAC address in the Ethernet / IP network is assigned automatically.

3.8.6.5.2. DHCP Client

The DHCP Client is enabled by default. If disabled, the IP address must be assigned manually. If enabled, the terminal will be assigned an IP address by the network server.

3.8.6.5.3. IP, Subnet Mask and Gateway Address

The Terminal's IP Address, Subnet Mask and Gateway Address are configured as described in section 3.8.5.1, above.

3.8.6.6. Modbus TCP

Additional interface information and programming examples can be found in the **IND780 PLC Interface Manual**, which is included on the documentation CD. The Modbus TCP setup screen (Figure 3-142) is used to configure this PLC interface option.

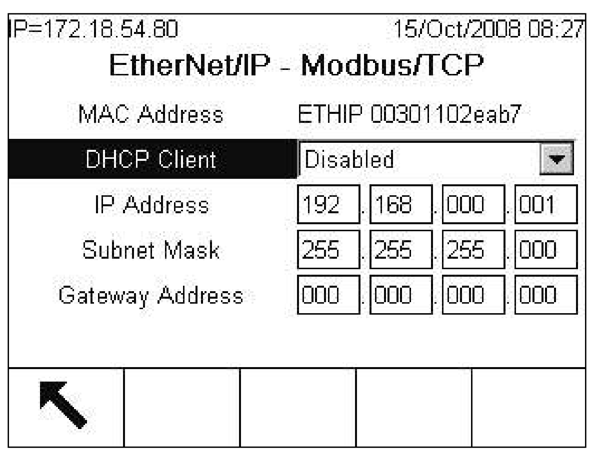


Figure 3-142: Modbus TCP PLC Interface Setup Screen

3.8.6.6.1. MAC Address

The Terminal's MAC address in the Modbus TCP network is assigned automatically.

3.8.6.6.2. DHCP Client

The DHCP Client is enabled by default. If disabled, the IP address must be assigned manually. If enabled, the terminal will be assigned an IP address by the network server.

3.8.6.6.3. IP, Subnet Mask and Gateway Address

The Terminal's IP Address, Subnet Mask and Gateway Address are configured as described in section 3.8.5.1, above.

3.8.6.7. PROFIBUS

The PROFIBUS PLC Interface supports discrete data transfer that enables bi-directional communication of discrete bit-encoded information or 16-bit binary word (signed integer) numerical values.

Additional interface information and programming examples can be found in the **IND780 PLC Interface Manual**, which is included on the documentation CD.

The PROFIBUS setup screen (Figure 3-143) is used to configure PROFIBUS as a PLC interface option.

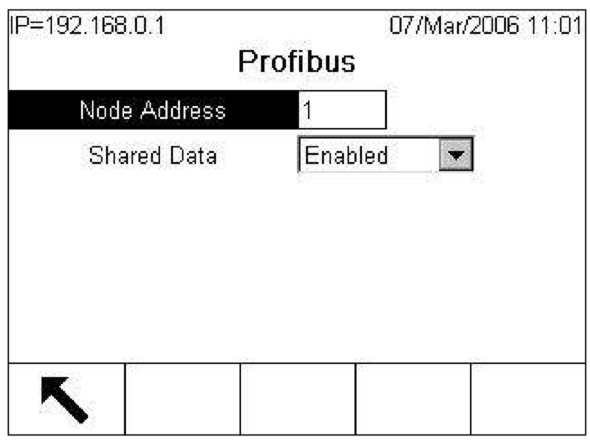


Figure 3-143: PROFIBUS Setup Screen

3.8.6.7.1. Node Address

Each IND780 Terminal connected to the network represents 1 physical node. This address is determined by the system designer, then configured in the IND780 Terminal by selecting the Node Address text box and using the numeric keypad to enter the appropriate node address (0–125).

3.8.6.7.2. Shared Data

The Shared Data parameter enables or disables an extended message length that includes shared data access. This data is added to the end of the standard scale slot information and extends the message length.

Use the Shared Data selection box to select Disabled or Enabled for shared data message communication.

3.8.6.8. PROFINET

The PROFINET standard supports Cyclic and Acyclic messaging. It uses commercial, off-the-shelf EtherNet hardware (for example, switches and routers) and is fully compatible with the Ethernet TCP/IP protocol suite.

Additional interface information and programming examples can be found in the **IND780 PLC Interface Manual**, which is included on the documentation CD.

The PROFINET setup screen (Figure 3-143) is used to configure PROFINET as a PLC interface option.

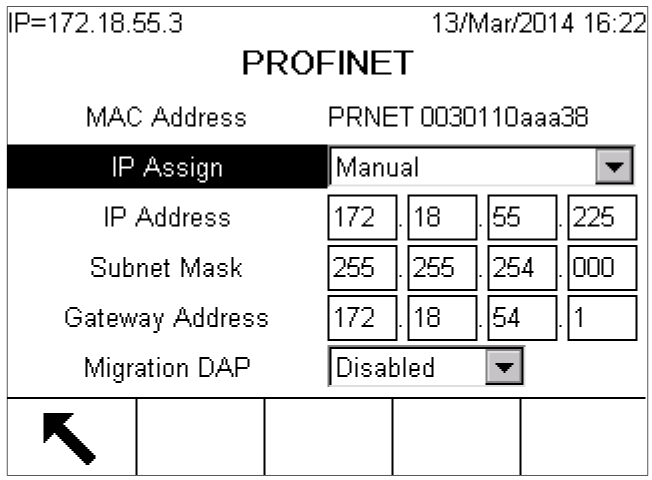


Figure 3-144: PROFINET Setup Screen

3.8.6.8.1. MAC Address

The Terminal's MAC address in the network is assigned automatically.

3.8.6.8.2. IP Assign

IP Assign settings are:

Manual Select if the IP Address, Subnet Mask and Gateway Address are to be assigned manually.

DCP [Default] Select if the PLC programming software will assign the IP Address.

DHCP Select if the IP address is to be assigned automatically by the network server.

- In all cases, the Device Name must be set by the PLC programming software before communication with the PLC can be established.

3.8.6.8.3. IP, Subnet Mask and Gateway Address

The Terminal's IP Address, Subnet Mask and Gateway Address are configured as described in section 3.8.5.1, above.

3.8.6.8.4. Migration DAP

The Migration DAP (Device Access Point) option allows the IND780 to communicate with older PROFINET PLC Controllers that do not support PROFINET IO Specification 2.0. or later, and only support DAP's with no Physical Device (PDEV). If this option is Enabled, the user must select the modules from the Migration DAP in the Hardware Configuration (Figure 3-145).

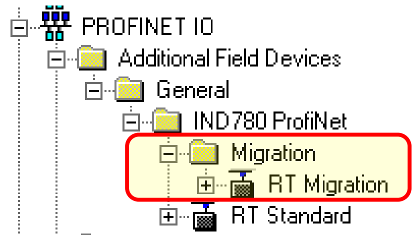


Figure 3-145: Migration Module Selection

3.8.6.9. Data Format

1. From Setup, select **Communication > PLC Interface > Data Format**. Figure 3-89 shows the screen with Template selected as the format, revealing the Time Interval, Configure, and directional displays. When Application format is selected, only the Format box and the VIEW TABLE softkey appear on this screen.

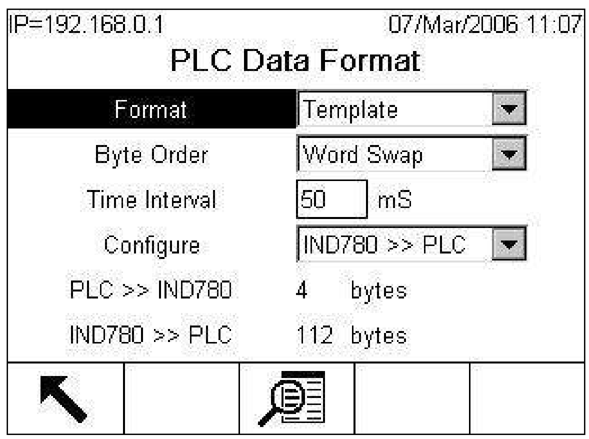


Figure 3-146: PLC Data Format Screen

2. Select the Format. Not that changing the Format will delete any existing Message Slots.
   - **Integer** – the default value. Reports scale weight as a signed 16 bit integer (± 32767).
   - **Divisions** – reports scale weight in display divisions (± 32767). The PLC multiplies the reported divisions by the increment size to calculate the weight in display units.
   - **Floating Point** – displays weight in floating point data format
   - **Template** – Reads or Writes data based upon the shared data variables that are assigned to the slots within a template.
   - **Application** – This data format is set up by a Task Expert application. A TaskExpert program must be written to control the IND780 >> PLC and PLC >> IND780 data, and to control data length for both input and output assemblies. Refer to the TaskExpert Manual for information on writing the program.
3. Select Byte Order:
   - **Word Swap** – The default value. Takes the IEE 754 single-precision floating point format and swaps the two words in the 32-bit double word. This format is compatible with

RSLogix 5000 processors.

- **Byte Swap** – Makes the floating point format compatible with S7 PROFIBUS.
- **Historic** – Makes the floating point data format compatible with PLC 5. (Available only with A-B RIO interface)
- **Double Word Swap** – Makes the data format compatible with the Modicon Quantum PLC for Modbus TCP networks. (Available only with Ethernet / IP and Modbus TCP interfaces.)

4. Set the Time Interval in milliseconds.
5. The bottom of this screen (Figure 3-146) displays the number of bytes that will be sent by the IND780 and the number of bytes expected from the PLC.
6. Depending on which format is selected, press the VIEW TABLE softkey  to set up the number of Message Slots (1, 2, 3, or 4. In Block Transfer mode, default value is 0, maximum 3), or to configure the Template for communications between the IND780 and the PLC. Figure 3-147 shows the Message Slots View, which is viewed whenever the Format is not Template.

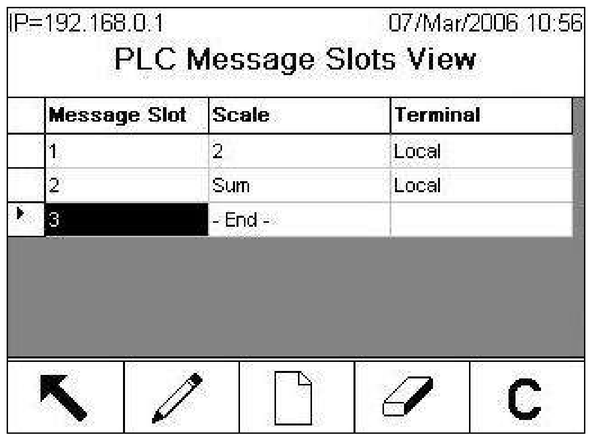


Figure 3-147: PLC Message Slots View Screen

Typically only 1 slot is used in a single scale application, but sometimes an application requires multiple fields of data in a cyclic data transfer. In order to accomplish this, 2, 3, or even 4 message slots can be assigned for the output. As the number of message slots is increased, so is the length of the message, because each slot requires enough memory to transmit a complete set of data. More detailed information can be found in the **IND780 PLC Interface Manual**, included on the documentation CD.

Figure 3-148 shows the Template View, accessed when Format is set to Template. Each message slot will be a Shared Data Variable, entered by the user. These entered message slots are associated only with the Shared Data Variable entered and not with a scale.

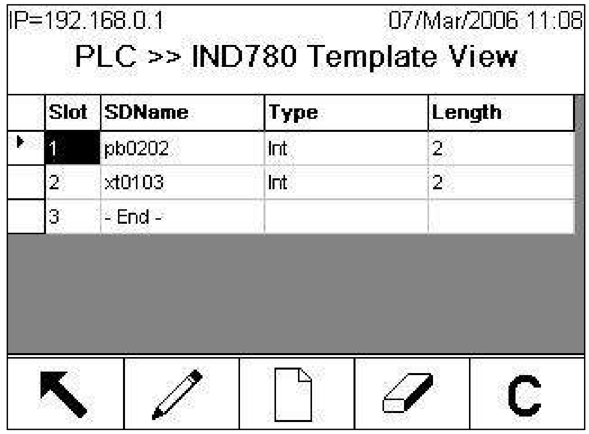


Figure 3-148: PLC Template View

7. Press the EXIT softkey to exit the view screen.
8. Press the EDIT softkey to edit an existing slot.
9. Press the NEW softkey to enter a new slot.
10. Press the DELETE softkey to delete an existing slot.
11. Press the CLEAR softkey to delete all existing slots.

Figure 3-149 shows the screen that opens when NEW is selected from the Message Slots View screen (Figure 3-147).

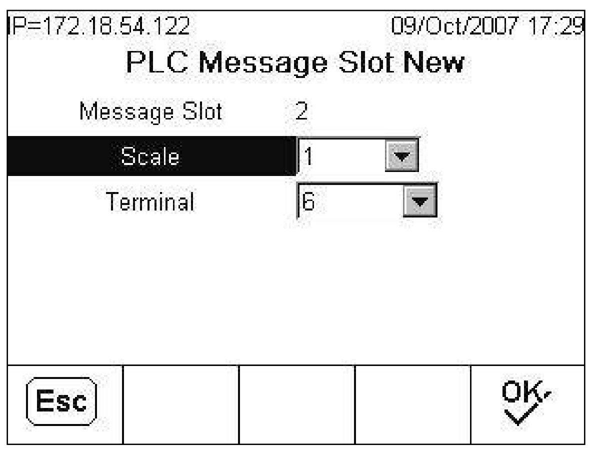


Figure 3-149: New Message Slot Screen

- **Scale** – Enter the scale number to be associated with the new Message Slot.
- **Terminal** – Default is Local; remote terminals 1 through 20 may be selected if remote PLC interface sharing is used.

Figure 3-150 shows the Template New screen accessed from the Template View screen (Figure 3-148).

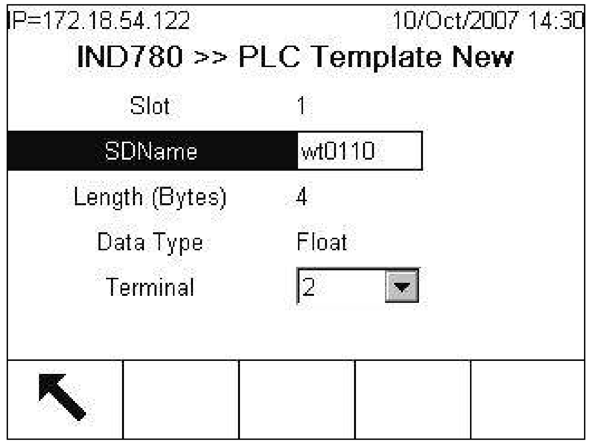


Figure 3-150: New Template

- **Slot** – Automatically assigned.
- **SDName** – An alphabetic entry field used to define the Shared Data variable associated with the slot.
- **Length (Bytes)** and **Data Type** – Automatically displayed once the SDName has been entered. The maximum length of a Shared Data variable cannot exceed 16 bytes when Block Transfer is disabled, or 14 bytes when Block transfer is enabled.
- **Terminal** – Default is Local; remote terminals 1 through 20 may be selected if remote PLC interface sharing is used.

For a complete listing of Shared Data Fields, refer to the IND780 Shared Data Reference.

3.8.7. Reset

The Reset setup screen resets setup values to factory default settings for the communication setup.

3.8.7.1.1. Communication Reset

To initiate a reset, press the OK softkey OK. If the reset was successful, a verification message that reads "Reset Successful" displays. If the reset was not successful, an error message that reads "Reset Failure" displays. If the reset fails, try to initiate the reset again. If the reset continues to fail, contact a local METTLER TOLEDO representative for assistance.

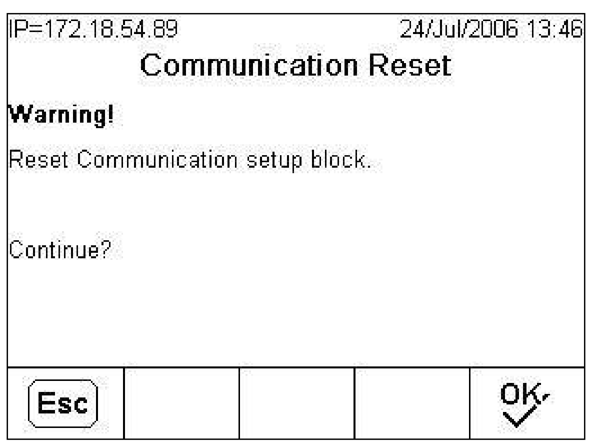
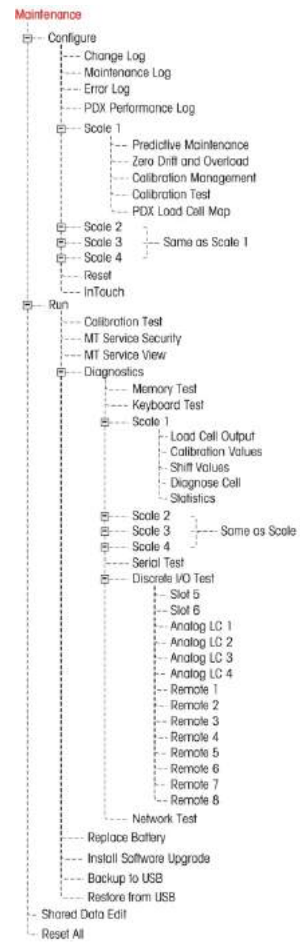


Figure 3-151: Communication Reset Screen

Press the ESCAPE softkey Esc to exit without resetting.

3.9. Maintenance



The maintenance setup branch includes:

- Configure/view the log files and calibration test
- Running diagnostics or the calibration test

3.9.1. Configure

The Configure setup branch includes the following screens:

- Change Log
- Maintenance Log
- Error Log
- PDX Performance Log
- Predictive Maintenance
- Zero Drift and Overload
- Calibration Management
- Calibration Test
- Shared Data Edit
- PDX Load Cell Mapping
- InTouch[SM]
- Reset

3.9.1.1. Change Log

The Change Log tracks all changes to setup and shared data. The log will hold approximately 8,500 records before it must be reset. More details regarding the Change Log can be found in Appendix C, **Table and Log File Structure**.

Use the selection box on this setup screen to select Disabled or Enabled for the change log.

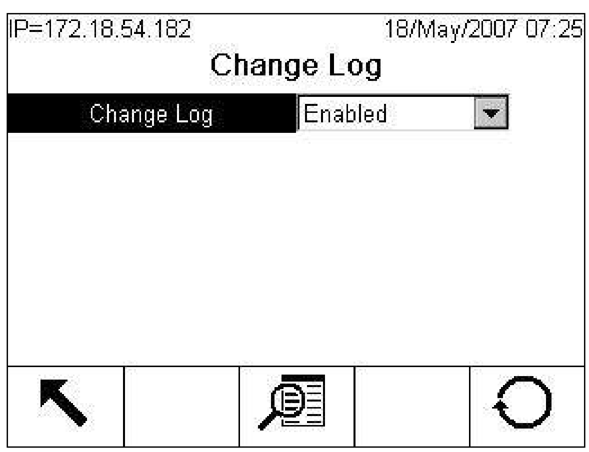


Figure 3-152: Change Log Setup Screen

3.9.1.1.1. To reset all records in the change log file

1. Press the RESET softkey . A warning message displays asking for verification that all configuration change records are to be reset.

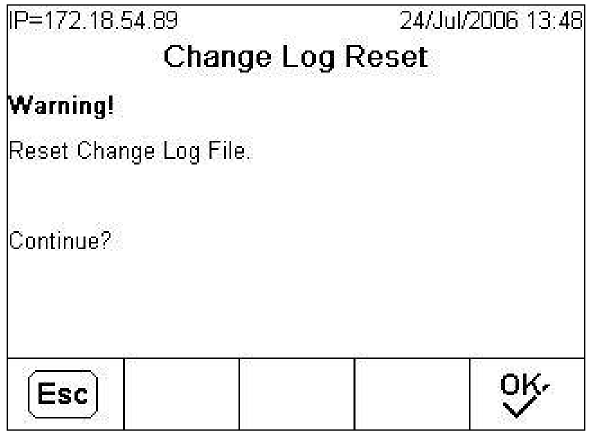


Figure 3-153: Change Log Reset Warning Screen

2. Press the OK softkey . The configuration change records history is reset.
3. If the reset was successful, a verification message that reads "Reset Successful" displays. If the reset was not successful, an error message that reads "Reset Failure" displays. If the reset fails, try to initiate the reset again. If the reset continues to fail, contact a local METTLER TOLEDO representative for assistance.
4. Press the ESCAPE softkey Esc to return to the Change Log screen.

3.9.1.1.2. To view change log records

1. Press the VIEW TABLE softkey . The Change Log Search screen displays.

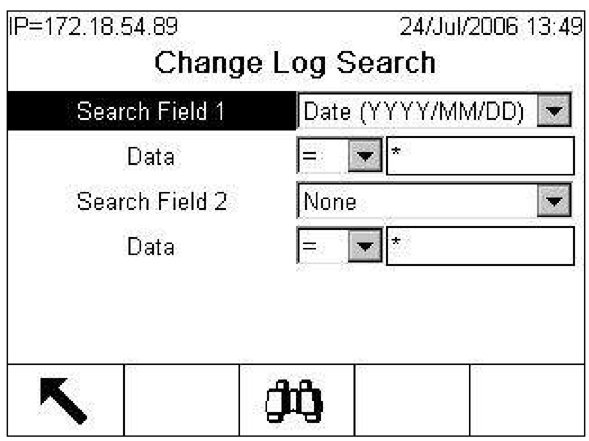


Figure 3-154: Change Log Search

2. Use the Search Field 1 and Search Field 2 selection boxes and associated data fields to enter specific search information to limit the search by date, shared data (SDName), Time, or Username, or enter * (the "find all" character) to view all Change Log information.

3. Press the START SEARCH softkey . The Log Search View screen displays with the search results sorted in chronological order (The most recent change record displays at the end of the file with focus. Older records may be viewed by pressing the UP navigation key.).

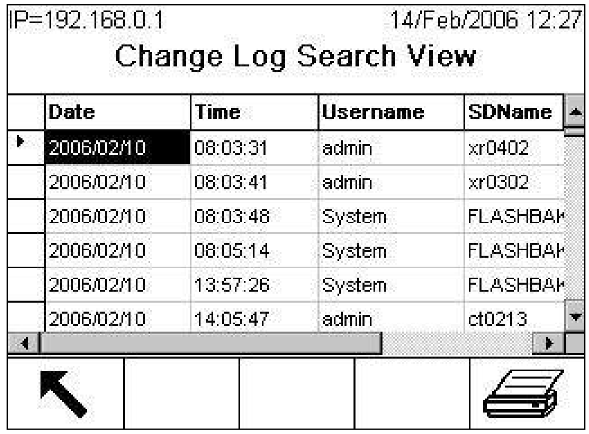


Figure 3-155: Change Log Search View Screen

Information displayed in the Change Log View includes:

- Time Stamp
- Username
- Shared Data Field Name
- New Value

4. Press the PRINT softkey to print the list to all Report connections.
5. Press the EXIT softkey to return to the Change Log Search Screen.

3.9.1.2. Maintenance Log

The Maintenance Log will hold approximately 32,000 records before it begins over-writing the oldest entries. More details regarding the Maintenance Log can be found in Appendix C, Table and Log File Structure.

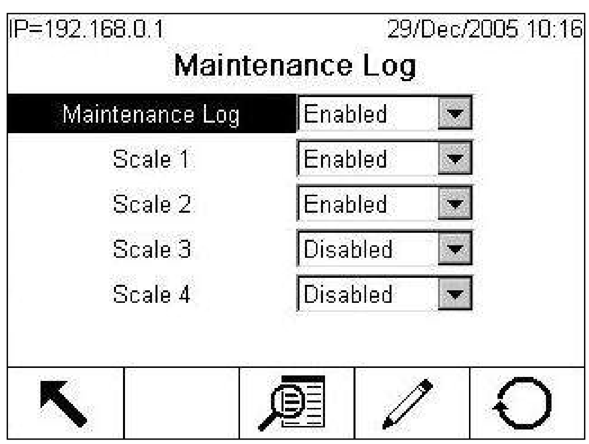


Figure 3-156: Maintenance Log Screen

The Maintenance Log is approximately 150k bytes in size. More details regarding the Maintenance Log can be found in Appendix C, Table and Log File Structure.

Reset all records or view records in the Maintenance Log by following the same steps described for Change Log.

Information that displays on the Maintenance Log Search View screen includes:

- Time Stamp
- Event
- User name
- Status

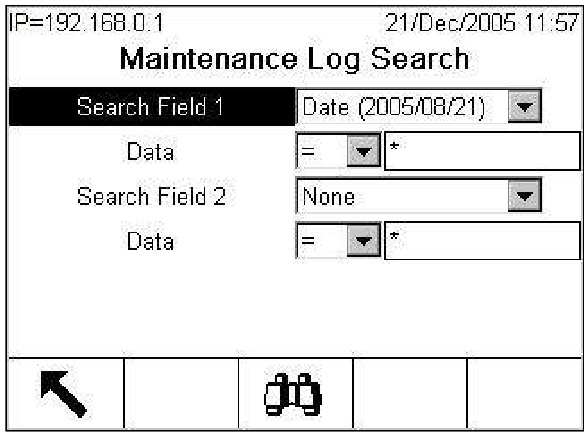


Figure 3-157: Maintenance Log Search Screen

3.9.1.3. Error Log

The error log is a record of errors logged by the system; its contents are not cleared by a Master Reset. The log will hold approximately 32,000 records before it begins over-writing the oldest entries. Use the selection box on the setup screen to select Disabled or Enabled for each of the following parameters of the error log:

- Date
- Time
- Source
- Message

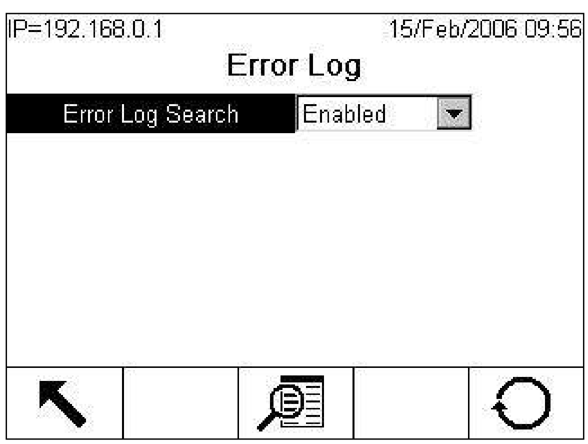


Figure 3-158: Error Log Screen

3.9.1.4. PDX Performance Log

The PDX Performance Log provides a summary of the performance and diagnostics data collected on a scale using POWERCELL PDX load cells. The log will hold approximately 1,600 individual records before it begins over-writing the oldest entries. Note that the accumulation of data in the log also depends on the number of cells in the system – each cell produces one record at each log interval.

More details regarding the PDX Performance Log can be found in Appendix C, **Table and Log File Structure**.

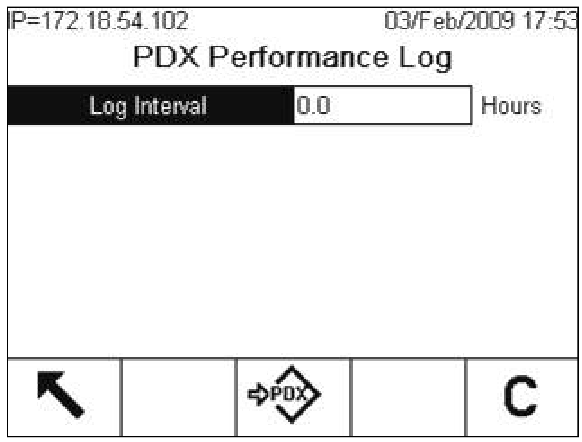


Figure 3-159: PDX Performance Log Setup Screen

Use the Log Interval entry box on this setup screen to enter a time interval (0 – 999.9) in hours for the IND780 to automatically record a set of data in the log. A value of 0 (default) disables the automatic logging. For day-to-day operation, 12 hours is a typical value. When a scale is being tested, the interval can be decreased to collect more data frequently.

The user can also trigger a manual record by pressing the PDX PERFORMANCE LOG softkey from this setup screen. The manual record can also be created using the same softkey or Application Key when it is assigned to the home screen.

To clear the records from the PDX Performance Log, press the CLEAR softkey C. Once pressed, a warning message displays asking for verification that all records are to be cleared. Press the OK softkey OK to continue, or press the ESCAPE softkey Esc to return to the PDX Performance Log screen.

The PDX Performance Log records cannot be viewed in the IND780. To see the log file, retrieve the Terminal/HIS/PDX_Performance.csv file via FTP or USB Backup, or use the InSite SL software tool.

- The MT Service Security feature must be unlocked in order to retrieve the records in the log. Refer to the MT Service Security section, below.

3.9.1.5. Scale 1–4

The Scale branches of Configuration contain setup screens for Predictive Maintenance, Zero Drift and Overload, Calibration Management, and Calibration Test. The Predictive Maintenance, Zero Drift and Overload nodes are enabled only for POWERCELL, PDX and RAAD box bases.

3.9.1.5.1. Predictive Maintenance

Use the predictive maintenance configuration to configure the predictive failure algorithms and run flat operation. Predictive maintenance enables the terminal to monitor and predict the operating condition of each load cell in a POWERCELL, PDX or RAAD box weighing system by comparing the current range of load cell values against empirical data stored in the terminal during calibration. It compares the current load cell readings to the readings established when the scale was calibrated. A shift in the load cell output may indicate either current or impending load cell failure.

- The Predictive Maintenance screen is not available on a scale with only a single load cell configuration.
- The Predictive Maintenance functions will not be supported if CalFree is used during scale calibration.

Predictive Maintenance includes the following settings:

- Symmetry Monitor
- Start Threshold
- Difference Threshold
- On Failure
- Run Flat
- Cell # (if Run Flat is set to Manual)

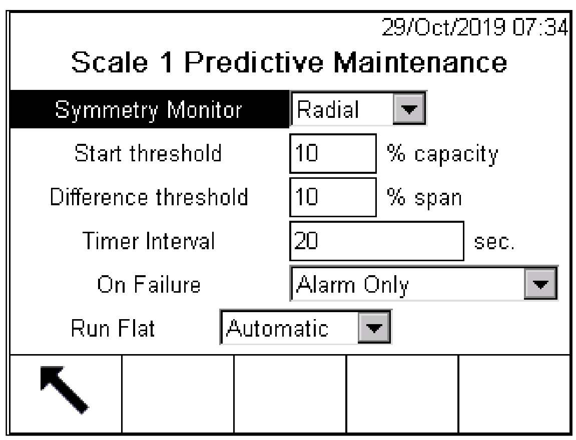


Figure 3-160: Scale 1 Predictive Maintenance

Symmetry Monitor

Set the symmetry monitor to none, radial, or axial.

- Axial symmetry should be used in any system with 2 or more pairs of load cells in which each cell of the pair sees nearly the same loading pattern (such as a floor scale).
- Radial symmetry should be used on any system where all the cells see almost identical loads (such as a cylindrical tank or hopper scale).
- In the case of a system with no symmetry, predictive maintenance will not operate since the software cannot cross-check the readings of individual load cells.

Start Threshold

To prevent a false trigger of a symmetry error due to light loads, the terminal allows for a symmetry check start threshold value. This value is entered as a percentage of the calibrated scale capacity. Symmetry checking will be triggered only if the load on the scale exceeds the start threshold value.

Difference Threshold

Enter the maximum permissible percent deviation in span between symmetrical cells.

Execution of axial symmetry checking is based upon monitoring the change of the initial offset in the span output between the load cells in a symmetric pair. If the change from the initial offset exceeds the Difference Threshold value, a symmetry error is triggered.

Execution of radial symmetry checking is based upon monitoring the change in the initial load distribution for each cell. A symmetry error is triggered if the change in load distribution exceeds the Difference Threshold value.

Timer Interval

The Timer Interval determines how long the system will wait after a "no-motion" condition is achieved, before it can trigger a symmetry error. The alarm is triggered if the symmetry error occurs after the timer has expired. The time is measured in seconds, and valid values are from 0 to 120. 0 is the default setting, and means that the timer is disabled.

On Failure

Set the alarm level when a possible failure is detected. The options are:

- Alarm Only
- Alarm & Disable Scale

The Maintenance Log for the scale must be enabled for Alarms to be triggered.

The alarm message will be displayed for 10 seconds on the System Line, and will reappear periodically after a fixed period of time if the error is not resolved.

Run Flat

If the terminal determines that a load cell is operating out of tolerance or fails to detect communication with a single load cell, it can invoke the Run Flat algorithm to compensate for the cell's questionable readings until the cell can be replaced.

Load cell symmetry monitoring is required for the algorithm to run properly. There are 3 options for Run Flat:

- Disabled (Run Flat will not operate)
- Manual (user selects which cell to replace)
- Automatic (Run Flat algorithm uses threshold settings to determine which cell to replace)

If **Manual** is selected, a field titled Cell # will appear. Enter the number of the cell you would like to replace with the Run Flat estimate.

Once Run Flat is triggered, the weight value and units change to orange, to indicate that the displayed weight is an estimate.

To ensure that the terminal will reliably recognize an intermittent fault, Run Flat does not turn off automatically once the error condition has been corrected. To disable Run Flat and return to normal operation once the error condition has been corrected, do one of the following:

- Cycle power to the IND780.
- Enter setup and access **Maintenance > Configure > Scale n > Predictive Maintenance**, and disable Run Flat.
- Set Shared Data variable xc0108 = 1 to disable Run Flat. The user can connect this SD trigger to a key switch via a discrete input (configured in setup at **Application > Discrete I/O > Inputs**) to enable or disable Run Flat manually.

3.9.1.5.2. Zero Drift and Overloads

For POWERCELL and PDX bases, or applications with an Analog/Digital converter for analog load cells such as a RaaD box, the Zero Drift and Overloads screen (Figure 3-161) is accessible. These settings permit early diagnosis of load cells that are failing, and of possible damage to weighing equipment caused by excessive loads.

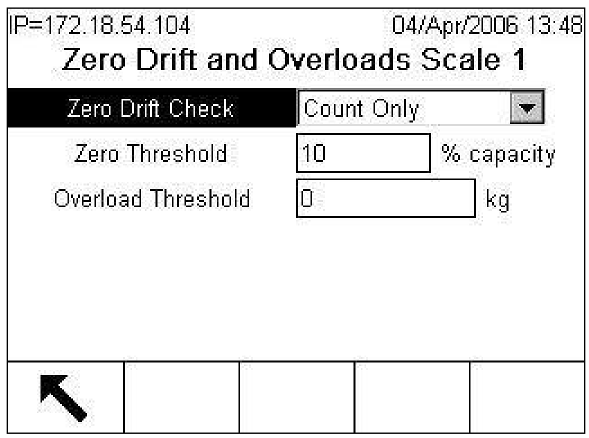


Figure 3-161: Zero Drift and Overloads Screen

Zero Drift Check

The Zero Drift Check option may be Disabled, or set to Alarm, or Alarm & Disable Scale.

When a scale Zero command is issued the scale is assumed to be empty. The threshold measure compares the current zero balance reading with the calibrated zero for each load cell; if the difference exceeds the value set in this field, a cell Zero Drift error is triggered. Depending on how this parameter is set, the terminal generates an Alarm, or generates an Alarm and disables the scale.

Zero Threshold

The Zero Threshold value is set as a percentage of the calibrated load cell capacity. Its default value is 10%. If the Maintenance Log is enabled, an alarm message will be displayed for 10 seconds in the System Line, and will reappear periodically after a fixed period of time if the error is not resolved.

Note that an out-of-tolerance zero value for a load cell does not mean that the scale zero range (configured in setup at **Scale n > Zero > Ranges**) has been exceeded. In that aggregate measure, individual variations between load cells may cancel one another out. An error generated by a load cell will not necessarily prevent the scale as a whole from zeroing. If the scale is out of its zero range, an error message will appear prompting the operator to correct the fault condition.

Overload Threshold

For non-digital load cells, the cell overload condition is not configurable. For digital load cells, the threshold at which a cell overload is logged may be set as a total weight value in primary weight units. The value entered should also account for the pre-load amount and typically not exceed the load cell's rated capacity. The overload trigger is not re-set until the measured weight falls below 90% of the overload threshold value.

- The Zero Drift Check functions will not be supported if CalFree is used during scale calibration.

3.9.1.5.3. Calibration Management

Calibration management includes a test interval to program how much time elapses or how many weighments should be completed between calibration checks. When the set time or number of weighments is exceeded, an expiration action is initiated. The type of expiration action is also programmable. This feature is disabled by entering zeroes into both the number of days and number of weighments entry boxes.

Use the Calibration Management setup screen to configure parameters used for managing calibration activities.

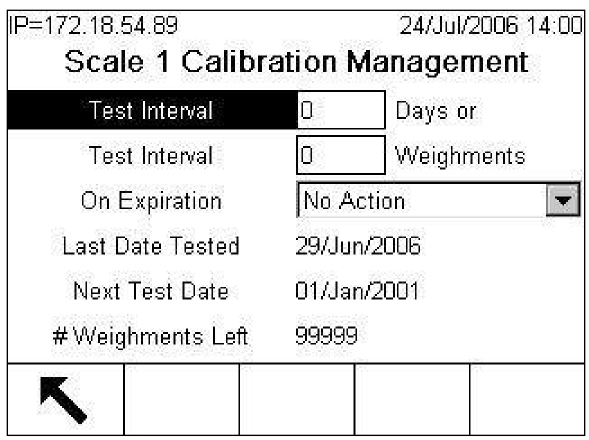


Figure 3-162: Scale 1 Calibration Management Setup Screen

Test Interval

Specify test intervals in days or weighments in the corresponding field text boxes.

The expiration action will be triggered when the first of either of these values is reached. For example, if 30 days and 3,000 weighments were programmed, as soon as 30 days or 3,000 weighments were exceeded (whichever were first), the expiration action would occur.

Expirations based on the number of days expire at midnight on the date indicated.

The expiration date and number of weighments remaining are reset after a successful calibration or CalTest has been completed.

On Expiration

Use the On Expiration selection box to configure the activity to occur upon expiration of the calibration after the next test date or number of weighments occurs. Settings include:

- No Action
- Alarm Only (displays an expiration message)
- Alarm & Disable (displays expiration message and disables the scale)

The Maintenance Log for the scale must be enabled for the Alarms to be triggered. The alarm message will be displayed for 10 seconds on the System Line. If the expiration is based on days, the alarm will appear periodically after a fixed period of time, if the calibration remains expired. If the expiration is based on weighments, the alarm message will appear with each print transaction.

Last Date Tested and Next Test Date or # of Weighments Left

The Last Date Tested and Next Test Date (if days are specified for intervals), or the number of weighments left until the next service (if weighments are specified for intervals), automatically calculate and display.

3.9.1.5.4. Calibration Test

The calibration test provides a prompting, scale test sequence to help lead the person performing the test through a test sequence. A test load with +/– tolerance is programmable for each step along with a prompt of up to 40 characters in length to guide the test technician through the sequence. Up to 25 steps can be programmed. The test must be set up separately for each scale.

The Calibration Test may be run from setup (see below), or from a softkey or Application Key from the home screen.

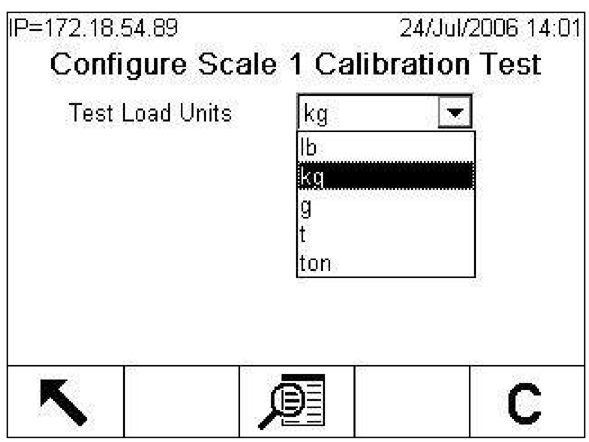


Figure 3-163: Configure Scale 1 Calibration Test Setup Screen

Use the Test Load Units selection box to select calibration test load units. Only test units selectable as the scale's Primary Units (in Scale Capacity and Increment) are available in this screen.

The entire calibration test sequence can be cleared by pressing the CLEAR softkey C. When the calibration test sequence is cleared (empty), it still shows the –End– step. The –End– record will always display as the last step of the calibration test sequence. This field cannot be deleted and cannot be edited.

Press the VIEW TABLE softkey to access the current calibration test sequence setup. The Calibration Test View screen displays.

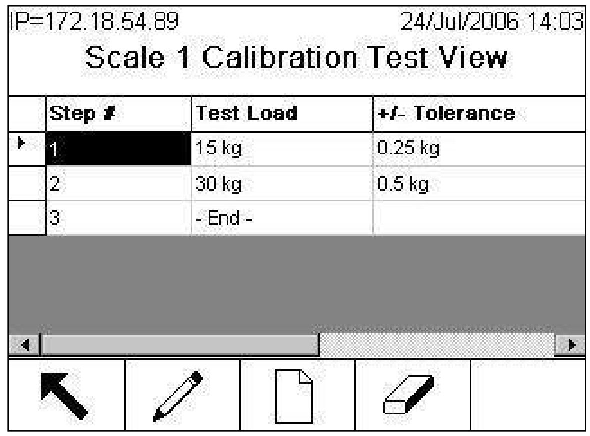


Figure 3-164: Scale 1 Calibration Test View Setup Screen

When the Calibration Test View screen opens, the step numbers and their associated test loads, tolerances and prompts display. Calibration test steps can be configured by:

- Editing
- Inserting
- Deleting

Editing

To edit a calibration step:

1. When the Calibration Test setup screen opens, the first step in the list will have focus. Use the UP and DOWN navigation keys to select a step to edit.
2. Press the EDIT softkey to open the setup screen for the step where edits can be made.

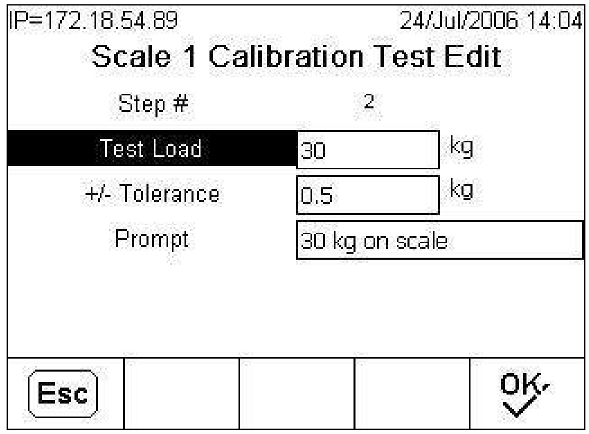


Figure 3-165: Scale 1 Calibration Test Edit Setup Screen

3. The edit screen includes fields for entry of the step's Test Load and +/- Tolerance data. A Prompt field allows entry of a message of up to 40 characters in length. The prompt (for example, "Place test load 1 on scale") will display during the calibration step.
4. Press the OK softkey to accept the calibration step parameters as entered.
5. Press the ESCAPE softkey Esc to return to the Calibration Test View screen without saving the changes to the calibration step parameters.

Inserting

To insert a calibration step:

1. Use the UP and DOWN navigation keys to select the step in the calibration test procedure where the new step is to be inserted.
2. Press the NEW softkey to open the setup screen to create a new calibration test step.
3. Enter the step's test load and tolerance data and information for Prompt Field 1 and Prompt Field 2.
4. Press the OK softkey . The current screen data is stored at the indicated step number, and any existing steps move down 1 record to make room for the new step.
5. Press the ESCAPE softkey Esc to return to the Calibration Test View screen without saving the calibration step.

Deleting

Use the UP and DOWN navigation keys to select a step to delete. Press the DELETE softkey to delete the step.

Printing

Press the PRINT softkey to print the calibration test steps.

Exiting

Press the EXIT softkey to return to the Calibration Test screen.

3.9.1.5.5. PDX Load Cell Mapping

This branch provides a graphical view of connected PDX load cells. When completed, the network diagram will help to clarify errors reported by showing the physical load cell layout (by address), identifying the cell to which the home run cable connects, and which load cell is the last in the network. It is recommended that the load cell network be sketched on a sheet of paper before completing the functions described in this section.

Figure 3-166 shows a PDX map for Scale 1. Before mapping is performed, each cell's address appear as a "?," and the cable connection list below the diagram is blank. The platform graphic includes the number of loads cells specified in setup at **Scale > Type > # of Load Cells**. Use the navigation keys to move focus from one cell position to the next in the diagram.

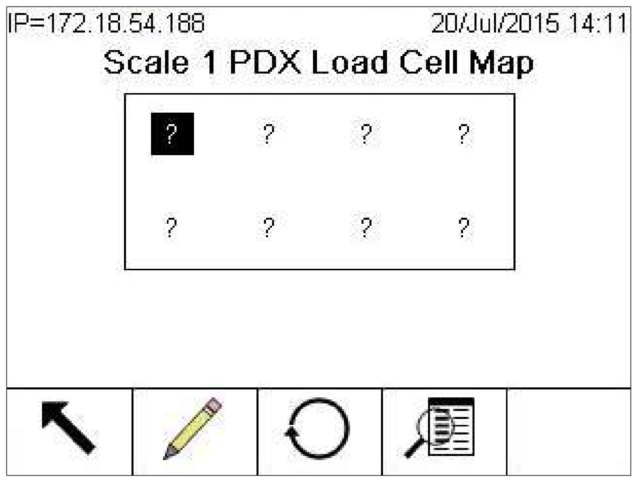


Figure 3-166: Load Cell Map View

Note that the position of each cell in a platform is designated alphabetically – to differentiate it from the numeric address value. Figure 3-167 shows the alphabetic positions for 14 load cells. In the example shown in Figure 3-166, only the first eight positions are used.

A	C	E	G	I	K	M
B	D	F	H	J	L	N

Figure 3-167: Alphabetic Designation of Load Cells in a Platform

These alphabetical designations will appear, with the corresponding node number, in the **Position** column of the **PDX Load Cell Map Table View** screen (Figure 3-172). The alphabetization restarts at A for each platform in a scale system.

Editing

Pressing the **EDIT** softkey on the **PDX Load Cell Map** screen displays the **Node Edit** screen, which allows entry of the information required to create a graphic representation of the load cell network.

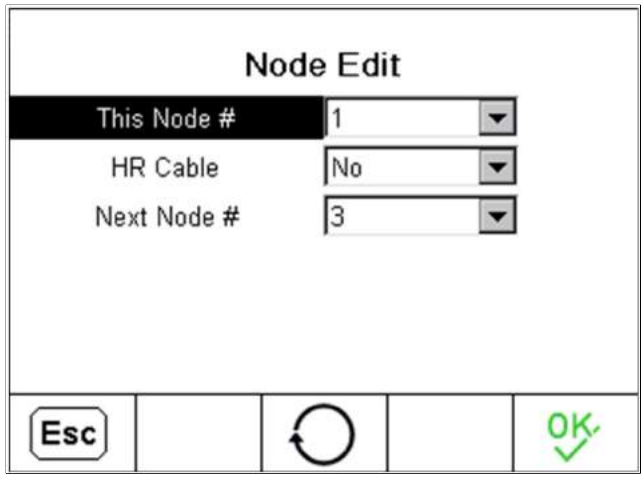


Figure 3-168: Node Edit Screen

The **Node Edit** screen includes the following parameters and softkeys:

This Node #	The cell address of the current cell position. Default value is null; the drop-down box lists all available cells. Select the cell address of the physical location in focus in in the network graphic, then press ENTER.
HR Cable	Select **No** if the Home Run cable is not connected to this cell. Select **Yes** if the Home Run cable is connected to this cell.
Next Node #	The cell address of the next cell in the network connected to the current cell. Default value is null; the drop-down box lists all available cells, plus a selection for **Termination**. Enter the cell address of the next load cell that the load cell cable is connected to in the network via the cell-to-cell cable. If this is the last load cell in the system (which contains the termination connector), select **Termination**.
ESC	Exits the screen without saving the values entered.

Reset | Resets the values shown on this screen. When pressed, a warning screen is displayed:

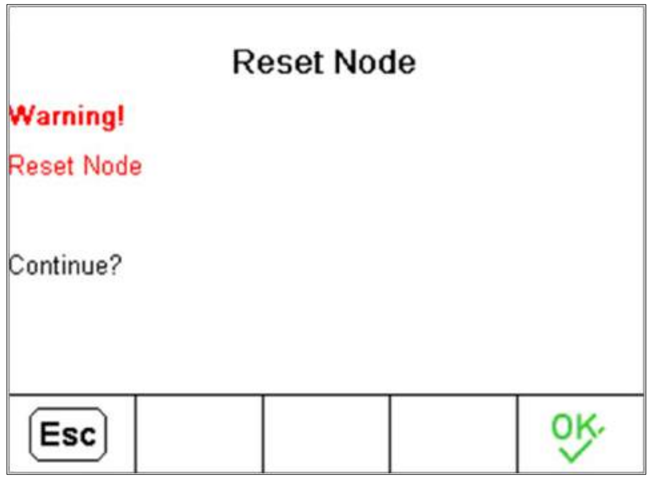


Figure 3-169: Node Reset Warning

- If **ESC** is selected, the screen is closed and the values are not reset.
- If **OK** is selected, both node values are reset to null, **HR Cable** to **No**, and a [Complete] message is shown. Press EXIT to return to the Node Edit screen.

OK | Saves the settings and exits the screen, **only if**

- both Node parameters **have values** or
- both Node parameters are **null**

After all information has been entered correctly, a graphic describing each load cell address position displays. Below the graphic, the load cell connection sequence is shown beginning with the home run cable and finishing with the load cell that contains the termination connector. The information shown here can be used to better understand and locate specific load cell or load cell network errors.

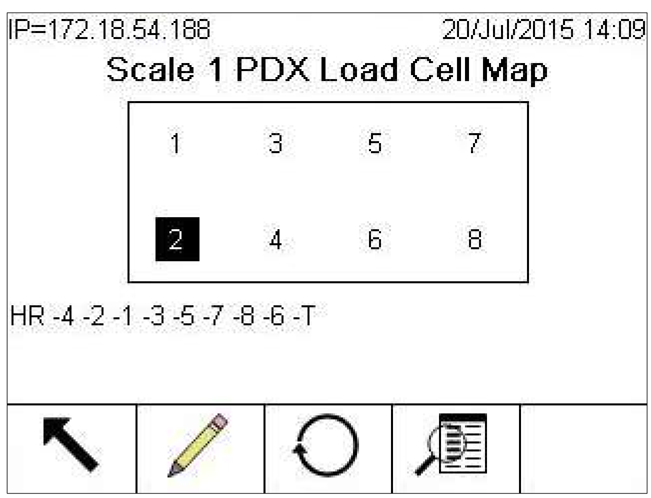


Figure 3-170: Completed PDX Load Cell Map

Reset

The **Reset** softkey on the **PDX Load Cell Map** screen is used to reset the network graphic back to its initial (blank) state. When it is pressed, a warning screen is displayed:

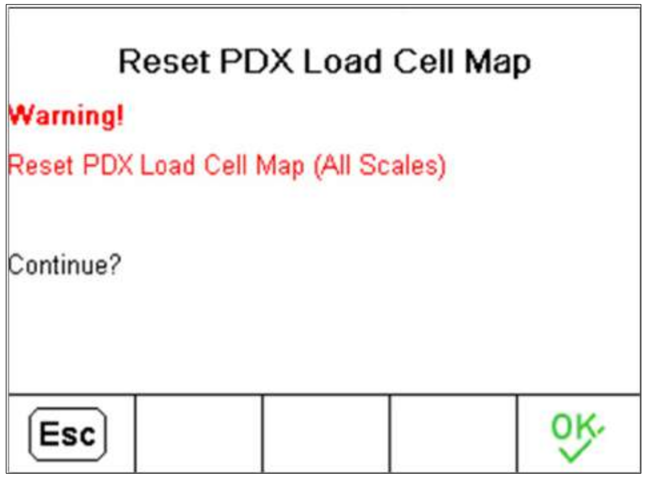
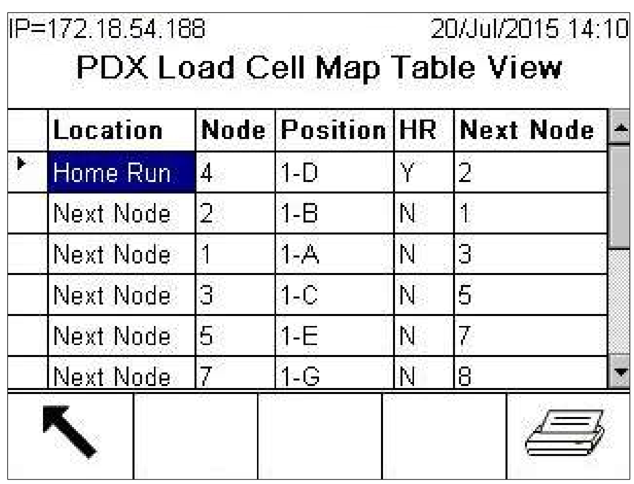


Figure 3-171: Map Reset Warning

- If **ESC** is selected, the display returns to the **Load Cell Map** screen and the values are not reset.
- If **OK** is selected, all load cell positions are re-set, and the load cell sequence is cleared. A message of [Complete] is shown and the EXIT softkey must be pressed to return to the **PDX Load Cell Map** screen.

List View

Pressing the **List View** softkey in the **PDX Load Cell Map** screen displays a table view of the load cell network information. The table shows data for each cell from the home-run cable to termination, as entered on the **Node Edit** screens (and displayed in the load cell map, Figure 3-170).



Location	Node	Position	HR	Next Node
Home Run	4	1-D	Y	2
Next Node	2	1-B	N	1
Next Node	1	1-A	N	3
Next Node	3	1-C	N	5
Next Node	5	1-E	N	7
Next Node	7	1-G	N	8

Figure 3-172: Table View of PDX Load Cell Map

Use the navigation keys to scroll though the table and display further nodes.

The **Position** column indicates the scale number, followed by the cell's physical location relative to the scale. Refer to Figure 3-167 for an explanation of the position letters.

Example Sequence, Scale with Single 8-Cell Platform

The following procedure describes the method for mapping a single-platform, eight-cell PDX POWERCELL scale.

1. With the scale's cabling in place, sketch a map of the scale. The map should show the physical and cabling relationship between cells as seen from the point of view of the terminal or scale-house. The connection from the terminal to the first load cell should be shown, as well as connections between the load cells. In this example, the sketch might look like this:

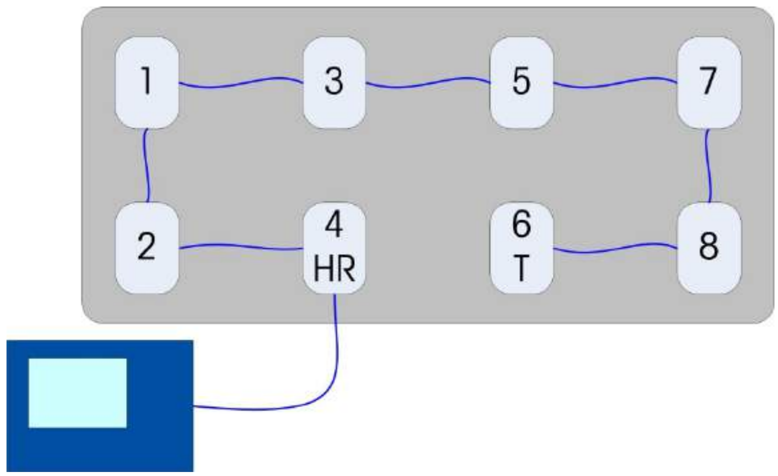


Figure 3-173: Sketch of PDX Cell Network

2. In setup, access **Maintenance > Configure > Scale 1 > PDX Load Cell Map**.
3. The unconfigured map view (Figure 3-166) will display, with each load cell represented by a question mark (**?**).
4. Use the arrow keys to select the cell to which the home run cable is connected – the second in the bottom row in Figure 3-166 – and press the EDIT softkey. The Node Edit screen (Figure 3-168) will appear.
5. The sketch shows that this load cell is assigned address number 4, so select **4** from the **This Node #** dropdown list. The home-run cable is connected here, so the **HR Cable** value should be set to **Yes**. Finally, the next cell in sequence in the sketch is 2, so set **Next Node #** to **2**.
6. Press the OK softkey to confirm the settings.
7. In the cell map, use the arrow keys to select the next load cell in sequence – which the sketch indicates is node address 2. With that node selected, press the EDIT softkey. In the **Node Edit** screen, make the following settings:

   This Node #: **2**

   HR Cable: **No**

   Next Node #: **1**

8. Press the OK softkey to confirm the settings. Repeat the process for cells 1, 3, 5, 7 and 8.

9. Finally, set cell 6 – the last cell in the network – as follows:

   This Node #: **6**

   HR Cable: **No**

   Next Node #: **Termination**

10. Press the OK softkey to confirm. For this simple single-platform layout, the map (and the load cell sequence at the foot of the screen) will now resemble the one shown in Figure 3-170.
11. With the cell mapping complete, press the EXIT ↖ softkey to return to the setup menu tree.

Example Sequence, Three-Platform Scale

The following procedure describes the method for mapping a scale including three platforms and fourteen PDX load cells.

1. As in the example above, start by sketching a map of the scale:

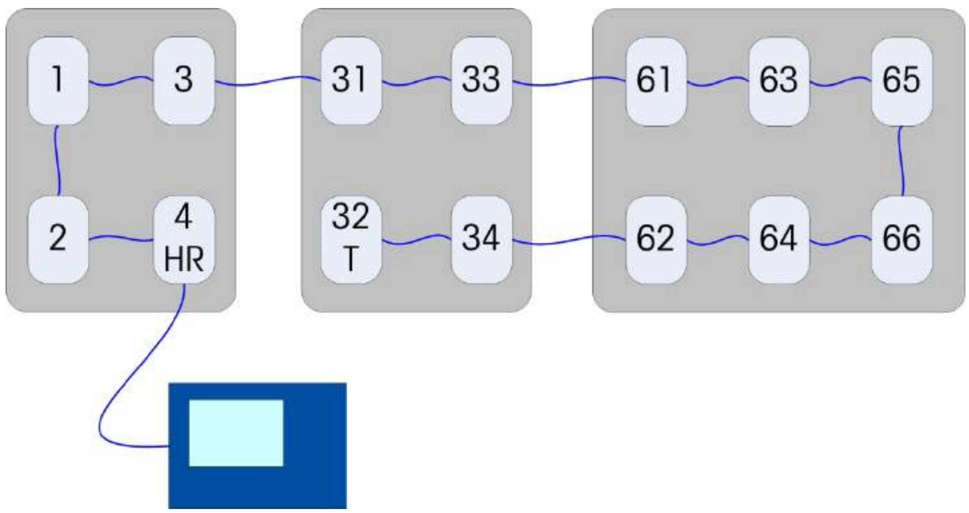


Figure 3-174: Sketch of PDX Cell Network in a Multi-Platform Scale

Notes

- The cells are connected logically from the point of view of installation and cabling. The mapping procedure ensures that the correct cells are associated with each platform.
- The node address numbering designates the platform to which a cell belongs. Thus, all cells up to 30 are defined by default as belonging to platform 1; cells 31 to 60 to platform 2; and 61 to 90, platform 3.

2. In setup, access **Maintenance > Configure > Scale 1 > PDX Load Cell Map**.
3. In the **Load Cell Map** view for Scale 1, select the position for cell #4, click the EDIT softkey, and configure the node as follows:

   This Node #: **4**

   HR Cable: **Yes**

   Next Node #: **2**

Press the OK softkey to confirm the settings and return to the load cell map screen.

4. Select the next cell, node address 2. Configure it as follows:

   This Node #: **2**

   HR Cable: **No**

   Next Node #: **1**

5. Repeat the process for cells 1 and 3. For load cell 3, assign it a **Next Node #** of **31**, to complete mapping for Scale 1.
6. Press the EXIT softkey to return to the menu tree.
7. Scroll down to select **Maintenance > Configure > Scale 2 > PDX Load Cell Map**.
8. In the map, select the cell position for address 31. Its next node is **33**.
9. The **Next Node #** for cell 33 is **61**. Assign cell 34 a **Next Node #** of **32**, and designate cell 32 as the **Termination** node.

- Because scale 3 has not yet been configured, cells 34 and 32 will not appear in the load cell map.

10. The map for Scale 2 will appear as follows:

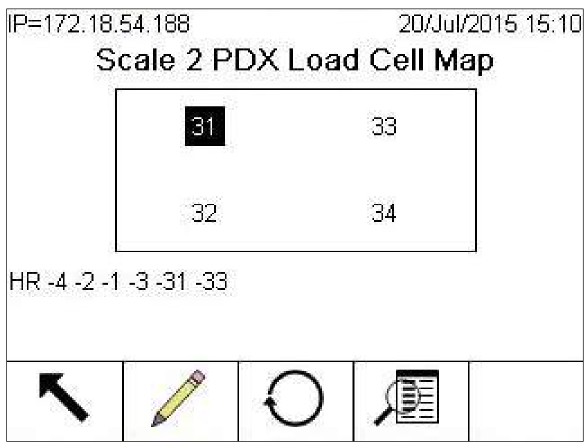


Figure 3-175: Load Cell Map for Scale 2, Configured, Not All Cells Displayed

11. Press the EXIT softkey to return to the menu tree.
12. Scroll down to select **Maintenance > Configure > Scale 3 > PDX Load Cell Map**.
13. Select and configure cells 61 through 62, and configure them appropriately, assigning cell 62 a **Next Node #** of **34**.
14. Press the OK softkey to confirm. The map, and the load cell sequence at the foot of the screen, will appear as follows:

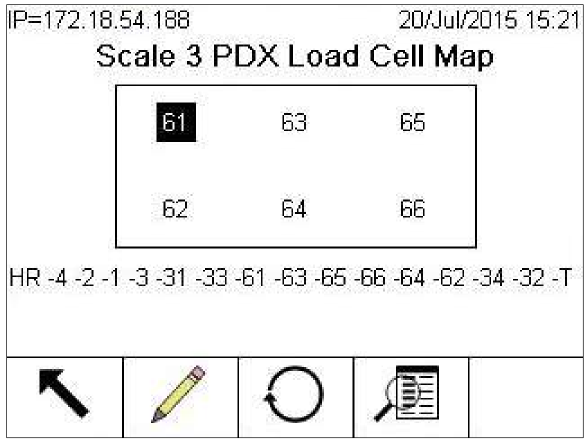


Figure 3-176: Load Cell Map for Scale 3, All Cells Displayed

- Since the complete load cell network has been mapped now, the same complete sequence will also now appear at the foot of the Load Cell Map pages for Scales 1 and 2.

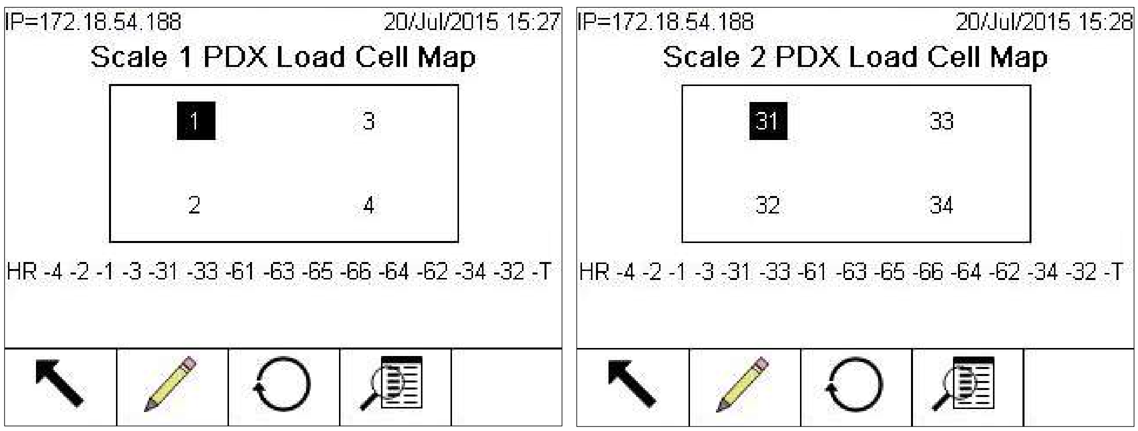
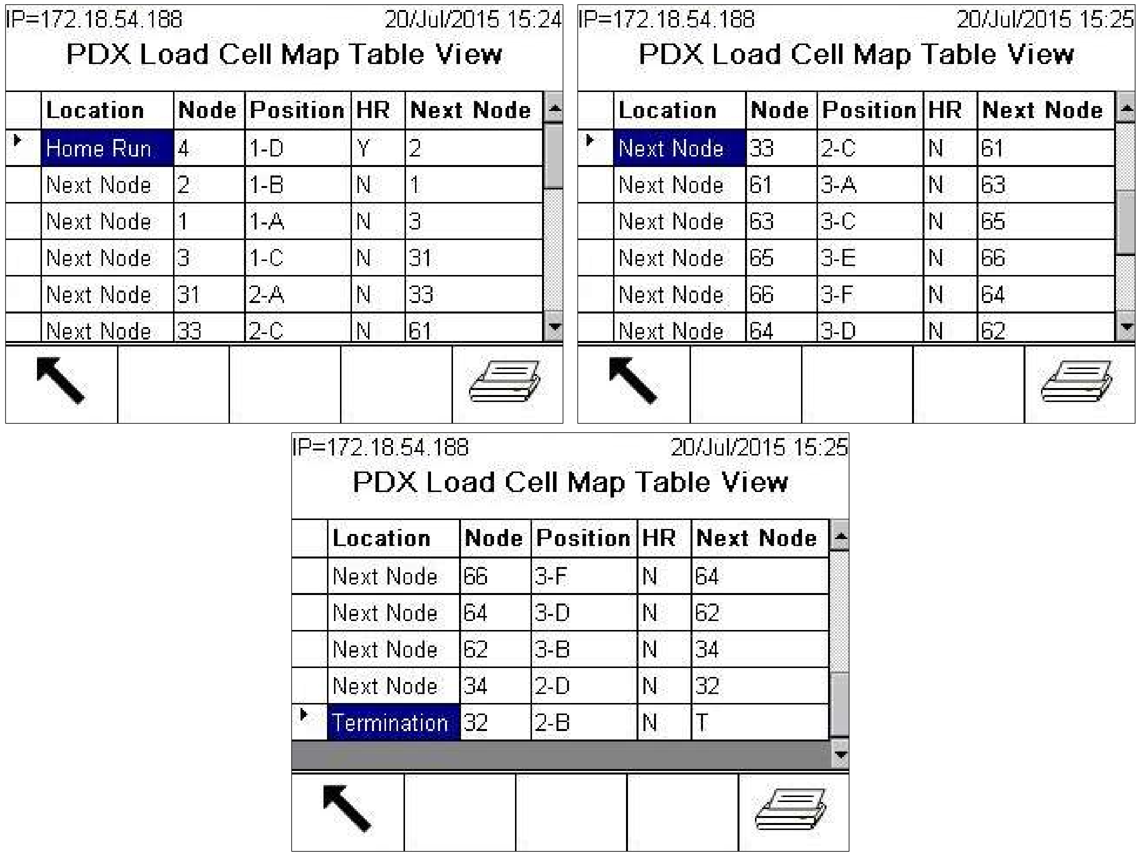


Figure 3-177: Load Cell Maps for Scales 1 and 2, All Cells Displayed

15. With the cell mapping complete, press the EXIT  softkey to return to the setup menu tree.
16. The **Load Cell Map Table View** will now appear as follows – three screens of information:



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PDX Load Cell Map Table View

Location	Node	Position	HR	Next Node
Home Run	4	1-D	Y	2
Next Node	2	1-B	N	1
Next Node	1	1-A	N	3
Next Node	3	1-C	N	31
Next Node	31	2-A	N	33
Next Node	33	2-C	N	61

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PDX Load Cell Map Table View

Location	Node	Position	HR	Next Node
Next Node	33	2-C	N	61
Next Node	61	3-A	N	63
Next Node	63	3-C	N	65
Next Node	65	3-E	N	66
Next Node	66	3-F	N	64
Next Node	64	3-D	N	62

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PDX Load Cell Map Table View

Location	Node	Position	HR	Next Node
Next Node	66	3-F	N	64
Next Node	64	3-D	N	62
Next Node	62	3-B	N	34
Next Node	34	2-D	N	32
Termination	32	2-B	N	T

Figure 3-178: Multi-Platform Scale Displayed in Table View

3.9.1.6. InTouch[SM]

Activation of the embedded InTouch Remote Service communication agent is handled in this branch of the setup menu. The selections are:

Disabled [default], Enabled

The InTouch agent should not be enabled without the express permission of the user. Additional configuration, both internal and external of the terminal, is required for its proper function.

3.9.1.7. Reset

The Reset setup screen resets setup values to factory default settings for the Maintenance Configure/View setup.

3.9.1.7.1. Maintenance Reset

To initiate a reset, press the OK softkey OK. If the reset was successful, a verification message that reads "Reset Successful" displays. If the reset was not successful, an error message that reads "Reset Failure" displays. If the reset fails, try to initiate the reset again. If the reset continues to fail, contact a local METTLER TOLEDO representative for assistance.

Press the ESCAPE softkey Esc to exit without resetting.

3.9.2. Run

The Run screens enable the operator to:

- Run the calibration test
- Access the secured MT Service View diagnostics
- View and run diagnostic tests
- Replace Battery

3.9.2.1. Calibration Test

The Run Calibration Test screen allows the initiation of a calibration test with external weights. If a SICS scale is present, an internal calibration test function is also available, provided the base supports the 'TST3' SICS function.

The name of the person who previously ran the calibration test displays on the Calibration Test screen. Press the ENTER key to change the name. Use the alpha keys to enter a new name. Press ENTER.

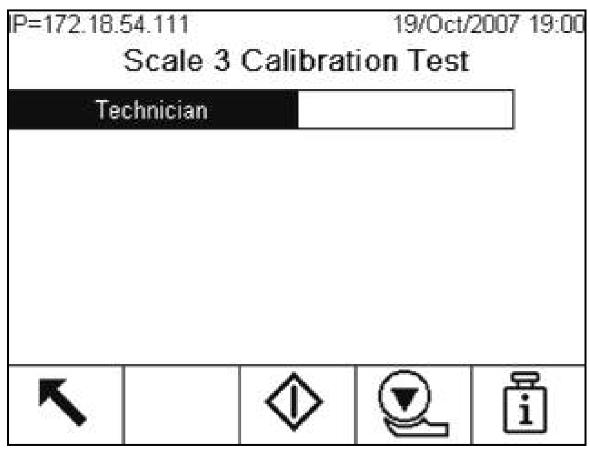


Figure 3-179: Scale 3 Calibration Test Screen

3.9.2.1.1. To view and modify test weight information

1. Press the TEST WEIGHT INFORMATION softkey to access the Test Weight View screen where test weight information such as weight values and serial numbers can be edited, inserted, or deleted.

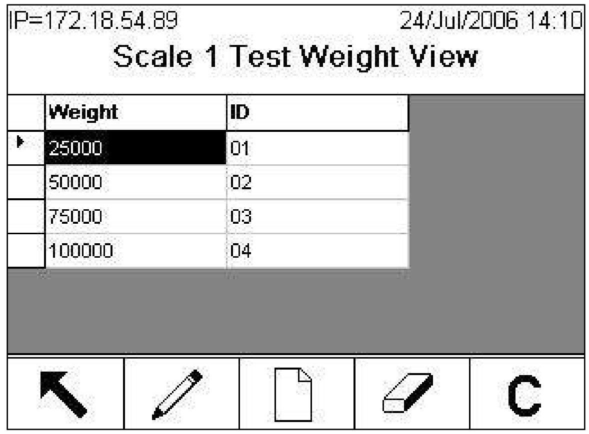


Figure 3-180: Scale 2 Test Weight View Screen

2. Press the EDIT softkey to change a weight value or ID for an existing test weight, or press the NEW softkey to define the weight value and ID of a new test weight.

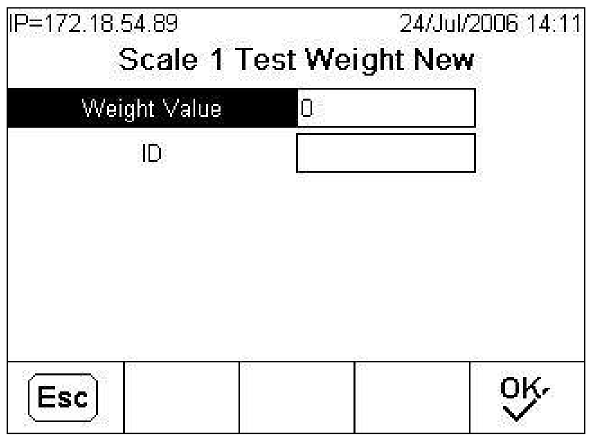


Figure 3-181: Scale 2 Test Weight New Screen

3. Press the OK softkey to save the changes or the new test weight record.
4. Press the ESCAPE softkey Esc to exit without saving.
5. Press the DELETE softkey to delete a test weight from the list.
6. Press the CLEAR softkey C to clear all test weight records from the list.
7. Press the EXIT softkey to return to the Run Calibration Test screen.

3.9.2.1.2. To run the external calibration test:

1. Press the START softkey to initiate the external calibration test. The currently displayed weight unit is compared to the programmed calibration test procedure weight unit.

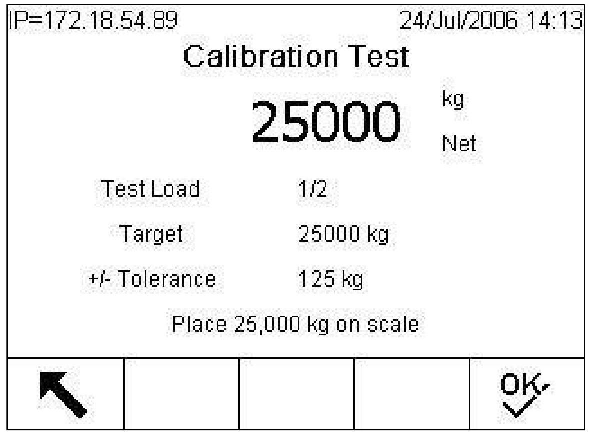


Figure 3-182: Calibration Test Screen

- If the units do not match, the IND780 terminal will automatically check other programmed units and switch to the corresponding weight unit. If the unit selected for calibration does not match the primary or secondary units, an error message will display and the test cannot be run. If this occurs, reprogram the unit selection or the calibration test unit to ensure that they match.

2. Live scale weight (active weight) displays on the first line (under the system line).
3. The calibration test step (for example, 1/5, which indicates step 1 of 5) displays under the active weight display.
4. The next line displays the test load value and +/– tolerance values for the step.
5. The prompt displays on the line under the test load.
6. Follow the prompts on the display and add the required test weights.
7. Press the OK softkey OK to proceed to the next calibration test step.
8. If a tolerance fails at any step, a Calibration Test Tolerance Error message displays. Press ENTER to acknowledge the error. There are now 3 possible steps:

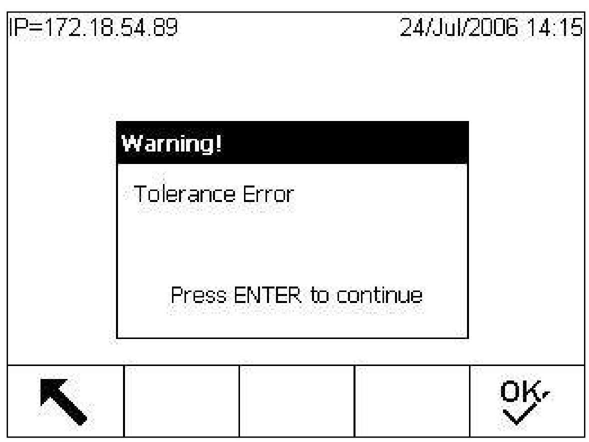


Figure 3-183: Calibration Test Tolerance Error Screen

9. If the wrong test weights were added to the scale, adjust the weights and press the OK softkey OK to repeat the steps.

10. If the test weights were correct and the scale needs to be recalibrated, press the ESCAPE softkey Esc to abort the calibration test.

11. To accept the calibration test error and continue to the next step, press the SKIP softkey (a new softkey that displays when a Calibration Test Tolerance Failure occurs). This step of the test will still report as a failure, but the test can be run to completion if desired.

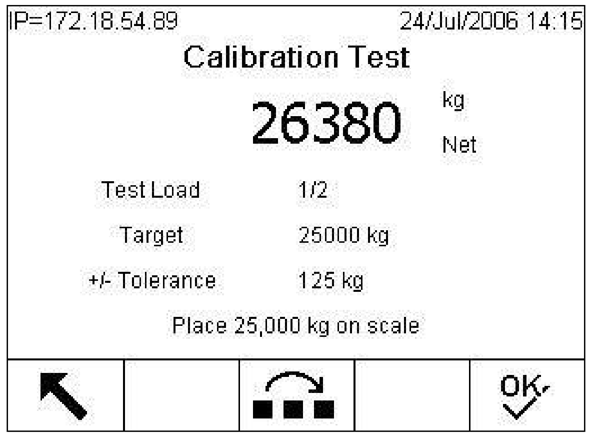


Figure 3-184: Calibration Test Screen

12. After progressing through all of the steps in the calibration test procedure, a Test Complete message displays along with a Status message of either Pass or Fail. Press the PRINT softkey to print the calibration test report to connections with a Report assignment.

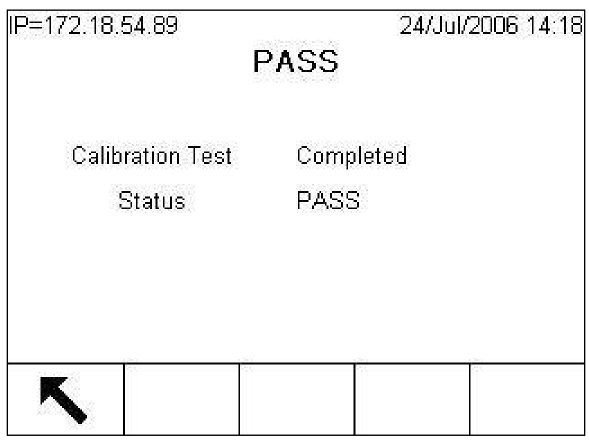


Figure 3-185: Calibration Test Completed Screen

13. Press the ESCAPE softkey Esc during any step to abort the calibration test and return to the Run Calibration Test screen.

3.9.2.1.3. To run the calibration test with internal test weights (only for SICS scale bases):

1. Press the INTERNAL CALIBRATION TEST softkey to access the internal calibration test. The Internal Calibration test setup screen appears, with a tolerance weight value entry and a status message directing the user to empty the scale and press the START softkey.

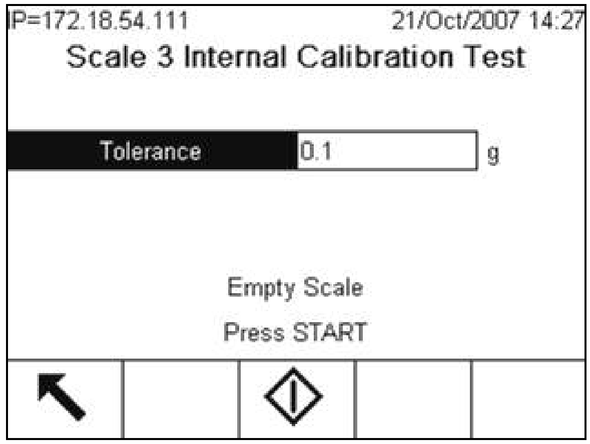


Figure 3-186: Internal Calibration Test Screen

2. Enter the +/- tolerance value to determine pass/failure of the calibration test.
3. Empty the scale and press the START softkey ◇. A "Testing" message appears, indicating the status of the internal calibration procedure.

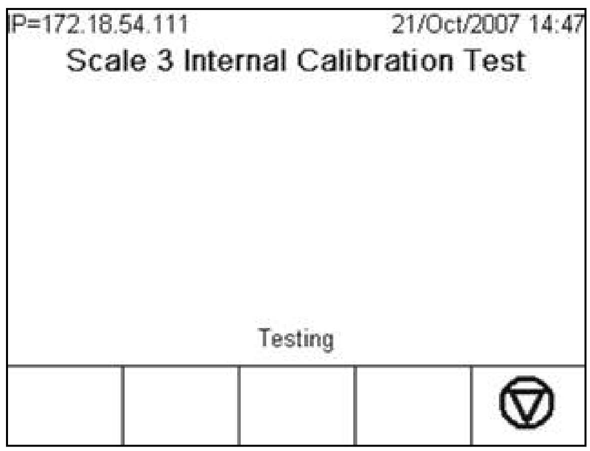


Figure 3-187: Internal Calibration 'Testing' Message

4. When the test operation is completed, a Test Complete message displays, along with a status message of either Pass or Fail. The weight deviation since the last calibration is also indicated. Press the PRINT softkey to print the calibration test report to connections with a Report assignment.

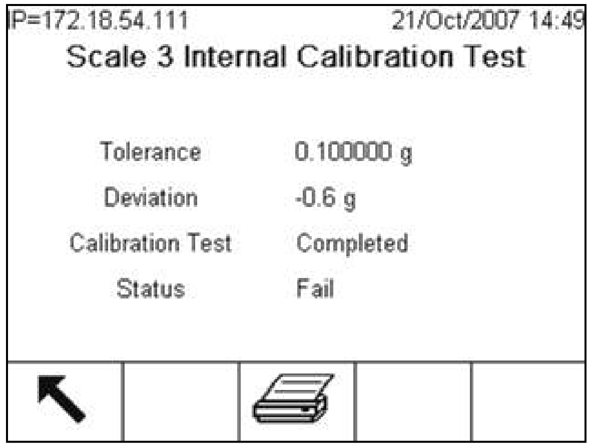


Figure 3-188: Internal Calibration Test Complete Screen

5. Press the EXIT softkey to return to the Run Calibration Test screen.

- If motion is detected during the test procedure, and stability cannot be achieved within the scale base's timeout period, the test operation will be aborted and must be restarted. The timeout period depends on the type of SICS scale base.
- Pressing the ABORT softkey during the test sequence ends the internal calibration test operation and returns to the Run Calibration Test screen.

3.9.2.2. MT Service Security

The MT Service Security screen allows only a METTLER TOLEDO authorized service representative to unlock or lock access to the MT Service View and POWERCELL PDX diagnostic functions. The terminal is in a locked state by default. The security status is displayed in the center of the screen.

Figure 3-189: MT Service Security Secured Screen

3.9.2.2.1. To unlock the terminal

1. Ensure that the terminal's Serial Number field on the screen is not blank. If it is blank, first set the serial number in the **Terminal > Device** setup screen before proceeding.
2. Press the UNLOCK softkey to access the Create MT Service Key screen (Figure 3-190).

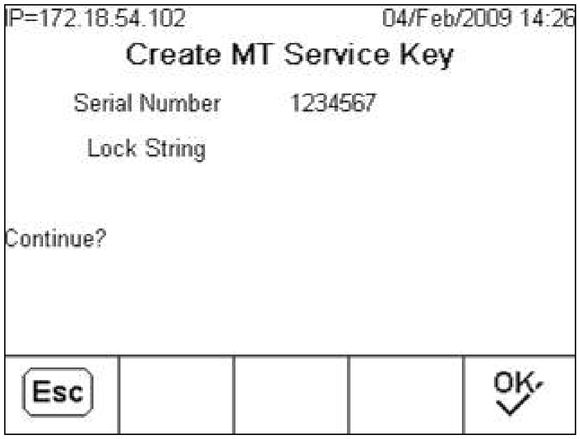
3. 

Figure 3-190: Create MT Service Key Screen

4. Press the OK softkey OK to continue to the next step and generate a Lock String.
5. A Lock String will appear on the screen and the security status changes from "Secured" to "Awaiting Key" on the screen (Figure 3-191). Providing a matching Key String is necessary at this point to unlock the terminal.
6. Press the ESCAPE softkey Esc to return to the setup menu tree if it is not required to enter the Key String at this moment. It is possible to return to this screen at any time, since the Lock String will remain stored in the terminal until the user generates a new one.

7. 

Figure 3-191: Awaiting MT Service Key Screen

8. Referencing the Lock String, use an authorized version of InSite to create the matching Key String. In Figure 3-192, once the Lock String has been entered clicking the Create Key button will generate a Key String.

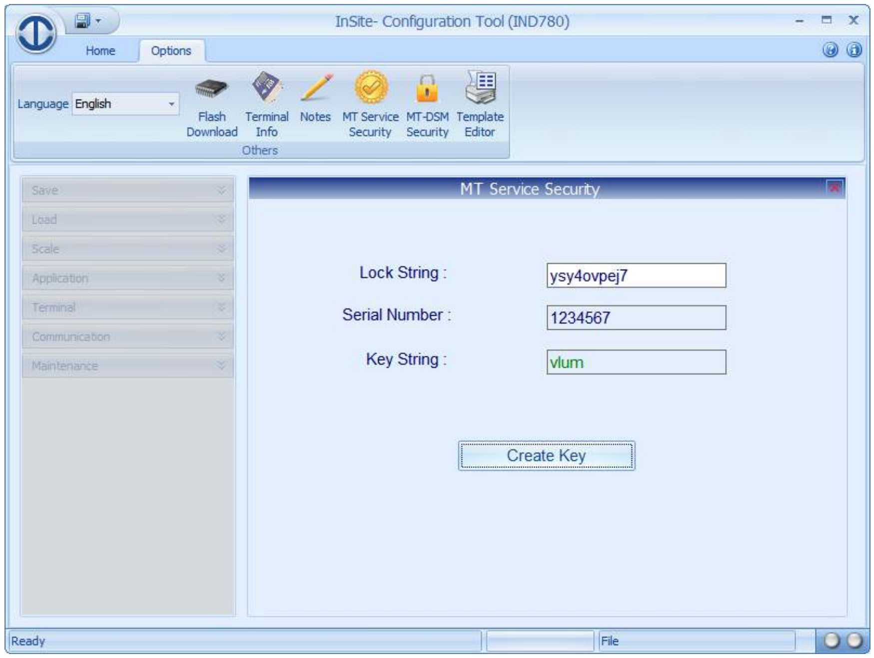


Figure 3-192: InSite Create Key String Screen

9. Then enter the Key String generated in step 6 into the IND780 at the MT Service Security screen (Figure 3-191), and press the OK softkey.
10. If the Key String is valid and accepted, the terminal will be unlocked and the security status is shown as "Open" on the screen.

- If the Key String is not valid, an error message will be displayed and the user is allowed to re-enter the key for a total of three attempts before a new Lock and Key String will need to be created.

11. Press the BACK softkey to return to the setup menu tree.
12. The UNLOCK softkey can always be used to generate a new Lock String.

3.9.2.2.2. To lock the terminal

1. Press the LOCK softkey on the MT Service Security screen.
2. The security status on the display will change from "Open" to "Secured".
3. Press the BACK softkey to return to the setup menu tree.

- The terminal will automatically return to a locked state 36 hours after it has been unlocked.
- With appropriate access rights, when InSite is connected online to the terminal it can unlock the MT Service Security feature, without the user accessing the terminal's setup mode.

3.9.2.3. MT Service View

The MT Service View screen allows a METTLER TOLEDO authorized service representative to view various diagnostics data collected from a POWERCELL PDX scale. More details on the diagnostics data are described in Chapter 4, **Service and Maintenance**. This screen is not accessible if the MT Service Security is locked. MT Service View screens include:

- Scale Load Cell Temperature
- Scale Load Cell Com Voltage
- PDX Terminal
- PDX Terminal
- Scale Load Cell Supply Voltage
- Load Cell Information

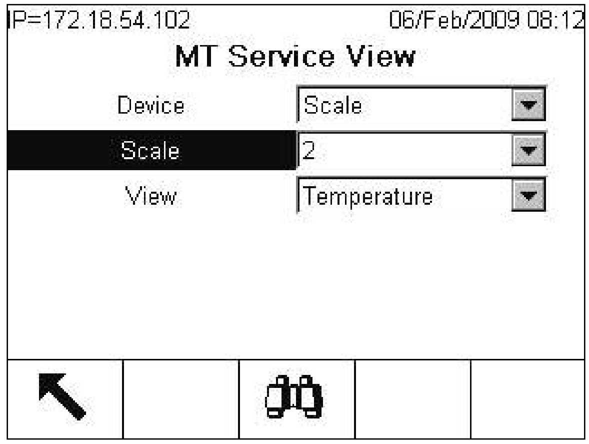


Figure 3-193: MT Service View Screen

3.9.2.3.1. Scale Load Cell Temperature

The Scale Load Cell Temperature screen displays the current temperature of each of a scale's load cells.

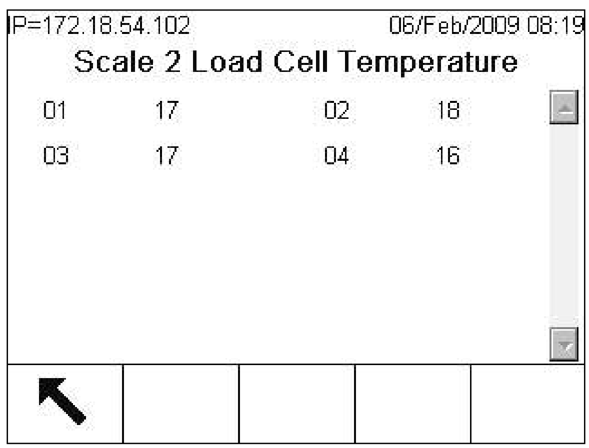


Figure 3-194: Scale Load Cell Temperature Screen

To access this screen from the MT Service View screen, choose Scale in the Device selection box and Temperature in the View selection box. Select the PDX scale channel to view and press the VIEW softkey to display the Scale Load Cell Temperature screen. Press the EXIT softkey to return to the previous screen.

3.9.2.3.2. Scale Load Cell Supply Voltage

The Scale Load Cell Supply Voltage screen displays all load cells' input supply voltage.

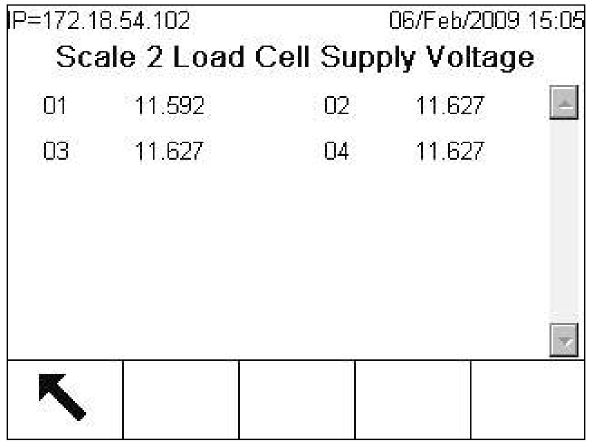


Figure 3-195: Scale Load Cell Supply Voltage Screen

To access this screen from the MT Service View screen, choose Scale in the Device selection box and Supply Voltage in the View selection box. Select the PDX scale channel to view and press the VIEW softkey to display the Scale Load Cell Supply Voltage screen. Press the EXIT softkey to return to the previous screen.

3.9.2.3.3. Scale Load Cell COM Voltage

The Scale Load Cell COM Voltage screen displays the voltage levels on the CAN Bus communication lines for every load cell of the scale.

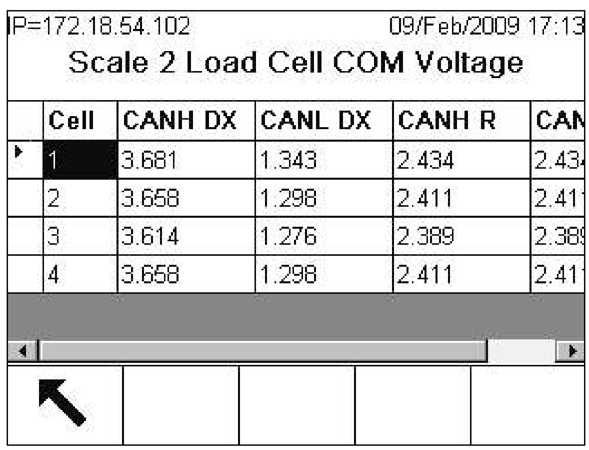


Figure 3-196: Scale Load Cell COM Voltage Screen

To access this screen from the MT Service View screen, choose Scale in the Device selection box and COM Voltage in the View selection box. Next, select the PDX scale channel to view and press the VIEW softkey. A warning and confirmation screen will be displayed after the VIEW softkey is pressed. Press the OK softkey to proceed to display the Scale Load Cell COM Voltage screen. This operation will take several minutes as each load cell is required to interrupt its communication lines temporarily in order to take CAN voltage measurements. Press the EXIT softkey to return to the previous screen.

3.9.2.3.4. Load Cell Information

The Load Cell Information screen displays various diagnostics data for a selected POWERCELL PDX cell. Each data field will have both a current value and a value recorded at the time of calibration. This enables the user to make data comparisons to a known working condition of the cell. The displayed information includes:

- Cell S/N
- Temperature
- CAN-High Dominant X
- CAN-High Recessive
- Gas Concentration
- Install Date
- LC Supply Voltage
- Energy
- CAN-Low Dominant X
- CAN-Low Recessive

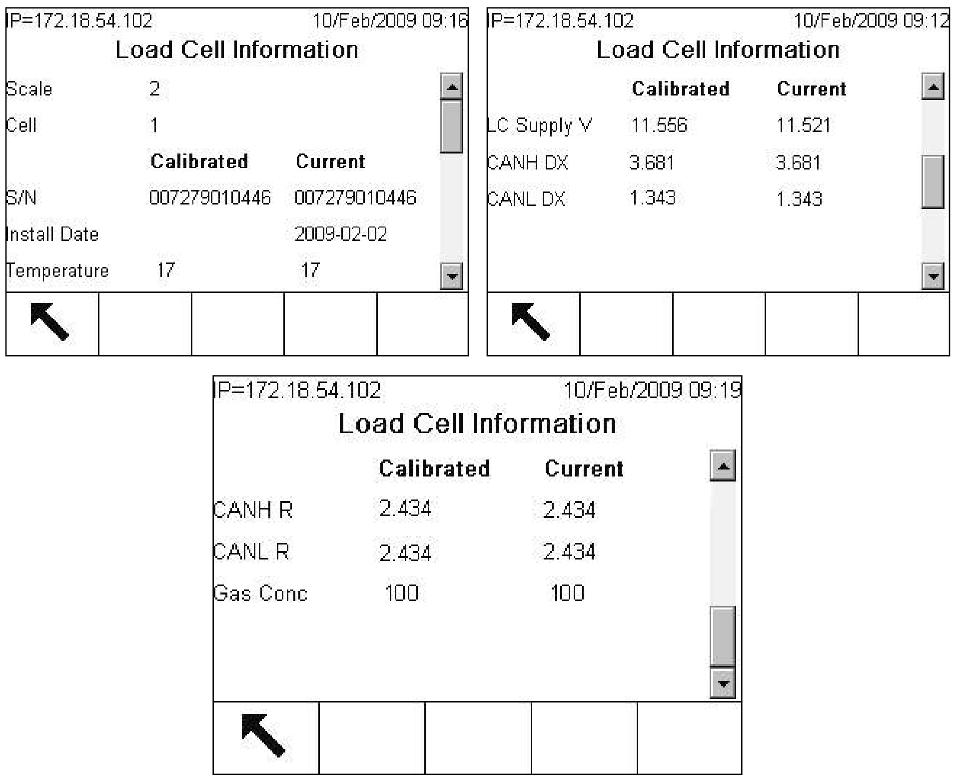


Figure 3-197: Load Cell Information Screen

To access this screen from the MT Service View screen, choose Load Cell in the Device selection box. Next, select the PDX scale channel and the specific Load Cell number to view. Press the VIEW softkey to proceed. Use the UP and DOWN navigation keys to scroll through each data field. Press the EXIT softkey to return to the previous screen.

3.9.2.3.5. PDX Terminal

The PDX Terminal screen displays the minimum and maximum voltages and current detected on the IND780 PDX option board. The displayed information includes:

- Minimum CAN-High Voltage
- Maximum CAN-High Voltage

- Minimum CAN-Low Voltage
- Minimum CAN Voltage Difference
- Minimum Supply Voltage
- Minimum Supply Current
- Maximum CAN-Low Voltage
- Maximum CAN Voltage Difference
- Maximum Supply Voltage
- Maximum Supply Current

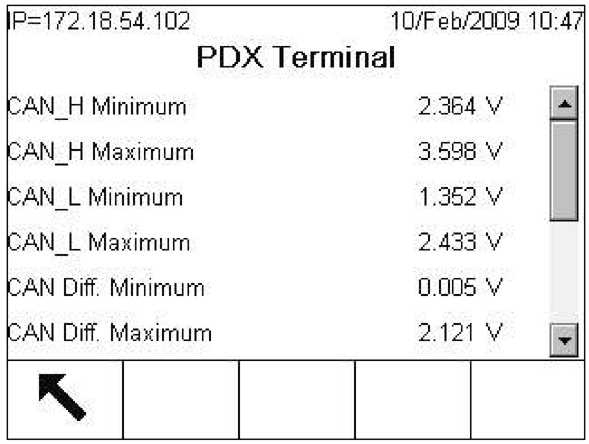


Figure 3-198: PDX Terminal Screen

To access this screen from the MT Service View, choose Terminal in the Device selection box. Press the VIEW softkey to proceed. Use the UP and DOWN navigation keys to scroll through each data field. Press the EXIT softkey to return to the previous screen.

3.9.2.4. Diagnostics

Diagnostic procedures are described in Chapter 4, **Service and Maintenance**. Diagnostic test setup screens include:

- Memory Test
- Keyboard Test
- Scale 1 - 4
- Load Cell Output
- Calibration Values
- Shift Values
- Statistics
- Serial Test
- Discrete I/O Test
- Slot 5
- Slot 6
- ALC 1
- ALC 2
- ALC 3
- ALC 4
- Remote 1
- Remote 2
- Remote 3
- Remote 4
- Remote 5
- Remote 6
- Remote 7
- Remote 8
- Network Test

3.9.2.4.1. Memory Test

The memory test runs a short test on the BRAM. Press the start softkey to run the test. The display will show "Testing" and the PASS or FAIL.

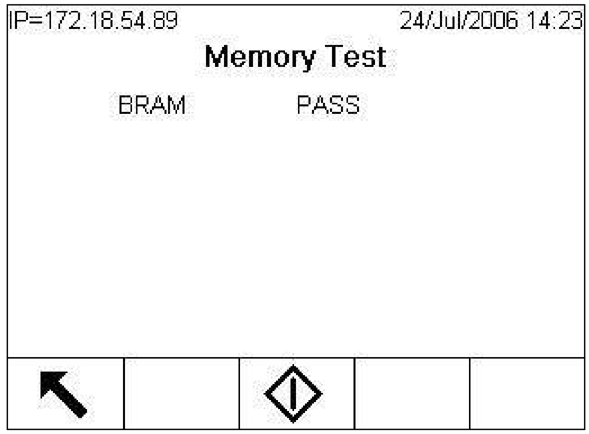


Figure 3-199: Memory Test Screen

Press the Exit softkey to return to the menu tree.

3.9.2.4.2. Keyboard Test

The Keyboard Test screen enables testing of the terminal keys, including:

- Softkeys
- Navigation keys
- Application keys
- Scale function keys
- Numeric keys

Press any key. The screen (like the one shown in Figure 3-200) will display the key last pressed.

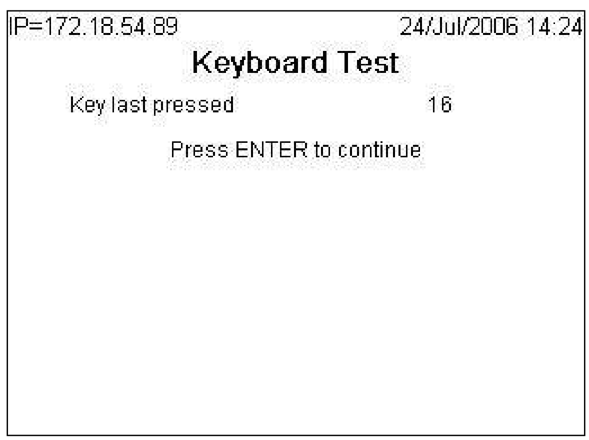


Figure 3-200: Keyboard Test Screen

Press the EXIT softkey to return to the menu tree.

3.9.2.4.3. Scale 1 - 4

Scale diagnostics setup screens include:

- Load Cell Output
- Calibration Values
- Diagnose Cell
- Statistics

- Shift Values

Load Cell Output

The Load Cell Output screen displays the current number of counts (active value) for the scale. This display is only available for analog or digital load cells.

If Scale 1 type is POWERCELL, the addresses that appear here will represent load cells within the defined group, up to a maximum of 24. Refer to **Scale > Scale 1 > Type**, above, for details on selecting a load cell group and specifying the number of cells in it.

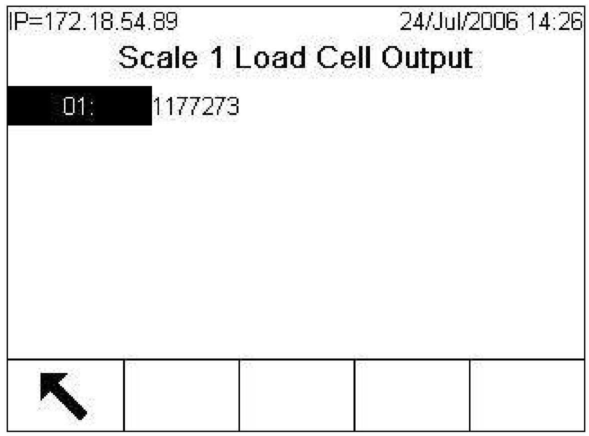


Figure 3-201: Scale 1 Load Cell Output Screen

Press the EXIT softkey to return to the menu tree.

Calibration Values

The Calibration Values screen displays the current calibration values configured for the scale. The number of test loads that display calibration values is determined by the Linearity Adjustment setting configured for the scale (see the Scale branch, Calibration setup).

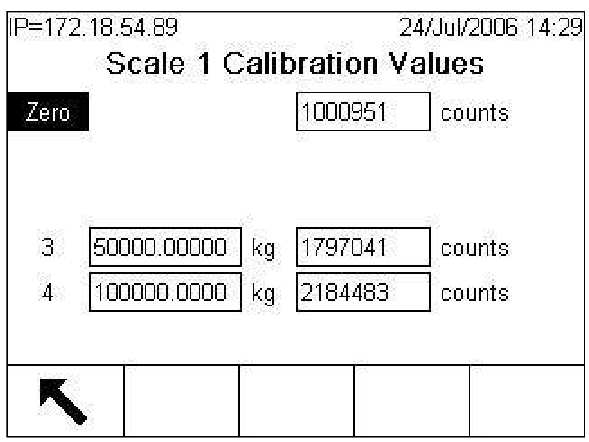


Figure 3-202: Scale 2 Calibration Values Screen

- These calibration values can be recorded and then manually entered into a new replacement board should a failure ever occur, which eliminates having to recalibrate the scale with test weights. While this method is quick, it is not as accurate as placing test weights on the scale.

Use the UP and DOWN navigation keys to select a calibration value to be modified. Use the numeric keypad to enter new values.

Press the EXIT softkey to return to the menu tree.

Shift Values

A shift value is the gain compensation factor applied to a single load cell in a multiple load cell system. Only POWERCELL and PDX scales have a shift value display. All shift values can be viewed or edited on this screen. Scrolling up/down may be required to see all of the data.

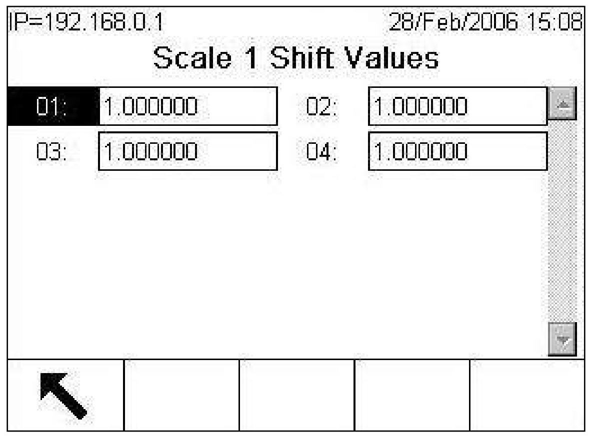


Figure 3-203: Scale 1 Shift Values Screen

Use the cursors to select the load cell, and press the ENTER key to enter a new shift value.

Diagnose Cell

The Diagnose Cell screen is only available when the scale type is POWERCELL (excluding POWERCELL PDX). It allows the verification of the node address of a single load cell. If the cell being diagnosed has a known address, select that address from the Load Cell Address selection box. Otherwise, select the default option, Connected Cell. Do not connect or disconnect any load cells to the terminal until prompted by the terminal.

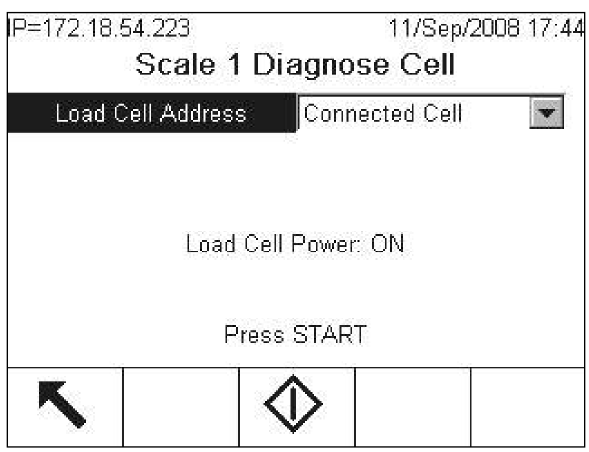


Figure 3-204: Diagnose Cell Start Screen

Press the START softkey to initiate the diagnostic. Shortly after, the terminal will shut down its power supply to the load cells and prompt to connect a single load cell (Figure 3-205). Once the load cell is connected, press the OK softkey.

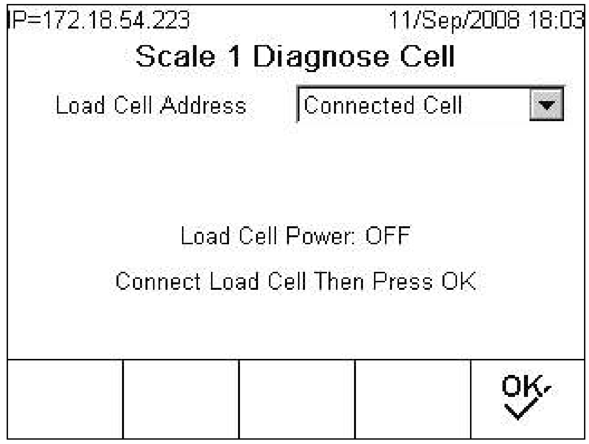


Figure 3-205: Diagnose Cell Connect Cell Screen

The terminal will begin searching for the connected load cell. An error message will be displayed if this process is unsuccessful. Reasons for failure include communication errors, incorrect cell address or a defective cell. Rectify the failure and restart the diagnostic. If the load cell is found during the diagnostic, both the cell address and cell counts are displayed, as shown in Figure 3-206.

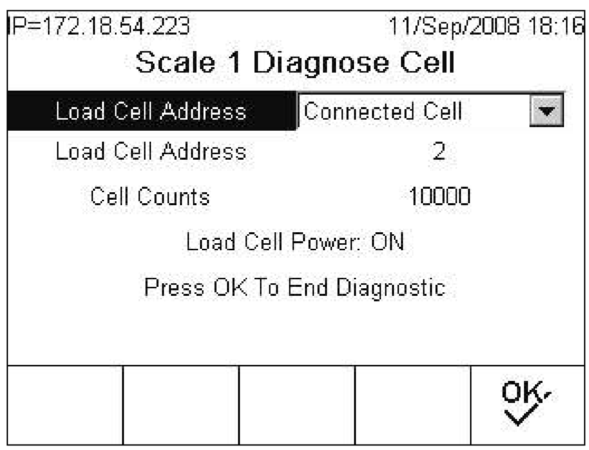


Figure 3-206: Diagnose Cell End Diagnostic Screen

Press the OK softkey to end the diagnostic. The terminal will again shut down the power to the load cell and allow the cell/s to be removed or reconnected to the terminal.

Statistics

The Scale Statistics screen displays statistical information for the scale such as weighments (increments each time a transaction is triggered), overloads (increments when the applied load for a single load cell exceeds its overload capacity), peak weight, zero commands (increments each time a zero command is received from an operator or remotely), and zero failures.

In some cases, more statistical data is available than can be viewed in a single screen. Use the UP, DOWN, LEFT, and RIGHT navigation keys to view all information and records.

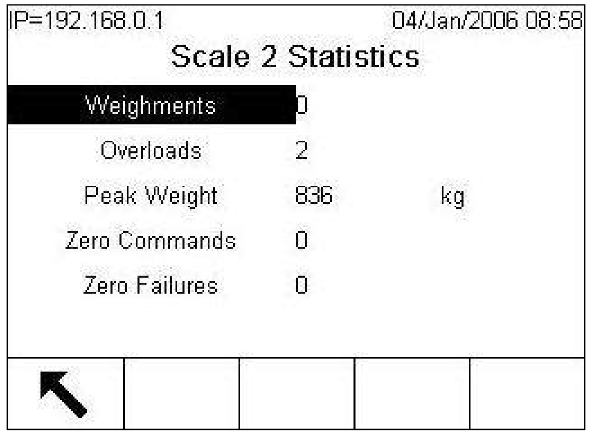


Figure 3-207: Scale 2 Statistics Screen

Press the EXIT softkey to return to the menu tree.

3.9.2.4.4. Serial Test

The Serial Test screen enables testing of the sending and receiving hardware on the serial ports COM1, COM2, COM3, and COM4.

Com Port

Use the Com Port selection box to select the serial port for testing (1, 2, 3, or 4).

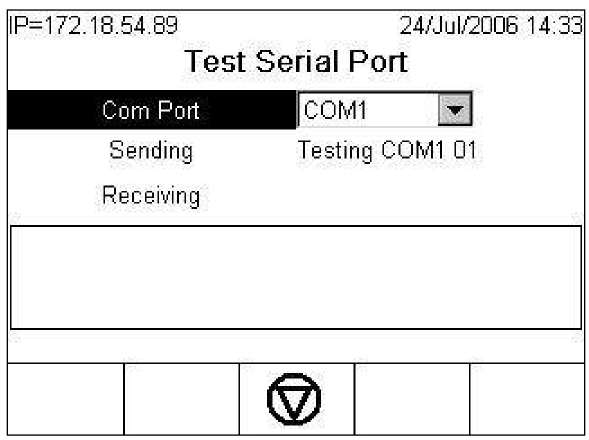


Figure 3-208: Test Serial Port Screen

Press the START softkey to initiate transmission of the test string. After pushing the START softkey, it changes to a STOP softkey. Press this key to end transmission of the test string.

In the serial test mode, the terminal will transmit a string "Testing COMX nn" out the selected serial port where the "X" is the selected com port number (1, 2, or 3) and "nn" is a sequential two-digit number (00–99). If a jumper is placed between the transmit and receive terminals on that port, the same data displays in the receiving field.

If another device is connected to the receiving port, any ASCII data received displays in the receiving field.

The serial test continues until the STOP softkey is pressed, which returns the user to the main Serial Test screen.

Press the EXIT softkey to return to the menu tree.

3.9.2.4.5. Discrete I/O Test

Discrete I/O Test setup screens include:

Slot 5	Remote 3
Slot 6	Remote 4
ALC 1	Remote 5
ALC 2	Remote 6
ALC 3	Remote 7
ALC 4	Remote 8
Remote 1	
Remote 2	

Select the item to test and press ENTER.

WARNING

WHEN ANY OF THE DISCRETE I/O TEST SCREENS ARE FIRST ACCESSED, A WARNING MESSAGE DISPLAYS WITH INSTRUCTIONS TO REMOVE OUTPUT CONTROL POWER BEFORE PROCEEDING WITH THE TEST. THE DISCRETE I/O TEST SCREENS ENABLE MANUAL SETTING OF ANY OF THE OUTPUTS TO ON OR OFF FOR TESTING, SO IT IS NECESSARY TO REMOVE OUTPUT CONTROL POWER BEFORE PROCEEDING.

Figure 3-209 shows an example of a Discrete I/O Test screen. In this case, the screen displays the inputs and outputs associated with a DIO option board located in slot 6.

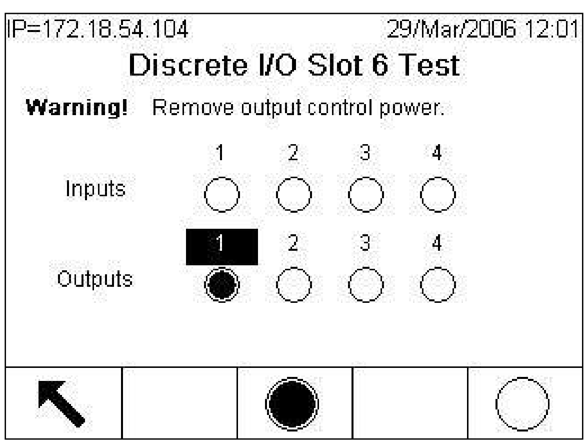


Figure 3-209: Discrete I/O Option Board Test Screen

Press the EXIT softkey ↖ to abort and not perform the test.

To continue the test:

1. .In the menu tree, use the UP and DOWN arrows to select the channel to be tested. Press ENTER to select the channel in focus.
2. A real-time display shows the status of each of the inputs and enables each of the outputs to be turned on and off. An input or output that displays ○ is turned off. An input or an output that displays ● is turned on.
3. Use the LEFT and RIGHT navigation keys, or the ENTER key, to select an output to test.
4. With an output selected, press the DISCRETE OFF softkey ○ to turn it off, or press DISCRETE ON ● to turn it on. Figure 3-210 shows the test screen for an Analog Load Cell, with its output turned on.

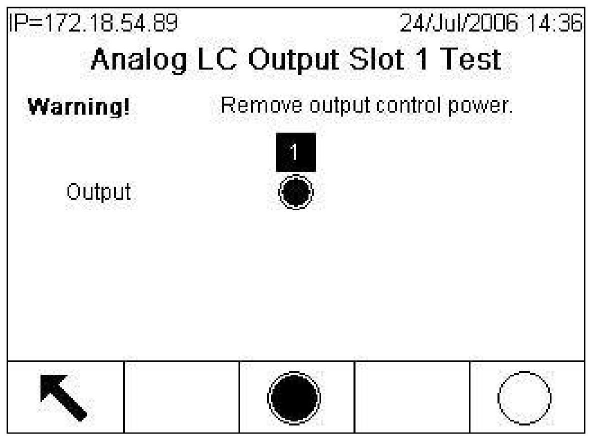


Figure 3-210: Analog LC Output Slot 2 Test Screen

5. Press the EXIT softkey ↖ to return to the menu tree. The outputs return to their previous on/off configuration before the tests were initiated.
6. The status of the discrete inputs can be tested by applying a voltage to the input. Changes in status are indicated by the On and Off graphic.

- When the Discrete I/O Test screen is exited, all outputs will be turned off again.

3.9.2.4.6. Network Test

The Network Test screen enables Ethernet network testing and assists in determining the availability of network options. The status of each line associated with the network setup displays during and after testing, showing a status of either Testing, Pass, Fail, or Timeout.

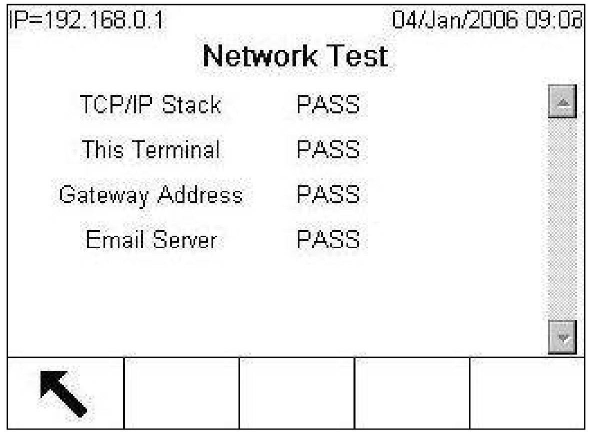
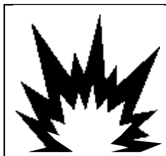


Figure 3-211: Network Test

Press the EXIT softkey  to return to the menu tree.

3.9.2.5. Replace Battery



⚠ CAUTION

RISK OF EXPLOSION IF BATTERY IS REPLACED WITH WRONG TYPE OR CONNECTED IMPROPERLY. DISPOSE OF BATTERY ACCORDING TO LOCAL LAWS AND REGULATIONS.

Changing the battery on the main PCB will cause volatile BRAM memory to be lost. Selecting Replace Battery opens a screen (Figure 3-212) prompting for BRAM Backup. This procedure should be performed during initial installation. Backing up the BRAM to flash also sets the clock used by the battery replacement monitor.

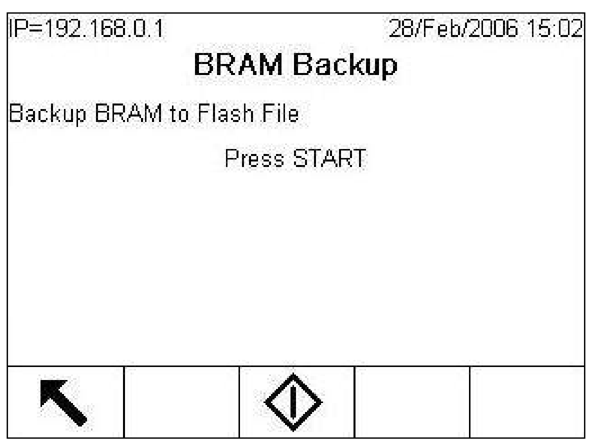


Figure 3-212: BRAM Backup

Press the START softkey ◇ to backup the BRAM. Once the process is complete, a prompt (Figure 3-213) appears – "Power off terminal and replace battery."

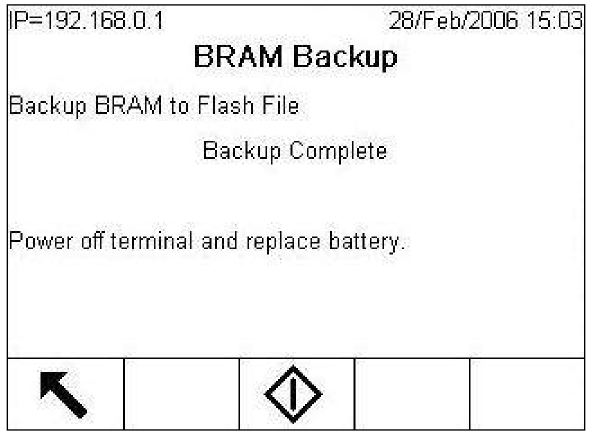


Figure 3-213: Replace Battery Screen

When power is restored to the IND780 after battery replacement, the BRAM will be restored from the saved file.

3.9.2.6. Install Software Upgrade

The software upgrade screen offers two options for upgrading the IND780's software – using an internal file, or by plugging USB memory into the terminal's USB port. Figure 3-214 shows the upgrade screen.

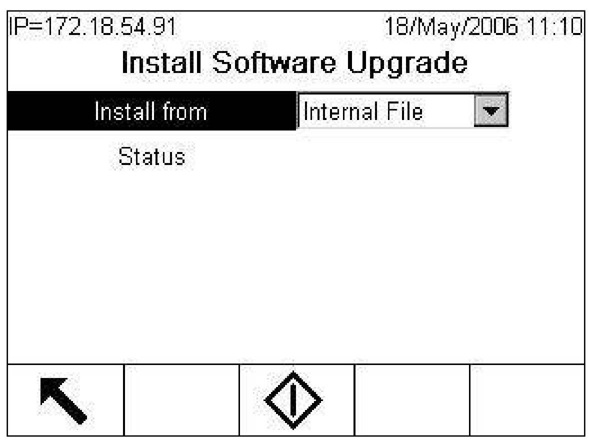


Figure 3-214: Install Software Upgrade Screen

- Refer to Chapter 4, **Service and Maintenance**, for the procedure to follow when upgrading firmware. The firmware cannot be upgraded if the Indicator is sealed and the Metrological Security switch S-1 is in its ON position.

3.9.2.7. Backup to USB

The system backup screen allows a backup dataset to be named and saved to a USB device connected, either directly or via an extension cable, to the IND780's USB port. Figure 3-215 shows the backup screen.

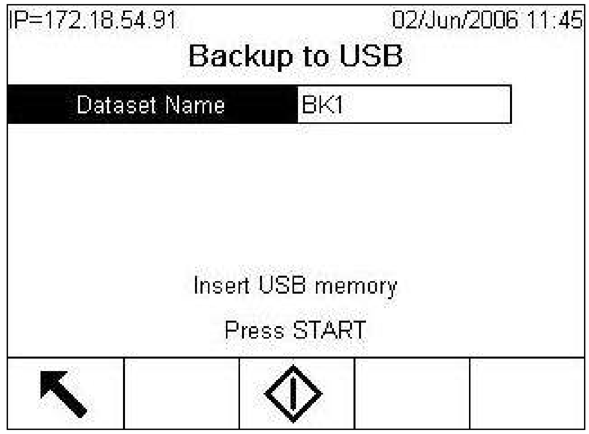


Figure 3-215: Backup to USB Screen

Refer to Chapter 4, **Service and Maintenance**, for the procedure to follow when backing up the system configuration. Backup can be performed by users with any access level, and may be carried out even when the indicator is metrologically sealed.

3.9.2.8. Restore from USB

The system restore screen allows a dataset saved on a USB device to be restored, or copied to a new terminal. Scale calibration parameters can be restored or not restored, depending on the selection from the drop-down list. Log files are not restored from the dataset, and the procedure can only be performed by operators with Administrator-level access. Configurations cannot be restored or copied to indicators that are metrologically sealed. Figure 3-216 shows the restore screen.

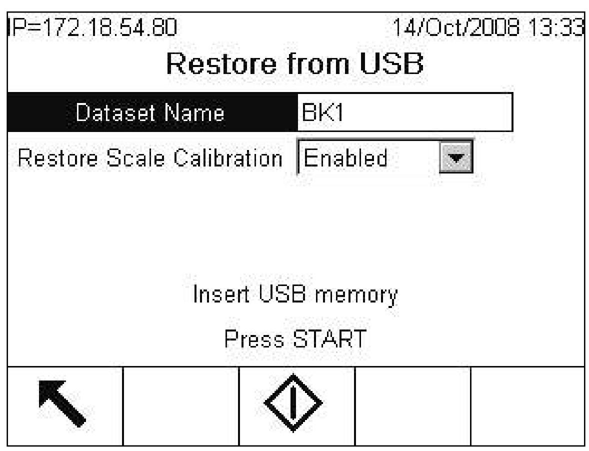


Figure 3-216: Restore from USB Screen

Refer to Chapter 4, **Service and Maintenance**, for the procedure to follow when restoring the system configuration.

3.9.3. Shared Data Edit

NOTICE
ENTERING INCORRECT SHARED DATA VALUES CAN CAUSE THE IND780 TO OPERATE INCORRECTLY. A CONFIGURATION BACKUP IS STRONGLY RECOMMENDED BEFORE ANY SHARED DATA VALUE IS CHANGED. REFER TO SECTION 3.9.2.7, ABOVE.

Shared Data variables can be edited directly from the IND780 setup menu tree. Select **Shared Data Edit** to display the screen shown in Figure 3-217.

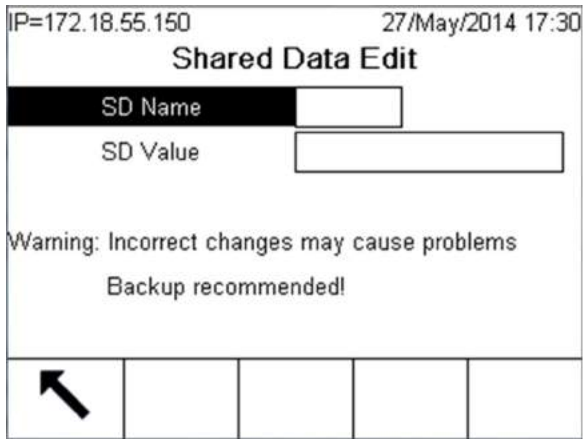


Figure 3-217: Shared Data Edit Screen

Enter the name of the shared data variable in the **SD Name** field, then its new setting in the **SD Value** field. For example, to set **Current Units** on **Scale 2** to **Primary**, the entries would be as follows:

SD Name	ws0205
SD Value	1

Refer to the **IND780 Shared Data Reference** for detailed information about available Shared Data variables and their settings.

3.9.4. Reset All

The Reset All setup screen resets all setup blocks to factory default settings.

- The Reset All step resets all parameters in the terminal, excluding calibration and the tables.

When the Reset All screen is first accessed, a message displays that asks for verification to reset all setup parameters to factory default settings. To continue with the Reset All, press the OK softkey OK. If the reset was successful, a verification message that reads "Setup parameters were reset. Terminal will now restart." displays. If the reset was not successful, an error message that reads "Reset Failure" displays. If the reset fails, try to initiate the reset again. If the reset continues to fail, contact a local METTLER TOLEDO representative for assistance.

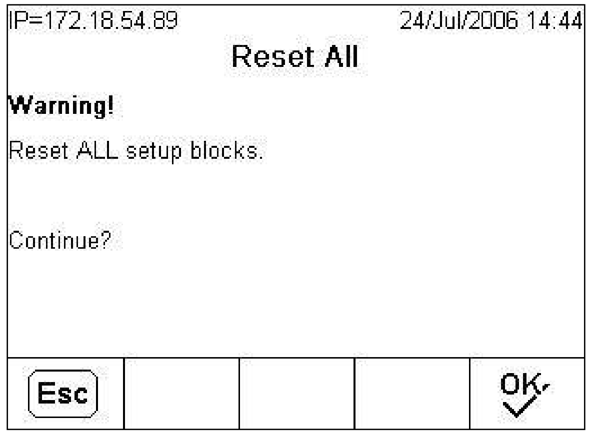


Figure 3-218: Reset All Screen

Press the ESCAPE softkey Esc to exit without resetting.

3.10. Restoring Factory Default Settings

Factory default settings can be restored individually for branches such as scale, application, and terminal, or globally with the Reset All screen under the Maintenance branch. The Reset screen is the last node in each major branch of the menu tree. To restore factory default settings for Application for example:

1. Press the SETUP softkey. The setup menu tree displays.
2. Use the DOWN navigation key to move the focus to Application.
3. Press the RIGHT navigation key to expand the Application branch.
4. Use the DOWN navigation key to move the focus to Reset.
5. Press the ENTER key to open the Application Reset screen.
6. Press the OK softkey to reset the Application setup values to factory default settings.
7. A status message appears that verifies a successful reset.
8. Press the ESC softkey Esc to return to the setup menu tree display.
9. Repeat steps 2–8 to reset factory default settings for any major branch in Setup.

- Scale reset does NOT include the reset of type, capacity, increment, or calibration data. Reset these data by initiating a "hard reset" using the hardware reset pushbutton at power up, and with S2 in its ON position. Refer to the Master Reset section in Chapter 4, **Service and Maintenance**.

4 Service and Maintenance

The IND780 terminal is designed to provide years of dependable operation. However, METTLER TOLEDO recommends that – as with any industrial measurement equipment – the IND780 terminal and the connected scale system be serviced periodically. Timely, factory-specified maintenance and calibration by a METTLER TOLEDO service technician will ensure and document accurate and dependable performance to specifications.

4.1. Precautions

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

	⚠ **WARNING**
	ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THE TERMINAL. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.
	⚠ **WARNING**
	IF THE KEYBOARD, DISPLAY LENS OR ENCLOSURE IS DAMAGED ON A DIVISION 2 APPROVED OR CATEGORY 3 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.
	⚠ **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.
	⚠ **CAUTION**
	RISK OF EXPLOSION IF BATTERY IS REPLACED WITH WRONG TYPE OR CONNECTED IMPROPERLY. DISPOSE OF BATTERY ACCORDING TO LOCAL LAWS AND REGULATIONS.

⚠ 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.

NOTICE

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

4.2. List of Tools Required

The following tools are required to perform these procedures:

- Soft cloth and mild glass cleaning solution
- Voltmeter
- Anti-static mat and wrist strap
- Two sizes of Philips head screwdrivers
- Flat blade screwdriver
- Wrenches to fit 33 mm and 19 mm, for use with cable glands
- Nut driver with 7 and 8 mm sockets

4.3. Cleaning and Maintenance

Clean the IND780 terminal's keypad and cover with a clean, soft cloth that has been dampened with a mild glass cleaner. Do not use any type of industrial solvent such as toluene or isopropanol (IPA) that could damage the terminal's finish. Do not spray cleaner directly on the terminal.

Regular maintenance inspections and calibration by a qualified service technician are recommended. The IND780 is a rugged stainless steel enclosed instrument; however, the front panel is a polyester covering over sensitive electronic switches and a lighted display. Care should be taken to avoid any punctures to this surface or any vibrations or shocks to the instrument. Should the front panel become punctured, ensure that steps are taken to prevent dust and moisture from entering the unit until the terminal can be repaired.

4.3.1. Enclosure Gasket

For the harsh environment model, in order to preserve the enclosure's IP rating, inspect the sealing gasket to ensure that it makes a good seal, and does not have permanent indentations.

Gasket lifetime is shortened by exposure to high temperatures. The enclosure gasket should be inspected during any maintenance activity, and replaced if it becomes damaged or brittle.

4.4. Firmware Upgrade Procedure

There are two ways to install an upgraded version of the IND780's firmware. The preferred method uses the PC-based InSite™ CSL software tool (only available to METTLER TOLEDO personnel), but it is also possible to do so without a computer, using a USB flash memory drive (thumb drive) connected to the IND780's USB port.

4.4.1. Upgrade Using InSite™ CSL

To upgrade existing installed field units, two upgrade files (Upgrade.L78 and Upgrade.Z78) are required. These files and the method described below can **only** be used if you are upgrading from IND780 revision 3.xx or higher **and** the terminal has at least 256MB of CF card memory.

If the terminal has a 2.xx or lower revision firmware or a smaller CF card memory, the upgrade operation requires a re-format of the CF memory card and a complete flash of the new firmware files and folders structure. For this condition, contact a local METTLER TOLEDO representative for assistance in upgrading your terminal.

With the IND780 connected to a network:

1. Run the InSite Configuration Tool (only version 5 or higher).
2. In InSite, access **Home | Connection | Settings**, or click the Settings icon, to set up InSite to address the terminal.
3. Access Options | Flash Download, or click on the Flash Download icon. From the Firmware Download window (Figure 4-1), select the files to copy to the IND780's Upgrade folder. Refer to the InSite documentation or help system for details on performing this step.

- The files selected for download must not be read-only. If necessary, right-click the files in Windows Explorer, select Properties, and modify their attributes – clear the Read-Only box at lower left, and then click OK to confirm the change.

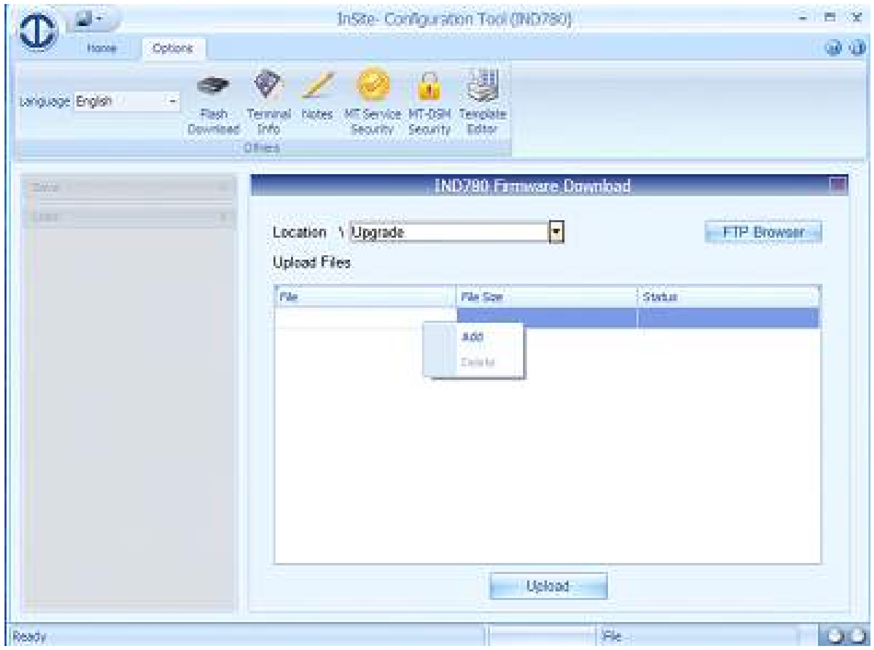


Figure 4-1: InSite Firmware Upgrade File Selection Screen

4. Press the SETUP softkey to access the IND780's setup tree. When prompted, enter a valid user name and password at an access level that permits setup parameters to be changed.

5. Use the arrow keys to move focus to **Maintenance > Run > Install Software Upgrade**. When the node is in focus, press ENTER. The screen shown in Figure 4-2 will appear.

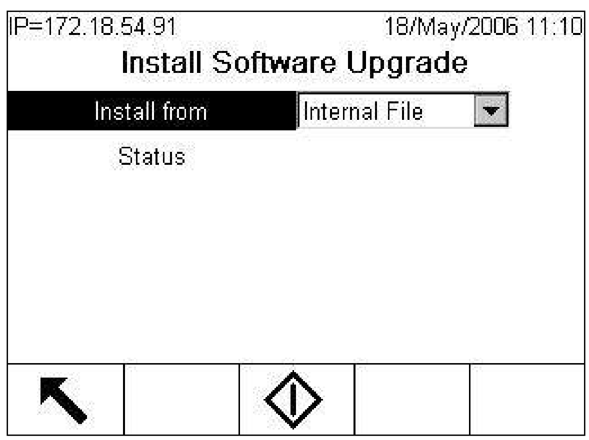


Figure 4-2: Firmware Upgrade Screen

- If the terminal is sealed this screen will appear without a START button, and with a Status message that software upgrade will not be permitted when the metrological security switch S-1 is ON (locked). The terminal must be unsealed and the switch set to OFF, in order to permit a software upgrade.

6. By default, the Internal File option is selected in the **Install from** list. This is the correct setting for upgrade from files downloaded using InSite.

7. Press the START softkey to perform the upgrade. If the files are not present in the Upgrade folder, the screen shown in Figure 4-3 appears. Performing the copy operation from InSite will continue the process. Pressing the EXIT softkey abandons the process and returns to the setup tree.

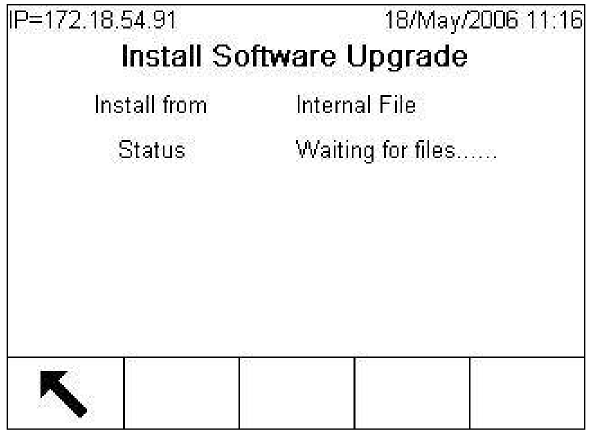


Figure 4-3: Firmware Upgrade – Waiting for Files

8. If the IND780 finds the files in the UPGRADE directory, the screen shown in Figure 4-4 appears briefly, and the terminal restarts.

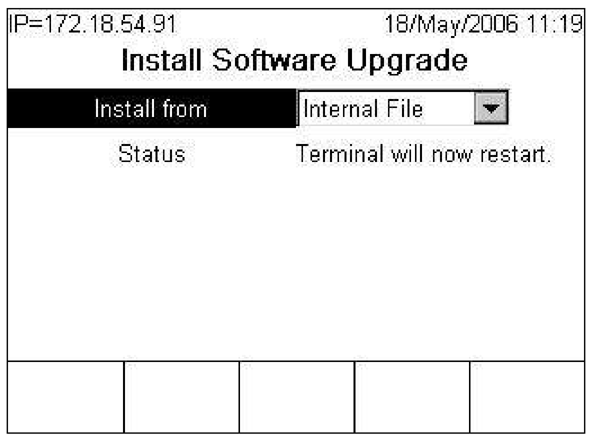


Figure 4-4: Firmware Upgrade in Progress

9. On-screen messages will indicate the progress of the upgrade. Do not disconnect power from the IND780 during this procedure. The terminal will back up existing files, unpack the upgrade files and perform clean-up operations. Once this process is complete, start-up continues as normal.
10. If prompted to do so, manually cycle power to the terminal to complete the process.

4.4.2. Upgrade Using USB Memory

To upgrade existing installed field units, two upgrade files (Upgrade.L78 and Upgrade.Z78) are required. These files and the method described below can **only** be used if you are upgrading from IND780 revision 3.xx or higher **and** the terminal has at least 256MB of CF card memory.

If the terminal has a 2.xx or lower revision firmware or a smaller CF card memory, the upgrade operation requires a re-format of the CF memory card and a complete flash of the new firmware files and folders structure. For this condition, contact a local METTLER TOLEDO representative for assistance in upgrading your terminal.

In general, USB drives that are USB 2.0 certified and 1.1 compatible are supported by the IND780. To perform an upgrade:

1. Create a folder called UPGRADE in the root of a USB Memory drive ("thumb drive").
2. Copy the two UPGRADE files into the UPGRADE folder.
3. Connect the USB Memory to the IND780's USB port, either by plugging it in directly or via a USB extension cable connected to the port.
4. Access **Setup > Maintenance > Run > Install Software Upgrade**, as above.
5. With focus on the Install from box, press ENTER, and use the DOWN arrow key to highlight USB Memory, as shown in Figure 4-5, then press ENTER to make the selection.

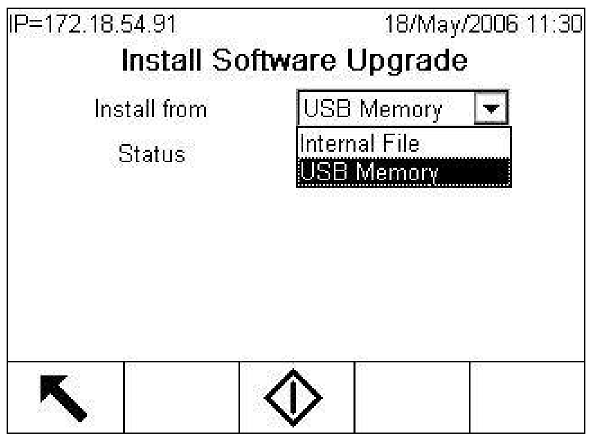


Figure 4-5: Firmware Upgrade From USB Memory

- If the terminal is sealed this screen will appear without a START button, and with a Status message that software upgrade will not be permitted if the metrological security switch S-1 is ON (locked). The terminal must be un-sealed and the switch set to OFF in order to permit a software upgrade.

6. Press the START softkey . If the USB drive is not attached or the folder isn't present, a Status message will appear – "USB Memory Error." Otherwise, the terminal will display a message "Copying USB to CF." Wait while the process is complete, and another message appears – "Unplug USB Memory." The terminal automatically re-starts. Status messages will indicate that files are being backed up, unpacked and upgraded. Do not turn off power to the terminal during this procedure.
7. If prompted to do so, manually cycle power to the terminal to complete the process.

4.4.3. Power Up and Screen Saver Graphics

The graphic used by the IND780 as a splash screen during start up and the image used as a screen saver (which displays when the Screen Saver setting at **Terminal > Display** has a value other than zero) can both be changed by downloading replacement files to the terminal's UPGRADE folder.

4.4.3.1. Power Up Graphic

The graphic used at power up must be a bitmap file measuring no more than 320 pixels wide and 140 pixels high. It must be named pwrup.bmp.

4.4.3.2. Screen Saver Graphic

The screen saver graphic is also a bitmap file, which may be in 256 color format. The image should measure no more than 320 pixels wide and 200 pixels high, and must be named saver.bmp.

4.4.3.3. Installing New Graphics

Either or both of the power up and screen saver graphics can be installed on the IND780 by making an ftp connection to the terminal via EtherNet, logging on as an administrator (with write privileges), and copying the file/s to the UPGRADE folder. When the terminal is restarted, the files are automatically moved to their correct location, where they replace the existing images.

4.5. System Backup and Restore Procedures

The configuration of an IND780 may be exported (backed up) to and restored from, USB memory. Files can be restored to the original terminal or copied to another IND780, which acquires a configuration identical to that of the original. This permits the restoration of setup should a main PCB require replacement, for example, and allows the creation of functionally identical terminals.

- Once the backup dataset is copied to a USB drive, it can be saved to a PC. However, for restoration to an IND780 the file must always reside in the directory indicated below.

4.5.1. Backup

When the IND780 is backed up, the dataset includes all log files in .csv format. These can be viewed or printed from a PC.

To back up files from an IND780:

1. Connect a USB (flash) memory device to the IND780's USB port, either directly or via a USB extension cord.
2. Access **Setup > Maintenance > Run > Backup to USB**. The screen shown in Figure 4-6 will appear.

Figure 4-6: Backup to USB

3. By default, the Dataset Name is BK1; press ENTER to select the field and enter another name, if required.
4. Press the START softkey. The IND780 will check for the presence of a valid USB memory device. On finding one, it checks for available space. If a device is not found, or a device is present that has insufficient space for the operation, a prompt ("USB Memory Error") informs the operator and the backup does not proceed. If space is available, the IND780 creates a folder titled **Mettler Toledo/Backup/IND780/ <dataset name >** (where "dataset name" is the name entered in step 3), then begins the transfer of data. An on-screen message ("Working") indicates that the procedure is in progress.
5. Once the terminal indicates that the backup is complete, the USB device can be unplugged and the EXIT softkey pressed to return to the menu tree.

4.5.2. Restore

- System Restore cannot be performed if the terminal is locked.
- An Administrator level login must be in effect to carry out this procedure.

A system restore operation does not copy log files from the dataset, and the terminal's existing log files are not over-written on restore.

To restore files to an IND780:

1. Connect a USB (flash) memory device to the IND780's USB port, either directly or via a USB extension cord.
2. Access **Setup > Maintenance > Run > Restore from USB**. A screen like the one shown in Figure 4-7 will appear.

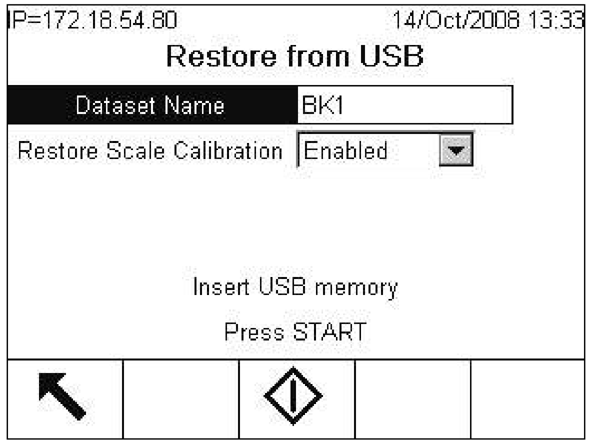


Figure 4-7: Restore from USB

3. Press ENTER to select the Dataset Name field, then use the alphanumeric keys or an external keyboard to enter the name of the dataset to be uploaded to the terminal.
4. If scale calibration parameters are to be included in the restore procedure, select Enabled in the Restore Scale Calibration box.
5. Press the START softkey to initiate the transfer of files. The IND780 will check for the presence of a valid USB memory device and for the existence, in a folder named **/Mettler Toledo/Backup/IND780/<dataset name>**, of the file named in step 3. It then begins the transfer, with an on-screen message ("Working") showing that the procedure is in progress. If a USB device is not found, or the named dataset is not present in the correct folder, a message ("Could not find Dataset Name, please re-enter.") appears.
6. Once the terminal indicates that the transfer is complete, the USB device can be unplugged and the EXIT softkey pressed to return to the menu tree.
7. It may be necessary to restart the terminal in order to complete the restore operation.

4.6. Service

Only qualified personnel should perform installation, programming, and service. Please contact a local METTLER TOLEDO representative for assistance.

In general, once the IND780 is installed, programmed, and calibrated for a given application, only routine calibration service is required.

⚠ WARNING

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

4.7. Troubleshooting

Troubleshooting activities for the IND780 include:

- Board LED interpretation
- AC power test
- Power supply voltage test
- Battery test
- RS-232 serial output voltage test
- Internal diagnostic testing
- MT Service View
- External diagnostics
- Watchdog monitoring
- Master reset

4.7.1. Troubleshooting Overview

Each of the procedures listed in Table 4-1 is described in detail in the following sections. If the result of any of these procedures indicates a problem, refer to this table to isolate the possible cause/s and to identify the appropriate response.

Table 4-1: Troubleshooting

<table>
<tr><th>Diagnostic Procedure</th><th>Expected Outcome</th><th>Response/s to Incorrect Outcome</th></tr>
<tr><td>AC Power Test</td><td>Power source within range -5% to +10% of rated VAC (100-240 VAC, depending on terminal configuration)</td><td>If display operates incorrectly, or there are intermittent problems with Terminal function:
Check whether power source is within correct range
If power source is not OK, find a reliable power source
If problem persists, perform Power Supply Voltage Test</td></tr>
<tr><td>Power Supply Voltage Test</td><td>12 VDC: In range 11.7-12.3 VDC
5 VDC: In range 4.9-5.1 VDC</td><td>If voltages are absent or outside specified ranges, replace the Power Supply</td></tr>
<tr><td>Battery Test</td><td>Not less than 2.5 VDC</td><td>If voltage is below 2.5 VDC, replace battery</td></tr>
<tr><td>BRAM Test</td><td>BRAM PASS</td><td>If BRAM FAIL displays, replace Main PCB</td></tr>
<tr><td rowspan="2">Keyboard Test</td><td rowspan="2">On-screen display of character associated with pressed key</td><td>Front panel keypad:
If no response, or incorrect character displays:
• Check connection between HMI board and Main PCB
If problem persists, replace HMI board, or HMI harness, or Main PCB, or ETX board</td></tr>
<tr><td>External keyboard:
If no response, or incorrect character displays:
• Check keyboard connection to USB port
• Attach another external keyboard and re-test
If problem persists, replace Main PCB</td></tr>
</table>

Diagnostic Procedure	Expected Outcome	Response/s to Incorrect Outcome
Load Cell Output Test	Raw counts displayed vary as expected, indicating proper function of load cells	If no value displays for load cell, or values are inappropriate: • Check connection to load cell If revisiting Load Cell Output screen shows same result, replace load cell or affected scale option board
Serial Port Test	Sent characters are received	If test fails: • Check physical connection to port (or correct installation of self-test jumper wire) • Check port configuration • Check that receiving/sending device is functioning properly If problem persists, replace Serial option board, or Main PCB, or ETX board
Discrete I/O Test	Appropriate changes to bit state	If bit state does not change: • Check that correct setup screen is in use (i.e. installed I/O device is addressed – DIO board, ARM100 module) • Check physical connection to external device • Check function of external device (powered, correctly configured, etc.) If problem persists, replace DIO board or remote module
Network Test	PASS on all four tests	If Timeout displays for test: • Check physical connection to network • Check terminal configuration – IP, Email and Gateway addresses set up correct • Check that Gateway and Email server are available/on-line If TCP/IP Stack or This Terminal test times out, replace Main PCB or ETX board
RS-232 Serial Output Voltage Test	Demand: Stable within range -5 to +15 VDC Continuous: Fluctuation within range -10 to +10 VDC	If either mode fails, replace Serial Option board, or ETX board, or Main PCB

4.7.2. Board LED Interpretation

The following sections describe the function of LEDs visible in the IND780. The functions of the LED arrays found on ControlNet and Ethernet / IP boards are described in the pertinent chapters of the IND780 PLC Interface Manual.

4.7.2.1. Main PCB

Figure 4-8: Main PCB LEDs

Table 4-2: Main PCB LEDs

LED	Color	Function
D12	Yellow	Indicates 12V supply is present.
D13	Yellow	Indicates 5V supply is present.
D30	Green	When lit, indicates USB port has been identified and is functional. ■ Note that this LED remains lit whether or not a USB device is connected.
D72	Amber	Used for software development purposes; blinking during normal system operation.
D73	Yellow	Indicates that an Ethernet connection exists.
D74	Green	When blinking, indicates that the Ethernet connection is actively receiving or transmitting data.
D75	Red	When lit, indicates that Ethernet connection is 100 MB. D73 lit, D75 off, indicates that Ethernet connection is 10 MB.

4.7.2.2. ETX Board

The ETX board features a single, green LED, mounted beneath the lower card guide. Its approximate location is indicated in Figure 4-8. When power is supplied to the board, this LED is lit steadily, indicating that the core power supply is on. This in turn indicates that both on-board regulators are functioning correctly.

4.7.2.3. Option Boards

4.7.2.3.1. Analog Load Cell and POWERCELL MTX Boards

Figure 4-9 indicates the locations of LEDs on the Analog Load Cell and POWERCELL boards.

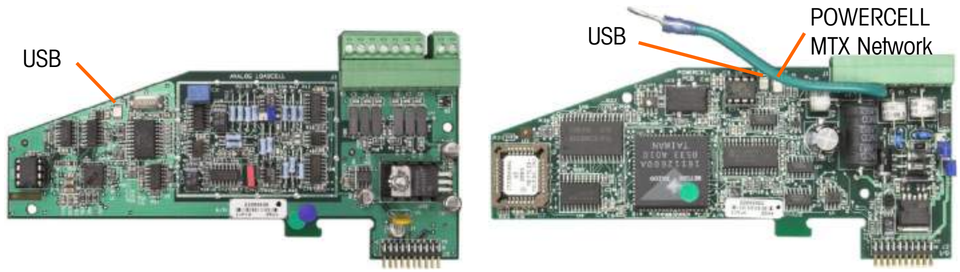


Figure 4-9: Analog Load Cell (left) and POWERCELL MTX (right) LEDs

Table 4-3: Analog Load Cell and POWERCELL MTX LEDs

LED	Color	Function
Analog Load Cell: USB	Amber	Slow blink (~1 Hz) indicates no USB communication with Main PCB Fast blink (~4 Hz) indicates USB communication with Main PCB is operating properly
POWERCELL: USB	Amber	
POWERCELL: PC	Amber	Slow blink (~1 Hz) indicates POWERCELL MTX not connected Fast blink (~4 Hz) indicates POWERCELL MTX connected

4.7.2.3.2. IDNet, Serial and Discrete I/O Boards

All other option boards – IDNet, Serial, Discrete I/O – feature a pair of green LEDs, only one of which is functional in the IND780.

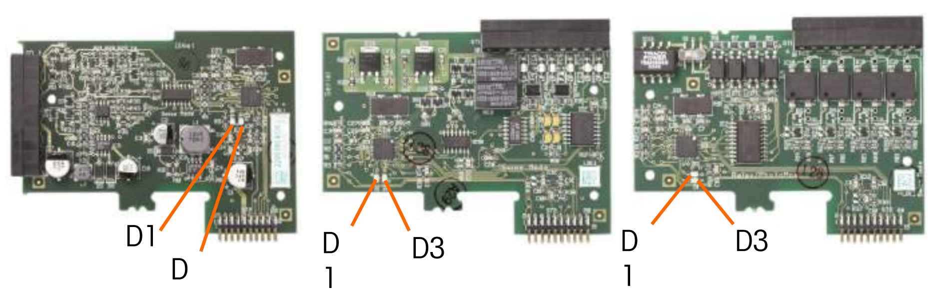


Figure 4-10: LED Locations: IDNet (left), Serial (center) and DIO (right) Cards

These LEDs function as follows:

LED	Color	Function
D1	N/A	N/A
D3	Green	Slow blink (~1 Hz) indicates there is no USB communication with main PCB. Fast blink (~4 Hz) indicates USB communication with main PCB is operating properly.

4.7.2.3.3. POWERCELL PDX/PowerMount Board

Figure 4-11 indicates the locations of LEDs on the POWERCELL PDX/PowerMount board. Table 4-4 describes the function of the LEDs.

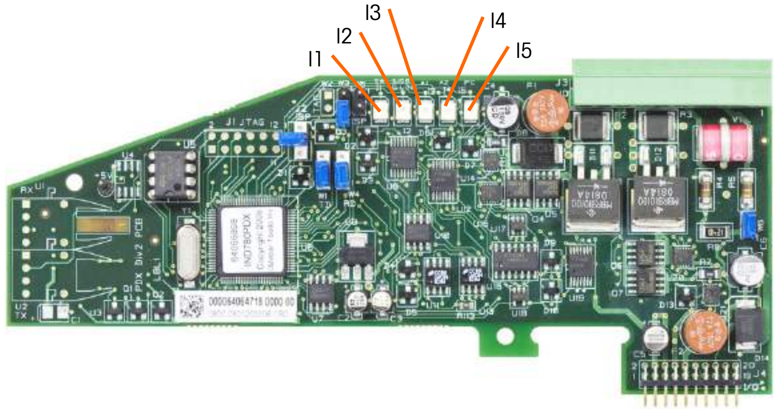


Figure 4-11: Board LEDs

Table 4-4: LED Functions

LED	Color	Function
I1: SW	Amber	ON – the board's discrete output is turned on OFF – the board's discrete output is turned off
I2: USB	Amber	ON – the USB connection to the main board is active OFF – the USB connection to the main board is inactive
I3: A1 I4: A2	Amber	I3 solid ON, I4 OFF – indicates that the CAN communication to the load cells is active I3 and/ or I4 blinking – indicates that the CAN communication to the load cells is interrupted
I5: IPC	Amber	Slow blink (~1 Hz) indicates that the board's processor is not working correctly Fast blink (~ 3 Hz) indicates that the board's processor is working correctly

4.7.2.3.4. Analog Output Board

Figure 4-11 indicates the locations of LEDs on the Analog Output board. Table 4-4 describes the function of the LEDs.

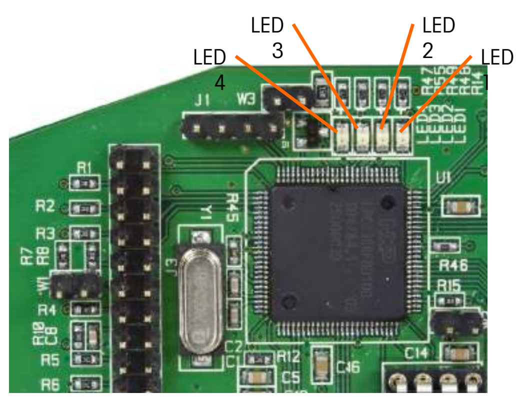


Figure 4-12: Analog Output Board LEDs

Table 4-5: Analog Output Board LEDs Function

LED	Color	Function
LED 1: USB	Green	Solid ON: USB communicating with IND780 main board
LED 2: Channel 1	Green	Solid ON: Channel 1 is functioning
LED 3: Channel 2	Green	Solid ON: Channel 2 is functioning
LED 4: Board OK	Green	Slow blink: checking board communication and function Fast blink: board communicating and functioning

4.7.3. AC Power Test

If the display is blank or if intermittent problems are occurring, the condition of the AC power source should be checked. Use a multi-meter to check the AC input power. Input power must be within -15% to +10% of the standard 100–240 voltage range.

If no AC power is present, have a qualified electrician restore power at the source. After power is restored, test the IND780 for correct operation.

- There is no fuse in the IND780. The external AC power is connected directly to the internal power supply.

4.7.4. Power Supply Voltage Test

The power supply provides 5 VDC to both the Main PCB and the Display PCB, and 12 VDC to the Main PCB. Verify the 12 VDC voltage is between 11.7 and 12.3 volts when measured from Pin 5 (+V) to Pin 3 or 4 (Ground). Verify the 5 VDC voltage is between 4.9 and 5.1 volts when measured from Pin 1 (+5V) to Pin 3 or 4 (Ground), and Pin 2 to Pin 3 or 4 (Ground). If the voltages are absent or deviate from the specified range, replace the Power Supply PCB. See Figure 4-13 for the location and description of Pins 1, 2, 3, 4 and 5 on the Power Supply harness.

Figure 4-13: Main PCB Connections and Mounting Screws

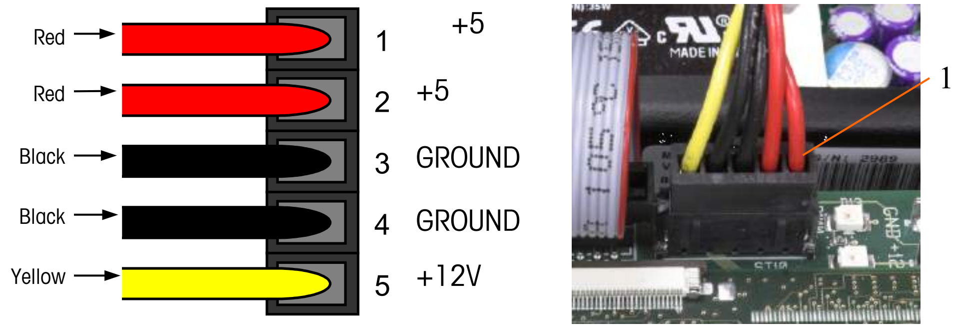


Figure 4-14: Pins on the Power Supply Harness

4.7.5. RS-232 Serial Output Voltage Test

If the send and receive functions of the serial (COM) ports test fail, use the following procedure to determine whether the RS-232 serial port is operational:

1. Disconnect AC power from both the IND780 terminal and the printer.
2. Disconnect the serial cable from the COM port on the IND780 main PCB.
3. Set the voltmeter to read 20 VDC.
4. Connect the red lead to the transmit terminal of the COM port and connect the black lead to the ground terminal of the COM port.
5. Apply power to the IND780. The meter should read as follows:
   - Demand mode—The meter should read a stable value (without fluctuation) between –5 and +15 VDC.
   - Continuous mode—The meter should fluctuate continuously within the range –10 to +10 VDC. The actual values and degree of fluctuation observed will depend on the type and sensitivity of meter used. The constant fluctuation on the meter display indicates that the scale/indicator is transmitting information.

To test Demand baud rates, press the PRINT key . The display should fluctuate as for continuous mode for the duration of the transmission, then become stable again. This fluctuation indicates the terminal has transmitted data.

- When measuring the higher baud rates in the Demand mode, the meter display will fluctuate for a shorter period of time.

4.7.6. Battery Test

CAUTION

RISK OF EXPLOSION IF BATTERY IS REPLACED WITH WRONG TYPE OR CONNECTED IMPROPERLY. DISPOSE OF BATTERY ACCORDING TO LOCAL LAWS AND REGULATIONS.

If setup parameters change uncontrollably or programming is lost, check the BRAM battery voltage. Battery voltage is tested at the battery assembly on the Main PCB. The battery is shown in Figure 4-15.

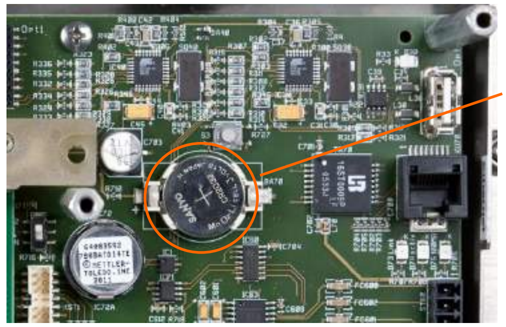


Figure 4-15: Main PCB, Battery Location Indicated

Use a Volt-Ohm meter to measure voltage between terminal 1 (positive) and terminal 2 (negative) to the left and right of the battery with the AC power disconnected. This measurement should be approximately 3.0 VDC. Replace the battery (Panasonic CR2032 or comparable) if the measured voltage is below 2.5 VDC.

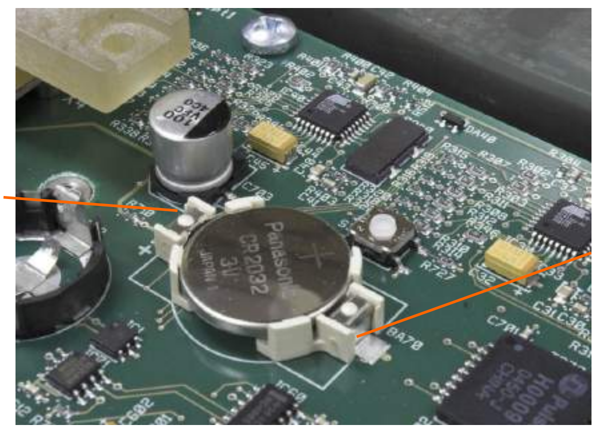


Figure 4-16: Battery Installed

- The battery replacement procedure is detailed in the **Maintenance > Run** section of Chapter 3, **Configuration**.

4.7.7. Internal Diagnostic Testing

The IND780 provides several internal diagnostic tests that are accessible in setup mode. Press the SETUP softkey to view the setup menu tree. Use the DOWN navigation key to scroll down the menu tree to Maintenance. Press the RIGHT navigation key to expand the menu tree selections for Maintenance. Scroll down and expand Run. Scroll down and expand Diagnostics. Available diagnostic setup screens are shown in the setup tree view in Figure 4-17.

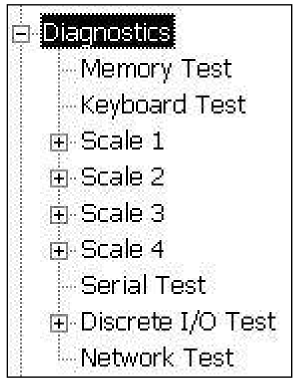


Figure 4-17: Maintenance Diagnostic Options Tree

4.7.7.1. Memory Test

To test the BRAM, press the START softkey. When testing is complete, press the EXIT softkey to return to the menu tree.

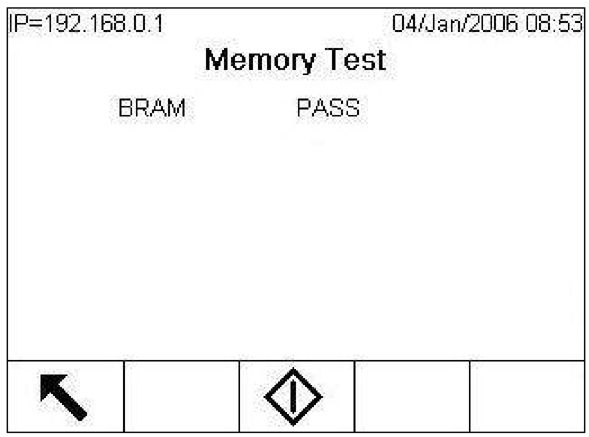


Figure 4-18: Memory Test Screen

4.7.7.2. Keyboard Test

Enables testing of the keyboard. Each key that is pressed will be shown on the display. When testing is complete, press the EXIT softkey to return to the menu tree.

Figure 4-19: Keyboard Test Screen

4.7.7.3. Scale

Shows the diagnostics options for a scale:

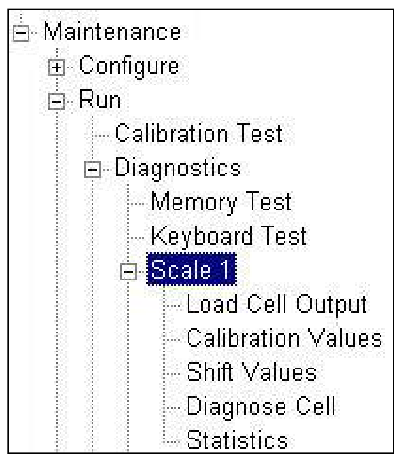


Figure 4-20: Scale Diagnostics Menu Tree Options

4.7.7.4. Load Cell Output

Displays the current load cell output (active weight) for the scale. The numbers in the scale below feature load cell addresses for each output. For digital load cells, individual cell counts will be displayed. Individual cell counts are the raw output of the load cells, which the indicator translates into weight by calculation, using information it acquires through the calibration process.

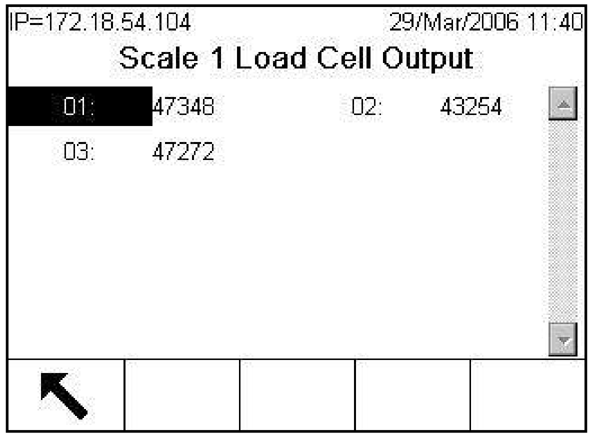


Figure 4-21: Load Cell Output Screen

4.7.7.5. Calibration Values

Displays the current calibration values for each scale. If these values are recorded after a scale calibration, and the scale channel PCB is replaced in the future, the calibration values can be manually entered here to "transfer" the previous calibration to the new scale channel PCB. This is not available with IDNet bases.

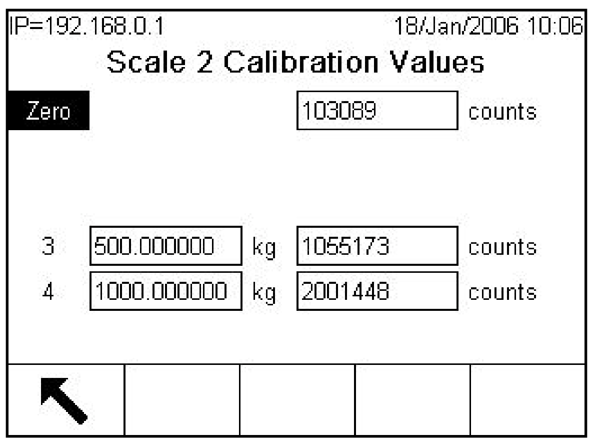


Figure 4-22: Calibration Values Screen, Zero in Focus

4.7.7.6. Shift Values

Used for POWERCELL and PDX scales only. The following screen shows values used to adjust gain for each load cell in a multiple load cell system. The values compensate for difference in response between cells. The load cell numbers represent the node cell addresses. Where more than 12 load cells are present this screen displays a scroll box to reveal further rows.

The diagnostic purpose of the Load Cell Output and Shift Values screens is to permit a technician to confirm valid calibration values were obtained when the calibration routine (**Setup > Scale > Scale *n* > Calibration**) was carried out.

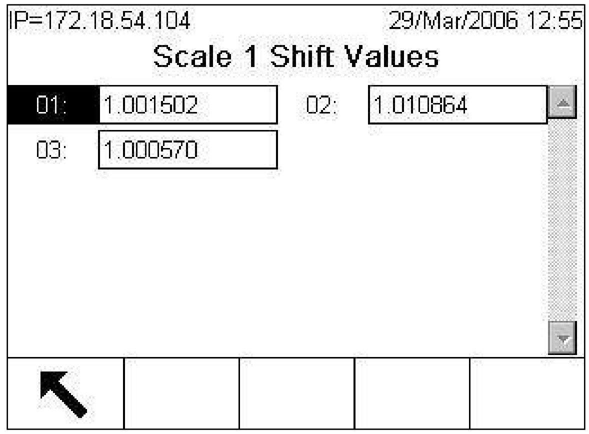


Figure 4-23: Scale Shift Values Screen

4.7.7.7. Diagnose Cell

Used for POWERCELL scales only (but not POWERCELL PDX). The purpose of the Diagnose Cell screens is to allow the technician to verify a load cell's node address and raw counts. If the cell that is being diagnosed has a known address, select that address from the Load Cell Address selection box. If the cell address is unknown, then select Connected Cell. If the cell is faulty or it has an invalid address, the terminal will fail to communicate with the cell. If the cell responds correctly, the node address and the cell counts will be displayed on the screen (Figure 4-24).

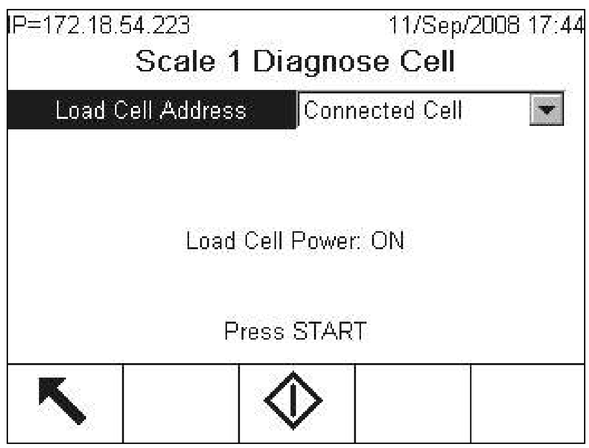


Figure 4-24: Diagnose Cell Screen

4.7.7.8. Statistics

Displays statistical information for each scale such as the total number of weighments, the number of scale overloads, the peak weight weighed on the scale, the total number of zero commands, and failed zero commands (Figure 4-25). These are very helpful when diagnosing scale problems. These statistics accumulate for each scale, and are saved until a master reset is performed. It is not considered likely that a master reset will be a frequent occurrence, so these statistics are effectively permanent.

- Statistics cannot be deleted without losing all other setup values.

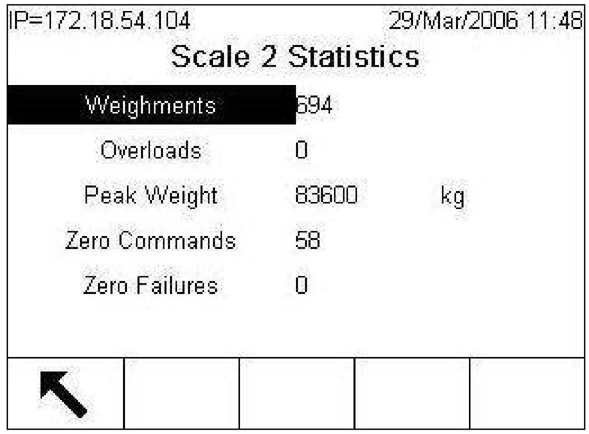


Figure 4-25: Scale Statistics Screen

4.7.7.9. Serial Test

Enables testing of the transmit and receive functions on the serial (COM) ports. Select the COM port to be tested using the selection box for Com Port (Figure 4-26). Only those ports installed are available for testing.

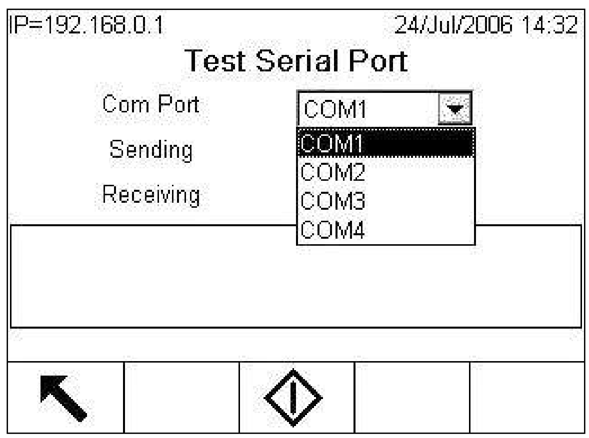


Figure 4-26: Serial Test Setup Screen

Press the START softkey and a data string is output repeatedly approximately once every 3 seconds Figure 4-27). The data is: [Testing COMx: nn] where "x" is the COM port and "nn" is an incrementing value beginning at 00 and continuing to 99. Each transmission increments this number by one.

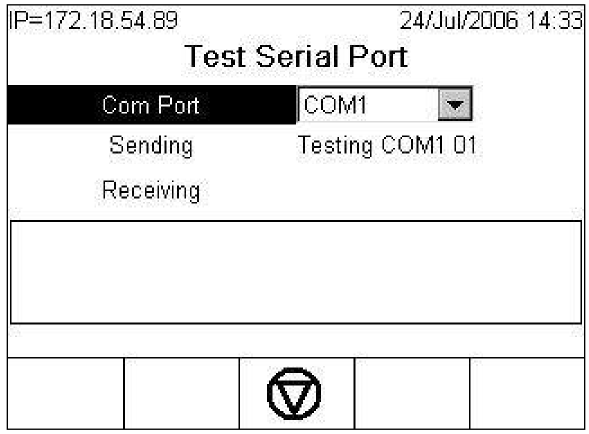


Figure 4-27: Serial Test Screen

If a jumper wire is placed between the transmit and the receive terminals (Figure 4-28) on the port being tested, the same data string that is transmitted displays as the receiving field.

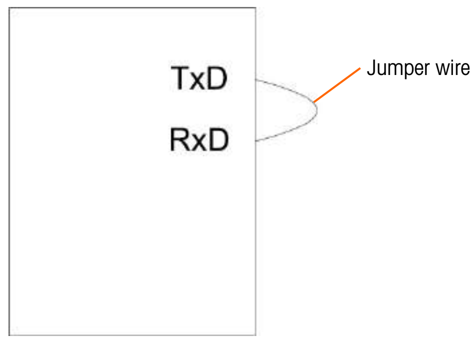


Figure 4-28: Jumper Wire Placed Between the Transmit and Receive Terminals

If another device is connected to the receiving port, any ASCII data received displays in the receiving field.

To stop the serial port test, press the STOP softkey.

4.7.7.10. Discrete I/O Test

Provides a view of the status of the discrete inputs and allows enabling or disabling of the discrete outputs for diagnostic purposes. With Discrete I/O highlighted (menu tree), expand its branch by pressing the RIGHT navigation key. Choose whether the test will be performed on the local (internal) discrete I/O option or one of the remote ARM100 modules. Press ENTER when that branch is highlighted.

A warning (Figure 4-29) will appear to remind the tester that the outputs can be turned on manually during this test, so any control power to the discrete outputs should be removed.

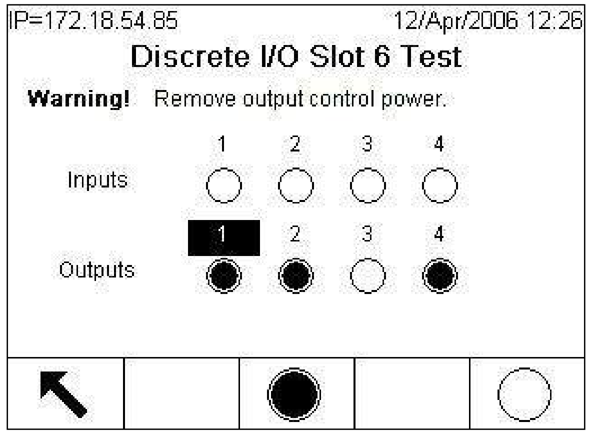


Figure 4-29: Discrete I/O Test Screen

⚠ WARNING

THE DISCRETE OUTPUTS OF THE IND780 TERMINAL WILL BE MANUALLY ENABLED DURING THIS TEST. REMOVE OUTPUT CONTROL POWER SO EXTERNAL EQUIPMENT WILL NOT BE ENERGIZED BY MISTAKE. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

When viewing the test screen, the input status will be shown at the top of the display and the output status will be shown at the bottom of the display. Focus is shown on Output #1 first.

Focus can be moved to any of the other outputs by using the RIGHT and LEFT navigation keys on the front panel, or pressing ENTER.

- Note that when the Discrete I/O Test screen is exited, all outputs will be turned off again.

4.7.7.11. Network Test

Enables testing of the Ethernet programming/hardware/firmware in the terminal. Figure 4-30 shows the result of running a network test.

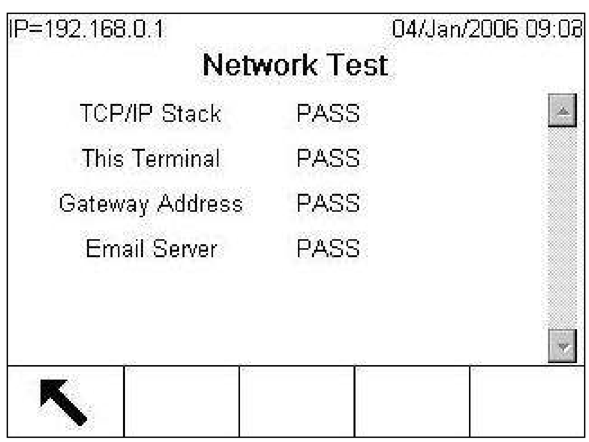


Figure 4-30: Network Test Screen

The following tests are run during this diagnostic process:

- TCP/IP Stack
- This Terminal
- Gateway Address
- Email Server

Each step will indicate "Testing" during the test then indicate a Pass or Timeout status. If the status is shown as Timeout, it indicates that the IP address or gateway address has not been programmed in the terminal. Refer to the Communication and Network section of Chapter 3, **Configuration**, for information on entering the IP and gateway addresses.

4.7.8. MT Service View

The MT Service View functionality provides a METTLER TOLEDO authorized service representative access to various diagnostics data collected from a POWERCELL PDX or PowerMount scale. This functionality is accessed in setup mode but the MT Service Security must be first unlocked. MT Service View screens include:

- Scale Loadcell Temperature
- Scale Loadcell Com Voltage
- PDX Terminal
- Scale Loadcell Supply Voltage
- Load Cell Information

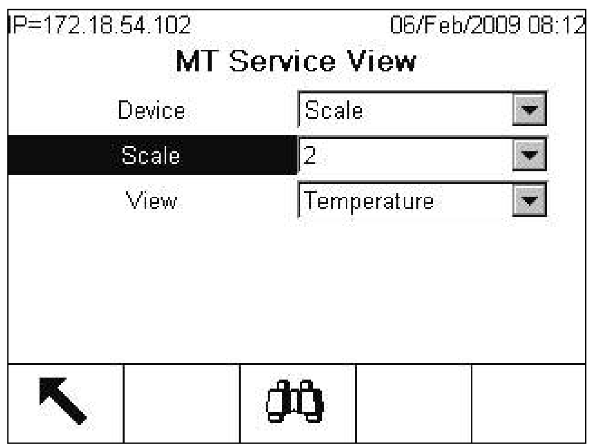


Figure 4-31: MT Service View Screen

4.7.8.1. Scale Load Cell Temperature

From the MT Service View screen, choose Scale in the Device selection box and Temperature in the View selection box. Select the PDX scale channel to view and press the VIEW softkey to display the Scale Load Cell Temperature screen. This screen provides a view of the temperature sensor readings measured in every PDX cell for the selected scale. For each cell node address shown is the corresponding temperature value.

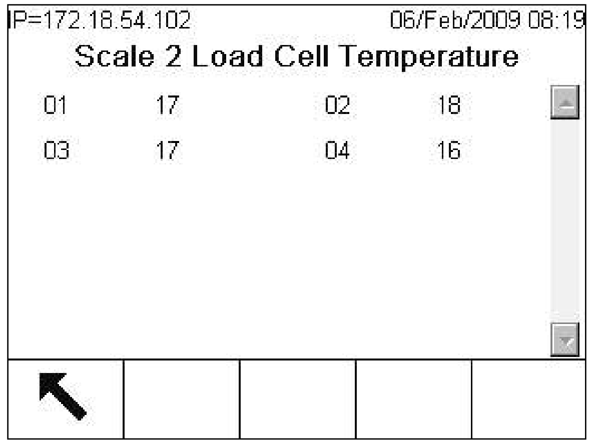


Figure 4-32: Scale Load Cell Temperature Screen

The PDX cells rely on their temperature sensors to compensate for temperature variations and continuously provide accurate weight measurements. To ensure that the sensors are operating correctly, it is important to compare the temperature readings between the load cells. Readings should be reasonably close between the cells if there are no obvious differences in external influences (e.g. sunshade, heating pipes).

4.7.8.2. Scale Load Cell Supply Voltage

From the MT Service View screen, choose Scale in the Device selection box and Supply Voltage in the View selection box. Select the PDX scale channel to view and press the VIEW softkey to display the Scale Load Cell Supply Voltage screen. This screen provides a view of the input supply voltage readings measured in every PDX cell for the selected scale. For each cell node address, the corresponding supply voltage value is shown in volts. Measurements are automatically updated hourly, and after power-up.

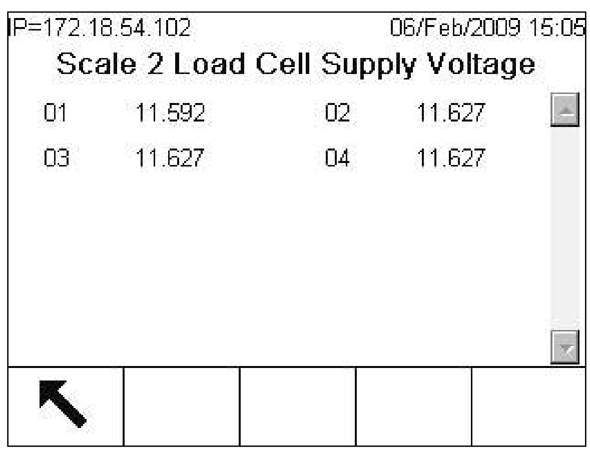


Figure 4-33: Scale Load Cell Supply Voltage Screen

The nominal supply voltage is based on whether the IND780 uses its internal 12 VDC or the external 24 VDC supply to power the cells. It is normal to have the voltage readings from one cell to another drop in value. This is the result of the additional power consumption attributed to each cell on the network and the voltage dissipation along the length of cabling. The expected load cell supply voltage ranges are:

- At 12 VDC: 12.5 – 7.9 VDC
- At 24 VDC: 24.5 – 15 VDC

Most importantly the supply voltage measured at any cell must not be below 7.8 VDC for the PDX cell to operate reliably. Wiring shorts or an overloaded supply will cause these readings to be out of range. A system that has supply voltages that deteriorate over time may also indicate a potential problem.

4.7.8.3. Scale Loadcell COM Voltage

From the MT Service View screen, choose Scale in the Device selection box and COM Voltage in the View selection box. Next, select the PDX scale channel to view and press the VIEW softkey. A warning and confirmation screen will be displayed after the VIEW softkey is pressed. Press the OK softkey to proceed to display the Scale Load Cell COM Voltage screen. This operation will take several minutes as each load cell is required to interrupt its communication lines temporarily in order to take CAN voltage measurements.

This screen provides a view of the CAN-High and CAN-Low signal voltages measured in every PDX cell when they are placed into the Dominant and Recessive communication mode. For each cell node address, the corresponding CAN signal voltage values are shown in volts. Measurements are static and are only updated each time this screen is viewed.

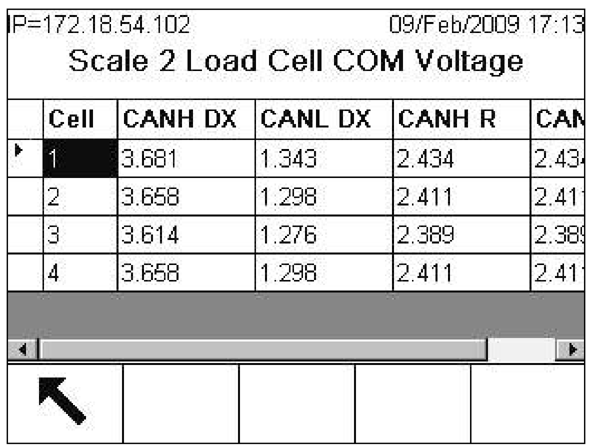


Figure 4-34: Scale Load Cell COM Voltage Screen

The CAN-High and CAN-Low Dominant states combine to represent a logical bit 0 whereas CAN-High and CAN-Low Recessive states represent a logical bit 1. When checking for proper operation, verify not only the voltage levels of each signal but also the voltage differential between the signals. The expected voltage ranges are:

CAN Signals	Dominant Mode Voltage	Recessive Mode Voltage
CAN-High	3 – 5 VDC	2 – 3 VDC
CAN-Low	0 – 2 VDC	2 – 3 VDC
CAN-High and CAN-Low Differential	≈ 2 VDC	≈ 0 VDC

Wiring shorts or poor network termination may cause these readings to be out of range.

4.7.8.4. Load Cell Information

From the MT Service View screen, choose Load Cell in the Device selection box then select the PDX scale channel and the specific load cell node to view. Press the VIEW softkey to display the Load Cell Information screen. This screen provides a collective view of various diagnostic parameters for a selected POWERCELL PDX cell. Each data field will have both a current value and a value recorded at the time of calibration. This enables the user to track changes and make data comparisons to a known working condition of the cell.

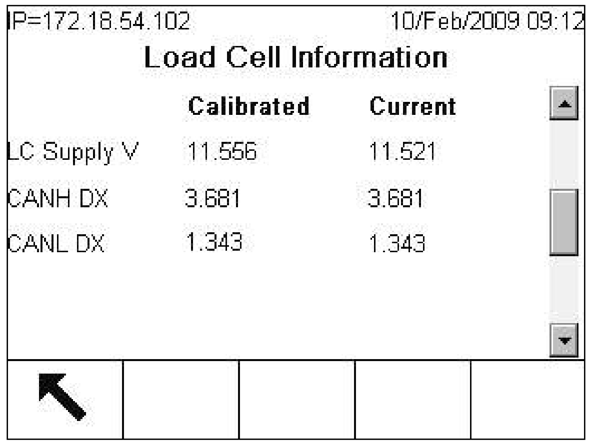


Figure 4-35: Load Cell Information Screen

The recorded load cell parameters include:

Data Field	Description
Cell S/N	Represents the unique factory serial number embedded in the cell.
Install Date	Indicates the date the load cell was last addressed.
Temperature	Temperature sensor reading in the cell.
LC Supply Voltage	Input supply voltage measured in the cell in volts.
CAN-High Dominant X	Cell CAN-High voltage recorded for Dominant mode in volts.[1]
CAN-Low Dominant X	Cell CAN-Low voltage recorded for Dominant mode in volts.[1]
CAN-High Recessive	Cell CAN-High voltage recorded for Recessive mode in volts.[1]
CAN-Low Recessive	Cell CAN-Low voltage recorded for Recessive mode in volts.[1]
Gas Concentration	Level (%) of inert gas concentration enclosed in the cell as a measure of the hermetic sealing. Small losses of gas levels are expected over the years. A sudden rapid loss of gas levels is an apparent indication of a cell enclosure breach condition.

Note

1. These values are stored from the last time the Load Cell COM Voltage Screen was accessed.

4.7.8.5. PDX Terminal

From the MT Service View screen, choose Terminal in the Device selection box and press the VIEW softkey to display the PDX Terminal screen. This screen provides a view of the minimum and maximum voltages and current detected on the IND780 PDX option board. These values are updated dynamically while the screen is viewed.

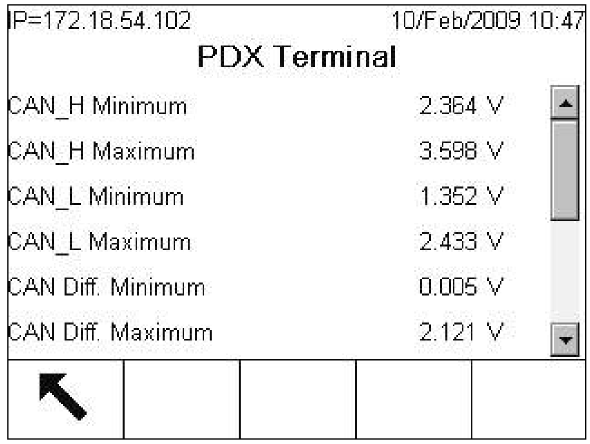


Figure 4-36: PDX Terminal Screen

The displayed information includes:

Data Field	Description
Minimum CAN-High Voltage	Typically associated with the CAN-High voltage value (volts) measured during a Recessive communication state. Normal range: 2 – 3 V.
Maximum CAN-High Voltage	Typically associated with the CAN-High voltage value (volts) measured during a Dominant communication state. Normal range: 3 – 5 V.
Minimum CAN-Low Voltage	Typically associated with the CAN-Low voltage value (volts) measured during a Dominant communication state. Normal range: 0 – 2 V.
Maximum CAN-Low Voltage	Typically associated with the CAN-Low voltage value (volts) measured during a Recessive communication state. Normal range: 2 – 3 V.
Minimum CAN Voltage Difference	Minimum difference between CAN-High and CAN Low voltages. Normal range: ≈ 0 V.
Maximum CAN Voltage Difference	Maximum difference between CAN-High and CAN Low voltages. Normal range: ≈ 2 V.
Minimum Supply Voltage	Minimum supply voltage measured at the present voltage level as driven by the internal (12 VDC) or external (24 VDC) power supply. Normal range: ≈ 5 % tolerance of nominal values.
Maximum Supply Voltage	Maximum supply voltage measured at the present voltage level as driven by the internal (12 VDC) or external (24 VDC) power supply. Normal range: ≈ 5 % tolerance of nominal values.
Minimum Supply Current	Minimum supply current consumption measured with the cells connected. Normal range: ≈ 10 mA – 38 mA per cell.
Maximum Supply Current	Maximum supply current consumption measured with the cells connected. Normal range: ≈ 10 mA – 40 mA per cell.

4.7.9. External Diagnostics

The IND780 includes a utility that provides valuable tools for examining the operation of the terminal, its installed options and software, and (for POWERCELL bases only) of associated load cells. Information available in Web Help includes:

- System hardware and software configuration
- Resource utilization
- Share data variables, viewed either statically or dynamically
- Scale and (if digital load cells are used) load cell status and statistics

Web Help is accessed with a web browser via an Ethernet connection. Connect to the Terminal using its IP address.

Depending on how it is configured, the terminal's IP address may appear at upper left in the home screen. It may also be viewed and modified in Setup at Communication > Network > Ethernet.

At the bottom of each page, a HOME button returns the view to the index page seen in Figure 4-37.

4.7.9.1. Index Page

When Web Help is first accessed, the index page shown in Figure 4-37 appears in the browser window.

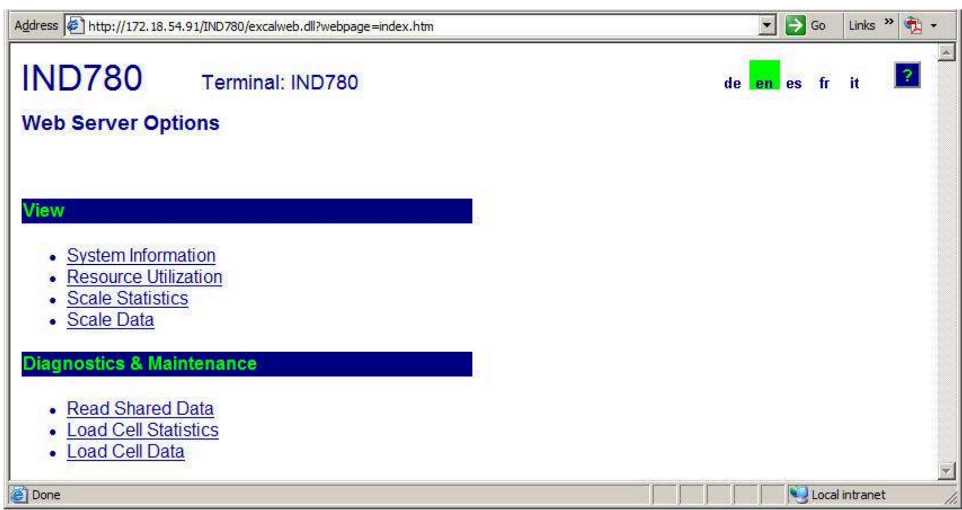


Figure 4-37: Web Help Home Screen

Click the links on this page to visit the respective views, each of which is detailed in the following sections.

4.7.9.2. Help File

A help file, accessible from each page via the help button explains the full range of the utility's features. Figure 4-38 shows a portion of the help file.

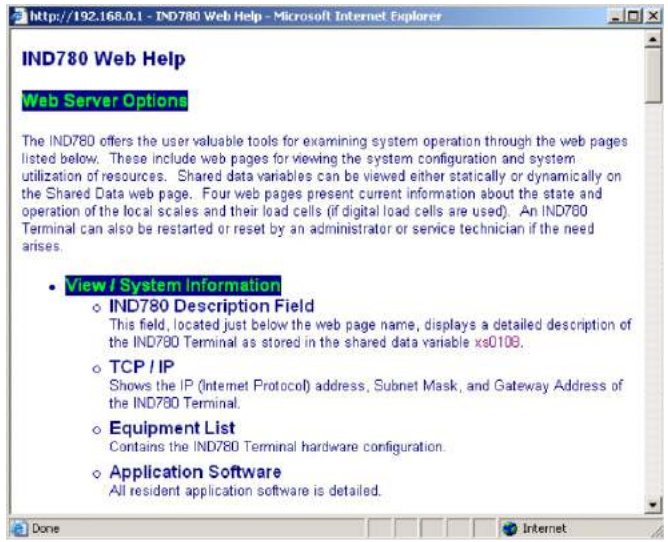


Figure 4-38: Help File

At the bottom of the page, a CLOSE PAGE button allows the user to close this browser window without exiting the Web Help utility.

4.7.9.3. System Information

The system information page (Figure 4-39) provides information about asset information, installed component part numbers, software versions and serial numbers, and installed application software.

IND780 Terminal: IND780

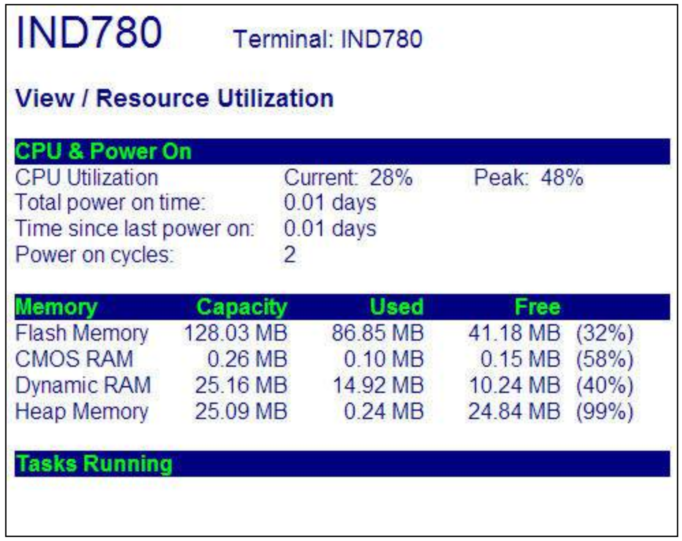
View / System Information

	Part Number	Software	Serial Number	Kit Number
Model:	IND780			
ID1:	IND780			
ID2:	Mettler Toledo			
ID3:				
Software	**Part Number**	**Software**		
IND780 RST	173678R.0	3.07.00		
IND780 CP		3.07		
Equipment List	**Part Number**	**Software**	**Serial Number**	**Kit Number**
MTA ETE-XSC255	50-3763C402C		0505700015	
Baseboard	22009023	xxxxxxxxxxxxx	0000000000021	22009023
HMI Mono	22009026	xxxxxxxxxxxxx	0000000000018	
Analog Load Cell	22009030	172240R.0	1VMI7	64057418
Analog Load Cell	22009030	C171655R.0	1UM6Q	64057418
Serial IO	22009901	172506R.0	0000000000009	64057420
Discrete IO	22009913	172504R.0	P000000000057	64057422
Channel	**Name**			
1	Scale 1			
2	Scale 2			

Figure 4-39: System Information Page

4.7.9.4. Resource Utilization

The resource utilization page (Figure 4-40) gives a snapshot of the current status of the terminal, including CPU usage and information about the various types of memory used by the IND780.



IND780 Terminal: IND780

View / Resource Utilization

CPU & Power On		
CPU Utilization	Current: 28%	Peak: 48%
Total power on time:	0.01 days	
Time since last power on:	0.01 days	
Power on cycles:	2	

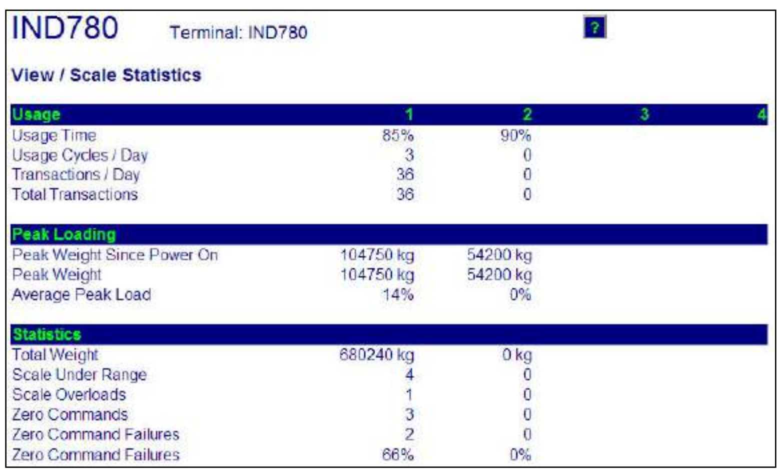
Memory	Capacity	Used	Free	
Flash Memory	128.03 MB	86.85 MB	41.18 MB	(32%)
CMOS RAM	0.26 MB	0.10 MB	0.15 MB	(58%)
Dynamic RAM	25.16 MB	14.92 MB	10.24 MB	(40%)
Heap Memory	25.09 MB	0.24 MB	24.84 MB	(99%)

Tasks Running

Figure 4-40: Resource Utilization Page

4.7.9.5. Scale Statistics

The scale statistics page (Figure 4-41) shows a variety of data for each installed scale.



IND780 Terminal: IND780

View / Scale Statistics

Usage	1	2	3	4
Usage Time	85%	90%		
Usage Cycles / Day	3	0		
Transactions / Day	36	0		
Total Transactions	36	0		
Peak Loading				
Peak Weight Since Power On	104750 kg	54200 kg		
Peak Weight	104750 kg	54200 kg		
Average Peak Load	14%	0%		
Statistics				
Total Weight	680240 kg	0 kg		
Scale Under Range	4	0		
Scale Overloads	1	0		
Zero Commands	3	0		
Zero Command Failures	2	0		
Zero Command Failures	66%	0%		

Figure 4-41: Scale Statistics Page

4.7.9.6. Read Shared Data

The shared data page (Figure 4-42) allows the user to interact with the terminal, requesting a display of current values for up to ten shared data variables at a time. Values are accessed by entering the shared data name in one of the fields at left, and then clicking on the Save Changes button at bottom. The button is in focus when a new entry has been made in a name field.

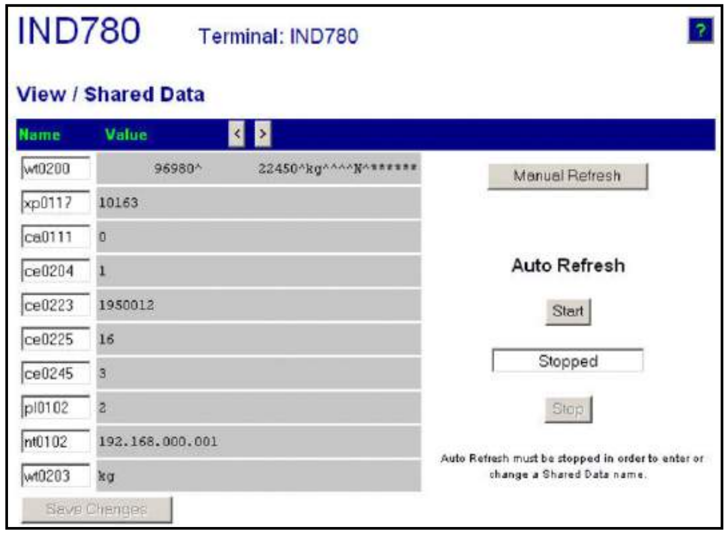


Figure 4-42: Shared Data Page

To refresh the displayed values without changing any variable names, click on the Manual Refresh button.

Values may also be refreshed automatically, at one second intervals, by clicking on the Start button. Once Start is selected, the Stop button is in focus and clickable. The current status of dynamic display (Stopped or Running) is shown in a field between the two buttons. Note that, as indicated on the page, Auto Refresh must be stopped before new shared data names can be entered.

For a complete list of available shared data names, refer to the IND780 Shared Data Manual. In the example shown in Figure 4-42, the shared data information displayed is as follows:

Table 4-6: Shared Data Information

Name	Data Displayed	Interpretation
wt0200	96980^ …etc.	Composite of entire data block for Scale 2
xp0117	10163	Cumulative power on time, in minutes
ca0111	0	SmartTrac Appearance. 0 = Bar Graph
ce0204	1	Number of ranges defined for Scale 2
ce0223	1950012	Encoder counts at the middle calibration value for Scale 2
ce0225	16	GEO code set in the Scale 2 calibration page
ce0245	3	Analog Load Cell gain jumper setting. 3 = 3 mV/V
pl0102	2	PLC Interface Module type. 2 = PROFIBUS
nt0102	192.168.000.001	Ethernet IP Address

Name	Data Displayed	Interpretation
wt0203	kg	Primary units set in the Scale 2 calibration page

When a string is longer than the data display width of 40 characters (e.g. wt0200 in the example above), the left/right scroll buttons may be used to move through the string to view all of it.

4.7.9.7. Scale Data

The scale data page (Figure 4-43) shows information, including current configuration and calibration values, for each installed scale. The signal quality display permits troubleshooting of the connection between the IND780 and load cells. When quality is poor, a red bar is displayed. A yellow bar indicates adequate quality, and green bar means the quality is good, as in the example below.

Figure 4-43: Scale Data Page

4.7.9.8. PDX Scale Data (POWERCELL PDX and PowerMount bases only)

The PDX Scale Data page (Figure 4-44) shows individual load cell information, for a PDX or PowerMount scale. This page provides access to several views:

- Adjusted Counts
- Gross Weight
- Communication Errors
- Temperature (MT Service only)
- Input Voltage (MT Service only)
- Gas Concentration (MT Service Only)

As indicated in the list above, some views are accessible only if the terminal's MT Service Security has been unlocked.

In the data pages each cell node is represented by a circle, with different colors to indicate if certain fault conditions exists. A circle with a red border (as in cells 2 and 7 in the example below) indicates that a fault condition has been detected, but in a different view. A completely red circle indicates that a fault is present in the current view.

Indicated fault conditions include cell communication errors, cell zero drift, cell overloads and enclosure breach. Click on each individual cell to go to a specific detailed PDX Load Cell page (Figure 4-46).

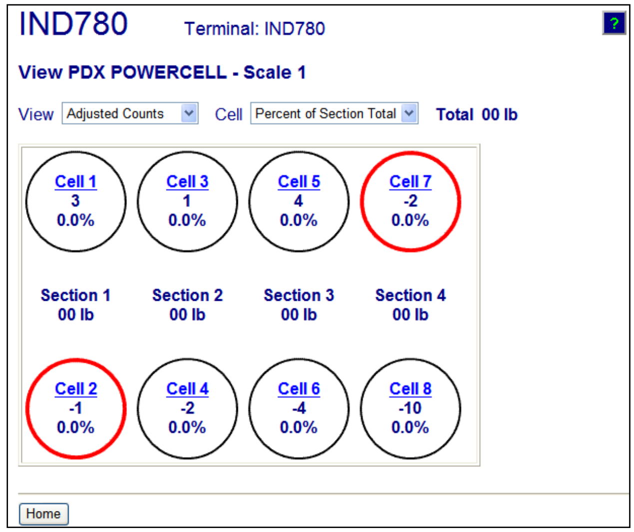


Figure 4-44: PDX Scale Data Page

4.7.9.9. PDX Terminal (POWERCELL PDX and PowerMount bases only)

The PDX Terminal page (Figure 4-45) shows the minimum and maximum voltages and current detected on the IND780 PDX option board. This page can be used to determine if the terminal's PDX option board is providing the proper electrical parameters to support the CAN Bus communication and to power the cells. It also helps to indicate if there are issues with poor wiring, a short condition or an overloaded power supply. Most of the information on this page is only accessible if the terminal's MT Service Security has been unlocked.

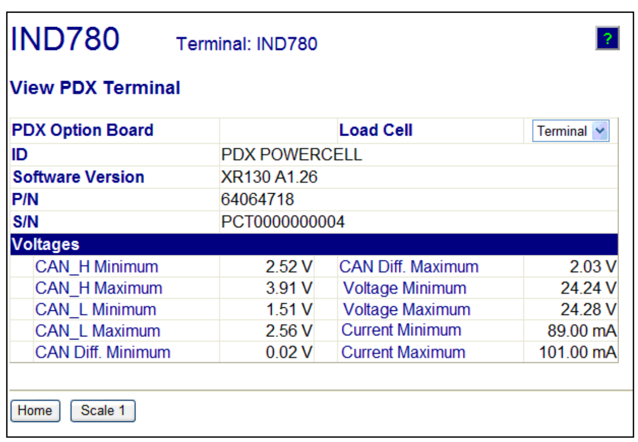


Figure 4-45: PDX Terminal Page

4.7.9.10. PDX Load Cell (POWERCELL PDX and PowerMount bases only)

The PDX Load Cell page (Figure 4-46) provides a collective view of various diagnostic parameters for a selected POWERCELL PDX cell. Most data fields will have both a current value and a value recorded at the time of calibration. The data is arranged into five main categories – weight, puncture, tilt, temperature, voltages and other errors. When a category or value is highlighted in red, it indicates that a value is out of its normal range, which may mean that an error condition is present. Most of the information on this page is only accessible if the terminal's MT Service Security has been unlocked.

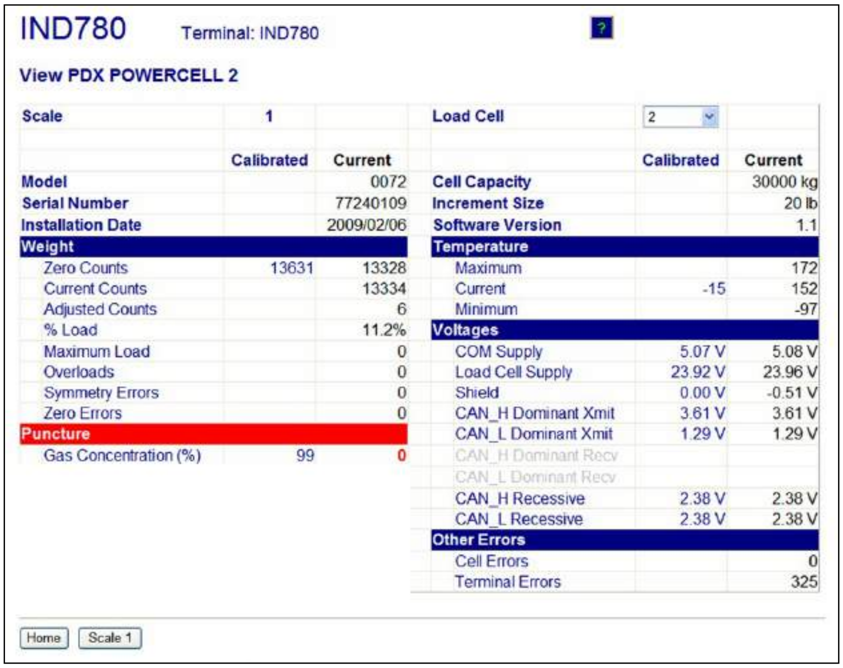


Figure 4-46: PDX Load Cell Page

4.7.9.11. Load Cell Statistics and Load Cell Data (POWERCELL PDX and PowerMount bases only)

Load cell statistics (Figure 4-47) and data (Figure 4-48) are collected for POWERCELL bases. In the examples shown, a POWERCELL option board is installed, but no load cell is connected.

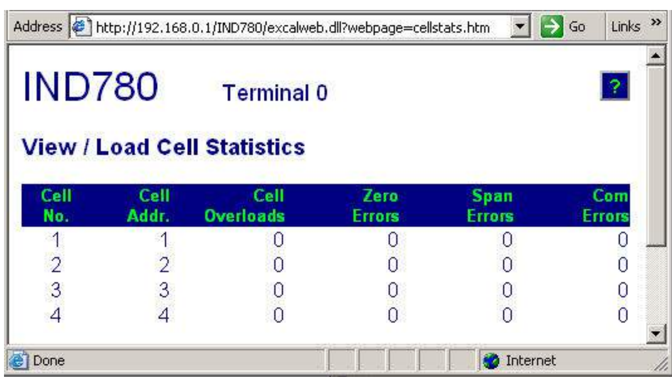


Figure 4-47: Load Cell Statistics Page

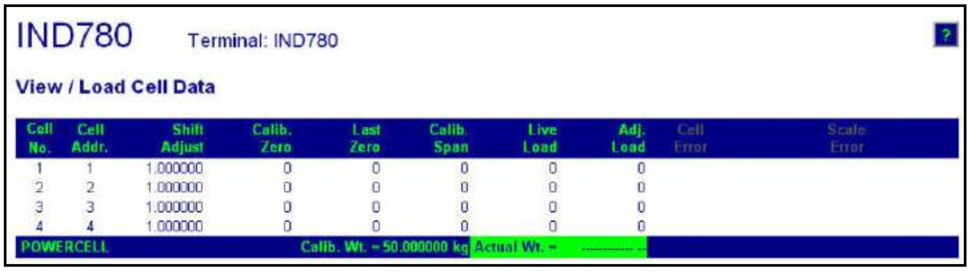


Figure 4-48: Load Cell Data Page

4.7.9.12. Load Cell Symmetry (POWERCELL PDX and PowerMount bases only)

When symmetry monitoring is enabled, the View/Load Cell Symmetry page (Figure 4-49) shows live load cell symmetry difference percentages. The symmetry difference values are displayed only when the start threshold for the monitoring is exceeded. This page can be used in troubleshooting load cell failure based on symmetry difference, or it can be used to determine a suitable difference threshold value for SETUP.

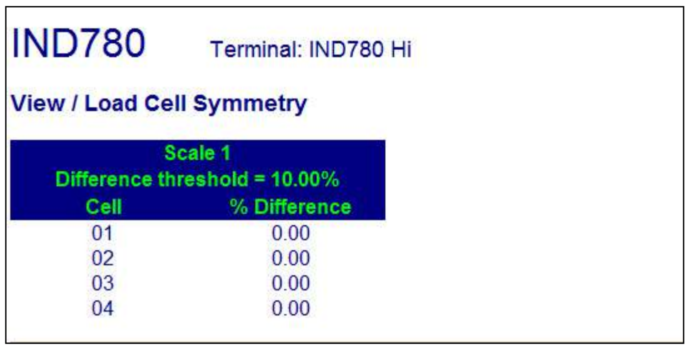


Figure 4-49: Load Cell Symmetry Page

4.7.10. Watchdog Monitoring

The main hardware microprocessor of the IND780 has a built-in hardware watchdog timer that is used to constantly monitor the performance of the measurement channels, weight display, peripheral communications and the discrete I/O functions. If any one of these functions fails to respond to the watchdog within a fixed time interval, the watchdog timer will timeout and the entire terminal will automatically reboot within 40 seconds. Given the seriousness of the system failure, if feasible the terminal will record the watchdog update failure event in the error log. Watchdog monitoring allows the terminal to detect certain system failures and to automatically recover from them.

4.7.11. Master Reset

A hardware master reset switch is provided, that sets all IND780 terminal settings to the factory default settings (see Appendix B, Default Settings). This includes scale setup and calibration information, log files (except for the error log) and counters. The master reset typically is performed under these circumstances:

- When a hardware configuration change is made, such as adding a new scale or Discrete I/O board to the terminal.

- When a software configuration problem arises that cannot be resolved without starting from the factory default settings.
- When security is enabled to protect setup, and the password is lost.
- After a firmware upgrade is performed.
- After a hardware key is installed or removed.

- Two types of master reset are possible, depending on the position of switch S2 (shown in its OFF position in Figure 4-50): A full reset **including** metrologically significant scale configuration data, and a reset that **preserves** scale data.

4.7.11.1. To initiate a master reset

1. Remove AC power.
2. If the reset is to include scale configuration data, set S2 to its ON position. If scale configuration data are to be retained, leave S2 OFF.
3. Press and hold the MASTER RESET button (Figure 4-50).

Figure 4-50: Main PCB, Master Reset Button and S2 Locations Indicated

4. Apply AC power. Hold the MASTER RESET button until the unit beeps and the "BRAM reset to Factory" message pops up.
5. Press ENTER to acknowledge each message box as it appears.
6. If S2 was set to ON to include metrologically significant data in the reset, return it to its OFF position.

4.8. Main PCB

4.8.1. To remove a main PCB from an IND780, follow these steps

1. Remove AC power.
2. Use a grounding strap to prevent risk of electrostatic discharge.
3. At the back of the terminal, identify and label all option board cables.
4. Disconnect the option board cables and power cable from the back of the terminal.
5. It may not be necessary to remove the panel mount from its location. If removal is required:

6. Use an 8 mm nut driver to remove the eight nuts securing the terminal to its mounting location.
7. Remove the backing plate and lift the terminal out of the opening in which it is installed.
8. Open the terminal by removing its rear cover (in the case of a panel mount terminal) or its front panel (in the case of a harsh environment terminal).
9. Remove the two screws attaching the upper card guide, shown in Figure 4-51, and lift the guide from its stand-offs.

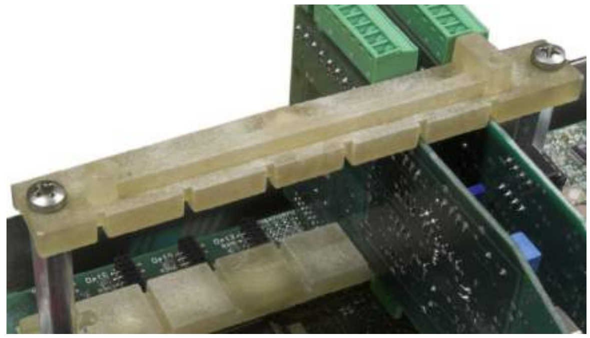


Figure 4-51: Upper Card Guide

- The option board connector pins are delicate. Take care to avoid damaging them when removing the boards.

10. Note the locations of the option boards then remove them and set them aside on a static-free mat.
11. Remove all peripheral connectors from their sockets – COM1, COM2, Ethernet, USB, power and video. Connector locations are indicated in Figure 4-52.

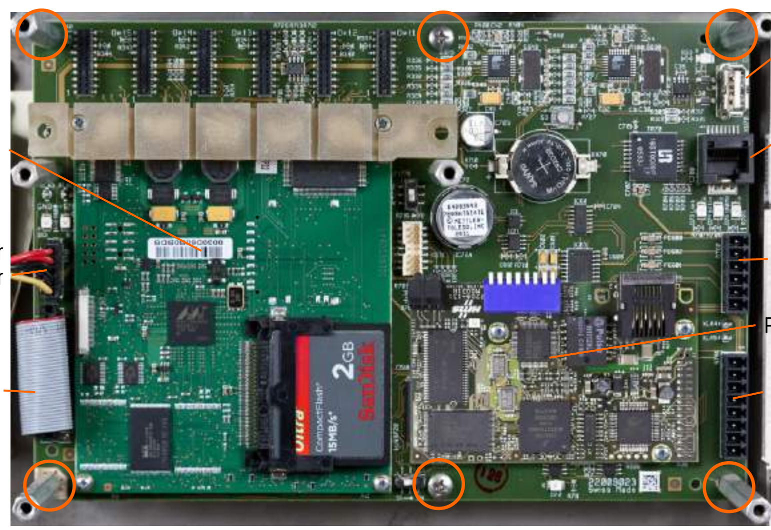


Figure 4-52: Main PCB Connections and Mounting Screws

12. Disconnect any PLC interface module cables or connectors from their sockets.
13. Unscrew and remove the six screws holding the main PCB to the enclosure. Their locations are circled in Figure 4-52. In the case of a panel mount terminal, the four outer fasteners will be hex post stand-offs, as shown in Figure 4-53.

Figure 4-53: Stand-Off on Main PCB

14. Carefully lift the PCB out of the enclosure and set it on a static-free mat.

4.8.2. Main PCB Installation

- All mounting screws should be installed with 23 inch pounds (2.6 Nm) of torque.

1. Position the main PCB board over the six stand-offs in the terminal enclosure.
2. Install the hex post stand-offs:

- For a panel mount terminal, install screws in the center holes and in the four hex post stand-offs in the outer holes (see Figure 4-53).

3. For a harsh enclosure terminal, install six screws.
4. Reconnect all peripherals – COM1, COM2, Ethernet, USB, power and video.
5. Install option boards as necessary.
6. Reconnect the PLC interface module cable or connectors if appropriate.
7. Replace the rear cover or front panel.

4.9. ETX Board

4.9.1. ETX Board Versions

Newer IND780 terminals are equipped with a faster, new-generation ETX board. The IND780 main PCB is compatible with both types of board, but the terminal must use firmware versions as follows:

Original ETX board	Firmware version 6.x or earlier
New ETX board	Firmware version 7.x or later

To determine which type of ETX board is installed in an IND780 terminal, watch the boot-up display. The processor type will appear in the upper left corner of the screen:

MSC ET(e) – PXA255 = original board

MSC ET(e) – PXA270 = new board

To identify the two types of ETX board, refer to Figure 4-54. Note the change in orientation of the CF card.

Original / PXA255 New / PXA270

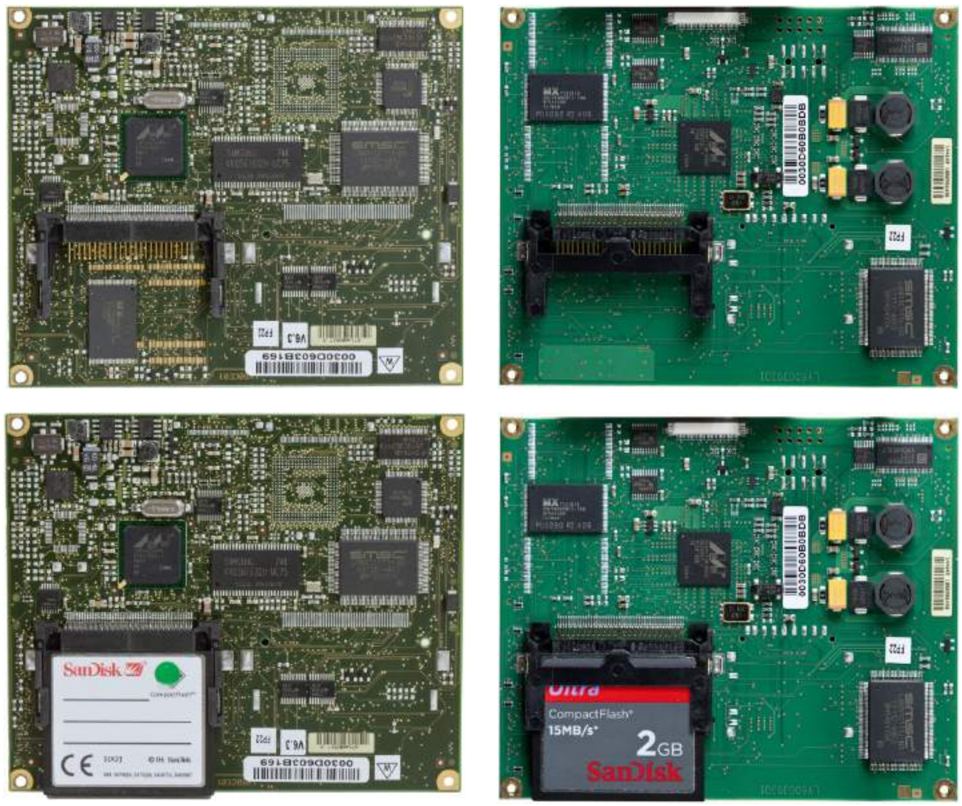


Figure 4-54: Original and New ETX Boards

4.9.2. ETX Board Removal

To remove the ETX board from the main PCB, first remove the main board from the IND780 chassis. Then:

1. Remove the two screws holding the lower card guide and the ETX board to the main PCB (Figure 4-52). The locations of these screws are indicated in Figure 4-55.

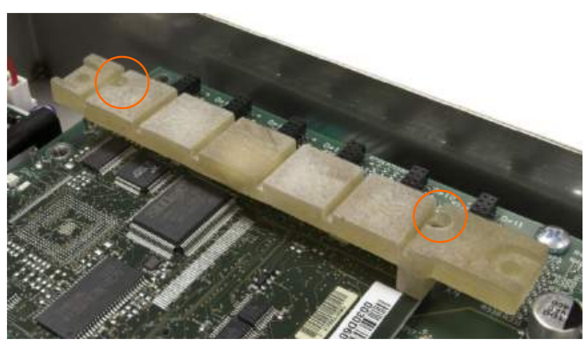


Figure 4-55: Lower Card Guide Screw Locations

2. Remove the other two screws securing the ETX board in place, shown in Figure 4-56.

Figure 4-56: ETX Board Mounting Screws

3. Taking precautions to avoid static discharge, lever the ETX board up from its connectors, starting at the CF card end indicated in Figure 4-56.
4. Lift the ETX board off the main PCB and set it down on a static-free mat.

4.9.3. ETX Board Installation

This procedure must be performed with the main PCB removed from the IND780 enclosure:

- All mounting screws should be installed with 23 inch pounds (2.6 Nm) of torque.

4.9.3.1. To install an ETX board on the main PCB

1. Note the orientation of the ETX board indicated in Figure 4-52. The ETX connectors are arranged so that it cannot be installed backwards.
2. Position the ETX board over its connectors. Figure 4-57 shows two of the connectors, and Figure 4-58 shows a side view of the board resting on its connectors.

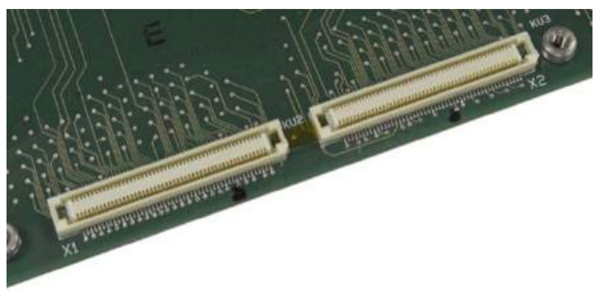


Figure 4-57: Close-Up View of ETX Connectors on Main PCB

Figure 4-58: ETX Board Resting on Connectors

3. With the main PCB resting flat on a static-free mat, press down firmly over each ETX board connector to seat it. The connectors seat with an audible snap.

- Note that simply installing the ETX board mounting screws will not seat the connectors properly – see Figure 4-59. Each connector must be pressed into place.

Figure 4-59: ETX Board Connectors Improperly Seated

4. Check to ensure that all connectors are fully seated, as shown in Figure 4-60.

Figure 4-60: ETX Board Connectors Fully Seated

5. Install screws to secure the board to the main PCB. Two of these screws also attach the lower card guide. This bar is asymmetrical, and must be mounted in the orientation indicated in Figure 4-55. Note that the longer end is oriented toward the main PCB battery.

4.9.4. CF Card Removal and Installation

To remove a CF card from the ETX board, hold the sides of the CF card and carefully slide it out of its socket, in the direction indicated in Figure 4-61. It may be necessary to move the card slightly side to side to disengage it. If any PLC interface module option is installed, it may need to be removed first.

Note that Figure 4-61 shows the CF card in the same orientation as in Figure 4-52.

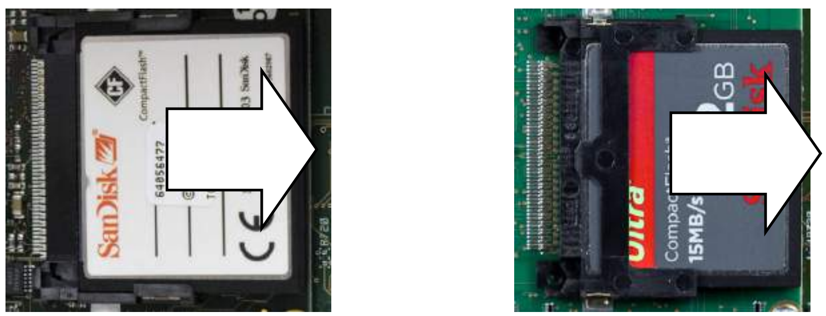


Figure 4-61: CF Card Removal – Original (left) and New (right) ETX

To install a CF card in the ETX board, slide the CF card into its socket. Keep the card straight, to avoid damaging the socket's pins. The card will snap into place. There are two guides on the CF Card. One is thinner than the other. Do not force the CF Card into the carrier.

- If the CF card has been completely reformatted on a PC, it is important to select the FAT file system as the formatting option.

4.10. Power Supply

4.10.1. Power Supply Removal

Components in the power supply may be hot to the touch. Allow them to cool before performing the procedure described below.

4.10.1.1. To remove a power supply

1. Disconnect the incoming power cord and the cord from the main PCB from their connectors on the power supply board. These connectors are keyed and can only be attached in the correct orientation. They are shown attached in Figure 4-62, and disconnected in Figure 4-63.

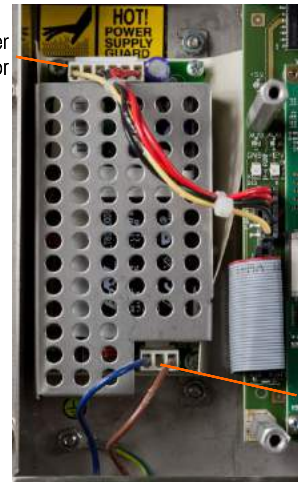


Figure 4-62: Power Supply, Connected

Figure 4-63: Power Supply, Disconnected

2. Use a 7 mm nut driver to remove the two nuts and washers (indicated in Figure 4-63) from each the two posts holding the power supply bracket to the enclosure. In a panel mount terminal (shown here) this bracket is mounted beside the main PCB. In a harsh enclosure terminal, the bracket is mounted to one end wall of the enclosure.
3. Lift the bracket and power supply out of the enclosure.
4. Remove the power supply PCB from the bracket by removing the four screws, one at each corner, visible in Figure 4-63.

4.10.2. Power Supply Installation

- All mounting screws should be installed with 23 inch pounds (2.6 Nm) of torque.

4.10.2.1. To install a power supply

1. Mount the power supply PCB to the mounting bracket using four screws, one at each corner. Note the orientation of the power supply relative to the bracket in Figure 4-63.

2. Position the bracket over the two mounting posts in the terminal enclosure, and install two nuts with star washers to secure it in place.
3. Connect the incoming power cord and power cord to the main PCB as shown in Figure 4-62.

4.11. Option Board Installation

- All mounting screws should be installed with 23 inch pounds (2.6 Nm) of torque.
- The option board connector pins are delicate. Take care not to bend them when aligning them with their socket on the main PCB.

4.11.1. To install an option board on the main PCB

1. Loosen and remove the screws holding the upper card guide (Figure 4-51) in place on its stand-offs.
2. Remove the upper card guide.
3. Position the option board over its connector.
4. Ensure that the connector pins are correctly aligned with the socket, and press down gently to seat the board and fit the board into the slot in the lower card guide.
5. Replace the upper card guide, taking care to position the upper edge of the option board/s in the slot/s in the upper guide (see Figure 4-51).

4.12. PLC Interface Module Removal and Installation

To remove a PLC interface module from the main PCB, loosen and remove the three screws (indicated in Figure 4-64) holding it in place, and carefully lift the module off its connector.

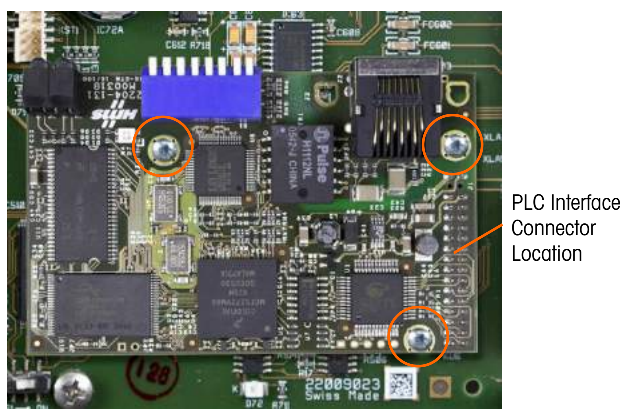


Figure 4-64: PLC Interface Module Installed on Main PCB

4.12.1. To install a PLC interface module on the main PCB

- All mounting screws should be installed with 23 inch pounds (2.6 Nm) of torque.

1. Position the module over its connector.

2. Ensure that the module's pins are correctly located over the connector, and press down gently to engage them.

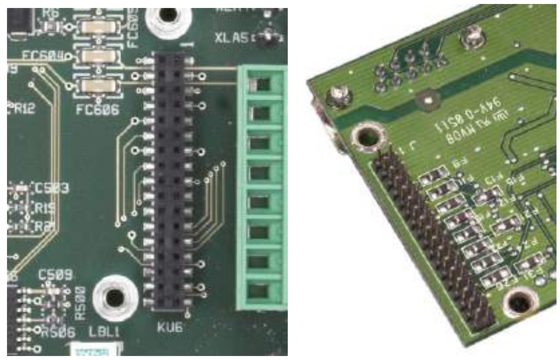


Figure 4-65: PLC Interface Module Socket on Main PCB (left) and Connector Pins on the Underside of a Module (right)

3. Install the three screws indicated in Figure 4-64.

5 Parts and Accessories

5.1. IND780 Terminal Harsh Enclosure

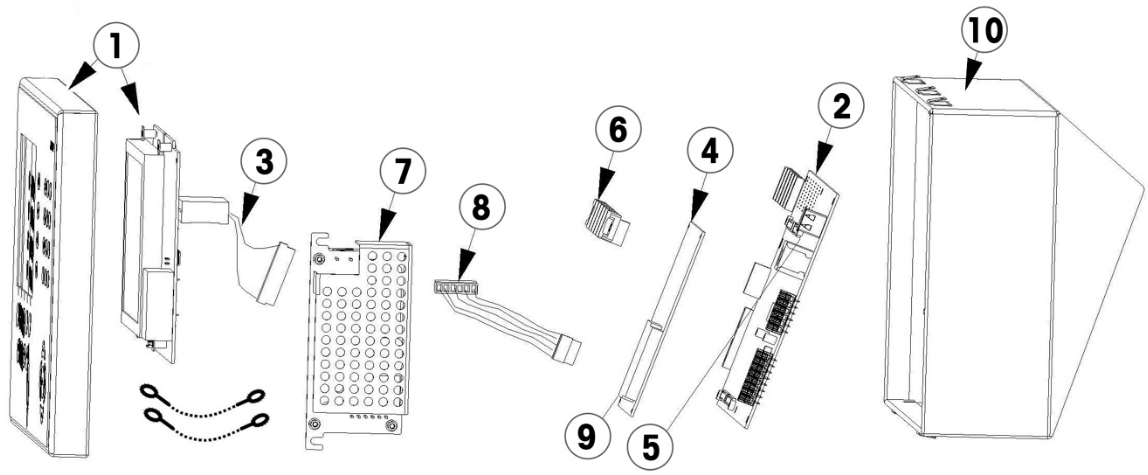


Figure 5-1: Harsh Enclosure

5.2. Harsh Enclosure Parts

Table 5-1: Harsh Enclosure Parts

Item #	Part Description	Part No.	Quantity
1	Keypad and front panel assembly with color LCD and HMI Driver Board	30500283	1
2	Base board (Main PCB)	64084167	1
3	Extended HMI Base board harness (for rotated front panel)	64087303	1
	HMI Base board harness	22009179	1
4	ETX CPU board (PXA270 version; CF card not included)	64061985	1
5	Battery	22009188	
6	Plastic Card Guide	22009192	2
7	Power Supply with mounting bracket	64057328	1
8	Power Supply to Base board harness	22009186	1
9	Programmed Compact Flash (CF) card (Win CE 5 with 7.x s/w)	64085476	1
	Programmed Compact Flash (CF) card (Win CE 6 with 8.x s/w)	30411137	1

Item #	Part Description	Part No.	Quantity
10	Rear housing enclosure • Must provide photographs: (1) picture of existing data label, with readable serial number; (2) picture of removed and voided data label • Replacement enclosures may not be used inside a Division 2 hazardous area	64067676	1
n/s	Hardware kit (includes screws, nuts, hex spacer)	64057325	1

5.2.1. Miscellaneous Harsh Enclosure Items

Table 5-2: Miscellaneous Harsh Enclosure Items

Part Description	Part No.	Quantity
Sealing Kit, Weights and Measures	64056538	1
Capacity/Range Label Kit (includes 5 labels)	64057354	1
Connector kit (one each of all connector plugs included)	64057327	1
Grip bushing kit	64057326	1
PDX option cable gland assembly	64068346	1
PowerMount option cable gland assembly	30095639	1
Long harness for inverted display	64087303	1
Line cord, North America	22009142	1
Line cord Schuko	22009143	1
Line cord, United Kingdom	22009144	1
Line cord, Australia	22009145	1
Line cord, Switzerland	22009146	1
Line cord, Denmark	22009147	1
Line cord, India	22009149	1

5.3. IND780 Terminal Panel-Mount Enclosure

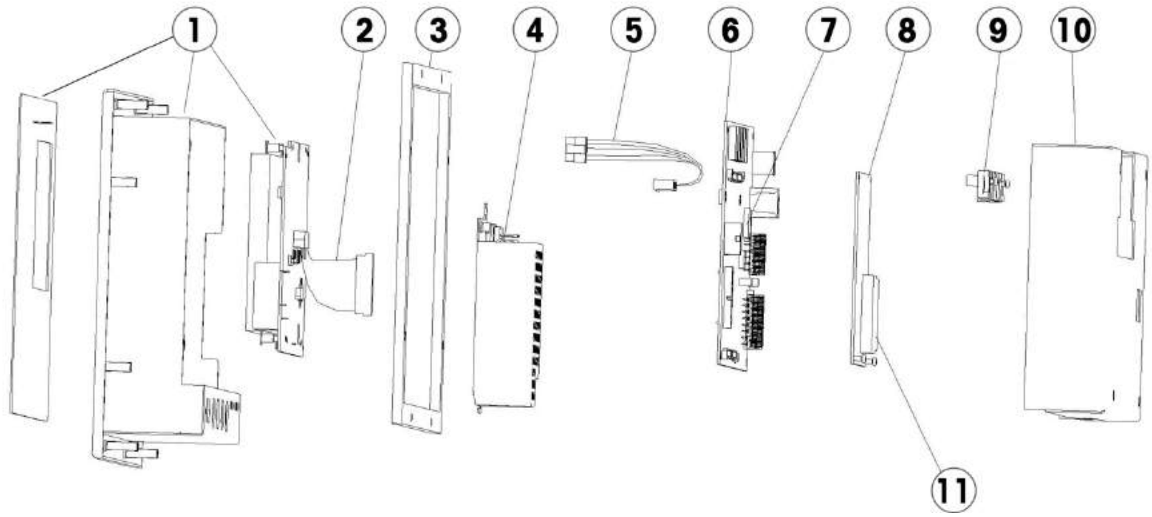


Figure 5-2: Panel-Mount Enclosure

5.3.1. Panel-Mount Enclosure Parts

Table 5-3: Panel-Mount Enclosure Parts

Item #	Part Description	Part No.	Quantity
1	Keypad assembly with color LCD and HMI Driver Board	30500284	1
2	HMI Base board harness	64056103	1
3	Panel gasket	22009018	1
4	Power Supply with mounting bracket	64057328	1
5	Power Supply to Base board harness	22009186	1
6	Base board (Main PCB)	64084167	1
7	Battery	22009188	
8	ETX CPU board (PXA270 version; CF card not included)	64061985	1
9	Card Guide, top	64085012	1
10	Rear cover panel	22009021	1
11	Programmed Compact Flash (CF) card (Win CE 5 with 7.x s/w)	64085476	1
	Programmed Compact Flash (CF) card (Win CE 6 with 8.x s/w)	30411137	1
n/s	Card Guide, bottom	22009192	1
n/s	Hardware kit (includes screws, nuts and rubber feet)	64057325	1

5.3.2. Miscellaneous Panel-Mount Enclosure Items

Table 5-4: Miscellaneous Panel-Mount Enclosure Items

Part Description	Part No.	Quantity
Mounting brackets and screws kit	71209381	1
Sealing Kit, Weights and Measures	64056538	1
Capacity/Range Label Kit (includes 5 labels)	64057354	1
Connector kit	64057327	1
Line cord, North America	22009142	1
Line cord Schuko	22009143	1
Line cord, United Kingdom	22009144	1
Line cord, Australia	22009145	1
Line cord, Switzerland	22009146	1
Line cord, Denmark	22009147	1
Line cord, India	22009149	1
USB Connector Extension Kit for Panel Mount terminal	30139559	1

5.3.3. Documentation

Table 5-5: Documentation

Part Description	Part No.	Quantity
Documentation CD	64057241	1
Installation Guide	64057253	1
Division 2 and Zone 2/22 Installation Guide	64063214	1
User's Guide, English	64057247	1
User's Guide, German	64057248	1
User's Guide, French	64057249	1
User's Guide, Spanish	64057250	1
User's Guide, Italian	64057251	1
Technical Manual, English	64057242	1
Technical Manual, German	64057243	1
Technical Manual, French	64057244	1
Technical Manual, Spanish	64057245	1
Technical Manual, Italian	64057246	1

5.4. Optional Components

5.4.1. ARM100 Remote I/O Relay Module

Part Description	Part Number
ARM 100 Module	71209352
24 VDC Power Supply (100 – 240 VAC universal)	64053820

5.4.2. M12 PowerDeck Connector

Part Description	Part No.
M12 Cable Assembly for PowerDeck	30411436

5.4.3. Wall-Mounting Brackets (Harsh Enclosure)

Part Description	Part Number
Wall-mounting Kit	71209353

5.4.4. VESA Mounting Bracket (Harsh Enclosure)

Part Description	Part Number
VESA mounting bracket	22020286

5.4.5. POWERCELL MTX Option

Part Description	Part Number
POWERCELL MTX option	64057417

5.4.6. POWERCELL PDX/PowerMount Option

Part Description	Part Number
POWERCELL PDX/PowerMount option	64067252

5.4.7. Analog Load Cell Option

Part Description	Part Number
Single Analog Load Cell option	64063330

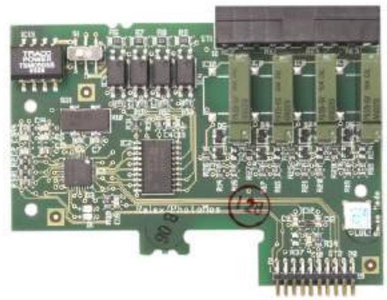
5.4.8. Flow Meter Interface Option

Part Description	Part Number
Flow Meter Interface option	64068605

5.4.9. IDNet Option

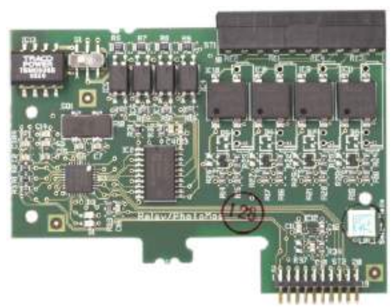
Part Description	Part Number
IDNet/DigiNET option	64057421

5.4.10. Discrete I/O, Relay Option



Part Description	Part Number
Relay Discrete I/O Option	64057419

5.4.11. Solid State Relay Discrete I/O Option



Part Description	Part Number
Solid State Relay Discrete I/O Option	64057422

5.4.12. Serial Option

Part Description	Part Number
Serial Option	64057420

5.4.13. Dual-Channel Analog Output Option

Part Description	Part Number
Dual-Channel Analog Output Option	72230302

5.4.14. Allen-Bradley Remote I/O PLC Option (Discontinued, January 2021)

Part Description	Part Number
A-B RIO Option	71209098

5.4.15. ControlNet PLC Option

Part Description	Part Number
ControlNET PLC option	64057423

5.4.16. DeviceNet PLC Option

Part Description	Part Number
DeviceNet PLC Option	72193580

5.4.17. EtherNet/IP and Modbus TCP PLC Option

Part Description	Part Number
EtherNet / IP and Modbus TCP PLC Option	64058677

Note: Modbus TCP requires Ethernet / IP board version 1.32 or higher.

5.4.18. PROFIBUS PLC Option (Panel Mount Enclosure)

Part Description	Part Number
PROFIBUS PLC Option (vertical header, panel enclosure)	71209096

- Note that the PROFIBUS connector is not included.

5.4.19. PROFIBUS PLC Option (Harsh Enclosure)

Part Description	Part Number
PROFIBUS PLC Option (horizontal header—harsh enclosure)	71209097

- Note that the PROFIBUS connector is not included.

5.4.20. PROFINET PLC Option

Part Description	Part Number
PROFINET PLC Option	30130721

5.5. Software Applications

- Application kits include application hardware key (ibutton), documentation and software files for download into the terminal (if required).

5.5.1. TaskExpert

Part Description	Part Number
TaskExpert	22009173

5.5.2. Axle-780

Part Description	Part Number
Axle-780 Application	64061173

5.5.3. COM-780

Part Description	Part Number
COM-780 Module	22009174

5.5.4. Drive-780

Part Description	Part Number
Drive-780 Application	22009172

5.5.5. COM-780 and TaskExpert

Part Description	Part Number
COM-780 Module and TaskExpert	22009175

5.5.6. Drive-780 and TaskExpert

Part Description	Part Number
Drive-780 Application and TaskExpert	64057889

A. Installation

	DIV 2 AND ZONE 2/22 INSTALLATION
	IF YOU WISH TO INSTALL THE IND780 IN A DIVISION 2 OR ZONE 2/22 AREA, REFER TO THE DIVISION 2 AND ZONE 2/22 INSTALLATION INSTRUCTIONS INCLUDED ON THE RESOURCE CD PROVIDED WITH THE TERMINAL. FAILURE TO COMPLY WITH THE INSTRUCTIONS PROVIDED THERE COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

This appendix provides installation instructions for the IND780 terminal panel mount and harsh enclosures. Please read this chapter thoroughly before beginning installation.

A.1. Precautions

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

	⚠ WARNING
	ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THE TERMINAL. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.
	⚠ WARNING
	NOT ALL VERSIONS OF THE IND780 ARE DESIGNED FOR USE IN HAZARDOUS (EXPLOSIVE) AREAS. REFER TO THE DATA PLATE OF THE IND780 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.
	⚠ CAUTION
	GROUNDING MUST BE PERFORMED ACCORDING TO LOCAL ELECTRICAL CODE.

	⚠ **CAUTION**
	RISK OF EXPLOSION IF BATTERY IS REPLACED WITH WRONG TYPE OR CONNECTED IMPROPERLY. DISPOSE OF BATTERY ACCORDING TO LOCAL LAWS AND REGULATIONS.
	⚠ **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.
	NOTICE
	OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

A.2. Opening the Enclosure

Procedures for opening the IND780 terminal panel mount and harsh enclosures differ and are described in the following sections.

Only qualified personnel should perform installation, programming and service. Please contact a local METTLER TOLEDO representative for assistance.

In general, once the IND780 is installed, programmed and calibrated for a given application, only routine calibration service is required.

A.2.1. Panel Mount Enclosure

The panel mount enclosure is designed to allow the system integrator or installer to have easy external access to connectors, minimizing the need to access the interior of the unit. On some occasions, the rear cover must be removed to add option cards or to set internal switches. The Panel Mount version of the IND780 is opened by removing the four Phillips head screws on the back, panel, circled in Figure A-1. The rear panel can then be removed.

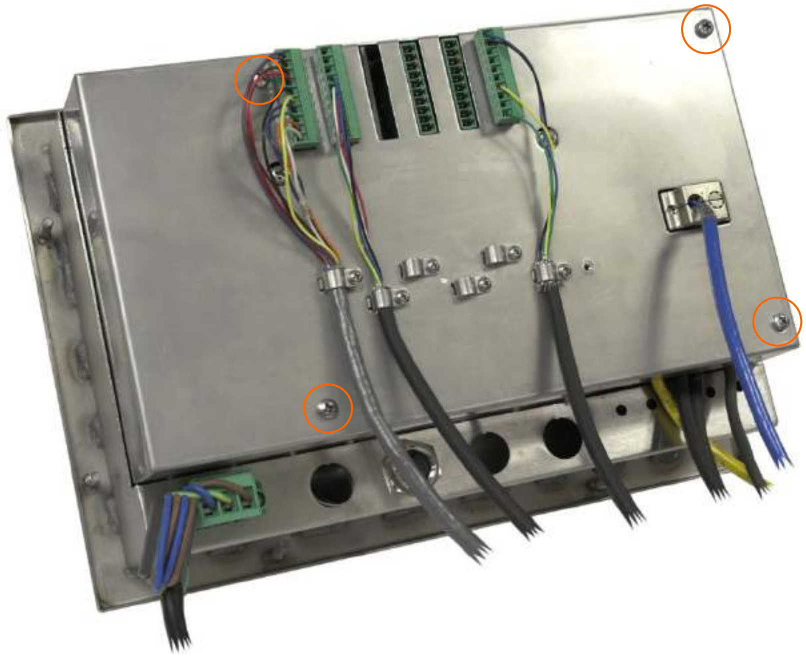


Figure A-1: Opening the Panel Mount Enclosure

A.2.2. Harsh Enclosure

The front panel of the harsh enclosure IND780 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. Place the terminal on a stable, flat surface, with its front panel facing up.
2. **Preferred method**: Insert the metal part of the terminal opening tool into one of the two slots located on the side of the front panel assembly, press lightly down on the top to help release the clips, and push the tool in until the clip releases with a "pop" sound.

Figure A-2: Opening the Harsh Enclosure, Preferred Method

3. Repeat for the second slot, and lift the cover.

Figure A-3: Harsh Enclosure, Cover Released

4. **Alternative method**: Insert the tip of a flat blade screwdriver into one of the two slots located on the side of the front panel assembly. Squeeze the top of the front panel firmly down against the enclosure, in order to relieve the pressure on the retaining clip, and push the screwdriver in toward the enclosure until a "pop" sound is heard.

- When using a screwdriver, take care not to damage the clips.

Figure A-4: Opening the Harsh Enclosure, Alternative Method

5. Repeat Step 2 for the other slot, freeing the bottom of the cover from the spring retaining clips.
6. Once the panel is released, lift the bottom of the panel firmly up and out until it clears the edge of the enclosure.
7. Press down on the top of the front panel and push the panel upward, relative to the enclosure, until the spring retaining clips unsnap. The cover will then be free to swing down, hinged by two wire cables at its bottom edge.

A.3. 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, **Introduction**.

A.3.1. 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:

1. Cut an opening and holes in the panel or industrial enclosure as indicated in the panel cutout dimensions shown in Figure A-5 in inches and [mm].

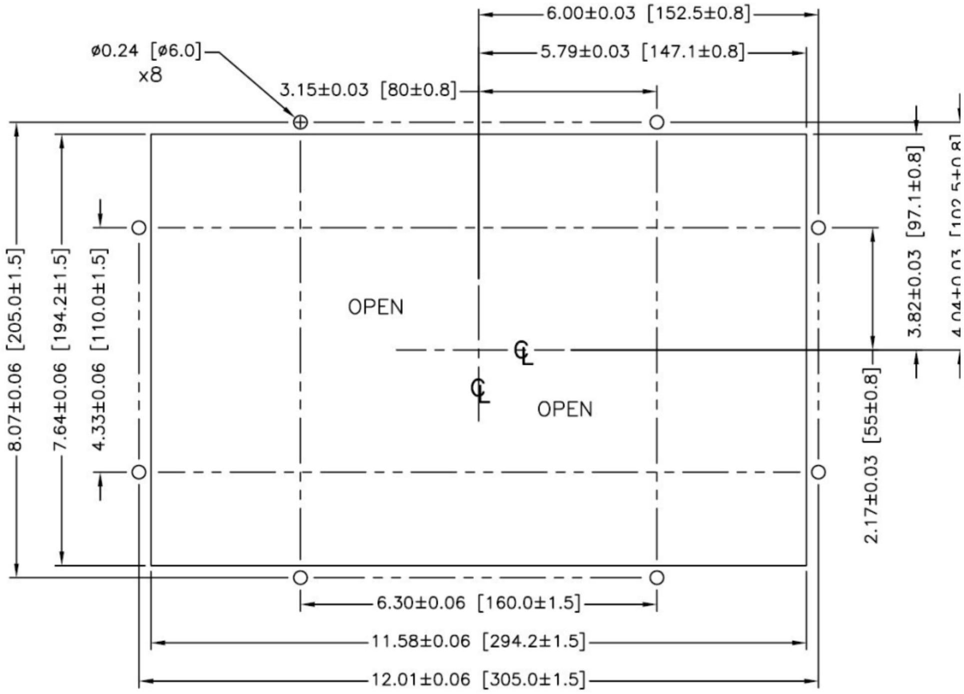


Figure A-5: Panel Cutout Dimensions

2. 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 A-6 shows two images of the enclosure, one with the backing plate removed to show the gasket, the other with the backing plate installed.

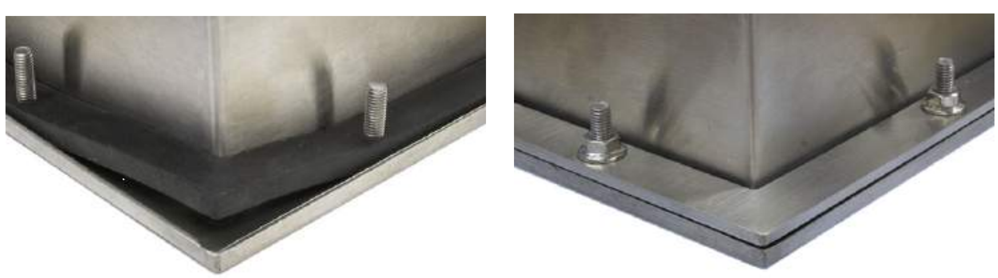


Figure A-6: Gasket on Enclosure (left) and Backing Plate Installed (right)

3. 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 A-7 shows a side view of a panel installation.

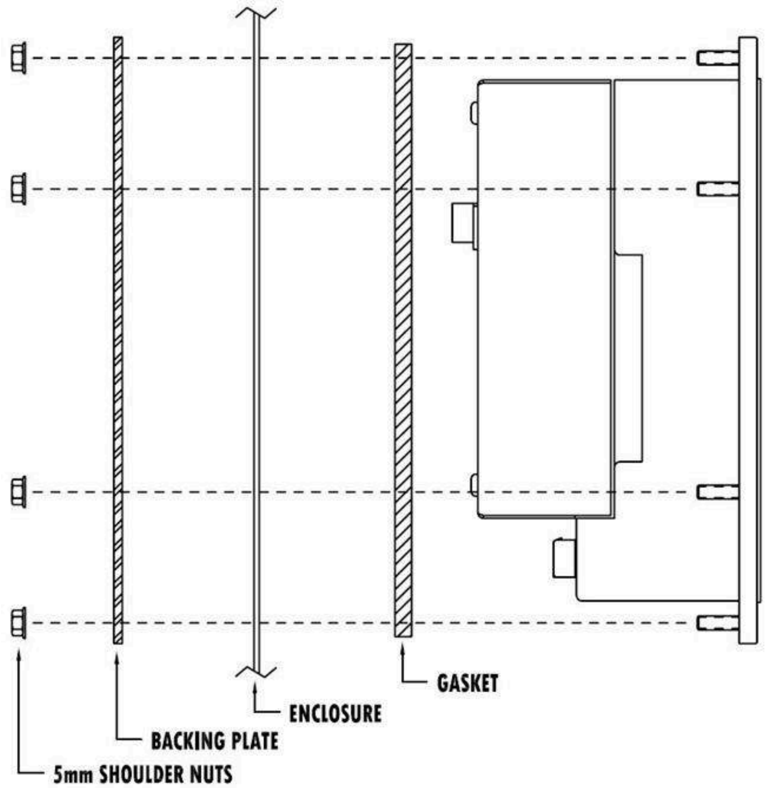


Figure A-7: Panel Mounting, Side View

A.3.2. 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).

A.3.2.1. 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 A-8.

Figure A-8: Rubber Feet for Desktop Mounting

A.3.2.2. 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). Requires Kit of Parts 64087303.
    1. Install enclosure on brackets
    2. Mark attachment points
    3. Install mounting hardware
    4. Mount terminal hardware

A.3.2.3. Setting Front Panel Orientation

- **Note**: In order to rotate the harsh enclosure front panel, an extended HMI harness (64087303) must be purchased separately.

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 as described in section A.2.2.

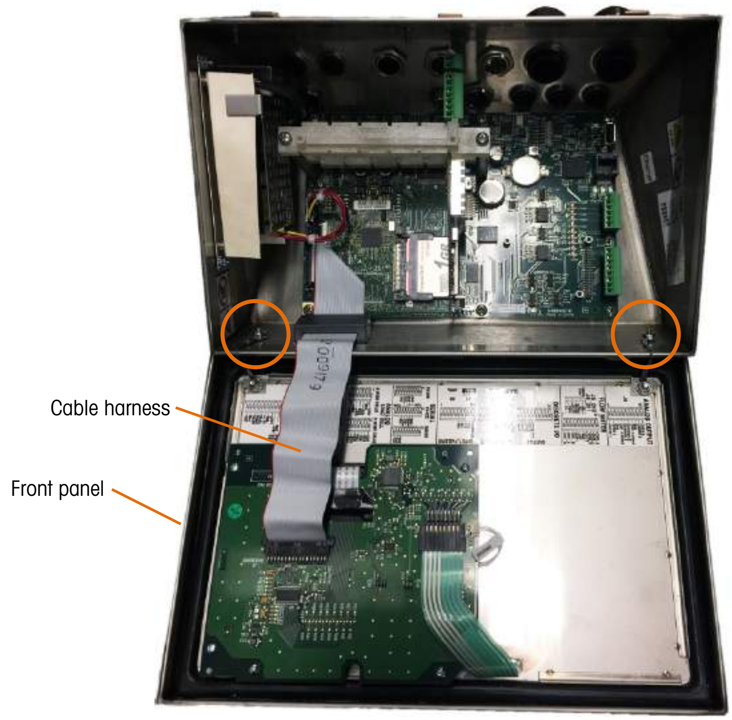


Figure A-9: Harsh Enclosure Open, with Front Panel in Original Orientation

2. Disconnect and remove the grey cable harness connecting the main PCB to the front panel. This harness will be replaced by the longer equivalent noted above.
3. Loosen and remove the two nuts securing the two metal cables that hinge the front cover to the rear housing. These are circled in Figure A-9.
4. Carefully rotate the rear of the enclosure 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 A-10 shows one of the studs. Tighten the two nuts.

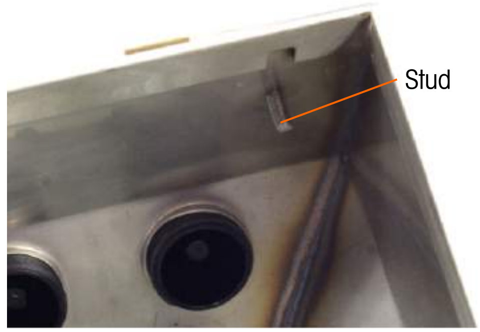


Figure A-10: Stud for Attaching Reversed Front Panel

5. Connect the replacement cable harness (64087303) as shown in Figure A-11.

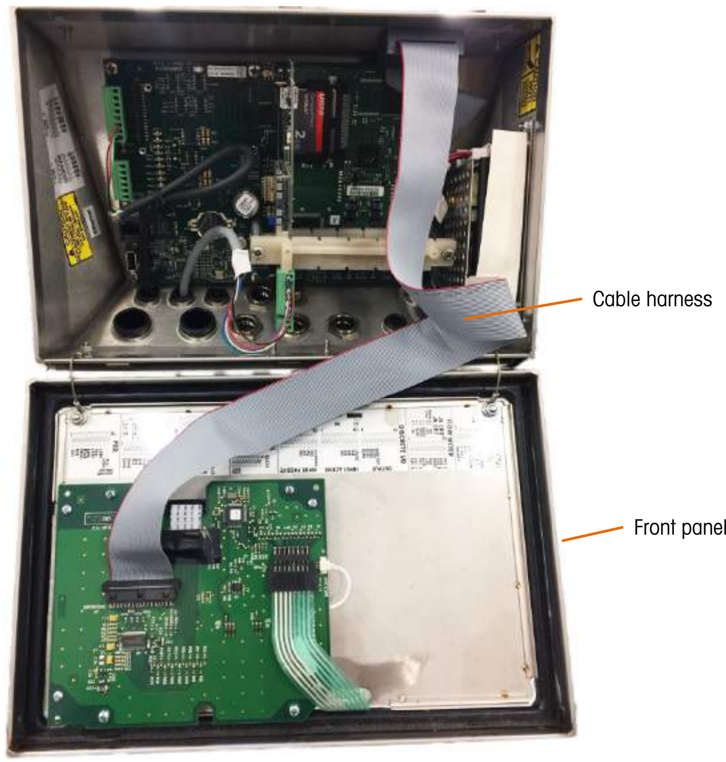


Figure A-11: Front Panel Reversed, Longer Cable Harness Installed

6. Reinstall the front panel on the rear of the enclosure, taking care to seat the gasket correctly and engage all the spring clips.

- The enclosure gasket should be inspected during any maintenance activity, and replaced if it becomes damaged or brittle.

A.3.3. 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 M4 screws. One bracket is shown in Figure A-12, with the slotted holes indicated. The screws are tightened by fitting the screwdriver through the slotted holes.

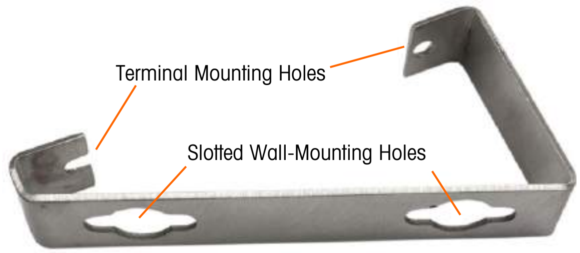


Figure A-12: Wall-Mounting Bracket

Figure A-13 shows the brackets attached to an enclosure. Note the orientation of the enclosure relative to the brackets.

Figure A-13: Attaching the Wall-Mounting Brackets

A.3.3.1. Marking Mounting Hole Position

Mark the position of the mounting holes on the vertical surface per the dimensions shown in Figure A-14 in inches and [mm], or by holding the terminal up to the surface and marking through the bracket holes.

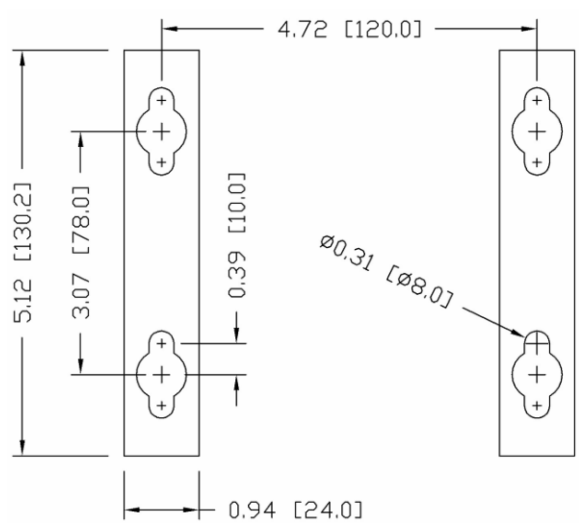


Figure A-14: Mounting Hole Pattern

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

- 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.

A.3.3.2. 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 A-15 shows an example of mounting hardware.

Figure A-15: 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 A-12 and Figure A-14).
9. Turn the screws, by hand, until they are snug against the mounting plate. Figure A-16 shows the nut, washer and bolt installed.

A.3.3.3. 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 A-16 shows an example of mounting hardware.

Figure A-16: 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 A-12 and Figure A-14).

A.3.3.4. 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 A-12 and Figure A-14.

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.

A.3.3.5. 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 A-12).

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 A-17 shows the relationship between bracket, hardware and wall.

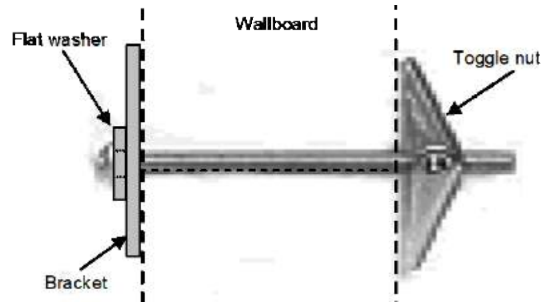


Figure A-17: Wallboard or Drywall Installation

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.

A.4. Ferrites and Option Board Cabling

A.4.1. 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, serial interface and analog load cell cable.
- The small clamp ferrite is to be used on the ground wire of the POWERCELL MTX 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. Similarly, on the analog load cell cable, wrap the individual wires around the ferrite core twice to reduce the effects of electrical noise and interference.

Figure A-18: Ferrite Core on Panel Mount Power Cord

Figure A-19: Ferrite Core on Analog Load Cell Cable

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 A-20: Installing Clamp Ferrite

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

A.4.2. 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 A-21, before attaching the green connector to the board.

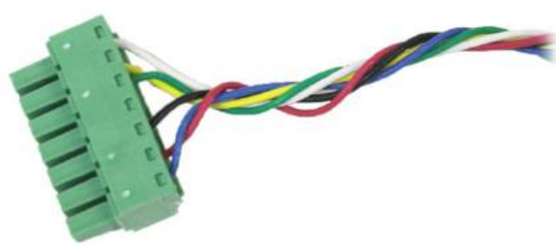


Figure A-21: Option Board Wires Twisted

On the IND780 panel mount enclosure, cable shield terminations can be made using the strain relief cable clamp provided on the back cover. Fold the shield braid back evenly over the cable's insulation sheath and then fasten down the cable and shield with the clamp and screw onto the back cover (Figure A-22).

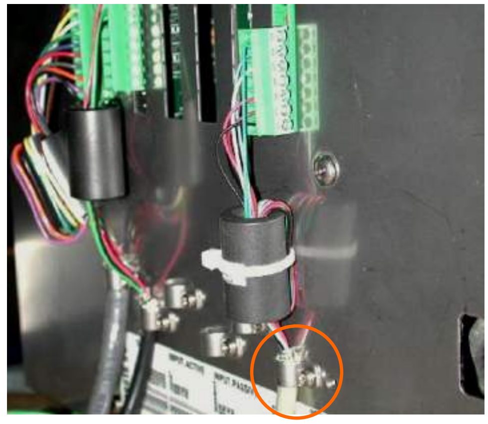


Figure A-22: Shield Wire Termination, Panel Enclosure

Analog load cell, POWERCELL MTX and POWERCELL PDX/PowerMount cable shield termination on the IND780 harsh enclosure can be made using the metal cable gland and grommet as described in section A.7.4. Other cables' shield termination can be made on the ground stud inside the enclosure (Figure A-23).

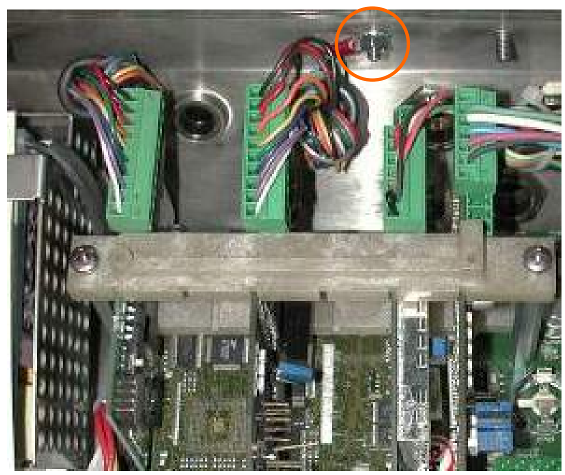


Figure A-23: Shield Wire Termination, Harsh Enclosure

A.5. Harsh Enclosure Cable Glands and Cable Assignments

On the IND780 panel mount enclosure, cable shield terminations can be made using the strain relief cable clamp provided on the back cover. Fold the shield braid back evenly over the cable's insulation sheath and then fasten down the cable and shield with the clamp and screw onto the back cover (Figure A-22).

A.5.1. Harsh Enclosure Cable Openings

Figure A-24 and Table A-1 show the uses and cable size limits of the various openings in the back of the harsh enclosure. The pattern code is included for ease of reference.

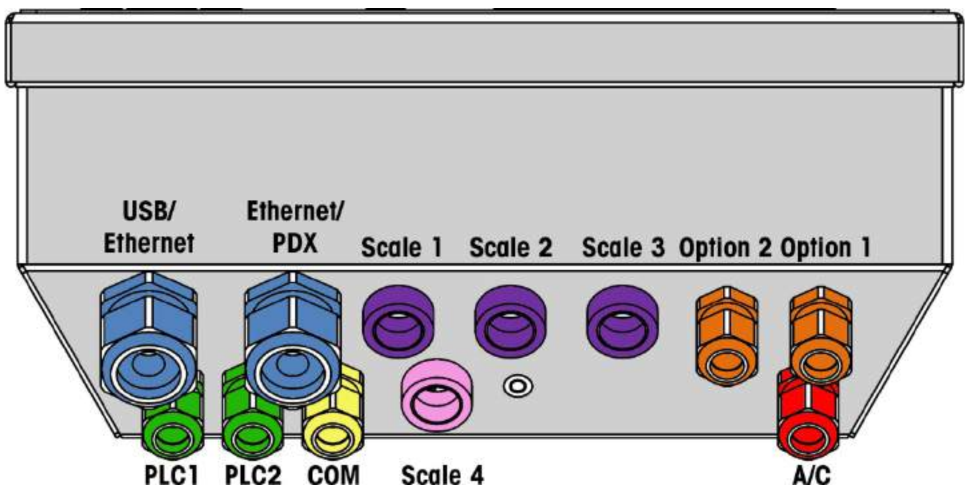
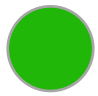
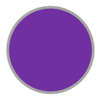
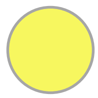
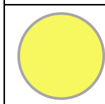
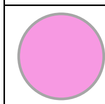


Figure A-24: Harsh Enclosure Cable Opening Assignments

Table A-1: Harsh Enclosure Cable Openings

Color	Description/Use	Cable Size Limits inches and [mm]
Blue	USB and Ethernet connections. 25 mm plastic cable gland	0.20–0.43 [5–11] 0.51–0.71 [13–18]
	POWERCELL PDX/PowerMount, 16 mm metal cable gland	0.24-0.39 [6-10]
Purple	Analog Load Cell, 16 mm metal cable gland	0.24–0.31 [6–8]
	Analog Load Cell, larger cable	0.31–0.39 [8–10]
	POWERCELL MTX, 16 mm metal cable gland	0.31–0.39 [8–10]
	Analog Output, 16 mm metal cable gland	0.24-0.39 [6-10]
Orange	Discrete I/O and Serial cables. 16 mm plastic cable gland	0.16–0.32 [4–8]
	Analog Output, 16 mm metal cable gland	0.24-0.39 [6-10]

Color	Description/Use	Cable Size Limits inches and [mm]
	A-B RIO / PROFIBUS connectors – one in, one out	N/A
 	Scales 1-4, IDNet (proprietary connector)	N/A
	COM1 or COM2	0.16–0.32 [4–8]
	Fourth scale connector or, with insert, COM2	0.16–0.32 [4–8]

A.5.2. 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 grip. Figure A-25 shows the components, including the blank used when no cable is present.

Figure A-25: Cable Gland Components

2. Before connecting the wires, pass the cable through an appropriately sized cable grip and into the enclosure. Then, if required, place a grommet around the cable as shown in Figure A-26.

Figure A-26: Cable Inserted Through Grommet, Nut, and Cable Grip

3. A metal cable gland is provided with the Analog Load Cell, POWERCELL MTX, PDX/PowerMount 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. Refer to section A.7.4.3.1, where shield wire grounding is described in detail.
4. Press the grommet into the body of the cable grip, as shown in Figure A-27.

Grommet in
Cable Grip

Figure A-27: Grommet in Body of Cable Grip

5. Move the cable through the grommet 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.
6. Finally, tighten the nut onto the body of the cable grip. Figure A-28 shows the assembled cable grip.

Figure A-28: Cable Grip Assembled

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

A.6. Main PCB

A.6.1. Main Board Wiring Connections

The following connections are made to the IND780 main board:

- Ethernet
- USB
- COM1
- COM2
- Optional scale interface boards
- Optional serial communications boards
- Optional discrete Input / Output boards
- Optional PLC interface boards

The harsh enclosure must be opened to make the connections, as shown in Figure A-29. The rear cover of the panel mount enclosure (Figure A-30) needs to be removed in order to make these connections. Note that the option board sockets shown at the top of these figures represent the locations where option cards (Discrete I/O, Serial Communications, IDNet, Analog Load Cell, POWERCELL MTX and PDX/PowerMount Interfaces) would be installed. These may not be present in your unit.

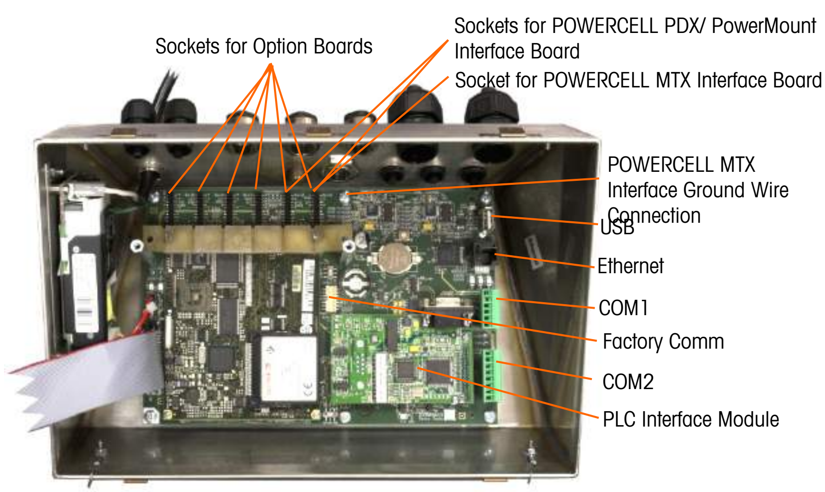


Figure A-29: Wiring Connections, Top View, Harsh Enclosure

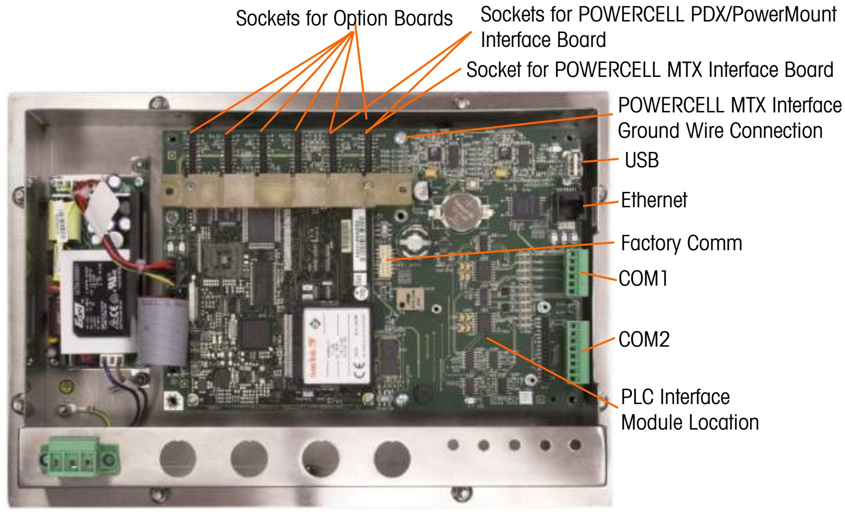


Figure A-30: Wiring Connections, Top View, Panel Mount Enclosure

A.6.1.1. Power Connection

A permanently attached line cord supplies AC power to the harsh enclosure version of the IND780 terminal. The panel mount enclosure does not provide an AC power cord – it is designed to have AC wiring connected to the AC power connector, which is plugged into the mating connector on the rear of the chassis. Figure A-31 shows the connector and indicates the correct assignments for neutral, ground and line wires. Ensure that the grounded neutral of the power source is connected to the NEUTRAL terminal and the ungrounded conductor is connected to LINE.

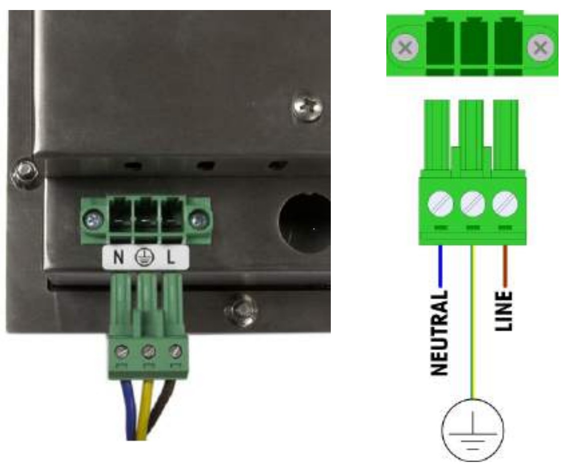


Figure A-31: Power Connector, Panel Mount Enclosure

Power connector screws should be tightened to between 4.4 and 5.3 inch-pounds (0.5 and 0.6 Newton-meters) of torque.

No voltage or frequency settings are required since the terminal includes a universal power supply that operates from 100 to 240 VAC.

- 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 IND780 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 ON THE HARSH ENCLOSURE LINE CORD. ENSURE PROTECTIVE EARTH (GROUND) IS SECURELY CONNECTED TO THE PROPER CONNECTOR POSITION ON THE PANEL MOUNT UNIT.

A.6.1.1.1. Power Requirements

The terminal requires 100 to 240 VAC (at 400 mA maximum) with a line frequency of 49 to 61 Hz of power. The AC provided must be a single phase TN (grounded neutral) power system that is limited to a maximum of 20A with a protective Earth.

A.6.1.2. Ethernet and USB Connections

The IND780's Ethernet connection provides a 10/100 base T connection (10/100 Mb) via a standard RJ45 connector.

The standard ST30 USB connector allows USB-supported peripherals, such as keyboards, to be attached to the IND780.

Figure A-32 shows the locations of the Ethernet and USB connectors on the main PCB. In this case, the PCB is mounted in a Panel enclosure.

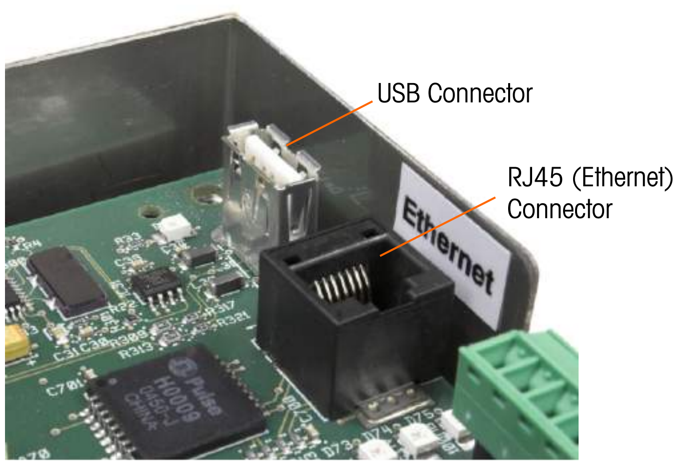


Figure A-32: Ethernet and USB Connections

A.6.1.3. COM1 and COM2 Serial Port Connections

The COM1 port includes connections for RS232, while COM2 supports connections for RS-232, RS-422 and RS-485. The Interface parameter (in Setup at **Communication > Serial**) must be set to match the hardware connection used. This parameter controls how the transmit and receive lines are controlled.

A.6.1.3.1. COM1 Serial Port

Figure A-33 indicates which terminal represents which signal on the COM1 Port, and Figure A-34 shows how the port is wired for an RS232 connection. Make the connections as necessary. Table A-2 describes the functions for each signal in the COM1 port connector.

- Note that RTS and CTS hardware handshaking is not supported.

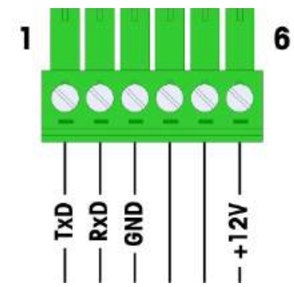


Figure A-33: COM1 Port Connector

Table A-2: COM1 Port Connections

Pin	Signal	Function
1	TxD	RS-232 Transmit data
2	RxD	RS-232 Receive data
3	GND	RS-232 Signal ground
4	Not used	
5		
6	+12V	+12V Out, <0.5 A

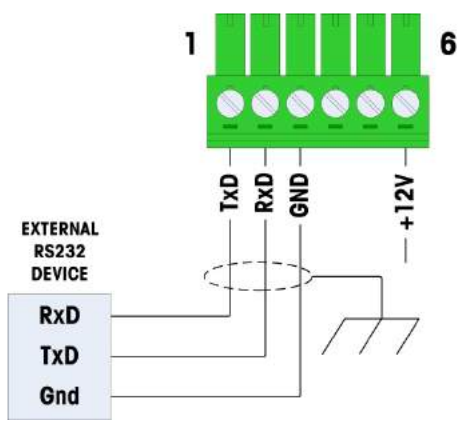


Figure A-34: COM1 Wiring for RS232

A.6.1.3.2. COM2 Serial Port

Details for COM2 are provided in Figure A-34 and Table A-3.

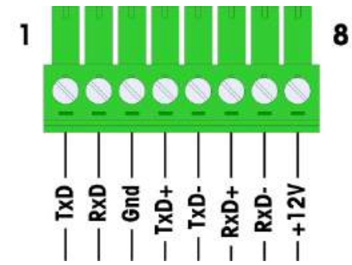


Figure A-35: COM2 Port Connections

Table A-3: COM2 Port Connections

Pin	Signal	Function	Notes
1	TxD	RS-232 Transmit data	
2	RxD	RS-232 Receive data	
3	GND	RS-232 Signal ground	
4	TxD+	RS-422/485 Transmit +	Jumper to RxD+ for RS-485
5	TxD-	RS-422/485 Transmit -	Jumper to RxD- for RS-485
6	RxD+	RS-422/485 Receive +	Jumper to TxD+ for RS-485
7	RxD-	RS-422/485 Receive -	Jumper to TxD- for RS-485
8	+12V	+12V Out, <0.5 A	

Some examples of connecting external equipment are shown in Figure A-36.

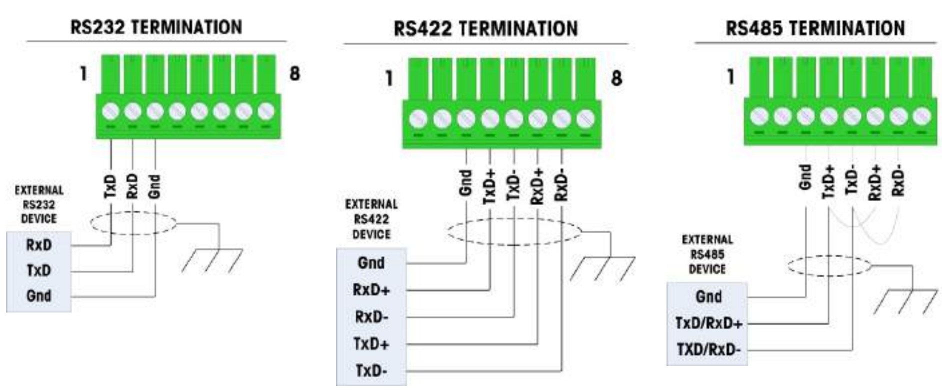


Figure A-36: COM2 Wiring for External Equipment

A.6.1.3.3. RS-485 Transmission Line Termination

The RS-485 network should include a terminating resistor, installed between the two lines at or on the last node. The terminating resistor should match the characteristic impedance of the transmission line, approximately 120 ohms. This terminating resistor is required when connecting ARM100 modules to the port.

A.6.2. Switch Settings

Two switches are located on the main PCB in the positions indicated in Figure A-37. These switches' functions are explained in Table A-4.

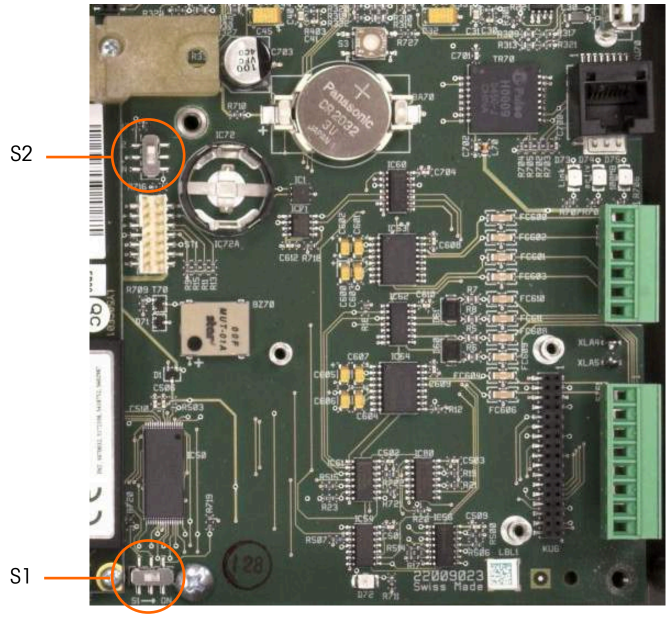


Figure A-37: Main PCB Switch Locations

Table A-4: Main PCB Switch Functions

Switch	Function
S-1	Metrology Security Switch. When in the ON (right) position, this switch prohibits access to Scale settings in the menu and other metrologically significant areas.
S-2	Task Expert Disable Switch. When in the ON (down) position, disables the task expert auto-start feature. This is used primarily for maintenance purposes.

Note that the switches shown in Figure A-37 are both in their OFF position.

A.6.3. Master Reset Button

To erase all programming in the terminal and reset all settings (except metrologically significant scale calibration data) to their factory default values, press the master reset button adjacent to the battery. Figure A-38 indicates the location of this button. This process is described in Chapter 4, **Service and Maintenance**.

- To reset scale data as well, S2 (shown in its OFF position in Figure A-38) must be set to ON before the master reset.

Figure A-38: Main PCB Master Reset Button Location

A.6.4. LED Interpretation

Figure A-39: Main PCB LEDs

Table A-5: Main PCB LEDs

LED	Color	Function
D12	Yellow	Indicates 12V supply is present.
D13	Yellow	Indicates 5V supply is present.
D30	Green	When lit, indicates USB port has been identified and is functional. ■ Note that this LED remains lit whether or not a USB device is connected.
D72	Amber	Used for software development purposes; blinking during normal system operation.
D73	Yellow	Indicates that an Ethernet connection exists.
D74	Green	When blinking, indicates that the Ethernet connection is actively receiving or transmitting data.
D75	Red	When lit, indicates that Ethernet connection is 100 MB. D73 lit, D75 off, indicates that Ethernet connection is 10 MB.

A.7. Option Boards

A.7.1. Wiring Connections for Options

Options available for the IND780 terminal include the following:

- Analog Load Cell
- POWERCELL® MTX®
- POWERCELL® PDX®
- PowerMount™
- Flow Meter Interface
- Discrete I/O (Relay) and Solid State Relay
- SICS High Precision Balance Interface
- IDNet Scale Interface
- Serial Communications
- Analog output
- Rockwell (Allen-Bradley) RIO (Discontinued, January 2021)
- ControlNet
- DeviceNet
- Ethernet/IP and Modbus TCP
- PROFIBUS (Harsh Enclosure)
- PROFIBUS (Panel Enclosure)
- PROFINET

Figure A-40 shows each of these options, together with its location in the terminal. The connections and board settings for each option are described in the following sections.

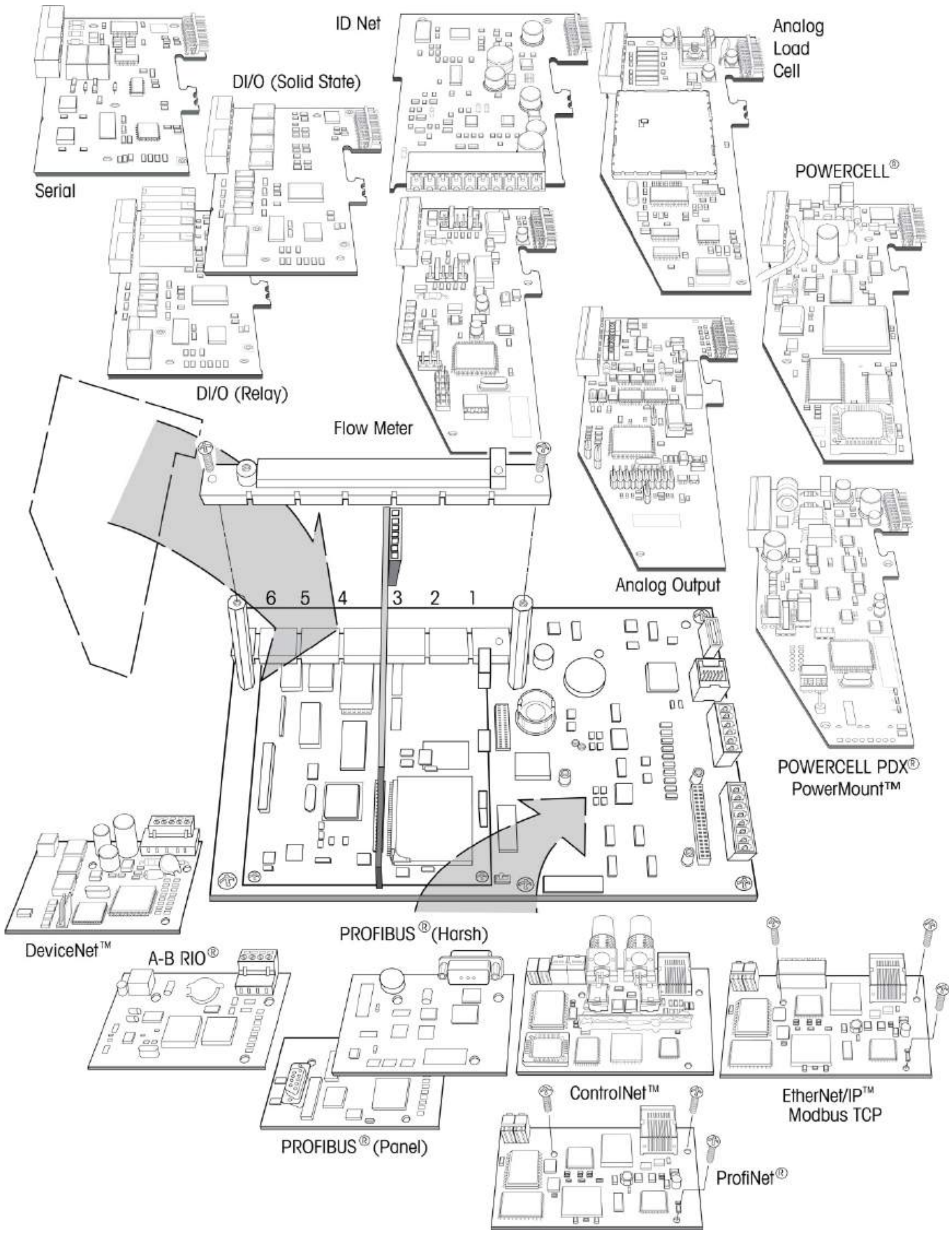


Figure A-40: IND780 Options Locations

A.7.2. Analog Load Cell

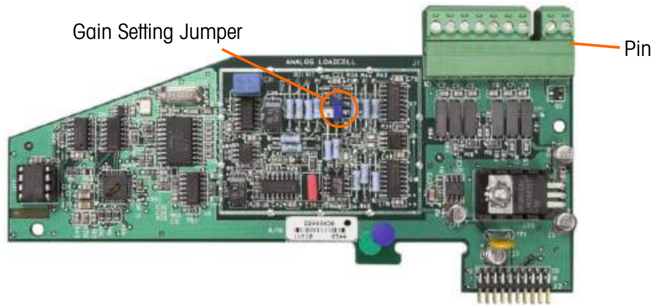


Figure A-41: Analog Load Cell Option Board

A.7.2.1. Jumper Settings

One jumper (W1) on the IND780 analog scale option board permits the gain of the analog section to be set to either 2 mV/V or 3 mV/V. The factory default is 3 mV/V, which normally 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. Figure A-42 shows the jumper's location and settings on the board.

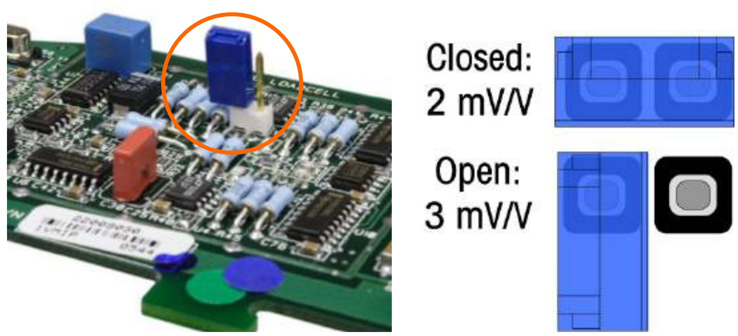


Figure A-42: Analog Load Cell Board Millivolt Jumper Location and Settings

The 2 mV/3 mV jumper settings are described in Table A-6.

Table A-6: Millivolt Jumper Description

Jumper	On	Off	Description
W1	X		When the jumper is closed, the connected scale's load cell setting is 2 mV/V.
		X	When the jumper is open, the connected scale's load cell setting is 3 mV/V

A.7.2.2. Connections

NOTICE

TO AVOID DAMAGE TO THE PCB OR LOAD CELL, REMOVE POWER FROM THE IND780 TERMINAL AND WAIT AT LEAST 30 SECONDS BEFORE CONNECTING OR DISCONNECTING ANY HARNESS.

When using the IND780 with one or more analog load cells, load cell connections are made to the connector located on the Analog Load Cell option board. The 7-position connector is visible at top right in Figure A-41, with the board's 2-position discrete output connection next to it. Note that for clarity the board's socket is shown with two (unwired) connectors plugged into it.

- When installing Analog Load Cell boards, to prevent electromagnetic interference twist the connector wires before attaching the connector to the board.

Analog Load Cell boards may be placed in any of slots 1 through 4, for a total of four scales. The IND780 can power as many as 16 load cells.

The IND780 terminal is designed to power up to eight 350-ohm load cells (or a minimum resistance of approximately 43 ohms) per card. 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 IND780 has a resistance greater than 43 ohms before connecting the load cells. If the resistance is less than 43 ohms, the IND780 will not operate properly.

In addition, the maximum cable distance must be reviewed. Table A-7 provides recommended maximum cable lengths based on TSR and cable gauge.

Table A-7: 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

Figure A-43 shows wiring definitions for the analog load cell connector. 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.

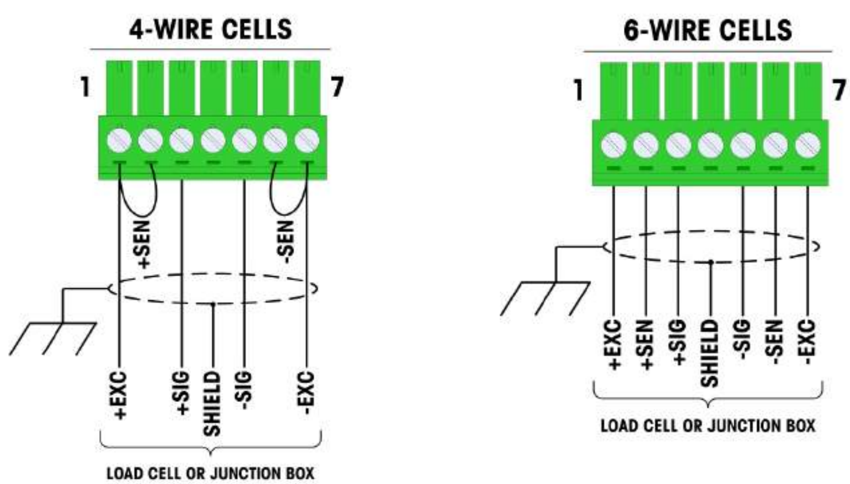


Figure A-43: Load Cell Connections

- 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).

Figure A-44 shows wiring definitions for the analog load cell discrete output connector.

Note – The voltage source must be a Class 2 marked or a Limited Power Source (LPS)-compliant power supply

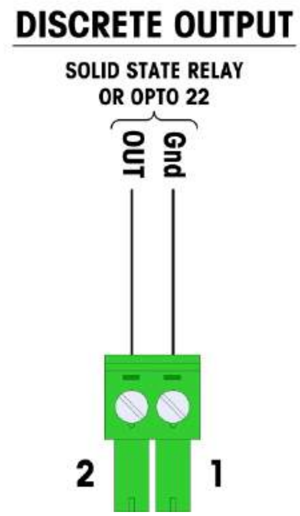


Figure A-44: Analog Load Cell Discrete Output Connector

The TTL-compatible open collector output is reserved for use only with the scale's material transfer target functionality. It provides the signal for the feed output associated with the active target for that scale. It is not necessary to configure this output.

The output is a current-sinking component which can handle from 5 to 30 volt DC signals at a maximum of 35 mA current. A solid-state relay or OPTO 22 is typically connected to buffer the IND780 terminal outputs to a 120 or 220 volt AC signal.

A.7.2.3. LED Interpretation

Figure A-45 indicates the location of LED on the Analog Load Cell board.

Figure A-45: Analog Load Cell LED

Table A-8: Analog Load Cell LED

LED	Color	Function
USB	Amber	Slow blink (~1 Hz) indicates no USB communication with Main PCB Fast blink (~4 Hz) indicates USB communication with Main PCB is operating properly

A.7.3. POWERCELL MTX

Figure A-46: POWERCELL MTX Option Board

A.7.3.1. Jumper Settings

Two jumpers on the POWERCELL MTX board are designed W1 and W2. If the application contains more than 14 POWERCELLs, an external Power Supply (P/N 68001984) must be connected on pins 9 and 10 of the board connector, and jumper W2 should be in the 24V position. Figure A-47 shows the jumper's locations and settings. Table A-9 describes the purpose of each setting.

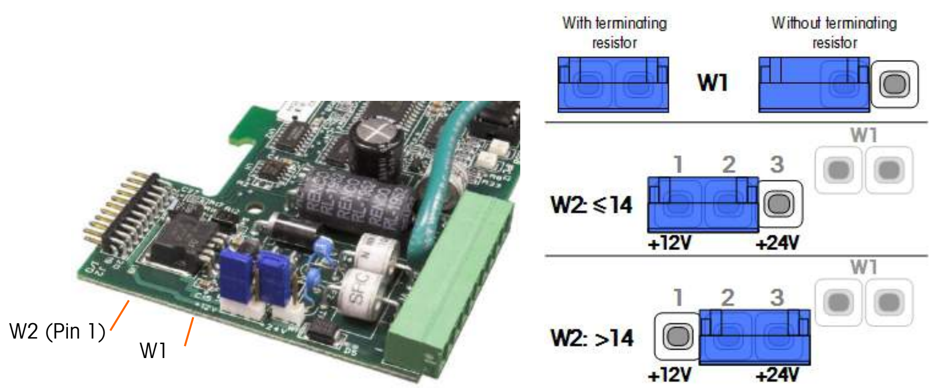


Figure A-47: POWERCELL MTX Card Jumper Locations and Settings

Table A-9: POWERCELL MTX Jumper Description

Jumper	On	Off	Description
W1	X		This jumper should be closed when a network terminating resistor is required to be installed in the terminal. This resistor is almost always required.
		X	This jumper should be open when a network terminating resistor is not to be installed in the terminal.
	Pins		
W2	1, 2		When 14 or fewer load cells are connected, internal power (12V) can be used, and the jumper should close pins 1 and 2.
		2, 3	When more than 14 load cells are used, external power is necessary and the jumper should close pins 2 and 3.

A.7.3.2. Connections

NOTICE
TO AVOID DAMAGE TO THE PCB OR LOAD CELL, REMOVE POWER FROM THE IND780 TERMINAL AND WAIT AT LEAST 30 SECONDS BEFORE CONNECTING OR DISCONNECTING ANY HARNESS.

The POWERCELL MTX option board should be placed in slot 1 on the main board, and its ground wire attached to the screw indicated in Figure A-29 and Figure A-30. The POWERCELL MTX option is used with METTLER TOLEDO DigiTOL® POWERCELL MTX or RAAD box load cells used in large tank and vehicle weighing applications. Figure A-46 shows a POWERCELL MTX option board.

Figure A-48 shows the connections for this board.

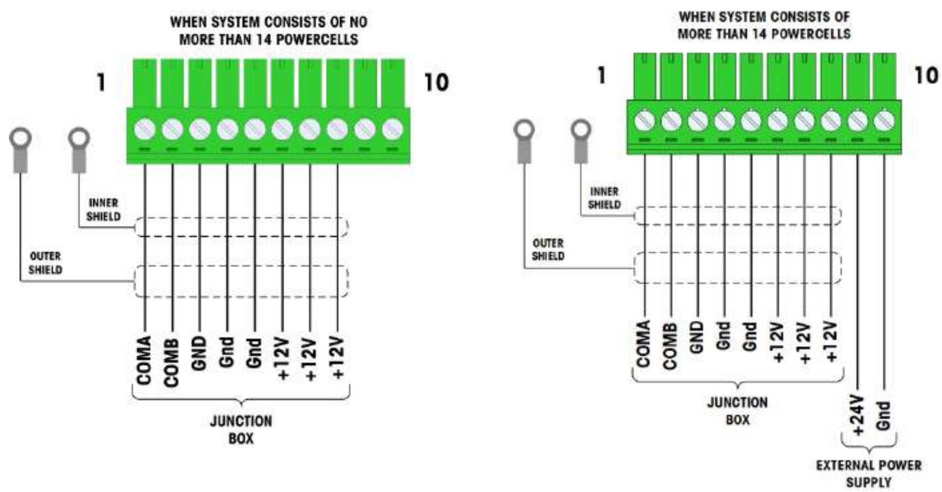


Figure A-48: POWERCELL MTX Option Board Connections

Table A-10: POWERCELL MTX Cable Color Code

Pin #	Wire Color	
	≤14 POWERCELLS	>15 POWERCELLS
1	Yellow	Yellow
2	Blue	Blue
3	Black	Black
4	Brown	Brown
5	Green	Green
6	Orange	Orange
7	Red	Red
8	White	White
External Power Supply Connections		
9	–	Red / +12V
10	–	Black / GND

The total maximum cable length from the last junction box to the IND780 terminal depends on the power supply level, number of cells and cable gauge sizes. Refer to Table A-11 for the recommended maximum cable lengths supported by the IND780 POWERCELL MTX option board using its internal 12VDC supply. These values are for non-hazardous area applications only.

Table A-11: Recommended Maximum Cable Lengths

Number of CMOS/MTX Cells	20 Gauge (meters/feet)
4	274/900
6	213/700
8	152/500
10	121/400
12	106/350
14	91/300

Number of RAAD Boxes (350Ω cells)	20 Gauge (meters/feet)
1	274/900
2	137/450
3	91/300

If an external 24VDC power supply is used, up to 24 load cells per terminal with the maximum cable length of 900 feet is possible.

A.7.3.3. LED Interpretation

Figure A-45 indicates the locations of LEDs on the POWERCELL MTX board.

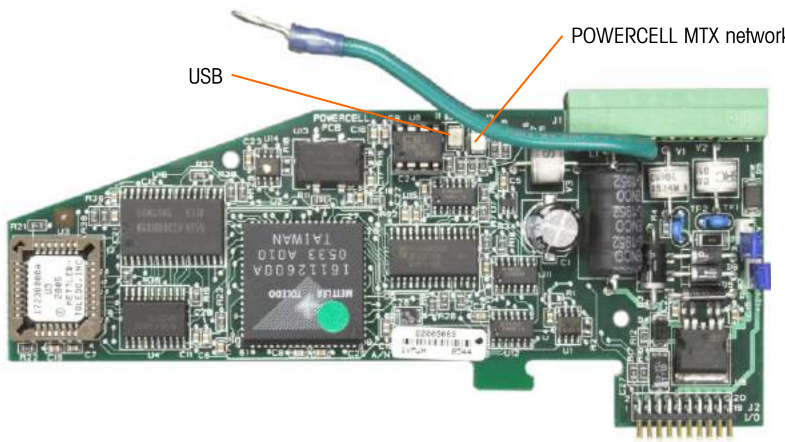


Figure A-49: POWERCELL MTX LEDs

Table A-12: POWERCELL MTX LEDs

LED	Color	Function
USB	Amber	Slow blink (~1 Hz) indicates no USB communication with Main PCB Fast blink (~4 Hz) indicates USB communication with Main PCB is operating properly
PC	Amber	Slow blink (~1 Hz) indicates POWERCELL MTX not connected Fast blink (~4 Hz) indicates POWERCELL MTX connected

A.7.4. POWERCELL PDX and PowerMount

A.7.4.1. Jumper Settings

The POWERCELL PDX board has several jumpers. The W6 jumper is used to set in the PDX network's terminating resistor on the IND780. Figure A-50 shows the jumpers' locations and settings. Table A-13 describes the purpose of each setting.

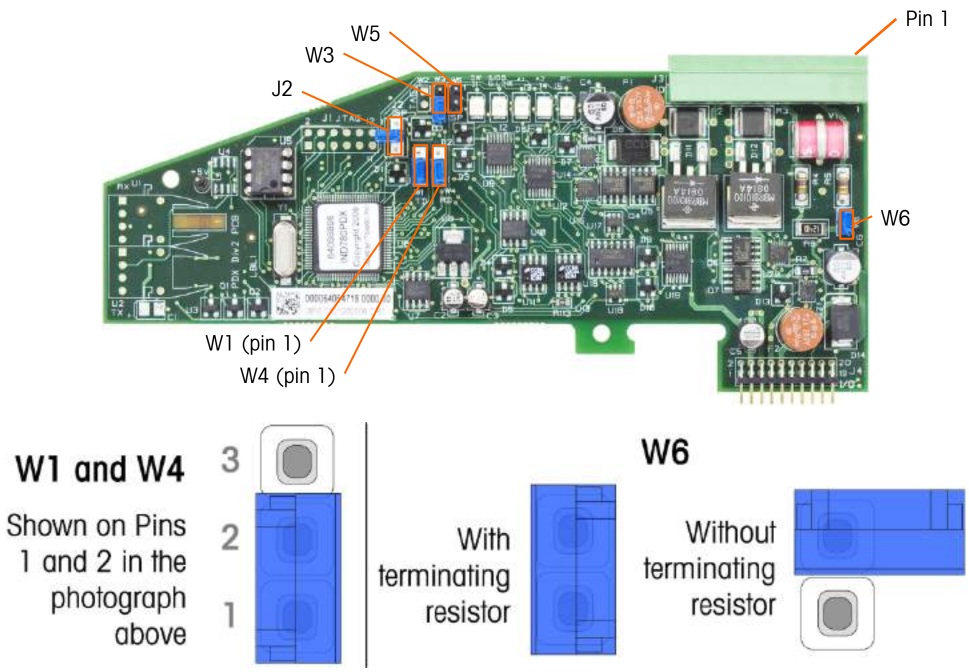


Figure A-50: POWERCELL PDX Board Jumper Locations and Settings

Table A-13: POWERCELL PDX Board Jumper Description

Jumper	On	Off	Description
J2		X	Always set to off in normal operation (factory use).
W3		X	Always set to off in normal operation (factory use).
W5		X	Always set to off in normal operation (factory use).
W6	X		Set this jumper on to install a PDX network terminating resistor. Should be on in normal operation.
		X	Remove this jumper if a network terminating resistor is not to be installed in the terminal.
	Pins		
W1	1, 2		Jumper pins 1 and 2 in normal operation. (reserved)
W4	1, 2		Jumper pins 1 and 2 in normal operation. (reserved)

A.7.4.2. Connections

	⚠ **WARNING**
	THE POWERCELL PDX SCALE INTERFACE BOARD #64064718 (KIT NUMBER 64067252) 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.

NOTICE
TO AVOID DAMAGE TO THE PCB OR LOAD CELL, REMOVE POWER FROM THE IND780 TERMINAL AND WAIT AT LEAST 30 SECONDS BEFORE CONNECTING OR DISCONNECTING ANY HARNESS.

The POWERCELL PDX option board should be placed in slot 1 or slot 2 on the main board. The POWERCELL option is used with METTLER TOLEDO POWERCELL PDX/PowerMount load cells used in large tank and vehicle weighing applications. Figure A-51 shows a PDX option board. Only one POWERCELL PDX option board can be installed in the terminal, to support up to four scales.

Figure A-51: POWERCELL PDX Option Board

Figure A-52 shows the terminal strip connections for this board.

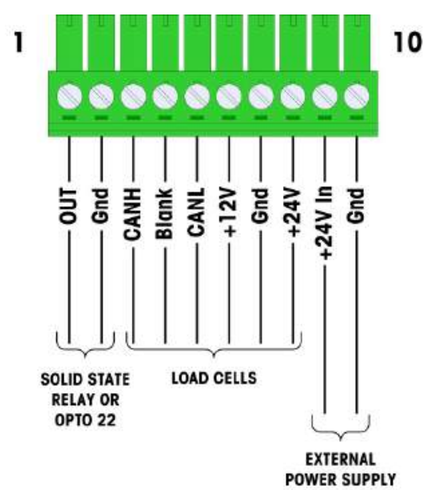


Figure A-52: POWERCELL PDX Option Board Connections

Table A-14: POWERCELL PDX and PowerMount Cable Color Code

Pin #	Wire Color		
	12 V	**24 V**	**Function**
1	–	–	
2	–	–	
3	White	White	Can-H
4	–	–	
5	Blue	Blue	Can-L
6	Red	–	+12 VDC
7	Black	Black	Gnd
8	–	Red	+24 VDC
External Power Supply Connections			
9	–	Red / +24V	
10	–	Black / GND	

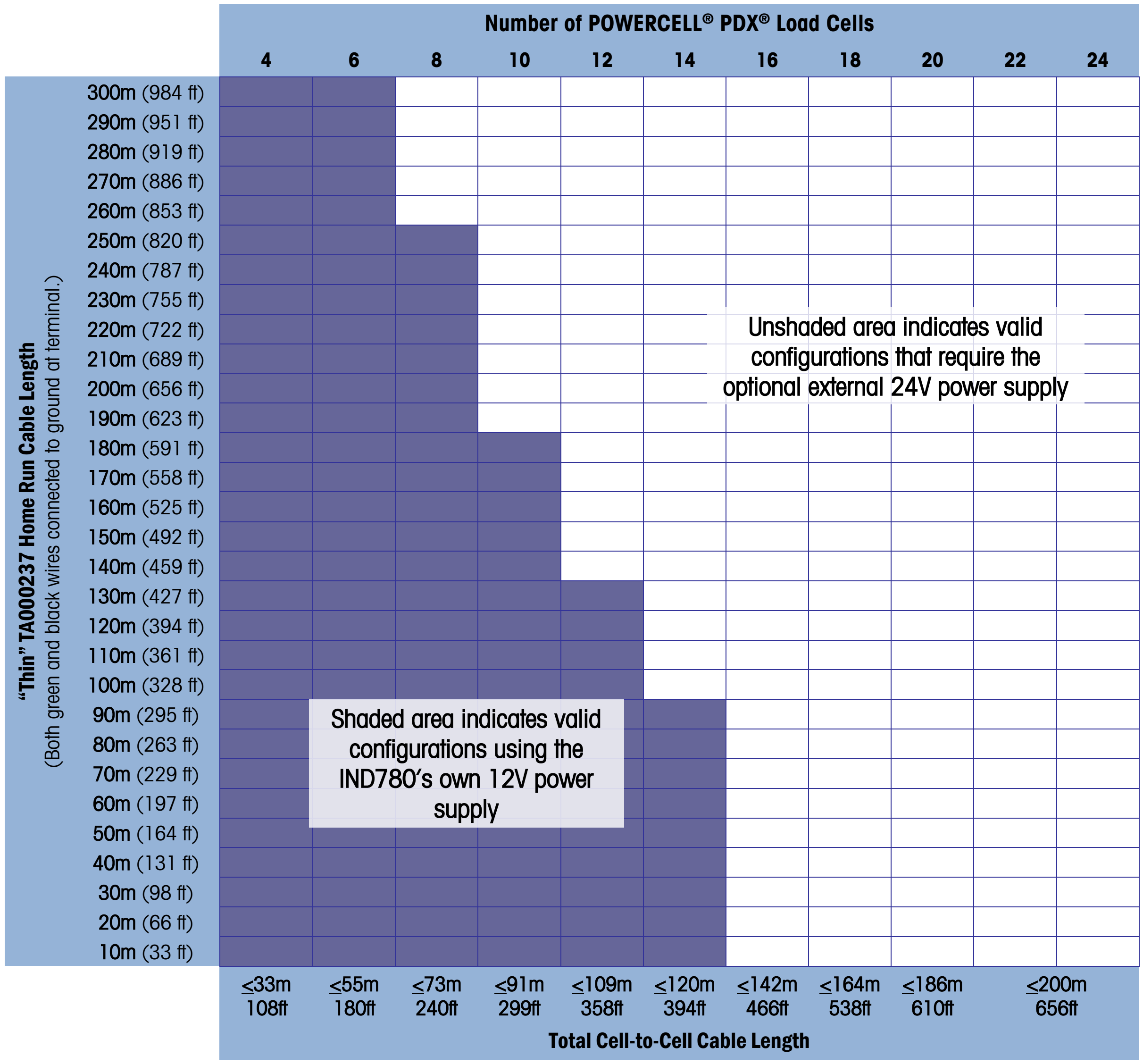
The TTL-compatible open collector output is reserved for use only with the scale's material transfer target functionality. It provides the signal for the feed output associated with the active target for that scale. It is not necessary to configure this output.

The output is a current-sinking component which can handle from 5 to 30 volt DC signals at a maximum of 35 mA current. A solid-state relay or OPTO 22 is typically connected to buffer the IND780 terminal outputs to a 120 or 220 volt AC signal.

Depending on the number of load cells and the cabling configuration, the IND780 terminal PDX option board uses either its internal 12 VDC supply (via pins 6 and 7) or an external 24 VDC supply (via pins 9 and 10) to power the load cells.

- For POWERCELL PDX, refer to Table A-15 for the recommended maximum cable lengths and the number of load cells supported by the IND780 PDX option board.
- For PowerMount weigh modules, refer to the SWB605 PowerMount Installation and Service Manual, Tables 3-5 through 3-8.

Table A-15: Recommended Maximum Cable Lengths



⚠ CAUTION

THE CABLE LENGTHS LISTED IN TABLE A-15 ARE VALID FOR INSTALLATIONS IN NON-HAZARDOUS AREAS ONLY. FOR HAZARDOUS AREA INSTALLATIONS, REFER TO THE IND780 DIVISION 2 AND ZONE 2/22 INSTALLATION GUIDE.

- The configurations indicated in Table A-15 are confirmed for operation up to 50°C (122°F).
- The optional external 24 VDC power supply (P/N 68001984) connects to pins 9 and 10 on the PDX board.

A.7.4.3. PDX Home Run Cable Grounding and Shielding

Ground and shield terminations are a critical part of the system's immunity to noise and electrical surges. The following procedures describe proper cabling methods for the harsh and panel enclosures, respectively.

A.7.4.3.1. Cable Preparation, Both Enclosure Types

1. Use metal shears to cut back the braided outer metal sheath, about 8″ from the end, then trim the cut edge of the sheath to make a neat edge. Take care not to cut the external drain wire when trimming the sheath.

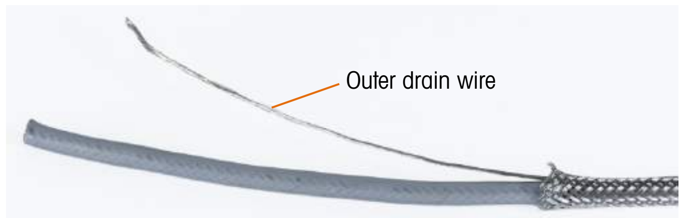


Figure A-53: Outer Sheath Trimmed

2. Push the sheath about 5″ back down the cable, so that it compresses as shown in Figure A-54. Use electrical tape to keep the sheath in position.

Figure A-54: Outer Sheath Secured with Electrical tape

3. Push the sheath down over the tape to create a neat edge.

Figure A-55: Outer Sheath Pushed Up Over Taped End

A.7.4.3.2. Cable Installation, Harsh Enclosure

1. Pass the cable through the body of the gland, and slide the gland down to meet the sheath. If necessary, loosen the clamp's screw to allow the sheath to fit inside it. Note that the sheath is completely under the nut and against the body of the gland, and that the external drain wire emerges between the two pieces of the clamp.

Figure A-56: Clamp in Position

4. Check to ensure that sufficient length of cable will remain inside the terminal to make connections, then tighten the clamp in position.

5. Use a razor knife to cut around the circumference of the insulation about 0.5″ away from the body of the gland. Slit the insulation along its length, taking care not to cut into the cable inside. Remove the insulation.

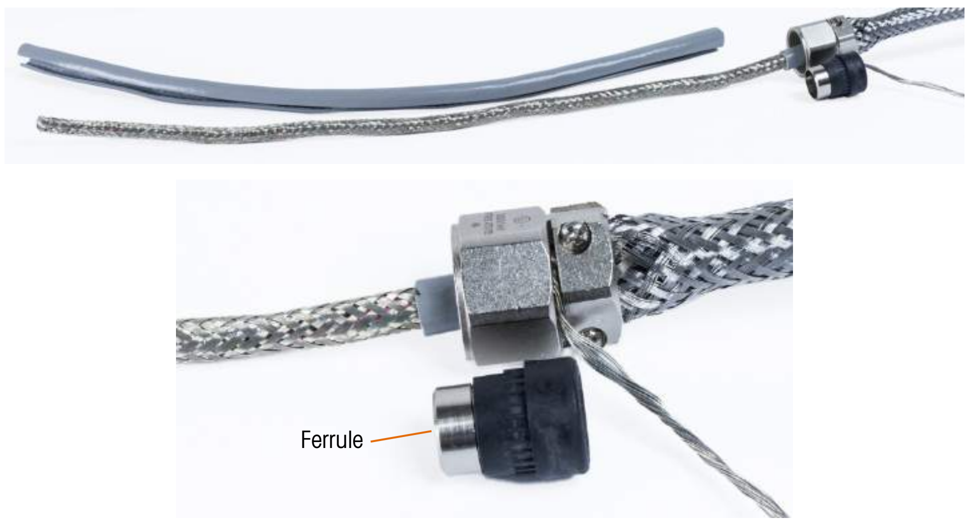


Figure A-57: Insulation Trimmed Back

6. Use metal shears to cut back the inner sheath, leaving about 3″ or 4″ inside the body of the gland.

Figure A-58: Inner Sheath Trimmed Back

7. Slide the ferrule over the end of the cable and into the body of the gland. The metal part of the ferrule will protrude from the body of the gland.

8. Use the metal shears to unbraid and fray the inner sheath.

Figure A-59: Inner Sheath Frayed

9. Trim the frayed sheath so that about 0.5″ remains outside the ferrule.

Figure A-60: Frayed Inner Sheath Cut Back

10. Fold the frayed sheath back around the metal part of the ferrule.

Figure A-61: Inner Sheath Wires Folded Back Over Ferrule

11. Separate the wires and cut back the aluminum foil. Spread it over the frayed sheath wires and the metal part of the ferrule.

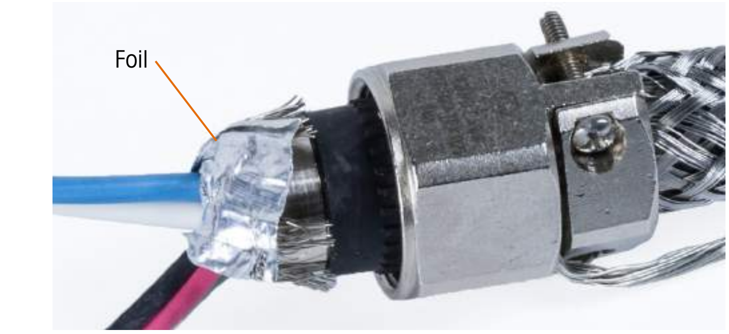


Figure A-62: Foil Cut Back and Folded Over Ferrule

12. Slide the compression screw over the cable and up over the frayed wire and foil. Use wrenches to tighten it into the body of the gland.

Figure A-63: Compression Screw Installed

13. Wrap the ground strap around the cable next to the gland, slide a band clamp over the strap and tighten it down.

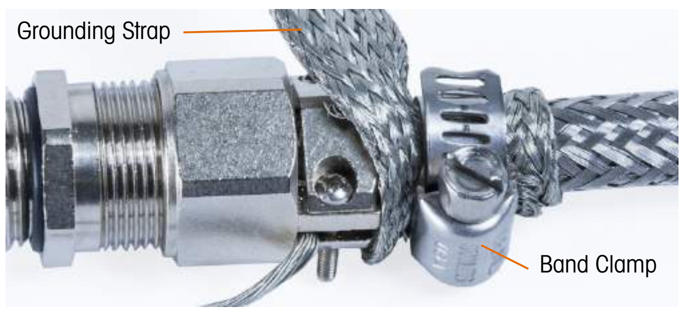


Figure A-64: Ground Strap and Clamp Installed

14. Install the gland into the terminal. Pass the outer drain and the ground strap through the grounding fixture on the enclosure. **Do not cut the ground strap**: it must form a continuous connection from the cable gland through the terminal enclosure grounding fixture to the ground.

Figure A-65: Cable and Strap Assembly Installed on Harsh Enclosure

- **Note**: Inside the enclosure it is important to keep the POWERCELL wiring, and especially the ground wires, as short as possible to preserve lightning protection.

15. Inside the enclosure, cut the wires to length and make the connections to the PDX Load Cell board. To make the power ground connection on pin 7 of the option board terminal strip:

    a. First, a separate short length of the power ground wire with a ring terminal on one end must be prepared in advance. Attach this separate wire with the ring terminal end to the ground stud located inside the terminal's enclosure using a hex nut. Connect the other end to pin 7 on the terminal strip.

    b. Next, twist the home run cable's inner drain wire together with the black and green ground wires and make a connection to the same ground stud using another ring terminal as shown in Figure A-66.

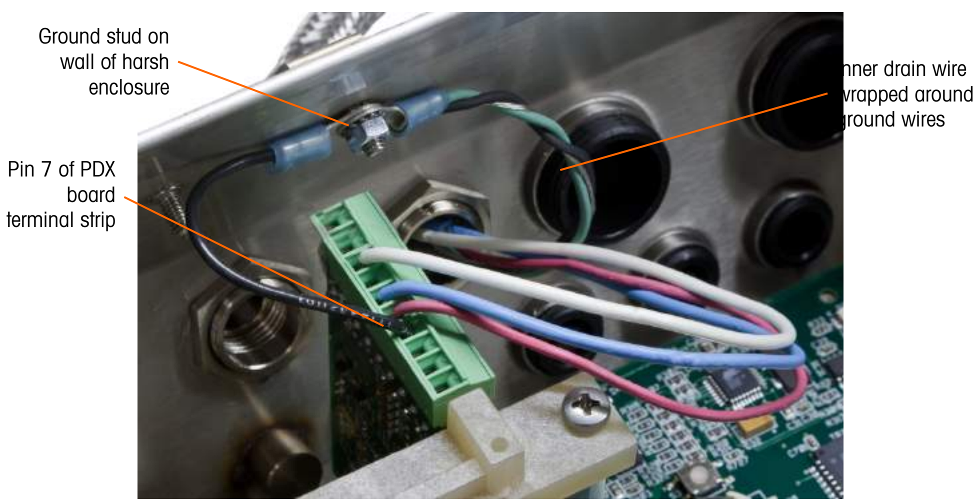


Figure A-66: POWERCELL PDX Home Run Power Ground Connection, Harsh

A.7.4.3.3. Cable Installation, Panel Mount Terminal

1. Follow the steps described in the Cable Preparation section on page A-38.

2. Trim the inner braid shield and the foil, leaving about 20 mm (0.8 inches) exposed.

3. To terminate the home run cable's outer and inner braid shield for an IND780 panel mount terminal, when using a cable gland with an enclosure, follow the procedure described in section A.7.4.3.2. Alternatively, when using a conduit hub entry:

    a. Slide back the outer braid and fold the trimmed inner braid and foil shield back evenly over the edge of the cable insulation sheath, as shown in Figure A-67.

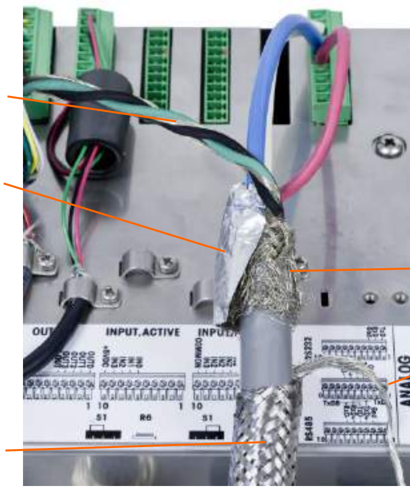


Figure A-67: POWERCELL PDX Home Run Cable, Panel Mount Enclosure

    b. Slide forward the outer braid to cover over the inner braid and foil. Pull the outer drain wire back over the outer braid and trim it to approximately 25 mm (1 inch). Place the flat braided ground cable around the home run cable and the drain wire before finally securing everything to the back cover of the IND780 using the large strain relief cable clamp provided with the unit (Figure A-68). The other end of the flat braided cable is terminated at the ground rod.

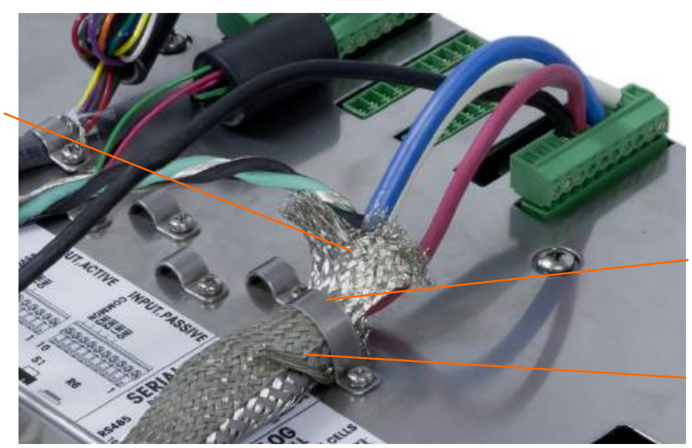


Figure A-68: POWERCELL PDX Home Run Outer Braid Termination, Panel Mount Enclosure

4. Twist the home run cable's inner drain wire together with the black and green ground wires and attach them to the external ground stud, as shown in Figure A-69.

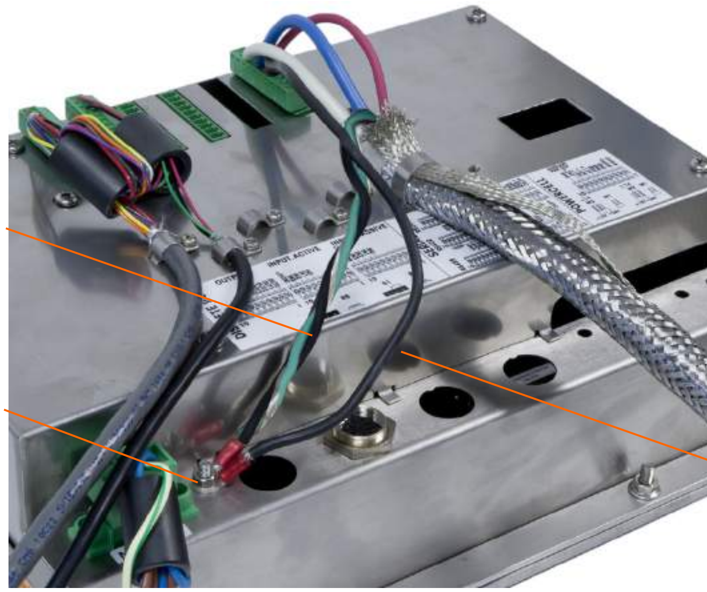


Figure A-69: Completed POWERCELL PDX Home Run Power Ground Connection, Panel Mount Enclosure

A.7.4.4. PowerMount Cabling

PowerMount home run cables are pre-finished at the factory, making them ready for connection to the IND780. In cases where a PowerMount home run cable connection must be refinished, such as damage or length change, the installer can follow a procedure very similar to that for the POWERCELL PDX described in section A.7.4.3, with the following exceptions:

- The PowerMount cable does not have an outer drain wire, and does not have a braided sheath.
- The PowerMount cable does not have a green wire; a short length of black wire is provided with the cable to connect to the enclosure grounding stud.

The free ends of the cable must be cut to length during installation, to avoid excess cable inside the enclosure.

Figure A-70: PowerMount Home Run Cable (left) and Connector (right)

Note that a special gland, part number 30095639, must be used for the PowerMount cable, which has a smaller diameter than the POWERCELL equivalent.

Figure A-71: PowerMount Gland

- The end of the home run cable is prepared for connection to the terminal. If the end of the cable is damaged, refer to section A.7.4.3 for cable preparation instructions.

A.7.4.5. PowerDeck Platform Connection

A PowerDeck home run cable can either be equipped with a factory-installed M-12 connector, or left unfinished.

If the M12 connector is present on a PowerDeck home run cable, as shown in the figure below, there are two options for connection to the IND780. The M12 connector can be cut from the cable and directly wired to the IND780 using the procedures described for POWERCELL PDX, with the same differences noted in section A.7.4.4, immediately above.

Alternatively, for terminals with a harsh environment enclosure, a PowerDeck M12 connector kit (p/n 30430517) is available for field installation into the terminal.

Figure A-72: M12 Cable Assembly for PowerDeck

A PowerDeck cable and connector are shown in the figure below.

Figure A-73: PowerDeck Cable (left) and Connector (right)

A.7.4.6. Open Collector Output

The POWERCELL PDX option board provides a single TTL-compatible open collector output (pin 1 and pin 2), with current sinking components that can handle from 5 to 30 VDC signals at a maximum of 35 mA current. A solid state relay or OPTO 22 is typically connected to buffer the output to a 120 or 220 VAC signal. The voltage source must be a Class 2 marked or a Limited Power Source (LPS)-compliant power supply.

This output is reserved for use with the scale's material transfer target functionality. It provides the feed output signal associated with the active target for a POWERCELL PDX scale assigned as scale 1.

A.7.4.7. LED Interpretation

Figure A-74 indicates the locations of LEDs on the POWERCELL PDX board. Table A-16 describes the function of the LEDs.

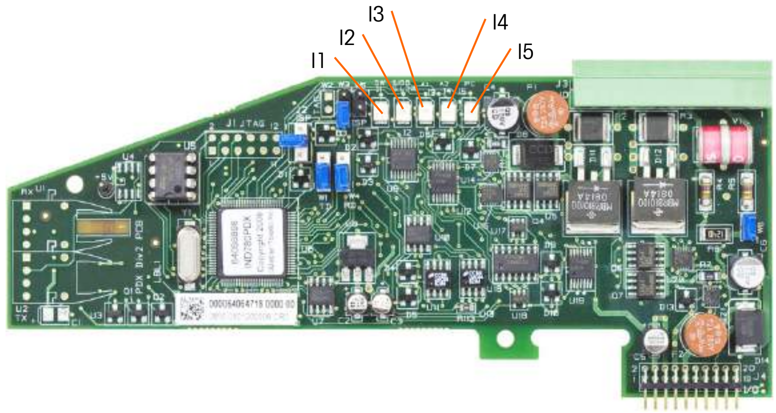


Figure A-74: POWERCELL PDX Board LEDs

Table A-16: POWERCELL PDX Board LEDs Function

LED	Color	Function
I1: SW	Amber	ON – the board's discrete output is turned on OFF – the board's discrete output is turned off
I2: USB	Amber	ON – the USB connection to the main board is active OFF – the USB connection to the main board is inactive
I3: A1 I4: A2	Amber	I3 solid ON, I4 OFF – indicates that the CAN communication to the load cells is active I3 and/ or I4 blinking – indicates that the CAN communication to the load cells is interrupted
I5: IPC	Amber	Slow blink (~1 Hz) indicates that the board's processor is not working correctly Fast blink (~ 3 Hz) indicates that the board's processor is working correctly

A.7.5. Flow Meter Interface

A.7.5.1. Overview

The Flow Meter Option Board is a two-channel isolated pulse counter/flow meter board available for use with the IND780 terminal. In the IND780batch, the board provides a flow meter totalizer target comparison to directly control on-board discrete outputs.

- Please note that open collector outputs require an external power source to switch on and off.

The board can count the input pulses up to 50 kHz on each of two isolated input channels simultaneously, as well as measuring the frequency of the input signal. Four-jumper selectable switching threshold for each input channel are available as well as a jumper selectable 15 kHz analog filter. The required peak input levels for the AC mode are 50mV to 50Vrms. The required peak input levels for the DC mode are 2.5 volts to 42 volts at 1 Amp. The state of the input counter levels is also available to the processor, so that any channel can be used as a discrete input.

The control outputs are 7407 open-collector drivers. Each control O/P is capable of sinking 40 mA. The Max off state O/P voltage is 30V. This enables the control O/P to drive interposing relays such as those by Opto-22.

Each flow meter board in an IND780 has its own unique address, assigned automatically by the IND780. Each flow meter board has two isolated input channels. Each IND780 can accommodate up to two flow meter boards, for a total of 4 isolated input channels per terminal. The IND780 terminal supports up to four channels in any combination of scales and flow meters.

Flow meter channel configuration is performed using the front panel of the IND780. Please refer to Chapter 3, **Configuration**, for detailed instructions.

A.7.5.1.1. Features

- Two individually isolated input channels
- Jumper selectable 15 kHz analog RC filter for each input
- Four jumper selectable input switching thresholds (0.0V, 2.3V, 6.0V, 8.0V)
- Input frequency: AC 50 kHz Max or DC
- Maximum count value: 4,294,967,295
- Channel update time of 5 msec/channel maximum
- Frequency output mode
- Two open-collector output switches
- Current limited 5V output power
- Input to backplane isolation of 750VDC
- Input channel to channel isolation of 750VDC
- Easy calibration using actual throughput or calculated settings
- Power supply: The digital circuitry runs off the system's +5V supply; the isolated input circuitry is powered by the system's 12V supply.

A.7.5.2. Terminal Blocks

The field connection on the Flow Meter Option Board consists of a single Phoenix Contact 10 pin socket connection block. It receives a single Phoenix Contact 10-pin plug connection block. Figure A-75 shows the Flow Meter Option Board with the location of pin number 1 indicated (adjacent to the corner of the board).

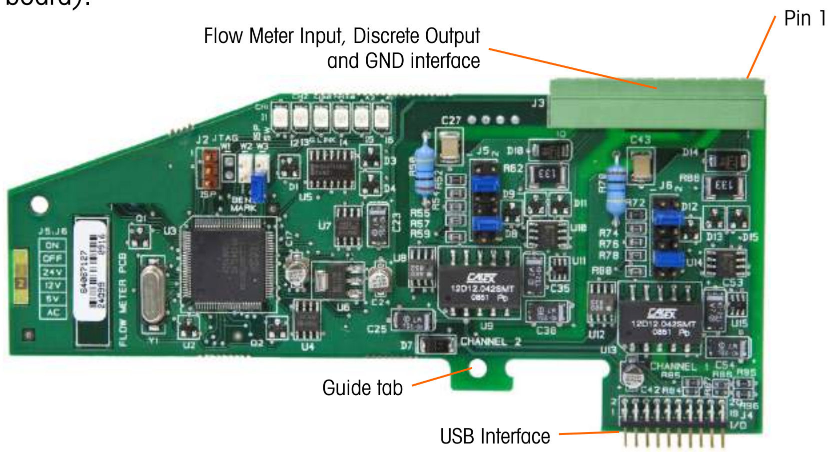


Figure A-75: Flow Meter Option Board

The Phoenix Contact 10-pin connector pin outs are as follows:

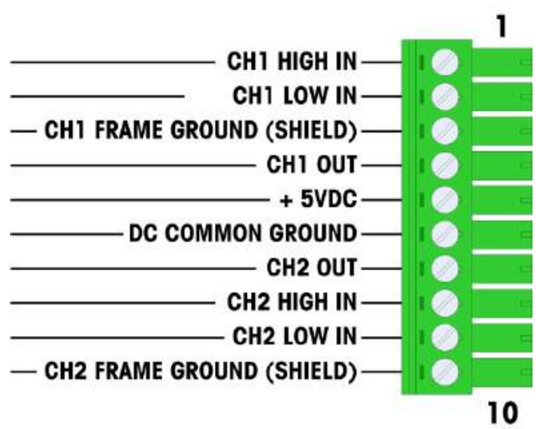


Figure A-76: Flow Meter Connector

Pins 3 and 10 (the frame grounds for Channels 1 and 2) provide floating grounds, and are the return lines for pins 1 and 8 (the high inputs for Channels 1 and 2). This maintains the isolation of the input circuitry from the rest of the board electronics.

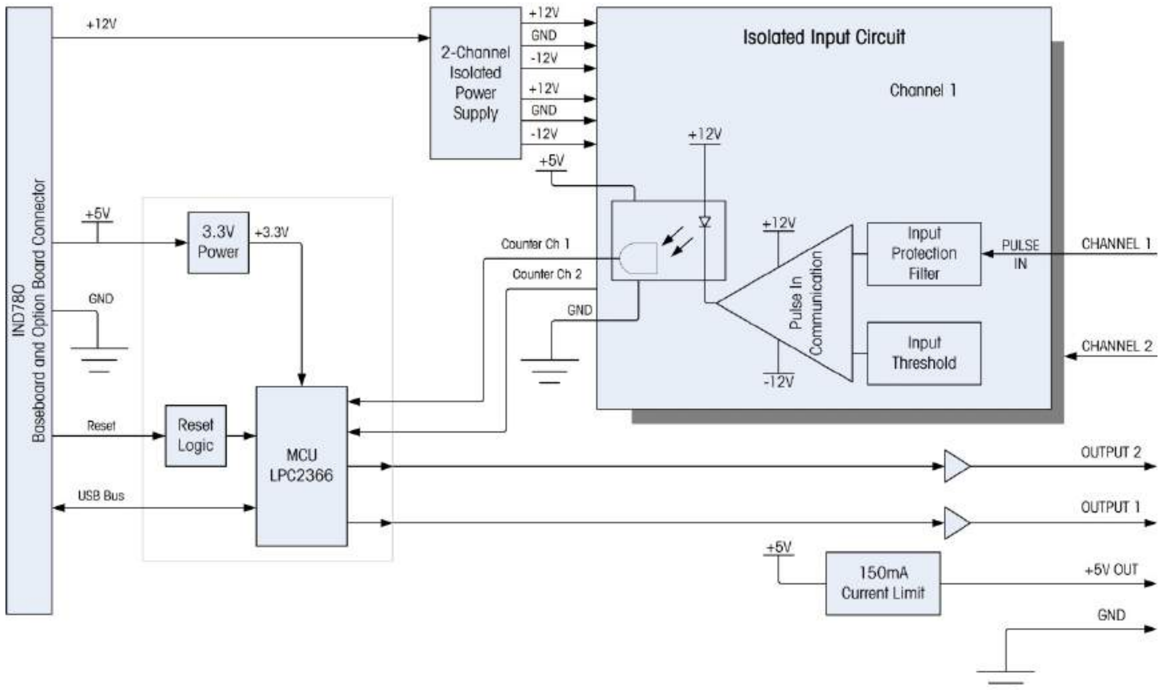


Figure A-77: Block Diagram, Channel 1 Shown

A.7.5.3. Board Components

The flow meter board consists of digital circuitry, two isolated analog input circuits, and two open-collector outputs with a 150mA, 5V power source.

A.7.5.3.1. Digital Circuitry

The digital circuitry consists of a micro-controller, EEPROM and glue logic. The micro-controller counts input pulses and measures flow rate for each isolated input circuit. It also does limit comparisons on the inputs and sets the outputs based on the results. The EEPROM is used to store configuration data that should not be lost at power-down. A USB version 1.0 communication links the Flow Meter Option Board to the IND780 main controller board.

A.7.5.3.2. Isolated Analog Input Circuits

Each isolated input circuit consists of a comparator, an optocoupler, one set of hardware jumpers and discrete resistors, capacitors, diodes, and a transient voltage suppressor. The comparator is used to compare the input voltage to the switching voltage. Each input section has a hardware jumper to select one of the four available input switching voltages. A second hardware jumper is provided to enable or disable a 15 kHz analog filter on each input. The optocoupler isolates the output of the comparator from the counter input of the microcontroller. The transient voltage suppressor provides ESD protection for each input. The diodes provide over-voltage protection of each input.

A.7.5.3.3. Open Collector Outputs

The output circuitry contains two non-isolated open collector 7407 drivers that can be used to drive the input to an Opto 22 output module. The board also provides a 150 mA, 5V power source that can be used to provide power to an Opto 22 output module.

Note: The IND780 Flow Meter Option Board may **only** be used with flow meter outputs that do not exceed Class 2 limits according to The National Electric Code.

The open collector outputs are TTL compatible and current-sinking, and can handle signals from 5 to 30 VDC at a maximum of 35 mA.

A.7.5.4. Hardware Jumper Settings

The flow meter board has four sets of hardware jumpers, indicated in Figure A-78.

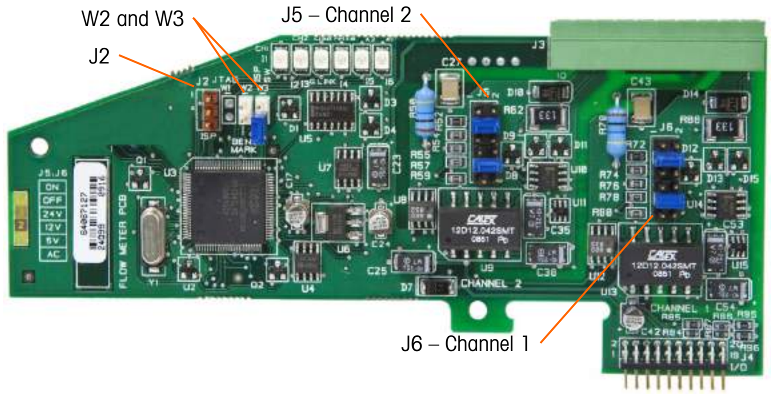
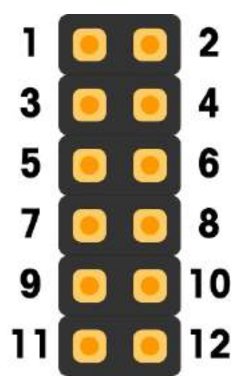


Figure A-78: Flow Meter Interface Board Jumper Locations

A.7.5.4.1. J5/J6 – Filter Enable

Each of the two input channels indicated in Figure A-78 has a set of six jumper settings, which function as shown in Table A-17. Jumper locations 1-2 (enable) and 3-4 (disable) control the 15kHz low-pass analog filter, which is used to filter noise on the input.

Table A-17: Settings for Jumpers J5 (Channel 2) and J6 (Channel 1)



Function	Jumper Location	
Analog Low-Pass Filter on	1	2
Analog Low-Pass Filter off	3	4
24V Range	5	6
12V Range	7	8
5V Range	9	10
AC Range	11	12

The analog filter should be enabled in the following cases:

- For flow meter frequencies below 15 kHz
- For all AC applications, regardless of frequency

A.7.5.4.2. J5/J6 – Input Switching Threshold

For each channel, this jumper has four possible positions (5/6, 7/8, 9/10, 11/12), which set the comparison voltage level for the input comparator. Voltage levels are:

- 0.0 VAC – use the AC jumper selection
- 2.3 VDC – use the 5 BDC jumper selection
- 6.0 VDC – use the 12 VDC jumper selection
- 8.0 VDC – use the 24 VDC jumper selection

Please consult the documentation for the specific flow meter you intend to use.

A.7.5.4.3. Microprocessor setup and programming

Jumpers J2 and W2 are for factory use only, during board manufacturing, setup and programming. The operating position is open and no jumper is supplied.

Jumper W3 is a single on/off jumper used only by the factory during board manufacturing, setup and programming. The operating position is open.

A.7.5.5. Wiring a Flow Meter

An attached flow meter can be either isolated with respect to the Q.i output voltage, or it can be non-isolated and share a common output voltage. The circuits in Figure A-79 and Figure A-80 illustrate these two methods of connecting a flow meter's pulse outputs to a Q.i flow meter interface board.

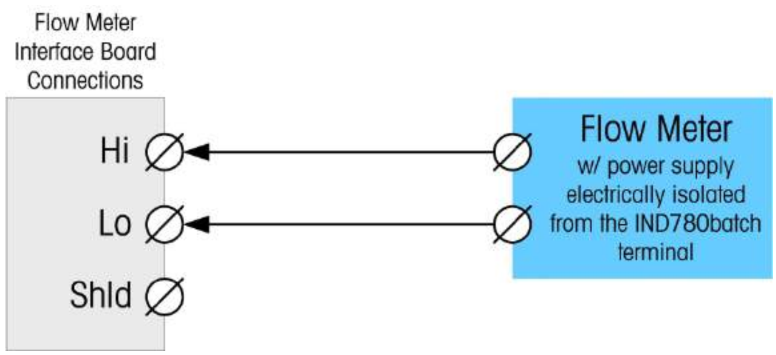


Figure A-79: Isolated Flow Meter Connections

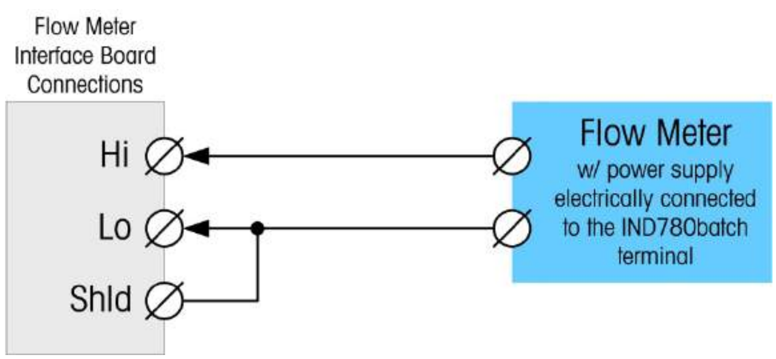


Figure A-80: Non-Isolated Flow Meter Connections

A.7.5.6. Electrical Specifications

Specification	Description				
Configuration	2 channels of differential flow meter inputs (uni-directional) or 1 channel of differential flow meter inputs (bi-directional); 2 open collector output switches				
Input Modes	AC or one of the 3 levels of DC inputs				
Voltage Range	AC (rms)	DC (5V)	DC (12V)	DC (24V)	
VIL*	-50mV	+1.4V	+3.0V	+4.0V	
VIH*	+50mV	+3.4V	+9.0V	+12.0V	
Vmax	+/-50V	+/-50V	+/-50V	+/-50V	
Maximum Input Voltage	42 VDC peak				
Maximum Input Current	1 A				
Minimum Input Impedance	11 KΩ				
Input Specifications					
Maximum Input Frequency	50 KHz				
Min. Input Frequency for Rate Measurement	1 Hz				
Duty Cycle	**Input Level**	**Frequency Max.**	**Duty Cycle**	**Max Duty Cycle**	**Min Pulse Width**
	5 VDC	50 kHz	35	55	7 µsec
	12 VDC	50 kHz	40	60	8 µsec
	24 VDC	50 kHz	40	60	8 µsec
	AC	50 kHz	40	50	8 µsec
Minimum Input Low Time	8 µsec (input filter off); 16 µsec (input filter on)				
Minimum Input High Time	8 µsec (input filter off); 16 µsec (input filter on)				
Channel Update Time					
Accumulated Flow Data	≤5 msec per channel maximum				
Rate Data					
Instantaneous	Larger of (2/FREQ) or channel update time.				
Average	2 seconds				
Accuracy					
1 Hz Averaging Mode	+/- 1 Hz				
Instantaneous mode **Analog Filter**	+/- 1% @ 50KHz 15kHz software selectable for each channel				
Maximum Count Value	4,294,967,295				
Maximum Rate Value	65,535				
Fault detection	Configuration error.				
Isolation					
Input Channel to Backplane	750 VDC Continuous				
Input Channel to Input Channel	750 VDC Continuous				

Specification	Description
Discrete Output	
Target latency time (turn off time)	200 μsec maximum
Preset to output on time	20 msec maximum
Power-up state	Off
Output Type	Open collector, TTL-compatible, current-sinking, negative true
Maximum Output Current Sink 35 mA Output Voltage 5-30 VDC	
Power Requirements	
Internal Supply +5V (no Output current)	230mA maximum
Internal Supply +5V (with 150mA Output current)	440mA maximum
Internal Supply +12V	150mA maximum
Aux Power Supply	
Output Power	5V @ 150 mA, current limited

A.7.6. SICS

A.7.6.1. Connections

SICS scale bases use a serial connection. They communicate using RS-232/422/485, and can connect to COM1 or COM2 on the IND780 main board, or to a serial option board.

A.7.7. Discrete I/O (Input/Output)

A.7.7.1. Mode Selector Switch

A switch on the Discrete I/O board selects whether 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 (S1) is shown in the drawing and photograph in Figure A-81. In both cases, the switch in the illustration is set to active.

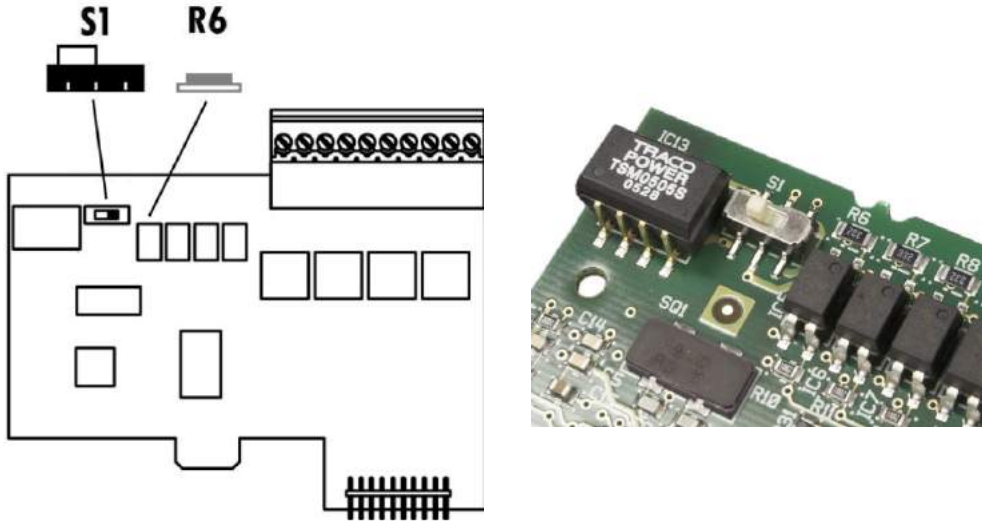


Figure A-81: Discrete I/O Board Mode Selector Switch Location

A.7.7.2. Connections

The relay output version of the Discrete I/O option provides four isolated inputs and four 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.

Figure A-82 and shows a Discrete I/O board in its Solid State Relay configuration, and Figure A-83 the Relay version.

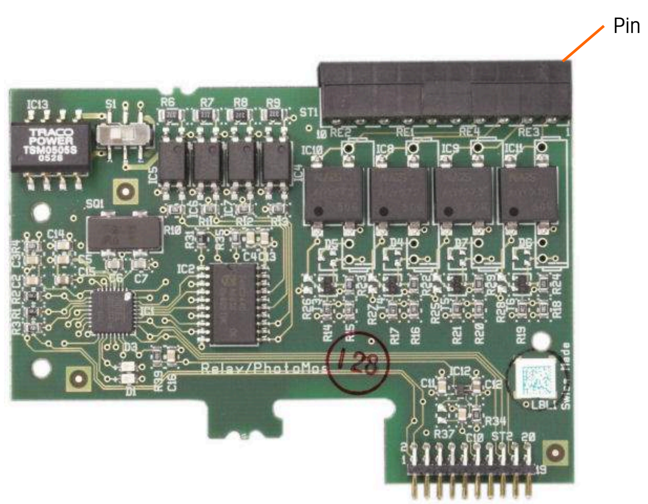


Figure A-82: Discrete I/O Board, Solid State Relay

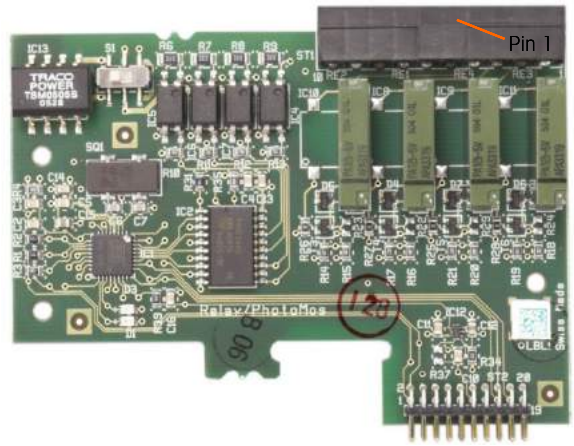


Figure A-83: Discrete I/O Board, Relay

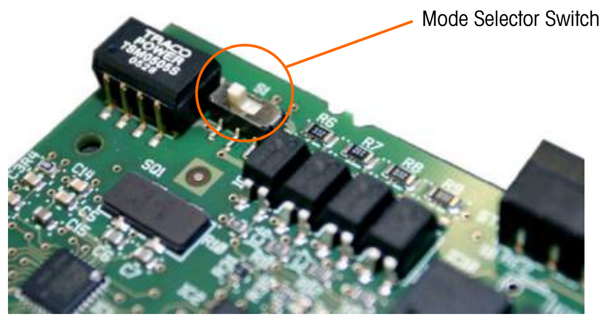


Figure A-84: Discrete I/O Mode Selector Switch, Active Position

A.7.7.2.1. Active Input

Selecting the inputs as active 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 A-85. Note that pin 10, the +5VDC connection, can carry no more than 200 mA current.

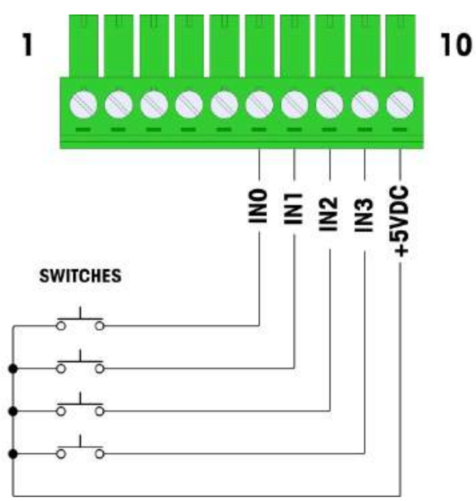


Figure A-85: Example of Active Input from Switches

- The +5VDC shown in Figure A-85 is referenced to an internal ground inside the discrete I/O card. Measuring from pin 10 to the IND780 chassis ground will **not** show +5VDC. The +5VDC output is used internally, and has no function except for digital inputs as shown in Figure A-85.

A.7.7.2.2. Passive Input

Selecting the inputs as passive enables other devices such as PLCs to provide the trigger voltage (typically 24 VDC, 5-30 VDC) to turn the IND780 inputs "on". An example of wiring to the passive inputs is shown in Figure A-86. The voltage polarity may be reversed. Furthermore, inputs can be programmed in SETUP to accept either a + True or – True polarity level as "ON".

Note – The voltage source must be a Class 2 marked or a Limited Power Source (LPS)-compliant power supply

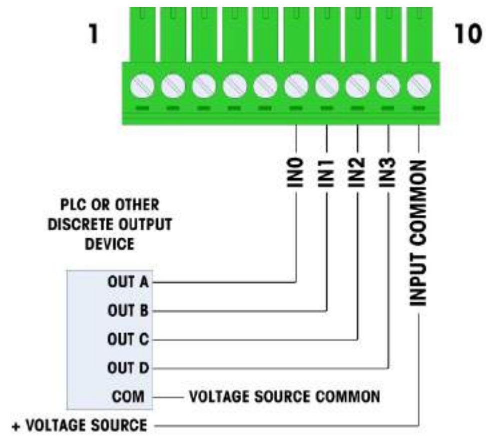
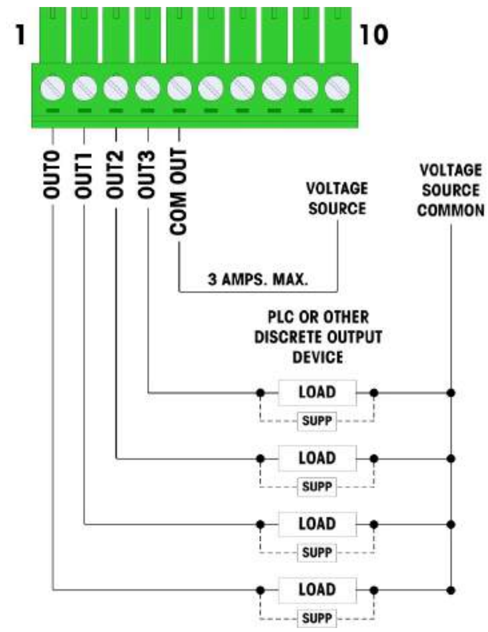


Figure A-86: Example of Passive Input from Discrete Output Device

A.7.7.2.3. Relay Outputs

The relay and solid state relay outputs can switch up to 30 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 A-87.



Note – The voltage source must be a Class 2 marked or a Limited Power Source (LPS)-compliant power supply.

Figure A-87: Relay Outputs

A.7.8. IDNet

A.7.8.1. Connections

NOTICE
TO AVOID DAMAGE TO THE PCB OR LOAD CELL, REMOVE POWER FROM THE IND780 TERMINAL AND WAIT AT LEAST 30 SECONDS BEFORE CONNECTING OR DISCONNECTING ANY HARNESS.

For IDNet base load cells, the IND780 terminal supplies 12 VDC for the new T-Brick type, and 30 VDC for the legacy PIK-Brick type. When using an IDNet card in the IND780 terminal, the cable connection from the base is made to a connector on the rear of the housing. IDNet cards are supplied with a length of cable and a connector that mates to the connector on the IND780 terminal. The board is shown in Figure A-88.

Figure A-88: IDNet Option Board

Figure A-89 shows the IDNet harness. One end attaches to the option board, and the threaded body of the connector mounts in one of the keyed holes in the back of the Panel or Harsh Enclosure, with its nut on the outside of the enclosure. Route the harness wire away from any Analog Loadcell Boards to protect the IND780 from external influences. Refer to Figure A-24 and Table A-1 for the Harsh enclosure mounting position.

Figure A-89: IDNet Harness

The IDNet cable is required to connect between the option board and the enclosure case. The cable is configured as shown in Figure A-90.

IDNet Cable 64062067			
P1	**P2**	**Color**	**Remarks**
P1-G	N.C.		
P1-D	P1-A	Green	Jumper
P1-M	P2-1	Orange	RxD1-
P1-L	P2-2	Black	TxD1+
P1-K	P2-3	Violet	TxD1-
P1-E	P2-4	Red	RxD1+

IDNet Cable 64062067			
P1	**P2**	**Color**	**Remarks**
P1-F	P2-5	White	RxD-
	P2-6		
P1-J	P2-7	Yellow	TxD-
P1-A	P2-8	Green	TxD+/RxD+*
P1-C	P2-8	Gray	+12V
P1-B	P2-9	Blue	+30V
P1-H	P2-10	Pink	Gnd

* Connected to +12V, to drive current loop

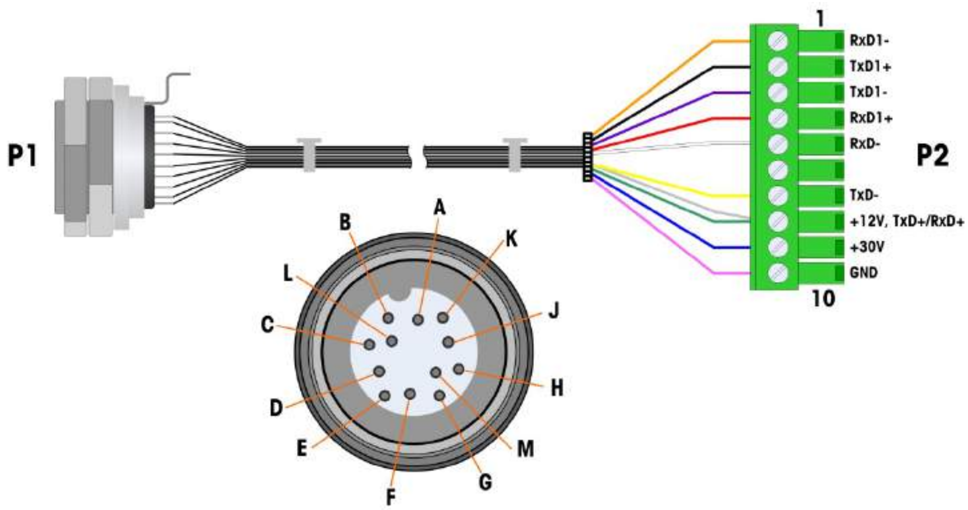


Figure A-90: IDNet Cable for IDNet Option Board

A.7.9. Serial Option Board

A.7.9.1. Connections

The Serial option board provides an extra COM port. The card can be placed in slots 2 to 6 on the main PCB. The board is shown in Figure A-91, and connector pin assignments in Figure A-92.

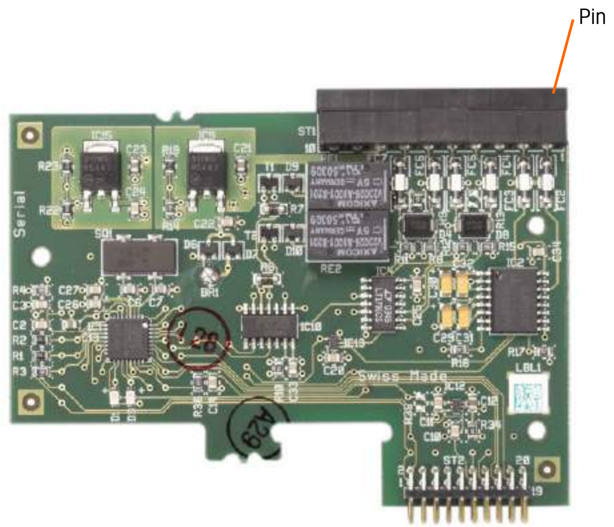


Figure A-91: Serial Option Board

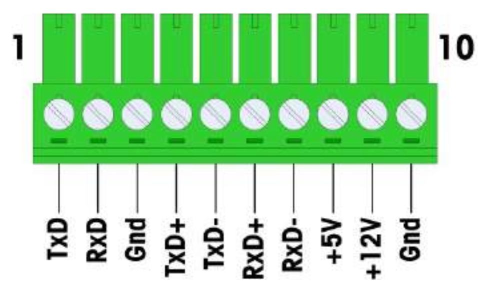


Figure A-92: Serial Option Board Connector

Port connector assignments for this board are shown in Figure A-93, and termination for RS232, RS422 and RS485 in Table A-18.

Table A-18: Serial Option Board Pin Connections

Pin	Signal	Function	Notes
1	TxD	RS-232 Transmit data	
2	RxD	RS-232 Receive data	
3	GND	RS-232 Signal ground	
4	TxD+	RS-422/485 Transmit +	Jumper to RxD+ for RS-485
5	TxD-	RS-422/485 Transmit -	Jumper to RxD- for RS-485
6	RxD+	RS-422/485 Receive +	Jumper to TxD+ for RS-485
7	RxD-	RS-422/485 Receive -	Jumper to TxD- for RS-485

Pin	Signal	Function	Notes
8	+5V	+5V out, 0.5 A max.	
9	+12V	+12V out, 0.5 A max.	
10	GND	Ground	

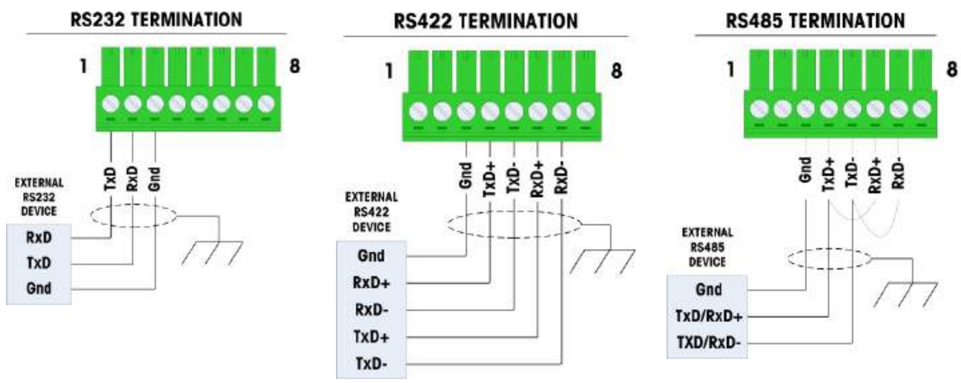


Figure A-93: Connector Terminations for Serial Option Board

A.7.9.2. RS-485 Transmission Line Termination

The RS-485 network should include a terminating resistor, installed between the two lines at or on the last node. The terminating resistor should match the characteristic impedance of the transmission line, approximately 120 ohms. This terminating resistor is required when connecting ARM100 modules to the port.

A.8. PLC Interface Modules

A.8.1. Analog Output Connections

	⚠ **WARNING**
	IF THIS DEVICE IS USED IN AN AUTOMATIC OR MANUAL FILLING CYCLE, ALL USERS MUST PROVIDE A HARD-WIRED EMERGENCY STOP CIRCUIT OUTSIDE THE DEVICE. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY.
	⚠ **WARNING**
	DISCONNECT ALL POWER TO THIS UNIT BEFORE SERVICING. DO NOT APPLY POWER TO THE TERMINAL UNTIL INSTALLATION OF COMPONENTS AND EXTERNAL WIRING HAVE BEEN COMPLETED.

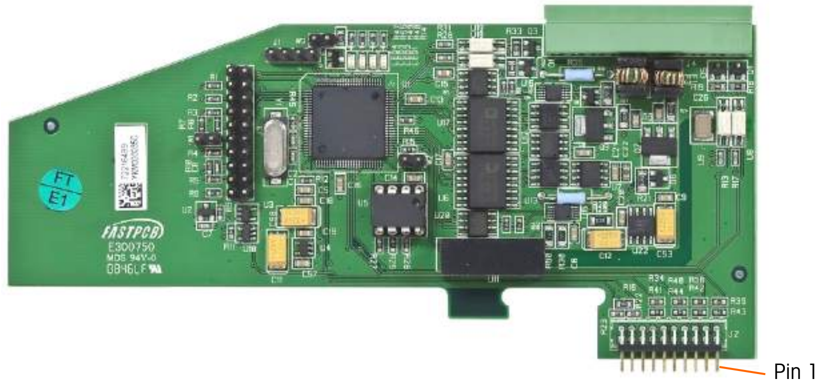
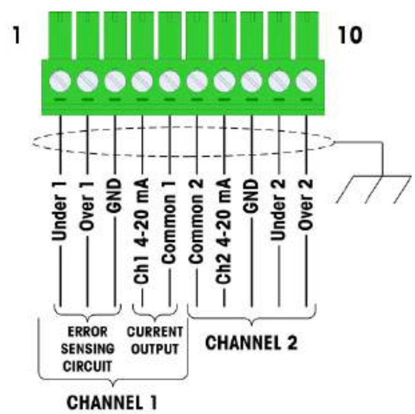


Figure A-94: Dual-Channel Analog Output Option Board

The maximum recommended cable length for the 4-20 mA output is 1,000 feet (300 meters). The recommended cable for use with the analog output is shielded two-conductor stranded 20-gauge cable (Belden #8762 or equivalent), which is available from METTLER TOLEDO using part number 510220190. Refer to Figure A-95 for connection and termination information.



NOTES:

1. ERROR OUTPUTS MUST BE MONITORED TO DETERMINE WHEN WEIGHT SIGNAL IS VALID.
2. ERROR SIGNALS ARE OPEN COLLECTOR, CURRENT SINKING OUTPUTS.
3. VOLTAGE: 5-30 VDC, 200 MA MAXIMUM CURRENT.
4. USE TWO-CONDUCTOR SHIELDED CABLE FOR SIGNAL LINES.
5. MAXIMUM RESISTANCE OF DEVICE LOAD IS 500 OHMS.
6. THE VOLTAGE SOURCE FOR THE ERROR OUTPUTS MUST BE A CLASS 2 MARKED OR A LIMITED POWER SOURCE (LPS) COMPLIANT POWER SUPPLY.
7. PIN 5 COMMON 1 IS THE RETURN PATH FOR CHANNEL 1 (4-20MA OUTPUT). PIN 6 COMMON 2 IS THE RETURN PATH FOR CHANNEL 2 (4-20MA OUTPUT). PIN 5 AND PIN 6 ARE NOT THE SAME AS THE GND OF PIN 3 AND PIN 8.
8. WIRE SIZE: 14 AWG (2.1 mm^2) MAXIMUM
   22 AWG (0.3 mm^2) MINIMUM.

Figure A-95: Analog Output Kit Wiring Connections

A.8.1.1. LED Interpretation

The Analog Output option board has four LEDs to indicate status of the card for troubleshooting purposes. Figure A-96 indicates the location of the LEDs and Table A-19 explains its indications.

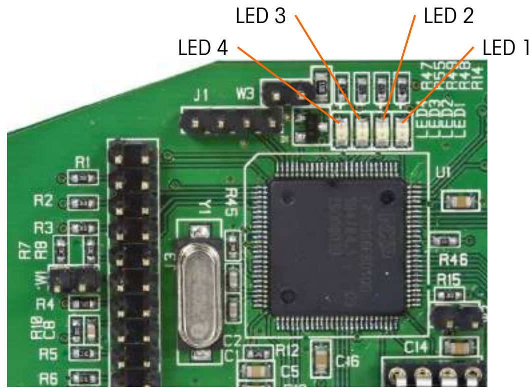


Figure A-96: Analog Output LEDs

Table A-19: Analog Output Status LED Indications

LEDs	Color	Meaning
LED 1: USB	Green	Solid ON: USB communicating with IND780 main board
LED 2: Channel 1	Green	Solid ON: Channel 1 is functioning
LED 3: Channel 2	Green	Solid ON: Channel 2 is functioning
LED 4: Board OK	Green	Slow blink: checking board communication and function Fast blink: board communicating and functioning

A.8.2. Rockwell (Allen Bradley) RIO Connections

- The Allen Bradley RIO interface was discontinued in January 2021. Information provided in this manual is for the purpose of legacy installation support only.

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 A-97.

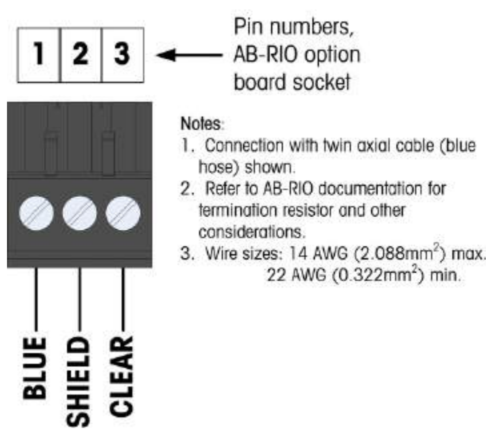


Figure A-97: RIO Connection Wiring

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

Figure A-98 shows the RIO PLC interface module, with its connector at upper right.

Figure A-98: Allen Bradley RIO PLC Interface Module

A.8.3. ControlNet Interface

The ControlNet PLC Module (Figure A-99) connects to the ControlNet network via one or two coaxial cables (Figure A-101). Channel B is redundant with Channel A, and is not used unless ControlNet detects no signal on Channel A. Note that the module's address is set in software, and the MAC ID switches indicated in Figure A-99 are not used.

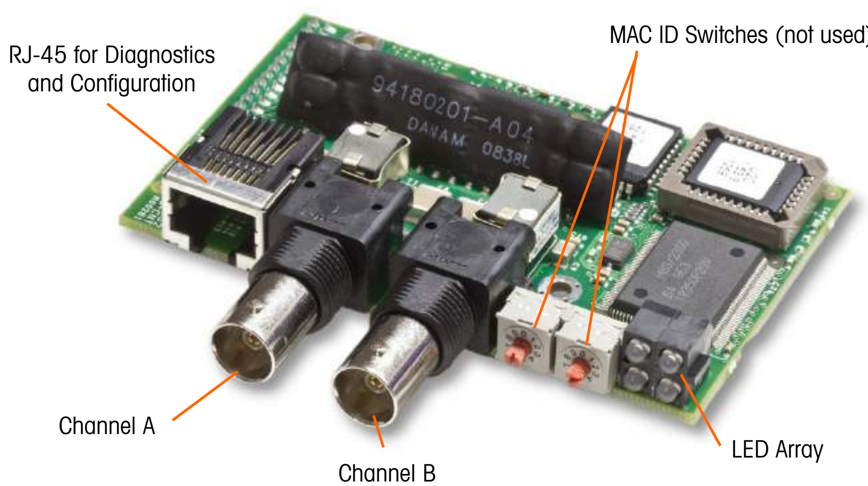


Figure A-99: ControlNet PLC Module Connections and Components

- Do **not** plug an Ethernet cable into the RJ-45 connector shown at left in Figure A-99. Damage to the IND780 may result.

Figure A-100 shows the array of status indicator LEDs on the ControlNet card (see also Figure A-99).

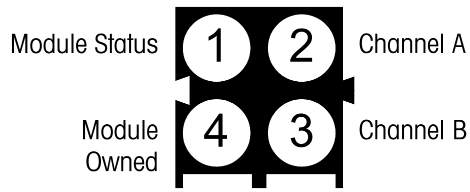


Figure A-100: ControlNet Status Indicator LEDs

Figure A-101 shows an example of a ControlNet cable, and a close-up view of the connector. Note that the connector may be right-angled or straight. This cable is not supplied by METTLER TOLEDO.

- When the ControlNet option is installed in a harsh environment terminal, the cable with the straight connector must be used.

Figure A-101: ControlNet Cables and Connector

A.8.4. DeviceNet Connections

The DeviceNet option board (Figure A-102) is connected to the network by a DeviceNet-specific twisted pair cable.

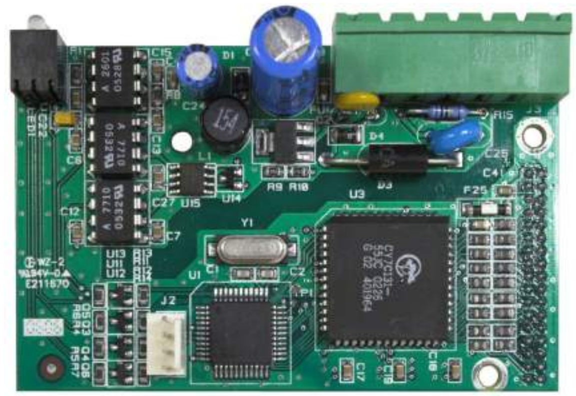
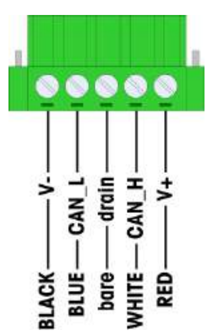


Figure A-102: DeviceNet Option Board

Figure A-103 indicates the pin numbering of the DeviceNet Option Board connector. Wire colors and functions are detailed in Figure A-104.

Figure A-103: DeviceNet Option Board Connector Pin Numbering



NOTES:

1. CONNECTION WITH 2 TWISTED PAIR SHIELDED CABLE BELDEN 3082A OR 2083A OR EQUIVALENT.
2. REFER TO O.D.V.A. DEVICENET DOCUMENTATION FOR OTHER CONSIDERATIONS.
3. WIRE SIZE: 14 AWG (2.088 mm2) MAXIMUM
   22 AWG (0.322 mm2) MINIMUM.

Figure A-104: DeviceNet Connector Wiring

Consult http://www.odva.org/ for additional DeviceNet wiring information.

A.8.5. Ethernet / IP and Modbus TCP Interface

The Ethernet / IP Module (Figure A-105) connects to the network via a standard Ethernet patch cable. The module's address is set in software, and the DIP switches indicated in Figure A-105 are not used and must all be set to OFF.

Note: For use in a Modbus TCP network, the module must be version 1.32 or higher.

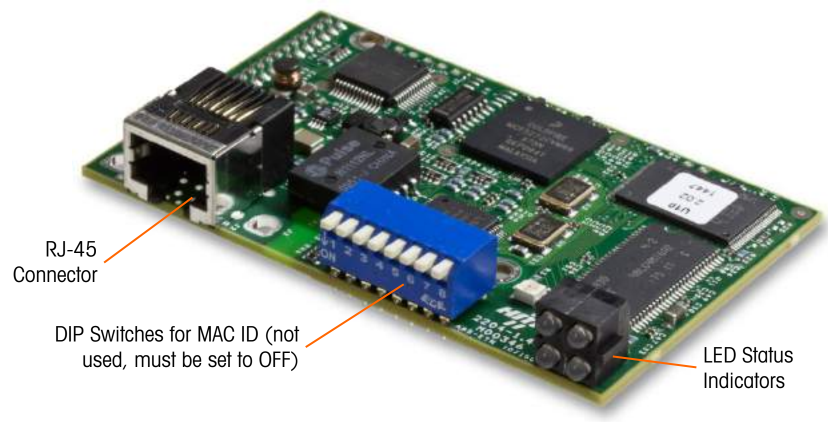


Figure A-105: Ethernet / IP PLC Module Components

Figure A-106 shows the array of status indicator LEDs on the Ethernet / IP card (see also Figure A-105).

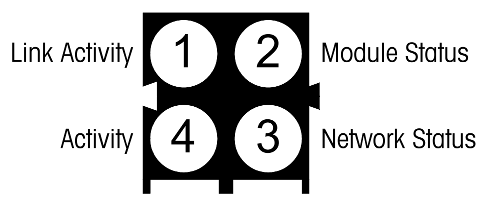


Figure A-106: Ethernet / IP Status Indicator LEDs

A.8.6. PROFIBUS Connections (Harsh Enclosure)

The PROFIBUS connection to the harsh enclosure is made using a straight nine pin connector inside the IND780 enclosure. Follow the instructions included with the connector to terminate the wires. Figure A-107 shows the PROFIBUS module for use in the Harsh Enclosure, with its connector at upper right.

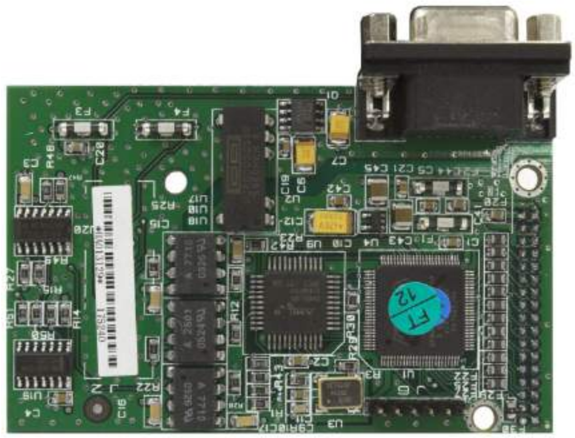


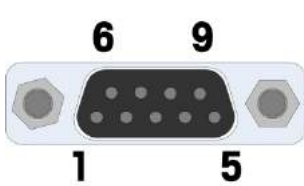
Figure A-107: PROFIBUS PLC Module for Harsh Enclosure

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

A.8.7. PROFIBUS Connections (Panel Mount Enclosure)

The PROFIBUS connection to the Panel Mount enclosure is made using a straight nine-pin connector. The connector will extend through the cutout in the back panel of the terminal. This connector (or an equivalent) is a standard METTLER TOLEDO part # 64054361. The connector is not supplied by METTLER TOLEDO as part of the option.

Attach the nine-pin mating plug to the connector. Pin assignments are shown in Figure A-108. Follow the wiring instructions included with the connector to terminate the wires.



PROFIBUS Connector Wiring	
Pin	**Signal**
1	None
2	None
3	RxD/TxD +
4	RTS
5	Gnd BUS
6	+5V BUS
7	None
8	RxD/TxD -
9	None

Figure A-108: PROFIBUS 9-Pin Connector Assignments

Figure A-109 shows the PROFIBUS board used in panel mount installations, with the appropriate connector circled.

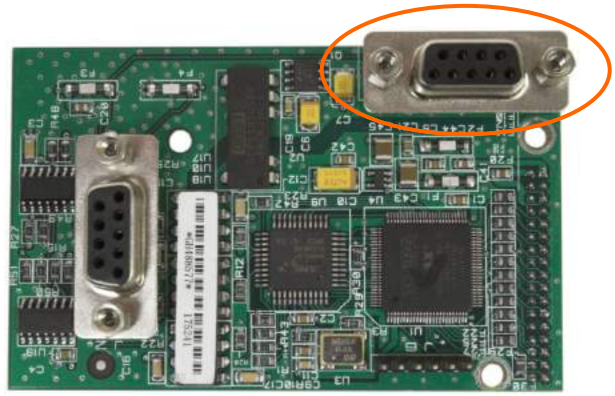


Figure A-109: PROFIBUS PLC Module for Panel Mount Enclosure

Figure A-110 shows (from left to right) the module installed in the panel mount enclosure, with the connector attached, and the rear panel in place.

Figure A-110: PROFIBUS PLC Module Connector for Panel Mount Enclosure

A.8.8. PROFINET Interface

The PROFINET interface (Figure A-111) connects to the network via a standard Ethernet patch cable.

Figure A-111: PROFINET PLC Module Components

Figure A-112 shows the array of status indicator LEDs on the PROFINET board (see also Figure A-111).

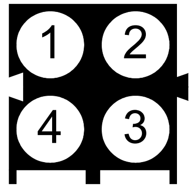


Figure A-112: PROFINET Status Indicator LEDs

A.9. Sealing the Enclosure

When the IND780 terminal is used in a metrologically "approved" application, it must be protected from tampering by use of seals. An optional sealing kit is available from METTLER TOLEDO that contains all the required hardware (Part number 64056538). Note that when the terminal is sealed non-metrological components cannot be serviced without breaking the seal.

A.9.1. Panel Enclosure Sealing

The Panel Mount enclosure must be sealed internally and externally. 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 S1 is in the "on" position.
    5. Install the Security Cover to prevent access to S1, the Metrology Security Switch indicated in Figure A-113, Main PCB Switches.

Figure A-113: Metrology Security Switch (left) and Cover Installed (right)

6. To protect the load cell interconnecting cable/s (attached to option boards), a security seal must be placed over each connector to ensure that it is not removed or disconnected. The seal also prevents access to the wire retaining screws indicated in Figure A-114. Figure A-115 shows a seal in place.

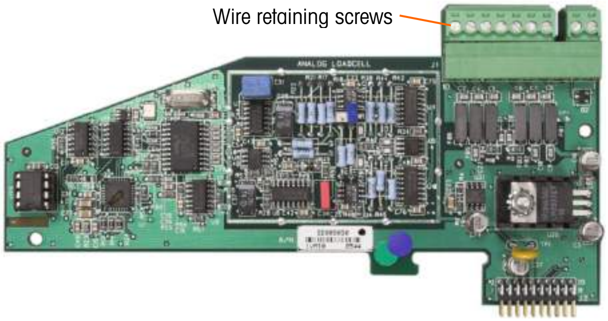


Figure A-114: Unprotected Option Board Connection

Figure A-115: Security Seal Installed

7. Finally, the back panel of the enclosure is sealed. Install three sealing screws as shown in Figure A-116 – two secure the panel in place on its stand-offs and one secures one end of the upper card guide.

Figure A-116: Panel Enclosure Rear Cover with Sealing Screws Installed

8. With the screws installed, thread the sealing wire through each of them, then thread the free end through the hole in the plastic seal.

Figure A-117: Sealing Wire Installed, Wire Threaded Through Seal

9. Remove most of the slack from the wire, then loop it once around the seal, as shown in Figure A-118.

Figure A-118: Wire Looped Around Seal

10. Finally, snap the seal shut and trim off the excess wire.

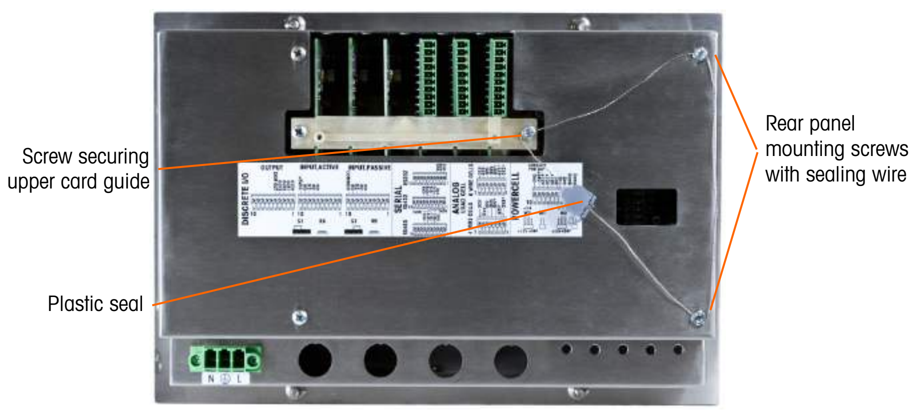


Figure A-119: 3-Point Sealing, Panel Enclosure Rear Cover

A.9.2. Harsh Enclosure Sealing

For external sealing of the harsh enclosure, refer to Figure A-122 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 S-1 is in the "on" position.
2. With the front panel installed on the enclosure and snapped into place, thread the free end of the wire seal through the center hole at the back of the IND780 front panel, and through the hole in the retaining clip.

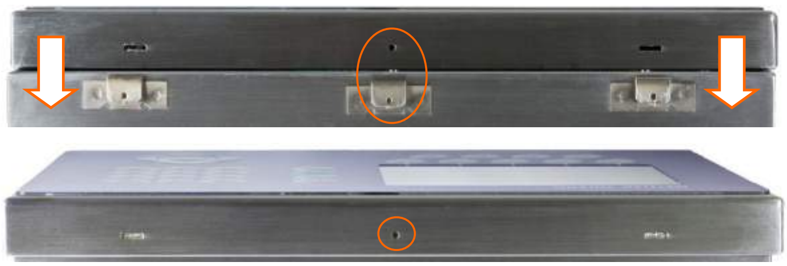


Figure A-120: Sealing Location at Back of Front Panel

- Needle-nosed pliers may be useful, to pull the wire through the holes in the cover and clip.

Figure A-121: Sealing Wire Threaded Through Cover and Clip

11. Thread the free end of the wire through the hole in the plastic seal (see Figure A-117).
12. Loop the wire once around the body of the seal (Figure A-118, Figure A-122), snap the seal shut and trim off the excess wire.

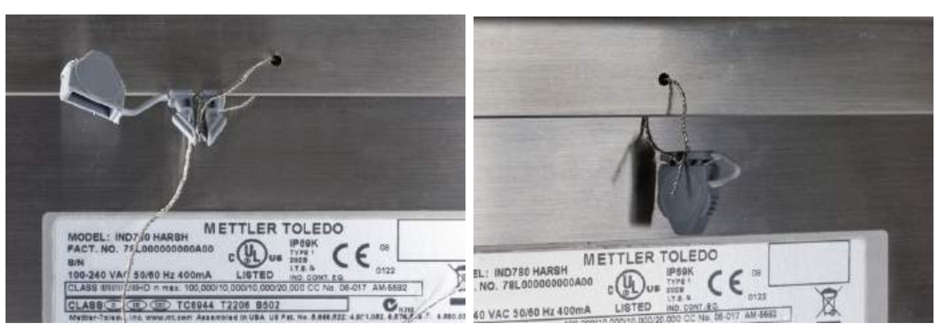


Figure A-122: Final Steps in Sealing Harsh Enclosure

Figure A-123: Harsh Enclosure, Sealing Complete

B. Default Settings

The following tables list the factory default settings and associated security levels for the IND780 terminal setup parameters.

- Items noted with an asterisk [*] are not shown for IDNet scales. Items noted with two asterisks [**] are not shown for Analog scales.

Table B-1: Setup Defaults

Setup Feature	Default Value	Security Access
Scale – Type		
Name	Scale 1	Maintenance
Scale Type	[Automatically Determined]	N/A
* Approval	None	Administrator
Address Range [POWERCELL MTX and POWERCELL PDX/PowerMount only]	1 - 24	Administrator
# of Load Cells [POWERCELL MTX and POWERCELL PDX/PowerMount only]	4	Administrator
Option Location	[Automatically Determined]	N/A
Scale – Type, POWERCELL MTX and POWERCELL PDX/PowerMount		
Name	Scale 1	Maintenance
Scale Type	POWERCELL	N/A
* Approval	None	Administrator
Address Range	1 - 24	Administrator
# of Load Cells	4	Administrator
Scale – Load Cell - Manual Address [POWERCELL MTX]		
Load Cell	1	Maintenance
Scale – Load Cell - Auto Address [POWERCELL PDX/PowerMount]		
Auto Advance	Disabled	Maintenance
Scale – Load Cell - Shift Adjust [POWERCELL MTX and POWERCELL PDX/PowerMount]		
Adjust by	Pairs	Maintenance

Setup Feature	Default Value	Security Access
Scale – Capacity & Increment		
Primary Units	kg	Administrator
* # of Ranges	1	Administrator
* >|1|<	50 x 0.01	Administrator
* Blank Over Capacity	5 d	Administrator
Scale – Calibration		
* Geo Code	16	Administrator
Base Serial Number	<null>	Administrator
* Calibration Units	kg	Administrator
* Linearity Adjust	Disabled	Administrator
* Analog Gain Jumper	3 mV/V	Administrator
Scale – Calibration - CalFREE™ [Analog load cell and POWERCELL PDX/PowerMount scales only]		
* Cell Capacity [Analog only]	0.00	Administrator
* Cell Capacity Unit [Analog only]	kg	Administrator
* Rate Cell Output [Analog only]	3.000000 mV/V	Administrator
* Use Zero	Calibrated	Administrator
* Estimated Preload	0.00	Administrator
* Estimated Preload Unit	kg	Administrator
Scale – Zero – AZM & Display		
* Auto Zero	Gross	Administrator
** Auto Zero	Enabled	Administrator
* Auto Zero Range	0.5 d	Administrator
* Under Zero Blanking	5 d	Administrator
Power Up…	RESTART	Administrator
Scale – Zero – Ranges		
* Power Up Zero	Disabled	Administrator
* Power Up Range [when Power Up Zero enabled]	+ 10 % –10 %	Administrator
Pushbutton Zero	Enabled	Administrator
* Pushbutton Range	+ 2 % –2 %	Administrator

Setup Feature	Default Value	Security Access
Scale – Tare – Types		
Pushbutton Tare	Enabled	Maintenance
Keyboard Tare	Enabled	Maintenance
Net Sign Correction	Disabled	Maintenance
** Terminal Tare	Disabled	Maintenance
Scale – Tare – Auto Tare		
Auto Tare	Disabled	Maintenance
Tare Threshold Weight [when Auto Tare enabled]	0.000000 kg	Maintenance
Reset Threshold Weight [when Auto Tare enabled]	0.000000 kg	Maintenance
Motion Check	Enabled	Maintenance
Scale – Tare – Auto Clear		
Auto Clear Tare	Disabled	Maintenance
Clear Threshold Weight [when Auto Clear Tare enabled]	0.000000 kg	Maintenance
Motion Check [when Auto Clear Tare enabled]	Enabled	Maintenance
Clear After Print [when Auto Clear Tare enabled]	Disabled	Maintenance
Clear With Zero [when Auto Clear Tare enabled]	Disabled	Maintenance
Power Up… [when Auto Clear Tare enabled]	RESTART	Maintenance
Scale – Units		
Secondary Units	None	Administrator
Custom Factor [when Custom chosen]	1.000000	Administrator
Custom Name [when Custom chosen]	[Blank]	Administrator
Custom Increment [when Custom chosen]	0.100000	Administrator
Power Up…	RESTART	Administrator
Scale – Rate		
Weight Units	None	Maintenance
Time Units	Seconds	Maintenance

Setup Feature	Default Value	Security Access
Measurement Period	1 second	Maintenance
Output Average	5 seconds	Maintenance
Scale – Filter		
* Low Pass Frequency	2.000000 Hz	Maintenance
* Low Pass # of Poles	8	Maintenance
* Notch Filter Frequency	30.000 Hz	Maintenance
* Stability Filter	Disabled	Maintenance
** Vibration	Average Conditions	Maintenance
** Weighing Process	Universal Weighing	Maintenance
Scale – Stability		
* Motion Range	1 d	Administrator
* No-motion Interval	0.3 seconds	Administrator
** Stability	2	Administrator
Timeout	3 seconds	Administrator
Scale – Log or Print		
Minimum Wt.	0.000000 kg	Maintenance
Interlock	Disabled	Maintenance
Automatic	Disabled	Maintenance
Reset on [when Automatic enabled]	Return, 0.000000 kg	Maintenance
Threshold Wt. [when Automatic enabled]	0.000000 kg	Maintenance
Motion Check [when Automatic enabled]	Disabled	Maintenance
Scale – Sequential Number		
Sequential Number	Disabled	Supervisor
Number Reset [when Sequential Number enabled]	Disabled	Supervisor
Next Value [when Sequential Number enabled]	1	N/A
Scale – MinWeigh		
MinWeigh	Disabled	Supervisor
Uncertainty U_0 [when MinWeigh set to Calculated]	0.000000 kg	Supervisor
Uncertainty c [when MinWeigh set to Calculated]	0.000000	Supervisor

<table>
<tr><th>Setup Feature</th><th>Default Value</th><th>Security Access</th></tr>
<tr><td>Tolerance
[when MinWeigh set to Calculated]</td><td>0.100000</td><td>Supervisor</td></tr>
<tr><td>Safety Factor\
[when MinWeigh set to Calculated]</td><td>1</td><td>Supervisor</td></tr>
<tr><td>MinWeigh Value</td><td>0.000000 kg</td><td>N/A</td></tr>
<tr><td colspan="3">Sum Scale</td></tr>
<tr><td>Sum</td><td>Disabled</td><td>Administrator</td></tr>
<tr><td>Name
[when Sum Scale enabled]</td><td>Sum</td><td>Administrator</td></tr>
<tr><td>Approval
[when Sum Scale enabled]</td><td>None</td><td>Administrator</td></tr>
<tr><td>Include in Sum:
[one field for each scale present, when Sum Scale enabled]</td><td>Enabled</td><td>Administrator</td></tr>
<tr><td colspan="3">Sum Scale – Capacity & Increment [When Sum Scale is Enabled]</td></tr>
<tr><td>Primary Units</td><td>kg</td><td>Administrator</td></tr>
<tr><td>* # of Ranges</td><td>1</td><td>Administrator</td></tr>
<tr><td>* >|1|<</td><td>50 x 0.01
[Same as scales 1-4]</td><td>Administrator</td></tr>
<tr><td>* Blank Over Capacity</td><td>5 d</td><td>Administrator</td></tr>
<tr><td colspan="3">Sum Scale – Tare – Types</td></tr>
<tr><td>Pushbutton Tare</td><td>Enabled</td><td>Maintenance</td></tr>
<tr><td>Keyboard Tare</td><td>Enabled</td><td>Maintenance</td></tr>
<tr><td>Net Sign Correction</td><td>Disabled</td><td>Maintenance</td></tr>
<tr><td colspan="3">Sum Scale – Tare – Auto Tare</td></tr>
<tr><td>Auto Tare</td><td>Disabled</td><td>Maintenance</td></tr>
<tr><td>Tare Threshold Wt.
[when Auto Tare enabled]</td><td>0.000000 kg
[Same as scales 1-4]</td><td>Maintenance</td></tr>
<tr><td>Reset Threshold Wt.
[when Auto Tare enabled]</td><td>0 kg
[Same as scales 1-4]</td><td>Maintenance</td></tr>
<tr><td>Motion Check
[when Auto Tare enabled]</td><td>Enabled</td><td>Maintenance</td></tr>
<tr><td colspan="3">Sum Scale – Tare – Auto Clear</td></tr>
<tr><td>Auto Clear Tare</td><td>Disabled</td><td>Maintenance</td></tr>
<tr><td>Clear Threshold Weight
[when Auto Clear Tare enabled]</td><td>0.000000 kg
[Same as scales 1-4]</td><td>Maintenance</td></tr>
<tr><td>Motion Check
[when Auto Clear Tare enabled]</td><td>Enabled</td><td>Maintenance</td></tr>
</table>

Setup Feature	Default Value	Security Access
Clear After Print [when Auto Clear Tare enabled]	Disabled	Maintenance
Clear With Zero [when Auto Clear Tare enabled]	Disabled	Maintenance
Power Up [when Auto Clear Tare enabled]	RESTART	Maintenance
Sum Scale – Units		
Second Units	None	Administrator
Custom Factor [when Custom chosen]	1.000000	Administrator
Custom Name [when Custom chosen]	[Blank]	Administrator
Custom Increment [when Custom chosen]	0.100000 [Same as scales 1-4]	Administrator
Power Up	RESTART	Administrator
Sum Scale – Rate		
Weight Units	None	Maintenance
Time Units	Seconds	Maintenance
Measurement Period	1 second	Maintenance
Output Average	5 seconds [Same as scales 1-4]	Maintenance
Sum Scale – Log or Print		
Minimum Wt.	0.000000 kg [Same as scales 1-4]	Maintenance
Interlock	Disabled	Maintenance
Automatic	Disabled	Maintenance
Reset on [when Automatic enabled]	Return, 0.000000 kg [Same as scales 1-4]	Maintenance
Threshold Wt. [when Automatic enabled]	0.000000 kg [Same as scales 1-4]	Maintenance
Motion Check [when Automatic enabled]	Disabled	Maintenance
Sum Scale – Sequential Number		
Sequential Number	Disabled	Maintenance
Number Reset [when Sequential Number enabled]	Disabled	Maintenance
Next Value [when Sequential Number enabled]	0	N/A

Setup Feature	Default Value	Security Access
Flow Meter – Channels 1, 2, 3, 4 – Board Settings		
Board Update Rate	Med (5 Hz)	Maintenance
Option Location	None	Maintenance
Flow Meter – Channels 1, 2, 3, 4 – Channel Configuration		
Name	None	Maintenance
Increment/Weight Units	0.1/none	Maintenance
"K" Factor	0 Pulse/Liter	Maintenance
Flow Rate multiplier	0.0000	Maintenance
Pushbutton Zero	Disabled	Maintenance
Rate Time Units	None	Maintenance
Output Average	0	Maintenance
Application – Memory – Alibi		
Alibi Memory	Disabled	Administrator
Application – Memory – Tare Table		
Totalization	None	Maintenance
Records	Blank table	Supervisor
Application – Memory – Message Table		
Records 01–99	Blank table with no entries listed	Supervisor
Application – Memory – Target Table		
Mode	None	Maintenance
Tolerance Type [when Mode is not None]	Weight Deviation	Maintenance
Output Type [when Mode is Material Transfer]	Concurrent	Maintenance
Records	Blank table	Supervisor
Application – Operation – Target [By Scale, including Sum Scale]		
Source	Displayed Weight	Maintenance
SmartTrac	None	Maintenance
Latching [when Target Table Mode is not Over/Under]	Enabled	Maintenance
Motion Detect [when Target Table Mode is Over/Under]	Disabled	Maintenance

Setup Feature	Default Value	Security Access
Application – Operation – Comparators		
Records	Blank table	Supervisor
Application – Operation – Totalization		
Mode	None	Maintenance
Clear GT on Print [when Mode is not None]	Disabled	Maintenance
Subtotal [when Mode is not None]	Disabled	Maintenance
Clear ST on Print [when Mode is not None]	Disabled	Maintenance
Convert Weight [when Mode is not None]	Enabled	Maintenance
Application – Operation – ID1, ID2		
Mode	Disabled	Maintenance
Trigger	Scale 1	Maintenance
Threshold	0	Maintenance
Reset	0	Maintenance
Records	Blank table	Maintenance
Application – Discrete I/O – Inputs		
Discrete Inputs	Blank table	Maintenance
Application – Discrete I/O – Outputs		
Discrete Outputs	Blank table	Maintenance
Application – Task Expert – Start		
Records	Blank table	Maintenance
Terminal – Device		
Terminal ID #1	IND780	Maintenance
Terminal ID #2	METTLER TOLEDO	Maintenance
Terminal ID #3	Blank	Maintenance
Alarm Beeper	Enabled	Maintenance
Keypad Beeper	Enabled	Maintenance
Serial Number	[Blank]	Maintenance
Terminal – Display		
Backlight Timeout	10 minutes	Maintenance
Screen Saver	0 minutes	Maintenance

Setup Feature	Default Value	Security Access
Weight Display	All Scales	Maintenance
Auxiliary Display	Tare Active	Maintenance
SmartTrac Size	None	Maintenance
Terminal – Region – Format Time & Date		
Time Format	24:MM:SS	Maintenance
Date Format	DD/MMM/YYYY	Maintenance
Date Field Separator	' / ' [slash]	Maintenance
System Line View	Disabled	Maintenance
Terminal – Region – Set Time & Date		
Time and Date	Current values	Supervisor
Terminal – Region – Language		
Display Messages	English	Maintenance
Keypad Selection	English	Maintenance
External Keyboard	English	Maintenance
Terminal – Transaction Counter		
Transaction Counter	Enabled	Maintenance
Counter Reset	Disabled	Maintenance
Next Transaction	1	Maintenance
Terminal – Users		
Username #1	admin	Maintenance
Access #1	Administrator	Maintenance
Password #1	<null>	Maintenance
Username #2	anonymous	Maintenance
Access #2	Operator	Maintenance
Password #2	<null>	Maintenance
Terminal – Softkeys		
Softkey 1	Time_Date	Maintenance
Softkey 9	Recall Information	Maintenance
Softkey 10	Setup	Maintenance
All Others	Blank	Maintenance
Terminal – Application Keys		
A1	Blank, None	Maintenance
A2	Blank, None	Maintenance

Setup Feature	Default Value	Security Access
A3	Blank, None	Maintenance
A4	Blank, None	Maintenance
Communication – Templates – Input		
Preamble Length	0	Maintenance
Data Length	1	Maintenance
Postamble Length	0	Maintenance
Termination Char	CR	Maintenance
Assignment	Tare	Maintenance
Communication – Templates – Output		
Template 1	Refer to Table B-2 for format	Maintenance
Template 2…Template 10	[Blank]	Maintenance
Repeat Print Field	Header	Maintenance
Communication – Templates – Strings		
Strings 01–20	Blank table with no entries listed.	Maintenance
Communication – Reports Format		
Format	Narrow [40]	Maintenance
Header	2 CR/LF	Maintenance
Title	Enabled	Maintenance
Record Separator	None	Maintenance
Footer	5 CR/LF	Maintenance
Communication – Connections		
Port	COM1	Maintenance
Assignment	Demand Output	Maintenance
Trigger	Scale 1	Maintenance
Template	Template 1	Maintenance
Communication – Serial – COM1		
Baud	9600	Maintenance
Data Bits	8	Maintenance
Parity	None	Maintenance
Flow Control	None	Maintenance
Interface	RS-232	Maintenance
Character Set	CP 1252	Maintenance

Setup Feature	Default Value	Security Access
Communication – Serial – COM2		
Baud	9600	Maintenance
Data Bits	8	Maintenance
Parity	None	Maintenance
Flow Control	None	Maintenance
Interface	RS-232	Maintenance
Character Set	CP 1252	Maintenance
Communication – Serial – COM3 [Screen accessible if one or two Serial option boards detected.]		
Baud	9600	Maintenance
Data Bits	8	Maintenance
Parity	None	Maintenance
Flow Control	None	Maintenance
Interface	RS-232	Maintenance
Character Set	CP 1252	Maintenance
Option Location	None	Maintenance
Communication – Serial – COM4 [Screen accessible if two Serial option boards detected.]		
Baud	9600	Maintenance
Data Bits	8	Maintenance
Parity	None	Maintenance
Flow Control	None	Maintenance
Interface	RS-232	Maintenance
Character Set	CP 1252	Maintenance
Option Location	None	Maintenance
Communication – Network – Ethernet		
MAC Address	[Unique value]	Maintenance
DHCP Client	Disabled	Maintenance
IP Address [when DHCP Client enabled]	0 .0 .0 .0	
IP Address [when DHCP Client disabled]	192.168.000.001	Maintenance
Subnet Mask [when DHCP Client disabled]	255.255.255.000	Maintenance
Gateway Address [when DHCP Client disabled]	000.000.000.000	Maintenance
System Line View	Disabled	Maintenance

Setup Feature	Default Value	Security Access
Communication – Network – Port		
Secondary Port #	0	Maintenance
Communication – Network – FTP		
ID #1	1	Maintenance
Username #1	admin	Maintenance
Password #1	admin	Maintenance
Access #1	Administrator	Maintenance
ID #2	2	Maintenance
Username #2	anonymous	Maintenance
Password #2	[Blank]	Maintenance
Access #2	Operator	Maintenance
Communication – Network – Cluster – This Terminal		
Network Server	Enabled	Maintenance
Multicast IP Address	227.227.000.001	Maintenance
Node Number	0	Maintenance
Communication – Network – Cluster – Members		
Records 01 – 20	0.0.0.0	Maintenance
Communication – Network – Cluster – Connections		
Blank table (no connections listed)		Maintenance
Communication – Network – Print Client		
Server IP Address	111.111.111.111	Maintenance
Server TCP Port	9100	Maintenance
Character Set	CP 1252	Maintenance
Communication – Network – Email Alert – Parameters		
Email Alert Parameters	0 .0 .0 .0	Maintenance
Sender Email Address	[blank]	Maintenance
Sender Name	IND780	Maintenance
Subject Line	IND780 ALERT!	Maintenance
Communication – Network – Email Alert – Recipients		
Blank table (no recipients listed)		Maintenance
Communication – PLC Interface – A-B RIO [If A-B RIO PLC Module detected]		
Node Address	1	Maintenance

Setup Feature	Default Value	Security Access
Start Quarter	1	Maintenance
Last Rack	Disabled	Maintenance
Data Range	57.6 kb	Maintenance
Block Transfer	Enabled	Maintenance
Communication – PLC Interface – ControlNet [If a ControlNet PLC Module detected]		
Node Address	1	Maintenance
Communication – PLC Interface – Ethernet / IP, Modbus TCP [If an Ethernet / IP PLC Module detected]		
MAC Address	[Unique value]	Maintenance
DHCP Client	Enabled	Maintenance
IP Address	192.168.000.001	Maintenance
Subnet Mask	255.255.255.000	Maintenance
Gateway	000.000.000.000	Maintenance
Communication – PLC Interface – DeviceNet [If a DeviceNet PLC Module detected]		
Node Address	63	Maintenance
Data Rate	125Kb	Maintenance
Communication – PLC Interface – PROFIBUS [If a PROFIBUS PLC Module detected]		
Node Address	1	Maintenance
Shared Data	Disabled	Maintenance
Communication – PLC Interface – PROFINET [If a PROFINET PLC Module detected]		
Mac Address	Assigned automatically	Maintenance
IP Assign	DCP	Maintenance
IP Address	Assigned automatically in DCP mode	Maintenance
Subnet Mask		Maintenance
Gateway Address		Maintenance
Migration DAP	Disabled	Maintenance
Communication – PLC Interface – Analog Output [If an Analog Output PLC Module detected]		
Source	Displayed Weight	Maintenance
Channel	Scale 1	Maintenance
Zero Value	0 kg	Maintenance
Full Scale Value	50 kg	Maintenance
Communication – PLC Interface – Data Format [If a PLC Interface module detected.]		
Format	Integer	Maintenance
Byte Order	Word Swap	Maintenance

Setup Feature	Default Value	Security Access
Time Interval	50 mS	Maintenance
Configure	IND780 >> PLC	Maintenance
Message Slots	1	Maintenance
Maintenance – Configure – Change Log		
Change Log	Disabled	Maintenance
Maintenance – Configure – Maintenance Log		
Maintenance Log	Disabled	Maintenance
Scale 1	Disabled	Maintenance
Scale 2	Disabled	Maintenance
Scale 3	Disabled	Maintenance
Scale 4	Disabled	Maintenance
Maintenance – Configure – Error Log		
Error Log	Enabled	Maintenance
Maintenance – Configure – PDX Performance Log		
Log Interval	0.0 Hours	Maintenance
Maintenance – Configure – Scale 1 – Predictive Maintenance **[if POWERCELL MTX or POWERCELL PDX/PowerMount base installed]**		
Symmetry Monitor	None	Maintenance
Start Threshold	10% capacity	Maintenance
Difference Threshold	10% span	Maintenance
On Failure	No Action	Maintenance
Run Flat	Disabled	Maintenance
Maintenance – Configure – Scales 1 - 4 – Zero Drift and Overload [not for Analog bases]		
Zero Drift Check	Count Only	Maintenance
Zero Threshold	10% capacity	Maintenance
Overload Threshold	0.00	Maintenance
Maintenance – Configure – Scales 1 - 4 – Calibration Management		
Test Interval [Days]	0	Maintenance
Test Interval [Weighments]	0	Maintenance
On Expiration	No Action	Maintenance
Last Date Tested	1/1/2001	Maintenance
Next Test Date	1/1/2001	Maintenance
# Weighments Left	99999	Maintenance

Setup Feature	Default Value	Security Access
Maintenance – Configure – Scales 1 - 4 – Calibration Test		
Test Load Units	None	Maintenance
Calibration Test View	Blank table with no entries listed	Maintenance
Maintenance – Configure – InTouch		
InTouch	Disabled	Maintenance
Maintenance – Run – Calibration Test – Scales 1 – 4, Sum		
Technician	[Blank]	Maintenance
Test Weight View	Blank table with no entries listed	Maintenance
Maintenance – Run – MT Service Security		
Key String	[Blank]	Maintenance
Maintenance – Run – MT Service View		
Device	Scale	Maintenance
Scale	1	Maintenance
View	Temperature	Maintenance
Maintenance – Run – Diagnostics – Scales 1-4 – Load Cell Output		
01: - 04:	[current value]	N/A
Maintenance – Run – Diagnostics – Scales 1-4 – Calibration Values **[Linearity Adjust set to default of Disabled]**		
Zero	100000 counts	Maintenance
4	50.000000 kg 2000000 counts	Maintenance
Maintenance – Run – Diagnostics – Scales 1-4 – Shift Values **[POWERCELL MTX and POWERCELL PDX/PowerMount base only]**		
01:	1.000000	Maintenance
02:	1.000000	Maintenance
03:	1.000000	Maintenance
04:	1.000000	Maintenance
Maintenance – Run – Diagnostics – Scales 1-4 – Statistics		
Weighments	0	N/A
Overloads	0	N/A
Peak Weight	0.00 kg	N/A
Zero Commands	0	N/A
Zero Failures	0	N/A

Setup Feature	Default Value	Security Access
Maintenance – Run – Diagnostics – Serial Test		
COM Port	COM1	Maintenance
Maintenance – Run – Diagnostics – Install Software Upgrade		
Install from	Internal File	Maintenance
Maintenance – Run – Diagnostics – Backup to USB		
Dataset Name	BK1	Operator
Maintenance – Run – Diagnostics – Restore from USB		
Dataset Name	BK1	Administrator

B.1. Default Template

Output Template 1 is defined as shown in Table B-2. Output Templates 2 through 10 can be defined by the user in Setup at **Communication > Templates > Output**, or by using the InSite™ CSL Template Editor. Refer to the **IND780 Shared Data Reference** for further information on data that can be included in a template. A summary of useful Shared Data variables is also included in the Templates section of Chapter 3, **Configuration**.

Table B-2: Default Template Definition

Template 1		
Element	**Data**	**Format**
1	Gross:	
2	wt0101	--
3		
4	wt0103	--
5	<CR><LF>	1
6	Tare:	
7	ws0110	--
8		
9	wt0103	--
10		
11	ws0109	--
12	<CR><LF>	1
13	Net:	
14	wt0102	--
15		
16	wt0103	--
17	<CR><LF>	3
18	-End-	

Figure B-1 shows an example of a print-out generated using the default template.

```
Gross:          13930 kg
Tare:            2200 kg T
Net:            11730 kg
```

Figure B-1: Default Template Printout Example

C. Table and Log File Structure

The IND780 terminal includes files and tables as indicated in the table of contents for the chapter on the left.

The Message table and the Change, Maintenance and Error log files can be viewed only through setup, and not directly from the home screen.

Descriptions of each of these are included in this chapter.

C.1. Table and Log File Searching and Printing

C.1.1. Searching Tables and Files

Tables and log files of the IND780 can all be searched with the help of search fields (listed in Table C-1). (* =Default value.)

Table C-1: Search Field Options

Table or File	Search Field Options
Alibi memory	Transaction Counter*, Date (YYYY/MM/DD)
Tare table	ID*, Description, Tare
Message table	ID*, Message
Target table (Material Transfer)	ID*, Description, Target, Spill, +Tol, -Tol, Fine
Target table (Over/Under)	ID*, Description, Target, +Tol, -Tol
Change log file	Date (YYYY/MM/DD)*, SDName, Username
Maintenance log file	Date (YYYY/MM/DD)*, Event, Username
Error log file	Date (YYYY/MM/DD)*, Source

Table C-2 shows comparative data values you can use with the search fields.

Table C-2: Comparative Value Operators

Operator	Action on Data Field Contents
<	Finds all values **less than** entered data
<=	Finds all values **less than or equal to** entered data
= *	Finds all values **equal to** entered data
<>	Finds all values **different from** entered data
>=	Finds all values **greater than or equal to** entered data

Operator	Action on Data Field Contents
>	Finds all values **greater than** entered data

* =Default value

Thus, a typical search in the Tare Table might select Tare as the search field, and data as values greater than (>) 100. The resulting Tare Table Search View would display only those records with a Tare value greater than 100.

C.1.1.1. Non-Numeric Search Data

In text fields (such as Message or Description), the search operators assume alphabetical sorting. Thus, a search of the Message Table using Message as the search field and defining Data as <= (less than or equal to) "R" would return a view containing only those messages beginning with letters A through R.

C.2. Alibi Memory

Alibi memory stores transaction information in a preset format that is not changeable. Alibi memory can be enabled or disabled in the **Application > Memory > Alibi** node of the menu tree.

The flash file (alibi.log) can store up to 256,000 transactions before it rolls over and begins to overwrite the oldest record, using a FIFO method. When the Alibi memory becomes 75% full, a warning message displays indicating the status. Another message displays when the file is 90% full. Alibi Memory will continue to store records until it is 100% full and then begin overwriting the oldest files. Additional records will be recorded over the oldest ones.

Each record in the Alibi Memory file includes:

- Date and time stamp fields
- Transaction number–a unique numeric field that identifies the transaction (the transaction counter must be enabled in terminal setup to activate the transaction counter value)
- Gross, Tare and Net weights
- Tare type
- Channel number

An Alibi Memory record is created by one of the following:

- Pressing the PRINT key
- An Automatic Print
- A Discrete Print input
- A PLC Print request

■ Demand connection must be present, and a print to FILE connection programmed if a printer is not used.

C.2.1. Viewing Alibi Memory Records

There are three ways to view Alibi memory records:

- From the REPORTS softkey
- By using the Alibi softkey **Alibi** from the home screens.
- Through setup, at the **Application > Memory > Alibi** node

In each case, the Alibi Search screen must be accessed.

C.2.1.1.1. To View Alibi Memory records through the REPORTS softkey

1. Press the REPORTS softkey .
2. Select Alibi in the Report Type field.
3. Press the VIEW TABLE softkey
4. The Alibi Search screen (Figure C-1) displays.

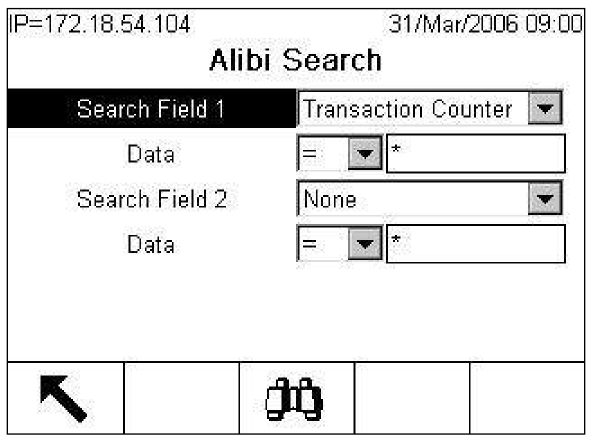


Figure C-1: Alibi Search Screen

C.2.1.1.2. To view Alibi Memory records through Setup

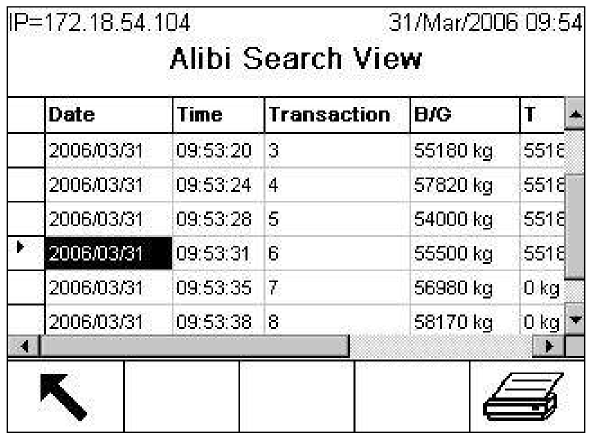
1. Press the SETUP softkey .
2. Go to **Application > Memory > Alibi**.
3. Press the VIEW TABLE softkey .
4. The Alibi Search screen (Figure C-1) displays.

With the Alibi Search screen displayed:

5. Select the desired search options, or use the default "find all" character, the asterisk (*), to view all records.
    - Options for Search Field 1 are Date and Transaction Counter. The default is Transaction Counter
    - Options for the Data fields are as described in Table C-2 (<, <=, =, <>, >=, >). The default value is =.

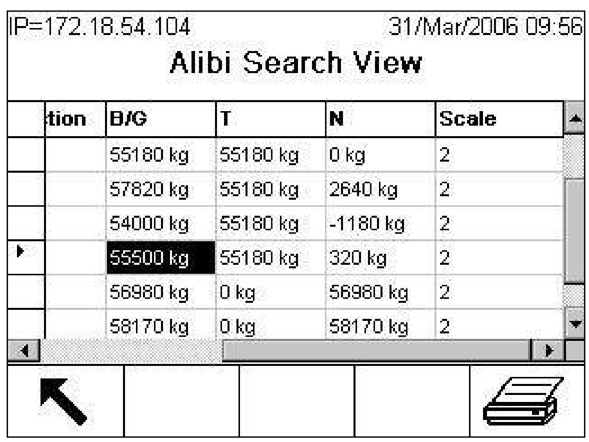
- Adjacent to each Data field is an alphanumeric entry field where the value on which the Data operator works can be entered.
- Options for Search Field 2 are none (the default), Date and Transaction Counter.

6. Press the SEARCH softkey. The Alibi Search View screen (Figure C-2 and Figure C-3) displays, with the search results sorted in chronological order. Focus will be on the most current record, at the end of the file. Only the first four columns will be shown on the display (Figure C-2). The remaining data can be viewed by pressing the RIGHT navigation key to scroll the view to the right (Figure C-3). Pressing the LEFT navigation key will return the view toward the left. Continuing to press the RIGHT key moves focus to the first column of the next row. If an external keyboard is in use, pressing the Page Up and Page Down keys will move up and down through the table view, one page (six records) at a time.



Date	Time	Transaction	B/G	T
2006/03/31	09:53:20	3	55180 kg	5518
2006/03/31	09:53:24	4	57820 kg	5518
2006/03/31	09:53:28	5	54000 kg	5518
2006/03/31	09:53:31	6	55500 kg	5518
2006/03/31	09:53:35	7	56980 kg	0 kg
2006/03/31	09:53:38	8	58170 kg	0 kg

Figure C-2: Alibi Search View



tion	B/G	T	N	Scale
	55180 kg	55180 kg	0 kg	2
	57820 kg	55180 kg	2640 kg	2
	54000 kg	55180 kg	-1180 kg	2
	55500 kg	55180 kg	320 kg	2
	56980 kg	0 kg	56980 kg	2
	58170 kg	0 kg	58170 kg	2

Figure C-3: Alibi Search View, Scrolled Right

- To print the Alibi Memory, or the subset of it selected in the Alibi Search page, press the PRINT softkey.
- The Alibi records are subjected to a checksum validation. Any records that are found to be corrupted will not be displayed in the search view and print operations. Retrieving the Terminal\HIS\alibi.csv file via FTP will provide access to all stored alibi records. Corrupted records will include data fields designated with asterisks.

C.2.2. Clearing the Alibi Memory

The Alibi Memory cannot be manually cleared. It is automatically cleared after it has been disabled and enabled again, or when a master reset is performed.

C.2.3. Alibi Memory Structure

Table C-3 shows the structure of the Alibi Memory with an example record.

Table C-3: Alibi Memory Structure

Timestamp	Channel	Trans No	Net	Tare	Units	Tare Type
2006/02/16 11:46:23	02	256000	218980	3027	kg	PT

C.3. Message Table

The IND780 contains a 99-record Message Table that stores user-defined alphanumeric messages with ID numbers from 1 to 99. These messages can be used as text strings for print templates, or to provide on-screen information in Task Expert applications. Refer to Chapter 3 of this manual, Configuration, for an explanation of their use.

C.3.1. Finding, Creating, and Editing Messages

The Message Table Search screen (Figure C-4) is in Setup at **Application > Memory > Message Table**. It allows messages to be viewed, created, and edited. Each record can be up to 100 characters long. The message table report can only be printed from the Message Table screen, using the PRINT softkey .

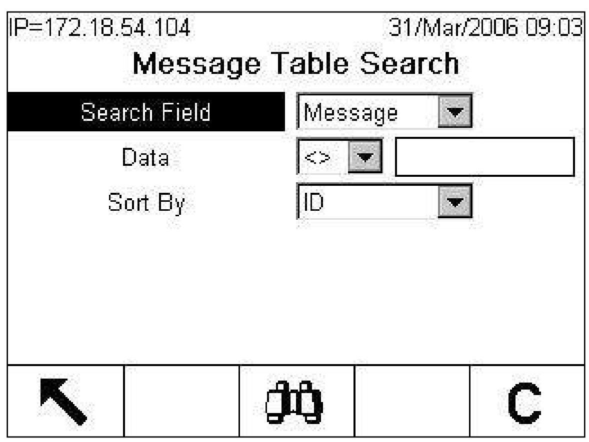


Figure C-4: Message Table Search Screen

Press the SEARCH softkey to view and edit the Message Table (Figure C-5).

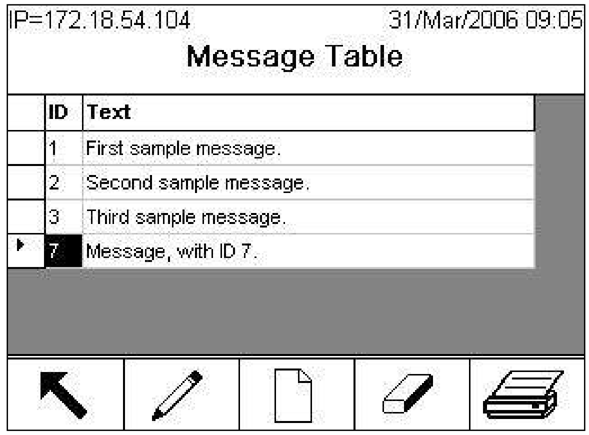


Figure C-5: Message Table

To create a new message, press the NEW softkey. From the screen shown in Figure C-6, messages can be defined and given ID numbers from 1 to 99. A message ID number cannot be changed except by deleting the message and re-creating it with a new ID. Duplicate ID numbers cannot be assigned.

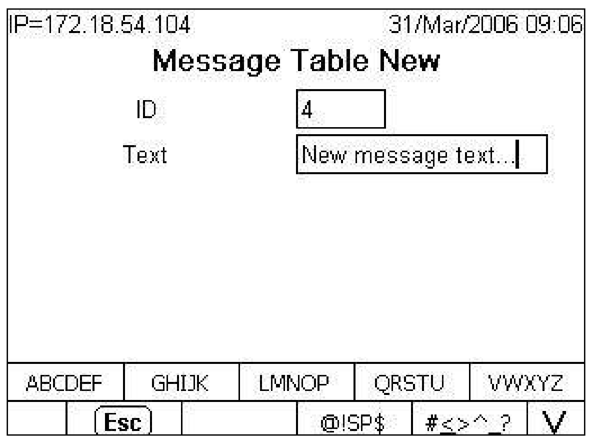


Figure C-6: New Message Screen

To edit an existing message, press the EDIT softkey. The message ID number cannot be changed from the Message Table Edit screen.

C.3.2. Clearing the Message Table

Individual messages can be deleted from the Message Table (Figure C-5) using the DELETE softkey. To clear the entire table, press the CLEAR softkey **C** in the Message Table Search screen (Figure C-4). The warning screen seen in Figure C-7 displays.

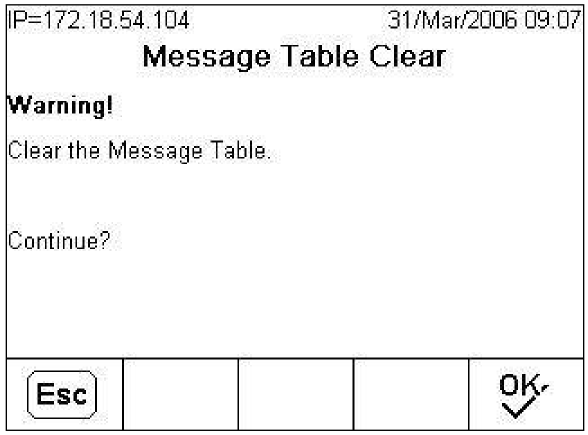


Figure C-7: Message Table Warning Screen

Press the OK softkey to clear the table, or the ESCAPE softkey Esc to return to the search screen without clearing the table.

C.4. Tare Table

The IND780 terminal contains a table for storing tare weights. The operator can recall the stored weights, rather than manually entering a tare for each transaction. This recall function is especially useful when certain tare values are used repeatedly. When totalization is enabled for the tare table, each time a transaction is completed using a specific tare ID, the selected weight value (gross or net) is added to the total for that tare, and the tare's counter increases by one.

The counter for the tare totals is eight digits long and has a maximum value of 15,000,000. When this value is exceeded, an overflow error displays and that value is not accumulated. The counter must be reset in order to continue totalizing. The tare counter is 16 digits in length. The decimal position is determined by the display resolution for the unit entered for the tare. The maximum value for a display resolution of 0.01 kg would be 99,999,999,999,999.99. When this value is exceeded an overflow error displays and that value is not accumulated. To continue totalizing, reset the total by editing the tare record as described below (see Figure C-20).

Tare Table totalization may be reset as described in Clearing Tare Table Records, below. In addition, these values are lost when:

- The Application Setup Block is reset
- A Master Reset is performed

A printed report of the records in the Tare Table is available through the REPORTS softkey or by pressing the PRINT softkey while viewing the table. This procedure is explained later in this chapter.

The structure and contents of a tare record are shown in Table C-4.

Table C-4: Tare Records Stored in the Tare Table

Field	Max. Length	Type	Description
ID	16	Numeric	Numeric string used for tare record lookup
Tare Weight	8	Numeric	Tare value–Stored in display resolution
Tare Units	3	Alpha	Tare weighing units (dwt, g, kg, lb, oz, ozt, t, ton)
Description	40	Alphanumeric	Description of this tare value
Total Weight	16	Numeric	Total weight of transactions completed using this stored tare record
Total Count	8	Numeric	Total number of transactions using this stored tare record

C.4.1. Tare Table Totalization

The Tare Table setup screen (Figure C-8), found in Setup at **Application > Memory > Tare Table**, offers Totalization options. These include None, Displayed Weight and Gross Weight.

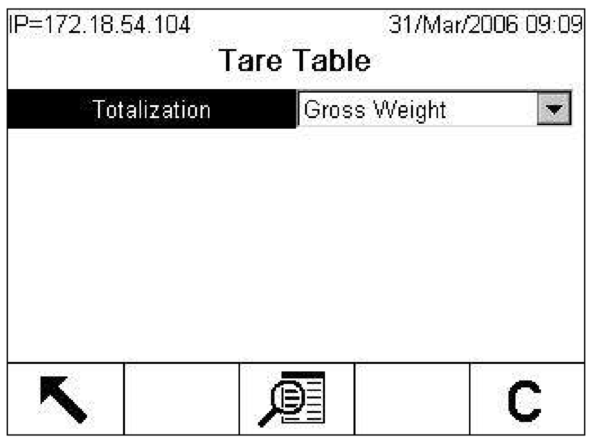


Figure C-8: Tare Table Setup Screen

If Totalization has been in use and then the option is changed to None, the screen shown in Figure C-9 displays, warning that existing totalization data may be lost. Press the ESCAPE softkey Esc to return to the setup screen without changing Totalization to None, or the OK softkey OK to complete the change.

Figure C-9: Tare Table Totalization Data Loss Warning

C.4.2. Recalling Tare Table Records

Tare Table records can be recalled by selecting from the table, or by direct entry of the record ID.

C.4.2.1.1. To select a record from the Tare Table

Before a record can be recalled from the tare table, the TARE TABLE softkey must be added to the softkeys on one of the home screens (see Appendix E, Softkey Mapping).

1. Press the TARE TABLE softkey to display the search screen as shown in Figure C-10.

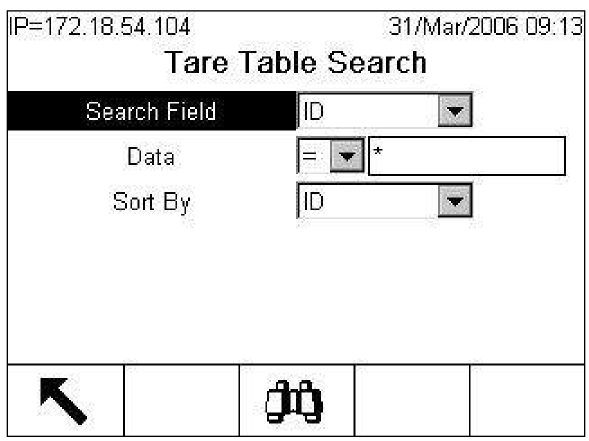


Figure C-10: Tare Table Search Screen

2. Select the desired search options, or use the default "find all" character, the asterisk (*), to view all records:
   - If Totalization is set to none, options for the Search and Sort By Fields are ID, Description and Tare. If Totalization is not set to none, options also include n and Total. The default value is ID.
   - Options for the Data fields are as described in Table C-2 (<, <=, =, <>, >=, >). The default value is =.
   - Adjacent to each Data field is an alphanumeric entry field where the value on which the Data operator works can be entered.

3. Press the SEARCH softkey. The Tare Table Search View screen (Figure C-11) displays with the search results sorted as specified in the Sort By field. The file will have the lowest record ID at the top of the file and focus will be on that record. Only the first four fields (ID, Tare, Units, and Description) will be visible.

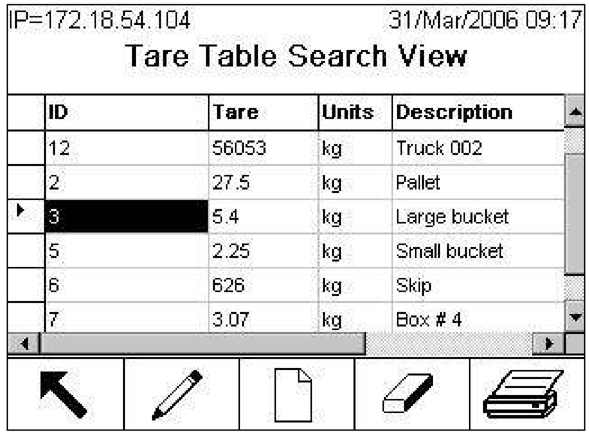


Figure C-11: Tare Table Search View

- The Tare Table may contain more columns: n and Total (if Totalization is enabled in Setup at **Application > Operation > Totalization > Scale**). Neither column can be seen when the table is accessed from the TARE TABLE softkey. They can only be seen when the table is viewed in Setup at **Application > Memory > Tare Table > Search > View**.

4. Use the UP and DOWN navigation keys to move focus to a particular tare record. If an external keyboard is in use, pressing the Page Up and Page Down keys will move up and down through the table view, one page (six records) at a time.

5. Press the OK softkey to use that record for the tare. The stored tare value is recalled from the Tare Table and is used as the preset tare value. A value stored in the tare table is automatically converted when recalled if it does not match the display unit, although this does not modify the Tare Table entry.

C.4.2.1.2. For Quick Access to a Specific Tare Table Record

If the tare has been assigned an ID number (as seen in Figure C-11) and the ID for a specific tare record in the Tare Table is known, the record can be quickly recalled for use without going through the view and selection process.

1. Use the numeric keys on the panel to enter the ID for the desired tare. The digits display immediately above the softkey icons, as shown in Figure C-12.

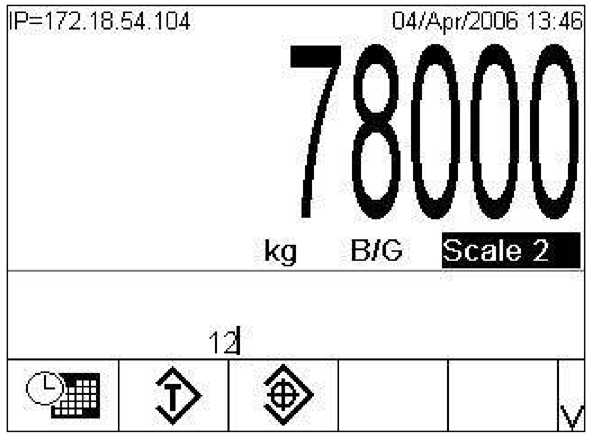


Figure C-12: Direct Entry of Tare ID for Quick Recall

2. Press the TARE MEMORY softkey to recall the ID record entered. The stored tare value is recalled from the Tare Table and is used as the preset tare (PT) value. If a value stored in the tare table doesn't match the current display units, it is automatically converted when recalled. The tare displays, as shown in Figure C-13.

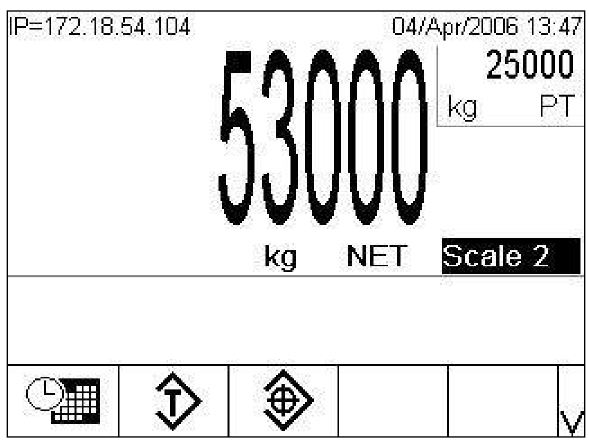


Figure C-13: Preset Tare Showing

3. If an invalid ID number is entered, the message in Figure C-14 displays.

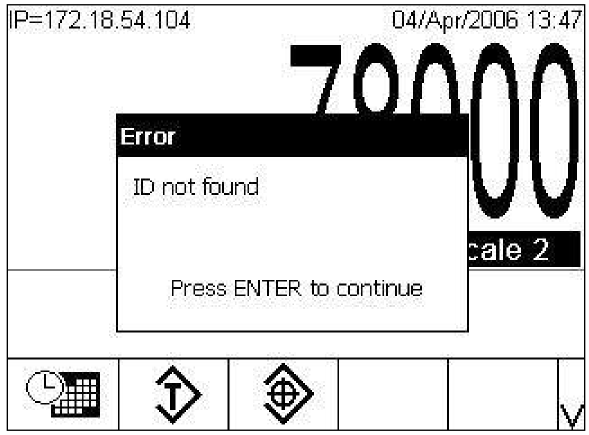


Figure C-14: 'Tare ID Not Found' Error Message

4. If a Tare is recalled from the Tare Table, but its units do not match those displayed for the scale in use, a unit mismatch error is displayed.

C.4.3. Clearing Tare Table Records

C.4.3.1.1. To Clear All Records in the Tare Table

1. Press the CLEAR softkey C when viewing the first setup page for the table in Setup at **Application > Memory > Tare Table**. The screen shown in Figure C-15 displays.

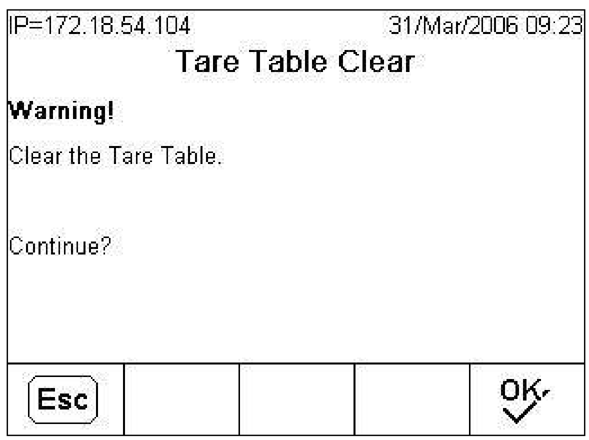


Figure C-15: Clear Tare Table Warning Screen

2. Press the OK softkey OK to confirm the table clear, or the ESCAPE softkey Esc to return to the Tare Table screen without clearing the table.

C.4.3.1.2. To Clear Totals for All Records in the Tare Table

1. Press the REPORTS softkey, select Tare Table from the selection box, and press the CLEAR TOTALS softkey seen in Figure C-16.

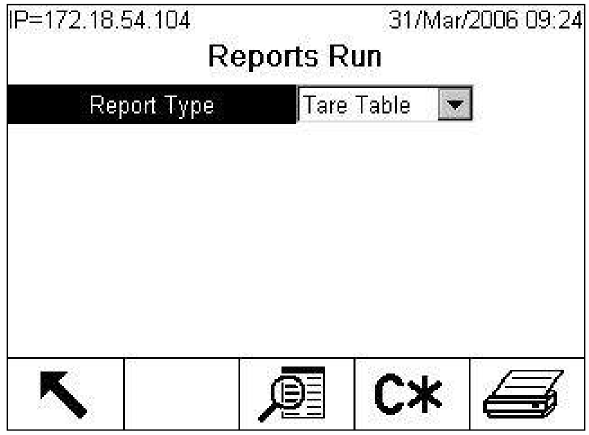


Figure C-16: Reports Run Screen with Clear Totals Softkey

2. Once is pressed, the screen shown in Figure C-17 displays.

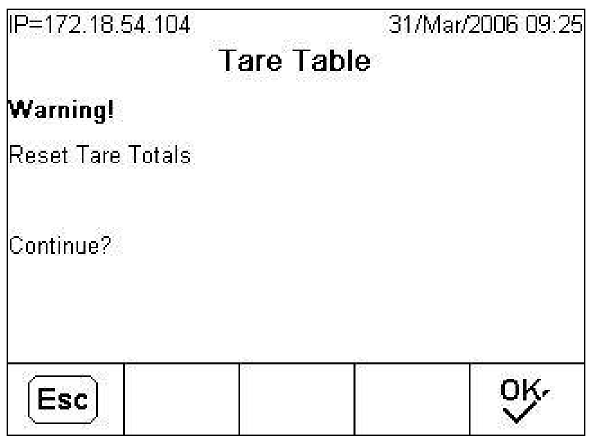


Figure C-17: Reset Tare Table Totals Warning Screen

C.4.3.1.3. To Clear the Total Value of an Individual Record

1. Press the SETUP softkey and move to the **Application > Memory > Tare Table** node.
2. Press the VIEW TABLE softkey . The Search screen (Figure C-18) displays.

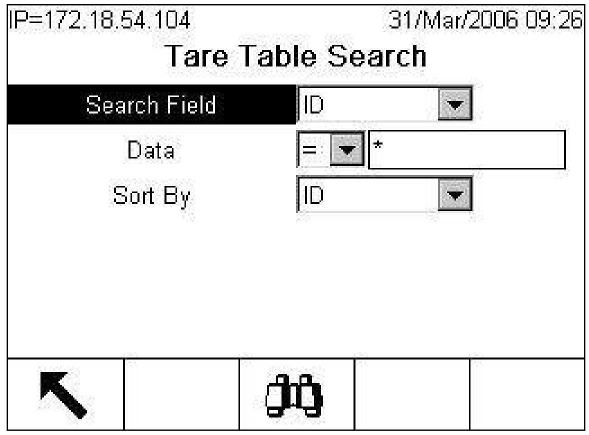


Figure C-18: Tare Table Search Screen

3. Select the desired search options as described above under Selecting From a List, or use the default "find all" character (*) to view all records.
4. Press the SEARCH softkey . The Tare Table Search View screen (Figure C-19) displays with the search results sorted by ID.

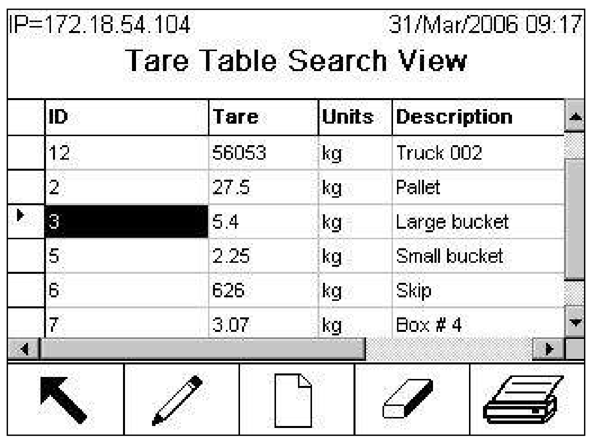


Figure C-19: Tare Table Search View

5. Use the UP and DOWN navigation keys to highlight the tare record for which the total is to be cleared and press the EDIT softkey . If an external keyboard is in use, pressing the Page Up and Page Down keys will move up and down through the table view, one page (six records) at a time. The Tare Edit screen (Figure C-20) displays.

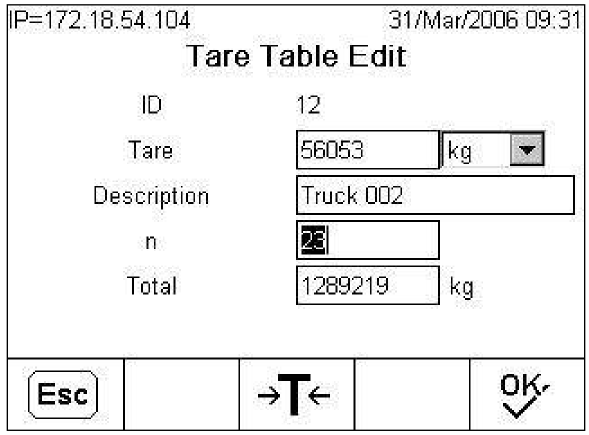


Figure C-20: Tare Table Edit Screen

6. Press the DOWN navigation key to highlight the n field, and press ENTER.
7. When focus is on the appropriate field, press the CLEAR key on the numeric keypad. When the value in the data entry box is clear, press ENTER.
8. To clear the Total field as well, press the DOWN navigation key, press ENTER, press the CLEAR key again and press ENTER to confirm the change.
9. Press the OK softkey to accept all changes and return to the Tare Table Search screen.
10. Press the EXIT softkey four times to return to the home screen.

C.5. Target Table

The IND780 contains a Target Table that is used to store frequently used target comparison values. The fields in the record will depend upon the operating mode of the Target Table and Tolerance Type as selected in Setup at **Application > Memory > Target Table**. There are two choices for the mode: Material Transfer or Over/Under. Depending on the target mode selection, there are either two or three choices for the tolerance type.

A printed report of the records in the Target Table is available through the REPORTS softkey or from the Search View (Figure C-22 through Figure C-27). This procedure is explained in the Table Reports section at the end of this chapter.

The possible fields for a target record are shown in Table C-5. Not all fields will be used for all combinations of Operating Mode and Tolerance Type.

Table C-5: Target Records Stored in the Target Table

Field	Length	Type	Description
ID	16	Alphanumeric	String used for target record lookup
Description	40	Alphanumeric	Description of the target record
Target weight	8	Numeric	Target value to be used for the comparison
Target units	3	Alpha	Target weighing units (lb, kg, g, t, ton, ozt, dwt, oz or custom). Unit depends on the Primary Units selected in

Field	Length	Type	Description
			Setup at **Scale > Scale *n* > Capacity & Increment** and Secondary Units selected at **Scale > Scale *n* > Units**
+ Tolerance or Upper Limit	4	Numeric	Acceptable tolerance over the target weight or maximum acceptable weight
– Tolerance or Lower Limit	4	Numeric	Acceptable tolerance under the target weight or minimum acceptable weight
Fine Feed	8	Numeric	Amount of material that will be fed in the slower rate of feed in a 2-speed feed system
Spill	8	Numeric	Amount of material in suspension that will add to the weight after all feeds are shut off

C.5.1. Target Table Modes and Tolerance Types

Table C-6 details the modes and tolerance types available in the Target Table, and shows the columns that will display in the Target Table View depending on which type of Target is selected.

- In order to enter spill values when defining a new target or editing an existing one, Material Transfer mode must be selected before entering the table.

The selected Mode determines the Tolerance Types available. In the case of the Material Transfer Mode, the choice of Tolerance Type determines the Output Type options. Finally, each Tolerance Type generates a specific set of columns in the Target Table View, and offers different Search Keys to match.

Table C-6: Target Table Modes, Tolerance Types, and View Data

Mode	Available Tolerance Types	Output Types	Search Keys	View Columns
None	None	n/a		
Material Transfer	Target Deviation	Concurrent	ID*, Description, Target, Spill, +Tol, -Tol, Fine	ID, Description, Target, Units, Spill, +Tol, -Tol, Fine
		Independent		
	% of Target	Concurrent		
		Independent		
Over/Under	% of Target*	n/a	ID*, Description, Target, +Tol, -Tol	ID, Description, Target, Units, +Tol, -Tol
	Target Deviation	n/a	ID*, Description, Target, +Tol, -Tol	
	Weight Value	n/a	ID*, Description, Lower Limit, Upper Limit	ID, Description, Units, Lower Limit, Upper Limit

C.5.2. Recalling Target Values

The TARGET MEMORY softkey must be added to the softkeys on one of the home screens (see Appendix E, **Softkey Mapping and Application Key Configuration**) before Target Table values can be recalled.

There are two ways to recall target values – selecting from a list by viewing the Target Table, or entering the Target ID directly from the home screen.

C.5.2.1.1. To Select from a List

1. From the main screen, press the TARGET TABLE softkey to display the search screen as shown in Figure C-21.

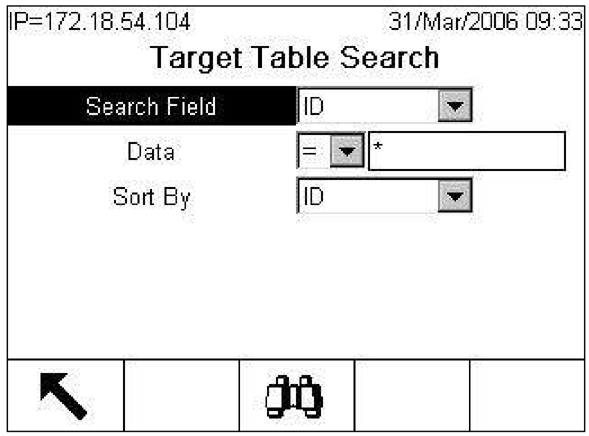


Figure C-21: Target Table Search Screen

2. Select the desired search options, or use the default "find all" character, the asterisk (*) to view all records:
   - Options for the Search and Sort By Fields are ID, Description, Target, Spill, +Tol, -Tol and Fine. The default value is ID.
   - Options for the Data fields are as described in Table C-2 (<, <=, =, <>, >=, >). The default value is =.
   - Adjacent to each Data field is an alphanumeric entry field where the value on which the Data operator works can be entered.
3. Press the SEARCH softkey . Depending on the mode selected, the Target Table Search View screen (Figure C-22 through Figure C-27) displays with the search results sorted by ID. The file will have the lowest record ID at the top of the file and focus will be on that record. Only the first two fields (ID and Description [if enabled]) will be shown on the display. The remainder of the fields in each record can be viewed by pressing the RIGHT navigation key to move the view to the right. Pressing the LEFT navigation key will return the view toward the left. If an external keyboard is in use, pressing the Page Up and Page Down keys will move up and down through the table view, one page (six records) at a time.

Each of the views below is shown in its initial state (Figure C-22) and scrolled to the right with the additional columns showing (Figure C-23).

Figure C-22: Target Table Search View, Material Transfer Mode, Target Deviation or % Target Tolerance Type

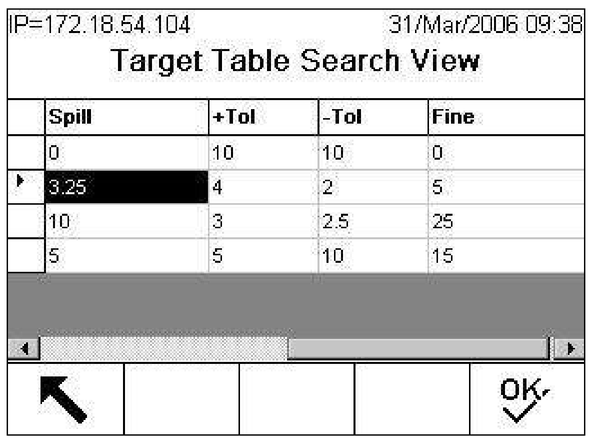


Figure C-23: Target Search View, Material Transfer Mode, Target Deviation or % Target Tolerance Type, Scrolled Right

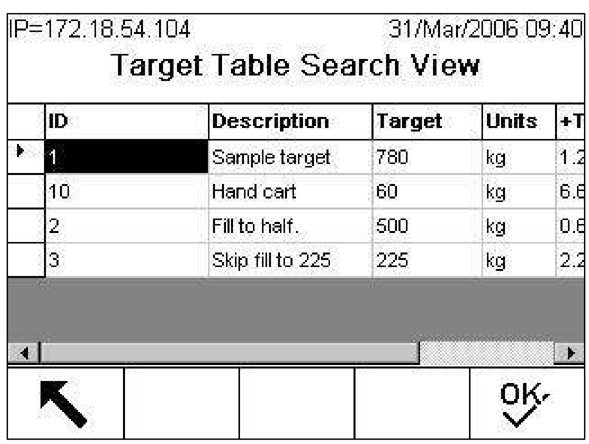


Figure C-24: Target Search View, Over/Under Mode, Target Deviation or % Target Tolerance Type

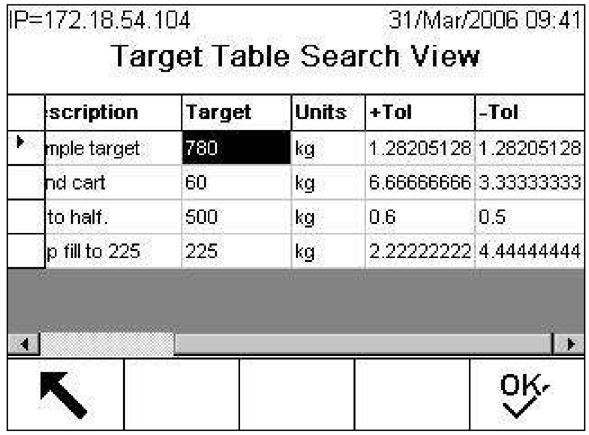


Figure C-25: Target Search View, Over/Under Mode, Target Deviation or % Target Tolerance Type, Scrolled Right

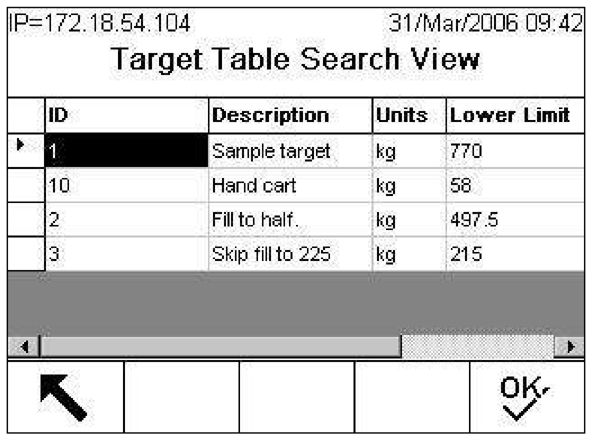


Figure C-26: Target Search View, Over/Under Mode, Weight Value Tolerance Type

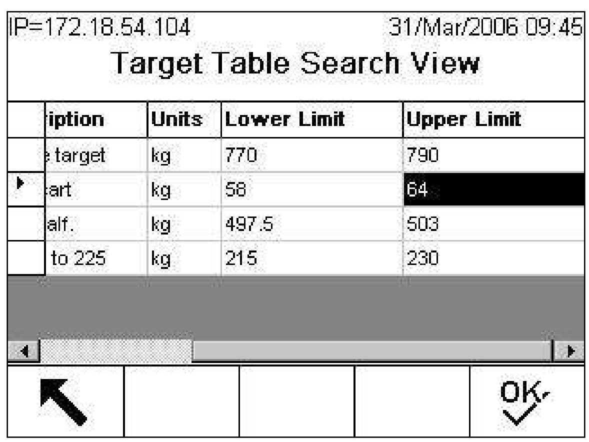


Figure C-27: Target Search View, Over/Under Mode, Weight Value Tolerance Type, Scrolled Right

4. Use the UP and DOWN navigation keys to focus on a target record and press the OK softkey OK. The stored target record is recalled from the Target Table and used as the active target, and focus is returned to the home screen.

C.5.2.1.2. To Recall a Target Record Directly

If the ID number for a specific target record in the Target Table is known, you can quickly recall the record without going through the view and selection process.

1. Use the numeric keypad to enter the one- or two-digit ID for the tare that is to be used. The digits will appear just above the row of softkey icons, as seen in Figure C-12.
2. Press the TARGET MEMORY softkey to quickly recall the ID record entered. The stored target value is recalled from the Target Table and is loaded into the active target record.
3. If an invalid ID number is entered, an "ID Not Found" message displays, as in Figure C-14.

C.5.3. Clearing the Target Table

To Clear Individual Records in the Target Table:

Individual Target Table records may be deleted from the Target Table Search View screens (Figure C-22 through Figure C-27).

C.5.3.1.1. To Clear All Records in the Target Table

1. Press the CLEAR softkey when viewing the first setup page for the table in Setup at **Application > Memory > Target Table**. The screen is shown in Figure C-28.

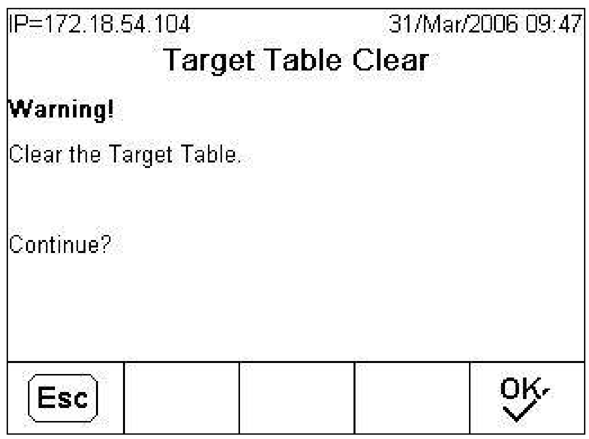


Figure C-28: Clear Target Table Warning Screen

2. Press the OK softkey to confirm the table clear, or the ESCAPE softkey Esc to return to the Target Table screen without clearing the table.

C.6. Change Log File

The Change Log in the IND780 terminal file tracks all intentional changes to system configuration parameters. The Change Log can be enabled or disabled in Setup at **Maintenance > Configure > Change Log**. Figure C-29 shows the Change Log configuration screen.

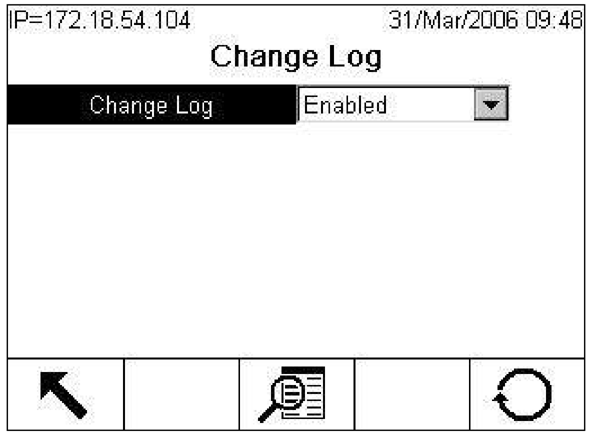


Figure C-29: Change Log Configuration Screen

The Change Log file is a linear-type file that eventually becomes full if not reset. It will hold an estimated 30,000 records. When the file becomes 75% full, a warning message displays indicating the status. Another message displays when the file is 90% full. If the file is not reset, it will continue to store records until it is 100% full and a final 100% full message displays. Additional changes to shared data will not be recorded until the file is reset.

C.6.1. Viewing Change Log File Records

Change Log records can be viewed in Setup at **Maintenance > Configure > Change Log**.

C.6.1.1.1. To View Change Log File Records

1. Press the SETUP softkey and select the **Maintenance > Configure > Change Log** node.
2. Press the VIEW TABLE softkey . The Change Log Search screen displays (Figure C-30).

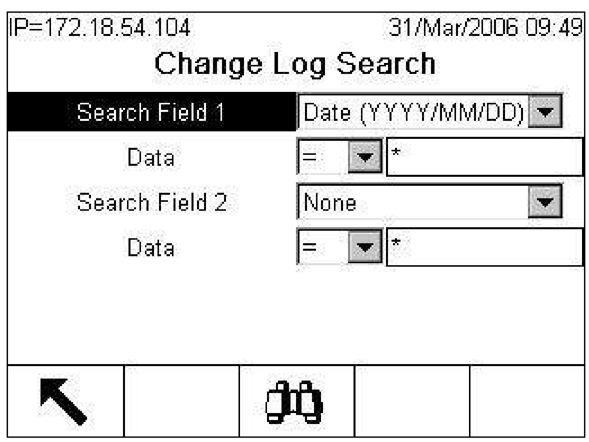


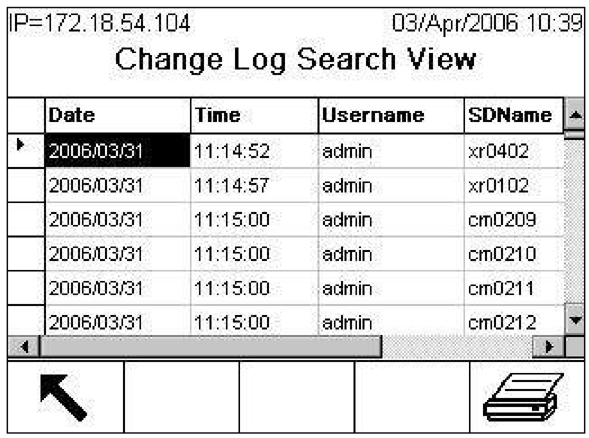
Figure C-30: Change Log Search Screen

3. Select the desired search options, or use the default "find all" asterisk character (*) to view all records:
   - Options for Search Field 1 are Date (the default), SDName and Username.
   - Options for the Data fields are < (less than), <= (less than or equal to), = (equal to), <> (not equal to), >= (greater than or equal to), and > (greater than). The default value is =.

- Adjacent to each Data field is an alphanumeric entry field where the value on which the Data operator works can be entered.
- Options for Search Field 2 are None (the default), Date, SDName and Username.

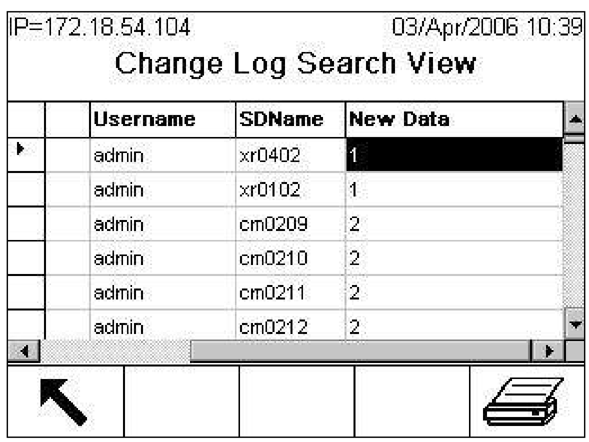
4. Once the search criteria are set, press the SEARCH softkey. The Change Log Search View screen displays with the search results sorted in chronological order (oldest record displays first). To see additional information, use the RIGHT arrow key to move the view to the right. The LEFT arrow key returns the view to the left. If an external keyboard is in use, pressing the Page Up and Page Down keys will move up and down through the table view, one page (six records) at a time.

   Figure C-31 shows the view as it initially displays. In Figure C-32 the view is scrolled to the right to reveal the additional column of data.



Date	Time	Username	SDName
2006/03/31	11:14:52	admin	xr0402
2006/03/31	11:14:57	admin	xr0102
2006/03/31	11:15:00	admin	cm0209
2006/03/31	11:15:00	admin	cm0210
2006/03/31	11:15:00	admin	cm0211
2006/03/31	11:15:00	admin	cm0212

Figure C-31: Log Search View Screen



Username	SDName	New Data
admin	xr0402	1
admin	xr0102	1
admin	cm0209	2
admin	cm0210	2
admin	cm0211	2
admin	cm0212	2

Figure C-32: Log Search View Screen, Scrolled Right

   In Figure C-32, the New Data column contains the changed value of the Shared Data variable identified in the SDName column.

5. Press the EXIT softkey to return to the Log Search Screen.

C.6.2. Resetting the Change Log File

The Change Log file is reset each time a Master Reset is done. It can also be manually reset in setup.

C.6.2.1.1. To Reset the File Manually

1. Press the SETUP softkey and select the **Maintenance > Configure > Change Log** node (see Figure C-29).
2. Press the RESET softkey to reset the log file. A warning screen (Figure C-33) displays that asks for verification. All Change Log entries are deleted when the log is reset. Press the ESCAPE softkey Esc to cancel the operation, or the OK softkey OK to confirm it.

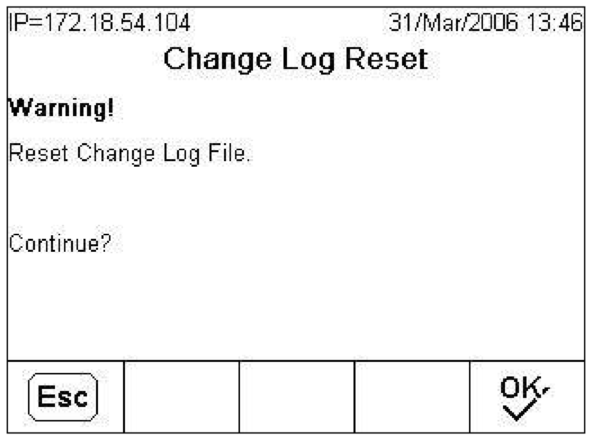


Figure C-33: Change Log Reset Screen

3. A status message displays briefly, verifying that the reset was successful.

C.6.3. Change Log File Structure

The Change Log file is available as a comma-delimited file (change.csv) that can be exported to the InSite SL program or any FTP client PC. Refer to InSite's help system for further information. For an example of an FTP transfer, refer to the example given in Appendix D, **Communications**.

Table C-7 shows the structure of a variable length Change Log record with two examples of records. The commas used to separate fields are not shown in these examples.

Table C-7: Change Log File Record Structure

Timestamp	User	Shared Data ID	Value
2006/02/16 11:57:22	SYSTEM	ce0402	91
2006/02/16 11:59:10	SYSTEM	tblA1	D_05

C.7. Maintenance Log File

The Maintenance Log File can be enabled or disabled in Setup at **Maintenance > Configure > Maintenance Log**. The maintenance log may be enabled or disabled for each scale individually.

The Maintenance Log is a FIFO file that overwrites the oldest record when it becomes full. It will hold an estimated 32,000 records. When the file becomes 75% full, a warning message displays indicating the status. Another message displays when the file is 90% full. If the file is not reset, it will continue to store records until it is 100% full and then begin overwriting the oldest records.

The Maintenance Log tracks and logs service operations that are performed on the IND780. The items logged include functions such as calibration and file export.

C.7.1. Viewing Maintenance Log File Records

The Maintenance Log records can be viewed in Setup at **Maintenance > Configure > Maintenance Log**.

C.7.1.1.1. To View the Maintenance Log File

1. Press the SETUP softkey and select **Maintenance > Configure > Maintenance Log**. The Maintenance Log configuration screen (Figure C-34) displays.

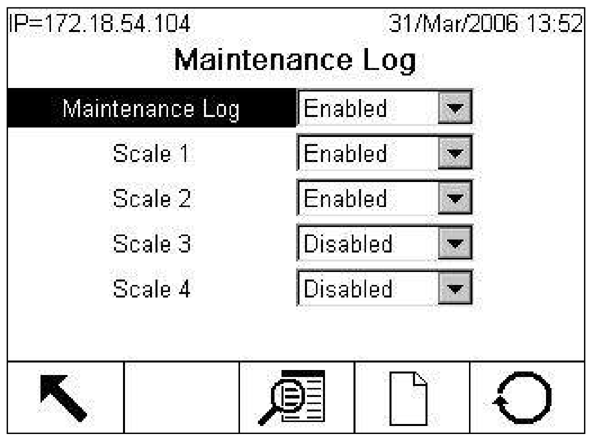


Figure C-34: Maintenance Log Configuration Screen

2. Press the VIEW TABLE softkey . To open the Maintenance Log Search screen (Figure C-35).

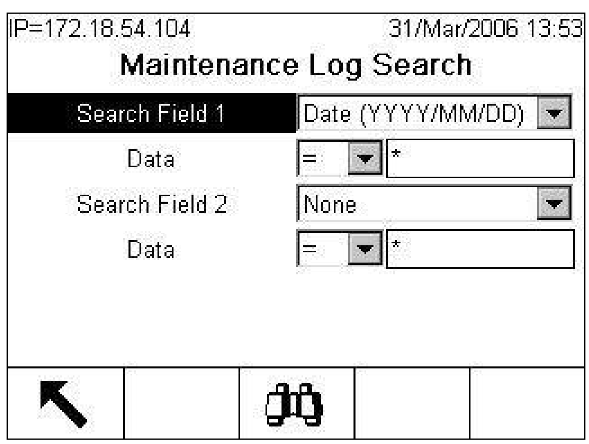


Figure C-35: Maintenance Log Search Screen

3. Select the desired search options, or use the default "find all" asterisk character (*) to view all records:

- Options for Search Field 1 are Date (the default), Event and Username.
- Options for the Data fields are as described in Table C-2 (<, <=, =, <>, >=, >). The default value is =.
- Adjacent to each Data field is an alphanumeric entry field where the value on which the Data operator works can be entered.
- Options for Search Field 2 are None (the default), Date, Event and Username.

4. When the search criteria are set, press the SEARCH softkey. The Maintenance Log Search View screen (Figure C-36) displays with the search results sorted in chronological order, oldest first. The remaining columns in each record can be viewed by pressing the RIGHT navigation key (Figure C-37). Press the LEFT navigation key to return the view to the left. If an external keyboard is in use, pressing the Page Up and Page Down keys will move up and down through the table view, one page (six records) at a time.

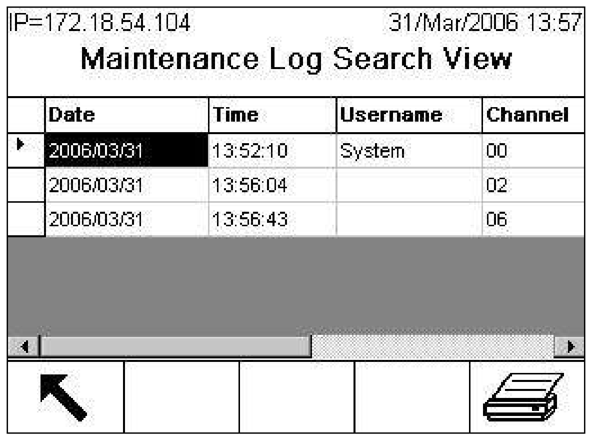


Figure C-36: Maintenance Log Search View Screen, Initial

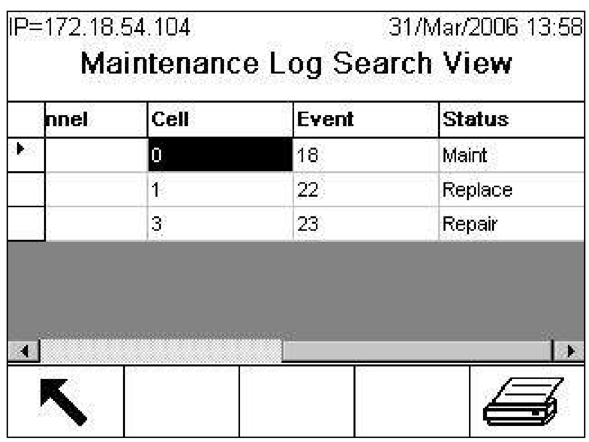


Figure C-37: Maintenance Log Search View Screen, Scrolled Right

5. Use the UP and DOWN navigation keys to focus on any record.
6. Press the EXIT softkey to return to the Maintenance Log Search Screen.

C.7.1.1.2. To Add a Maintenance Log Record Manually

1. Press the SETUP softkey and select Maintenance > Configure > Maintenance Log.
2. Press the NEW softkey. The screen shown in Figure C-38 displays.

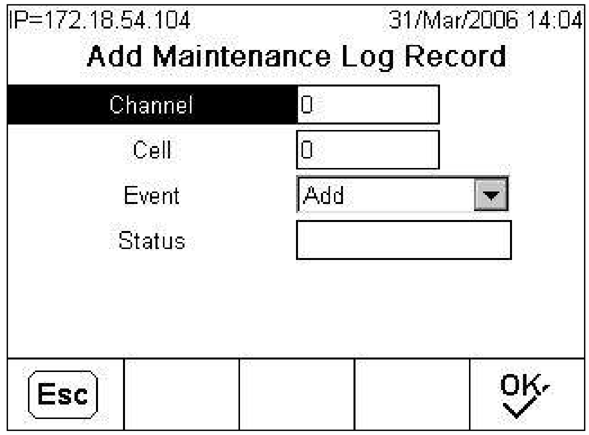


Figure C-38: Add Maintenance Log Record

3. Enter the Channel and Cell identifiers. Options in the Event list box are Add, Remove and Replace. Use the alpha keys to enter the Status. The Status field accepts up to 8 characters.
4. Press the OK softkey to save the record and exit, or press the ESCAPE softkey to return to the configuration screen without saving the record.

C.7.2. Resetting the Maintenance Log File

The Maintenance Log file is reset each time a Master Reset is performed. The file can also be manually reset in setup.

C.7.2.1.1. To Reset the File Manually

1. Press the SETUP softkey and select Maintenance > Configure > Maintenance Log.
2. Press the RESET softkey to reset the log file. A warning screen similar to the one shown in Figure C-33 displays, asking for verification. Press the OK softkey to continue. A status message displays verifying that the reset was successful. To return to the configuration screen without performing the reset, press the ESCAPE softkey.

C.7.3. Maintenance Log File Structure

The Maintenance Log file is available as a comma-delimited file that can be exported to the InSite SL program or any FTP client PC. Table C-8 shows the structure of a maintenance log record, together with an example record showing that Zero Calibration has been performed successfully. The commas used to separate fields are not shown in this example.

Table C-8: Maintenance Log File Record Structure.

Timestamp	Username	Channel	Cell	Event Code	Status
2006/02/16 11:48:52	System	01	027	02	SUCCESS

The value in the Channel column refers to the source of the maintenance log information. Sources include scales and option boards. Cell refers to the load cell for which the log entry is generated; if the channel does not represent a cell, the value is left blank.

Table C-9 lists all maintenance event and status codes the IND780 terminal may display.

Table C-9: Maintenance Log Events and Status Codes

Device	Event	Description	Status Code(s)
Scale	1	Calibration test failed	STEP # 1-N
Scale	2	Zero Calibration	1=SUCCESS; 0=FAILED; 2=MOTION
Scale	3	Span Calibration	1=SUCCESS; 0=FAILED; 2=MOTION
Scale	4	CALFree Calibration	1=SUCCESS; 0=FAILED
Scale	5	POWERCELL Shift Adjust	1=SUCCESS; 0=FAILED
Cell	6	POWERCELL (re)addressed	1=SUCCESS; 0=FAILED
Terminal	7	File Defragmentation	1=SUCCESS
Terminal	8	Log File FTP export	1=Maintenance, 2=Change, 3=Error, 4=Alibi
Terminal	9	Shared Data Setup FTP export	1=Flash, 2=BRAM, 3=MEEPROM, 4=Cal Test Base File Name + scale instance
Terminal	10	Metrology switch / electronic seal broken	1=SUCCESS
Scale	11	Calibration Expiration *	1=DAYS, 2=WEIGHOPS
Scale	12	Run flat operation manual start	SUCCESS
Scale	13	Run flat operation stopped	SUCCESS
Scale	14	Run flat operation autostart *	SUCCESS
Varies	15	Option Component Added	Manually-entered text
Varies	16	Option Component Removed	Manually-entered text
Varies	17	Option Component Replaced	Manually-entered text
Terminal	18	Log Initialized	MAINT, CHANGE, ERROR, ALIBI
Scale	19	Cal Edit Manual	SUCCESS
Scale	20	Shift Edit Manual	SUCCESS
Terminal	21	Date & Time Set	SUCCESS
Varies	22	Table Exported	A0, A2,…….A9
Varies	23	Calibration Test Passed	SUCCESS
Varies	24	Table Imported	A0, A2…….A9
Terminal	25	Replace Battery	Manually-entered text
Scale	26	Monitor Scale Overload	Overload weight, in cell counts
Scale	27	Monitor Weighment	Weight
Scale	28	Monitor Successful Zero Command	None
Scale	29	Monitor Zero Failure	None

Device	Event	Description	Status Code(s)
Scale, Cell	30	Monitor Cell Overload	None
Scale, Cell	31	Monitor Zero Drift Success	Current cell zero
Scale, Cell	32	Monitor Zero Drift Failure	Current cell zero
Scale, Cell	34	Monitor Symmetry Drift Failure	Deviation
Scale, Cell	35	Monitor Symmetry Comm Success	None
Scale, Cell	36	Monitor Symmetry Comm Failure	None
Scale, Cell	37	Monitor Symmetry Check Success	None
Scale	39	Monitor Cal Complete	Calibration counter
Scale	40	Standard Calibration	1=SUCCESS, 0=FAILED, 2=MOTION
Scale, Cell	41	Monitor PDX Enclosure Break	None

* These are automatic operations logged by the IND780 terminal.

C.8. Error Log File

C.8.1. Viewing Error Log File Records

C.8.1.1.1. To View the Error Log

1. Press the SETUP softkey and select **Maintenance** > **Configure** > **Error Log**. The Error Log configuration screen (Figure C-39) displays.

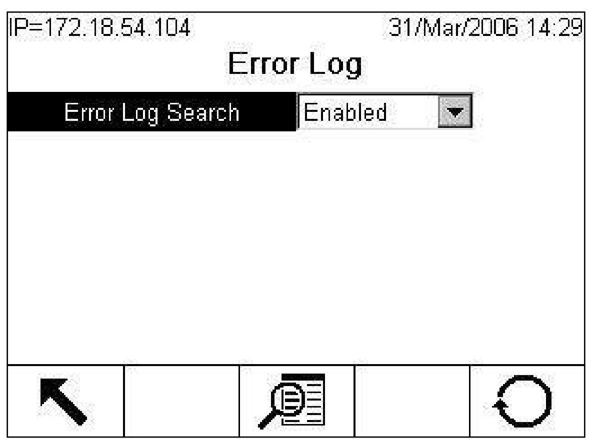


Figure C-39: Error Log Configuration Screen

2. Press the VIEW TABLE softkey. The Error Log Search screen (Figure C-40) displays.

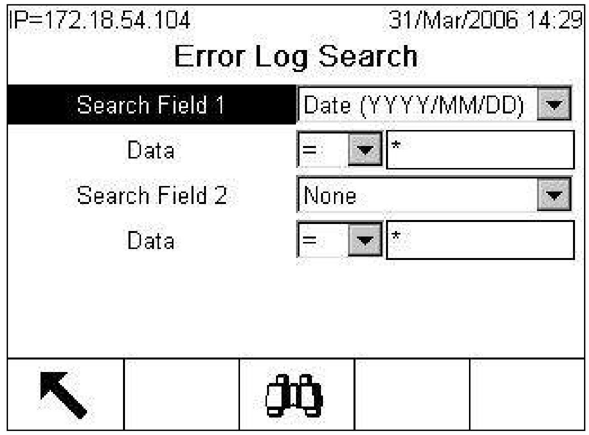


Figure C-40: Error Log Search Screen

3. Select the desired search options, or use the default "find all" asterisk character (*) to view all records:
   - Options for Search Field 1 are Date (the default) and Source.
   - Options for the Data fields are as described in Table C-2 (<, <=, =, <>, >=, >). The default value is =.
   - Adjacent to each Data field is an alphanumeric entry field where the value on which the Data operator works can be entered.
   - Options for Search Field 2 are None (the default), Date and Source.
4. When the search criteria are set, press the SEARCH softkey. The Error Log Search View screen (Figure C-41) displays with the search results sorted in chronological order, oldest record first. The remaining fields in each record can be viewed by pressing the RIGHT navigation key to move the view to the right (Figure C-42). Pressing the LEFT navigation key returns the view to the left. If an external keyboard is in use, pressing the Page Up and Page Down keys will move up and down through the table view, one page (six records) at a time.

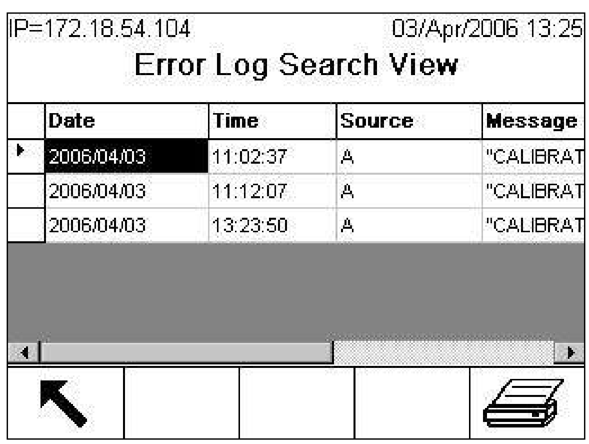


Figure C-41: Error Log Search View

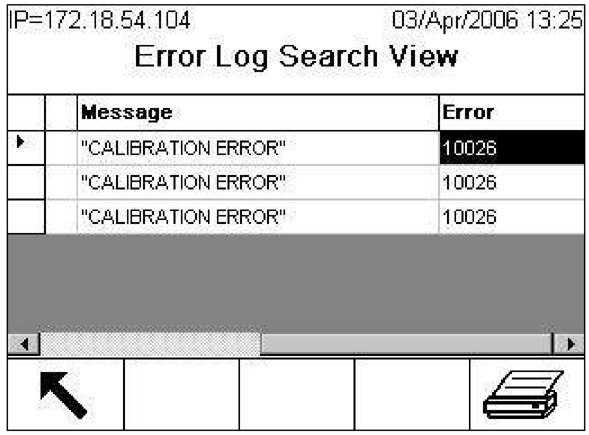


Figure C-42: Error Log Search View, Scrolled Right

5. Use the UP and DOWN navigation keys to focus on any record.
6. Press the EXIT softkey to return to the Error Log Search Screen.

C.8.2. Resetting the Error Log File

The Error Log file is **not** reset when a Master Reset is performed, but the file can be manually reset in setup.

C.8.2.1.1. To Reset the Error Log File

1. Press the SETUP softkey and select **Maintenance** > **Configure** > **Error Log**.
2. Press the RESET softkey to reset the log file. A warning screen similar to the one shown in Figure C-33 displays, asking for verification. Press the OK softkey to continue. A status message displays verifying that the reset was successful. To return to the configuration screen without performing the reset, press the ESCAPE softkey Esc.

C.8.3. Error Log File Structure

Table C-10 uses a typical record to show the structure of the Error Log file. The commas used to separate fields are not shown in this example.

Table C-10: Error Log File Record Structure

Timestamp	Severity	Source	Error Code	Message
2006/08/29 08:35:57	E	A	0018	COMMUNICATION_TIMEOUT

Error codes are device-specific. Each code is associated with an explanatory message.

C.8.3.1. Severity

Table C-11 explains the Severity codes used in a log entry. These codes do not appear in the Error Log Search View.

Table C-11: Error Log File Record Structure

Severity Code	Explanation
F	**Fatal error** requiring system halt. On detection, an "F" error will immediately initiate a flush of the memory buffers to their associated log files.
C	**Critical error** signaling a serious condition that will affect overall performance or functionality of the system. An example would be loss of an option card.
E	**Error** that in general is recoverable, or which the system is able to handle. Note: It is likely that a persistent error condition may result in a critical error.
I	**Message** that is intended to provide information to help service personnel resolve issues.

Critical errors (F, C) generate a message box that must be dismissed by pressing ENTER. The message indicates corrective action that must be taken to restore the Terminal to normal operation. Non-critical errors (E, I) are displayed, typically for 10 seconds, in the System Line at the top of the home screen. Some errors stay on the System Line for 3-5 seconds and then reappear periodically if the error is not resolved – for example, POWERCELL No Response errors. The System Line View settings do not affect the display of these errors.

C.8.3.2. Source

Error sources by device type are detailed in Table C-12.

Table C-12: Error Log Source and Format, by Device Type

Source Code	Device Type	Format
A	Measurement Adapter (scale, flowmeter, temperature)	PCCx
C	COM port Adapter	xxxx
D	Discrete I/O Adapter	Cxxx
E	Main CPU / Baseboard	xxxx
F	Template errors	xxxx
H	HMI (display, keypad, keyboard) Adapter	xxxx
I	Interpreter (Task Expert)	xxxx
N	Network Adapter (Ethernet, USB, PLC)	xxxx
P	PLC or PC – a network partner	xxxx
S	Shared Data	xxxx
T	Terminal – a network partner	xxxx
U	Application software	xxxx

C.8.3.3. Format of Error Code

Error codes are constructed as follows:

X	X X	X
If more than one instance is possible, the first digit identifies it.	If there is more than one instance, and it has 'children', these two digits identify the child, in hexadecimal notation.	Error number. Corresponds to the Message that appears in the Error Log and the System Message Line
	Example	
2xxx = Scale Channel 2	x03x = error affecting load cell at address 3	xxx8 = no response from POWERCELL

Thus, an error code will have one of the following configurations:

xxxx One instance, all digits represent the error

Pxxx Multiple instances; first digit (P) represents instance to which the error applies

PCCx Multiple instances with subordinate items; first digit (P) represents the parent instance, next two digits (CC) identify the child

C.8.3.4. Interpretation of Errors

The error message only gives a general indication of source, so to interpret errors arising from sources with multiple instances it is useful to know the structure of the four-digit code. In the example used above, the error message displayed in the system message line and recorded in the error log would be POWER_CELL_NO_RESPONSE. The corresponding code, 2038, comprises a parent (the scale channel or network of POWERCELLS) and 2-digit child (the specific POWERCELL affected), but only the final digit is reflected in the error message. However, the error log would show A as the source code. The structure of the code (refer to Table C-12) is thus known, so the channel and cell affected can be determined.

C.9. PDX Performance Log File

The PDX Performance Log can be set to automatically record data in Setup at **Maintenance > Configure > PDX Performance Log**. The PDX Performance Log is a FIFO file that overwrites the oldest record when it becomes full. It will hold approximately 1,600 individual records. If the file is not reset, it will continue to store records until it is 100% full and then begin overwriting the oldest records.

The PDX Performance Log provides a summary of the performance and diagnostics data collected on a scale with POWERCELL PDX load cells. The items logged include data such as load cell raw counts, cell error counters, cell voltages and temperature.

C.9.1. Viewing PDX Performance Log File Records

Only a METTLER TOLEDO authorized service representative can retrieve the PDX Performance Log records. The log file can only be viewed using an authorized version of the InSite SL software program or accessed as a comma-separated value (.csv) file, downloaded using any FTP client PC or with the Backup to USB feature.

C.9.1.1.1. To View the PDX Performance Log File

The PDX Performance Log does not automatically log records by default. To setup the automatic logging, go to the **Maintenance > Configure > PDX Performance Log** setup screen (Figure C-43) and enter an appropriate log interval, between 0.1 and 999.9 hours. A typical value for day-to-day operation is 12, but for diagnostic purposes this interval can be much smaller. A manual record can also be triggered using the PDX PERFORMANCE LOG softkey .

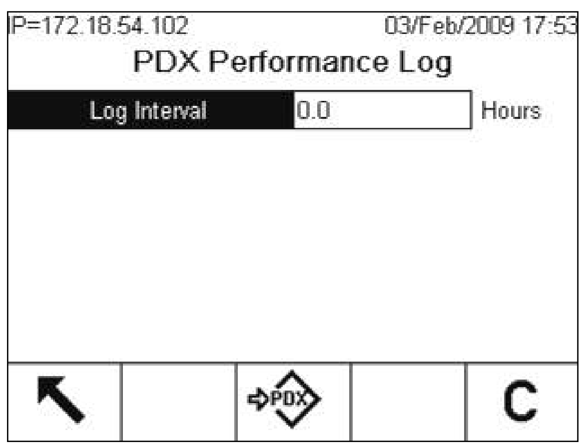


Figure C-43: PDX Performance Log Setup Screen

1. To retrieve the log records, the MT Service Security feature must be unlocked. To unlock from the terminal, press the SETUP softkey and select **Maintenance > Run > MT Service Security**. The MT Service Security screen (Figure C-44) displays. Refer to Chapter 3, **Configuration** for information on how to create the Lock String and enter the matching Key String. The terminal can also be unlocked when connected online via Ethernet to an authorized version of InSite SL.

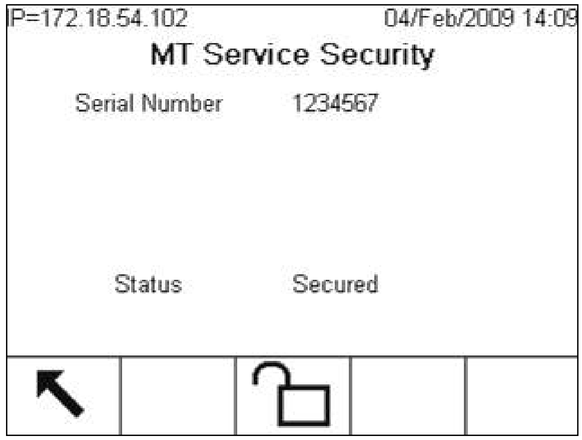
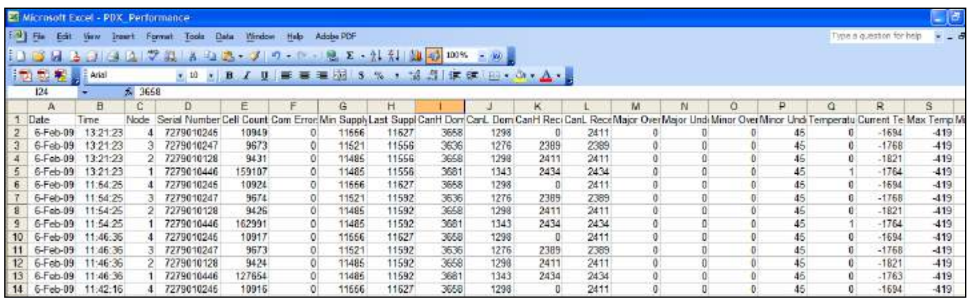


Figure C-44: MT Service Security Secured Screen

2. Once the MT Service Security is unlocked, use either InSite, an FTP client PC or the Backup to USB feature to access the log file. If using the FTP client, refer to Appendix D, Communications for information on accessing the terminal's FTP server. The file and path name for the log is /Terminal/HIS/PDX_Performance.csv.
3. The .csv file can be opened using a PC program such as MS Excel, as shown in Figure C-45.


Microsoft Excel - PDX_Performance

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Date	Time	Node	Serial Number	Cell Count	Com Error	Min Supply	Last Suppl	CanH Dom	CanL Dom	CanH Rec	CanL Rece	Major Over	Major Und	Minor Over	Minor Und	Temperatu	Current Te	Max Temp
2	6-Feb-09	13:21:23	4	7279010246	10949	0	11666	11627	3658	1298	0	2411	0	0	0	45	0	-1694	-419
3	6-Feb-09	13:21:23	3	7279010247	9673	0	11521	11556	3636	1276	2389	2389	0	0	0	45	0	-1768	-419
4	6-Feb-09	13:21:23	2	7279010128	9431	0	11485	11556	3658	1298	2411	2411	0	0	0	45	0	-1821	-419
5	6-Feb-09	13:21:23	1	7279010446	159107	0	11485	11556	3681	1343	2434	2434	0	0	0	45	1	-1764	-419
6	6-Feb-09	11:54:25	4	7279010246	10924	0	11666	11627	3658	1298	0	2411	0	0	0	45	0	-1694	-419
7	6-Feb-09	11:54:25	3	7279010247	9674	0	11521	11592	3636	1276	2389	2389	0	0	0	45	0	-1768	-419
8	6-Feb-09	11:54:25	2	7279010128	9426	0	11485	11592	3658	1298	2411	2411	0	0	0	45	0	-1821	-419
9	6-Feb-09	11:54:25	1	7279010446	162991	0	11485	11592	3681	1343	2434	2434	0	0	0	45	1	-1764	-419
10	6-Feb-09	11:46:36	4	7279010246	10917	0	11666	11627	3658	1298	0	2411	0	0	0	45	0	-1694	-419
11	6-Feb-09	11:46:36	3	7279010247	9673	0	11521	11592	3636	1276	2389	2389	0	0	0	45	0	-1768	-419
12	6-Feb-09	11:46:36	2	7279010128	9424	0	11485	11592	3658	1298	2411	2411	0	0	0	45	0	-1821	-419
13	6-Feb-09	11:46:36	1	7279010446	127654	0	11485	11592	3681	1343	2434	2434	0	0	0	45	0	-1763	-419
14	6-Feb-09	11:42:16	4	7279010246	10916	0	11666	11627	3658	1298	0	2411	0	0	0	45	0	-1694	-419

Figure C-45: PDX Performance Log

4. By default the records are sorted by time and date, with the most recent showing first. Each record row represents the data collected for a specific PDX cell node.

C.9.2. Resetting the PDX Performance Log File

The PDX Performance Log is cleared each time a Master Reset is performed. It can also be manually reset in setup.

C.9.2.1.1. To Reset the File Manually

1. Go to the **Maintenance > Configure > PDX Performance Log** setup screen (Figure C-43).
2. Press the CLEAR softkey **C** to clear the log records and reset the log file. A warning screen (Figure C-46) displays, requesting verification. Press the ESCAPE softkey **Esc** to cancel the operation or the OK softkey **OK** to confirm it.

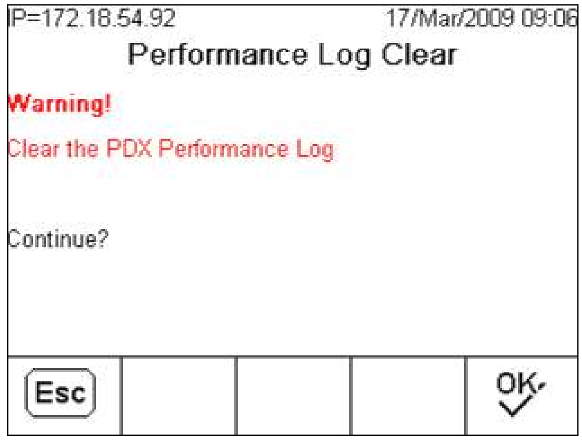


Figure C-46: PDX Performance Log Clear Screen

3. A status message displays, verifying that the reset was completed.

C.9.3. PDX Performance Log File Structure

The PDX Performance Log file is available as a comma separated value file. The file includes a header row with the fields as described in Table C-13. Each row of record represents the data captured for a PDX cell connected to the terminal.

Table C-13: PDX Performance Log Data Fields

Data Field	Description
Date	Date when the record was generated.
Time	Time when the record was generated.
Node	PDX cell node address.
Serial Number	The unique factory serial number embedded in the cell.
Cell Counts	Load cell counts at the time the record was generated.
Com Errors	Total number of cell communication errors.
Min Supply Voltage	Minimum cell input supply voltage measured in millivolts.
Last Supply Voltage	Last measured cell input supply voltage in millivolts.
CanH Dominant Voltage	Cell CAN-High voltage recorded for Dominant mode in millivolts.†
CanL Dominant Voltage	Cell CAN-Low voltage recorded for Dominant mode in millivolts. †
CanH Recessive Voltage	Cell CAN-High voltage recorded for Recessive mode in millivolts. †
CanL Recessive Voltage	Cell CAN-Low voltage recorded for Recessive mode in millivolts. †
Major Overvoltage Count	Total number of severe or long term over-voltage events detected by the IND780 PDX option board for all connected cells. Possible causes include a near lightning strike or a short circuit.
Major Undervoltage Count	Total number of severe or long term under-voltage events detected by the IND780 PDX option board for all connected cells. Possible causes include a near lightning strike or an overloaded supply.
Minor Overvoltage Count	Total number of intermittent over-voltage events detected by the IND780 PDX option board for all connected cells. Possible causes include a distant lightning strike or a short circuit.

Data Field	Description
Minor Undervoltage Count	Total number of intermittent under-voltage events detected by the IND780 PDX option board for all connected cells. Possible causes include a distant lightning strike or an overloaded supply.
Temperature Deviation	The deviation in cell temperature since last scale calibration, calculated by subtracting the current temperature from the temperature at time of calibration.
Current Temperature	The current temperature sensor reading in the cell.
Max Temperature	Maximum cell temperature recorded.
Min Temperature	Minimum cell temperature recorded.
Gas Concentration	Current level (%) of inert gas concentration enclosed in the cell.
Zero Drift Errors	Total number of cell zero drift errors.
Zero Drift Value	Current cell zero drift value in primary weight units.
Cell Overloads	Total number of cell overload errors.
Average Overload Weight	The weight value detected by the cell and recorded as an average each time it is overloaded. In primary weight units.
Symmetry Errors	Total number of cell symmetry drift errors.
Symmetry Difference	Current cell symmetry difference (%) value.
Total Transactions	Total number of print transactions for a specific scale.

Note

† These values are stored from the last time the Load Cell COM Voltage Screen was accessed.

C.10. Table Reports

The Alibi Memory, Tare Table, and Target Table can be viewed by an operator by pressing the REPORTS softkey . Results of the table views can also be printed. The table report structures are based on the fields defined in the table and report configuration. Setup of the format for the report print is described below in Formatting Reports. Sample report printouts are provided in the Reports section of Appendix D, Communications.

In order to use the report function, the REPORTS softkey must be added to the selection of softkeys on one of the home pages (see Appendix E, Softkey Mapping).

C.10.1. Viewing and Printing a Table Report

C.10.1.1.1. To View and/or Print a Table Report

1. Press the REPORTS softkey . The Reports Run screen displays (Figure C-47).

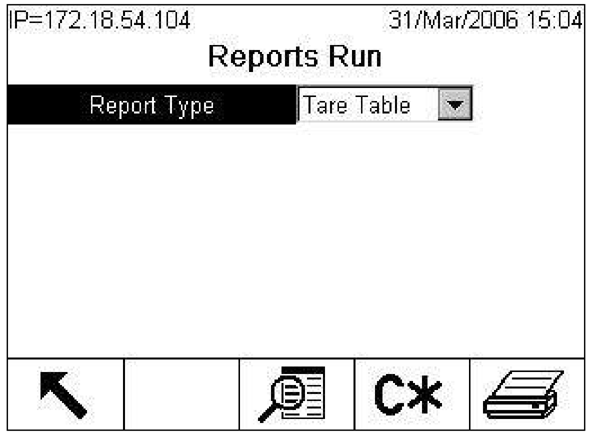


Figure C-47: Reports Run Screen

2. Select the table to view (or from which to print a report) from the Report Type list. Note that the available softkeys will change based on the selection of the type of report.
3. After selecting the report, either press the PRINT softkey or the VIEW TABLE softkey . A "Reports" connection must be assigned in setup at **Communication > Connections**, in order to allow the report to print.
4. If the VIEW TABLE softkey was pressed, a table search screen displays. These screens are shown in Figure C-4, Figure C-10 and Figure C-21, depending upon which table is being searched.
5. Use the Search Field selection boxes and associated data fields to enter specific search information to limit the search, or use the default "find all" character, the asterisk (*) to view all records.
6. Press the Search softkey to view the results of the search (see Figure C-5, Figure C-11, Figure C-22 through Figure C-27).

C.10.2. Formatting Reports

C.10.2.1.1. To Format Reports for Printing

1. Press the SETUP softkey and open **Setup > Communication > Reports**. The screen shown in Figure C-48 displays.

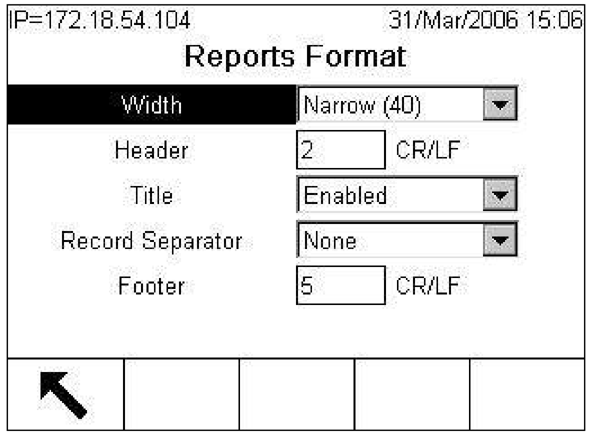


Figure C-48: Reports Format Screen

2. Make settings as appropriate:

- The report is sent to the printer using standard ASCII codes and characters (refer to Appendix G, **ASCII Standard and Control Characters**). Sample reports are provided in the Reports section of Appendix D, **Communications**.

  - Width sets the width in characters of each report. Options are Narrow (40) and Wide (132).
  - Header and Footer set the number of line feeds placed at the start and end of each report.
  - When Enabled, Title causes a title line to print at the head of the report.
  - Record Separator allows the choice of characters used to separate records in the report. Options are None, asterisk (*), hyphen (-), equal (=), and Carriage Return/Line Feed.

1. Once settings are selected, press the EXIT softkey to confirm the changes.

D. Communications

D.1. Overview

This document describes the physical connections available in the IND780 Terminal. It then details the logical connections that can be defined to use them, and explains the available communication modes, commands and protocols.

D.2. Physical Connections

D.2.1. Serial

The main PCB of the IND780 includes two serial ports, COM1 and COM2.

COM1 provides an RS-232 interface – three-wire (TXD, RXD, and GND) with XON/XOFF flow-control capabilities (handshaking).

COM2 can be configured as an RS-232, RS-422 or RS-485 interface. The RS-422 interface is a four-wire interface designed for single point-to-point communication. When Com2 is configured as an RS-422 port, the Transmit line is "On," even when no data is being transmitted. This operation is consistent with the standard operation of an RS-422 port, but differs in function from many legacy Mettler Toledo terminals. If compatibility with the "multi-drop" mode of operation for an RS-422 port is required, select RS-485 as the Interface Type and connect to the RS-422 connections.

In addition, the terminal can support up to two single-channel Serial port option boards, providing RS-232, RS-422 or RS-485 interfaces. If present, these ports are designated **COM3** and **COM4**.

Character framing is programmable in the setup mode. Framing can be:

- 1 start bit
- 7 or 8 ASCII data bits (selectable)
- 0 or 1 parity bit (none, even, or odd)
- 1 stop bit

The baud rate can be configured from 300 to 115.2K baud and a checksum character can also be configured for the standard continuous output string.

The IND780 terminal uses software handshaking to control data flow commonly referred to as XON/XOFF handshaking. When a receiving device (typically a printer) is getting information from an IND780 terminal and cannot receive any more in its buffer, it sends an ASCII XOFF (13h) telling the IND780 terminal to temporarily stop sending data until its buffer clears.

When the device can receive more data, it sends an ASCII XON (11h) telling the IND780 terminal to begin sending data again. This process can occur as often as required by a receiving device.

The XON/XOFF method is the only type of handshaking that is supported by the IND780 terminal.

The IND780 terminal supports two different modes of data output – demand and continuous.

D.2.2. Ethernet

D.2.2.1. Overview

The Ethernet port for the IND780 provides a connection to an Ethernet network. Up to 10 clients can be connected to the IND780 at one time. The Ethernet port can be used for the following functions:

- Shared data access
- Demand output
- Continuous output
- FTP
- Flashing new IND780 software
- Terminal network clustering for remote console and interface sharing
- Connection to the InTouch Remote Services enterprise

D.2.2.2. Ethernet Port

The Ethernet port for the IND780 provides a way to interface a PC to the IND780 to download and upload files and configuration information. In order to carry out these functions, the IND780 must be connected to the PC with an Ethernet cable. The Ethernet port supports auto-negotiation, half or full duplex, 10 or 100 mbits per second.

D.2.2.3. Cables

There are two types of Ethernet cables: Patch and Crossover. Patch cables are used to connect a PC to a network or a hub. The easiest way to connect a PC to the IND780 via Ethernet is to use a crossover Ethernet cable (Figure D-1). A crossover cable connects directly from the PC Ethernet port to the IND780 Ethernet port (no hubs or network needed). If a crossover cable is unavailable, it is possible to still connect with two patch cables and a hub (Figure D-2). Both types of Ethernet cable are readily available at stores that sell computer equipment.

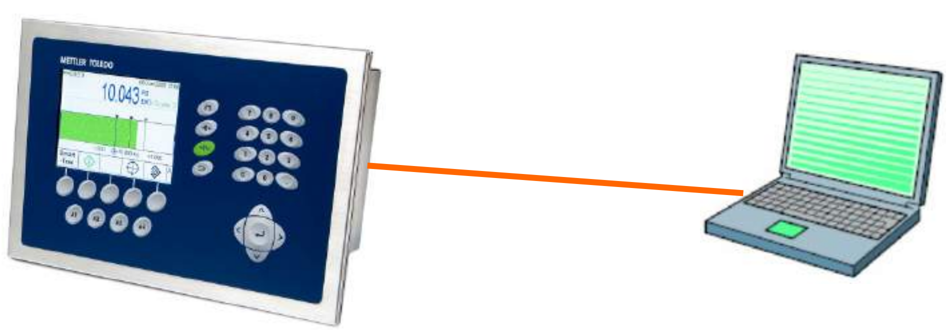


Figure D-1: Connecting the IND780 to a PC with a Crossover Cable

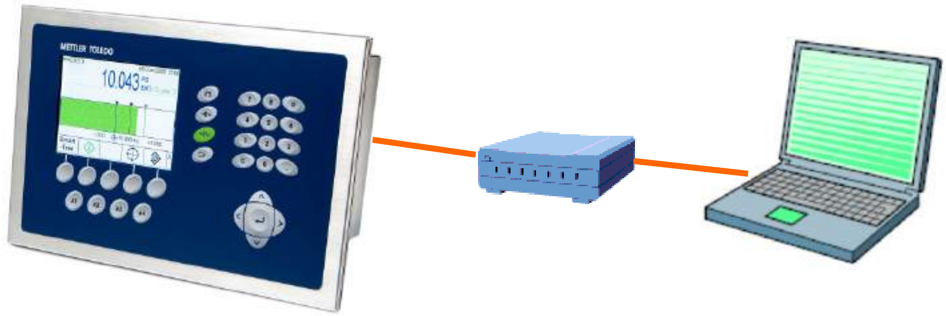


Figure D-2: Connecting the IND780 to a PC with Patch Cables

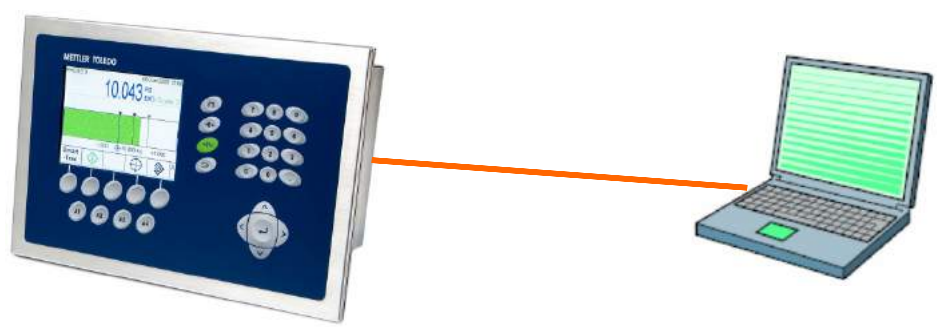
D.2.2.4. IP Address Setup

The IP addresses must be set up on both the IND780 and the PC, as follows:

1. Check the IND780 IP address and subnet mask and note the numbers to configure the PC. (See Chapter 3 of this manual, **Configuration | Communication | Network** for information about network configuration.)
2. The PC and the IND780 should have the same subnet mask.
3. The PC and the IND780 must have unique IP addresses. The IP address numbers must be the same where the subnet mask is 255, but different where the subnet mask is 0, as indicated in Table D-1 and Figure D-3.

Table D-1: IP Address Configuration Example (for Crossover or Hub Configuration)

IND780 IP Address	192	168	0	1
Subnet Mask	255	255	255	0
PC IP Address	192	168	0	2



IND780 Setup

IP Address: 192.168.0.1

Subnet Mask: 255.255.255.0

PC Setup

IP Address: 192.168.0.2

Subnet Mask: 255.255.255.0

Figure D-3: IP Address Configuration Example (for Crossover or Hub Configuration)

4. The PC IP address and subnet mask may be configured by accessing the screens shown in Figure D-4, Figure D-5 and Figure D-6 on the PC as follows:

a. In Windows, click on **Start | Settings | Network Connections** (Figure D-4).

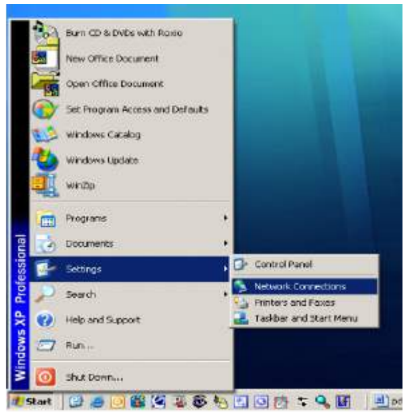


Figure D-4: Accessing the Network Connections Screen

b. The window shown in Figure D-5 will display:

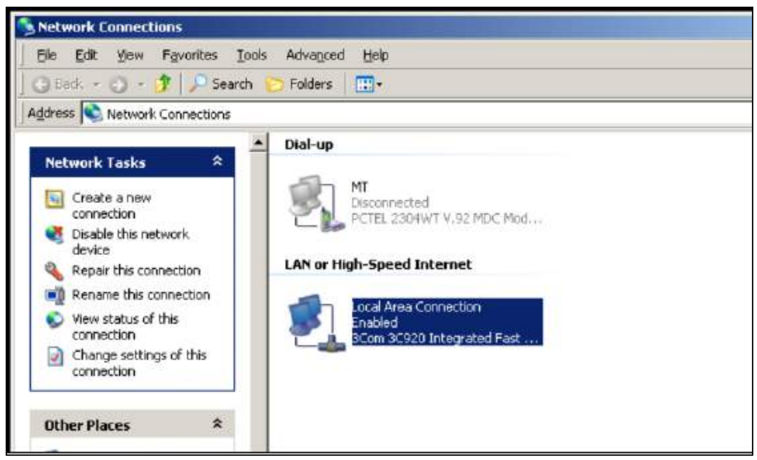


Figure D-5: Network Connections Screen

c. Right-click the local area internet connection and select Properties.

d. In the Properties pane (Figure D-6), select Internet Protocol (TCP/IP) and click the Properties button. The Internet Protocol Properties window (at right in Figure D-6) displays.

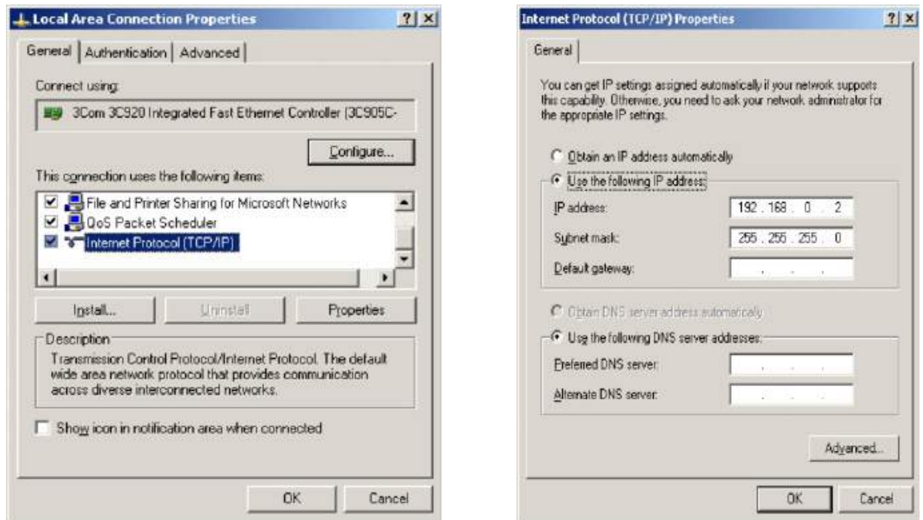


Figure D-6: Local Area Connection and Internet Protocol Properties Dialog Boxes

e. Typically, "Obtain an IP address automatically" is checked. However, to connect to the IND780, set the PC IP address and subnet mask by selecting "Use the following IP address".

f. Enter the IP address and subnet mask settings for the specific PC.

g. Click on the OK button.

- After disconnecting from the IND780 and before reconnecting to the PC's normal network connection, remember to change the Internet Protocol (TCP/IP) Properties Screen setting back to "Obtain an IP address automatically," or to whatever setting was active when the screen was first accessed.

D.2.3. Remote Discrete I/O (ARM100)

The IND780 provides the ability to expand the discrete input and output control to remote ARM100 devices. This ability is required when more than eight inputs or eight outputs are used (these are limits of the internal discrete I/O option) or, depending on the application, when it is beneficial to have all of the I/O external to the IND780. In addition to the two sets of internal I/O, the IND780 supports eight sets of external I/O.

The communication link from the IND780 terminal to the ARM100 remote discrete I/O module is an RTU-based RS-485 communication protocol. During power-up, if remote discrete I/O has been enabled, communication will be established between the IND780 terminal and the remote modules. Any communication errors will be shown on the system line of the IND780's display. The error message will be displayed for 5 seconds for each respective remote module. Errors in communication to a remote module will automatically shut off all internal and remote I/Os assigned to the target controls (.e.g feed, fast feed, tolerance) as a safety precaution.

Since the communication link is RS-485, only COM2 and the optional COM3 and COM4 may be programmed for use with the ARM100 (COM1 is RS-232 only). This communication uses both the input and output portions of the port so it cannot be shared with any other connections. When "Remote Discrete I/O" is selected as the assignment for COM2, COM3 or COM4, the communication parameters are automatically preset by the terminal and cannot be changed from the front panel – they can only be viewed. The parameters are:

- Baud Rate 57600
- Data bits 8
- Parity None
- Flow Control None
- Interface RS-485

After wiring the ARM100 modules (including the terminating resistor mentioned in Appendix A of this manual, **Installation**) and programming the assignment in the connections portion of setup, the remote modules should be operational. When assigning functions to remote discrete I/O locations, the remote modules are addressed by 1.0.x for module #1, 2.0.x for module #2, and so on for each subsequent ARM100. Each module provides four inputs and six dry-contact relay outputs.

Example

Tare assigned to discrete I/O input address 1.0.1.

This indicates that when input #1 is turned on in remote module #1, a tare will be taken.

D.2.4. USB

The onboard USB port is used for firmware upgrades, and for backing up and restoring system configuration files using a USB flash-drive. The port also allows the use of an external QWERTY keyboard.

The selection of the proper language type for the keyboard enables correct access to the layout of the appropriate keyboard for that language. The default condition of the external keyboard is to enable NUM LOCK, supporting use of the numeric keypad. Functions of the external keyboard are listed in Table D-2 and Table D-3.

Table D-2: External Keyboard ESCAPE Key Functions

Current Focus	Function
Home screen	Moves cursor into quick access entry mode
Setup menu tree	Returns to home screen
Setup screen, no field in focus	Returns to setup menu tree
Setup screen, alphanumeric entry field in focus	Closes alpha key display, field remains in focus
Setup screen, list box item in focus	Leaves previous list selection in place, moves focus to next field label

Table D-3: Keyboard Mapping

Keypad	External Keyboard	Keypad	External Keyboard
A1	F10 / ALT and F1	7	Numeric keypad 7
A2	F11 /ALT and F2	8	Numeric keypad 8

Keypad	External Keyboard
A3	F12 / ALT and F3
A4	APPS Key / ALT and F4
SK1	F1
SK2	F2
SK3	F3
SK4	F4
SK5	F5
1	Numeric keypad 1
2	Numeric keypad 2
3	Numeric keypad 3
4	Numeric keypad 4
5	Numeric keypad 5
6	Numeric keypad 6

Keypad	External Keyboard
9	Numeric keypad 9
0	Numeric keypad 0
.	Decimal
C (Clear)	Backspace
Enter	Enter
Left Arrow	Left arrow
Right Arrow	Right arrow
Up Arrow	Up arrow
Down Arrow	Down arrow
Scale Select	F6
Zero	F7
Tare	F8
Print	F9

D.3. Logical (User-Definable) Connections

D.3.1. Inputs

D.3.1.1. ASCII Input

With the IND780 terminal, a bar code scanner or other ASCII device can be connected to a port and used as an input device to enter ASCII data. This is done with the ASCII Input connection type. When this input type is selected, the assignment for the data received must also be specified. Available assignments include:

- Application
- Tare
- Tare ID
- Target ID
- Keypad

As part of the programming for using the ASCII input, an input template must be configured. The template feature permits removal of a preamble (preceding characters) and a postamble (trailing characters) that are not part of the desired data. Using these parameters in the setup of the input template, the number of characters to be ignored before and after the data is programmed. These must be the same for each data input string the IND780 receives.

An input will be terminated after the receipt of the programmable "Termination Character" or a 10 second timeout if no new are characters received. At this time, any input data that has been collected will be applied to the selected assignment. This could be an actual value such as a preset tare value, or it could initiate a look-up into the tare or target table by selecting Tare ID or Target ID, or it could be used to enter data into an ID prompt sequence or entry box similar to a keypad input.

The following notes apply to how ASCII input is handled by the input template:

- The Preamble Length selects how many characters should be skipped at the beginning of an input string before the desired data.

- Data Length defines the maximum length of a string. All characters beginning after the Preamble through the Length selection will be used as the input.
- The Postamble length is the number of characters (before the Termination Character) that will be stripped off the data string. All other data from the Preamble Length to the Termination Character minus the Postamble Length will be used as the input string. When using an input that is always the same fixed length, this field would remain blank.
- The Termination Character is used to signal the end of the string input. It can be any ASCII control character. If "None" is selected, the timeout feature will terminate the entry.
- There is also a 10 second timeout feature that tracks the amount of time between characters. If this 10 second time is exceeded, the string will be considered terminated.

Example

Preamble of 2, Data length of 5, Postamble of 0, Termination Character of <CR>, Input assignment of Tare.

Data received is: <STX>P001.5 kg<CR>

The preamble of 2 removes the <STX> and P characters. The next 5 characters of 001.5 are the actual data. The postamble is set to 0 because the data field has already been filled so no characters have to be removed. The <CR> terminates the input.

This string would input 1.5 as a preset tare to the IND780.

This same data could be obtained by programming a Preamble of 2, Data length of 8, Postamble of 3, Termination Character of <CR>. The Postamble length of 3 would remove the <space>kg from the data field since they are the last 3 characters received before the <CR>.

D.3.1.2. CTPZ

The CTPZ input mode provides a method for a remote device to trigger several basic functions when a control character is sent to the IND780 via the COM1 - COM4 or EPrint ports. Remote ASCII control characters and the IND780 terminal responses include:

- C – Clears the scale to gross
- T – Tares the scale (causes a pushbutton tare)
- P – Initiates a print command
- Z – Zeros the scale

ASCII control characters can be sent in upper- or lower-case. All other characters are ignored. It is possible to assign CTPZ input to a specific scale by selecting the desired scale as the trigger in the connections setup. If the scale trigger is set to none, then the CTPZ input is directed to the active selected scale.

Example

To initiate a pushbutton tare on a specific scale, program the terminal for CTPZ input for a specific COM port and specific scale trigger, program the serial port parameters to match the other device and then send the ASCII character "T".

If the CTPZ scale trigger is set to none, the ASCII control characters are directed to the active selected scale unless a scale designation character is included in the control characters. You can specify a scale to receive the control character by preceding the control character/s with the designation A (for Scale 1), B (scale 2), K (scale 3), D (scale 4) or E (sum scale).

Example

To take a Pushbutton tare on scale 1 regardless of which scale is selected, send the command AT. Similarly, the command BT takes a pushbutton tare on scale 2 regardless of the selected scale.

It is possible to enter a Keyboard Tare by preceding the "T" with a numeric value. For example, 10.5T enters a tare value of 10.5 on the currently selected scale. For two scales, enter Keyboard Tare using the desgination A or B before the tare value. For example, A2000T enters a tare of 2000 on scale 1.

D.3.2. Keyboard Input

The Keyboard Input mode provides a method for a remote serial device (e.g. a keyboard or barcode scanner) to send ASCII data to the IND780, or to act as a remote keyboard. Data input to an ID prompt sequence or data entry box is possible. The Keyboard Input accepts ASCII characters 0x20 through 0x7e hex and converts the characters to appropriate US keyboard key values. It also handles keyboard control keys using ANSI or VT200 escape sequences to map to the keypad functions on the IND780. The following table shows the control keys supported and the data expected:

Keyboard Control Keys	ANSI Hex Key Code(s)	VT200 Hex Key Code(s)	IND780 Keypad
Ctrl-A	01	01	A1
Ctrl-B	02	02	A2
Ctrl-C	03	03	A3
Ctrl-D	04	04	A4
Backspace	08	08	C (Clear)
Enter / Return	0d	0d	Enter
ESC	1b	1b	Escape/ Exit
F1	1b 4f 50	1b 5b 31 31 7e	SK1
F2	1b 4f 51	1b 5b 31 32 7e	SK2
F3	1b 4f 52	1b 5b 31 33 7e	SK3
F4	1b 4f 53	1b 5b 31 34 7e	SK4
F5	1b 4f 54	1b 5b 31 35 7e	SK5
F6	1b 4f 55	1b 5b 31 37 7e	Scale Select
F7	1b 4f 56	1b 5b 31 38 7e	Zero
F8	1b 4f 57	1b 5b 31 39 7e	Tare
F9	1b 4f 58	1b 5b 32 30 7e	Print
Delete	7f	7f	Delete
Up Arrow	1b 5b 41	1b 5b 41	Up Arrow

Keyboard Control Keys	ANSI Hex Key Code(s)	VT200 Hex Key Code(s)	IND780 Keypad
Down Arrow	1b 5b 42	1b 5b 42	Down Arrow
Right Arrow	1b 5b 43	1b 5b 43	Right Arrow
Left Arrow	1b 5b 44	1b 5b 44	Left Arrow

D.3.3. Outputs

D.3.3.1. Demand Output Mode

The demand output mode transmits data only when the IND780 terminal receives a print request. Print requests are sent to the IND780 terminal when:

- The operator presses the PRINT function key
- A discrete input selected as print is triggered
- An ASCII "P" is sent through a command input port
- Auto print is enabled and all conditions for auto print are met
- A PLC command to print is received
- The "Print" command shared data is triggered

When triggered, data is transmitted in a string programmed in the template editing portion of setup. Demand mode is used typically when sending data to a printer or PC on a transactional basis. When a user logs into the shared data server, he or she acquires the level of access for the username and password used. All levels of users can receive a demand string.

In versions previous to 6.5.xx, there is a combined total limit of 1,000 characters for each demand print transmitted through the serial and Ethernet port. The print is aborted and a printing error is logged in the error log when an attempt is made to output more than 1,000 characters in single demand print. This has to be taken in consideration when combining different templates into a main template for output. In firmware versions 6.5.x and above, there is no restriction on the number of characters that can be output in a demand print. One important feature of this revised functionality is that the contents of the buffer are lost if power is cycled, meaning that the repeat print function will not be available after a power loss.

D.3.3.2. Custom Triggers

Twenty programmable custom triggers are available in the Connections section of setup. These can be used to "trigger" a specific demand output. This could be used to provide a separate "Print" key (using a discrete input) that prints a template to a different serial port or Ethernet. Using the custom triggers enables printing of different information to the same port or a different port based on which custom trigger is initiated. While not normally used, these custom triggers provide great flexibility in configuring demand outputs.

A connection using a custom trigger is configured like a standard demand output except that one of Triggers 1 to 20 is selected as the trigger instead of a Scale or Sum Scale. These triggers are available if the Connection is assigned to one of the IND780's COM ports, or to one of the Ethernet ports, Enet 1 through 3 and EPrint.

Custom Triggers 1-5 may also be assigned to one of the discrete inputs, softkeys or A1-A4 application keys to initiate the demand output. A custom trigger can also be initiated directly by a PLC command (refer to the **IND780 PLC Interface Manual**) or by toggling one of the cp0101, cp0102, or cp0103 shared data variables (refer to the **IND780 Shared Data Reference**).

D.3.3.3. Output Templates

The IND780 provides ten templates to define a custom string of data to be transmitted. A template can be used with a demand mode connection, a custom trigger connection or with a continuous template connection. In the setup of the terminal, a template is tied to an output connection so that when that connection is triggered, the selected template will be transmitted. Three default templates are configured as follows:

Template 1	Template 2
• XX.XX kg	• Scale ID
• XX.XX kg T	• Current Time
• XX.XX kg N	• Current Date
	• XX.XX kg
	• XX.XX kg T
	• XX.XX kg N

Template 5

Totals Report

Current Time	Current Date
Subtotal:	
n = XXX	XXX.XX kg
Grand Total:	
n = XXX	XXXX.XX kg

Each template can store up to 1,000 bytes of data. Table D-4 defines how the 1,000 bytes are calculated. There is no warning if a template overflows this limit until the template is saved. At this time, any information over the 1,000-byte limit will be lost. The InSite CSL program does track the size of the template as it is being built and provides an appropriate warning if the limit is exceeded. Nonetheless, there is a combined total limit of 1,000 characters for each demand print transmitted over the serial and Ethernet port. A printing error message will appear when an attempt is made to output more than 1,000 characters in single demand print. This has to be taken in consideration when combining different templates into a main template for output.

Table D-4: Calculation of Template Data Bytes

Print Field	Space Used
IND780 Data Field	8 characters
Special Character	4 characters + code (2 or 3 characters depending on the character)
String Field	String length + quantity (1 or 2)

Print Field	Space Used
Justify a Field	2 characters + justify letter (L, R, C) + space limit (1, 2, or 3 characters)
Zero Fill a Field	2 characters + Z + space limit (1, 2 or 3 characters
Repeat Character	5 characters + number (1, 2 or 3 digits for number of times repeated
Line end <CR><LF>	7 characters

D.3.3.3.1. Template Example

The following example shows a customer ticket that has three centered template strings in a 40-character wide field, and an asterisk underline.

DAGGER DAVE'S WORLD
OF WOVEN RUGS!
ANY SIZE - EVERY COLOR
****

Use the information in Table D-5 to calculate how much of the template remains for field data.

Table D-5: Space Required for the Example Ticket Heading Information

Character Description	Character Total
IND780 Field (String 1)	8 (IND780 shared data field)
Centered (Justify in 40-character field)	2 + 1 (letter C) + 2 (two digits for quantity 40)
CR (ASCII Carriage Return character)	2 + 1 (one digit for quantity 1)
LF (ASCII Line Feed character)	2 + 1 (one digit for quantity 1)
Total space required (each line)	19
Total for all three lines (19 × 3)	57
ASCII (*) character	1 (ASCII character)
Repeat (*) 40 times	5 (repeat function)
CR	2 + 1 (one digit for quantity 1)
LF (ASCII Line Feed character)	2 + 1 (one digit for quantity 1)
Total space for line of asterisks	12
Grand total of characters (57 + 12)	69
Total characters remaining in this template (1,000 – 69)	931

- For template space calculation:

  Regardless of the number of characters in an IND780 terminal data field, a template uses only eight characters (the field code).

  Justification uses four to six characters that are not used if the field remains unjustified.

D.3.3.4. Demand Output Via Ethernet Connection

If a demand output connection to Enet 1-3 is made in the connections section of setup, a remote device may "register" to receive the data through the Ethernet port. In order to do this, the remote device must login to the shared data server and send the command to register for the data. The login can be any valid username and password for the terminal.

- When a user logs into the shared data server, he or she acquires the level of access for the username and password used. All levels of users can receive a demand string.

If a demand output connection to EPrint is made in the connections section of setup, a remote device is not required to "register" with the Shared Data Server to receive the data through the Ethernet port. The data string simply contains the assigned template's information. The EPrint connection is made via the secondary TCP/IP port at the user-defined port number (set up at **Communication > Network > Port**).

D.3.3.5. Registering for the Demand Output

The "printout" command allows the client to define a Demand Print Stream as a callback field. The Demand Print Streams include demand print (triggered by the scale) and custom triggers (triggers 1, 2, and 3). The console print server sends a message to the client at each print output. Since print messages can span multiple message blocks (depending upon size), the start of the print message has a <dprint> tag and the end of the message has a </dprint > tag. After registering for the demand output, the client will receive the appropriate data stream. The "ctimer" command specifies the minimum time between repeated callback messages. The "xprintout" command removes the registration from the terminal and the communication will stop.

- The "xgroup all" command will also terminate any demand output registrations.

D.3.3.6. Sequence Example 1

1. Access setup, and open **Communications > Connections**. Press the NEW softkey and create a connection for Demand Output assignment to the Enet1-3 port triggered by Scale using Template 2.
2. Ensure that the IP and Gateway addresses are programmed properly. The client could use the primary port at 1701 or the secondary port at a user-defined port number (configured in Setup at **Communication > Network > Port**) to receive the demand output.
3. Login to the shared data server from the client, (see "user" command in the Shared Data Server section).
4. Register to receive the demand data by entering the "printout 1" command.
5. The IND780 will acknowledge the registration with a message [00Gxxx~number PRINTOUT streams=1]. Now, whenever a demand print is generated, the Template 2 data will be sent to the client.

```
00P004 <dprint>Scale 1
01:33:10
06/Sep/2005
  17.08 lb
  17.08 lb T
   0.00 lb N
</dprint>
```

The "xprintout" command allows the client to remove the print output callback registration thus stopping the demand output.

D.3.3.7. Sequence Example 2

1. Access setup, and open **Communications > Connections**. Press the NEW softkey and create a connection for Demand Output assignment to Enet 1-3 ports triggered by Trigger 1 using Template 1.
2. Ensure that the IP and Gateway addresses are programmed properly. The client could use the primary port at 1701 or the secondary port at a user-defined port number (configured in Setup at **Communication > Network > Port**) to receive the demand output.
3. Login to the shared data server from the client, (see "user" command in the Shared Data Server section).
4. Register to receive the demand data by entering the "printout 1" command.
5. The IND780 will acknowledge the registration with a message [00Gxxx~number PRINTOUT streams=1]. Now, whenever the custom trigger is initiated (by a programmed discrete input or PLC command), the Template 1 data will be sent to the client.

   00P004 <dprint> 17.08 lb
     17.08 lb T
      0.00 lb N
   </dprint>

The "xprintout" command allows the client to remove the print output callback registration thus stopping the demand output.

D.3.4. Continuous Output Mode

The continuous output mode of the IND780 can be used to send weight data and scale status information continuously to a remote device such as a PC or a remote display.

D.3.4.1. Standard Continuous Output

Continuous mode can be assigned to COM1, COM2, COM3, COM4 or Ethernet. When more than one Continuous Output scale triggers are assigned to a single serial port, only the current selected scale's data string will be output. Checksum can be enabled or disabled on the COM1 - COM4 serial ports with continuous output. A data string will be output approximately 20 times per second for baud rates above 4800 baud. If a baud rate below 4800 is selected, the output rate will be slower. At 300 baud, the output rate is only approximately 2 per second. The format is fixed, except for baud rate, parity, data flow (XON/XOFF), and interface type. The data consists of 17 or 18 bytes as shown in Table D-6.

Non-significant weight data and tare data digits are transmitted as spaces. The continuous output mode provides compatibility with METTLER TOLEDO products that require real-time weight data. Table D-6 shows continuous format output.

Table D-6: Continuous Output Format

		Status			Indicated Weight						Tare Weight							
Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Data	STX	STA	STB	STC	MSD	-	-	-	-	LSD	MSD	-	-	-	-	LSD	CR	CHK
Note	A	B			C						D						E	F

- Continuous Output Format Notes

  A. ASCII Start of Text character (02 hex), always transmitted.

  B. Status words. Refer to Table D-7, Table D-8 and Table D-9 for details.

  C. Displayed weight. Either gross or net weight. Six digits, no decimal point or sign. Insignificant leading zeroes are replaced with spaces.

  D. Tare weight. Six digits of tare weight data. No decimal point in field.

  E. ASCII Carriage Return <CR> character (0D hex).

  F. Checksum, transmitted only if enabled in setup for COM1/2/3/4. Checksum is used to detect errors in the transmission of data. Checksum is defined as the 2's complement of the seven low order bits of the binary sum of all characters preceding the checksum character, including the <STX> and <CR> characters.

Table D-7, Table D-8, Table D-9 detail the standard status bytes for standard continuous output.

Table D-7: Status Word A Bit Definitions

Bits 2, 1, and 0			
2	**1**	**0**	**Decimal Point Location**
0	0	0	XXXXX00
0	0	1	XXXXX0
0	1	0	XXXXXX
0	1	1	XXXXX.X
1	0	0	XXXX.XX
1	0	1	XXX.XXX
1	1	0	XX.XXXX
1	1	1	X.XXXXX
Bits 4 and 3			
4	3		**Build Code**
0	1		X1
1	0		X2
1	1		X5
Bit 5			Always = 1
Bit 6			Always = 0

Table D-8: Status Word B Bit Definitions

Status Bits	Function
Bit 0	Gross = 0, Net = 1
Bit 1	Sign, Positive = 0, Negative = 1
Bit 2	Out of Range = 1 (Over capacity or Under Zero)
Bit 3	Motion = 1, Stable = 0

Status Bits	Function
Bit 4	lb = 0, kg = 1 (see also Status Byte 3, bits 0-2)
Bit 5	Always = 1
Bit 6	Zero Not Captured = 1

Table D-9: Status Word C Bit Definitions

Bits 2, 1, and 0			Weight Description
2	1	0	
0	0	0	lb or kg, selected by Status Byte B, bit 4
0	0	1	grams (g)
0	1	0	metric tons (t)
0	1	1	ounces (oz)
1	0	0	troy ounces (ozt)
1	0	1	penny weight (dwt)
1	1	0	tons (ton)
1	1	1	custom units
Bit 3			Print Request = 1
Bit 4			Expand Data x 10 = 1, Normal = 0
Bit 5			Always = 1
Bit 6			Always = 0

D.3.5. Continuous – Extended Output

The continuous - extended output is a 24 byte message string that is an extension of the standard 17 bytes continuous output format. (An optional checksum is provided with COM1/2/3/4.) The additional bytes serve to provide a node address and, optionally, custom application bits. This format supports control of traffic lights in the ADI320 and ADI420 remote scoreboards.

There are two ways of utilizing the extended continuous output. One is for a point-to-point application and the other is a multi-drop application. The same format supports both applications.

For a multi-drop application, the output string consists of separate messages for each scale assigned to the continuous – extended output. Each scale's message is identified by monitoring the address byte in the output string. The node address can be assigned to the respective scales in the connections setup.

Table D-10 describes the continuous – extended output format. The output takes the form shown here:

<SOH><ADR><SB-1><SB-2><SB-3><SB-4><WWWWWWWWWW><TTTTTTTT><CR><CKS>

Table D-10: Format of Continuous – Extended Output

			Status				Indicated Weight									Tare Weight									
Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Data	SOH	ADR	SB1	SB2	SB3	SB4	W	W	W	W	W	W	W	W	W	T	T	T	T	T	T	T	T	CR	CKS
Note	A	B	C				D									E								F	G

- Continuous Output Format Notes

A. ASCII Start of Header character (01H)

B. Address character (31H - 39H) always present - default of 31H. If multi-drop communication is employed, each receiving device must have a unique address byte.

C. Status Bytes 1 to 4. Refer to Table D-11, Table D-12, Table D-13 and Table D-14.

D. Displayed weight (gross or net). Nine (9) ASCII digits including negative sign, decimal point. Leading zeros are set to spaces (20H). A minus sign (2DH) is sent immediately before the MSD for negative weights. Digits sent when data is invalid can be weight, zeros, or spaces (they should be ignored by receiving device). This field may also contain asynchronous error codes, when the data invalid bit is set.

E. Tare weight. Eight (8) ASCII digits including decimal point. Leading zeros set to spaces (20H).

F. ASCII carriage return (0DH).

G. Optional checksum. This character is the 2's complement of the sum of the 7 least significant bits of all preceding characters including the <SOH> and <CR>. The checksum character is transmitted with the same parity as all other characters.

Table D-11, Table D-12, Table D-13 and Table D-14 indicate the functions of status bytes 1, 2, 3 and 4.

Table D-11: Status Byte 1 Definitions

Bit 3	Bit 2	Bit 1	Bit 0	Units
0	0	0	0	None
0	0	0	1	pounds
0	0	1	0	kilograms
0	0	1	1	grams
0	1	0	0	metric tons
0	1	0	1	tons
0	1	1	0	troy ounces
0	1	1	1	pennyweight
1	0	0	0	ounces
1	0	0	1	custom
1	0	1	0	reserved
1	0	1	1	reserved
1	1	0	0	reserved
1	1	0	1	reserved
1	1	1	0	reserved

Bit 3	Bit 2	Bit 1	Bit 0	Units
1	1	1	1	reserved
Bit 4		Center of zero = 1		
Bit 5		Always = 1		
Bit 6		Weight in motion = 1		

Table D-12: Status Byte 2 Definitions

Bit	Description	
Bit 0	Gross or net mode, Net = 1	
Bit 2	**Bit 1**	**Tare type**
0	0	No tare
0	1	Auto or semi-auto tare
1	0	Preset tare
1	1	Tare memory
Bit 4	**Bit 3**	**Weight range**
0	0	Single range
0	1	Weight range 1
1	0	Weight range 2
1	1	Weight range 3
Bit 5	Always = 1	
Bit 6	Expanded by x10 = 1	

Table D-13: Status Byte 3 Definitions

Bit	Description
0	Data invalid = 1
1	Out of range under zero = 1
2	Out of range over capacity = 1
3	In power up (zero not captured) = 1
4	Print initiated = 1
5	Always = 1
6	Below MinWeigh threshold = 1

Table D-14: Status Byte 4 Definitions

Bit	Description
0	Application Bit 1 (as--35)
1	Application Bit 2 (as--36)
2	Application Bit 3 (as--37)
3	Application Bit 4 (as--38)
4	Application Bit 5 (as--39)
5	Always = 1

6	Application Bit 6 (as--40)

- Continuous – Extended Output Format Notes
  - If a tare weight has been identified as a Tare Memory type in Status Byte 2, it indicates that the value in the tare field might be a gross weight or a tare weight depending upon the application. This would be used when the terminal is programmed for net sign correction and the gross and tare weights have not been determined yet.
  - The Data Invalid bit in Status Byte 3 indicates an overcapacity value, an under zero condition, or other conditions that indicate the weight value may not be valid. Any device reading the continuous output must monitor the Data Invalid bit and handle the data accordingly.
  - The application bits in Status Byte 4 may be used for different functions by the IND780 in custom applications. These bits represent the dynamic statuses in the application shared data fields as--35 to as--40 that are controlled by a TaskExpert application. When not used, these bits are set to zeros.
  - Besides setting the Data Invalid bit to 1 in Status Byte 3 when the weight data is not available, the indicated weight data field could be replaced with an asynchronous error code. The 9-character weight field is replaced with the following error code data format:

Indicated Weight Field Character	Description
1	Always "E" (45 Hex) indicating an error message
2 – 5	Error source
6 – 7	Error code
8 – 9	Space (20 Hex)

Error Source	Indicated Weight Field Character 2	Indicated Weight Field Character 3, 4, 5
Scale	A	000
Other	U	000

  - The error code is a 2 character field that corresponds to the error message captured in the Error Log of the terminal. Examples of error code include 2e (Scale Overcapacity) or 2f (Scale Under Zero).

D.3.6. Multi-Continuous Out

There are two variations of multi-continuous output – multi-continuous 1 and 2.

D.3.6.1. Multi Cont 1

This continuous output is used with multi-scale scoreboards (except 8616). The string consists of separate messages for every enabled scale and the sum of the structure for each scale's message is shown below. The table shows an example of the complete output for two scales and, below it, a detail of one scale's component of the output. The channel identification character (e.g. 01H) replaces the STX leading character for that channel.

01H	Stat ABC	Gross Wt.	Tare	CR	CKS	02H	Stat ABC	Gross Wt.	Tare	CR	CKS

AD R	SW A	SW B	SW C	X	X	X	X	X	X	X	X	X	X	X	X	CR	CKS
1	2 Status Bytes			3 Gross / Net Weight						4 Tare						5	6

Notes

1. ASCII Character in hex that represents the scale address 01=scale 1, 02=scale 2, 03=scale 3, 04=scale 4, 05=scale 5 (sum).
2. <SWA>, <SWB>, <SWC> Status Word Bytes A, B, and C. Refer to the Standard Bit Identification Tables for individual bit definition.
3. Displayed weight, either Gross or Net weight. Six digits, no decimal point or sign. Non significant leading zeros are replaced with spaces.
4. Tare weight. Six digits, no decimal point or sign.
5. <CR> ASCII Carriage Return, Hex 0d.
6. <CKS> Checksum character (only available for COM1/2/3/4 connections), 2's complement of the 7 low order bits of the binary sum of all characters on a line prececing the checksum, including the STX and CR.

D.3.6.2. Multi Cont 2

This continuous output is used with multi-scale remote displays and 8618 scoreboard (set for protocol P:22). The string consists of separate messages for every enabled scale. The leading character for each channel is always STX. Each channel is identified by the binary encoding of the channel number in the three least significant bits (0-2) of Status Byte C – refer to Table D-17. The structure for each scale's message is:

STX	SW A	SW B	SW C	X	X	X	X	X	X	X	X	X	X	X	X	CR	CKS
1	2 Status Bytes			3 Gross / Net Weight						4 Tare Weight						5	6

Notes

The scale must be set up for sum and cannot have continuous output selected on any other port.

1. <STX> ASCII Start of Text Character, Hex 02.
2. <SWA>, <SWB>, <SWC> Status Word Bytes A, B, and C. Refer to the Bit Identification Tables for individual bit definition.
3. Displayed weight, either Gross or Net weight. Six digits, no decimal point or sign. Non-significant leading zeros are replaced with spaces.
4. Tare weight. Six digits, no decimal point or sign.
5. <CR> ASCII Carriage Return, Hex 0d.

6. <CKS> Checksum character (only available for COM1/2/3/4 connections), 2's complement of the 7 low order bits of the binary sum of all characters on a line preceding the checksum, inlcuding the STX and CR.

The following tables detail the standard status bytes for continuous output.

Table D-15: Bit Identification Table for Status Byte A

Bit 0	Bit 1	Bit 2	Decimal Point Location
0	0	0	XXXX00
1	0	0	XXXXX0
0	1	0	XXXXXX
1	1	0	XXXXX.X
0	0	1	XXXX.XX
1	0	1	XXX.XXX
0	1	1	XX.XXXX
1	1	1	X.XXXXX
Bit 3	**Bit 4**		**Build Code**
1	0		X1
0	1		X2
1	1		X5
Bit 5			Always = 1
Bit 6			Always = 0

Table D-16: Bit Identification Table for Status Byte B

Status Bits	Function
Bit 0	Gross=0, Net=1
Bit 1	Sign, Positive=0, Negative=1
Bit 2	Out of Range =1 (Over capacity or under zero)
Bit 3	Motion=1
Bit 4	lb=0, kg=1 (see also Status Byte C, bits 0-2)
Bit 5	Always=1
Bit 6	In Power Up=1

Table D-17: Bit Identification Table for Status Byte C

Bit 0	Bit 1	Bit 2	Weight Description
1	0	0	Scale A
0	1	0	Scale B
1	1	0	Scale C
0	0	1	Scale D
1	0	1	Scale E (Sum)

Bit 3	Print Request=1
Bit 4	Expand Data x 10=1
Bit 5	Always=1
Bit 6	Always=0

D.3.7. Continuous Template Output

If continuous template is selected as the assignment for a connection, a custom string of data can be configured using one of the ten available templates. When a continuous template output is selected, the output rate will depend on the size of the template and the baud rate selected. The rate will vary from approximately once per second up to approximately 20 times per second. Refer to Table D-18 for estimated output rates of a 160 byte template.

Table D-18: Continuous Template Output Rate

Baud Rate	Outputs/Second	Baud Rate	Outputs/Second
300	1	9600	10
600	2	19200	12
1200	4	38400	14
2400	6	57600	16
4800	8	115200	18

The template can include any combination of elements (IND780 Field Codes, ASCII characters, or print strings). Note that the output rate may be adversely affected by transmitting a large template or selecting a slow baud rate.

The template is configured as explained above in the Demand Output Mode, Output Template section, and in Chapter 3, **Configuration**. The template used in continuous output must not exceed 200 characters.

D.3.7.1. Continuous Output via Ethernet Connection

If a continuous output or continuous template output connection to Enet4 is made in the connections section of setup, a remote device may "register" to receive the data through the Ethernet port. In order to do this, the remote device must login to the shared data server and send the command to "register" for the data. The login can be any valid username and password for the terminal.

- When a user logs onto the shared data server, they acquire the level of access of the username and password used. All levels of users can receive a continuous string.

If a continuous output type of connection to Eprint is made in the connections section of setup, a remote device is not required "register" with the Shared Data server, to receive data through the Ethernet port. The data string simply contains the assigned continuous output or template information. The Eprint connection is made via the secondary TCP/IP port a the user-defined secondary port number (configured in setup at **Communication > Network > Port**).

D.3.7.2. Registering for the Continuous Output

The "contout" command allows the client to define the continuous output string as a callback field. The Console Print Server sends a message to the client at each continuous output. The continuous output message is either in the Standard METTLER TOLEDO Continuous Output format or in a continuous template format. The "ctimer" command specifies the minimum time between repeated callback messages. The "xcontout" command removes the registration from the terminal and the communication will stop.

- The "xgroup all" command will also terminate any continuous output registrations.

D.3.7.3. Sequence Example

1. Access setup, and open **Communications > Connections**. Press the NEW softkey and create a connection for Continuous Output assignment to the Ethernet port triggered by Scale. Note that continuous out is only available via the Enet 4 connection.
2. Ensure that the IP and Gateway addresses are programmed properly. The client could use the primary port at 1701 or the secondary port at a user-defined port number (configured in setup at **Communication > Network > Port**) to receive the continuous output.
3. Login to the shared data server from the client, (see "user" command in the Shared Data Server section).
4. Register to receive the continuous data by entering the "contout" command.
5. The IND780 will acknowledge the registration with a message [00Gxxx~number CONTOUT streams=1]. Now, whenever a continuous output string is generated by the IND780, the data will be sent to the client.

```
00C148 COUT 4! 354 236
>
00C149 COUT 4! 354 236
>
00C150 COUT 4! 354 236
>
00C151 COUT 4! 354 236
```

- The "xcontout" command allows the client to remove the continuous output callback registration thus stopping the continuous output.

D.4. Shared Data Access

All setup parameters, triggers and statuses in the IND780 are stored and routed through "Shared Data". This is a system of memory mapping that permits remote clients to send commands and receive data from the terminal. In order to access the shared data variables in the IND780, a remote client must login to the Shared Data Server. Access is provided through the Ethernet port.

- The shared data server is available via port 1701. For applications that have no access to port 1701, a second port can be enabled. To enable the second port, enter the desired port number in setup at **Communication > Network > Port**. Regardless of the method used, the same access is provided and the login procedure is very similar.

D.4.1. Shared Data Server Login

Shared data access is available from the Ethernet port.

To login to the Shared Data Server via Ethernet:

1. Program appropriate IP and Gateway addresses into the IND780 in the Communication, Network branch of the menu tree.
2. Connect a crossover cable between the remote client PC and the IND780.
3. Open a program in the client PC to communicate with the IND780 (such as HyperTerminal).
4. Create a TCP/IP connection to the IP address programmed in the IND780 at port 1701, or the port assigned in setup using the secondary port number.
5. If the IP and Gateway addresses and the cable connection are correct, the IND780 will display: 53 Ready for user
6. Type: user xxxxx where xxxxx is a valid username programmed in the **Terminal > Users** branch of the setup menu tree. The access level of the username used will determine which shared data variables can be accessed.
7. If a password is required for the username in the previous step, the terminal will display: 51 Enter password. If no password is required, skip to step 9.
8. Type: pass xxxxx where xxxxx is the valid password for the username entered in step 6.
9. Response from IND780: 12 Access OK. If the username or password is invalid, the response from the IND780 is: 93 No Access.
10. The remote client PC is now logged onto the Shared Data Server.

D.4.2. Shared Data Server Commands

After connecting to the Shared Data Server in the IND780, several commands are available for use by the client. All commands can be given in either upper- or lower-case letters. The quotation marks shown are for clarity only and should not be transmitted. The valid commands are described in the following sections.

- **Response Format**: "Read", "write", and "callback" message responses have a formatted header. The first two characters indicate the status. "00" is the success status. "99" is a failure status. The next character is the type of message, "R", "W", or "C". The next three characters are a sequence number, which cycles from 001 to 999, and then starts over again.

If the command sent to the IND780 has a syntax error or is invalid, the terminal will respond with: 81 Parameter Syntax Error or 83 Command Not Recognized.

D.4.2.1. "user" Command

A client must login to the SDSV using the "user" command before accessing Shared Data. The server validates the username and sends a response message back to the user. The SDSV responds with [Access OK] if no password is required or [Enter password] if a password is required.

A client can use only the "user", "pass", "help" and "quit" commands before successfully logging on.

Format: user username

Response 1: 12 Access OK

Response 2: 51 Enter Password

D.4.2.2. "pass" Command

The user enters a password using the "pass" command. If the password is valid, the server displays the [Access OK] message. If not valid, the server displays the [No access] message.

Format: pass password

Response: 12 Access OK

D.4.2.3. "help" Command

The "help" command returns the list of the valid commands for the IND780.

Format: help

Response: 02 USER PASS QUIT READ R WRITE W SYSTEM CALLBACK XCALLBACK GROUP RGROUP XGROUP CTIMER LOAD SAVE HELP NOOP CONTOUT XCOUNTOUT PRINTOUT XPRINTOUT

D.4.2.4. "quit" Command

The "quit" command terminates the TCP/IP connection.

Format: quit

Response: 52 Closing connection

D.4.2.5. "read" Command

The "read" command allows the client to read a list of one or more Shared Data fields. An individual field or an entire block can be read. If more than one field is requested, the fields should be separated by a space. If successful, the server responds with a separated list of values in ASCII format. The server separates individually requested fields with a "~"; and Shared Data separates items within a block with a "^". If an error is detected, the server responds with an error message. The maximum length of the reply message is 1,024 characters.

Format: read SDV#1 SDV#2

Example 1: read wt0101 wt0103

Response 1: 00R003~ 17.08~lb~

Example 2: read sp0100 (reads entire block)

Response 2:
00R012~XP/0163M^1^^78^20.500000^0^0^0^1.200000^3.500000^0.150000^0.050000^0^0.000000^0.000000^0^0^0^0^0^1^0.000000^0.000000^0.000000^0.000000^0.000000^~

- The 'read' command can be abbreviated as just the letter "r" if desired.

D.4.2.6. "write" Command

The "write" command allows the client to write a list of one or more Shared Data fields. A single field or an entire block can be written. The maximum length of the write message is 1,024 characters. Items within a list of writes must be separated with a "~". You must separate items within a block with a "^".

Format: write SDVblock#1=value1^value2^ value3 write SDV#1=value1~SDV#2=value2~SDV#3=value3

Example1: write ak0100=abc^def^hij^lmn (writes fields into a block)

Response 2: 00W006~OK

Example 2: write aj0101=12.56~aj0150=987.653 (writes fields within a list)

Response 2: 00W007~OK

- The "write" command can be abbreviated as just the letter "w" if desired.

D.4.2.7. "system" Command

The "system" command returns a description of the IND780 terminal. This is the same information that is shown on the Recall System Information screen of the IND780.

Format: system

Response: 00S001~IND780 SYSTEM INFO RECALL
Model: IND780
S/N:
ID1: IND780
ID2: Mettler Toledo
ID3:
Hardware
HMI Color
POWERCELL
Analog Load Cell
Serial IO
Discrete IO
780VETE (Pac)
Software
IND780 RST: 5.1
IND780 CP: 5.1
VehiclePack.cpt: 5.1

D.4.2.8. "systat" Command

The "systat" command returns a description of the IND780 terminal's resource utilization such as the CPU load and memory use.

Format: systat

Response: 00S001~IND780, D173678R.0, WinCE 4.20,
TotalMemory=24576 KB FreeMemory=7888 KB MemoryLoad=68
TotalStore =24504 KB FreeStore =24258 KB CPU Load =25

D.4.2.9. "noop" Command

The "noop" command performs no task; it checks communication and returns an [OK] response message.

Format: noop

Response: 00OK

D.4.2.10. "callback" Command

The "callback" command allows the client to define one or more fields for which the Shared Data Server sends a message to the client when the value of the callback field is updated or changes. Only certain SDV may be included in a callback command. These SDV are noted by an "rc" or "rt" status in the column after the structure column in the Shared Data document. Mainly, these are triggers that are used in the terminal. SDV with a status of "na" are not real-time SDV and cannot be used in callbacks. Certain dynamic SDV (eg. wt--, wx--, etc) is updated continuously and will generate a callback message periodically eventhough the value of the variable is unchanged.

The callback message contains one or more changed field names and the new value for each field. A maximum of twelve callback fields can be specified. The "ctimer" command specifies the minimum time between repeated callback messages.

Format: callback SDV#1 SDV#2

Example: callback st0102 st0103 st0104

Response 1: 00B001~OK

Response 2: 00C005~st0102=0^st0103=1^st0104=1 (sent when all of the SDV change)

Response 3: 00C006~st0104=0 (sent when only st0104 changes)

D.4.2.11. "xcallback" Command

The "xcallback" command allows the client to remove one or more callback fields from the list of current SDV.

Format: xcallback SDV#1 SDV#2 or xcallback all (removes all callbacks)

Example: xcallback st0102 (removes st0102 SDV from callback)

Response: 00X008~OK

D.4.2.12. "group" Command

The "group" command allows the client to define a group of callback fields. The Shared Data Server sends a message to the client when the value of any field in the group changes. The group callback message contains the group number and the values of all fields in the group in the defined order. The "ctimer" command specifies the minimum time between repeated callback messages. The maximum number of groups is six, and the maximum number of fields in a group is twelve.

Format: group n SDV#1 SDV#2 SDV#3 (where n = the number of the group 1–6)

Example: group 5 st0103 st0104 st0107 (groups target feeding and tolerance SDV into one group)

Response 1: 00B019~OK

Response 2: 00C026~group5=0^1^0 (indicates status of all 3 SDV in group 5 whenever any one of them changes)

D.4.2.13. "rgroup" Command

The "rgroup" command allows the client to define a group of fields. The client can use the group number to read the entire group at once using the READ command. The maximum number of groups is six, and the maximum number of fields in a group is twelve.

Format: rgroup n SDV#1 SDV#2 (where n = the number of the group 1–6)

Example: rgroup 3 di0101 di0102 di0103 di0104 (groups all discrete inputs into one group that can be read with a single read command)

Response: 0G008~group=3, number fields=4

Read Example: r 3

Response: 00R009~1~0~1~0~

D.4.2.14. "xgroup" Command

The "xgroup" command allows the client to remove one or all groups.

Format: xgroup n (where n = the group number 1 - 6) or XGROUP all (removes all groups, including "contout" and "printout")

Example: xgroup 5 (cancels group 5)

Response: 00X011~group=5

D.4.2.15. "contout" Command

The "contout" command allows the client to define the continuous output string as a callback field. The Console Print Server sends a message to the client at each continuous output. The continuous output message is either in the Standard METTLER TOLEDO Continuous Output format or in a continuous template format. The "ctimer" command specifies the minimum time between repeated callback messages. The "xcontout" command removes the registration from the terminal and the communication will stop.

- Refer to the Ethernet Continuous Output section earlier in this chapter for examples of using the "contout" command.

Format: contout

Response: 00G008~number CONTOUT streams=1

When a continuous output occurs to the Ethernet port, the data will be sent to the client formatted as selected in setup.

Data: 00C004 4! 354 236
00C005 4! 354 236

D.4.2.16. "xcontout" Command

The "xcontout" command allows the client to remove the continuous output callback, thus ending the registration so no further continuous outputs will be available.

Format: xcontout

Response: 00X070~CONTOUT

- Also refer to the Ethernet Continuous Output section earlier in this chapter for details on the "xcontout" command.

D.4.2.17. "printout 1" Command

The "printout" command allows the client to define a Demand Print Stream as a callback field. The Demand Print Streams include demand print (triggered by the scale) and custom triggers (triggers 1, 2, and 3). The console print server sends a message to the client at each print output. Since print messages can span multiple message blocks (depending upon size), the start of the print message has a <dprint> tag and the end of the message has a </dprint > tag. After registering for the demand output, the client will receive the appropriate data stream. The "ctimer" command specifies the minimum time between repeated callback messages. The "xprintout" command removes the registration from the terminal and the communication will stop.

- Refer to the Ethernet Demand Output section earlier in this chapter for details on using the "printout" command.

Format: printout 1

Response: 00G008~number PRINTOUT streams=1

When a demand output occurs to the Ethernet port, the data will be sent to the client formatted by the selected template. There will be <dprint> and </dprint> delimiters for the string.

Data: 00P004 <dprint> 22.08 lb
 17.06 lb T
  5.02 lb N
</dprint>

D.4.2.18. "xprintout" Command

The "xprintout" command allows the client to remove the print output callback, thus ending the registration so no further demand outputs will be available.

Format: xprintout

Response: 00X070~PRINTOUT

- Refer to the Ethernet Demand Output section earlier in this chapter for details on the "xprintout" command.

D.4.2.19. "ctimer" Command

The "ctimer" command allows the client to set the minimum time between repeated callback messages in milliseconds. The minimum allowable setting is 50 milliseconds and the maximum is 60 seconds. The default value is 500 milliseconds.

Format: ctimer n (where n is the number of milliseconds)

Example: ctimer 1000 (set the callback timing to 1 second)

Response: 00T862~new timeout=1000

D.4.2.20. "csave" Command

The "csave" command saves the current callback and group settings into Shared Data for use later with the "cload" command.

Format: csave

Response: 00L004~OK

D.4.2.21. "cload" Command

The "cload" command loads the callback and group settings from Shared Data into the shared data server. The terminal will begin to service the loaded callback and group commands.

Format: cload

Response: 00L001~OK

D.4.3. FTP Connections

D.4.3.1. Establishing an FTP Connection

An FTP connection may be established with the IND780 using either of two methods. The preferred method is via Internet Explorer. The terminal can also be addressed from DOS, or through a DOS window running under Windows. In the latter case, the directory structure of the IND780 software must be known in order to navigate appropriately.

- Files may also be transferred to and from the Terminal using the InSite SL or CSL program. Refer to the help system provided with InSight for information on its function and capabilities.

- Backup and upgrade files may also be transferred to and from the Terminal via its USB port. Refer to Chapter 4, **Service and Maintenance**, for detailed descriptions of these procedures.

D.4.3.1.1. Making an FTP Connection Using Internet Explorer

To connect to the IND780 via FTP using Internet Explorer:

1. Open Internet Explorer, and type the terminal's address into its address line as shown in the example in Figure D-7. Press ENTER.

Figure D-7: Terminal FTP Address

2. Explorer will display the IND780's directory structure (Figure D-8).

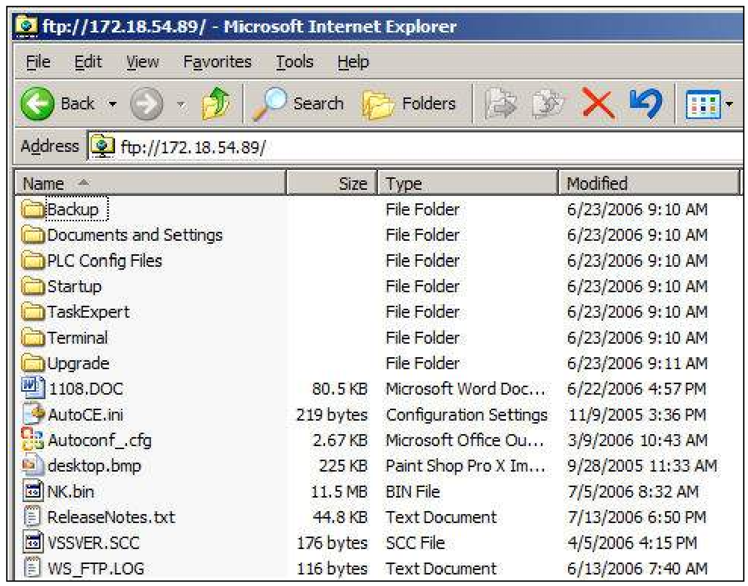


Figure D-8: Internet Explorer FTP Window

3. Right click in the window, and select Login As… from the context menu. When prompted, enter a valid user name and password, and click the LOG ON button.
4. Files may now be copied to and from the terminal by dragging or by using cut and paste operations.
5. When file transfers are complete, close the Internet Explorer window to terminate the FTP session.

D.4.3.1.2. Making an FTP Connection from DOS

The preferred method for upgrading firmware, backing up and restoring files is via the InSite™ CSL tool, or via the USB port using the appropriate pages in Setup. However, when files are transferred through the Command prompt using an FTP client, the following commands are used:

- get – all files can be read using this command
- put – only certain files can be downloaded back to the IND780 terminal

In order to access any files from the IND780, the client must login to the FTP server. Valid usernames and passwords are entered in the setup under Communications, Network, FTP and each username is assigned an access level. All access levels can read files but only maintenance and administrator levels can write new files to the terminal (see Chapter 3, **Configuration** for further information about configuring FTP usernames, passwords, and access levels).

Table D-19 indicates file names and paths for files that a user might want to transfer or copy using an ftp connection to the terminal. These files are in comma separated value (**.csv**) format, and can be opened and edited in a spreadsheet program such as Excel.

Table D-19: IND780 Files and Paths

File Name	Path	Description of File
Change.csv	/Terminal/HIS	Contents of the change log
Error.csv		Contents of the error log
Maintenance.csv		Contents of the maintenance log
PDX_Performance.csv		Contents of the PDX Performance log
Caltest1.cfg – Caltest4.cfg	/Terminal/Caltest	Contains weight and serial number of weights used when running the Calibration Test. One file for each scale. File only exists if weights have been recorded in the Test Weight View.
CalWT1.cfg – CalWT4.cfg		Contains definition of Calibration Test weights configured in setup at **Maintenance > Configure > Scale n > Calibration Test**. One file for each scale. File only exists if test weights have been defined.
Standard_A0.csv - Standard_A9.csv	/Terminal/TABLES	Tables A1 to A4 (Tare and Target Table configuration) and A0, A3-A9 (IND780vehicle configuration)

Table Notes

- **Alibi.csv**, stored in the HIS directory, is not formatted for direct access as a spreadsheet.
- Tare, Target and Message tables can be accessed and modified only through the IND780 interface, and cannot be downloaded and viewed externally.

Table D-20 lists files that should be copied to the terminal's Upgrade folder in order to install new firmware. Once the files are copied, re-booting the terminal will automatically overwrite existing files with the new ones.

Table D-20: IND780 Firmware Upgrade Files

File Name and Path	
NK.bin	\Terminal\DIC\SD.dic
\Terminal\Excalibur.exe	\Terminal\DIC\SD.val
\Terminal\SoftKeyManagerDLL.dll	\Terminal\JDD\BRAM.JDV
\Terminal\CP\langtran.dll	\Terminal\JDD\FLASH.JDV
\Terminal\CP\sdvalid_fill_pak.dll	\Terminal\JDD\HEAP.JDV

File Name and Path	
\Terminal\CP\sdvalid_standard.dll	\Terminal\JDD\MEEPROM.JDV
\Terminal\CP\sdvalid_vehicle_pak.dll	\Terminal\CP\setup.exe
\Terminal\CP\setup.sdf	

The following procedure shows how one might use an FTP connection to upload the calibration test to a PC running Microsoft Windows, modify the file, then download it to the terminal. The complete sequence is shown in Figure D-9.

1. A valid username and password from the FTP server of the IND780 terminal is required. Refer to the **Communication > Network > FTP** section of Chapter 3, **Configuration**.
2. The client must also know the IP address of the IND780 and a valid network connection established between the client and the terminal is required before beginning. Refer to the Ethernet section, Ethernet Connection to a PC earlier in this chapter.
3. Open the command prompt window in the client PC and type: ftp
4. Press ENTER. The command line should now display: ftp>.
5. To open the FTP connection, type open xxx.xxx.xxx.xxx where the xxx.xxx.xxx.xxx represents the IP address of the IND780 terminal.
6. Press ENTER. The display should indicate that service is ready and prompt for the username.
7. Enter the username from the IND780 FTP user list.
8. Press ENTER. If the username is valid, the display will prompt for a password.
9. Enter the password for the username used.
10. Press ENTER. If the login procedure was successful, the prompt line will now display: ftp>
11. Enter the command: get <filename>, where filename includes the path and name of the file to be copied from the IND780.
12. Press ENTER. This command will upload the file to the directory that was showing in the command prompt line before the FTP program was started – in the case of the example shown below, the root of the C: drive. The client screen will indicate when the transfer has been successfully completed.
13. Modify the file as required.
14. Download the modified file to the IND780 by typing:
    put <*filename*>
    The client screen will indicate when the transfer has completed successfully.
15. After the transfer is complete, type: quit.
16. Press ENTER to exit the FTP process. An acknowledgment message displays.
17. Type: exit, then press ENTER to close the command line screen and return to Windows.

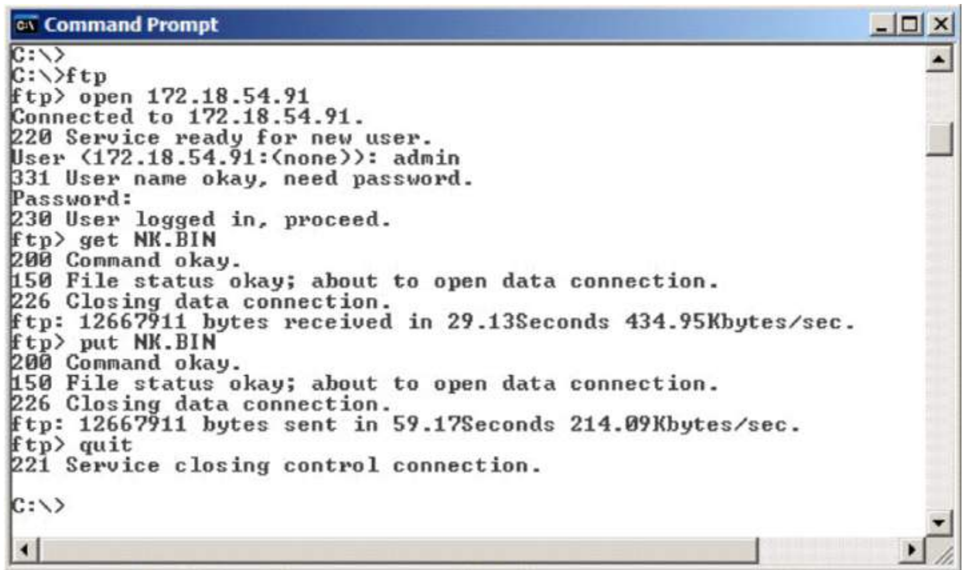


Figure D-9: Example FTP Sequence

D.4.3.2. Loading New Firmware

If new firmware is to be installed by file transfer (rather than through the InSite CSL program or via Setup), use one of the methods described above to transfer the new files into the IND780's Upgrade folder. In either case, when the terminal re-starts, the new files will automatically over-write the existing versions. Press ENTER as prompted to accept the changes.

D.5. Clustering

D.5.1. Overview

Clustering is a means of networking up to 20 individual IND780 terminals together in a peer-to-peer Ethernet network (Figure D-10). This is accomplished by assigning each IND780 terminal a unique IP address and a terminal number. Within a cluster, terminals can share Shared Data, operator consoles, printers, and PLC interfaces. The IND780 also extends its clustering services to host PCs or file servers on an Ethernet LAN for data exchange.

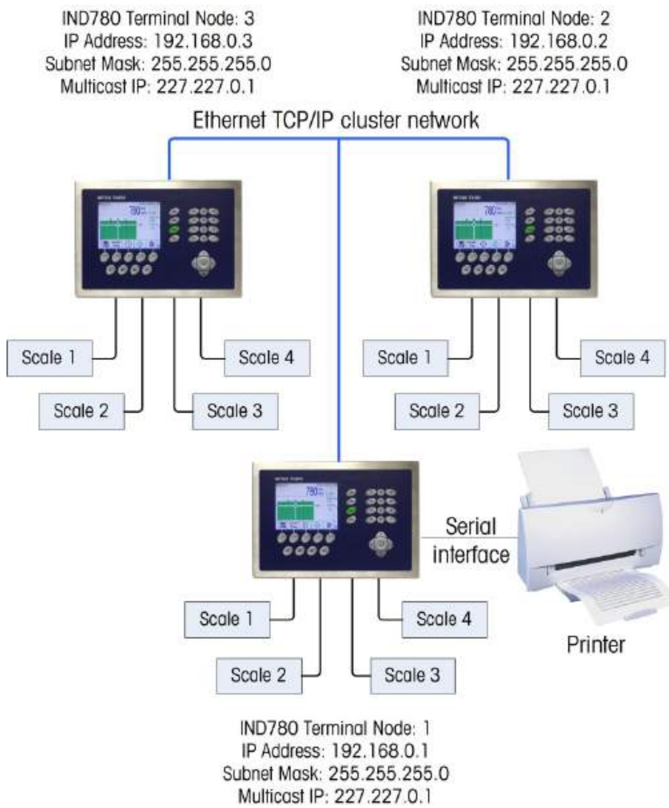


Figure D-10: Example of a Clustered Network of Terminals

An IND780 terminal can operate as a remote operator console to any clustered IND780. A dedicated SELECT TERMINAL softkey, assigned to the home screen, can be pressed to open a list of names of clustered terminals. Once a terminal is selected, pressing OK allows the local terminal to access the display, keypad and setup configuration of the remote terminal. The local terminal's display is replaced with that of the selected remote terminal. All front panel keys now function as if they belonged to the remote terminal, and softkeys assigned on the remote terminal appear on the home screen. The local terminal will not lock out the controls for the remote terminal during this remote connection.

To return to local control, pressing the SELECT TERMINAL softkey will allow you disconnect from the remote terminal. If the remote machine does not have the SELECT TERMINAL softkey assigned, it must be added by a user with access to the remote terminal's setup menu tree. If the user does not have setup access, cycling power on the local terminal will cause it to restart with local control.

Notes: Each IND780 in the cluster must be running software version 5.1 or above, in order to enable remote console viewing.

Only one remote viewer connection can be established between each pair of IND780 terminals at one time. (I.e., it is not possible for multiple terminals to view the same remote terminal simultaneously.) This is true only of remote **viewing**, and not of remote access to PLC interfaces, etc.

D.5.2. Cluster Communications

The IND780 cluster networking primarily uses the Ethernet TCP/IP Client-Server architecture to provide access to its shared resources. The IND780 also uses Windows CE's implementation of the Internet Group Management Protocol (IGMP) for its cluster configurations. All terminals in a cluster require a common multicast IP address. Each clustered terminal transmits its node number as an IGMP message to this address. In turn, each clustered terminal receives the multicast messages, and records the IP addresses and node numbers of other members of the cluster. The IND780 can then use these addresses for communicating with other terminals or networked PCs.

The multicast address has a default value of 227.227.000.001 that is usable in most instances. However, you may need to change the default value when there are two separate clusters on the same Ethernet LAN. Multicast IP addresses are in a reserved set within the address range from 224.0.0.0 through 239.255.255.255. A single multicast IP address within the reserved range identifies each multicast group, and all host members of the group share a common multicast group IP address. The host members listen for, and receive, any IP messages sent to the group multicast IP address.

Each IND780 regularly sends its node number to the multicast address. This permits terminals to detect when a node has gone off-line.

As Ethernet TCP/IP is used for clustering, the speed and reliability of the communications depends on the health of the network. Efforts to isolate the cluster network from other non-dependent Ethernet networks will improve the response during remote access and data exchange.

D.5.3. Configuring a Terminal for Clustering

Each terminal in a cluster must be correctly configured in order to participate. Follow these steps:

1. If remote operator console access is required, the SELECT TERMINAL softkey must be assigned to a home-screen location. Access **Setup > Terminal > Softkeys**, choose a location, and choose Select Terminal from the drop-down list. Confirm the choice by pressing OK, then press OK again to exit the Softkeys screen.
2. Access **Setup > Terminal > Device**.
3. In the Terminal ID#1 field, assign the terminal a name. This name should be unique within the cluster – it will appear in the list of clustered terminals accessed using the SELECT TERMINAL softkey.
4. Access **Setup > Communication > Network > Ethernet**.
5. If the System Line View is set to Disabled, Enable it to allow the System Line to display the IP address if an Ethernet connection is present.

6. If the local network is DHCP-capable, set DHCP Client to Enabled. If the local network is **not** DHCP-capable, set DHCP Client to Disabled. Enter the IP address, Subnet Mask and Gateway Address assigned to this terminal by the network administrator. Each terminal in the cluster must have the same Subnet Mask.

7. Any changes to the Ethernet settings will first require a restart of the terminal. Exiting Setup at this point will automatically restart the terminal if changes were made.

8. After the terminal restarts, access **Setup > Communication > Network > Cluster > This Terminal** (Figure D-11).

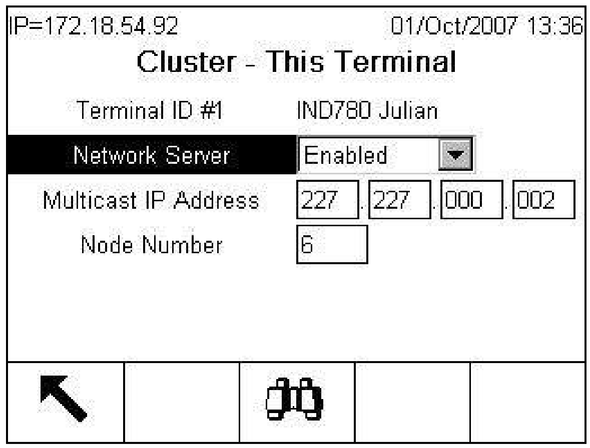


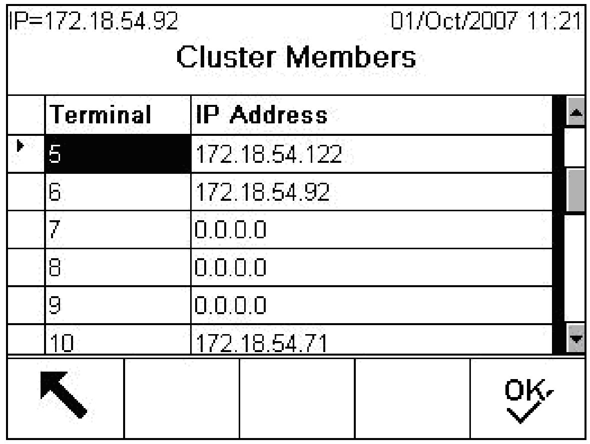
Figure D-11: Cluster – This Terminal Screen

9. To permit other terminals to view this terminal remotely, set Network Server to Enabled. If this terminal is to be a client only, set this value to Disabled; other terminals will not be able to view this terminal. However, this setting does not affect serial port and PLC interface sharing among terminals in the cluster.

10. Set the Multicast IP Address to the value provided by the network administrator. This value must be the same for all clustered terminals.

11. Enter an unused terminal node number ranging from 1 - 20. Each clustered terminal **must** have a unique node number. In the case of a conflict (more than one terminal with the same Node Number assigned), an error message "DUPLICATE NODE NUMBER" will be displayed on the system line periodically, and the terminal will be inaccessible in the cluster. A value of 0 disables the terminal from being part of a cluster.

12. To select from a list of available node numbers, press the VIEW softkey to see the list of clustered terminals (Figure D-12). From this view, select an unused Node Number – indicated by an IP Address of 0.0.0.0, by pressing OK.


IP=172.18.54.92 01/Oct/2007 11:21

Cluster Members

Terminal	IP Address
5	172.18.54.122
6	172.18.54.92
7	0.0.0.0
8	0.0.0.0
9	0.0.0.0
10	172.18.54.71

Figure D-12: List of Clustered Terminals

13. Press the EXIT softkey to close the Cluster - This Terminal screen. Press EXIT again to exit Setup.

The terminal is now ready to function as a member of the cluster. To see all members assigned to the cluster, go into **Setup > Communication > Network > Cluster > Members**.

D.5.4. Redirecting an Output Connection to a Clustered Terminal

Any serial port on any IND780 terminal in a cluster, except those already connected to a SICS scale or with a conflicting connection type assigned, can be used to output serial data from other IND780 terminals in the same cluster. For example, the same demand port on one terminal connected to a printer can be shared by multiple terminals to generate a template printout. Demand, Standard Continuous and Continuous Template outputs are types of remote connection that are supported.

The Connections branch of the **Communications > Network > Cluster** allows a connection to be made giving clustered terminals access to another terminal's serial port.

For example, to set up a connection to a printer attached to a remote terminal's COM1:

1. On the local terminal, at **Setup > Communication > Connections**, create a demand (via Enet1, 2 or 3) output, using whatever local trigger is appropriate – Scales 1, 2, 3 or 4, or the Sum Scale. (If the remote device was a scoreboard or a computer, a Continuous output would be required, for which only Enet4 may be used.)
2. On the remote terminal to which the printer is attached, access **Setup > Communication > Network > Cluster > Connections**, press the NEW softkey (Figure D-13) to add a connection as follows:
    a. In Local Port, select the port to which the printer is connected.
    b. In Source Terminal, enter the node of the terminal whose output is to be directed to the printer.
    c. In Assignment, select the same output connection as configured in the source terminal – Demand-Enet1, 2 or 3.
    d. Press OK to accept the changes.

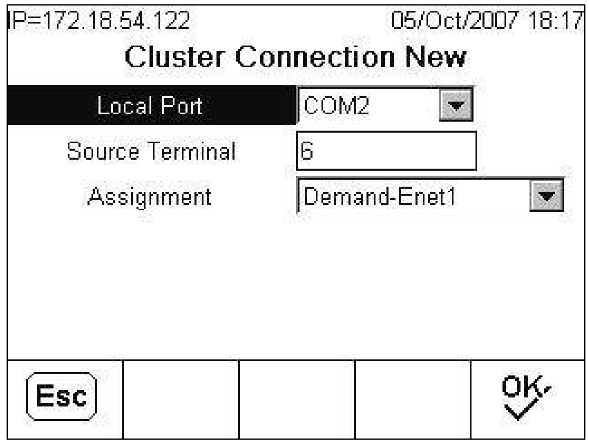


Figure D-13: Cluster Connection New

Now, whenever a demand print is initiated at the local (source) terminal, the output will be sent to the remote printer via the remote terminal. The same port can be used by multiple terminals for demand output.

Continuous output or continuous template connection can also be redirected to a remote terminal's serial port; however, only one connection is possible.

D.5.5. Sharing a PLC Interface

It is possible for a PLC interface to be concurrently shared between multiple clustered terminals. The following example (Figure D-14) shows a network topology where a PLC interface located in one IND780 terminal, known as the bridge, is shared across the terminal's Ethernet TCP/IP cluster.

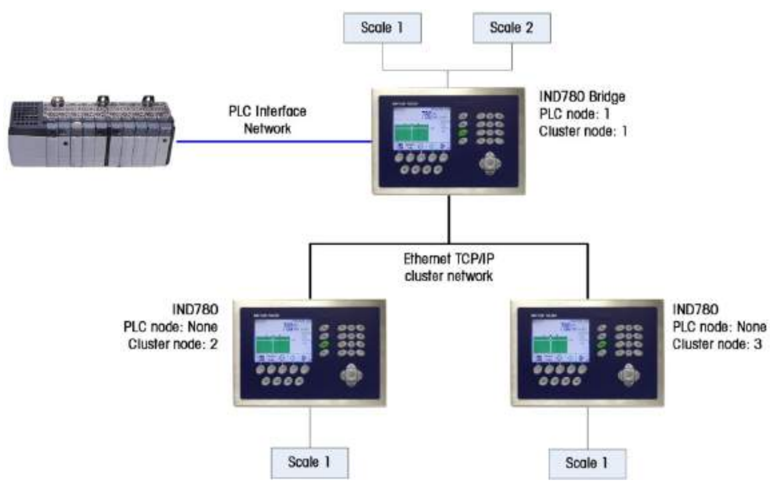


Figure D-14: Example of a Cluster with PLC Interface Sharing

Up to 20 terminals can be connected in the cluster. However, the number of message slots available for communications depends on the type of PLC interface. All available PLC message slots can be configured to send or receive data to or from the remote terminals via the cluster. Refer to the appropriate PLC chapters in the IND780 PLC Interface Manual for further details on message slots' limitations.

To allow bridging of the PLC interface, first a cluster network must be set up among the IND780 terminals. Once the cluster is established, configure the PLC interface on the bridge terminal, set up its data format and assign the required local or remote scale's data to the message slots. Figure D-15 shows an example of two message slots, the first being allocated to scale 1 of the local bridge terminal and a second slot to scale 1 of the remote terminal, node 6. For details on configuring the PLC interface in a cluster terminal, refer to the appropriate chapter (A-B RIO, PROFIBUS, DeviceNet, Ethernet/IP or Modbus TCP) of the **IND780 PLC Interface Manual**.

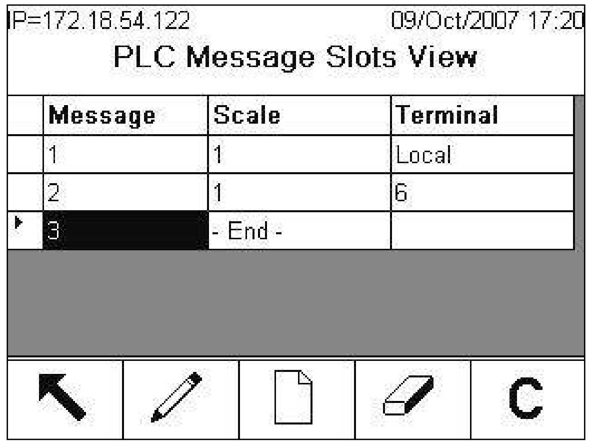


Figure D-15: PLC Message Slots View Screen

D.6. Configuring a Network Printer

The IND780 can be configured to send data to a network printer. To do this, the following must be set up:

- A print client connection must be defined in setup at **Communication > Connections**. The connection should be configured for Demand Output, with a trigger and a template assigned to it.

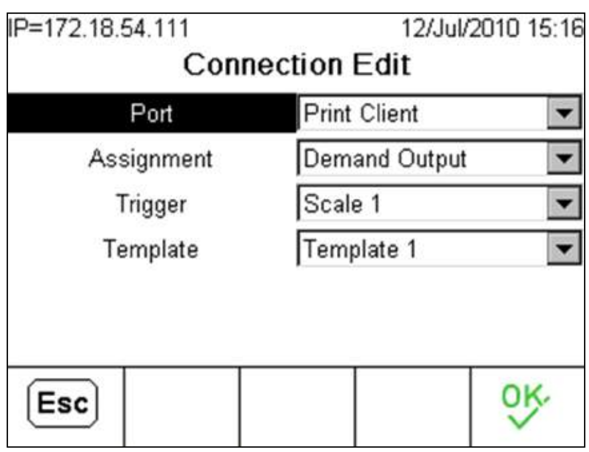


Figure D-16: Connection Edit Screen

- The printer's information (IP address, network TCP port number, and character set) must be defined in setup at **Communication > Network > Print Client**.

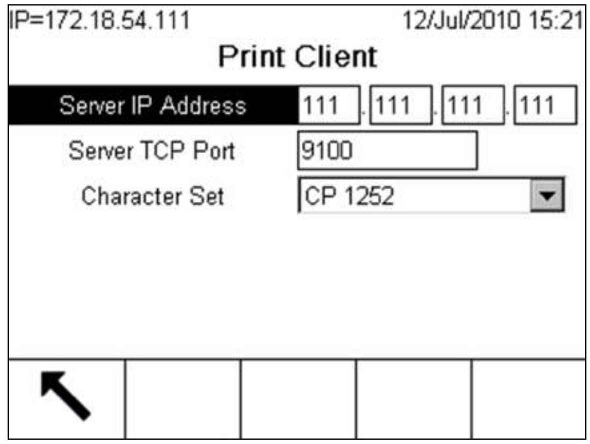


Figure D-17: Print Client Setup Screen

D.7. Protocols and Data Structures

D.7.1. Serial Interface Parameters

The IND780 supports two standard and two optional serial ports. They are designated COM1 and COM2 (standard ports on the main PCB), COM3 and COM4 (optional).

COM1 provides an RS-232 interface, three-wire (TXD, RXD, and GND) with XON/XOFF flow-control capabilities (handshaking).

COM2 can be configured as an RS-232, RS-422 or RS-485 interface. The RS-422 interface is a four-wire interface designed for single point-to-point communication. When Com2 is configured as an RS-422 port, the Transmit line is "On," even when no data is being transmitted. This operation is consistent with the standard operation of an RS-422 port, but differs in function from many legacy METTLER TOLEDO terminals. If compatibility with the "multi-drop" mode of operation for an RS-422 port is required, select RS-485 as the Interface Type and connect to the RS-422 connections.

Optional **COM3** and **COM4** provide RS-232, RS-422, and RS-485 interfaces.

Character framing is programmable in the setup mode. Framing can be:

- 1 start bit
- 7 or 8 ASCII data bits (selectable)
- 0 or 1 parity bit (none, even, or odd)
- 1 stop bit

The baud rate can be configured from 300 to 115.2K baud and a checksum character can also be configured for the standard continuous output string.

The IND780 terminal uses software handshaking to control data flow commonly referred to as XON/XOFF handshaking. When a receiving device (typically a printer) is getting information from an IND780 terminal and cannot receive any more in its buffer, it sends an ASCII XOFF (13h) telling the IND780 terminal to temporarily stop sending data until its buffer clears.

When the device can receive more data, it sends an ASCII XON (11h) telling the IND780 terminal to begin sending data again. This process can occur as often as required by a receiving device.

The XON/XOFF method is the only type of handshaking that is supported by the IND780 terminal.

The IND780 terminal supports two different modes of data output – demand and continuous.

D.7.2. Standard Interface Command (SICS) Protocol

D.7.2.1. Functionality of SICS Balances

The SICS scale interface was written to support Excellence (XS / XP) and Modulo (WM / WMH / WMH-Ex) balances, with some limited support for 4-Series balances. All other balances are considered to be Generic. The functionality for the supported balances allows setting calibration, filter parameters, etc. as limited by the balance. The functionality for Generic balances is limited to runtime only (Tare, Clear Tare, Zero and weight display).

A special mode for support of terminal devices is provided. A terminal device is one that restarts when receiving the reset (@) command. When the reset is sent to most SICS devices, any command in process will be cancelled and an I4 response will be sent. This mode of operation is selected by setting shared data cs--49 to 10. When cs--49 is set to other values the IND780 determines the device type and sets the value accordingly.

Table D-21shows the functionality of each type of balance.

Table D-21: SICS Balance Functionality

IND780 Function	Balance Type				Comments
	Excellence	Modulo	4-Series	Generic / Terminal	
Tare	X	X	X	X	
Clear Tare	X	X	X	X	
Zero	X	X	X	X	
Increment Size		X			RDP Cmd
Auto Calibration	X				C0 Cmd
Initial Adjust	X	X			C4 Cmd
External Cal	X	X	X		C2 Cmd
Internal Cal	X	X	X		C3 Cmd
Factory Reset	X	X			M38 / FSET
Filter Settings	X	X	X		M01 / M02
Motion Settings		X			M30
Internal Cal Test		X			TST3

D.7.2.1.1. Tare Operation

The IND780 uses the SIR command to request the displayed weight data. This command only returns the status, weight and units. Some balances support the SXIR command which sends the gross, tare and net weights (GENERIC and TERMINAL types only, cs--49). If this is available, the IND780 will use it; otherwise it requests data with the SIR command.

When SIR is used, if a tare is taken from the IND780 and Terminal Tare is **disabled**, the balance will be tared and the response from the tare command will be used as the tare value in the IND780. If the tare is cleared it will be cleared in the balance and in the IND780. If the balance has a keyboard and tare is taken at the balance, the balance will not communicate this to the IND780. The terminal will assume that the balance is still in gross mode, and tare in the 780 will be zero. If Terminal Tare is **enabled**, when a tare is taken at the IND780, it will not be sent to the balance – it is handled within the terminal. Thus, care must be taken when using tare at the balance since the IND780 may not be aware of it.

Support for the SXIR command is determined by the base's response to the IO command. If the base includes SXIR in its IO response, to indicate it supports the SXIR command, the IND780 will use the SXIR command instead of the SIR to obtain weight.

D.7.2.2. SICS Levels

The IND780 terminal supports the METTLER TOLEDO Standard Interface Command Set (MT-SICS), which is divided into four levels (0, 1, 2, 3), depending on the functionality of the device. The IND780 terminal supports parts of levels 0, 1, 2 and 3:

- MT-SICS level 0 – Command set for the simplest device.
- MT-SICS level 1 – Extension of the command set for standard devices.
- MT-SICS level 2 – Extension of the command set by commands specific for a device family
- MT-SICS level 3 – Application-specific commands as an extension of the command set

A feature of this concept is that the commands combined in MT-SICS level 0 and 1 are identical for all devices. Both the simplest weighing device and a fully expanded weighing workstation recognize the commands of MT-SICS levels 0
and 1.

D.7.3. Data Interface Configuration

Interface settings such as baud rate, number of data bits, parity, handshake protocols and connector pin assignments are described in Chapter 3 of this manual, **Configuration**.

D.7.3.1. COM Port Settings

For IND780 terminals with firmware version 7.2.x or higher, and terminals using the PXA255 processor and firmware version 6.6.04, the serial port's baud rate must be set when connecting to SICS scales. The default baud rate is 9,600, but some devices, such as WM cells, can communicate at higher rates for a faster update rate.

Earlier versions of firmware automatically set the baud rate to the highest possible value, based on a response from the weighing device.

D.7.4. Version Number of the MT-SICS

Each level of the MT-SICS has its own version number, which can be requested with the command I1 from level 0. The IND780 supports:

- MT-SICS level 0, version 2.2x (except the I5 and ZI commands)
- MT-SICS level 1, version 2.2x (except the DW and K commands)
- MT-SICS level 2, version 1.0x for IND780 terminals
- MT-SICS level 3, version 1.0x for IND780 terminals

D.7.5. Command Formats

Each command received by the scale via the data interface is acknowledged by a response of the device to the transmitter. Commands and responses are data strings with a fixed format. Commands sent to the IND780 terminal comprise one or more characters of the ASCII character set. Enter commands only in uppercase.

- The parameters of the command must be separated from one another and from the command name by a space (ASCII 32 dec., in the examples shown in this section, a space is represented as _).
- Each command must be terminated by CR LF (ASCII 13 dec., 10 dec.)

The characters CR and LF, which can be inputted using the ENTER or RETURN key of most entry keypads, are not listed in this description. However, it is essential they be included for communication with the IND780 terminal.

Example

Command to tare the IND780 terminal:

"TA_20.00_lb" (The command terminator CR LF is not shown.)

D.7.6. Response Formats

All responses sent by the IND780 terminal to the transmitter to acknowledge the received commands have one of the following formats:

- Response with weight value
- Response without weight value
- Error message

D.7.6.1. Format of the Response with Weight Value

A general description of the response with weight value as follows:

ID	___	Status	___	Weight Value	___	Unit	C_R	L_F
1–2 Characters		1 Character		10 Characters		1–3 Characters		

- ID – Response identification.
- _ – Space (ASCII 32 dec.)
- Status – Status of the IND780 terminal. See description of the commands and responses.

- Weight Value – Weighing result, shown as a number with 10 digits, including sign directly in front of the first digit. The weight value appears right justified. Preceding zeroes are suppressed with the exception of one zero to the left of the decimal point.
- Unit – Weight unit displayed.
- CR – Carriage Return (ASCII 13 dec.)
- LF – Line Feed (ASCII 10 dec.)

Comment – CR LF will not be shown in this description.

D.7.6.1.1. Example

Response with a stable weight value of 0.256 kg:

S _ S_ _ _ _ _ _ 0.256 _ kg

D.7.6.2. Format of the Response Without Weight Value

A general description of the response without weight value is as follows:

ID ___ **Status** ___ **Parameters** $\mathbf{C_R}$ $\mathbf{L_F}$

1–4 Characters 1 Character

- ID – Response identification.
- _ – Space (ASCII 32 dec.)
- Status – Status of the IND780 terminal. See description of the commands and responses.
- Parameters – Command-dependent response code.
- CR – Carriage Return (ASCII 13 dec.)
- LF – Line Feed (ASCII 10 dec.)

Comment – CR LF will not be shown in this description.

ID $\mathbf{C_R}$ $\mathbf{L_F}$

D.7.6.3. ID – Error Identification

There are three different error messages. The identification always comprises two characters:

- ES – Syntax error
  The IND780 terminal has not recognized the received command.
- ET – Transmission error
  The scale has received a "faulty" command, such as a parity error.
- EL – Logical error
  The IND780 terminal cannot execute the received command.
- CR – Carriage return (ASCII 13 dec.)
- LF – Line Feed (ASCII 10 dec.)

Comment – CR LF will not be shown in this description.

D.7.7. Tips for the Programmer

Tips for programming the IND780 terminal SICS protocol include:

D.7.7.1. Command and Response

Improve the dependability of application software by having the program evaluate the response of the IND780 terminal to a command. The response is the acknowledgment that the IND780 terminal has received the command.

D.7.7.2. Reset

When establishing communication between the IND780 terminal and system, send a reset command to the IND780 terminal to enable a start from a determined state. When the IND780 terminal or system is switched on or off, faulty characters can be received or sent.

D.7.7.3. Quotation Marks (" ")

Quotation marks included in the command responses are used to designate fields and will always be sent.

D.7.8. Commands and Responses, MT-SICS Level 0

The IND780 terminal receives a command from the system computer and acknowledges the command with an appropriate response. The following sections contain a detailed description of the command set in alphabetical order with the associated responses. Commands and responses are closed with CR and LF. These termination characters are not shown in the following description, but they must always be entered with commands or sent with responses.

The commands of MT-SICS level 0 are available with even the simplest devices that support the METTLER TOLEDO Standard Interface Command Set. These include:

I0	Inquiry of all implemented MT-SICS commands	**S**	Send stable weight value
I1	Inquiry of MT-SICS level and MT-SICS versions	**SI**	Send weight value immediately
I2	Inquiry of balance data	**SIR**	Send weight value immediately and repeat
I3	Inquiry of balance SW version and type definition number	**SNS**	Inquiry to determine which scale is active
		Z	Zero
I4	Inquiry of serial number	**@**	Reset

Detailed descriptions of these Level 0 commands follow.

D.7.8.1. I0 – INQUIRY OF ALL IMPLEMENTED MT-SICS COMMANDS

Command: I0 – Inquiry of all implemented MT-SICS commands

Response:	I0 B 0 "I0"	Level 0 "I0" command implemented
	I0 B 0 "I1"	Level 0 "I1" command implemented
	I0 B 0 "I2"	Level 0 "I2" command implemented
	I0 B 0 "I3"	Level 0 "I3" command implemented
	I0 B 0 "I4"	Level 0 "I4" command implemented
	I0 B 0 "S"	Level 0 "S" command implemented

	I0 B 0 "SI"	Level 0 "SI" command implemented
	I0 B 0 "SIR"	Level 0 "SIR" command implemented
	I0 B 0 "Z"	Level 0 "Z" command implemented
	I0 B 0 "@"	Level 0 "@" command implemented
	I0 B 1 "D"	Level 1 "D" command implemented
	I0 B 1 "SR"	Level 1 "SR" command implemented
	I0 B 1 "T"	Level 1 "T" command implemented
	I0 B 1 "TA"	Level 1 "TA" command implemented
	I0 B 1 "TAC"	Level 1 "TAC" command implemented
	I0 B 1 "TI"	Level 1 "TI" command implemented
	I0 B 2 "SX"	Level 2 "SX" command implemented
	I0 B 2 "SXI"	Level 2 "SXI" command implemented
	I0 B 2 "SXIR"	Level 2 "SXIR" command implemented
	I0 B 2 "R0"	Level 2 "R0" command implemented
	I0 B 2 "R1"	Level 2 "R1" command implemented
	I0 B 2 "U"	Level 2 "U" command implemented
	I0 B 3 "AR"	Level 3 "AR" command implemented
	I0 B 3 "AW"	Level 3 "AW" command implemented
	I0 B 3 "DY"	Level 3 "DY" command implemented
	I0 A 3 "P"	Level 3 "P" command implemented

Error Response I0 I - Cannot execute command at this time.

D.7.8.2. I1 – INQUIRY OF MT-SICS LEVEL AND MT-SICS VERSIONS

Command: I1 – Inquiry of MT-SICS level and MT-SICS versions

Response: I 1 _ A _ "" _ "2.2x" _ "2.2x" _ "1.0x" _ "1.0x"

- "" – No Levels fully implemented
- 2.2x – Level 0, version V2.2x
- 2.2x – Level 1, version V2.2x
- 1.0x– Level 2, version V1.0x
- 1.0x– Level 3, version V1.0x
- Error Response I1 _ I – Command understood, not executable at present.

Comments

- In the case of the MT-SICS level, only fully implemented levels are listed. In this case neither level 0 nor level 1 were fully implemented, so the level is not specified.
- In the case of the MT-SICS version, all levels are specified even those only partially implemented.

D.7.8.3. I2 – INQUIRY OF DATA

Command: I2 – Inquiry of data.

Response I 2 _ A _ "IND780_2-A-Scale 2 _30000_ kg"

- IND780 – Model number of terminal
- 2-A-Scale 2 – Scale number, scale type, and scale name
- 30,000 kg – Capacity and primary unit of the base connected to the IND780
- Error Response I2 _ Command understood, not executable at present

Comments

- The number of characters of "text" depends on the application software and scale capacity.

D.7.8.4. I3 – INQUIRY OF SW VERSION AND TYPE DEFINITION NUMBER

Command I3: Inquiry of SW version number(s) and type definition number.

Response: I3 _ A _ "1.00"

- 1.00--Software version of the IND780
- Error Response I3 _ I – Command understood, not executable at present.

Comment

- The number of characters of "text" depends on the revision and device type.

D.7.8.5. I4 – INQUIRY OF SERIAL NUMBER

Command: I4 – Inquiry of serial number.

Response: I4 _ A _ "text"

- Serial number as "text" (content of shared data xs0105 in IND780 terminal)
- Error Response I4 _ I – Command understood, not executable at present.

Example

Command: I 4 – Inquiry of serial number

Response: I 4 _ A _ "1234567-8LG"

Comments

- The serial number response is the content of the terminal serial number as entered in the setup.
- The response to I4 appears unsolicited after switching on and after the reset command (@).

D.7.8.6. S – SEND STABLE WEIGHT VALUE

Command: S – Send the current stable net weight.

Response:

- S _ S _ WeightValue _ Unit – Current stable weight value.

- S _ I – Command not performed (scale is executing another command, zero setting, or stability timeout reached).
- S _ + – IND780 in overload range.
- S _ - – IND780 in underload range.

Example

Command: S – Send a stable weight value.

Response: S _ S _ _ _ _ _ 100.00 _ kg – The current, stable weight value is 100.00 kg.

Comments

- The duration of the timeout depends on the scale type and its settings. If motion does not settle within this time, the command is aborted.

D.7.8.7. SI – SEND WEIGHT VALUE IMMEDIATELY

Command: SI – Send the current net weight value regardless of scale stability.

Response:

- S _ S _ WeightValue _ Unit – Stable weight value.
- S _ D _ WeightValue _ Unit – Non-stable (dynamic) weight value.
- S _ I – Command not executable (scale currently executing another command).
- S _ + – IND780 in overload range.
- S _ - – IND780 in underload range.

Example

Command: SI – Send current weight value.

Response: S _ D _ _ _ _ _ 129.07 _ kg – The current weight value is unstable (dynamic) and is 129.07kg.

Comments

- The response to the command SI is the last internal weight value (stable or dynamic) before receipt of the command SI.
- Weight value is in the current displayed units.

D.7.8.8. SIR – SEND WEIGHT VALUE IMMEDIATELY AND REPEAT

Command: SIR – Send the net weight values repeatedly, regardless of scale stability.

Response:

- S _ S _ WeightValue _ Unit – Stable weight value.
- S _ D _ WeightValue _ Unit – Non-stable (dynamic) weight value.
- S _ I – Command not executable (IND780 terminal is executing another command, such as taring).

- S _ + – IND780 in overload range.
- S _ - – IND780 in underload range.

Example

Command: SIR – Send current weight values at intervals.

Response:

- S _ D _ _ _ _ _ 129.07 _ kg
- S _ D _ _ _ _ _ 129.08 _ kg
- S _ D _ _ _ _ _ 129.09 _ kg
- S _ D _ _ _ _ _ 129.09 _ kg
- S _ D _ _ _ _ _ 114.87 _ kg
- **. . .** – The scale sends stable or non-stable weight values at intervals.

Comments

- SIR is overwritten and cancelled by the commands S, SI, SR, and @.
- The number of weight values per second depends on the scale type and will vary from approximately 6 (older IDNet bases) to approximately 18 (analog bases).
- Weight value is in the current displayed units.

D.7.8.9. Z – ZERO

Command: Z – Zero the scale.

Response:

- Z _ A – The following then holds:
- Scale is in gross mode
- Zero setting performed, (stability criterion and zero setting range complied with).
- Z _ I – Zero setting not performed (IND780 terminal is currently executing another command, such as taring, or timeout as stability was not reached.)
- Z _ + – Upper limit of zero setting range exceeded.
- Z _ - – Lower limit of zero setting range exceeded.

Example

Command: Z – Zero.

Response: Z _ A – Zero setting performed.

Comments

- If enabled in setup a tare value will be cleared during zero setting.
- The zero point determined during switching on is not influenced by this command (the measurement ranges remain unchanged).

- The duration of the timeout depends on the scale type and its settings. If motion does not settle within this time, the command is aborted.

D.7.8.10. @ – RESET

Command: @ – Reset the scale to the condition found after switching on, but without a zero setting being performed.

Response:

- I 4 _ A _ "text" – Serial number of the scale, the scale is ready for operation.

Example

Command: @

Response: I4 _ A _ "123456-6GG" – The IND780 terminal is reset and sends the serial number.

Comments

- All commands awaiting responses are canceled.
- The "reset" command is always executed.
- A reset command received by the IND780 terminal during the calibration and test procedure cannot be processed.

D.7.9. Commands and Responses, MT-SICS Level 1

The following commands of MT-SICS level 1 are available:

- D–Write text into display
- SR – Send weight value on weight change (Send and Repeat)
- T – Taring
- TA – Set tare value
- TAC – Clear tare value
- TI – Tare Immediately

D.7.9.1. D – WRITE TEXT INTO DISPLAY

Command: D

- D _ "text" – Write text into the terminal's runtime display.
- D _ n – Display message from Message Table where n represents message 1, 2, 3, 4 or 5.
- D _ "" – Clear the text display.

Response:

- D _ A – Text appears left-aligned on the terminal display.
- D _ I – Command not executable.

Example

Command: D _ "HELLO" – Write the text "HELLO" into the terminal display.

Response: D _ A – The text HELLO is shown on the terminal display.

D.7.9.2. SR – SEND WEIGHT VALUE ON WEIGHT CHANGE (SEND AND REPEAT)

Command: SR

- S R _ PresetValue _ Unit – Send the current stable weight value and then continuously after every weight change greater or equal to the preset value a non-stable (dynamic) value followed by the next stable value, range = 1d to maximum load.
- SR – If no preset value is entered, the weight change must be at least 12.5% of the last stable weight value, minimum = 30d.

Response:

- S _ S _ WeightValue _ Unit – Current, stable weight value. Weight change.
- S _ D _ WeightValue _ Unit – Dynamic weight value.
- S _ S _ WeightValue _ Unit – Next stable weight value.
- S _ I – Command not executable (the IND780 terminal is currently executing another command, such as taring, or timeout as stability was not reached.)
- S _ L – Command understood, parameter wrong.
- S _ + – IND780 in overload range.
- S _ - – IND780 in underload range.

Example

Command: S R _ 0.50 _ kg – Send the current stable weight value followed by every load change ≥ 0.50 kg.

Response:

- S _ S _ _ _ _ _100.00 _ kg – Scale stable.
- S _ D _ _ _ _ _115.23 _ kg – More than 0.50 kg loaded.
- S _ S _ _ _ _ _200.00 _ kg – Scale again stable.

Comments

- SR is overwritten and cancelled by the commands S, SI, SIR, @ and hardware break.
- If, following a non-stable (dynamic) weight value, stability has not been reached within the timeout interval, the response "S _ I " is sent and then a non-stable weight value. Timeout then starts again from the beginning.
- The preset value must be entered in the first unit that is the weight unit displayed after the IND780 terminal has been switched on.

D.7.9.3. T – Taring

Command: T – Tare a stable weight value

Response:

- T_S_WeightValue_Unit – Taring performed. Stability criterion and taring range comply with settings. Current Tare weight value in current units is returned.
- T_ I – Taring not performed (scale is executing another command, zero setting, or stability timeout reached.)
- T_+ – Upper limit of taring range exceeded.
- T_- – Lower limit of taring range exceeded.

Example

Command: T

Response: T _S _ _ _ _ _100.00_kg – The IND780 has accepted a tare value of 100.00 kg.

Comments

- The new tare weight value overwrites tare memory.
- The duration of the timeout depends on the scale type and its settings. If motion does not settle within this time, the command is aborted.
- Clearing tare value: See command TAC

D.7.9.4. TA – INQUIRE/ENTER TARE VALUE

Command: TA – Inquiry of tare weight value

TA _ Tare Preset Value _ Unit – Entry of a tare value.

Response:

- T A _ A _ TareWeightValue _ Unit – Current Tare weight value.
- T A _ I – Current Tare weight value cannot be transferred (the IND780 terminal is currently executing another command, such as zero setting).
- T A _ L – Command understood, parameter wrong.

Example

Command: T A _ 10.00 _ kg – Load a preset tare of 10 kg.

Response: T A _ A _ _ _ _ _10.00_kg – The IND780 has accepted the 10.00 kg tare value.

Comments

- The existing tare will be overwritten by the preset tare weight value.
- The IND780 terminal will automatically round the inputted tare value to the current readability.
- The preset value must be entered in the current units.

D.7.9.5. TAC – CLEAR TARE VALUE

Command: TAC – Clear tare value.

Response:

- TAC _ A – Tare value cleared.
- TAC _ I – Command not executable (the IND780 terminal is currently executing another command, such as zero setting, or timeout as stability was not reached).

D.7.9.6. TI– TARE IMMEDIATELY

Command: TI – Tare immediately, (store the current weight value, which can be stable or non-stable (dynamic), as tare weight value).

Response:

- T I _ S _ WeightValue _ Unit – Taring performed, stable tare value.
- T I _ D _ WeightValue _ Unit – Taring performed, non-stable (dynamic) tare value.
- T I _ I – Taring not performed (the IND780 terminal is currently executing another command, such as zero setting.)
- T I _ L – The command is not executable.
- T I _ + – Upper limit of taring range exceeded.
- T I _ - – Lower limit of taring range exceeded.

Example

Command: TI – Tare.

Response: T I _ D _ _ _ _ _117.57 _ kg – The tare memory holds a non-stable (dynamic) weight value.

Comments

- Any previous tare value will be overwritten by the new tare weight value.
- Even during a non-stable (dynamic) condition, a tare weight value can be determined. However, the tare value determined in this manner may not be accurate.

The stored tare weight value is sent in the current units.

D.7.10. Commands and Responses, MT-SICS Level 2

The following commands of MT-SICS level 2 are available:

- SX – Send stable weight data
- SXI – Send weight data immediately
- SXIR – Send weight data immediately and repeat
- R – Switch keyboard on/off

- U – Switch units

D.7.10.1. SX – SEND STABLE WEIGHT DATA

Command: SX – Send the current stable weighing data.

Response:

- SX _ S _ x1 _ y _ _ x2 _ y _ _ x3 _ y – Stable weight data where x1 = G _ GrossWeight, x2 = N _ NetWeight, x3 = T _ TareWeight, y = WeightUnits.
- SX _ I – Command not performed (scale is executing another command, zero setting, or stability timeout reached).
- SX _ + – Scale in overload range.
- SX _ - – Scale in underload range.

Example

Command: SX – Send a stable weight data.

Response:

- SX _ S _ G _ _ _ _ _ _ 15620 _ kg _ _ _ N _ _ _ _ _ _ 15305 _ kg _ _ _ T _ _ _ _ _ _ _ _ 315 _ kg_ – The current, stable gross, net and tare weight data is sent.

Comments

- The duration of the timeout depends on the scale type and its settings. If motion does not settle within this time, the command is aborted.
- The weight values are in the current displayed units.

D.7.10.2. SXI – SEND WEIGHT DATA IMMEDIATELY

Command: SXI – Send the current weighing data immediately regardless of scale stability.

Response:

- SX _ S _ x1 _ y _ _ x2 _ y _ _ x3 _ y – Current stable weight data where x1 = G _ GrossWeight, x2 = N _ NetWeight, x3 = T _ TareWeight, y = WeightUnits.
- SX _ D _ x1 _ y _ _ x2 _ y _ _ x3 _ y – Current unstable weight data where x1 = G _ GrossWeight, x2 = N _ NetWeight, x3 = T _ TareWeight, y = WeightUnits.
- SX _ I – Command not performed (scale is executing another command).
- SX _ + – Scale in overload range.
- SX _ - – Scale in underload range.

Example

Command: SXI – Send the current weighing data immediately.

Response:

- SX _ S _ G _ _ _ _ _ _ 22220 _ kg _ _ _ N _ _ _ _ _ _ 22220 _ kg _ _ _ T _ _ _ _ _ _ _ _ _ _ 0_ kg_ – The current, stable gross, net and tare weight data is sent.

- SX _ D _ G _ _ _ _ _ _ 2.520 _ ton _ _ N _ _ _ _ _ _ 2.520 _ ton _ _ T _ _ _ _ _ _ 0.000_ ton – The current, unstable dynamic gross, net and tare weight data is sent.

Comments

- The response to the command SXI is the last internal weight value (stable or dynamic) before receipt of the command SXI.
- Weight value is in the current displayed units.

D.7.10.3. SXIR – SEND WEIGHT DATA IMMEDIATELY AND REPEAT

Command: SXIR – Send the current weighing data repeatedly, regardless of scale stability.

Response:

- SX _ S _ x1 _ y _ _ x2 _ y _ _ x3 _ y – Current stable weight data where x1 = G _ GrossWeight, x2 = N _ NetWeight, x3 = T _ TareWeight, y = WeightUnits.
- SX _ D _ x1 _ y _ _ x2 _ y _ _ x3 _ y – Current unstable weight data where x1 = G _ GrossWeight, x2 = N _ NetWeight, x3 = T _ TareWeight, y = WeightUnits.
- SX _ I – Command not performed (scale is executing another command).
- SX _ + – Scale in overload range.
- SX _ - – Scale in underload range.

Example

Command: SXIR – Send the current weighing data immediately and repeat.

Response:

- SX _ S _ G _ _ _ _ _ _ 22220 _ kg _ _ _ N _ _ _ _ _ _ 22220 _ kg _ _ _ T _ _ _ _ _ _ _ _ _ _ 0_ kg_
- SX _ D _ G _ _ _ _ _ _ 22223 _ kg _ _ _ N _ _ _ _ _ _ 22223 _ kg _ _ _ T _ _ _ _ _ _ _ _ _ _ 0_ kg_
- SX _ D _ G _ _ _ _ _ _ 22228 _ kg _ _ _ N _ _ _ _ _ _ 22228 _ kg _ _ _ T _ _ _ _ _ _ _ _ _ _ _ 0_ kg_
- SX _ D _ G _ _ _ _ _ _ 22233 _ kg _ _ _ N _ _ _ _ _ _ 22233 _ kg _ _ _ T _ _ _ _ _ _ _ _ _ _ 0_ kg_
- … – The scale sends stable or unstable gross, net and tare weight data at regular intervals.

Comments

- SXIR is overwritten and cancelled by the commands S, SI, SR, SX, SXI and @.
- The number of weight values per second depends on the scale type and will vary from approximately 6 (older IDNet bases) to approximately 18 (analog bases).
- Weight value is in the current displayed units.

D.7.10.4. R – SWITCH KEYBOARD ON OR OFF

Command: R

- R0 – Switch on IND780 keypad and keyboard.
- R1 – Switch off IND780 keypad and keyboard.

Response:

- R0 _ A – Keypad and keyboard enabled.
- R1 _ A – Keypad and keyboard disabled.

Example

Command: R1 – Disable terminal keypad and keyboard.

Response: R1 _ A – Keypad and keyboard disabled.

Comments

- By default and after power-up the keypad and keyboard is always enabled.
- When the keypad and keyboard is disabled, the terminal cannot be manually operated.

D.7.10.5. U – SWITCH UNITS

Command: U

- U – Switch to main primary units.
- U _ Unit – Switch to specified units (Unit = g, kg, lb, ton, etc. select between primary and secondary units).

Response:

- U _ A – Units switched.
- U _ I – Command not performed (incorrect units specified).

Example

Command: U _ lb – Switch units to pounds.

Response: U _ A – The scale units are switched to pounds.

Comments

- Units switching is limited to the current settings for the primary and secondary units.

D.7.11. Commands and Responses, MT-SICS Level 3

The following commands of MT-SICS level 3 are available:

- AR – Read shared data field
- AW – Write shared data field
- DY – Specify SmartTrac target value

- P – Print text
- SNS – Find or set the active scale

D.7.11.1. AR – READ SHARED DATA FIELD

Command: AR _ SDName – Read a specific shared data field.

Response:

- AR _ A _ SDValue – Shared data field value returned (Content format is dependent on the shared data field type).
- AR _ I – Command not performed (invalid shared data field).

Example

Command: AR _ wt0101 – Read displayed gross weight for scale 1.

Response: AR _ A _ "_ _ _ _ _ _ 12.180" – The displayed gross weight value is returned.

Command: AR _ wx0131 – Read scale 1 motion status.

Response: AR _ A _ 0 – Scale 1 motion status returned.

Comments

- SDName is the shared data field name with a length of six A/N characters.
- String type SDValue fields returned are surrounded by quote marks.
- Array type SDValue fields are returned as a series of values separated by spaces.
- Composite variables of the entire shared data block are not supported.

D.7.11.2. AW – WRITE SHARED DATA FIELD

Command: AW _ SDName _ SDValue – Write to a specific shared data field.

Response:

- AW _ A – Written successfully to shared data field.
- AW _ I – Invalid shared data field.
- AW _ L – Shared data field cannot be written.

Example

Command: AW _ wc0101 _ 1 – Pushbutton tare for scale 1.

Response: AW _ A – Scale 1 pushbutton tared.

Command: AW _ aw0101 _ "HELLO" – Write the text HELLO to message table ID 1.

Response: AW _ A – HELLO is written into the message table ID 1.

Comments

- SDName is the shared data field name with a length of six A/N characters.
- String type SDValue fields have to be surrounded by quote marks.
- Array type SDValue fields have to be formatted as a series of values separated by spaces.
- Composite variables of the entire shared data block are not supported.
- Only operator and supervisor level access SDName fields can be written to.

D.7.11.3. DY – SPECIFY SmartTrac TARGET VALUE

Command:

- DY _ TargetWeight _ Unit _ LowTol _ Unit _ HighTol _ Unit – Specify the active target and tolerance values in weight units.
- DY _ TargetWeight _ Unit _ Tol _ % – Specify the active target and percentage tolerance values.
- DY – Clear the active target and tolerance values to zero.

Response:

- DY _ A – Target and tolerance values are set.
- DY _ I – Command not performed (specified units are not valid).

Example

- Command: DY _ 150 _ lb _ 12 _ lb _ 10 _ lb – Set target = 150 lb, low tolerance = 12 lb and high tolerance = 10 lb.
- Response: DY _ A – Target and tolerance values are set for the scale.
- Command: DY _ 100 _ kg _ 10 _ % – Set target = 100 kg and low / high tolerance =10 % of target.
- Response: DY _ A – Target and tolerance values are set for the scale.

Comments

- Weight units can only be specified in the primary or secondary units for the scale. Tolerance weight units must match the target weight units.
- % tolerance can be entered provided it is enabled in SETUP as the appropriate target tolerance type.
- Target and tolerance entries must match displayed increment sizes.

D.7.11.4. P – PRINT TEXT

Command:

- P – Prints the template assigned to custom trigger 11.
- P _ Text – Prints the specified text into a template assigned to custom trigger 11 (max. 50 characters).

Response:

- P _ A – text and template assigned to custom trigger 11 is printed successfully.
- P _ I – Print text and template failed.

Example

- Command: P _ METTLER TOLEDO – Prints text METTLER TOLEDO and template associated to custom trigger 11.
- Response: P _ A – Text METTLER TOLEDO and template printed.

Comment

- The text specified is stored into shared data field pa0120. Shared data field pa0120 must be configured as part of the template output format.
- To print the template, it must be assigned to custom print trigger 11.

D.7.11.5. SNS – ACTIVE SCALE

Command:

- SNS – Inquiry to determine which scale is active.
- SNS_*n* – Sets the active scale to *n*, where *n* is 1, 2, 3, 4 or 5.

Response:

- SNS_A_*n* – Response to inquiry, where *n* is the number of the active scale.
- SNS_A – Response to the SNS_*n* command.
- SNS_I – The SNS_*n* command specified an invalid scale number (i.e., $n \neq$ 1, 2, 3, 4 or 5).

Comment

- In SICS connection setup at **Communication > Connections**, if **None** is specified as the trigger, this command reads and sets the scale that is currently active. If a trigger scale is specified (**Scale 1, 2, 3, 4** or **Sum Scale**), the response to the inquiry will always be that scale.

D.8. Reports

In order to print reports of the tare table, target table, or message strings, a connection must be made for the "Reports" function. When a reports connection is made to a serial port, whenever a report is run and then printed, it will be routed to the assigned port.

The layout of printed reports, whether created from table views or using the Reports softkey, is defined in the Reports Format screen in setup at **Communication > Reports**.

A sample of each report in a 40 column wide print is shown in the following sections.

D.8.1. Alibi Table

The alibi table can be viewed and printed on the IND780 terminal. The alibi memory is searched, viewed and printed in the same way as any other table in the terminal. This function is available from the dedicated ALIBI softkey **Alibi**, the REPORTS softkey, or through the menu tree.

D.8.2. Tare Table Report

In the following report examples, all fields were programmed to print. An asterisk (*) record separator was selected for these reports.

D.8.2.1. 40 Column Example

If the first field on a line were disabled, it would not be printed and the field to the right would be shifted left. If a field on the right of a line were disabled, it would not print and that space would be blank. If all fields on a specific line were disabled, the complete line would be removed from the report.

```
Tare Memory Report

ID: 1   T: 26.4 kg
Desc: Blue Box #4
n: 54  Total: 52954.3 kg
****************************************
ID: 5   T: 3.7 kg
Desc: Green Bag #29
n: 7  Total: 25593.4 kg
****************************************
ID: 6   T: 23.3 kg
Desc: B16 Pallet
n: 0  Total:  0 kg
****************************************
```

D.8.3. Target Table Report

In the following examples, all fields were programmed to print. A (-) record separator was selected for these reports.

D.8.3.1. 40 Column Report Example

If the first field on a line were disabled, it would not be printed and the field to the right would be shifted left. If a field on the right of a line were disabled, it would not print and that space would be blank. If all fields on a specific line were disabled, the complete line would be removed from the report.

```
Target Memory Report

ID: 1   Target: 11.00 kg
Spill: 0.55 Fine: 0.4
+Tol: 0.1 -Tol: 0.1
Desc: White RT4 Gran
----------------------------------------
ID: 2   Target: 12.35 kg
Spill: 0.48 Fine: 0.6
+Tol: 0.2 -Tol: 0.2
Desc: Mixture #7728
----------------------------------------
ID: 3   Target: 23.85 kg
Spill: 0.3 Fine: 0.8
+Tol: 0.3 -Tol: 0.1
Desc: Yellow #40 Pel
----------------------------------------
```

D.8.4. Message Table Report

The message table contains text that can be used in print templates. There are 99 records and each record can be up to100 characters long. In the view of the message table, only the first 20 characters of the message string are shown. The message table report can only be printed from the Message Table sub-block of Application using the PRINT softkey . An example of the 40 column wide printed report is shown next. The 132 column report will also wrap if the line exceeds the 80 character limit.

```
Message Report

 1 Dagger Dave
----------------------------------------
 2 World of Rugs
----------------------------------------
 3 101 East Main Street
----------------------------------------
 4 This is an example of what the view
of a string of one hundred characters wo
uld look like in a report
----------------------------------------
```

D.8.5. Totals Report

The totals report will print only the fields that have been enabled for the totalizing function. If the subtotal feature has been disabled, then that field will not display or print. The example below includes both the grand total and subtotal fields. The totals report is always formatted in a 40 column width.

```
   Totals report
14:25:49     20/Jul/2007
Subtotal:
n = 6      86.19 kg
Grand Total:
n = 27     372.76 kg
```

E. Softkey Mapping and Application Key Configuration

This chapter provides information about assigning softkeys, which includes defining softkey functions and positions, and application key configuration. It also lists all icons encountered on-screen when using the IND780.

E.1. Introduction

Softkeys are located at the bottom of the display screens, and provide quick access to setup pages or application functions. Up to 15 softkeys can be defined. A maximum of five softkeys are visible at one time on any given screen. In addition, up to four application keys (A1—A4) can be defined, and are always available from the Indicator's front panel. Refer to the tables at the end of this chapter for an explanation of each icon used in the IND780 user interface.

Softkeys and Application Keys have an additional function as alpha entry keys. This feature is described in Chapter 2, Operation.

Follow the softkey and application key setup steps provided here to configure the IND780 to function in the most convenient manner for the application.

E.2. Softkey Setup and Navigation

Figure E-1 shows a sample weight display home screen.

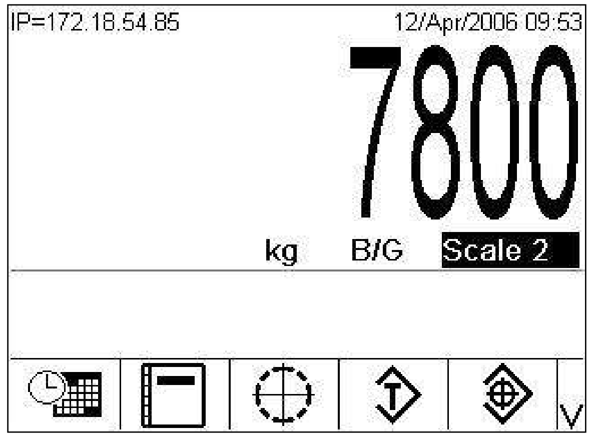
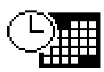
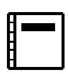
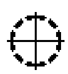


Figure E-1: Example Home Screen

In the sample screen shown in Figure E-1, the IND780 is displaying a gross weight value for Scale 2. The five softkeys visible in this screen function as follows:

	**Time & Date**	Allows time and date, and format of time and date, to be set
	**Reports**	Opens Reports Run screen
	**Target**	Defines the current target
	**Tare Table**	Opens Tare Table Search screen
	**Target Table**	Opens Target Table Search screen

When more than five softkeys are defined, a MORE DOWN symbol V displays to the right of the softkeys, as in Figure E-1. Press the DOWN navigation key on the keypad to advance to the second screen of softkeys. (If enough softkeys are defined, a third screen of softkeys is available, and the MORE UP/MORE DOWN symbol displays in the second screen. Pressing the DOWN navigation key again would scroll to a third screen).

On the last available screen of softkeys, a MORE UP symbol ∧ displays to the right of the softkeys (Figure E-2). Press the UP navigation key to return to the previous screen of softkeys.

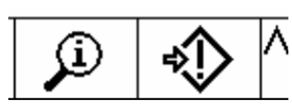


Figure E-2: MORE UP Symbol Displayed

E.3. Softkey Configuration

Add or rearrange the display of softkeys on the main weighing screen by configuring parameters on the softkey setup screen, which is located at the Terminal > Softkeys sub-branch in the setup menu tree.

When the softkeys setup screen opens, focus is on the softkey position number 1, located above the first icon as indicated by the highlight seen in Figure E-3.

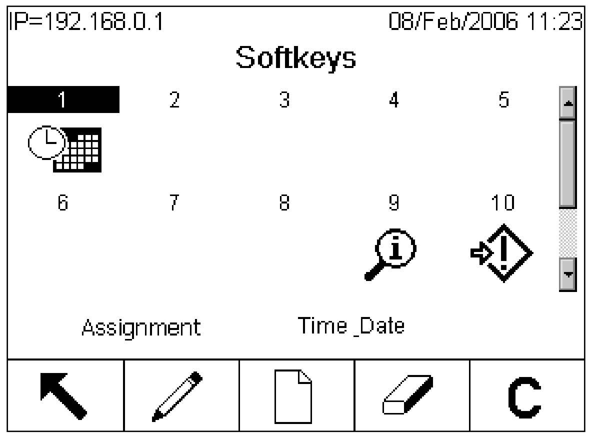


Figure E-3: Softkeys Setup Screen

Figure E-3 shows the default layout for softkeys. Another row of softkeys can be defined by using the DOWN arrow to display assignments 11 through 15.

Focus can be moved by pressing the UP, DOWN, LEFT, and RIGHT navigation keys, or the arrow keys on an optional external keyboard. As a different softkey position gains the focus, its assignment is shown in text near the bottom of the screen.

Two softkeys, INFORMATION RECALL and SETUP, must always be present. As a default, they are located together in positions 9 and 10. These keys can be moved by first creating a copy of the softkey in a new position and then deleting the softkey from the original position. The original position cannot be deleted until the new position has been created.

The softkeys at the bottom of this setup screen perform the following functions:

	Exit	Saves any changes and returns to setup menu tree
	Edit	Opens the Softkey Edit screen shown in Figure E-4, allowing editing of selected softkey's assignment
	New	Opens the New Softkey screen permitting assignment of a softkey in the selected position. This moves all following softkeys down one position.
	Delete	Deletes the selected softkey's assignment, and moves all subsequent softkeys up one position
C	**Clear**	Opens the screen shown in Figure E-6, allowing user to clear all softkey assignments except the Recall Information and Setup softkeys in positions 9 and 10

- If an entire row of softkeys is blank, then that row will not be accessible from the home screen. For example, if softkey positions 1–5 and 6–10 have softkeys programmed and positions 11–15 are blank, the third row of softkeys will not be accessible from the home screen.

E.3.1. Editing Softkeys

The edit function allows replacement of one softkey assignment with a different softkey assignment. The edit function enables replacement of a blank assignment with another softkey assignment, without shifting any other softkey positions.

To Edit a Softkey:

1. Use the navigation keys to move the focus to the position number of the softkey to be edited.
2. Press the EDIT softkey . The Softkey Edit screen (Figure E-4) displays. The softkey position number selected for editing is shown on the screen along with the current assignment.

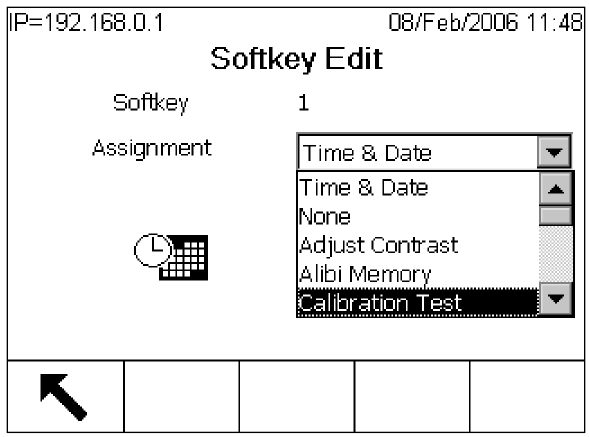


Figure E-4: Softkey Edit Screen

3. Press the ENTER key to open the assignment selection list.
4. Use the UP or DOWN navigation keys to scroll through the selections until focus is on the desired assignment.
5. Press the ENTER key to select the assignment. If None is selected for the assignment, the softkey assignment is reserved as a blank space.
6. Press the EXIT softkey to return to the Softkeys Setup Screen.

- There is no limit to the number of positions that can have the same softkey assignment. For example, if the SWITCH UNITS softkey is assigned to both softkey positions 2 and 7, it will display on both the first and second screens of softkeys.

E.3.2. Inserting Softkeys

To Insert Softkeys:

1. Use the navigation keys to move the focus to the position number where the softkey is to be inserted.
2. Press the INSERT softkey . The Softkey Insert screen displays. The softkey position selected is shown on the screen along with Assignment selection box.

3. Press the ENTER key to select the assignment selection box.
4. Use the UP or DOWN navigation keys to scroll through the selections until focus is on the desired assignment.
5. Press the ENTER key to select the assignment. If None is selected for the assignment, the softkey assignment is reserved as a blank space.
6. Press the EXIT softkey to return to the Softkeys Setup Screen. The new softkey will display on the Softkey setup screen in the position where it was inserted and all following softkeys will be moved one position to the right.

- If all 15 softkey positions are full and a new softkey is added, all positions after the inserted position will move one position to the right and the softkey in position 15 will be lost. The only exception to this is if the RECALL or SETUP softkeys are in that position, the softkey immediately before these special softkeys will be lost.

E.3.3. Deleting Softkeys

To Delete Softkeys:

1. Use the navigation keys to move the focus to the position number of the softkey to be deleted.
2. Press the DELETE softkey . The softkey is removed from the Softkey setup screen and all following softkeys will be moved one position to the left.

- Remember that there must always be one instance each of the RECALL and SETUP softkeys. The original cannot be deleted until the same softkey has been assigned in a new position.
- To remove a softkey without moving all following keys up one position, simply EDIT the key, reassigning it to None, as shown in Figure E-5.

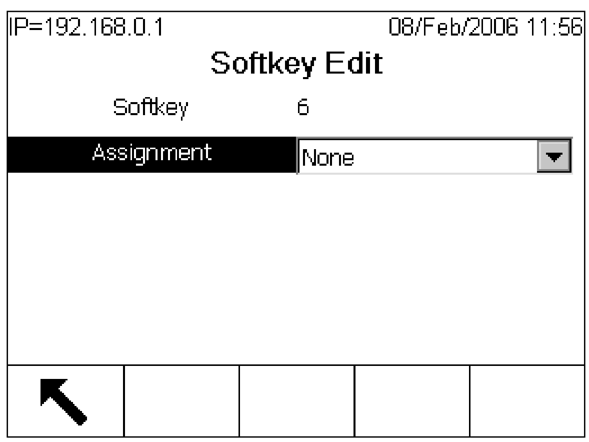


Figure E-5: Softkey Assigned to None

E.3.4. Clearing All Softkeys

To clear all softkey assignments except INFORMATION RECALL and SETUP, press the CLEAR softkey. A screen (Figure E-6) displays, asking for verification to clear all softkeys.

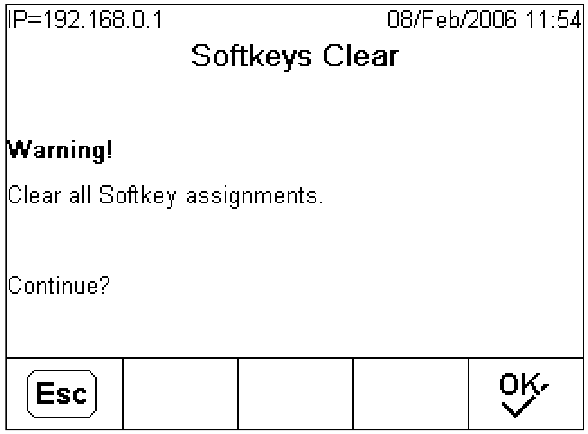


Figure E-6: Clear Softkeys Screen

In the Softkeys/Clear screen, the softkeys have the following functions:

Esc	**Escape**	Returns to softkey setup screen without clearing assignments
OK	**OK**	Clears all softkey assignments, restores default values, and returns to softkey setup screen

E.4. Application Key Configuration

Application keys (A1, A2, A3, and A4) can be assigned to perform specific functions during weighing operations. Application key function assignments can be configured on the Application Keys setup screen (Figure E-7), located under Terminal in the setup menu tree.

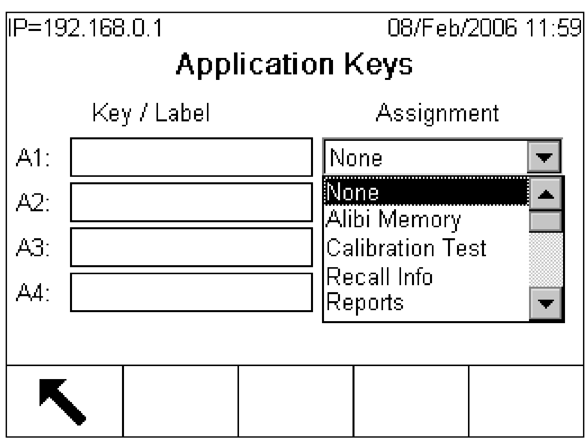


Figure E-7: Application Keys Setup Screen

The following application key functions are available for configuration from this screen:

- None
- Alibi Memory
- Calibration Test
- Comparators
- Counter Reset
- Custom Trigger 1
- Custom Trigger 2
- Custom Trigger 3
- Custom Trigger 4
- Custom Trigger 5
- ID1
- ID2
- MinWeigh
- Recall Info
- Repeat Print
- Reports
- Select Terminal
- Setup
- SmartTrac
- Target Control
- Target Start
- Target Table
- Tare Table
- Target
- Task List*
- Task 1*
- Task 2*
- Task 3*
- Time & Date
- Unit Switching
- X10 Display
- PDX Performance Log

* Only when TaskExpert™ or an application is installed.

To Configure an Application Key:

1. Use the DOWN arrow to move the focus to the desired application key.
2. Press the ENTER key to select the Key / Label field. Alpha keys display, permitting a label to be entered.
3. Press the ENTER key again to open the assignment selection list.
4. Use the UP or DOWN arrow keys to scroll through the menu until focus is on the desired assignment.
5. Press the ENTER key to select the assignment. If None is selected for the assignment, no function will occur when the application key is pressed.
6. Press the EXIT softkey to return to the setup menu tree.

E.5. IND780 Icon Reference

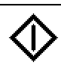
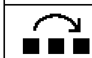
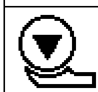
- In the following tables, an asterisk in the Softkey column indicates that this icon can be assigned to one of the fifteen softkey positions – refer to the Softkey Configuration section.

E.5.1. System Recall Icons

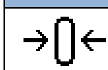
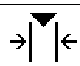
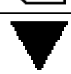
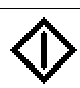
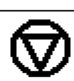
Icon	Softkey	Function	Explanation
	*	Information Recall	Provides access to the Recall Screens: Weight, System Info, Metrology, Totals
		Weight Recall	Shows the current gross, tare, net values
i		Recall Info - System Information Recall	Shows the model, serial number, IDs, software versions, and installed hardware
M		Metrology Recall	Shows the firmware version number, and time and date of the last calibration

Icon	Softkey	Function	Explanation
		Totals Recall	Provides access to the subtotal and grand total accumulations
		Print	Prints the selected memory to an attached peripheral
		Clear a Subtotal	Clears a subtotal register from the totals memory
C		Clear All	Clears both the subtotal and grand total registers from the totals memory

E.5.2. Calibration Test Icons

Icon	Softkey	Function	Explanation
	*	Calibration Test	Provides access to the defined sequence of the calibration test
		Calibration Test Weight List	Provides access to the test weight list for the calibration test
		Start	Begins the defined sequence
		Skip	Skips a failed step of the Calibration Test
		Internal Calibration Test	Initiates an internal calibration test of a SICS scale

E.5.3. Calibration Icons

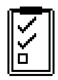
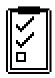
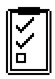
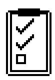
Icon	Function	Explanation
	Capture Zero	Resets the zero condition of the scale
	Capture Span	Resets the span value with known test weights
	Step Calibration	Calibrates the scale using a substitution method with a known weight and a substitution mass
Cal FREE	CalFREE	Adjusts span to precalibrate a scale without test weights
Service Mode	Service Mode	Permits access to the IDNet service mode.
	Internal Calibration	Initiates an internal calibration of a SICS scale
	Manual Calibration	Initiates manual calibration of a SICS scale
	Initial Adjustment	Starts an initial adjustment of a SICS scale
	Start	Begins the defined calibration sequence
	Stop / Abort	Stops or aborts the calibration sequence

Icon	Function	Explanation
	Reset	Resets the SICS scale to factory defaults

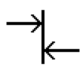
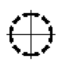
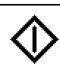
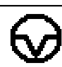
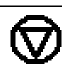
E.5.4. Table and Memory Icons

Icon	Softkey	Function	Explanation
	*	Reports	Provides access to the Run Reports of the Alibi, Tare and Target tables
		Table Search	Provides search capabilities for the selected table – Alibi, Tare, or Target
		Search/ View	Locates and displays an object specified by the user's selected parameters in the selected table – Alibi, Tare, or Target
C*		Clear Totals	Clears the Totals register for the Tare table
→T←		Capture Tare	Captures the current weight as a Tare weight
C		Clear All	Clears all records from the selected table – Tare or Target
		Print	Prints the selected memory to an attached peripheral – Alibi, Tare, or Target
	*	Repeat Print	Reprints the most recent transaction or Custom Print output, with heading "DUPLICATE"
	*	Tare Table	Provides access to stored tare values
Alibi	*	Alibi Memory	Provides access to stored transactional data
	*	Target Table	Provides access to stored target values
1→	*	Custom Trigger 1	When configured in Setup at Communication > Connections and assigned as a softkey, triggers associated output.
2→	*	Custom Trigger 2	
3→	*	Custom Trigger 3	
4→	*	Custom Trigger 4	
5→	*	Custom Trigger 5	
123	*	Counter Reset	Recalls and/or resets the next scale sequential number and transaction counter number
		Reset	Resets (clears) the currently selected log (Change, Maintenance, or Error)

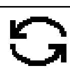
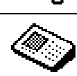
E.5.5. ID Sequence and Task Selection Icons

Icon	Softkey	Function	Explanation
ID1	*	ID1 Sequence	Initiates ID1 programmed transactional prompt sequence
ID2	*	ID2 Sequence	Initiates ID2 programmed transactional prompt sequence
	*	Task List	Displays list of assigned TaskExpert applications
 1	*	Task 1	Starts TaskExpert application designated as Task 1
 2	*	Task 2	Starts TaskExpert application designated as Task 2
 3	*	Task 3	Starts TaskExpert application designated as Task 3

E.5.6. Target Action Icons

Icon	Softkey	Function	Explanation
	*	Comparators	Access Comparators table to permit selection of simple setpoint
	*	Target	Defines the current target, spill, fine feed, tolerance, and description
	*	Target Control	Provides start, stop, pause, abort control of the current target
	*	Start Target	Begins the defined sequence
		Pause	Pauses the defined sequence
		Stop / Abort	Stops or aborts the defined sequence

E.5.7. Display Icons

Icon	Softkey	Function	Explanation
x10	*	Times Ten (x10 Display)	Expands the displayed weight by a power of ten
	*	Unit Switching	Toggles between the defined units of weighment
Smart -Trac	*	SmartTrac	Toggles SmartTrac on and off
Min- Weigh	*	MinWeigh	Defines the Minimum weight value
	*	Select Terminal	Switches between clustered IND780 terminals

Icon	Softkey	Function	Explanation
	*	Time and Date	Provides access to edit the hour, minutes, day, month, year

E.5.8. Editing Icons

Icon	Function	Explanation
	New	Creates or inserts a new object containing information that can be presented to the user
	Edit	Modifies the parameters of the selected object
	Exit	Exits a screen or parameter saving the values
	Delete	Clears an object
	Print	Prints the selected memory to an attached peripheral
OK	OK / Accept	Accepts or stores the new object parameter
	Cancel	Skips or ignores a setting or parameter
Esc	Escape	Leaves a screen or parameter without saving
	Copy	Makes a copy of the currently selected item
	Send Email	When pressed, sends test message to recipient currently in focus

E.5.9. Icon to Enter Setup

Icon	Softkey	Function	Explanation
	*	Setup	Provides access to the setup parameters and procedures of the instrument

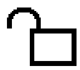
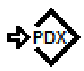
E.5.10. Softkey Menu Icons

Icon	Function	Explanation
∧	More Up	View the upper set of softkeys
∧ ∨	Up and Down	View the first or last five softkeys
∨	More Down	View the lower set of softkeys

E.5.11. Discrete I/O Icons

Icon	Function	Explanation
	Output Off	Toggles the output off in the discrete I/O test
	Output On	Toggles the output on in the discrete I/O test

E.5.12. PDX Service Icons

Icon	Softkey	Function	Explanation
		Sort And Address	Sort and readdress cells in an ascending order corresponding to the cells' S/N
		Unlock	Initiates MT Service Security unlock process
		Lock	Locks MT Service Security and inhibits MT Service View
	*	PDX Performance Log	Trigger a log record in the PDX Performance Log

F. GEO Codes

The following tables list ASCII standard and control characters used by the IND780. The Nul (00Hex), ^ (5E Hex) and ~ (7E Hex) characters are reserved for use by the operating system of the terminal and are not directly available to the user.

The GEO code feature provided in the IND780 terminal permits calibration readjustment due to changes in elevation or latitude without reapplying test weights. This adjustment assumes a previously accurate calibration was done with the GEO code set properly for that original location and that the GEO code for the new location can be accurately determined. The procedure for using this feature is as follows.

F.1. Original Site Calibration

1. Use the GEO code chart (Table F-1) on the following pages to determine the GEO code for the current altitude and location at which the scale will be calibrated.
2. Enter that GEO value into the GEO code parameter in Setup at Scale *n* > Calibration. Figure F-1 shows the Calibration screen for Scale 1.

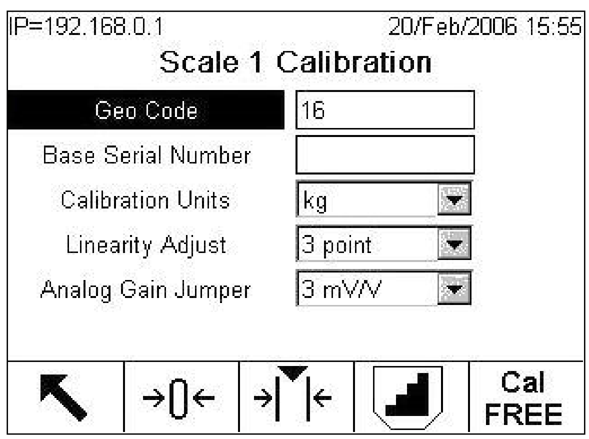


Figure F-1: Calibration Screen

3. Immediately after entering the GEO code, perform a zero and span adjustment using accurate test weights.
4. Exit the setup menu tree.

The scale can now be used in its new location.

F.2. New Site GEO Code Adjustment

When a terminal is to be reinstalled at a different geographic location, gravitational and altitude changes can be accounted for by following these steps. Note that this procedure is not necessary if an on-site recalibration is performed.

1. Use the GEO code chart (Table F-1) on the following pages to determine the GEO code for the new altitude and location at which the scale will be used.
2. Enter that GEO value into the GEO code parameter in Setup at Scale > Calibration (Figure F-1).
3. Immediately after entering the GEO code, exit the setup menu tree. DO NOT perform a normal calibration.

The calibration has now been adjusted for the differences in gravity from the original site of calibration to the new site of use.

- Using the GEO code value for calibration adjustment is not as accurate as re-applying certified test weights and re-calibrating the scale in a new location.

Table F-1: GEO Adjustment Values

Latitude North or South, in Degrees and Minutes	Height Above Sea Level, in Meters										
	0	325	650	975	1300	1625	1950	2275	2600	2925	3250
	325	650	975	1300	1625	1950	2275	2600	2925	3250	3575
	Height Above Sea Level, in Feet										
	0	1060	2130	3200	4260	5330	6400	7460	8530	9600	10660
	1060	2130	3200	4260	5330	6400	7460	8530	9600	10660	11730
0° 0'–5° 46'	5	4	4	3	3	2	2	1	1	0	0
5° 46'–9° 52'	5	5	4	4	3	3	2	2	1	1	0
9° 52'–12° 44'	6	5	5	4	4	3	3	2	2	1	1
12° 44'–15° 6'	6	6	5	5	4	4	3	3	2	2	1
15° 6'–17° 0'	7	6	6	5	5	4	4	3	3	2	2
17° 10'–19° 2'	7	7	6	6	5	5	4	4	3	3	2
19° 2'–20° 45'	8	7	7	6	6	5	5	4	4	3	3
20° 45'–22° 22'	8	8	7	7	6	6	5	5	4	4	3
22° 22'–23° 54'	9	8	8	7	7	6	6	5	5	4	4
23° 54'–25° 21'	9	9	8	8	7	7	6	6	5	5	4
25° 21'–26° 45'	10	9	9	8	8	7	7	6	6	5	5
26° 45'–28° 6'	10	10	9	9	8	8	7	7	6	6	5
28° 6'–29° 25'	11	10	10	9	9	8	8	7	7	6	6
29° 25'–30° 41'	11	11	10	10	9	9	8	8	7	7	6
30° 41'–31° 56'	12	11	11	10	10	9	9	8	8	7	7
31° 56'–33° 9'	12	12	11	11	10	10	9	9	8	8	7
33° 9'–34° 21'	13	12	12	11	11	10	10	9	9	8	8
34° 21'–35° 31'	13	13	12	12	11	11	10	10	9	9	8
35° 31'–36° 41'	14	13	13	12	12	11	11	10	10	9	9
36° 41′–37° 50′	14	14	13	13	12	12	11	11	10	10	9
37° 50′–38° 58′	15	14	14	13	13	12	12	11	11	10	10
38° 58′–40° 5′	15	15	14	14	13	13	12	12	11	11	10
40° 5′–41° 12′	16	15	15	14	14	13	13	12	12	11	11
41° 12′–42° 19′	16	16	15	15	14	14	13	13	12	12	11
42° 19′–43° 26′	17	16	16	15	15	14	14	13	13	12	12
43° 26′–44° 32′	17	17	16	16	15	15	14	14	13	13	12
44° 32′–45° 38′	18	17	17	16	16	15	15	14	14	13	13

Latitude North or South, in Degrees and Minutes	Height Above Sea Level, in Meters										
	0	325	650	975	1300	1625	1950	2275	2600	2925	3250
	325	650	975	1300	1625	1950	2275	2600	2925	3250	3575
	Height Above Sea Level, in Feet										
	0	1060	2130	3200	4260	5330	6400	7460	8530	9600	10660
	1060	2130	3200	4260	5330	6400	7460	8530	9600	10660	11730
45° 38′–46° 45′	18	18	17	17	16	16	15	15	14	14	13
46° 45′–47° 51′	19	18	18	17	17	16	16	15	15	14	14
47° 51′–48° 58′	19	19	18	18	17	17	16	16	15	15	14
48° 58′–50° 6′	20	19	19	18	18	17	17	16	16	15	15
50° 6′–51° 13′	20	20	19	19	18	18	17	17	16	16	15
51° 13′–52° 22′	21	20	20	19	19	18	18	17	17	16	16
52° 22′–53° 31′	21	21	20	20	19	19	18	18	17	17	16
53° 31′–54° 41′	22	21	21	20	20	19	19	18	18	17	17
54° 41′–55° 52′	22	22	21	21	20	20	19	19	18	18	17
55° 52′–57° 4′	23	22	22	21	21	20	20	19	19	18	18
57° 4′–58° 17′	23	23	22	22	21	21	20	20	19	I9	18
58° 17'–59° 32'	24	23	23	22	2\2	21	21	20	20	19	19
59° 32'–60° 49'	24	24	23	23	22	22	21	21	20	20	19
60° 49'–62° 9'	25	24	24	23	23	22	22	21	21	20	20
62° 9'–63° 30'	25	25	24	24	23	23	22	22	21	21	20
63° 30'–64° 55'	26	25	25	24	24	23	23	22	22	21	21
64° 55'–66° 24'	26	26	25	25	24	24	23	23	22	22	21
66° 24'–67° 57'	27	26	26	25	25	24	24	23	23	22	22
67° 57'–69° 35'	27	27	26	26	25	25	24	24	23	23	22
69° 5'–71° 21'	28	27	27	26	26	25	25	24	24	23	23
71° 21'–73° 16'	28	28	27	27	26	26	25	25	24	24	23
73° 16'–75° 24'	29	28	28	27	27	26	26	25	25	24	24
75° 24'–77° 52'	29	29	28	28	27	27	26	26	25	25	24
77° 52'–80° 56'	30	29	29	28	28	27	27	26	26	25	25
80° 56'–85° 45'	30	30	29	29	28	28	27	27	26	26	25
85° 45'–90° 00'	31	30	30	29	29	28	28	27	27	26	26

G. ASCII Standard and Control Characters

The following tables list ASCII standard and control characters used by the IND780. The Nul (00Hex), ^ (5E Hex) and ~ (7E Hex) characters are reserved for use by the operating system of the terminal and are not directly available to the user.

Table G-1: ASCII Standard Characters

Char.	Dec.	Hex.
NUL	0	00
SOH	1	01
STX	2	02
ETX	3	03
EOT	4	04
ENQ	5	05
ACK	6	06
BEL	7	07
BS	8	08
HT	9	09
LF	10	0A
VT	11	0B
FF	12	0C
CR	13	0D
SO	14	0E
SI	15	0F
DLE	16	10
DC1	17	11
DC2	18	12
DC3	19	13
DC4	20	14
NAK	21	15
SYN	22	16
ETB	23	17
CAN	24	18
EM	25	19
SUB	26	1A
ESC	27	1B
FS	28	1C
GS	29	1D
RS	30	1E
US	31	1F
SP	32	20
!	33	21
″	34	22
#	35	23
$	36	24
%	37	25
&	38	26
’	39	27
(	40	28
)	41	29
*	42	2A
+	43	2B
,	44	2C
-	45	2D
.	46	2E
/	47	2F
0	48	30
1	49	31
2	50	32
3	51	33
4	52	34
5	53	35
6	54	36
7	55	37
8	56	38
9	57	39
:	58	3A
;	59	3B
<	60	3C
=	61	3D
>	62	3E
?	63	3F
@	64	40
A	65	41

Char.	Dec.	Hex.
B	66	42
C	67	43
D	68	44
E	69	45
F	70	46
G	71	47
H	72	48
I	73	49
J	74	4A
K	75	4B
L	76	4C
M	77	4D
N	78	4E
O	79	4F
P	80	50
Q	81	51
R	82	52
S	83	53
T	84	54
U	85	55
V	86	56
W	87	57
X	88	58
Y	89	59
Z	90	5A
[	91	5B
\	92	5C
]	93	5D
^	94	5E
_	95	5F
`	96	60
a	97	61
b	98	62
c	99	63

Char.	Dec.	Hex.
d	100	64
e	101	65
f	102	66
g	103	67
h	104	68
i	105	69
j	106	6A
k	107	6B
l	108	6C
m	109	6D
n	110	6E
o	111	6F
p	112	70
q	113	71
r	114	72
s	115	73
t	116	74
u	117	75
v	118	76
w	119	77
x	120	78
y	121	79
z	122	7A
{	123	7B
|	124	7C
}	125	7D
~	126	7E
	127	7F
Ç	128	80
ü	129	81
é	130	82
ã	131	83
ä	132	84
à	133	85

Char.	Dec.	Hex.
å	134	86
ç	135	87
	136	88
ë	137	89
è	138	8A
ï	139	8B
î	140	8C
ì	141	8D
Ä	142	8E
Å	143	8F
É	144	90
œ	145	91
Æ	146	92
ô	147	93
ö	148	94
ò	149	95
û	150	96
ù	151	97
_	152	98
ö	153	99
Ü	154	9A
	155	9B
	156	9C
	157	9D
Pt	158	9E
ƒ	159	9F
á	160	A0
í	161	A1
ó	162	A2
ú	163	A3
ñ	164	A4
Ñ	165	A5
	166	A6
	167	A7

Char.	Dec.	Hex.
¿	168	A8
	169	A9
	170	AA
	171	AB
	172	AC
¡	173	AD
«	174	AE
»	175	AF
	176	B0
	177	B1
	178	B2
	179	B3
	180	B4
	181	B5
	182	B6
	183	B7
	184	B8
	185	B9
	194	C2
	186	BA
	187	BB
	188	BC

Char.	Dec.	Hex.
	189	BD
	190	BE
	191	BF
lb	192	C0
	193	C1
	195	C3
oz	196	C4
	197	C5
	198	C6
	199	C7
	224	E0
ß	225	E1
	226	E2
	227	E3
	228	E4
	229	E5
	230	E6
	231	E7
	232	E8
	233	E9
	234	EA
	235	EB

Char.	Dec.	Hex.
	236	EC
	237	ED
	238	EE
	239	EF
_	240	F0
□	241	F1
_	242	F2
	243	F3
Ø	244	F4
ø	245	F5
□	246	F6
	247	F7
°	248	F8
¨	249	F9
	250	FA
§	251	FB
	252	FC
	253	FD
	254	FE
	255	FF

Table G-2: ASCII Control Characters

Char	Definition	Function
SOH	START OF HEADING	A transmission control character used as the first character of a heading of an information message.
STX	START OF TEXT	A transmission control character that precedes a text and that is used to terminate a heading.
ETX	END OF TEXT	A transmission control character that terminates a text.
EOT	END OF TRANSMISSION	A transmission control character used to indicate the conclusion of the transmission of one or more texts.

Char	Definition	Function
ENQ	ENQUIRY	A transmission control character used as a request for a response from a remote station; the response may include station identification and/or station status. When a "Who are you" function is required on the general switched transmission network, the first use of ENQ after the connection is established will have the meaning "Who are you" (station identification). Subsequent use of ENQ may, or may not, include the function "Who are you", as determined by agreement.
ACK	ACKNOWLEDGE	A transmission control character transmitted by a receiver as an affirmative response to the sender.
BEL	BELL	A control character that is used when there is a need to call for attention; it may control alarm or attention devices.
BS	BACKSPACE	A format effector that moves the active position one character position backwards on the same line.
HT	HORIZONTAL TABULATION	A format effector that advances the active position to the next pre-determined character position on the same line.
LF	LINE FEED	A format effector that advances the active position to the same character position of the next line.
VT	VERTICAL TABULATION	A format effector that advances the active position to the same character position on the next pre-determined line.
FF	FORM FEED	A format effector that advances the active position to the same character position on a pre-determined line of the next form or page.
CR	CARRIAGE RETURN	A format effector that moves the active position to the first character position on the same line.
SO	SHIFT OUT	A control character that is used in conjunction with SHIFT IN and ESCAPE to extend the graphic character set of the code.
SI	SHIFT IN	A control character that is used in conjunction with SHIFT OUT and ESCAPE to extend the graphic character set of the code.
DLE	DATA LINK ESCAPE	A transmission control character that will change the meaning of a limited number of contiguously following characters. It is used exclusively to provide supplementary data transmission control functions. Only graphic characters and transmission control characters can be used in DLE sequences.
DC1	DEVICE CONTROL ONE	A device control character that is primarily intended for turning on or starting an ancillary device. If it is not required for this purpose, it may be used to restore a device to the basic mode of operation (see also DC2 and DC3), or for any other device control function not provided by other DCs.

Char	Definition	Function
DC2	DEVICE CONTROL TWO	A device control character that is primarily intended for turning on or starting an ancillary device. If it is not required for this purpose, it may be used to set a device to a special mode of operation (in which case DC1 is used to restore normal operation), or for any other device control function not provided by other DCs.
DC3	DEVICE CONTROL THREE	A device control character that is primarily intended for turning off or stopping an ancillary device. This function may be a secondary level stop, for example, wait, pause, stand-by or halt (in which case DC1 is used to restore normal operation). If it is not required for this purpose, it may be used for any other device control function not provided by other DCs.
DC4	DEVICE CONTROL FOUR	A device control character that is primarily intended for turning off, stopping, or interrupting an ancillary device. If it is not required for this purpose, it may be used for any other device control function not provided by other DCs.
NAK	NEGATIVE ACKNOWLEDGE	A transmission control character transmitted by a receiver as a negative response to the sender.
SYN	SYNCHRONOUS IDLE	A transmission control character used by a synchronous transmission system in the absence of any other character (idle condition) to provide a signal from which synchronism may be achieved or retained between data terminal equipment.
ETB	END OF TRANSMISSION BLOCK	A transmission control character used to indicate the end of a transmission block of data where data is divided into such blocks for transmission purposes.
CAN	CANCEL	A character, or the first character of a sequence, indicating that the data preceding it is in error. As a result, this data is to be ignored. The specific meaning of this character must be defined for each application and/or between sender and recipient.
EM	END OF MEDIUM	A control character that may be used to identify the physical end of a medium, or the end of the used portion of a medium, or the end of the wanted portion of data recorded on a medium. The position of this character does not necessarily correspond to the physical end of the medium.
SUB	SUBSTITUTE	A control character used in the place of a character that has been found to be invalid or in error. SUB is intended to be introduced by automatic means.
ESC	ESCAPE	A control character that is used to provide additional control functions. It alters the meaning of a limited number of contiguously following bit combinations.
FS	FILE SEPARATOR	A control character used to separate and qualify data logically; its specific meaning has to be specified for each application. If this character is used in hierarchical order, it delimits a data item called a file.
GS	GROUP SEPARATOR	A control character used to separate and qualify data logically; its specific meaning has to be specified for each application. If this character is used in hierarchical order, it delimits a data item called a group.

Char	Definition	Function
RS	RECORD SEPARATOR	A control character used to separate and qualify data logically; its specific meaning has to be specified for each application. If this character is used in hierarchical order, it delimits a data item called a record.
US	UNIT SEPARATOR	A control character used to separate and qualify data logically; its specific meaning has to be specified for each application. If this character is used in hierarchical order, it delimits a data item called a unit.

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