HI 6600 Series Modular Sensor System

User's Guide

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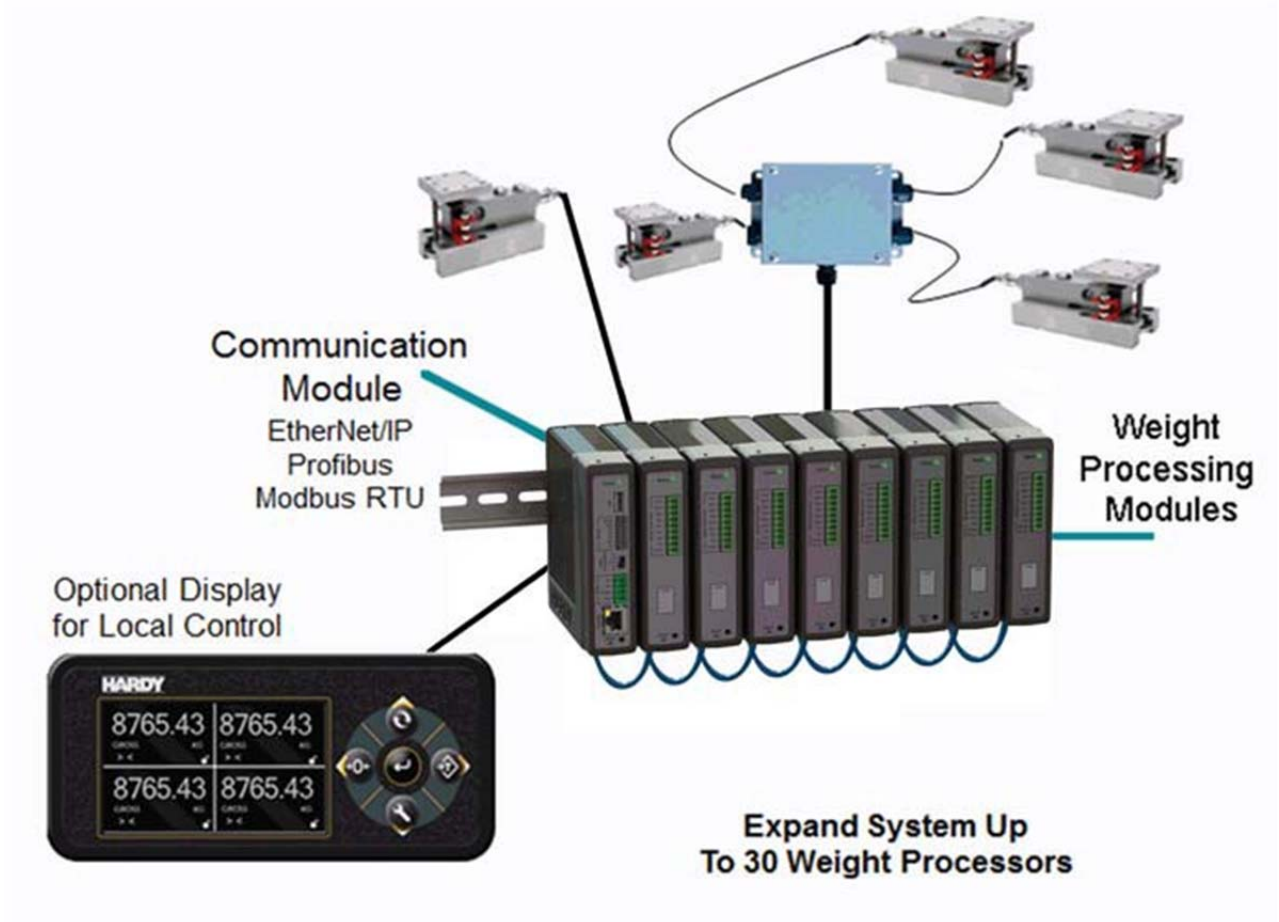
Local Field Service
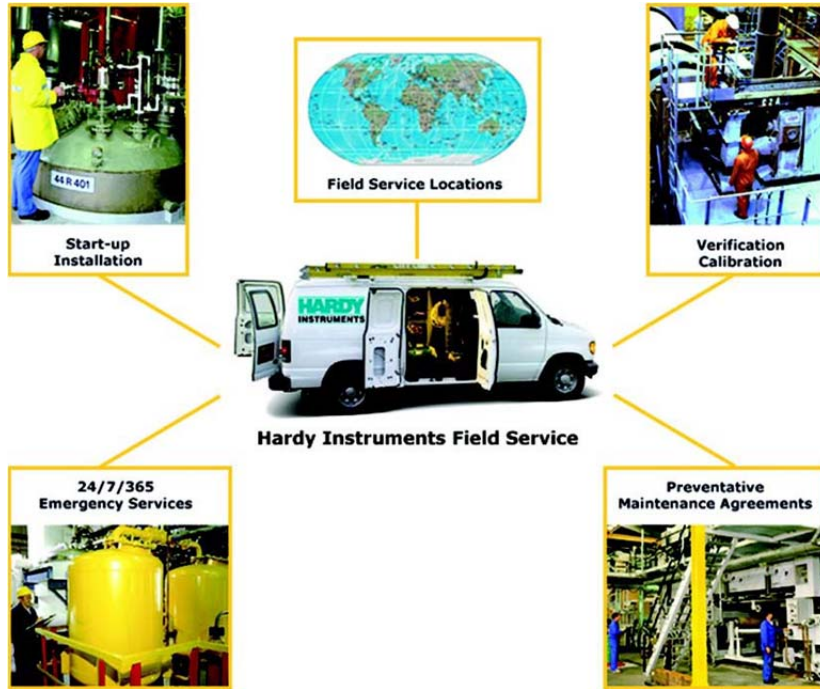
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- **Routine maintenance and certification**
- **Plant audits and performance measurement**
- **Emergency troubleshooting and repair**

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Outside the U.S

Hardy Process Solutions has built a network of support throughout the globe. For specific field service options available in your area please contact your local sales agent or our U.S. factory at
+**1 858-292-2710**.

Contents

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Chapter 1

HI 6600 Series Overview

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This Manual describes installation, setup and operating procedures for the HI 6600 Series Modular Sensor System. Be sure to read and understand all cautions, warnings, and safety procedures in this manual to ensure safe installation and operation of the instrument.

Hardy Process Solutions sincerely appreciates your business. We encourage input about the performance and operation of our products from our customers. Should you not understand any information in this manual or experience any problems with this product, please contact our Technical Support Department at:

Phone:	(858) 278-2900
Toll Free:	1-800-821-5831
FAX:	(858) 278-6700
E-Mail:	hardysupport@hardysolutions.com or hardyinfo@hardysolutions.com
Website:	www.hardysolutions.com

Please visit our website for the latest revision of the HI 6600 Series User Guide and sign up for the Hardy Newsletter to get the latest information on all Hardy products and services. For answers to technical issues and service problems, please visit the Hardy WebTech section of our website or contact a technician by phone during our normal operating hours (6:30 AM to 5:30 PM Pacific Time).

Introduction to the HI 6600 Modular Sensor System

The HI 6600 Modular Sensor System consists of at least one HI 6600 Hardy Gateway Module (HGM) and up to 30 HI 6610 Weight Processor Modules (WPM).

The system communicates with PLCs, PACs and DSCs over EtherNet/IP, Profibus-DP, Modbus-RTU and other popular communication protocols via a single communication link.
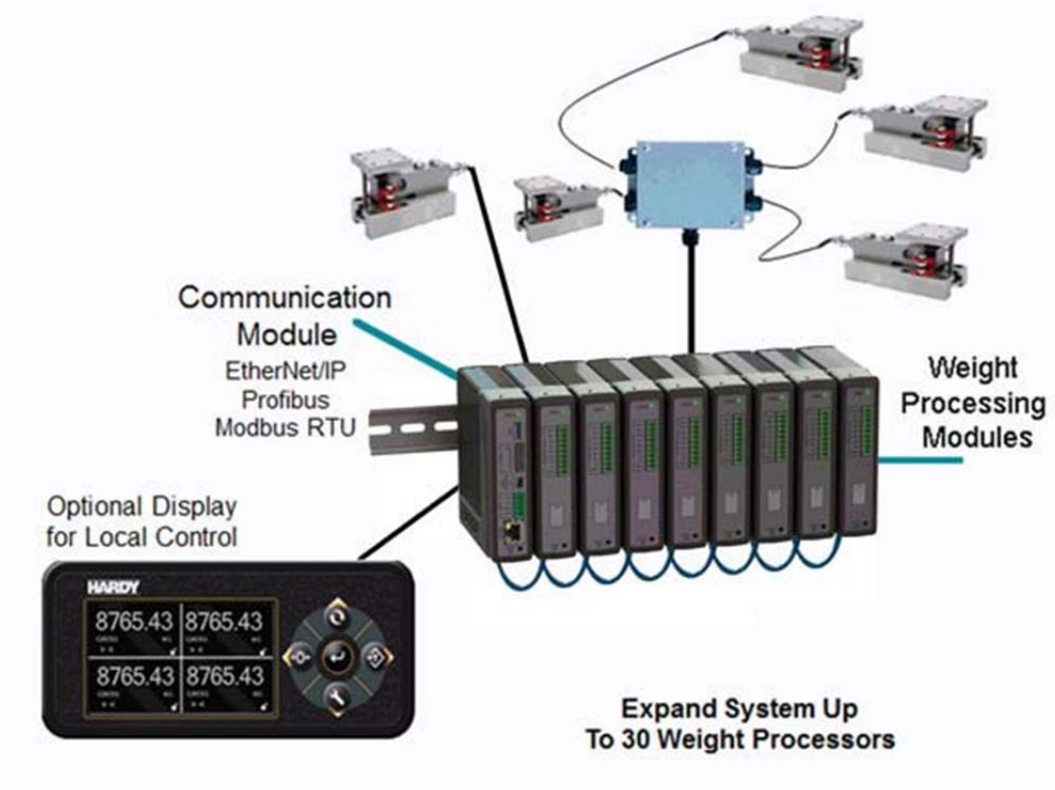
The system is used for front end signal processing of strain-gage type sensors and load cells for all types of industrial and machine weighing applications. Operating blind or with an optional display, the Modular Sensor System conditions, converts and communicates stable processed weight readings from connected load sensors or scales to a variety of control and monitoring systems.

The HardyNet Gateway Module (HGM or HI 6600) offers users many communication choices including Ethernet TCP/IP, Modbus RTU, Modbus TCP and either EtherNet/IP or Profibus-DP.

The HI 6600 series can be used with or without an optional Hardy HI 6110 display. The display is a bright 4.3" high-contrast LCD capable of high-resolution graphics and help text discrete messaging. The HI 6110 display can be panel mounted near the Gateway Module or remotely up to 100 feet away to provide a user interface for operating, calibrating or setting-up the system.

The modular array, small enclosures and low power consumption enable high density cabinet design for systems that require up to 30 channels of processed weight.

Typical Applications

Ideally suited for applications that require multiple channels of weight, the HI 6600 series serves a variety of industrial weighing needs found in batching, blending, filling, dispensing, inventory management, level by weight and check by weight verification.

HI 6600 Series Model Numbers

Model Number	Description
HI 6600-EIP	Hardy Gateway Module - EtherNet/IP
HI 6600-PB	Hardy Gateway Module - Profibus-DP
HI 6610-WP	Weight Processing Module, no display
HI 6110	Optional Multi-Channel Display

Chapter 2

Specifications and Features

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Chapter 2 provides specifications for HI 6600 series instruments. The specifications listed are designed to assist in the installation, operation and troubleshooting of your instrument. All service personnel should be familiar with this section before installing or repairing the instrument.

Basic Specifications

HI 6610 Weight Processing Module (WPM)

Number of Channels
Each Weight Processing Module is a single channel of weight. HI 6600 Modular Sensor System can support up to 30 channels. The actual number of channels that can be transmitted by a single I/O table request depends on the PLC interface format.

- EtherNet/IP: Up to 30 Channels per request
- Modbus-TCP: Up to 14 Channels per request
- Modbus-RTU: Up to 14 Channels per request
- Profibus-DP: Up to 10 Channels per request

Update Rate per Weight Processing Module (WPM)
- 110 times per second per channel (processed weight, display, communications)

Weight Processing Module (WPM) Resolution
- Displayed - 1:10,000
- Internal - 1:8,388,608

WAVERSAVER®
- User Selectable
  OFF, 7.50 Hz, 3.50 Hz, 1.00 Hz (default), 0.50 Hz, 0.25 Hz

Averages
- 1 to 250
- User-selectable in Single Increments

Load Sensor Input per WPM
- Up to four 350-ohm full Wheatstone bridge, strain gauge load sensor/cells (5 volt excitation) can be connected to the weigh scale input on each WPM.

Note: *Connecting 2 or more load cells requires a summing card or Junction Box.*

Non-linearity
- 0.0015% of full scale

Common Mode Rejection
- 110 dB at or below 60 Hz

Common Mode Voltage Range
- 2.5 VDC maximum (with respect to earth ground)

Load Cell Excitation
- 5 VDC +/- 1.15 VDC maximum
- Isolation from digital section 1000 VDC minimum

C2 Calibration Input
- Isolation from digital section 1000 VDC minimum

Load Sensor Cable Lengths per Weight Processing Module
- 250 feet maximum of C2 authorized cable (Maximum of 4 load sensors) with a Summing Card or IT Junction box

DC Input Voltage Weight Processing Module (with 4x 350ohm load cells)
- 1.72 Watts, 12-27 VDC, 71-118 mA

Maximum System Span Distance
- 500 feet (150 meters) span from the first Weight Processor Module to the Hardy Gateway Module

Hardy Gateway Module (HI 6600)

Network Connectivity
- Ethernet TCP/IP
- Ethernet UDP
- Modbus-RTU over RS485
- Modbus TCP
- EtherNet/IP (EIP models only)
- Profibus-DP (PB models only)

USB Port: For Parameter Saving and Backup to PC

Display Port: For optional Front Panel Display

Scoreboard: Uses RS485 port to stream weight readings to a large display or data logger

DC Input Voltage Hardy Gateway Module (HGM)
- 3.90 Watts, 12-24 VDC, 162-290 mA

Optional HI 6110 Front Panel Display

- Monochrome 480 x 272 LCD display with back light
- Five tactile keys for menu item selection
- Displays in either white on black or black on white
- IP66 rated when mounted on a smooth, rigid surface (minimum 16-gage) using the supplied gasket
- 2 watts maximum

Environmental Requirements

Operating Temperature Range
- -10ºC to 60º C (14º to 140º F)

Temperature Coefficient
- Less than 0.005% of full scale per degree C for Cal-LO and Cal-HI reference points

Storage Temperature Range

- -40 to 85º C (-40º to 185º F)

Humidity Range
- 0-90% (non-condensing)

Environmental
- Intended for Building-in, indoor use only at ambient temperatures between 10ºC to 60º C (14º to 140º F) with a pollution degree of 2.

Approvals
- UL, CUL and CE
- Hazardous Area Class I, Division 2, Groups A,B,C,D, T4A (pending)
- Hazardous Area Class III, Division 2, Groups E, F, G, T4A (pending)

Network Certifications
- EtherNet/IP ODVA Conformance Tested, Level 3)
- Profibus-DP by Profibus.org (pending)

Features and Capabilities

Hardy Process Toolbox
The Hardy Process Toolbox is a set of productivity tools that support process weighing functions. Each tool in the Hardy Process Toolbox saves time, increases accuracy, improves efficiency or reduces risk in process weighing applications. The HI 6600 includes the Toolbox functions discussed below.

C2® and eCal™ Calibration
Traditional calibration uses certified test weights. C2® (or eCAL™ as it is called in China) Electronic Calibration allows a scale to be calibrated without the need for test weights. A C2 or eCAL weighing system consists of up to four load cell sensors per WPM, a junction box, interconnect cable, and an instrument with C2 capabilities (e.g., the HI 6600 series instrument).

Each Hardy Process Solutions C2-certified load sensor outputs digital information used for calculating the calibration. When the HI 6600 series instrument reads the signals from the load sensors, it calibrates the scale based on the load sensor's output plus a user-supplied reference point value (from 0 to any known weight on the scale).

INTEGRATED TECHNICIAN®

In conjunction with an IT junction box, the HI 6600 series features INTEGRATED TECHNICIAN® (IT), a system diagnostics program that makes it possible to diagnose weighing system problems from Hardy's Web Server or a connected optional display panel. IT reads individual load sensor voltages and weights and isolates individual system components for quick and easy troubleshooting

NOTE: *If you do not have a Hardy IT Junction Box connected to the HI 6600, the weight reading is the total for all load cells on the system.*

WAVERSAVER®

When measuring small weight changes, the effects of mechanical vibration and noise from feeders and other plant environmental conditions can introduce substantial interference. WAVERSAVER factors out vibration, noise, and other interference-related signals from the load cell so the weight processor can better decipher the actual weight data.

While WAVERSAVER can factor out noise with frequencies as low as 0.25 Hz, five cut-off frequencies can be selected, with higher frequencies providing a faster response time. The default factory setting is 1.00 Hz vibration frequency immunity.

C2, INTEGRATED TECHNICIAN and WAVERSAVER are registered trademarks of Hardy Process Solutions.

Chapter 3

HI 6600 Hardware Installation

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Chapter 3 covers physical installation of HI 6600 Modular Sensor System. User and service personnel should read this chapter before installing or operating the HI 6600 Modular Sensor System.

Safety

Before you begin installing your HI 6600 series equipment, please review the important safety precautions below.

Do not operate or work on this equipment unless you have read and understand the instructions and warnings in this Manual. Failure to follow the instructions or heed the warnings could result in injury or death. Hardy Process Solutions provides manuals in PDF format that are easily downloaded from our website, free of charge. Look under the Docs & Programs tab on the web page for each product.

General Precautions
- Always disconnect the power cord before disassembling.
- Always replace broken or damaged modules or hardware immediately.
- Always check to be sure that no loose parts are sitting on printed circuit boards or electrical connectors or wires when disassembling or reassembling.
- Always protect printed circuit boards from electrostatic discharge (ESD). Always use approved ESD wrist straps and anti-static pads.

Unpacking

> **WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR DIVISION 2.**

> **AVERTISSEMENT – Risque d'explosion – La substitution de composants peut diminuer la conformité pour la Division 2**

> **WARNING -   EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS**

> **AVERTISSEMENT – Risque d'explosion – Ne pas débrancher l'équipement à moins que l'alimentation soit coupée ou que la zone ne présente pas de risques**

1) Before signing the packing slip, inspect the packaging for damage, and report damage of any kind to the carrier company.

2) Check to see that everything in the package matches the bill of lading.

3) If items are missing or you have any questions, contact Customer Service at:

Hardy Process Solutions 9440 Carroll Park Drive San Diego, CA 92121
Phone: (800) 821-5831
International: (858) 292-2710
FAX: (858) 278-6700
Web Site: http//www.hardysolutions.com
E-Mail: hardysupport@hardysolutions.com

Record the model number and serial number of the HI 6600 series instrument. Store them in a convenient, secure location for reference when contacting Hardy Customer Service Department or to buy parts or firmware upgrades.

Tool List

To install the HI 6600 series the following tools will be required.
- Jewelers screw driver (to make and modify cable assemblies)
- 10-50 mm Unibit (for optional display installation)
- Drill with 5mm drill bit (for optional display installation)
- 8 mm nut wrench or socket (for Optional Display)

Installing the HI 6610 Modules

Before getting started, take the following precautions:

WARNING - *Electrostatic discharge may damage semiconductor components in the module. DO NOT TOUCH THE CONNECTOR PINS.*

AVERTISSEMENT – Les décharges électrostatiques peuvent endommager les composants semi-conducteurs dans le module. NE TOUCHEZ PAS les broches du connecteur.

- Wear an approved wrist-strap grounding device when handling the instrument.
- Touch a grounded object or surface to rid yourself of any electrostatic discharged prior to handling the instrument.
- Handle the instrument from the bezel in front away from the connector. Do not touch the connector pins.
- Do not install the instrument right next to an AC power source or high voltage DC equipment
- Route all the low voltage cables away from high voltage cables

Overview of the HI 6600 Hardware

Before installing the HI 6600 Series, familiarize yourself with the basic configuration as shown below.
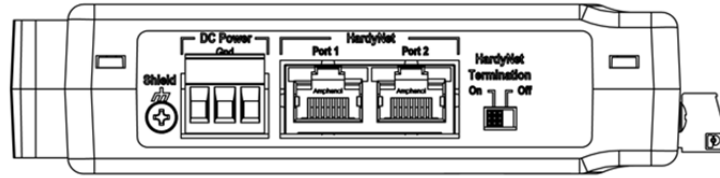
DC Power, Shield, Ports for HardyNet and a Termination switch can be found on the bottom of both the Hardy Gateway Module and the Weight Processing Modules.

The RJ45 ports located on the bottom are used to connect the system using Cat5e cabling. Communications between modules (HardyNet) as well as power distributed from the Gateway Module to the Weight Processing Modules is carried on the Cat5e cabling.
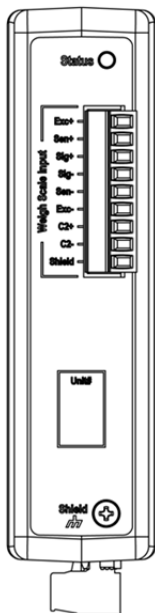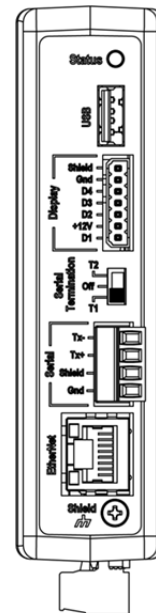
Weight Processing Module   **Hardy Gateway Module**

The Weigh Scale Input is located on the front of the HI 6610 Weight Processing Module.

Located on the front of the HI 6600 Gateway module is a USB port (used to store system settings), a Display port (for connecting to an optional HI 6110 display), Serial Termination switch, Serial Port and an Ethernet Port.

Installation

The HI 6600 Series WPMs and HGMs are designed to be installed on a DIN rail as shown below.
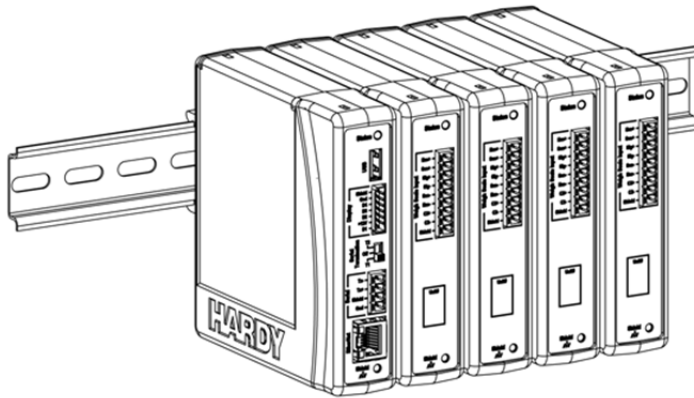
The MAXIMUM span between the first and last module that comprise a system is 500 feet (150 meters).

Note: *Use **Heavy Gage DIN** rail conforming to **EN 60715** and **EN 50022.***
        Use of thin or light gage DIN rail is not recommended.

Begin by installing the WPMs or HGMs onto the DIN rail as shown below.
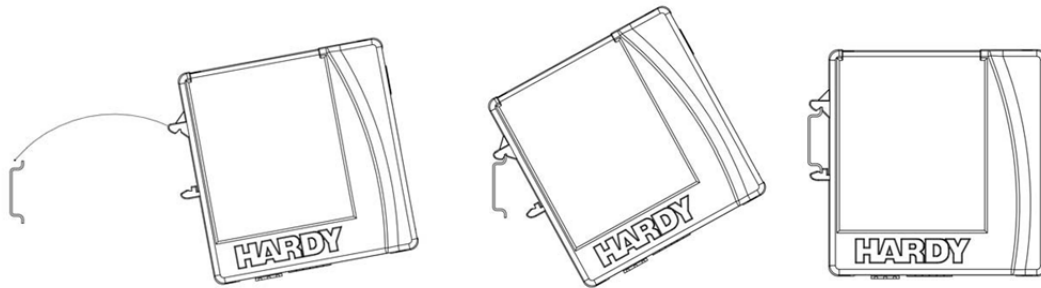
1)   Hook DIN rail bracket onto the DIN rail using the groove at the top of the bracket

2)   Push the module down on the top of the DIN rail and then rotate the bottom of the module onto the bottom bracket of the DIN rail until it clicks into place.

3)   While holding the HI 6600 series instrument, gently pull the bottom of the HI 6600 away from the DIN rail to verify that it is mounted correctly.

To remove, pull up on the bottom of the front corner of the module to disengage the bottom DIN rail catch first, and then lift up on the module to remove the top DIN rail catch.

Note: *Between 8 – 12 pounds of upward force is required to remove a Hardy HI Series Instrument from most DIN rail.*

Cabling the Units Together

Once the units are all placed on a DIN rail, connect them together in a series using the RJ45 ports on the bottom of the units and Cat5e cable.

The Cat5e cabling carries communications between the modules and distributes power from the Hardy Gateway Module to the Weigh Processing Modules.

Redundant DC power may also be supplied individually to each Weight Processing Module via the DC power input terminal located on the bottom of the module. DC power supplied to individual Weight Processing Modules is isolated and not distributed to other modules on the system.

At minimum, DC power must be supplied to the Gateway Module.

Wiring Power to the Hardy Gateway Module
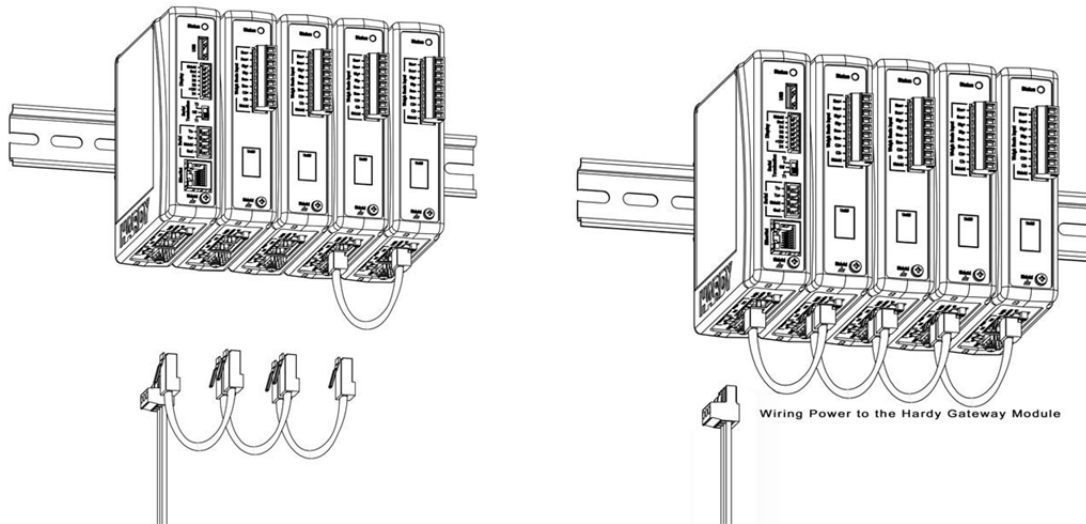
The maximum distance between the first and last module on a system is 500 feet (150 meters).

DC Power Input

WARNING - Do not operate with incorrect line voltage. To do so will result in property damage and/or personal injury. Make sure that the power source does not exceed 24 VDC.

AVERTISSEMENT – Assurez-vous que la source d'alimentation ne dépasse pas 240 V. L'utilisation d'un mauvaise voltage peut résulter en dégâts matériels et/ou des risques de blessures.

WARNING - Be careful not to reverse the ground and hot wires, which can result in damage to the equipment.

AVERTISSEMENT – Attention à ne pas inverser le sol et fils chauds, ce qui peut entraîner des dommages à l'équipement.
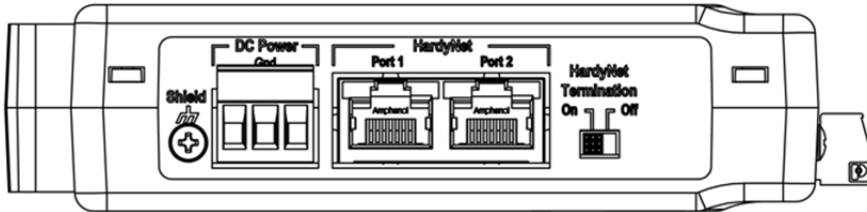
A power-limited 12-24 VDC power supply (Class 2) must be used on the DC input wiring. DC power should be supplied by a clean primary line, directly from the DC power source.

1) Make sure the VDC power is shut off before installing the wires to the connector.

2) Connect the 24 VDC voltage wire, ground wire and shield wire to the connector that plugs into the DC voltage header at the rear panel. The jumper connects the Earth ground and the internal ground making them common, and should remain in place.

3) Plug the connector into the bottom panel.

4) Apply VDC power to the unit.
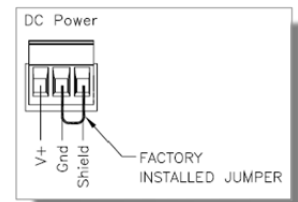
WARNING - If the HI 6600 series equipment is used in a manner that is not specified by the manufacturer, the protection provided by the equipment may be impaired.

AVERTISSEMENT – Si l'équipement de série HI 6600 est utilisé d'une façon qui n'est pas spécifiée par le fabricant, la protection fournie par l'équipement peut être altérée.

Connecting Sensors

The diagrams below show Hardy Load Sensors with C2 and non-Hardy Load Cells (4 wire and 6 wire are similar except 6 wire adds sense wiring) that do not have C2. Wire the terminal connector that plugs into the front of the Weight Processor Modules by carefully following the Weigh Scale Input termination label.
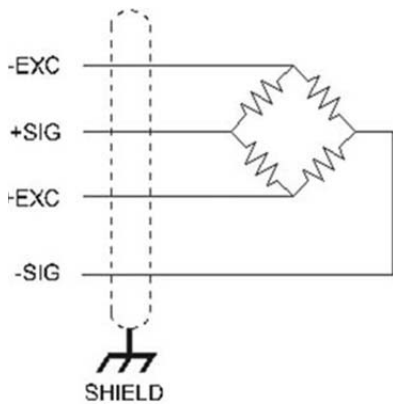
Non-C2 load cell wiring   Hardy load sensor with C2
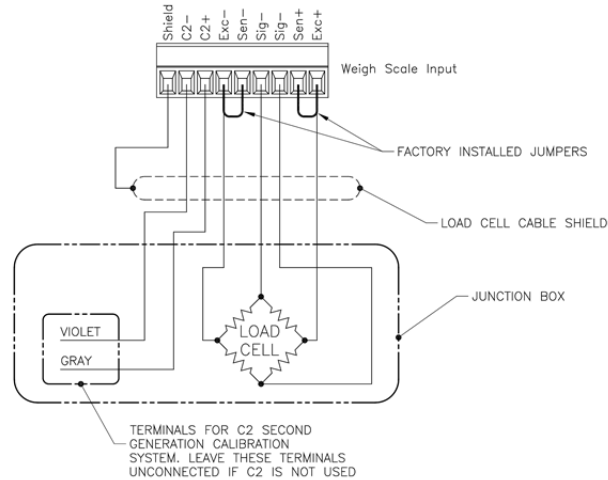
Note: when connecting the HI 6600 series instrument to a junction box, the sense lines would be connected between the +Sen and –Sen connections for the junction box and the instrument. See the I/I Diagram for further detail. You can find the I/I Diagram in the Hardy website under Products>

WARNING - Instrument power should be routed away from all other signal cables to avoid electrical interference.

AVERTISSEMENT – Tension de l'appareil doivent être acheminés à l'écart de tous les autres câbles de signaux pour éviter toute interférence électrique.

Installing the Optional Display

The following section provides details on how to mount the Optional Front Panel Display and connect to the HI 6600 HGM.

Blind Unit (No display)

The front display is not necessary for the HI 6600 series instrument to operate as a weight processor. Blind units can be fully configured using the Web browser communication.

Optional Remote Display Mount

The HI 6600 Modular Sensor System is compatible with HI 6110 displays.

The optional display for the HI 6600 series instrument can be mounted in a remote location up to 250 feet (75 meters) from the Hardy Gateway Module by modifying the supplied cable.

Mounting the Optional Front Panel Display

(1) Make sure that all Electrostatic Discharge (ESD) precautions are taken before and during installation.

(2) A thin plastic template comes with the product. Make the hole pattern in the panel door or cover using the dimensions provided on the diagrams below.

WARNING - We recommend installing the HI 6600 series modules in a NEMA 4, 4X or IP 55 rated enclosure or better.

AVERTISSEMENT – Nous vous recommandons d'installer le HI 6600 dans un boîtier NEMA 4, 4X ou IP 55 ou mieux.
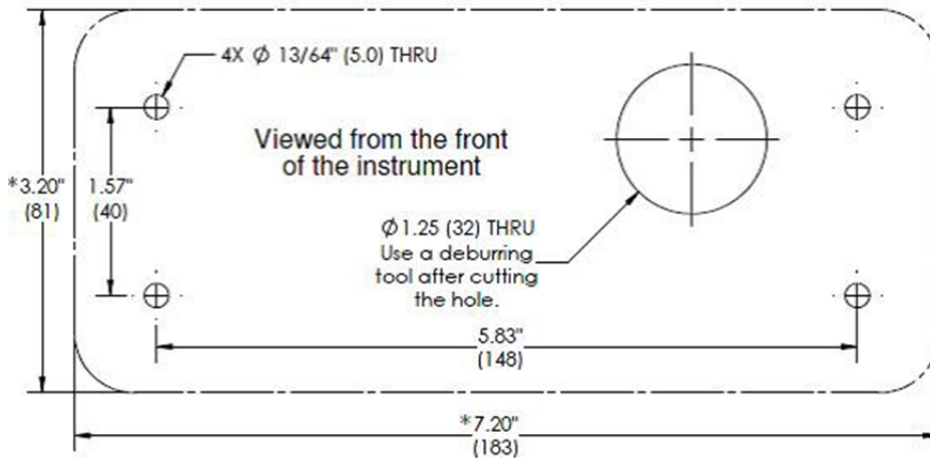
Panel Hole Dimensions (not displayed to scale)
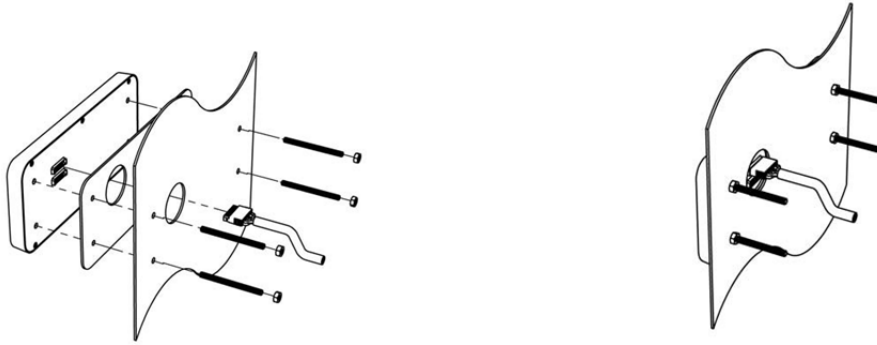
i)   Connect and hand-tighten the four screw rods into the Optional Front Panel display.

ii)   Place the gasket over the screw rods then slide the screw rods through the panel until flush with the surface.

iii) Place washer and nut onto the screw rods sticking through the panel. Tighten nuts so that the gasket is fully compressed and that the metal bezel of the display is in contact with the panel. Nuts should be torqued to 20 inch-lbs to ensure the seal required for an IP-66 rating.

iv)   Remove the terminal connectors from the cable assembly provided and replace the original cable with the desired cable length. See instructions above for Making Longer Display Interface Cables below.

v)   Connect the display cable to the back of the display and to the Display Port located on the front of the Hardy Gateway Module
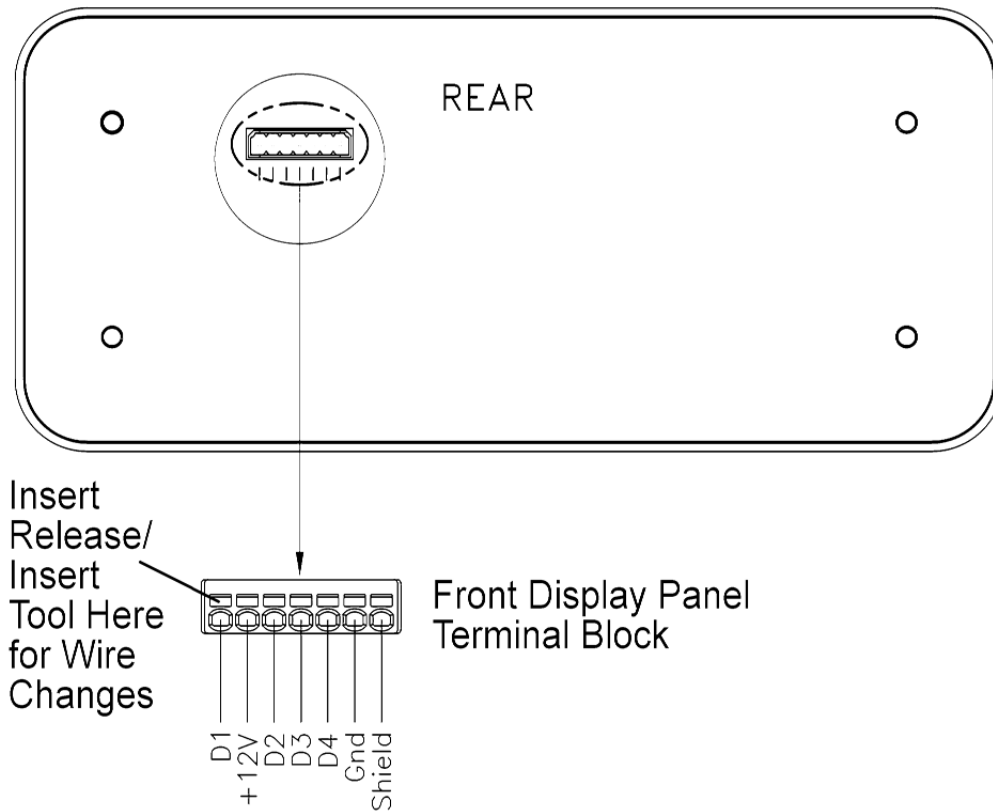
Making Longer Display Interface Cables

The terminal block uses a spring cage type contact. There is a slot provided to use an insert/release tool. The tool is a 2.0 mm x 0.4 mm wide flat blade screw driver. Inserting the end of the small screwdriver tool opens the cage contact and allows one wire to be inserted. Removing the insertion tool with bare conductor wire inserted will lock the connection.

Wiring Specifications
- Wire size: 20 AVG maximum / 26 AVG minimum
- Maximum cable length: 100 ft. (30.48 meters)
- Use three twisted pairs with a drain wires
- Pair wires +12 and GND, D1 and D2, D3, and D4

Chapter 4

Instrument Configuration

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Menu Structure

The menu tree below shows the location of commands and parameters used to configure and use the system.

Hardy HI 6620 Gateway Module

Communication
- EtherNet IP
- Ethernet TCP/IP
- Ethernet UDP
- Modbus-RTU
- Modbus-TCP
- Scoreboard
- USB

Diagnostics
- EtherNet/IP
- Modbus-RTU
- Modbus-TCP
- Power
- Stability

Information
- READ ONLY Product Serial# Software Revision
- MultiVersion WPM
- Begin Programming

Language
- Chinese
- English

Optional HI 6110 Front Panel Display

Display
- Backlight
- Power Saving
- Set Background
- Set Foreground

Display Security
- Calibration Lock
- Configuration Lock
- Display Lock
- Key Pad Lock
- Read Only Lock

Hardy HI 6610 Weight Processing Modules

Calibration
- C2 eCAL
- Hard Cal
- Cal Date

Diagnostics
- Stability Test
- C2
- Int. Technician
- Power

Filter
- NumAverages
- Waversaver

Information
- READ ONLY Product Serial# Software Revision

Operations
- Tare Operations
- Zero Operations
- Piece Count
- Auto Mode

Setup
- Capacity
- Decimal Point
- Grads
- Instrument ID
- Motion Tolerance
- Operator ID
- Unit

The system can be set-up, calibrated and operated either through the built-in Webserver or through an optional front panel display. The menu structure above may be followed using either interface.

Using the Webserver

To use the Webserver, a connection must first be established between the Hardy Gateway Module and a connect PC. The following steps will assist in establishing a connection:

1) Connect an Ethernet cable between the RJ45 port located on the front of the HI 6600 Gateway Module's RJ45 and a PC then power up the instrument. A cross-over cable is not required, but can be used.

2) The instrument will auto-negotiate settings suitable for a variety of operating systems and network configurations. Wait approximately 15 seconds and check to see if the green light of the Ethernet port is on and blinking – if so, skip to step 8 – you are connected.

3) If the green light on the Ethernet port does not light up, use the Optional Display to check that the unit's Enable DHCP is turned off and follow steps 4 through 8 If an optional display is not available, please call Hardy Tech Support for further assistance.

192.168.0.100

Network Identifier   Node Identifier
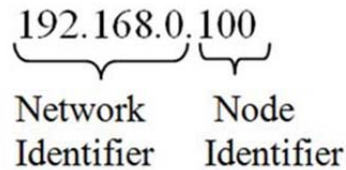
4) Using the unit's Fixed IP address (the default is 192.168.000.100), the PC must now be assigned a unique IP address (for example, 192.168.000.101)

There are two simple rules for the IP Address:
- It must have the same network identifier as the computer.
- It must have a different node identifier than the computer.

5) On a PC running windows, open Internet Properties (TCP/IP).

Click in the 'Use the Following IP Address' checkbox; then enter the following into the TCP/IP Properties dialog.

- IP Address = 192.168.0.101
- Subnet Mask = 255.255.255.000

6) Select OK on the TCP/IP Properties dialog box. The computer is now configured.

7) Enter the HI 6600 HGM's IP address into the Windows PC Web browser to access the embedded web browser. For example: http://192.168.000.100

NOTE *Additional information for setting up communications between the Gateway Module and the PLC, DCS, or PC is under Network Communications (Chapter 6).*

Once connected, browse the webpages by following the menu tree presented in the beginning of this chapter. Changes are made by clicking the item and either selecting an option or inputting a value using your PCs keyboard. *NOTE: Selections and inputs are ONLY saved to memory by clicking SAVE PARAMETERS in the webpage.*

Using the HI 6110 Front Panel Display
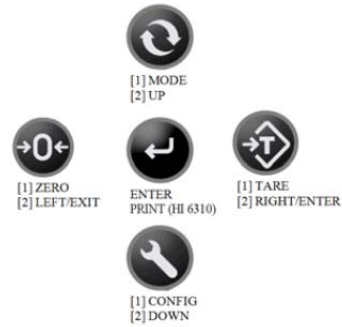
1) Toggle between showing multiple channels and a single-channel by pressing the ENTER button

2) Move the quadrant outline to the desired channel by using the arrows keys. Press ENTER to select the channel, once a channel is selected it will show in full-display mode and change function of the buttons from navigation (up, down, left, right) to instrument function (mode, config, zero, tare).

Instrument 1	Instrument 2
Instrument 3	Instrument 4

Instrument 3	Instrument 4
Instrument 5	Instrument 6

Scroll through available instruments by pressing the UP and DOWN arrows.

1) Enter Set-Up for the selected channel by pressing the CONFIG button.

Pressing the CONFIG button minimizes the displayed weight value and shows a list of submenus to the left that follow the menu tree presented in the beginning of this chapter.

2) Navigate UP and DOWN the submenus using the arrow keys, then select a menu by pressing the ENTER button.

3) Fixed options within a submenu are selected by using the UP & DOWN buttons to navigate to the choice, then by pressing ENTER key to select. Once an option is selected, back out of the submenu by pressing the LEFT arrow key.

4) Entering Numeric and Alphanumeric values are done pressing the UP & DOWN buttons to change a value and RIGHT & LEFT buttons to move the position of the cursor. Once a value is keyed in, press the ENTER key to save then the LEFT arrow key to return to main menus.
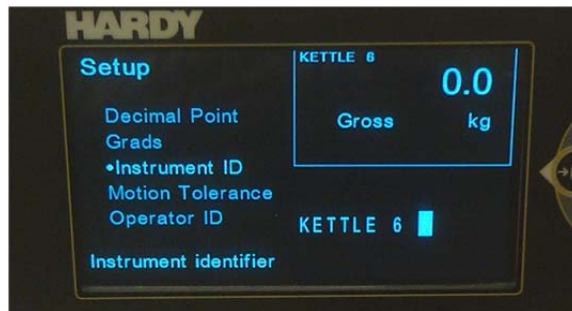
5) Values are saved to memory only by backing out to the top level.

Mode Button

Press the Mode Button to switch between different weighing modes of:

[1] MODE
[2] UP

- GROSS: Displays the GROSS weight of the system.
- NET: Displays the NET weight of the system. The NET weight displayed is the GROSS weight minus the TARE value.
- COUNT: Counts the number of objects once the weight for one object is set.

The displayed mode on the instrument can also be changed by selecting DISPLAY MODE on the Operations webpage and choosing Gross, Net or Count from the drop-down menu or by sending the DISPLAY MODE command over communications.

Channel Identification

System Discovery

Once the HI 6600 Series Modular Sensor System is installed, connected and powered, a discovery process is required to allow the Hardy Gateway Module to identify all Weight Processing Modules present on the HardyNet. This discovery process can be initiated in a number of ways and should be used each time the HardyNet system is changed. Examples of changes are removing a module from the system or adding a new module to the system.

The system initiates a discovery process that enables the Gateway Module to identify and track changes to the Weight Processor Modules connected on the HardyNet. The discovery process can also be initiated manually by selecting Start Discovery under the HardyNet sub-menu of the HI 6600 Gateway Module.

Discovered Weight Processing Modules are added to a list that is saved in non-volatile memory of the Gateway Module. The discovery process is designed to only add units that are not already saved in memory. If a Weight Processing Module has been physically removed or disconnected from the system, it must be manually deleted from the list of available modules by selecting Delete Channel. A module that is accidentally deleted can be discovered again by power cycling the Gateway Module or again by manually selecting Start Discovery

The number of Weight Processor Modules discovered (ie: channels of weight) connected to the system will be displayed as Discovered units: XX on the Web Browser as shown below or listed in the Discovery section of the optional front panel display once the process is complete.

Using the Webserver (shown below) is recommend for initial system set-up and changes to a system with a large number of channels.
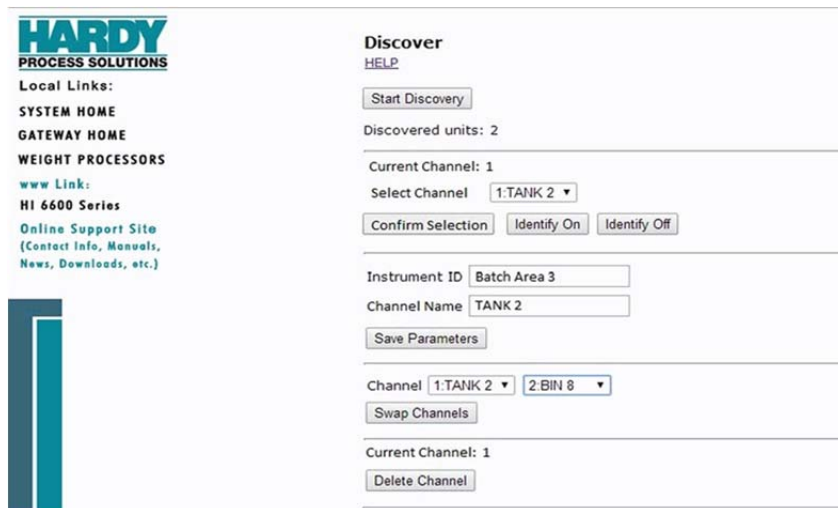
Naming the Weight Processing Modules

To ease identification of a particular Weight Processor Module, a meaningful name (ie: Ingredient C or BIN 8) may be assigned to the module by using Select Channel, Confirm Selection, then identifying the physical location of the module by pressing Identify On/Identify Off which will cause the LED on the selected module to blink. Once the particular module is identified, rename the module and press Save Parameters in the Web Server or ENTER on the front panel display to save the module name into memory.

Each Weight Processor Module is assigned a channel number during the discovery process. Weight Processor Modules are listed in the order they are discovered, not by physical position or location on the HardyNet.

Ordering the Weight Processing Modules

The order in which the channels appear in the drop down menus or on the optional display may be changed by using Swap Channel in the web server or by selecting the channel using the front panel of the optional display, pressing enter to 'capture' the channel, moving it by using the UP/DOWN arrows, then pressing enter again to 'release' the channel to its new position.

NOTE: *The channel will retain its Channel Name but be reassigned a new channel number and position on the list.*

Deleting or Replacing Channels

Deleting an unwanted channel from the system is completed by selecting **Delete Channel** (for example when a spare channel is connected to the system).

Parameters associated with channels remain in non-volatile memory of the Gateway Module and can therefore be transferred to a replacement Weight Processing Module by following these steps:

1) **Delete Channel** of the Weight Processor Module to be removed.

2) Remove the deleted Weight Processor Module. by disconnecting the RJ45 connectors on the bottom and lifting gently up the unit to lift it off the DIN rail

3) Place the new Weight Processor Module on the DIN Rail and connect the RJ45 connectors to reconnect the new module to HardyNet

4) **Start Discovery** to find the new module. Parameters from the removed module will now be applied to the new module.

NOTE: *The new module will appear at the end of the channel list. If need be, reassign the channel number and change its order in the list by using the Swap Channel process described above.*

Saving and Restoring Configuration Data Using the USB port

The HI6600 Gateway Module provides a USB port to save parameters to a memory stick. Parameters can be saved, restored, copied and modified from one instrument or channel to another instrument or channel using this feature. Details of use can be found in the USB Memory Stick section of the Network Communications section of this manual.

Suggested Minimum Steps When Setting Up the Instrument For the First Time

Choose a specific Weight Processor Module to set up by selecting a channel either from the front panel display or on the webserver.

Channel
1) Choose channel to set-up

↓

SET UP (minimum)
1) Select Unit of Measure
2) Input Total Scale Capacity
3) Select Graduation Size
4) Select Decimal Point Position
5) Input Motion Tolerance

↓

Filter
1) Num Averages
2) Waversaver

↓

Calibration
1) Cal Date
2) Cal Method
   a. C2 eCal
   b. Hard Cal
3) Complete Cal Procedure
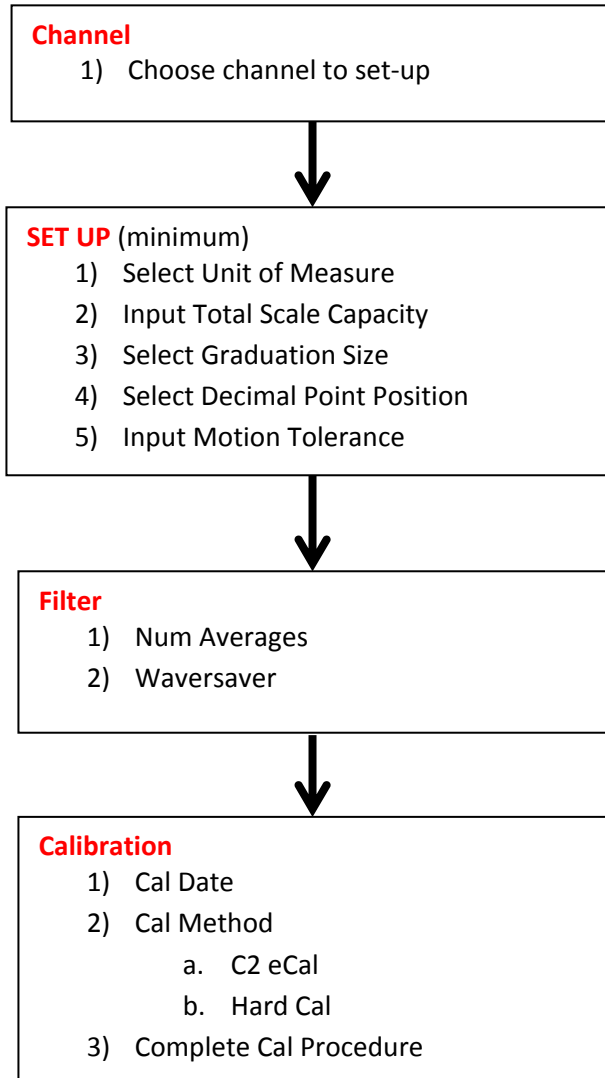
Setup Parameter Menus

The Setup Menus consists of the following parameters:

- Capacity
- Decimal Point
- Grads
- Instrument ID
- Motion Tolerance
- Operator ID
- Unit

Capacity Parameter

Scale Capacity is the scale's nominal operating capacity (the total weight capacity of the scale system). If this value is exceeded by six graduations, dashes appear on the front display. Communications to and from optional devices are not affected.

If a Capacity value is entered which conflicts with either the decimal point value or the graduation value, the decimal point and/or graduation values are automatically modified to match the programmed capacity. It is therefore recommended that the Capacity parameter is entered first before setting the Decimal Point and Grad parameters.

RANGE: .000001 - 999999 (Default 999999).

On the Web page Or Using the Front Panel Display: enter the capacity in the text box provided or enter the capacity using the arrow keys.

Decimal Point Parameter

Use the Decimal Point Parameter to set the resolution you want for the WPM. Here you set the location of the decimal point for the weight resolution. The higher the number, the farther to the left the decimal point moves and the higher the resolution of the scale. Note that setting more decimal points does affect the overall accuracy of the instrument.

RANGE: 0-5 (default 2) Not to exceed 1 part in 100,000

On the Web page Or Using the Front Panel Display: from the Decimal Point pull-down list, select the decimal position for this instrument or select from the list of decimal point values supported using the arrow keys.

Graduation Size Parameter

The Graduation Size is the Minimum increment displayed by the instrument. The Base Graduation Number can be calculated by dividing the Total Load Cell Capacity by 10,000.

For example, with two decimal points selected, a graduation size of 10 will display increments of .10 units and the graduation size .50 will display increments of .50 units. For a scale with 10,000 capacity, graduation size = 1
RANGE:1, 2, 5,10, 20, 50, 10, 200, 500, 1000 (default 1)

On the Web page Or Using the Front Panel Display: from the Decimal Point pull-down list, select the decimal position for this instrument or select from the list of graduation values supported using the arrow keys.

Instrument ID

Use this parameter to assign a meaningful name to the system to make it easier to identify on a network. The assignment applies to the Gateway Module only, channels connected to the Gateway may also be assigned a name by following the Naming the Weight Processing Modules section located in the beginning of this chapter.

Motion Tolerance Parameter

The value you enter for Motion Tolerance sets the amount of deviation to allow for your process. This value must be greater than or equal to the Graduation Sizes. We recommend 3 times the graduation size.

The base motion number can be calculated by using the following formula:

Base Motion Number = (Total Load Cell Capacity x 0.0003)

RANGE: .000001 - 999999 (default 10)

On the Web page or Using the Front Panel Display: enter the value in the text box provided or input the desired motion tolerance value using the arrow keys.

Operator ID Parameter

The Operator ID is the ID of the user who is going to operate the Weight Processor or service the instrument. Select three letters or numbers or any combination of letters and numbers that adequately identifies the user.

On the Web page or Using the Front Panel Display: enter the value in the text box provided or input a value using the arrow keys, then pressing the enter button to save.

Unit (of Measure) Parameter

The Unit (of measure) parameter sets the scale to either English or Metric units. The Selections are:

- Ounces
- Pounds
- Ton
- Gram
- Kilogram
- Metric Ton

On the Web page or Using the Front Panel Display: select the desired weight units from the pull-down list then click Change Unit to save or select from the list of values supported using the arrow keys.

Filter Parameter Menu

There are two parameters in the Filter menu

- NumAverages (Number of Averages)
- WAVERSAVER

NumAverages Parameter

The value you enter for NumAverages (the Number of Averages) sets the number of weight readings used to compute a sliding average of displayed weight. This helps reduce the effects of material impact and/or vibration if material does not enter or exit the scale evenly. This setting helps the instrument ignore the effects of material impact and/or vibration. Applications requiring very quick weight readings should reduce this setting to its minimum. If the weight is unstable, increase the averages. The HI 6600 series instrument does 110 updates per second, which translates to an update approximately every 9 milliseconds. If you average enough weight readings, the weight loss or gain remains smooth. If you average the weight too much you can cause over filling. Also see *WAVERSAVER for information on filtering unstable weight readings.*

RANGE:1-250 (default 10)

On the Web page Or Using the Front Panel Display: enter the value for the number of readings to factor into the average.

WAVERSAVER® Parameter

Typically, mechanical noise (from other machinery in a plant environment) is present in forces larger than the weight variations you want to detect. WAVERSAVER® reduces the effects of the vibratory forces that exist in all industrial weight control and measurement applications so the device can better calculate the actual weight. WAVERSAVER enables the Weight Processor to distinguish between actual weight data and mechanical noise, both of which are typically conveyed in the load cell signal. WAVERSAVER can be configured to ignore noise with frequencies as low as 0.25 Hz. One of three higher additional cut off frequencies may be selected to provide a faster instrument response time. The function is user selectable and can be turned off.

RANGE: 0.25 Hz, 0.5 Hz, 1.0 Hz, 3.50 Hz, 7.50 Hz, OFF (default 1.0 Hz)

Chapter 1 describes the benefits of using the WAVERSAVER feature.

On the Web page Or Using the Front Panel Display: from the pull-down list, select the FILTER menu and then select the value for WAVERSAVER.; Or select from the list of values supported using the arrow keys.

Calibration

The parameters in the System Calibration menu are shown below.

C2 or eCAL

- Sensitivity
- Gravity
- Ref Wt (Reference Weight)
- Do C2 Calibration
- Cal Tol (Calibration Tolerance)
- Num Dev (# of C2 Sensors)

Hard Cal

- Cal Tol (Calibration Tolerance)
- Sensitivity
- Cal Lo Wt (Zero Reference Point)
- Do Cal Lo
- Span Wt (Span Weight)
- Do Cal Hi

This section describes C2 or eCAL and traditional calibration procedures. For the Weight Processor Modules to give precise readings, they must be routinely calibrated both during operation or when it has not used for an extended period of time. It is important that users and service personnel be familiar with the procedures in this chapter before installing or operating the HI 6600 WPM modules.

All calibration is done in the Gross mode. Be sure to follow all the procedures completely to insure that the weights read by the unit are accurate.

In some incidents it is better to verify a calibration than just re-do the calibration. If during the scale verification, it is found to be out of calibration, check for damage and a mechanical problem. When all checks OK, then recalibrate. Perform a calibration and perform a scale verification. No calibration process ensures the load cells are functioning or installed correctly.

Always verify your scale after any calibration and maintenance routine.

NOTE: Do not perform a calibration while an application is in operation.

Pre-Calibration Procedures

Verify that the load cells have been properly installed.

- Refer to your load cell operations and installation manual for proper installation instructions.
- On some sensors and cells an arrow indicates the direction of the applied load. If the arrow is pointing in the wrong direction, change the position of the load cell so that it is mounted in the direction of the applied load.
- Check for binding on the Load Cell or other parts of the weighing system.

> **WARNING -** Binding on a scale/vessel or load cell does not allow the load cell free vertical movement and may prevent the instrument from returning to the original zero reference point.

> **AVERTISSEMENT** – Lier sur une échelle / récipient ou cellule de charge ne permet pas la cellule de charge libre circulation verticale et peut empêcher l'appareil de revenir au point de référence zéro d'origine.

A load cell must be mounted so that 100% of the load (Vessel w/Contents) passes vertically through the load cell.

Verify that nothing is binding the load cell. This means that nothing is draped across the scale/vessel or the load cell, such as a hose, electrical cord, tubes, or other objects. Verify that nothing is in contact with the scale/vessel other than service wires and piping that have been properly mounted with flexible connections. Flexible pipes are not to be used in any other than the horizontal plane and are not to be used to correct pipe alignment problems. Vertical or at angles other than horizontal will have an effect on the scales ability to repeat and provide accurate weight readings.
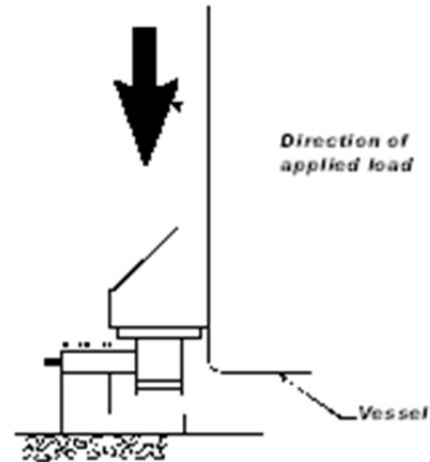
Electrical Check Procedures

Load Cell/Point Input/Output Measurements

The HI 6610 WPM instrument is designed to supply 5 VDC excitation to as many as four 350-Ohm load cells/points per channel. The expected output from each load cell/point will depend on the mV/V rating of the load cell/point and the weight.

For example, a 2mV/V load cell/point will respond with a maximum of 10 mVDC at the load sensor's full weight capacity, which includes the weight of the vessel and the weight of the product as measured by the load cell/point. Thus, if the load cell/point weight capacity is rated at 1000 pounds, the load cell/point will be 10 mVDC at 1000 pounds, 7.5 mVDC at 750 pounds, 5 mVDC at 500 pounds and so on.
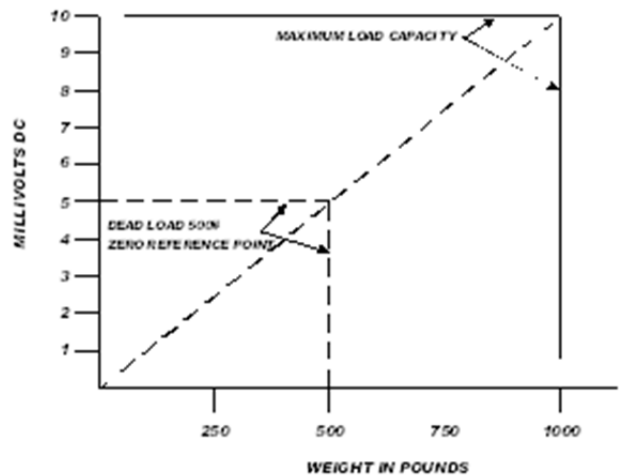
A zero reference point will vary from system to system depending on the "Dead Load" of the vessel.

"Dead Load" is the weight of the vessel and appurtenances only, with no product loaded. In our example we will assume the dead load to be 500 pounds.

NOTE: *The operating range for the scale in this example is 5-10 mVDC with a 500 pound weight range. After zeroing the instrument, the 0 reading refers to the zero reference point and not absolute 0 mVDC or absolute 0 weight.*

NOTE: *Load cell/point measurements are checked with a digital voltmeter at the load cell connector on the front of the module or by using INTEGRATED TECHNICIAN with a Hardy IT Junction Box. The scale calibration must be completed to enable IT to function correctly.*

Load Check

Place a load (weight) on the scale or vessel, and check to see if the weight reading on the input table changes in the proper direction.

For example, if the display reads 100 pounds and a 20-pound weight is placed on the vessel or scale, the display should read 120 or some value over 100. With the display reading 100 pounds, if a 20-pound load is placed on the vessel or scale and the reading is 80 pounds, the reading is going in the wrong direction and indicates some problem with the system.

If the display reads improperly or shows no change, something is wrong with the setup. If the display changes weight in the proper direction, remove the weight and proceed to calibrate the instrument. Refer to Chapter 9 on troubleshooting for additional help to determine the cause of the poor weight reading.

C2 & eCAL Electronic Calibration

C2 (also known as eCAL) Electronic Calibration, calibrates a scale system electronically without using certified test weights. Digital information within a Hardy C2 or eCAL- certified load sensor details its unique performance characteristics. The HI 6600 series instrument reads the performance characteristics of each load sensor and detects the number of load sensors in the system.

Before running C2or eCAL calibration, run all of the pre-calibration procedures. Make sure you have configured the HI 6600 series instrument. This includes setting the units, decimal point, NumAverages etc. For instructions on setting up your instrument, please see the Chapter on Instrument Configuration.

NOTE: *Ensure the Sensitivity, Reference Weight and Gravity Correction are all set prior to running C2 cal command.*

C2 and eCAL Calibration Commands and Parameters

Sensitivity Parameter

The load cell sensitivity, defined in mV/V, sets the expected change in analog signal over the full scale range of an analog strain gage load cell. For example if a 5 Volt excitation is applied to a load cell with a sensitivity of 2 mV/V then the full scale signal will be 10mV. To ensure that the HI 6600 optimizes the processing of the analog signal from the load cell, the load sensitivity parameter should be set to match that of the load cells being used.

Ref Weight Parameter

Reference Weight is the total live load that is currently on the scale. The calibration process uses a reference weight, which is normally zero (no weight on the scale), but can be any known weight on the scale. With nothing on the scale, the Reference Weight is 0.00. With 5 lbs on the scale, the Reference Weight is 5.00 lbs.

Cal Tolerance Parameter

Sometimes, the contents of the vessel you are weighing are in motion. Cal Tolerance allows you to set a value that determines the amount of motion that the system can tolerate and still calibrate. In other words, the value you enter for Calibration Tolerance sets the amount of deviation to allow during the calibration process. This value must be greater than or equal to the base motion value and/or the Graduation Sizes.

The base motion value can be calculated by using the following formula:

Base Motion value = (Total Load Cell Capacity x 0.0003)

RANGE: .000001 - 999999 (default 10)

Another way to determine what this value should be is to multiply the fluctuation from peak to peak and multiply this amount by two.

Gravitation Correction

Objects weigh about 0.5% less at the equator than they weigh at each pole because the force of gravity is less at the equator than at the poles. For example an object weighing 100 pounds at the North Pole on a spring scale would weigh 99.65 pounds at the equator.

Depending on the latitude of your location, your scales would measure somewhere in between. The table below shows the gravitation correction factor for a few cities around the world.

NOTE *Ensure that the scale system is clean and ready to receive product. This step establishes the gross zero reference. You must perform a C2 Calibration **after** setting the Gravity Correction or the correction factor won't work.*

In general if your location is between the 45th parallel and the equator, gravity correction is greater than 1.0. For example, at these latitudes, because the gravity is less, you are adding, 1.0006 for an error that is .06%). For locations between the 45th parallel and the North or South Pole your correction factor will be less than 1.0. For example .9994 for an error that is -.06%.

City	Grav. Accel	City	Grav. Accel	City	Grav. Accel
Amsterdam	0.999369	Istanbul	1.000406	Paris	0.999048
Athens	1.000684	Havana	1.001872	Rio de Janeiro	1.001884
Auckland NZ	1.000782	Helsinki	1.001405	Rome	1.000326
Bangkok	1.002392	Kuwait	1.001405	San Francisco	1.000702
Brussels	0.999503	Lisbon	1.000615	Singapore	1.00269
Buenos Aires	1.001004	London	0.999445	Stockholm	0.99877
Calcutta	1.00191	Los Angeles	1.001028	Sydney	1.00104
Cape Town	1.00104	Madrid	1.000461	Taipei	1.001741
Chicago	0.99922	Manila	1.000461	Tokyo	1.000886
Copenhagen	0.999075	Mexico City	1.002102	Vancouver BC	0.999653
Nicosia	1.00093	New York	1.000433	Washington DC	1.000601
Jakarta	1.002631	Oslo	0.998726	Wellington NZ	0.999399
Frankfurt	0.999579	Ottawa	1.000007	Zurich	0.999821

C2 and eCAL Calibration Process

Navigate to the C2 and eCAL menu from the Web brower or on the front panel display

Method 1: C2 eCal

cal date	Jan ▼	22	2013
Num Devices	1		
Ref Weight	0.00		
Gravity Correction	1.001500		

Do C2 Calibration

1) Check to make sure the number of load cells displayed in the Num Devices menu corresponds to the actual number of C2 devices installed. If the number varies, check to ensure that each load cell/point cable connection is securely fastened and that each load cell/point cable is not broken. Only Hardy Process Solutions load sensors are C2 (or eCal) calibration capable.

2) In the "Ref Weight" text field, enter the reference weight for your application. An empty scale will use a 0.00 reference weight setting.

3) Enter the Gravity Correction Factor, see the table above, then enter the Correction Factor number you selected from the table in the Gravity Correction field that best corresponds to your location.

4) Click the "Do C2 Calibration" button.

   Wait a few seconds and the results will appear.

   If the Calibration was successful a Cal completed OK appears and gross weight will read your reference value.

   If the Calibration failed, check to make sure C2 load cells are being use and properly connected. If the system is using one or more non-C2 load cells, calibrate using a traditional calibration (Hard Cal) process.

   See the Troubleshooting section of this manual for further information.

5) Click "back" in the Web browser or use the left arrow key on the front panel display to return to the main Calibration menus.

Hard Calibration

Hard Calibration is the method of calibration that uses test weights. We recommend that the span total 80 to 100% of the scale live load capacity and the weights be distributed uniformly on/in the scale.
Put a load (weight) on the scale or vessel. For a full load test you can put 80% to 100% of the expected weight you will see in your process on the scale or vessel.

1) Check to see if the weight reading changes on the display changes in the proper direction. For example, if the display reads 100 pounds and a 20 pound load is placed on the vessel or scale, the display should read 120 or some value over 100.

If the display reads 80 pounds after a 20 pound load is placed on the vessel or scale, the reading is going in the wrong direction and indicates some problem with the system. (See Chapter on Troubleshooting for corrective action)

If the display is reading improperly or shows no change there is something wrong with the configuration wiring or the load cell.

2) If the display changes in the proper direction, remove the weight and proceed to calibrate the Weight Processor.

Hard Cal Commands and Parameters
These commands and parameters are used when doing a Hard Cal or traditional calibration of the instrument.

Cal Lo Weight Parameter
The value you enter for Cal Lo Weight sets the lower weight value to be used when calibrating the system. The Cal Lo weight value, is normally zero (no weight on the scale), but can be set to any known weight on the scale. With nothing (zero) on the scale, the Cal Lo Weight is 0.00. With 5 lbs on the scale, the Cal Lo Weight is 5.00 lbs.

Cal Tolerance Parameter
The value you enter for Calibration Tolerance sets the amount of deviation the instrument will allow during the calibration process. This value must be greater than or equal to the base motion value and/or the Graduation Sizes.

The base motion value can be calculated by using the following formula:

Base Motion value = (Total Load Cell Capacity x 0.0003)

RANGE: 000001 - 999999 (default 10)

Do Cal Lo Command
Before executing this Do Cal Lo command verify that the Cal Lo Weight value is correct.
After setting/verifying the Cal Lo Weight value executing this command will run the Hard Calibration process using the Cal Lo Weight, Cal Tolerance and Sensitivity parameter settings.

Do Cal Hi Command
Before executing this Do Cal Hi command verify that the Span Weight value is correct. After

setting/verifying the Span Weight value executing this command will run the Hard Calibration process using the Cal Tolerance, Span Weight, and Sensitivity parameter settings.

Span Weight Parameter

The Span Weight value is the weight of the object that is being placed on the scale to set the "High" calibration point with respect to the "Low" calibration point set using the Cal Lo Weight parameter.
Span Weight is typically 80-100% of the expected maximum product loading on the load cells.

Hard Cal Process

Hard Calibration requires a zero point and the physical placement of test weights on the scale.

Set the zero point (Ref Weight) equal to the initial "live load" weight present on the scale. If the scale is empty, the Ref Weight value should be 0.00. If any product weight is on the scale when setting this value, the Ref Weight must be equal to the amount of load on the scale.

Navigate to the Hard Cal menus in the Webbrower or in the front panel display

1) Wait 12 seconds or more for the scale to stabilize. Turn off as much vibration and production equipment as possible to achieve the best calibration.

2) Enter a value for Ref Weight or leave 0.00 if the scale is empty.

3) Press or click Do Cal Lo button to do the hard Cal Zero operation.

4) A "Cal Completed OK" message appears briefly if the first step of the calibration process was successful. An Error number appears if the calibration was not successful. See the Error list in the troubleshooting chapter for help in correcting the error.

5) Place certified test weights on the scale.

6) Enter a Span Weight value equal to the test weights placed on the scale.

Method 2:Calibration - Span

Span Weight   10000.00

Do Cal High

7) Press or click the Do Cal Hi button. A "Cal Completed OK" message appears briefly if the calibration was successful. An Error message appears if the calibration was not successful. See the error list in the Troubleshooting chapter, for help in correcting errors.

8) The scale is now calibrated

Chapter 5

Instrument Operation

● ● ● ● ● ●

Operations

The following parameters are used for instrument operations:

- Tare Operations
    - o Tare Amount
    - o Tare Offset
    - o Tare
- Zero Operations
    - o Zero Tolerance
    - o Zero Amount
    - o Zero
- Auto Mode
    - o Auto Mode Enabled
    - o Auto Mode Disabled
- Count Operations
    - o Count Enable
    - o Unit Weight
    - o Sample Size
    - o Weigh Sample

Tare Parameters and Commands

Tare Amount

The Tare Amount parameter displays the total amount that has been "Tared" from the scale minus the Tare Offset.

This value is reset to zero when net and gross are the same weight, and totalizes the differences each time the Tare command is run. This value excludes the initial Tare Offset value, which is a constant value subtracted from the Net weight value without the operator running the Tare command

From the Web page or Using the Front Panel Display: Enter the Tare Amount in the text box provided or use the arrow keys to enter the Tare amount.

Tare Offset

The value you enter for Tare Offset allows the user to avoid pushing the Tare button each time he/she places an empty container on the scale.

RANGE: .000001 - 999999. (default 0.0)

From the Web page: enter the Tare Offset in the text box provided.

Using the Front Panel Display: enter the Tare Offset using the arrow keys.

Tare Command

[1] TARE
[2] RIGHT/ENTER

When the Tare command is selected the Net weight value is set equal to 0 (zero), and the displayed weight goes to 0.00 if the Net weight is being displayed. If the Gross weight is being displayed the displayed value does not change.

On the Web page: click the Tare button to tare the scale.

Using the Front Panel Display: momentarily press the Tare button to tare the scale.

The scale in NET mode will now show 000.00, indicating the TARE command was successful.
If the message "TARE FAILED" appears, wait for the scale to settle and try again.

If the tare operation continues to fail, check the Motion Tolerance parameter established during setup and adjust to allow for the unstable scale environment.

> **NOTE** *The Tare operation will fail if the scale is in motion. A scale in motion will show the symbol "*
>
> **~** *" in the lower right hand corner of the screen to indicate the scale has not settled.*

Zero Parameters and Commands

Zero Tolerance

The value you enter for Zero Tolerance sets the weight unit limit from zero the instrument will accept as gross zero during the zeroing function (when you push the Zero button).

> **NOTE** *The amount of weight zeroed off is cumulative. The zero command will fail if the current gross weight plus any previously zeroed amount exceeds the zero tolerance.*

RANGE: .000001 - 999999 (default 10.0)

From the Web page or Using the Front Panel Display: enter the Zero Tolerance value in the text box provided on the web page or enter the Zero Tolerance value using the arrow keys.

Zero Tolerance 10.00

Zero Amount 0.00

Tare offset 0.00

Tare amount 0.00

Save Parameters

Zero Amount

The Zero Amount parameter is READ ONLY and displays the amount that has been "zeroed" from the scale.

On the Web page or Using the Optional Front Panel Display: Enter the Zero Amount on the Operations Menu web page or enter the Zero Amount using the arrow keys on the operations menu on the front panel.

Zeroed Amount 0.00

Zero Command

On the Web page: click the Zero button to zero the scale. When the Zero command is selected the Gross weight value is set equal to 0 (zero) if the Gross weight is within the Zero tolerance, and the displayed weight will show 0.00 while in Gross mode.

Using the Front Panel Display: momentarily press the Zero button to Zero the scale.

[1] ZERO
[2] LEFT/EXIT

NOTE   *The Zero Command will fail if the scale is in motion*

Auto Mode

Auto Mode enables one-button functionality when performing Zero and Tare operations, automatically switching to Net mode when Tare is pressed. The default is Disabled. The reason you may want to use Auto Mode is when the scale is in constant operation and there isn't time to switch modes between weigh operations.

On the Web page: select the Operations menu and left click to pull down the Enabled/Disabled command to select Auto mode.

Using the Front Panel Display: select either Enable or Disable then press ENTER to execute the command.

Auto mode   Enabled ▾

display mode Net   ▾

Save Parameters

Count Operations

The count mode allows the unit to be calibrated and used as a piece counter. This mode allows the user to "count" the number of pieces placed on the scale.

Piece Count can be displayed on the main screen by first enabling the count mode in the menus, then pressing the MODE button to cycle through showing: GROSS > NET > COUNT >

Count Enable Enabled ▼
Unit Weight 12.30000
Save Parameters

Sample Size 13
Weigh Sample

Determining Piece Count:

If the weight of an individual piece is known:

1) First select Count Enabled

2) Select Unit Weigh by pressing ENTER and input the single unit weight.

If the weight of an individual piece (or pieces) is unknown:

1) Place a sample or samples onto the scale and enter the number of pieces being used for the "sample size".

2) Press or click on the "weigh sample"

The scale will divide the total weight of the "weighed sample" by the "sample size" to determine the weight of a single unit.

NOTE *All the samples must be the same weight, type and size.*

Be sure the scale has been Zero'd before determining piece count.

Hint: *When the weight of individual pieces varies, it is better to take the Weight Sample of a much larger number of pieces. This allows the individual pieces to have greater variability but ensures an accurate count.*

Chapter 6

Network Communications

● ● ● ● ● ●

Chapter Six contains step-by-step instructions for configuring the HI 6600 Hardy Gateway Module for communications with external networks, often interfacing with a PLC, DCS or PC network. We recommend reading these procedures because having a correct configuration is necessary to ensure trouble-free operation.

This chapter also explains how to either configure the HI 6600 series instrument from the Webserver over a standard Ethernet network. The features of the HI 6600 series instrument operate the same way in either case. You must use the Web interface to configure units that do not have an optional display.

Before operating the HI 6610 Weight Processor, make sure that:

Power and load point cables are properly installed and in working order.

Communication cables are properly installed and in working order. The following parameters are used to setup instrument communication

- EtherNet/IP (Available on HI 6600-EIP Models only)
- Ethernet TCP/IP /UDP
    - o DHCP
    - o Fixed IP
    - o Dynamic IP
    - o Mask Address
    - o Gateway Address
    - o DNS Server
- Ethernet UDP
- Hardy Port
- Modbus TCP
- Modbus-RTU
    - o Slave Address
    - o Baud Rate
    - o Parity
- Profibus-DP (Available on HI 6600-PB Models only)
- Scoreboard
- USB
    - o Restore
    - o Save

Maximum Number of Channels Supported for PLC Communication Formats

EtherNet/IP: 30 channels (496 bytes)

Modbus-TCP: 14 Channels (240 bytes)

Modbus-RTU: 14 Channels (240 bytes)

Profibus-DP: 10 Channels (176 bytes)

Ethernet TCP/IP Network Configuration

NOTE   *Do not confuse the on-board Ethernet TCP/IP communication with EtherNet/IP®.. EtherNet/IP is an industrial protocol that does not transmit Web traffic.*

An embedded Web Server in the HI 6600 Hardy Gateway Module allows you to easily configure every parameter of all the WPM modules via a standard Web browser. A standard Ethernet network is required to provide the connectivity between the HI 6600 series instrument and your desktop / laptop computer.

The HI 6600 HGM module is designed with a standard 10/100 BASE-T Ethernet connection for linking to any Windows PC. Once connected, you can monitor, download Hardy software from the Internet, or configure the HI 6600 series instrument from that PC. A Help function can assist you in setup or trouble-shooting. The browser also links to the Hardy Web Site where the user can find additional services and support.

There are two primary ways to connect the HI 6600 series instrument to your computer:

LAN Connection: Connect the HI 6600series HGM to an existing Ethernet-based Local Area Network (LAN) that has connectivity to your desktop or laptop computer. See the *LAN Connection* section below.

Direct Connection: A direct point-to-point connection between the HI 6600 and your desktop or laptop computer using any standard Ethernet cable. See the *Direct Connection* section below.

LAN Connection

To connect the HI 6600 HGM to a LAN, you simply connect a standard Ethernet cable between the module and the common network hub. You will then need to determine which scheme is used on the network to assign IP addresses. The HGM Module must have a unique IP address or conflicts will result.

Contact your Network Administrator for the IP addresses to use for the instruments.

The IP address can be set manually (Fixed IP), or it can be set automatically by a network service called DHCP.

NOTE   *If the DHCP service fails, the instrument will default to the Fixed IP address after a power cycle. If the DHCP service is repaired, the instrument will revert back to using the DHCP*

IP address.

If you are required to use a Fixed IP addresses, refer to the section Fixed IP Configuration Using the Optional Front Panel below. For automatic IP assignment (DHCP), use the following steps:

Enable DHCP

The Enable DHCP parameter enables the network to automatically assign an IP address when DHCP is enabled in the HI 6600 HGM. When DHCP is disabled or the network is unable to assign an IP address the Fixed IP address is used. Please note that DHCP works only if there is a DHCP server installed on your network.

On the Webpage or **from the optional Front Panel Display**: select the communication menu. Then select Ethernet TCP/IP, UDP and select either Enable or Disable from the list next to the DHCP parameter.

HELP

DHCP	OFF ▾
fixed IP	010.153.018.145
Dynamic IP	010.153.018.145
Mask	255.255.255.000
Gate	010.153.018.001
DNS	010.153.008.104
Ethernet UDP	
HardyPort	1024

Save Parameters

Both sides of the link require configuration of their IP addresses to establish a working connection. The following steps will walk you through the process of connecting the hardware and configuring the HI 6600 HGM and PC with compatible IP addresses.

NOTE   *You cannot change the values of the DHCP IP address. The LEFT button returns the operator to the Ethernet TCP/IP Menu.*

Mask Address Parameter

The Mask Address parameter, or subnet address, is used by the TCP/IP network to determine if the host is on a local subnet or on a remote network.

On the Web page or through the Optional Front Panel Display : enter the Mask Address in the text box providee

Gateway Address Parameter

The Gateway Address parameter, is required when the HI 6600 series instrument needs to communicate to a remote host.

On the Web page or through the Optional Front Panel: enter the Gateway Address in the text box provided.

DNS Server Parameter

The DNS Server parameter provides the host name when the HI 6600 series instrument is communicating with a remote host.

On the Web page or through the Optional Front Panel: enter the DNS Server Parameter in the text box provided.

Fixed IP Configuration

The HI 6600 series instrument can be configured to use any Fixed IP address. The Fixed IP addresses must be carefully selected to avoid accidentally configuring two devices to the same address with unpredictable results. Since 'guessing' a value could lead to personal or property damage and/or interrupted network services, your network administrator should provide this address.

1) **On the Web page or through the Optional Front Panel:** Press the communications button to enter the Communications menu; and use the UP or DOWN buttons to select the Communication menu, then use the UP or DOWN buttons to select the Ethernet TCP/IP menu item and press the RIGHT or ENTER button to access the Ethernet TCP/IP menu.

2) Select the Fixed IP menu item.

3) Starting at the right-most digit, enter the IP number using the standard format. Type the number into the web browser on the web page or use the UP or DOWN buttons to select each number, and press the LEFT or RIGHT button to move between numbers.

192.168.0.100
Network Identifier   Node Identifier
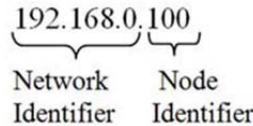
4) Press the ENTER button to save the entry.

5) Use the LEFT button to exit the menu structure.

6) The IP address is now saved and the instrument's embedded Web browser is now available at the entered IP address. From here you can jump to the Network Options Configuration section.

7) Cycle power to establish the fixed IP address as the current operating address.

This method of interconnect between an HI 6600 series instrument and a standard Windows PC allows you to configure the instrument using the embedded web browser, even if an Ethernet network is not part of the normal installation. A desktop or laptop may be used on location as necessary.

The IP address is now saved and the instrument's embedded Web browser is now available at the entered IP address. From here you can jump to the Network Options Configuration section.

Both sides of the link require configuration of their IP addresses to establish a working connection.

Direct Connect Hardware

Any standard Ethernet cable with RJ45 connectors at each end can be used to connect the HI 6600 HGM to your PC. A 'crossover' cable is not required. Simply plug the cable into the Gateway Module.

Windows PC Configuration: Windows 2000

1) After starting your computer, click the Start button.

2) Click on Settings > Control Panel to display the Windows   Control Panel.

3) Click the Network icon to display the Network dialog.

4) Click on TCP/IP; then click the Properties button to open   the TCP/IP Properties dialog.

5) Click the IP Address tab.

6) If the 'Use the Following IP Address' box is already checked, write down the displayed IP Address and jump to the *Direct Connect Configuration – HI 6600* section below.

7) Click the 'Specify an IP Address' check box; then enter the following into the TCP/IP Properties dialog.

   IP Address = 192.168.0.100
   Subnet Mask = 255.255.255.000

8) Select OK on the TCP/IP Properties dialog. The computer is now fully configured.

9) To return the PC to the original network settings, return to the 'Internet Properties (TCP/IP) dialog, select 'Obtain an IP address automatically,' and click OK.
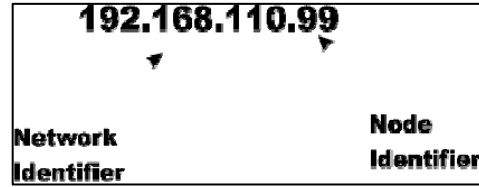
Windows XP

1) After starting your computer, click Start.and then Control Panel.

2) Click on Settings > Network Connections.

3) Right click on 'Local Area Connection' and select Properties.

4) Click on Internet Protocol (TCP/IP) and click on the Properties button to open the Internet Properties

   (TCP/IP) Properties dialog.

5) If the 'Use the Following IP Address' box is already checked, write down the displayed IP Address and jump to the *Direct Connect Configuration – HI 6600* section below.

6) Click the 'Use the Following IP Address' check box; then enter the following into the TCP/IP Properties dialog.

   IP Address = 192.168.0.100
   Subnet Mask = 255.255.255.000

7) Select OK on the TCP/IP Properties dialog box. The computer is now fully configured.
8) To return the computer to the original network settings, return to the 'Internet Properties (TCP/IP) dialog, select 'Obtain an IP address automatically,' and click OK.

Windows 7

1) After starting your computer, click the Start button.

2) Click on Control Panel to display the Windows Control Panel.

3) C lick on Network; then click Internet

4) Click on Network Sharing Center.

5) Click on Change Adapter Settings in the left-hand column.

6) Right click on Local Area Connection and select Properties.

7) Click on Internet Protocol Version 4 (TCP/IPV4)

8) Click the Properties button to open the Internet Properties (TCP/IP) Properties dialog.

9) If the 'Use the Following IP Address' box is already checked, then write down the displayed IP Address and jump to the *Direct Connect Configuration – HI 6600* section below.

10) Click in the 'Use the Following IP Address' checkbox; then enter the following into the TCP/IP Properties dialog.

> IP Address = 192.168.0.100
> Subnet Mask = 255.255.255.000

192.168.0.100
Network Identifier   Node Identifier
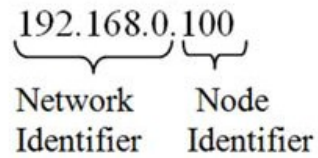
11) Select OK in the TCP/IP Properties dialog box. The computer is now fully configured.

12) To return the computer to the original network settings, return to the Internet Properties (TCP/IP) dialog , select 'Obtain an IP address automatically,' and click OK.

Direct Connect Configuration - HI 6600 HGM

The HI 6600 gateway module must now be assigned a unique IP address that will connect to the Windows PC. There are two simple rules for the IP Address:

- It must have the same network identifier as the computer
- It must have a different node identifier than the computer.

If your Windows PC already had an IP address assigned, simply increment by one the Node Identifier field of the IP Address you wrote down in the Windows PC configuration steps above.

If your Windows PC was originally set to automatically obtain an IP address (DHCP), use 192.168.100.50 for the HI 6600 IP address.

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 media. Ethernet technology enables the user to access device-level data from the Internet. The EtherNet/IP networking standard supports both implicit messaging (real-time I/O messaging) and explicit messaging (message exchange). EtherNet/IP is an open network that takes advantage of Commercial technology that already exists. EtherNet/IP is a registered trademark of ODVA.

IP is the transport and network layer protocol of the Internet and is commonly linked with all Ethernet installations and the business world. IP provides a set of services that any two devices can use to share data.

Once you have the Ethernet TCP/IP setup, there is no other configuration needed through either the web page or the Optional Front Panel for the Ethernet/IP setup in the HI 6600.

Refer to the I/O tables in Appendix A for an understanding of the data and format for the EtherNet/IP communications.

If you are connecting to an Allen-Bradley® Control Logix PLC®, the following is the setup parameters needed in the I/O configuration of the PLC to communicate with the HI 6600.

- COMM FORMAT: DATA – DINT
- INPUT INSTANCE 100, LENGTH 12
- OUTPUT INSTANCE 112 - LENGTH 12
- CONFIGURATION INSTANCE 150 - LENGTH 0

Alternatively, use the HI 6600 EDS_AOP available on the Hardy website to simplify the connection process.

If there is a problem with the connection between the PLC and the HI 6600, recheck the IP addresses used and the setup parameters in the PLC I/O configuration.

The read-only Connected entry confirms that the HI 6600 HGM is connected to the network. If the Gateway Module is not connected to the network, a message appears saying "Not Connected." Check the EtherNet/IP connection at the rear of the instrument to make sure it is securely fastened to the EtherNet/IP port.

EtherNet/IP Commands and Parameters

The HI 6600 instrument with the -EIP option will automatically detect and connect to any available EtherNet IP connection. The system will show either connected or not connected to display the availability of an EtherNet/IP connection.
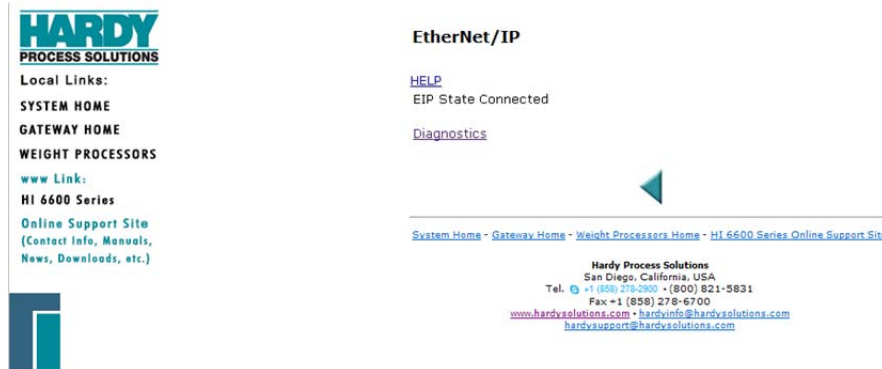
The EtherNet/IP Diagnostics Screen
The EIP diagnostic screen may help with troubleshooting connection problems with the HI 6600 series units.

HARDY
PROCESS SOLUTIONS

Local Links:

SYSTEM HOME

GATEWAY HOME

WEIGHT PROCESSORS

www Link:

HI 6600 Series

Online Support Site
(Contact Info, Manuals,
News, Downloads, etc.)

EtherNet/IP

EIP State	No Connection
TCP in	136
TCP out	136
UDP out	0
UDP in	0
UDP IO in	20919389
UDP IO out	19595941
PCCC in	0
PCCC out	0

System Home - Gateway Home - Weight Processors Home - HI 6600 Series Online Support Site

Hardy Process Solutions
San Diego, California, USA
Tel. +1 (858) 278-2900 · (800) 821-5831
Fax +1 (858) 278-6700
www.hardysolutions.com · hardyinfo@hardysolutions.com
hardysupport@hardysolutions.com

The EIP diagnostic parameters count the number of packets of various types received (in) or transmitted (out).

TCP in	24
TCP out	22
UDP out	9
UDP in	9

UDP IO in	0
UDP IO out	0
PCCC in	0
PCCC out	0

TCP is used for most explicit or unconnected messages. The usual sort of EtherNet/IP connection is one in which packets are sent and received at some specified RPI (requested packet interval). These packets are sent and received via UDP and show up in the "UDP IO" count variables. It takes a few TCP packets to set up this connection, and these packets show up in the TCP counters.

Finally, there are some older PLCs like the SLC and PLC-5 that lack a full implementation of EtherNet/IP, and cannot support a cyclic connection. These PLCs sometimes use an older protocol called PCCC, and the PCCC variables count the number of PCCC messages received or sent.

Ethernet UDP Parameters

Ethernet UDP enables the HI 6600 series instrument to send messages, datagrams, to other hosts on the IP network.

Menu	Menu Bits	SubMenu	Sub Menu Bits	Parameter Name	Param ID	Special	Read / Write
Communication	8	EthernetUDP	3	Do Cal Lo	0x3190	c	w
Communication	8	EthernetUDP	3	Do Cal Hi	0x3191	c	w
Communication	8	EthernetUDP	3	Do C2 eCAL	0x3192	c	w
Communication	6	EthernetUDP	3	Restore File	0x3193	c	w
Communication	6	EthernetUDP	3	Save File	0x3194	c	w
Communication	6	EthernetUDP	3	Tare Command	0x319A	c	w
Communication	6	EthernetUDP	3	Zero Command	0x319B	c	w
Communication	6	EthernetUDP	3	Weigh Sample	0x319C	c	w

Hardy Port

The Hardy Port provides the service port which is combined with the IP address to provide a unique application socket.

The Hardy Port value can be any 16-bit value between 0 and 65,535.

On the HI 6600 HGM Web page: select the communication menu and the Ethernet TCP/IP submenu, and left click inside the Hardy Port text field and enter the Hardy Port value.

On the HI 6110 optional display: select the communication menu and use the UP or DOWN button to select the Ethernet UDP submenu, then select the Hardy Port menu item. The current Hardy Port value will be displayed, press the ENTER or the RIGHT button if the value needs to be modified.

Modbus TCP

MODBUS is an application layer messaging protocol used to support client / server communications between devices connected on different types of buses or networks. All the HI 6600 series units have Modbus TCP built-in.There is no setup in the HI 6600 unit to configure the Modbus TCP.

Refer to the I/O tables in Appendix A for an understanding of the data and format for the Modbus TCP communications.

If you do not have a Modbus PLC available to test the Modbus communications, then you can download the Hardy Modbus Link test software from the Hardy Web site at http://www.hardysolutions.com. This program can be found currently on the HI 4050 products page under the Docs & Program.

Modbus TCP Commands and Parameters

The HI 6600 HGM will automatically detect and connect to any available Modbus TCP connection. The system will show either connected or not connected to display the availability of a Modbus TCP connection.

MODBUS TCP

HELP

Modbus status Connected

Diagnostics

Home - Configuration - HI 6500 Series Online Support Site

Hardy Process Solutions
San Diego, California, USA
Tel. +1 (858) 278-2900 · (800) 821-5831
Fax +1 (858) 278-6700
www.hardysolutions.com · hardyinfo@hardysolutions.com
hardysupport@hardysolutions.com

The Modbus TCP and Modbus RTU Diagnostics screen may help with troubleshooting connection problems with the HI 6600 series units.

The Modbus Diagnostics parameters count the number of frames received by the Hardy HI 6600 series and how many of these are valid compared to error frames. In this case, the instrument is correctly reporting that it is not connected and is not receiving any frames.

MODBUS TCP

Modbus status	No Connection
Valid Frames	0
Error Frames	0
Received Frames	0

Home - Configuration - HI 6500 Series Online Support Site

Hardy Process Solutions
San Diego, California, USA
Tel. +1 (858) 278-2900 · (800) 821-5831
Fax +1 (858) 278-6700
www.hardysolutions.com · hardyinfo@hardysolutions.com
hardysupport@hardysolutions.com

The Modbus Diagnostics parameters count the number of frames received by the Hardy HI 6600 series and how many of these are valid compared to error frames. In this case, the unit is correctly reporting that it is not connected and is not receiving any frames.

MODBUS TCP

Modbus status	Connected, TCP
Valid Frames	220540
Error Frames	0
Received Frames	220540

System Home - Gateway Home - Weight Processors Home - HI 6600 Series Online Support Site

Hardy Process Solutions
San Diego, California, USA

Installing the Hardy Modbus-Link Test Package

If you do not have a PLC or other client, Hardy has provided the Hardy Modbus-Link Client to test communications with the HI 6600 unit. This client package only communicates with the unit and is not a full communications package. If you have problems with this test, contact Hardy Technical Support. Double click the Hardy Modbus-Link .exe file to install the software on your PC. Upon completion, a Hardy Modbus-Link icon appears on your Desktop.

Modbus services are specified by function codes that are elements of MODBUS request / reply PDUs. MODBUS is implemented for the HI 6600 using TCP/IP over Ethernet. The Client/Server definitions are as follows:

- Client - The module asking for data.
- Server - The module providing the data.

   NOTE: *MODBUS is positioned at level 7 of the OSI model and is accessed at a reserved system port 502 on the TCP/IP stack. It will support communication with up to 10 different hosts (sockets).*

Configuring MODBUS TCP

1)   Click the Hardy Modbus-Link icon to open the Hardy Modbus-Link display.
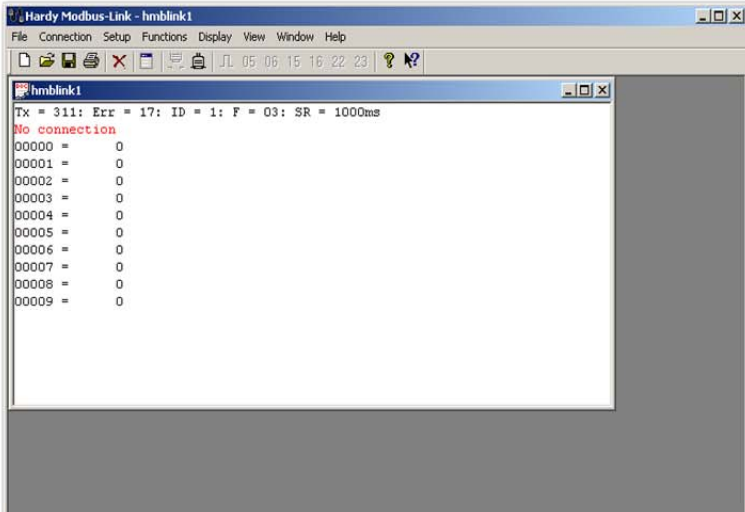
2)   Click Connect n the Connection pull-down menu, to display the TCP/IP Connection form.
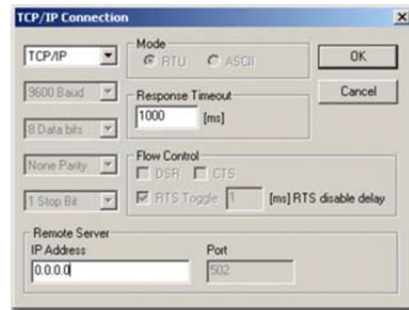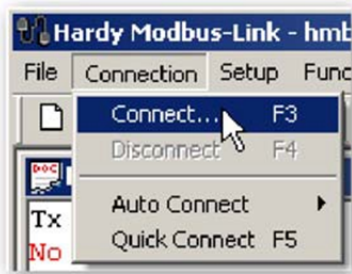
3)   If TCP/IP is not selected, select it from the pull-down list.

4)   Type the address of the HI 6600 module you want to communicate with into the IP Address text box and click OK.
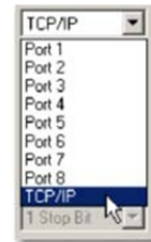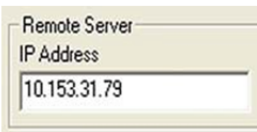
The red "No Connection" disappears and the values at the top of the page start to change.

You are now connected from your PC to the HI 6600 weight processor.

5) On the Setup pull down menu select Poll Definition and select the function 04 INPUT REGISTER and the Adress 0 and Length as 8 +(8 * x) where x = the number of Weight Processing Modules to a maximum of 120.

6) On the Hardy Modbus-Link page. Display pull-down menu, select Float Inverse.

The Weight value would be found in register 5 (net) or 6 (gross). Other registers are not float values so be aware of random numbers in other registers. For example, the above would be 8 registers for the Cmd module and 8 regular for each Weight Processing Module.
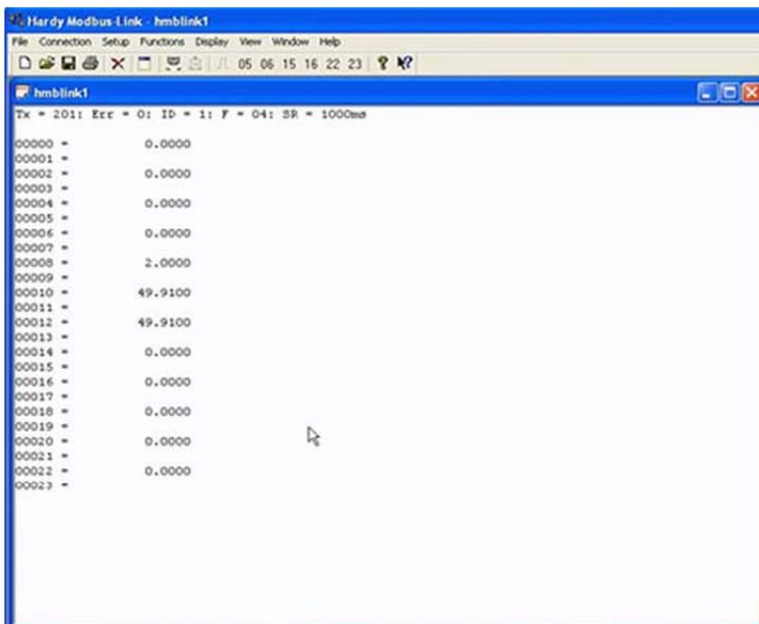
7) From the DISPLAY drop down, select the Long Inverse selection. This will allow us to write an integer value into the non-float registers.

8) From the FUNCTION drop down list select Read/Write registers, or click button 23 to open the Write multiple registers display.
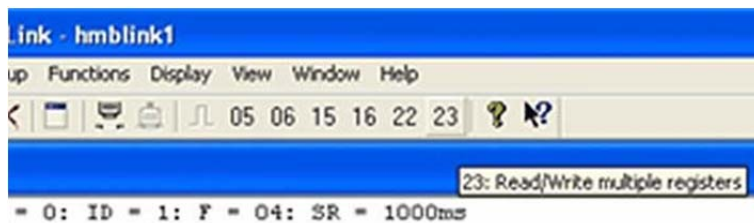
9) Double click on the first register and the Enter Value box appears. Enter the new value you wish to write to this register. Our example shows writing a value of "2", which is the Tare command number.
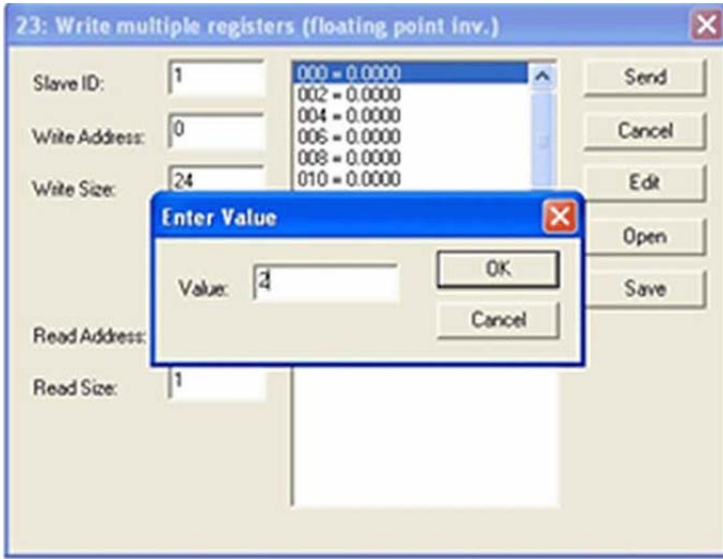
10) Click on OK to accept the value and click on the Send button to send it to the HI 6600. Click OK to the Response OK message.

11) Change the display back to Float Inverse and notice that our Tare command has caused the Net weight to change to zero
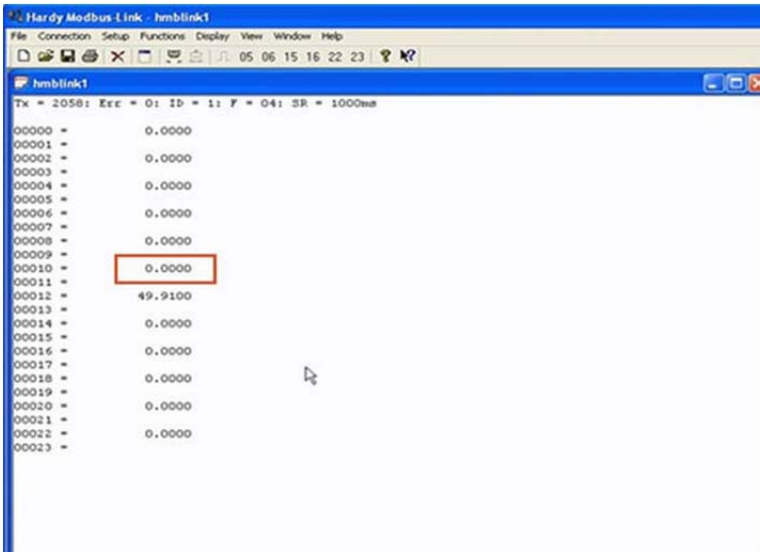
Modbus-RTU (over RS-485)

Modbus-RTU Commands and Parameters

Slave Address Parameter

The Slave Address parameter is a unique network address between 1 and 247 assigned to the HI 6600 series instrument.

On the Web page: select the communication menu and then select the Modbus RTU submenu, and left click inside the Slave Address text field and enter the Slave Address assigned to the HI 6600 series instrument.
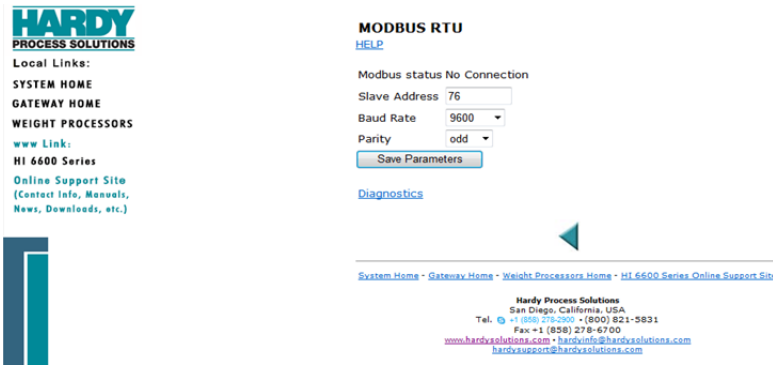
On the HI 6110 optional display: select the communication menu and use the UP or DOWN button to select the Modbus-RTU submenu, then select the Slave Address menu item. The current Slave Address value will be displayed, press the ENTER or the RIGHT button if the Slave Address needs to be modified.

Baud Rate Parameter

No specific baud rate is specified for Modbus-RTU, the Baud Rate parameter is used to match the baud rate set by the master device, typically 9,600 or 19,200.

On the Web page: select the communication menu and then select the Modbus RTU submenu and left click inside the Baud Rate text field and enter the Baud Rate.

MODBUS RTU
HELP

Modbus status No Connection
Slave Address 76
Baud Rate 9600 ▾
Parity odd ▾
Save Parameters

Diagnostics

◀

On the HI 6110 optional display: select the communication menu and use the UP or DOWN button to select the Modbus-RTU submenu, then select the Baud Rate menu item. The current Baud Rate value will be displayed, press the ENTER or the RIGHT button if the value needs to be modified.

Parity Parameter

The Parity parameter has three options, EVEN, ODD, or OFF.
On the Web page: select the communication menu and then select the Modbus RTU submenu, and left click inside the Parity field and select even, odd or off using the drop down menu.

On the HI 6110 optional display, select the communication menu and use the UP or DOWN button to select the Modbus-RTU submenu, then select the Slave Address menu item. The current Parity value will be displayed, press the ENTER or the RIGHT button if the Parity needs to be modified.

1) Setup a slave address assigned to the HI 6600 series instrument from the communications menu and the Modbus-RTU submenu.. Use a unique address between 1 and 247
2) Set the Baud Rate to the same as the master device, typically 9600 or 19,200 Step 3. Set the Parity Bit parameter to match that of the Modbus-RTU master (EVEN, ODD, or OFF)

The RS 485 half duplex pinout is:

GND	SHIELD	TX+	TX-
Signal Ground	Do Not Connect	TXD+ /RXD+ Non-inverting	TXD-/RxD- Inverting

Modbus Setup

- **Slave Address** may be set to any number in the range of 1-247.
- **Set Baud Rate parameter to match the settings of the Modbus master**
- **Set Parity to match the settings of the Modb**

Modbus Functions

The Modbus functions allowed in the HI 6600 are:

- Function 3: Modbus Read Holding Registers
- Function 4: Modbus Read Input Registers
- Function 6: Modbus Write Single Register
- Function 16 (0x10): Modbus Write Multiple Registers.

Note: *See the Data Tables in **Appendix A** for command format information.*

The Modbus master sends a 'command' by writing a value to register 0. **Any non-zero return value is an error.**

Here is a list of Hardy command numbers:

- **0: READ PARAM CMD**. To read a parameter, write a #0 to the command register (register #0), and write the parameter number in the parameter ID number in registers 2 and 3, most significant word first. The parameter value may then be read from registers 4 and 5, again most significant word first. This value may be in integer or floating point format, depending on the parameter. The status register in the reply will contain the lower 16 bits of the system status word.
  - o Status word bit 0: A/D error.
  - o Status word bit 6 (0x40): Motion status.
  - o Status word bit 15 (0x8000): Not Found - the requested parameter number does not exist

- **1: ZERO CMD**. Write a #1 to the command register to ZERO the gross weight. The status register will read 0 if this command succeeds.

  - o Status Error code 1 (motion)
  - o Status Error code 2 (A/D error)
  - o Status Error code 3 (out of tolerance)

- **2: TARE CMD**. Write a #2 to the command register to ZERO the net weight. The status register will read 0 if this command succeeds:
  - o Status Error code 1 (motion)
  - o Status Error code 2 (A/D error)

- **4: WRITE NONVOL CMD. Write a #4 to the command register to save parameters in non-volatile memory.**
  - o **No Error Codes**

- **5: CMD**: Reserved
  - o No Error Codes

- **6: WEIGHT SAMPLE CMD:** Write a #6 to the command register to run the Weigh Sample command to set up the calibration of the Counts (if enabled).
    - o Status Error code 1 (motion)
    - o Status error code 2 (A/D error)

- **0x64 (100 decimal): CAL LOW CMD**. Write a 0x64 hex to the command register to perform the low step of a traditional calibration. The status register will read 0 if this command succeeds:
    - o Calibration_Fail 1
    - o Calibration_Fail_Motion 3
    - o Calibration_Fail_Adc_Error 4

- **0x65 (101 decimal): CAL HIGH CMD**. Write a 0x65 hex to the command register to perform the high step of a traditional calibration.
    - o Calibration_Fail 1
    - o Calibration_Fail_Motion 3
    - o Calibration_Fail_Adc_Error 4
    - o HardcalFailCounts 8: not enough counts between hard cal hi and hard cal lo

- **0x66 (102 decimal): C2 CAL CMD**. Write a 0x66 hex to the command register to perform a C2 calibration.
    - o Calibration_Fail 1
    - o Calibration_Fail_Motion 3
    - o Calibration_Fail_Adc_Error 4
    - o Calibration_Fail_Noc2 5
    - o Calibration_Fail_C2capeq 6
    - o Calibration_Fail_C2clones 7

- **0x1000 (4096 decimal): WRITE INTEGER CMD**. Set the value of an integer parameter. Write 0x1000 in the command register 0, the parameter ID number in registers 2, 3 and the desired value in registers 4, 5.
- No Error Codes

- **0x1001 (4097 decimal): WRITE FLOAT CMD**. Set the value of a floating point parameter. Write 0x1001 in the command register 0, the parameter ID number in registers 2, 3 and the desired float value in registers 4, 5.
    - Failure 1
    - TooHigh -1 : value is above legal limit
    - TooLow -2 : value is below legal limit
    - ErrorNotFound 0x8000 : parameter id not found

Profibus-DP

The Profibus®-DP (Decentralized Peripherals) communication profile is designed for efficient field-level data exchange. Central automation devices, such as PLC/PC or process control systems, communicate through a fast serial (RS-485) connection with distributed field devices, e.g. PLCs.

To begin communicating weighing parameters between an HI 6000 Series controller and a PLC, PC or DCS system controller, you need only to load the *.GSD file and set the node address.

Wiring For Profibus, connect the two wires to pins 3 and 4.

GND	SHIELD	TX+	TX-
Signal Ground	DO Not Connect	TXD+ /RXD+ Non-inverting	TXD-/RxD- Inverting

Profibus Configuration

Profibus-DP operates using a cyclic transfer of data between master(s) and slave(s) on an RS-485 network. An assigned master periodically requests (polls) each node (slave) on the network. The HI 6600 is a slave device. All data communication exchanges between a master and the HI 6600 originate from the master device. Each HI 6600 is assigned to one master and only that master may write output data to that HI 6600. Other masters may read information from any slave, but can only write output data to their own assigned slaves.

Because Profibus uses a cyclic (periodic) polling mechanism between masters and slaves, it is also deterministic. Therefore, behavior of a Profibus system can be reliably predicted over time. Profibus is designed to guarantee a deterministic response.

The length (and timing) of the I/O data to be transferred from a single slave to a master is predefined in the slave's device data base or GSD file. The GSD files of each device connected via the network (slaves and class 1 masters only) are compiled into a master parameter record which contains parameterization and configuration data, an address allocation list, and the bus parameters for all connected stations. A master uses this information to set up communication with each slave during startup. Slaves can only acknowledge the messages they receive or transfer messages to a master when the latter requests a slave to do so. Slaves are also designated as passive nodes.

Refer to the section, "**I/O Tables For Communications to PLCs**," in Appendix A for an understanding of the data and format for the Profibus communications.

For a full list of command parameters, please see the "**Default Parameter IDs and Values**" in Appendix B.

NOTE   *Profibus-DP provides a very flexible network solution. In addition to the basic guideline provided in this manual, your installation could require procedures that are beyond the scope of this manual. For more information and to locate lists of links to other sources of Profibus-DP information, check the Profibus website at* http://www.profibus.com.

Configuring PROFIBUS From the Web Interface

1) From the Configuration menu select Options to open the Options menu; then Click on Profibus Card. to open then Click on Profibus Card form. Double click in the Node text field to highlight the current entry. Type in the HI 6600 OR HI 6510 Node address. Range:1-125 (default 5) Our example uses the default address #5.

Profibus-DP
HELP

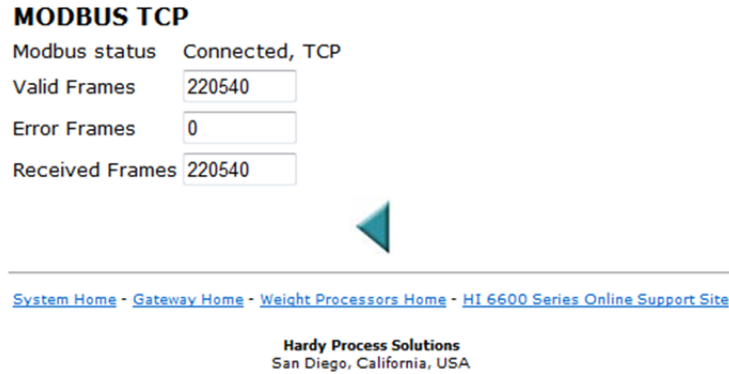|	
State	Initializing
Serial Option	Profibus-DP ▼
Profibus Node	5
Termination	Link ▼
Save Param	Disable
	Enable
	Link

Home - Configuration - HI 6500 Series Online Support Site

Hardy Process Solutions
San Diego, California, USA
Tel. ☎ +1 (858) 278-2900 · (800) 821-5831
Fax +1 (858) 278-6700
www.hardysolutions.com · hardyinfo@hardysolutions.com
hardysupport@hardysolutions.com

NOTE   *Profibus Node Address #5 is the lowest number that can be used by a slave device.*

2) Select termination drop down and select termination condition. Termination maybe be set to Enable, Disable or Link. Link means that the termination is set on or off depending on whether pin 2 of the connector is low (on) or high (off). There is an internal pull up on pin 2 that will set the termination off if nothing is connected to it.

3) Click Save Parameters to save the entry.

4) You can also read the communication status of the instrument.

5) Click Home to return to the Home Page.

Initialization Process

To be able to add an HI 6600 to a Profibus-DP network, you need a PC or a PLC and software such as Siemens Step 7™, Simatic Manager or the equivalent. The software must allow the Profibus-DP PLC and the HI 6600 to exchange data.

Profibus-DP .GSD File

All devices connected to a Profibus-DP network require a *.gsd file. The *.gsd file contains all the parameters including the baud rate, table formats and necessary data required by the network PLC when an HI 6600 or HI 6510 is connected to the network.

You must download the proper *.GSD file from the Hardy website.

1) Navigate from the products section to the HI 6600 web page.
2) Click on the Tab, Docs & Programs and scroll down to Documents and Programs.
Select the *.GSD option to download the file.

Regardless of Simatic Manager you use, you must go through these three steps:

1) Connect the HI 6600 Series Instrument to the Profibus DP network and verify the address. (See the Installation Section for Installation and Cabling Instructions.)
2) Connect the PC to the Trunk Line. Load the configuration properties to the initialization software on the PC and transfer them to the PLC.
3) Install the *.gsd file.

Pre-Initialization Procedures

1) Inspect the network cables and make sure that the cables have been installed correctly and satisfy the Profibus-DP guidelines for the data transmission baud rate(s) required. (See the Cabling Chapter/Profibus Installation in this manual for Profibus-DP cable specifications and cabling guidelines.)
2) Select the Node address for the HI 6600 or HI 6510. as shown above. This can be done before or after Initialization.
3) Cycle power, or perform the two previous steps before powering up your network. Address selection can only occur after cycling the power. Make sure that the software you use will detect the values as you have set them.

CAUTION: The address should never be changed during operation. if the address is modified while on line, an internal error could be generated and the instrument disconnected from the network.

ATTENTION L'adresse ne devrait jamais être changée durant le fonctionnement. Si l'adresse est modifiée pendant la mise en ligne, une erreur interne pourrait être créée et le module sera déconnecté du réseau.

4) Complete any additional configuration that is required by your PLC for initialization. Our initialization example is for a Siemens PLC. Your PLC initialization requirements may differ.

5) Install the *.GSD file for the instrument you connected to the Profibus Network.

Configuring Profibus from the Front Panel

1) Press the Configuration key
2) Down arrow to Communications; press enter.
3) Select Profibus-DP; press enter.
4) Select Termination; press enter
5) Up or down arrow to make termination selection. Press enter to select.
6) Down arrow to select Serial Option;
7) Press enter to toggle between Profibus-DP and Modbus. Select Profibus-DP and press enter.
8) Down arrow to Node.
9) Press enter to make changes to the Node. Use the arrow keys to enter node number and press enter to accept
10) Press exit key until display returns to the Summary Display.

Initialization Procedures on the PLC

NOTE *The examples below come from the Siemens Step 7™, Simatic Manager Software. Your software will vary from these procedures. Step 7™ is a trademark of the Siemens Corporation.*

1) In the Siemens Step 7™, Simatic Manager, open the Hardware Catalog.

2) Click on the "+" to expand the Additional Field Devices Folder.

3) Click + to expand the General Folder.
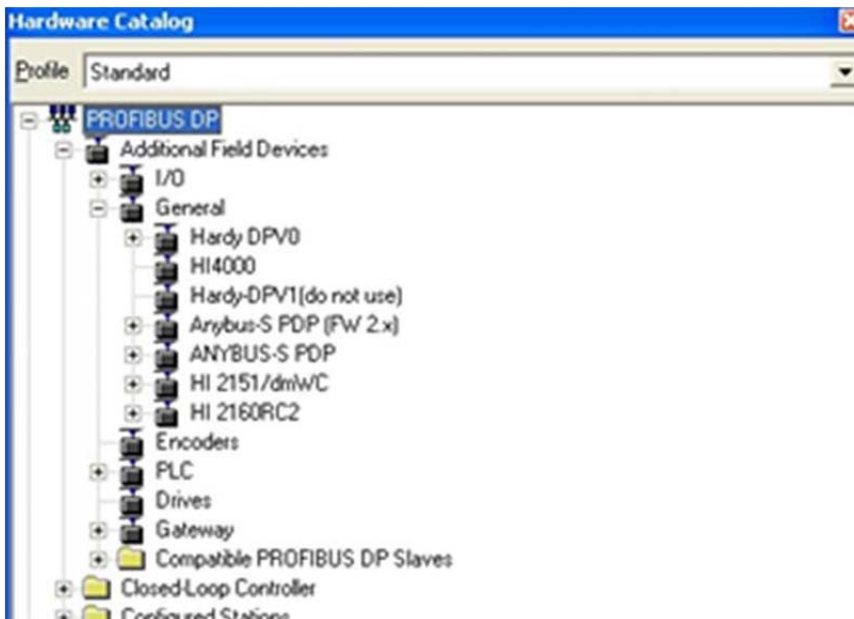
4) Highlight the CPU you selected in the UR dialog box.

5) Double Click on "HI6000" or drag and drop the "HI6000" folder to the Profibus-DP Network. This opens the HI 6000 PDP Parameters dialog box where you can set the address of the instrument, if necessary.
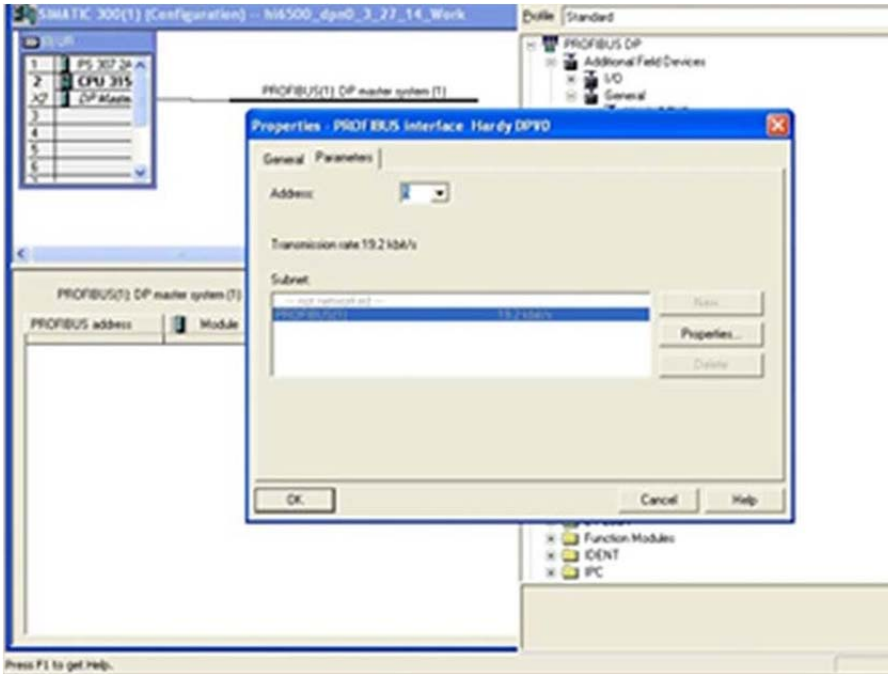
6) Click OK to set the Node Address.

7) The HI 6600 Series module appears in the Profibus Network.

8) Click in the module properties at slot 1. In the catalog, expand the module properties and make selection for "**48 bytes in and out**".
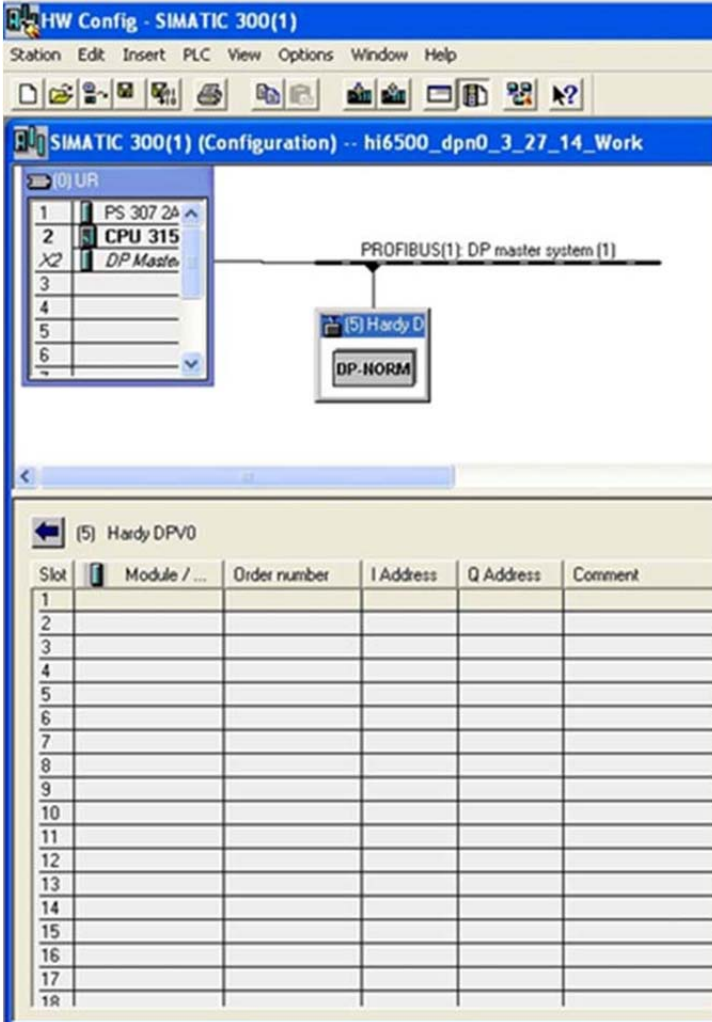
9) Once the selection has been made, you should see the input and output words showing the associated addresses in the table as shown.

NOTE   *The HI 6600 or HI 6510 Series Input and Output Sizes are expressed in 32 bit words. 12 words input and 12 words output.*
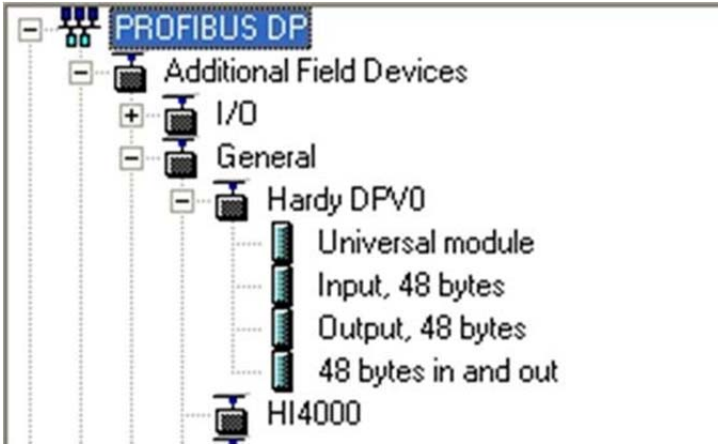
9) Click the Download Icon to download the configuration to the PLC and open the Select Destination Module dialog box.

10) Click OK to open the Select Station Address Dialog box; then click OK again. A status box will show the progress of configuration download to the PLC.

11) When the download is complete the HW Config dialog box should look something like this.
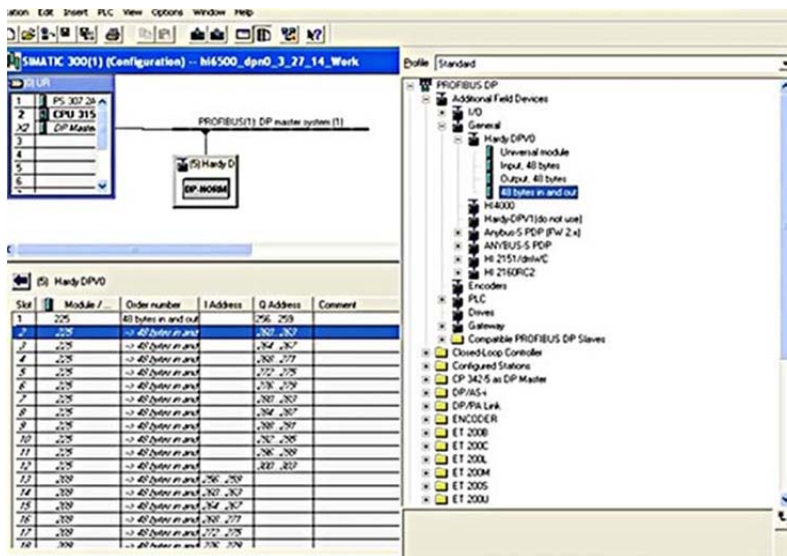
12) Initialization is Complete

USB Memory Stick

The HI 6600 series provides an interface to an external USB memory stick that allows HI 6600 parameters to be saved, restored or copied to another instrument.

The USB memory stick commands can be activated through the web interface or the display panel.

From the front keypad: To access the USB Menu, select Configuration > Enter, Communications > Enter, USB >Enter, UP or DOWN arrow to Save or Restore > Enter.

On the Webpage: Select Configuration, Communications, USB, then Save or Restore.

1) Insert the USB stick into the HI 6600 series HGM.

2) Using the web interface or display panel, save or restore system parameters.

Restore Command

This command replaces the existing HI 6600 series parameters by the parameters stored on a USB memory stick.

On the HI 6110 optional display: Select the Communication menu and use the UP or DOWN button to select the USB submenu, then select the Restore menu item then press the ENTER button.

Save Command

This command saves the current HI 6600 parameters to a USB memory stick.

On the HI 6110 optional display, select the Communication menu and use the UP or DOWN button to select the USB submenu, then select the Save menu item then press the ENTER button.

Chapter 7

Security

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Chapter 7 covers the security menu, which allows the user to lock out different levels of the menu hierarchy. The user configurable security settings only limit access through the Optional Front Panel to ensure the consistency of the instrument setup and weighing process. Parameter configuration through the network is unaffected by these security settings.

Note: *Security settings are universal and are applied to all channels on the system. For example, if Calibration Security is selected, then a password is required to calibrate ANY Weight Processor Module on the System.*

Optional HI 6110 Display Security Options

Lock Enabled	Operation
Display	Display is blank; and the Mode, Tare, Zero, and Configuration buttons are disabled. Pressing ENTER jumps to the password prompt.
Keypad	Display is active; and the Mode, Tare, Zero, and Configuration buttons are disabled. Pressing ENTER jumps to the password prompt.
Configuration	Display is active, and the Mode, Tare, and Zero buttons are active; but the configuration button is disabled. Pressing CONFIG jumps to the configuration password prompt.
Read Only	Display is active, and the Mode, Tare, and Zero buttons are active, the configuration button is active but no parameters can be modified.
Calibration	Display is active, all buttons are active, and all the parameters except the calibration parameters can be modified.
No Locks Enabled	When no locks are selected, the display is active, all buttons are active, and all the parameters can be modified.

The current status and password for each level of security can be read and changed through the web browser if using an Ethernet connection, or through the serial interface.

To access or modify the security parameters through the Optional Front Panel display, a password always needs to be entered before a lock can be enabled or disabled or the password modified. Note, that as the password can be read over the network, any security password can always be over written if the local operator enters an incorrect password.

The changes to the calibration and read only security features are updated when you exit the security submenu and return to the configuration menu; while changes to the display, keypad, or configuration security settings are updated when the operator exits the configuration menu.
The factory default for the security menu is to disable all lock modes and to preset each of the security passwords to 1234.

NOTE: *Once set, the security parameters can only be accessed via the Optional Front Panel display by entering a preset password, or directly through the network connection. There is no way to bypass the security password. We recommend you keep your passwords in a secure location.*

The Display Lock

The Display Lock disables and blanks the Optional Front Panel display and disables the keypad. If the ENTER button is pressed, a password dialog box is shown on the screen. If the correct password is entered the display is unlocked and operator can view the weight data and use the MODE button to change the weight between Gross and Net. If the ENTER button is pressed again the Display Lock parameter is reset to ENABLED and the display blanked. This security setting blanks the front screen so the current weight reading on the scale cannot be observed; and while the display is locked the Mode, Zero, Tare, and Configuration buttons are disabled regardless of the keypad lock or configuration lock settings; as enabling these buttons without the operator being able to read the Optional Front Panel display would lead to process errors.

If the ENTER button is pressed the "Enter Password" page will appear on the display. At this level of security the operator can enter one of three possible passwords for the display lock, the keypad lock, or the configuration lock.

NOTE *If the keypad is locked, then the tare, zero, mode, and configuration buttons are disabled*

The display lock flowchart below shows the options and features when the display lock is enabled.

Figure 1: Display Lock Flowchart
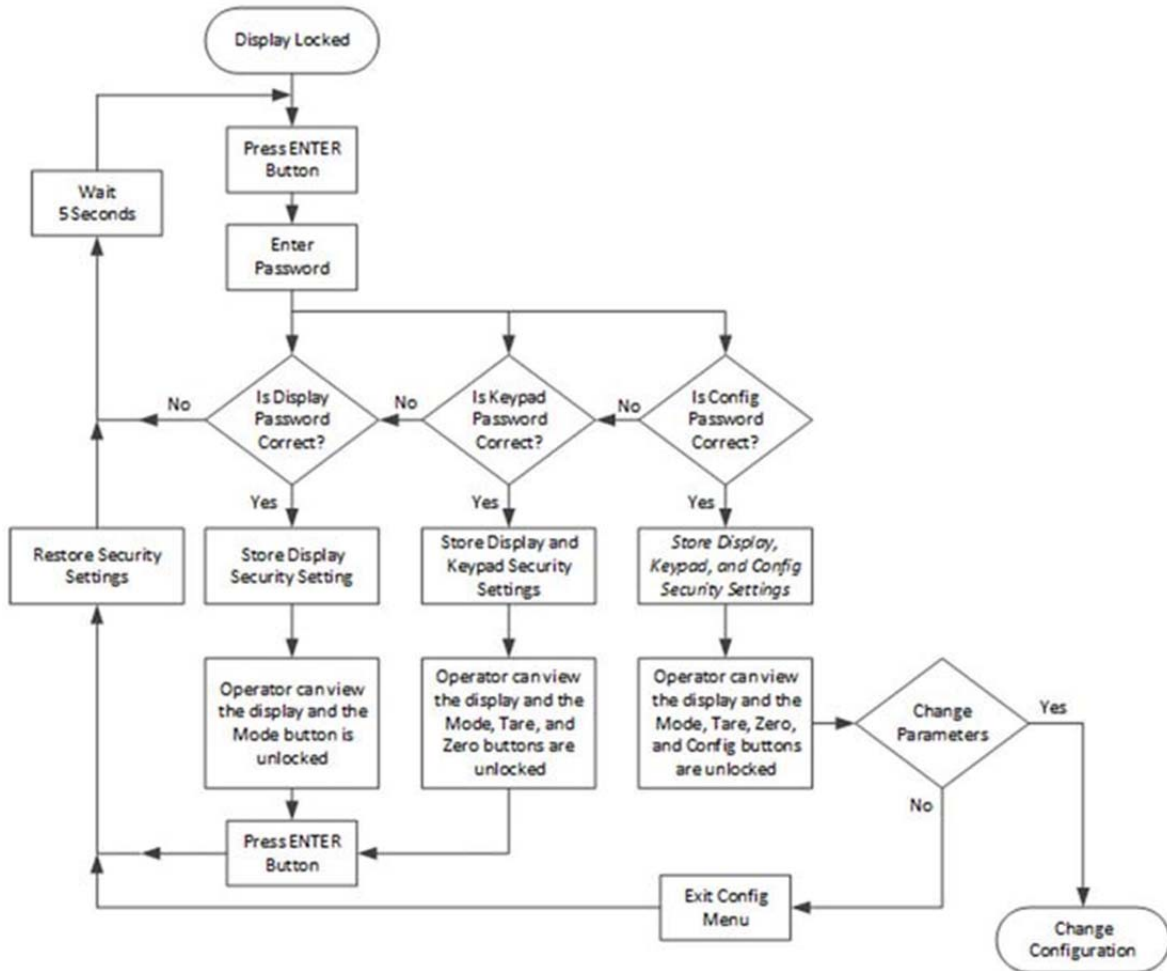
The following list explains the operation and features available if the correct 4 alphanumeric character password is entered by the operator.

1) Display Password:
- The current display lock setting is saved.
- The display lock is set to disabled and the MODE button is unlocked, enabling the operator to view the current Gross or Net weight on the Optional Front Panel display.
- Pressing the ENTER button a second time returns the display lock to its original setting.

2) Keypad Password:
- The current display lock and keypad lock settings are saved.
- The display lock is set to disabled and the MODE, TARE, and ZERO buttons are unlocked, enabling the operator to view the current Gross or Net weight on the Optional Front Panel display, and to tare or zero the scale.
- Pressing the ENTER button a second time returns the display lock and keypad lock to their original settings.

3) Configuration Password:
- The current display lock, keypad lock, and configuration lock setting are saved.
- The display lock is set to disabled and the MODE, TARE, and ZERO buttons are unlocked, enabling the operator to view the current Gross or Net weight on the Optional Front Panel display, and to tare or zero the scale.
- The CONFIG button is also enabled allowing the operator to open the configuration menus.

When the operator exits the configuration menu, the display lock and keypad lock are set to their original settings. If no changes to the configuration lock or password parameters were made the configuration lock is also set to its original lock settings; otherwise the latest configuration security settings are used.

The Keypad Lock

While the keypad lock is enabled the Mode, Zero, Tare, and Configuration buttons are disabled regardless of the configuration lock setting.

If the ENTER button is pressed the "Enter Password" page will appear on the display. At this level of security the operator can enter one of two possible passwords for the keypad lock or the configuration lock.

The keypad lock flowchart below shows the options and features when the keypad lock is enabled.

Figure 2: Keypad Lock Flowchart
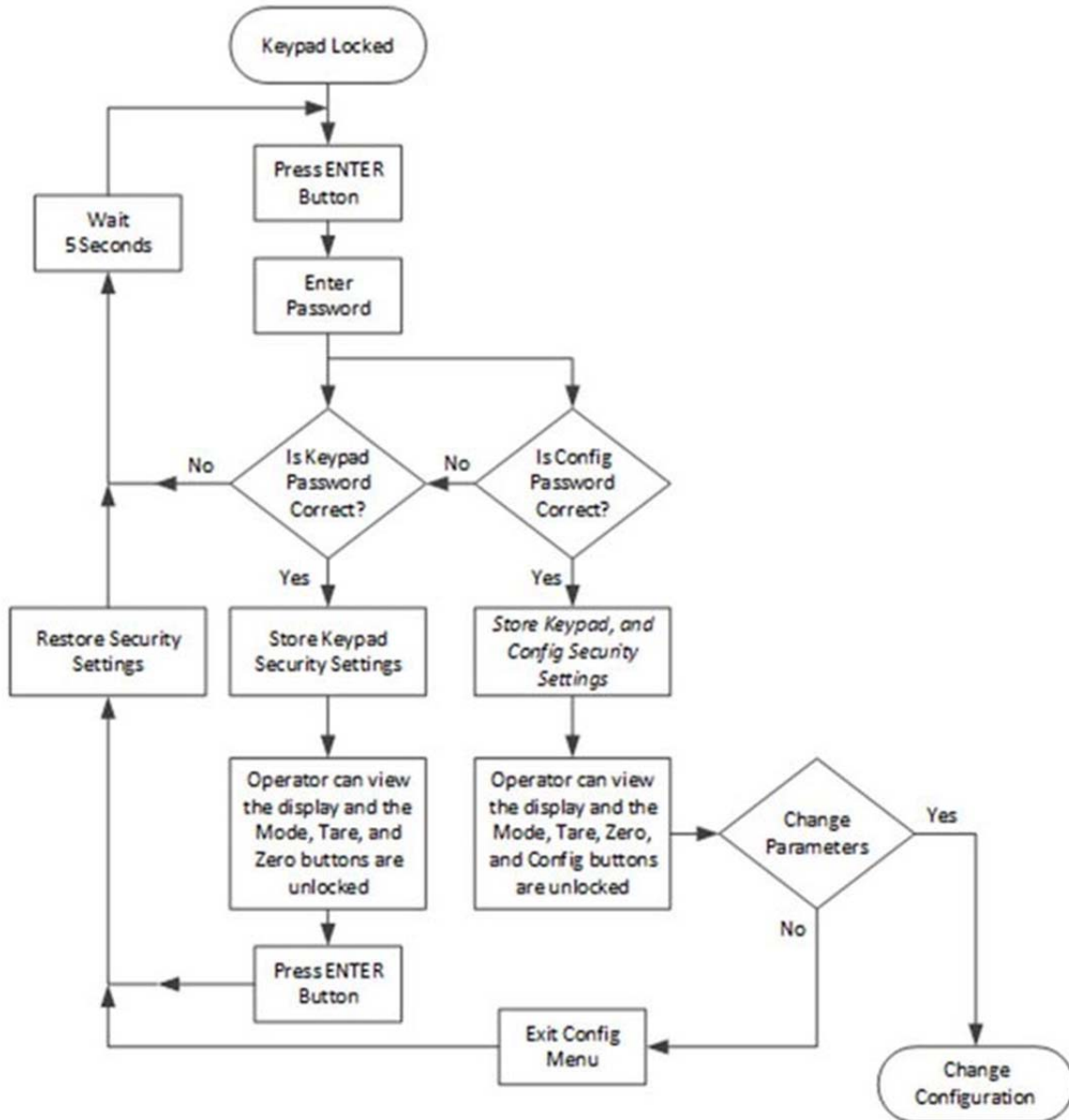
The following list explains the operation and features available if the correct 4 alphanumeric character password is entered by the operator.

1) **Keypad Password:**
   - The current keypad lock setting is saved.
   - The MODE, TARE, and ZERO buttons are unlocked, enabling the operator to tare or zero the scale.
   - Pressing the ENTER button a second time returns the keypad lock to its original setting.

2) **Configuration Password:**
   - The current keypad lock and configuration lock setting are saved.
   - The TARE and ZERO buttons are unlocked, enabling the operator to tare or zero the scale.
   - The CONFIG button is also enabled allowing the operator to open the configuration menus.
   - When the operator exits the configuration menu, the display lock and keypad lock are set to their original settings. If no changes to the configuration lock or password parameters were made the configuration lock is also set to its original lock settings; otherwise the latest configuration security settings are used.

The Configuration Lock

While the configuration lock is enabled the Configuration button is disabled, preventing the operator from viewing or modifying any instrument parameters.

If the CONFIG button is pressed the "Enter Password" page will appear on the display. At this level of security the operator can enter only one possible password for the configuration lock.

The configuration lock flowchart shows the options and features when the configuration lock is enabled.

Figure 3: Configuration Lock Flowchart
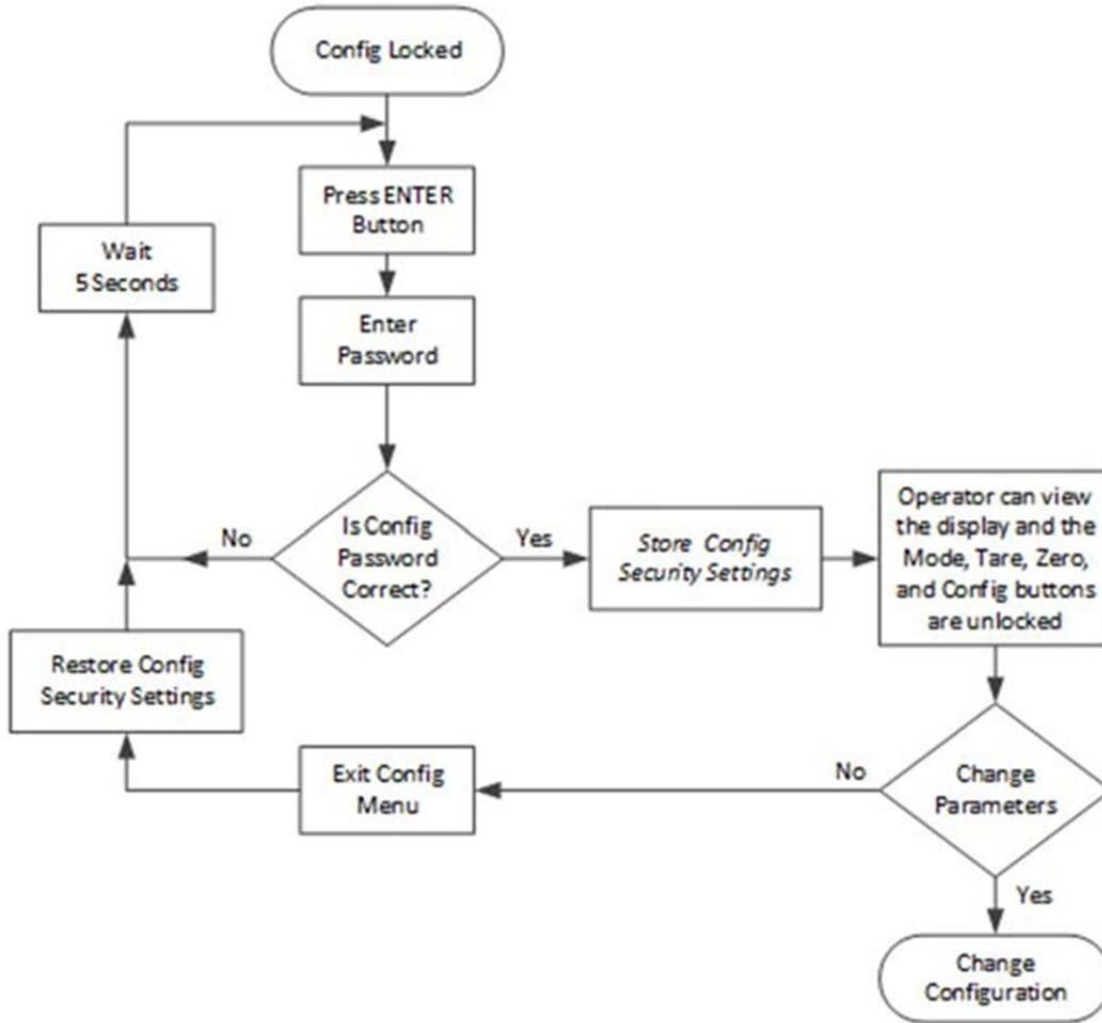
The following list explains the operation and features available if the correct 4 alphanumeric character password is entered by the operator.

Configuration Password:

- The current configuration lock setting is saved.
- The CONFIG button is also enabled allowing the operator to open the configuration menus.
- When the operator exits the configuration menu, if no changes to the configuration lock or password parameters were made the configuration lock is set to its original lock settings; otherwise the latest configuration security settings is used.

The Read Only, Security & Calibration Locks

There are three additional levels of security once the operator is within the configuration menu. These limit access to sensitive parameter settings such as calibration, security settings, and network settings.

If the operator has been given permission to access the configuration menu, the operator will at a minimum be able to view all the parameters except the security parameters.

Figure 4: Parameters Lock Flow Chart
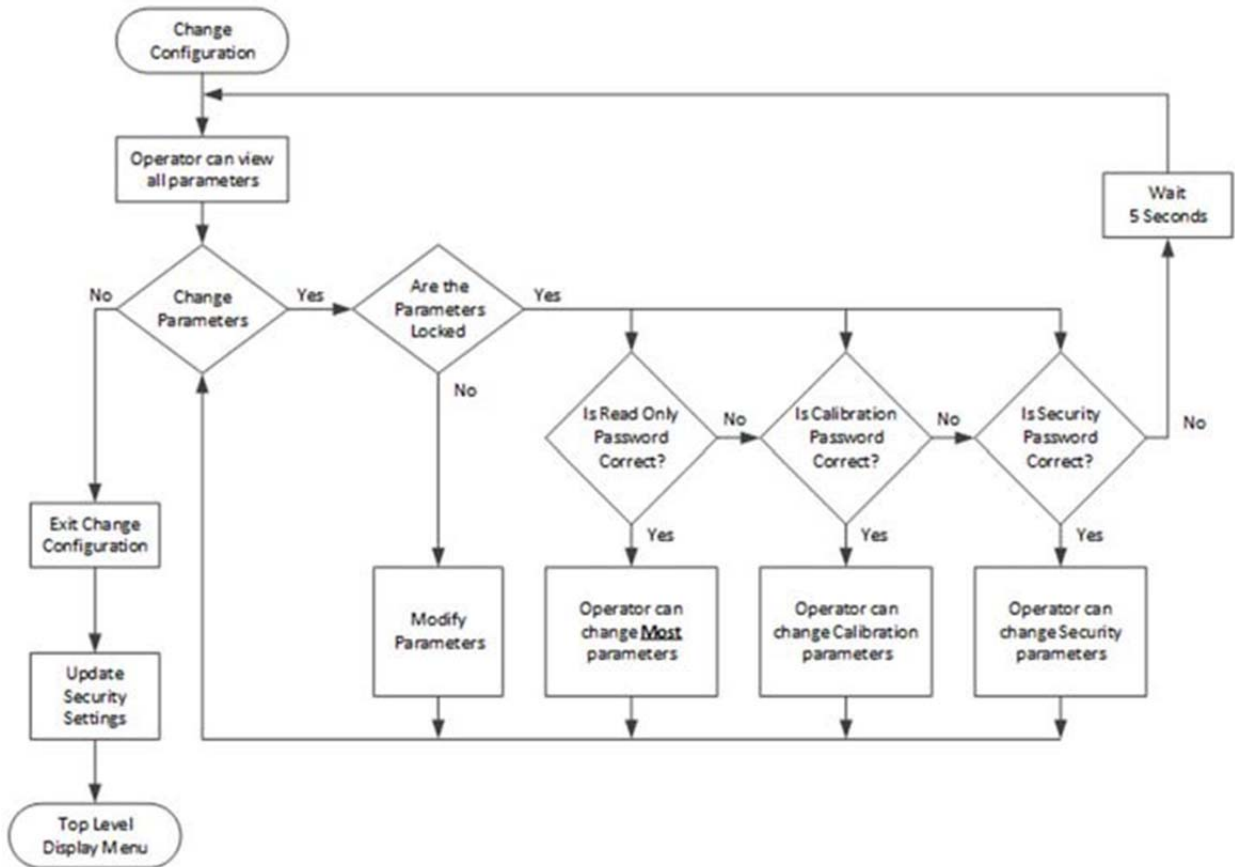
Modifying the Security Parameters

To view or modify the security parameters use the UP or DOWN button to select the security menu then press ENTER.

Figure 5: Parameters Lock Flow Chart
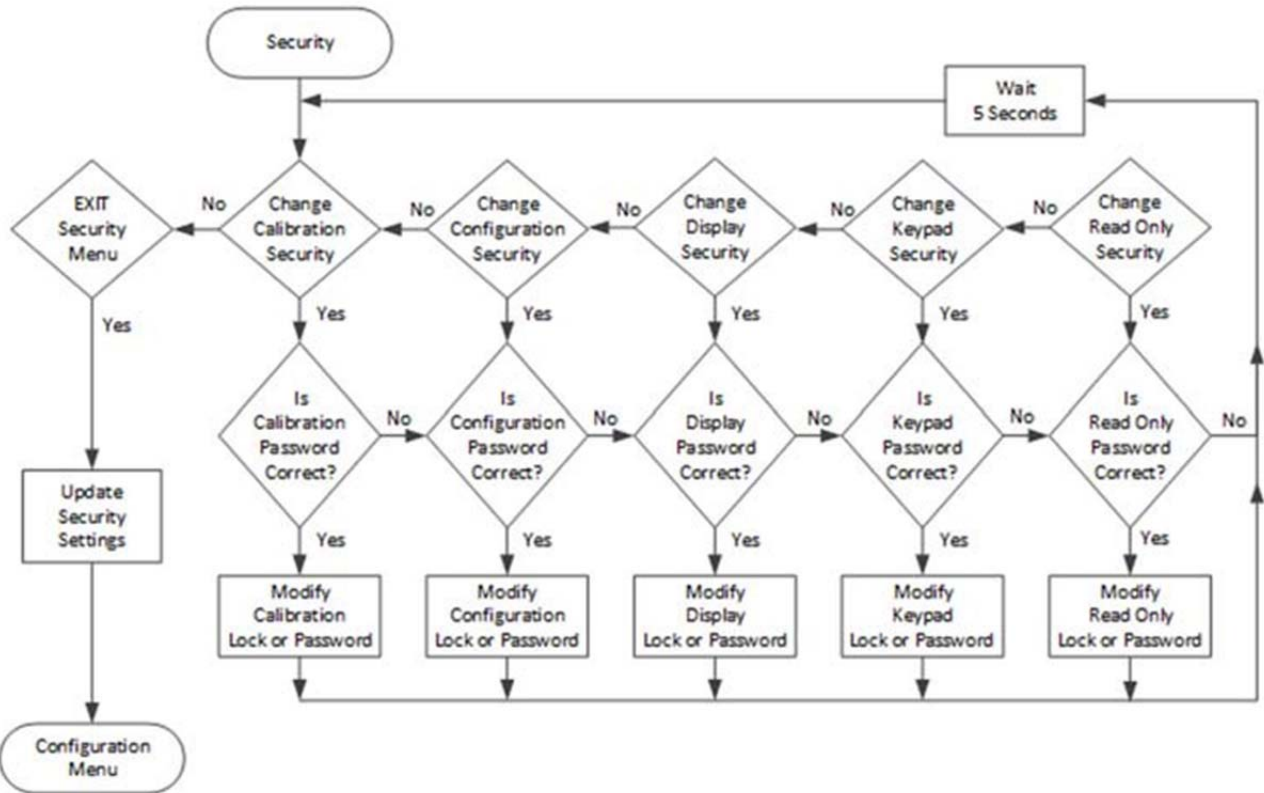
To modify the security feature use the UP or DOWN button to select the security feature then press the ENTER button. The password dialog box will appear; if the correct 4 alphanumeric character sequence is entered the operator will be able to either enable or disable the security feature or change the password. Note a password must consist of a 4 alphanumeric character sequence to be accepted as a valid password.

If an incorrect password is entered the menu will be returned to the security submenu.

The updated security features for the Read Only Lock and Calibration Lock will not be active until the operator leaves the security menu, any changes for the Configuration Lock, Keypad Lock, or Display Lock will not be active until the operator exits the configuration menu and returns to the top level display.

Modifying the Calibration Parameters

The calibration security locks out users from seeing any calibration parameters until you enter the correct calibration password.

To modify the calibration parameters use the UP or DOWN button to select the calibration menu and press the ENTER button. The password dialog box will appear; if the correct 4 digit alphanumeric character sequence is entered the calibration lock will be disabled until you exit the calibration menu; at which time the calibration lock will be automatically reset to the original setting.

If an incorrect password is entered the menu will return to the configuration menu.

Modifying the Read Only Parameters

The security and calibration parameters have their own password protection. The parameters discussed in this section are those listed under communication, diagnostics, display, filter, language, operation, and setup.

With the exception of the security and calibration parameters, all parameters can be read by the operator once the operator is navigating inside the configuration menu; however the ability to change these parameters can be password protected.

If the read only password is enabled and a parameter is selected, the password dialog box will appear. If the 4 alphanumeric character sequence is entered the read only lock will be disabled until you exit the configuration menu; at which time the configuration lock will be automatically reset to the original setting.

If an incorrect password is entered, the menu will return to the configuration menu.

Chapter 8

Troubleshooting

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Chapter 8 provides procedures for troubleshooting the electrical, mechanical and firmware elements of the HI 6600 series instrument and for using Hardy's Integrated Technician (IT®) software utility to isolate problems. Flow charts provide troubleshooting procedures for the Gateway Module, the WPM modules, load cells, and cabling.

NOTE   *Never run Hardy's Integrated Technician testing while in a production mode. The reported weight readings will not be correct and can cause equipment to start or stop unpredictably.*

Assembly Notes, Warnings & Cautions

WARNING - EXPLOSION HAZARD - DO NOT REPLACE COMPONENTS UNLESS POWER HAS BEEN SWITCHED OFF OR AREA IS KNOWN TO BE NON-HAZARDOUS.

AVERTISSEMENT – Risque d'explosion- Ne pas remplacer les composants à moins que la source d'alimentation soit éteinte ou que la zone est classifiée non dangereuse.

WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS

AVERTISSEMENT – Risque d'explosion – Ne pas déconnecter l'équipement à moins que la source d'alimentation ait été mise en position « éteint » ou que la zone soit classifiée non dangereuse.

Always disconnect the power cord before disassembling.
- Always replace broken or damaged modules or hardware immediately.
- Always check to be sure that no loose parts are sitting on printed circuit boards or electrical connectors or wires when disassembling or reassembling.
- Always protect printed circuit boards from electrostatic discharge (ESD). Always use approved ESD wrist straps and anti-static pads.

This chapter describes several tests that can shorten the time for troubleshooting. Most problems require the use of two or more tests to determine the cause.

If a problem is isolated to a load cell, it may not mean the load cell is the damaged component. Mechanical imbalances and system piping stress (lack of piping flexures, pressure hoses draped over, pipes etc.) can make a load cell or Weight Processor Module seem to be the problem.

If you are in doubt as to how to resolve a problem or if you need assistance, review Hardy's WebTech Knowledgebase at http://www.hardysolutions.com. WebTech is updated often and is available 365 days a year 24/7. It contains frequently asked questions to aid you in troubleshooting, and it provides a form for requesting additional information and answers to questions, with no waiting on hold. Located under the Support menu, select the FAQs.

Customer Service is also available from 6:30AM to 5:30 PM Pacific Standard Time. For direct factory support call Hardy Process Solutions Customer Service at:

- Factory Technical Support in the US and Canada: 1-800-821-5831
- Technical Support outside the US and Canada: 1-858-278-2900

Updating Instrument Firmware

Firmware should be updated to the latest release before proceeding with troubleshooting.

Information Page

The information page displays the firmware versions and description of the HI 6600 series instrument and can be accessed either through the Webrowser or optional Front Panel Display.
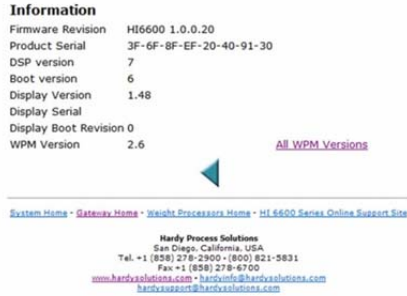
By Clicking on the All WPM Versions link, it displays information for the connected HI 6610 WPMs.
It also is where firmware updates for the HI 6610 WPMs can be initiated.
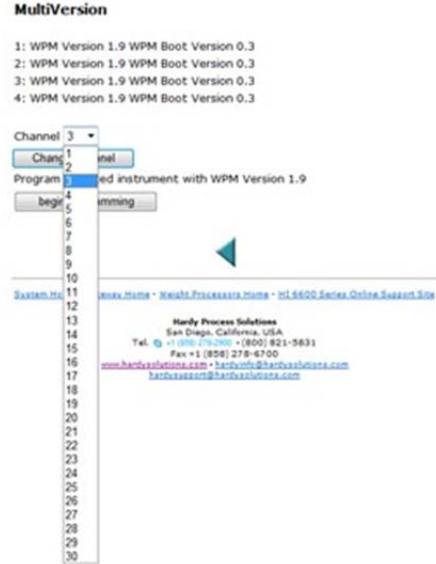
To change to a different WPM Channel, just select it from the pull down menu.
To update firmware on a WPM version, first select it and change the channel, then select Begin Programming.

Indicator Lights Summary

Weight Processing Module		
Green LED	**Red LED**	**Definition**
1 off	off	No Power, or ARM not programmed
2 off	solid	HardyNet network failure
3 off	slow blinking	Built-in self-test failure
4 off	fast blinking	Low Power indication
5 solid	off	Normal operation
6 slow blinking	off	Unit identification
7 fast blinking	off	Unit being programmed
8 slow blinking	slow blinking	Load cell current issue
9 fast blinking	fast blinking	Measurement errors

Hardy Gateway Module		
Green LED	**Red LED**	**Definition**
1 off	off	No Power, or ARM not programmed
2 off	Solid	HardyNet network failures
3 off	Slow bllinking	Built-in self-test failure
4 off	fast blinking	Low Power indication
5 solid	off	Normal operation
6 slow blinking	off	Unit identification
7 fast blinking	slow blinking	Unit being programmed
8 slow blinking	fast blinking	Network error (no comms)
9 fast blinking	fast blinking	DSP error

Common Error Messages

- A/D Convert Error! - Load Cells input out of range.

- Motion Error! - Check Motion Tolerance Settings and Retry

- Too Lo Error! - Verify that the load cell signal level is 0-25 mV. Verify that there is enough weight on the scale.

- Too Hi Error! - Verify that the load cell signal level is 0-25mV. Verify that there is too much weight on the scale.

- No C2 Sensor! - Instrument did not detect a C2 Load Sensor

- CAL Failed! - Too few counts between Zero and Span.

- C2 Caps Unequal! - Different load cell capacities (For example 50 lbs capacity load cell and 100 lbs capacity load cell on one system. Make the load cells equal by removing the odd load cell and replacing it with a load cell that is equal to the other's capacity.

- HI/LO Too Close! - Zero and Span are not more than 1,000 counts from each other or there is no change or negative change. Reset either so the counts are more than 1,000 counts of each other.

- Not Allowed! - Value entered is outside the range allowed. Try another value.

- Need Cal with ITJBOX - IT summing card is not installed. Install an IT summing card then do a Calibration with the card installed to access the IT information.

Diagnostics

Diagnostics is covered extensively in the Troubleshooting Section (Chapter 8). The available parameters on the Web

page are:

- Parameters (which shows all parameters on the instrument)
- Integrated Technician (when connected to an IT Junction Box)
- C2
- Stability Test

The available parameters on the device are:

- Stability Test
- Weight and Voltage Test

Trouble Shooting Using Integrated Technician (IT[®])

The Optional Front Panel display for the HI 6600 instrument's Stability test is shown below. To navigate this screen, select a test on the right using the right and left arrows with exit using the left arrow when you are at the first out of the five positions.

The test displays are live readings and only available if you have an IT summing junction card, maximum of one J-box and 4

channels to each HI 6610 Weight Processing Module.

The test for pass or fail may take 30 seconds to settle. It will always show the load cells as fail when the test is started.

The reduced voltage is a Yes or No selection. Then run the J-box test 1 as appropriate.

```
• Stability
• Weight & Voltage
   Reduced Voltage  Yes/No
        Jbox1
```
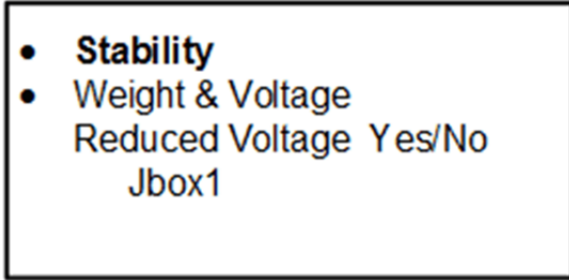
A more detailed explanation of each section of the test follows below:

Stability Test ALL

```
Stability:  Gross = 0.9lb
              RAW          Waversaver
Mean         32918        32993
Variation    0.17         0.00
Results      OK           OK
mV/V         0.0184
RTZ          Pass
```

PASS/FAIL and Stability Test

This test computes the variation of the A/D counts. The results show the variance and indicate pass or fail. The test is valid to help break down the problem into smaller divisions. Unstable test results can be caused by an internal A/D processor fault, grounding, power connection, EMI/RFI above specified CE limits, or noisy load cell input.

These numbers reflect a weight change at the smallest measurement of the filter setting, the internal analog-to-digital converter computer register.

WAVERSAVER TEST

These numbers also reflect weight change at the smallest measurement, the internal analog- to-digital converter computer register. The internal RAW A to D counts and filtered A to D counts are displayed for a comparison. A FAIL on the RAW counts and pass on the filtered counts indicates the WAVERSAVER filtering is necessary and functioning properly.-except that this reading is averaged using the WAVERSAVER and AVERAGES setting parameter from the Processor's configuration. Using the maximum number of internal averages and the 10ms update speed equals a maximum delay of 2.55 seconds

Weight and Voltage ALL

This test section looks at the readings from ALL the load cells to test overall system performance and signal voltage readings. This test works for most load cell types.

Further investigation to isolate system problems requires the use of hand tools and multi-meters or the INTEGRATED TECHNICIAN Junction or Summing Box and using the IT© Test section.

NOTE *INTEGRATED TECHNICIAN ® (IT) is a registered trademark of Hardy Process Solutions.*

Weight This displays the amount of force seen by all load cells installed in the summing junction box. Further investigation to isolate system problems will require the use of hand tools and Multi-meters or the Integrated Summing Junction box and using the IT test section.
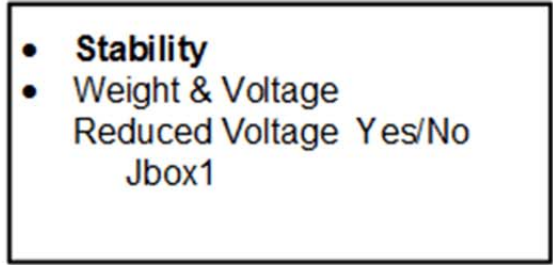
Millivolt/Volt equals the output from a load cell per each volt of excitation. The HI 6600 series reads the load cell output in mV/V which is a higher resolution (4 decimal places) reading than a mV reading, thereby providing more sensitivity to enable you to troubleshoot the condition of the load cell in question under certain conditions. . Load Cells are rated in Millivolts/Volts. **mV/V** are DC voltage signals between 0-5.0000 mV/V.

mV DC voltage signals are between 0-25 millivolts. Overloads and negative millivolt readings are not shown as actual readings but 25.5 mV for over voltage and 0.0 for negative voltage. You will need to use a multimeter with a 200 or 300mVDC range to view the out of range voltages.

RTZ (Return to Zero) Test

This check is to see if the scale returns to a zero reading condition when it is empty. Run this test only when the scale is empty. When the scale is calibrated at the **ZERO** or Reference zero, there is a period during which the **WEIGHT** readings are collected. After a valid calibration has been completed, the test compares the original weight reading with collected and current readings. If the difference is more than the combined Motion and the Zero Tolerance parameters the test will fail.

IT Test

If your system has an Integrated Technician Summing Junction box, the IT test can identify individual load cell problems up to a maximum of four load cell selections. The dwell displays are live readings and only available if you have an IT summing junction card, with a maximum of one JBox and 4 channels. From the front display, select Jbox1.

From the HI 6610 WPM Diagnostics menu, select Integrated Technician.

Sensor Number Indicates which sensor is under test. Using the up or down arrow, select the number of load cells to test.

and press Do IT Test. The Dwell test for pass or fail takes 30 seconds to settle. Until it settles, it will always show "fail" when the test is started. If the browser times out during the test, refresh your browser until the results appear.

Integrated technician requires a Hardy IT JBOX

Jbox1Sensors 4 ▾

Sensor	weight	RTZ	mV/V	raw variation	raw result	waversaver variation	waversaver result
1	0.0 lb	Pass	0.0204	6.49	Pass	9.43	Pass
2	0.0 lb	Pass	0.0323	1.22	Pass	283.37	Fail
3	0.0 lb	Pass	0.0347	3.01	Pass	12.29	Pass
4	0.0 lb	Pass	0.0351	5.14	Pass	4.01	Pass
REF			0.4982	0.22	Pass	443161.84	Fail

[Do IT test]

Sensor	weight	RTZ	mV/V	raw variation	raw result	waversaver variation	waversaver result
1							
2							
3							
4							
REF							

[Do IT test, reduced voltage]

NOTE   *Warning: Do not install your Junction Box or summing card in areas susceptible to high vibrations. The relays on the circuit board can chatter and affect your weight readings.*

General Troubleshooting Flow Chart Index
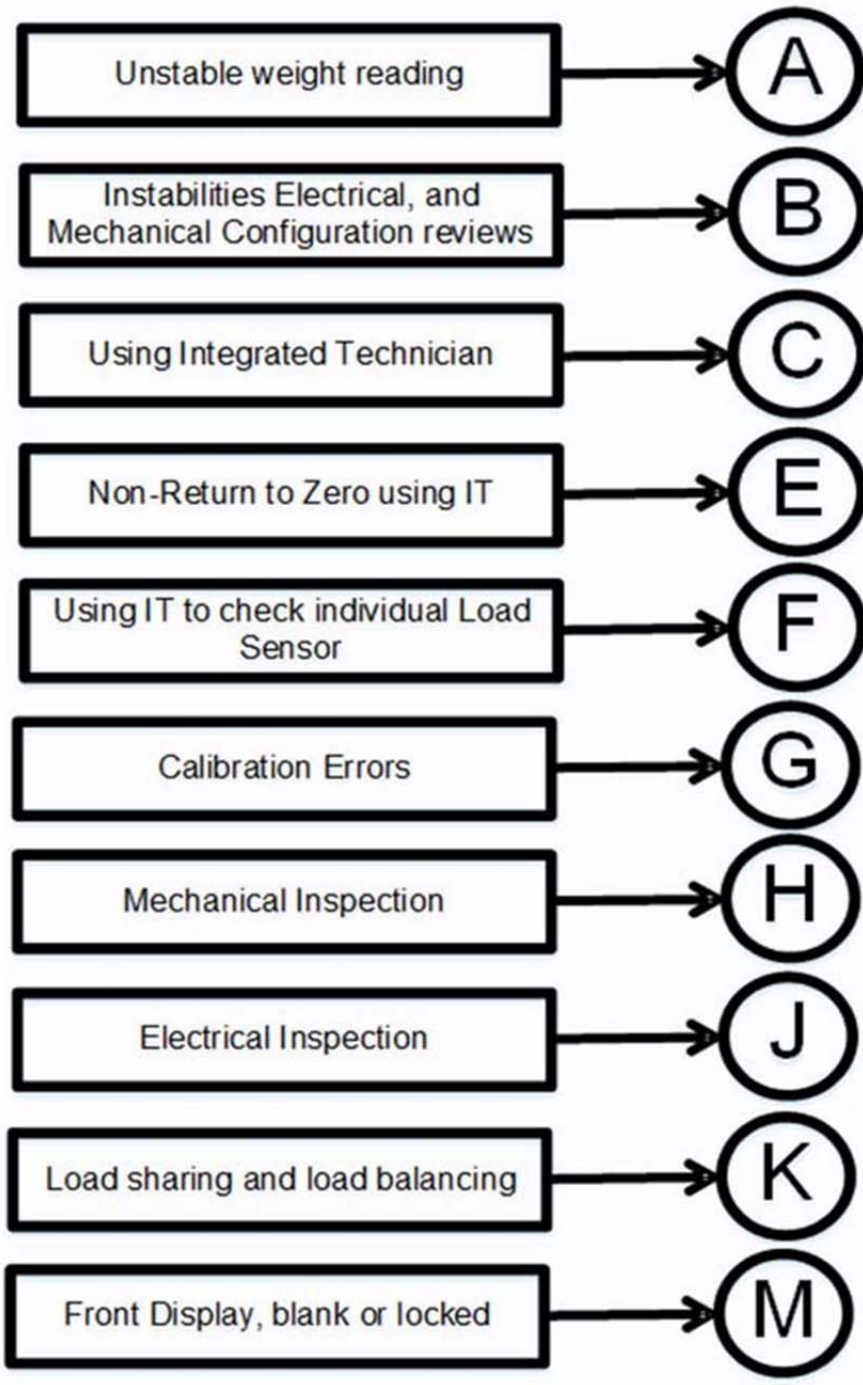
A - Electrical and Mechanical Review

Online using the Web Browser Select Diagnostics

Select Stability Test

Verify both RAW and Waversaver Variations Pass
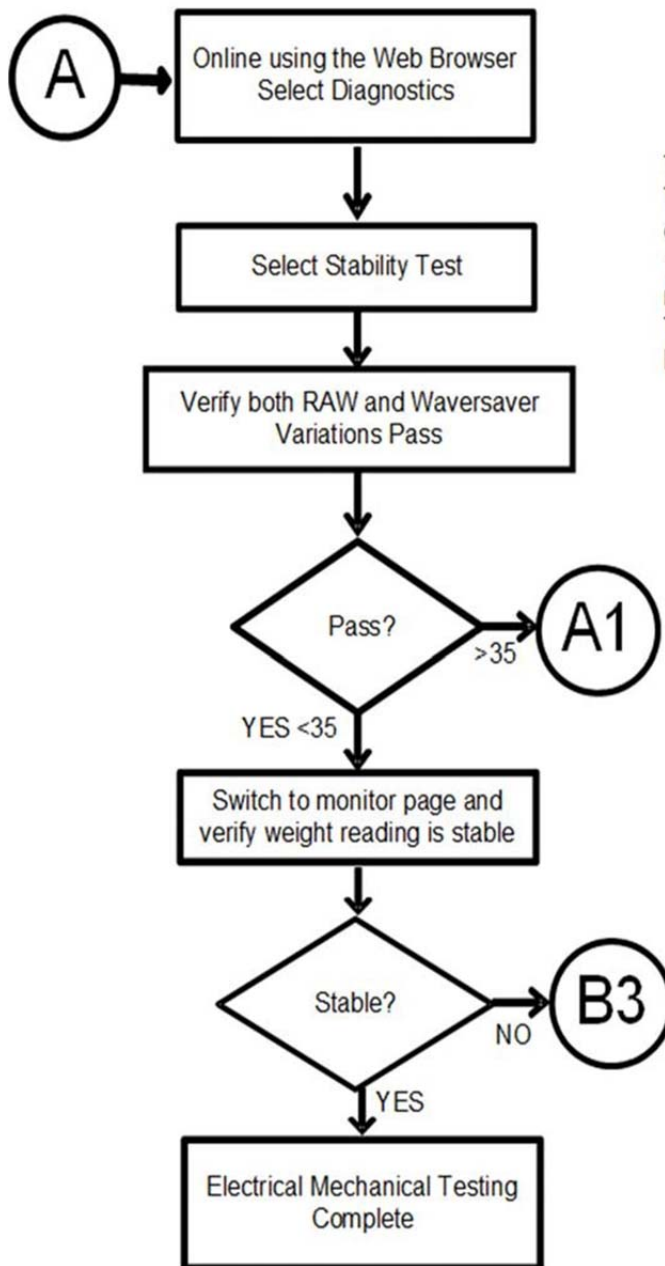
Pass?
>35 → A1
YES <35

This test is Pass or Fail. The raw and filtered signal standard deviation is compared over the last 100 updates. The mean deviation must be less than 35 counts to pass. Tests internal and external signal levels for excessive signal variations.

Switch to monitor page and verify weight reading is stable

Stable?
NO → B3
YES

Electrical Mechanical Testing Complete

A1. Checking for Unstable Components in a Weighing System

A1

Using the IT summing card test will help signal if a load cell, mechanical, cable run, or instrument is the problem. Use the IT test results to answer the questions below.

Did the individual load sensors PASS?

NO → **F**

YES

Did the Reference PASS?

NO → **B**

YES

A RETEST ← YES — Is the weight reading STABLE? — NO → **B2**

B. Guidelines for Electrical, Mechanical or Configuration Issues

```
                        ┌───────┐
                        │   B   │
                        └───┬───┘
                            │
                            ▼
                     ┌─────────────┐
                     │ Checking for│         ┌─────┐
                     │  Electrical │────────▶│ B1  │
                     │  Stability  │         └─────┘
                     └──────┬──────┘
                            │
                            ▼
                     ┌─────────────┐
                     │ Checking for│         ┌─────┐
                     │  Mechanical │────────▶│ B2  │
                     │  Stability  │         └─────┘
                     └──────┬──────┘
                            │
                            ▼
        ┌─────┐      ┌─────────────┐         ┌─────┐
        │  A  │◀─────│ Checking for│────────▶│ B3  │
        │RETEST│     │Configuration│         └─────┘
        └─────┘      │   caused    │
                     │ instability │
                     └─────────────┘
```

B1 - Guidelines to Verify Electrical Installation

B1

Physical Grounding -
All common equipment shares a common earth ground point. Keep the ground cable run lengths to a minimum. Install new ground rod if length is excessive.

Cable -
Cuts or breaks in the load cell insulation allow moisture to wick into the cable and some load cells. This can setup stray capacitance charges and allow ground currents to exist. This could create a highly intermittent situation.

Vessel, Fill and discharge piping –
Ground all components to a common earth ground point to eliminate electrical differences in potential and static build-up.

Load Sensors –
Ground straps must be installed to provide a direct discharge path to ground by-passing the load sensor.

Cable Routing –
Separate high voltage sources and cables from low voltage signal cables. Stay a minimum of 14 inches from magnetic fields and SCR controls. Avoid parallel high voltage and signal runs.

Cable Shielding –
Ground low voltage cable shields only at the controller end. Grounding both cable end shields produce ground currents.
Verify, with an ohm meter, the shield is only grounded at the weight controller.
Disconnect the shield at the controller and check for an open circuit between ground and shield.
Reconnect the shield to ground and confirm a proper ground path from the IT Junction box to the controller.
This is the most common reason for a Reference Stability failure.

Weight Controller -
DC common is at the same potential as earth ground. No floating DC power.

J

B2 - Guidelines to Verify Mechanical Installation

B2

Vessel -
When inspecting a vessel, keep in mind the center of Gravity (COG) should be low and centered equally over all the load points. Insure the load is directly over or under the load point to avoid side-loading.

COG and weight distribution -
Large weight changes in individual load sensors indicate a shift in the COG or faulty load cells.
Piping and motors can affect the individual load sensor readings.
Allow for a higher reading on load cells that support motors and piping.

PIPING -
Make sure there isn't any side loading from piping or external forces.
Install flexures on all piping to insure a free floating vessel. All flexures are to be in the horizontal plane and not used to correct piping misalignments or create bends.

External forces -
Insure pneumatic lines are not applying pressure to the vessel when energized. During testing and calibration, de-energize all vibration, vacuum, and pressurization equipment.

Check Rods and Auxiliary supports -
Install check (stay) rods to minimize vessel movement from outside sources, agitators, and motor.

Housekeeping – Check Points
Product, tools and production aids are to be stored OFF the scale vessel.
No workers are physically on the scale
Must protect equipment from environmental damage
Insure openings are sealed to keep water and environmental contaminates from damaging:
    Instrument cabinet or enclosure
    Summing or other circuit cards
    Load Sensors and mounts
    Conduit runs
ALL covers properly re-installed in level enclosures.
Enclosures not installed on flat surfaces will keep the lids or covers from properly sealing

OK

Additional Testing Go To

C

H

B3 - Verify Configuration/Filter Settings to Improve Stability

B3

Filter Settings –
Incorrect WAVERSAVER settings can cause unstable weight readings.
    Adjust to the lowest WS setting that gives you a stable weight reading.
    Selections from the least to the highest is: OFF, 7 Hz, 3.5 Hz, 1 Hz, 0.5 Hz, 0.25 Hz
    Higher frequencies with low amplitude - select 7 Hz or OFF
    Low frequencies with high amplitude – select settings 3.5 Hz or 1 Hz

Averages are used to counter bumps and intermittent events.
    Start with 2-5 and increase as required.
    Excessive Averages will delay the final weight reading.

Decimal Point selection –
Incorrect number of decimal points beyond the ability of the load cells will provide an unstable and unusable weight reading.

The number of decimal points should not exceed a 1:10,000 resolution. This is a level of stability described as a stable scale system. Your scale's performance will vary with filter settings. 1:10,000 is a good starting point.

Example:
A 10,000 lbs scale would not have any decimal points. Adding a decimal point and a Grad size of 5 would expand the resolution to 1:20,000

Graduation selections help select a more applicable weight reading setting.
Use the Grad sizes as steps in between decimal point selections.

Resolution –
Resolution is the smallest expected scale increment or weigh reading step.
1:30,000 is considered a very usable weight resolution, but may not be stable, and is considered the outside limits for decimal points and grad sizes.

C

C - Integrated Technician and Stability Test Overview

C

Operations> Diagnostics> Stability TEST
Used for overall system health and when you do not have an IT card.
   Stability is monitoring RAW data looking for:
   EMI/RFI interferences
   Out-of-range Filter settings

STABILITY TEST -
Gross weight - Current overall with an empty scale equaling 0.
mV/V - Current overall mV/V signal out reading. Between 0.00001 to 5.00000.
RTZ - Return to Zero test. A scale is judged to pass if the gross weight is less than the Zero Tolerance and Motion Tolerance combined.

Integrated Technician TEST -
Select the number of Sensor(s) under test.
Individual Sensor test results are displayed at normal Excitation and reduced Excitation if the IT summing card is used.
Gross weight - Individual gross weight readings with an empty scale equaling 0.
RTZ - Return to Zero for each load sensor test. A scale is judged to pass if the gross weight is less than the Zero Tolerance and Motion Tolerance combined.
mV/V - Current individual mV/V signal out reading. Between 0.00001 to 5.00000.
Variations tests - The rest are the same as the Stability test for individual load sensors and the reference is for the C2 cable run and the summing junction box immunity to EMI/RFI noises.

To Test Individual
Load cell Outputs

F

To Test individual
Load cell
Stability
And RTZ

E

E Non-Return to Zero (System with IT Summing Card.)

```
                    ┌───┐
                   │  E  │
                    └───┘
                      │
                      ▼
        ┌───────────────────────────┐
        │   Use the ZERO command     │
        │   Does the gross weight    │
        │       return to zero?      │
        └───────────────────────────┘
                      │
                      ▼
        ┌───────────────────────────┐
        │  Check for product buildup │
        │    or mechanical problems. │
        └───────────────────────────┘
                      │
                      ▼
        ┌───────────────────────────┐
        │  Run and review Integrated │
        │  Technician Diagnostics    │
        │           test             │
        └───────────────────────────┘
                      │
                      ▼
        ┌───────────────────────────┐          ┌───────────────────────────┐
        │       Sensor #1...#4       │─────────▶│          Errors?           │
        └───────────────────────────┘          │ "Motion" or "Out of        │
                      │                          │      tolerance"?           │
                      ▼                          └───────────────────────────┘
        ┌───────────────────────────┐                        │
        │         Reference          │                        ▼
        └───────────────────────────┘          ┌───────────────────────────┐
                      │                          │      RTZ or Stability      │
                      ▼                          │          FAIL?             │
                  ◇ Pass? ◇──── NO               └───────────────────────────┘
                      │                                        │
                     YES                                       ▼
                      ▼                          ┌───────────────────────────┐
        ┌───────────────────────────┐            │ Additional Testing         │
        │       Test complete        │            │ Suggestions                │
        └───────────────────────────┘            │ Verify connections and     │
                                                  │ cable color code.          │
                                                  │ Review Troubleshooting     │
                                                  │ Sections                   │
                                                  │ F – Individual load sensor │
                                                  │ testing                    │
                                                  │ A - Verify stability       │
                                                  │ B – Electrical, Mechanical │
                                                  │ and Configuration          │
                                                  │ K – Load sharing and       │
                                                  │ balancing                  │
                                                  └───────────────────────────┘
```

F. Verify Individual Load Sensor Millivolt Output readings

Testing an individual load sensor output requires an IT summing card or Millivolt meter with two decimal place resolution.To determine the sensitivity and parameters for your load sensor, use the load sensor certificate or read the C2 chip with the utility found under the Diagnostic menu.

Example: A 3mV/V Load sensor produces approximately 3.0000 mV/V at rated load. If the scale capacity is 1,000 lbs with 100 lbs of deadload, when empty the load point mV/V reading should measure 0.3000 mV/V. This number can be converted to mV by multiplying the mV/V results by 5. (5V excitation)

```
                    ┌──────────────────────────────────────────────┐
   ( F )  ────────► │ Enter Diagnostics and select the Integrated  │
                    │            Technician Test                    │
                    └──────────────────────────────────────────────┘
                                        │
                                        ▼
                              ┌──────────────────┐
                              │     Select       │
                              │   "Do IT Test"   │
                              └──────────────────┘
                                        │
                                        ▼
                         ┌───────────────────────────────────┐
                         │ If you have an HI6010-IT summing  │
                         │ card, repeat using the Reduced     │
                         │ Excitation test                    │
                         └───────────────────────────────────┘
                                        │
                                        ▼
                         ┌───────────────────────────────────┐
                         │ Review test results for mV/V       │
                         │ readings that were not reduced or  │
                         │ changed.                           │
                         └───────────────────────────────────┘
```

Load cell results for LOW mV/V readings

Load cell results for HIGH mV/V readings

No deadload: Apply weight and re-test
Wiring error: check manual or color code flag
Open bridge circuit:
- Remove power from load sensor
- Check using an Ohm meter
- Verify findings against load sensor certificate

Shipping brackets still installed: remove and re-test

Stressed load cell: remove load and re-test
Wiring error: check manual or color code flag
Shorted bridge circuit:
- Remove power from load sensor
- Check using an Ohm meter
- Verify findings against load sensor certificate

Lift off bolts to tighten: adjust to 2mm gap.

Replace load sensors or correct problems and re-test.

(K)

G- Calibration Errors During Calibration

```
                    ┌─────┐
                    │  G  │
                    └──┬──┘
                       │
                       ▼
        ┌──────────────────────────┐          ┌──────────────────────────────────┐
        │ Cal completed OK         │          │        Motion ERROR              │
        │ Cal Failed               │ ───────► │  Increase Cal Motion Tolerance   │
        │ Cal In progress          │          │                                  │
        │ Cal Failed: Motion       │          └──────────────────────────────────┘
        └──────────────┬───────────┘
                       │
                       ▼
        ┌──────────────────────────┐          ┌──────────────────────────────────┐
        │ Installation problems    │          │    Negative mV signal >          │
        │   A/D Converter Error    │          │    mV/V Out of range.            │
        │   No C2 sensors found    │ ───────► │    Load Sensor damaged.          │
        │   C2 capacity unequal    │          │ No test weight installed at SPAN point. │
        │   Bad C2 Device          │          └──────────────────────────────────┘
        │   HI/LOW Too Close       │
        └──────────────────────────┘
```

Mechanical Installation — H   Electrical Installation — J   F

Refer to the list of errors in the calibration section for details.

A

H. Mechanical Installation

```
( H )
  │
  │        Are pipes and          ┌──────────────────────────────────────────────────────────┐
  │        conduits flexible?      │  1.  Keep Flexures on the horizontal                     │
  │                                │  2.  Vertical flexures should be avoided                 │
  ├───────────────────────────────▶  3.  Do not use flexures to correct for misaligned piping│
  │                                │  4.  Do not use hose flexure to make right angle bends   │
  │                                │  5.  Non-flexed piping should have an unsupported        │
  │                                │      horizontal run using a ratio of 36 times it's       │
  │                                │      diameter                                            │
  │                                │  6.  Pipe flexure lengths should be a ratio of 6 times   │
  │                                │      it's diameter                                       │
  │                                │  7.  Flex feed and discharge piping                      │
  │                                │  8.  Are the flex joints on the correct side of the value?│
  │                                │      a.  You weigh the output valve, not the input valve │
  │        Is all mechanically     │      b.  Does the weight scale see the entire product to │
  │        isolated from Ladders   │          be weighed?                                     │
  │        and connecting          │      c.  If the product applies a force to a valve or    │
  │        structures?             │          pipe, that pipe or valve must be included in    │
  │                                │          the weight vessel.                              │
  │                                │      d.  Your vessel must seem to float not only up and  │
  │                                │          down, but as a gimbaled assembly to avoid       │
  │                                │          side loading.                                   │
  │                                └──────────────────────────────────────────────────────────┘
  │                                ┌──────────────────────────────────────────────────────────┐
  ├───────────────────────────────▶  1.  Walking around the structure should not cause a      │
  │                                │      weight change.                                      │
  │                                │  2.  Local traffic should not interact with the scale.   │
  │                                │  3.  Protect from forklifts and adjacent processes       │
  │                                │      equipment.                                          │
  │                                └──────────────────────────────────────────────────────────┘
  │        Are the load points     ┌──────────────────────────────────────────────────────────┐
  │        mounted properly?       │  1.  Level, solid mounting base                          │
  │                                │  2.  Is the load sensor mounted right side up?           │
  ├───────────────────────────────▶  3.  All load sensor bolts installed using anti-seize     │
  │                                │      compounds                                           │
  │                                │  4.  Mechanically aligned to compensate for expansion    │
  │                                │      and contraction?                                    │
  │                                │  5.  Load sensors bolts properly torqued as specified in │
  │                                │      the manual?                                         │
  │                                └──────────────────────────────────────────────────────────┘
  │                                ┌──────────────────────────────────────────────────────────┐
  ├───────────────────────────────▶  1.  Protects the load sensors from overload and impact   │
  │                                │      force.                                              │
  │                                │  2.  Limit the movement of the vessel                    │
  │                                │  3.  Rods must be loose and not interact with the vessel.│
  │                                │  4.  You should be able to twist the rods using your hands│
  │                                └──────────────────────────────────────────────────────────┘
  │        Are load sensor         ┌──────────────────────────────────────────────────────────┐
  │        cables proper           │  1.  Separate conduit for low and high voltage cables    │
  │                                │  2.  Do not bundle low voltage with high voltage cables  │
  ├───────────────────────────────▶  3.  Maintain at least 3 inches of separation from 110 vac│
  │                                │  4.  Maintain 14" separation from magnetic fields and    │
  │                                │      440 vac power                                       │
  │                                │  5.  Cables are in conduit of tied up off the floor and  │
  │                                │      out of harms way.                                   │
  │                                │  6.  Watch for pinch points that will sever the cable    │
  │                                │      runs or interfere with the weighing process.        │
  │                                └──────────────────────────────────────────────────────────┘
  │
  └──▶ ( J )
```

J- Electrical Inspection

J

Physical Grounding
1. Insure all common equipment shares a common ground point.
2. Keep the ground cable length to earth ground as short as possible.
3. Install a new ground rod if the cable length is excessive.
4. Verify Chassis ground and earth ground connections are less than one ohm.
5. Ground straps must be installed to provide a direct discharge path to ground around the load points.
6. Verify the voltage from common to ground is less than ONE vac.

Cabling
1. Cuts or breaks in the load cell cable insulation allow moisture to wick into the cable and load points. This can setup stray capacitance charges and allow ground currents to exist. This could create a highly intermittent situation.
2. Never route low voltage cable in with or bundled to high voltage cable.
3. Separate high voltage sources and cables from low voltage signal cables. Stay a minimum of 14 inches from Magnetic fields and SCR controls. Avoid parallel high voltage and signal cable runs.
4. Use the Hardy C2 certified cable from the controller to the summing junction box. This is to insure communications with the C2 and Integrated Technician functions.

Cable Shielding
1. Ground low voltage cable shields only at the controller end.
2. Grounding both cable ends will produce ground currents.
3. Verify, with an ohmmeter, the shield is only grounded at the weight controller.
4. Disconnect the shield at the controller and check for an open circuit between ground and shield. Reconnect the shield to ground and confirm a proper ground path from the Junction box to the controller.
5. Verify the shield is not connecting to ground at the Junction Box.
6. Load cell cable shields only pass thru the Junction Boxes and are not connected to ground at that point.

Vessel grounding
1. Ground all to a common point to eliminate electrical differences in potential and static build-up.
2. Verify this ground is the same ground potential as the instrument.

Computer clean AC power
1. VFD units can produce extreme voltage disturbances that power conditioning transformers are not equipped to filter. An Active Tracking filter is required for these high frequency spikes that can scramble the system memory.

K

K - Installation Check Points

K

Load cell wiring is complete and correct?

1. Does the mV signal increase in a positive direction?
2. If you receive negative results, check if load sensor is mounted correctly.
a. The arrow goes with the direction of force.
b. If there isn't an arrow, you must manually verify the correct direction. A negative reading indicates the load cell is upside sown.
c. Load cells in tension will not reflect a negative reading if installed upside down. If upside down, the only problem is that the force applied by the cable will be included in the weight reading.
d. If you are still receiving a negative signal, verify load cell wire color code and proper placement.

Multiple load cells Map the mV readings. Balance the load.

1. Verify a positive mV reading from each load sensor using the IT test Mv or a meter.
2. Record the mV readings and compare each corner for proper load sharing.
a. For proper load sharing, you should see only a difference of +/- 0.5mV
b. Larger differences due to motors and piping should not exceed +/- 2mV
c. If there aren't any motors, scales or piping to explain the mV difference, adjust the corners and balance the mV reading.
d. Use shims or if equipped adjusting bolts on the load cell mounting hardware.
e. Drawing a load cell map helps determine the correct keg to adjust and in which direction

Three load cells balance like a three legged chair:
3. Using a spirit level, verify the vessel is vertical and horizontally correct
4. Verify if any height change affects the attitude of adjacent vessel or piping.
5. Read the total mV reading without balance. This is your target mV setting for each load cell.
6. Adjust each leg to dynamically match the mV outputs
7. Verify the mV readings and physical level when complete

Four or more load cells presents a challenge:
8. Use the weight and voltage test to determine the sum of the load cell signals to set your target mV reading for each load cell
9. Read the output of individual load cells.
10. Adjust the load cell with the lowest reading to dynamically match the target mV readings obtained in step 1
11. Read the mV readings from each load cell to verify the proper correction
12. Repeat step to achieve a proper load sharing vessel
13. Verify the vessel is still level and aligned after the adjusting

Verify proper operation and calibration.
Changing levels can add binds and piping interference.
Insure flexures are still properly installed and aligned.
Testing is complete

M. Weight Processor's Optional Front Display Blank or Locked

M

Verify input and output voltages

1. Is the voltage proper?
   a. Check for broken connections and power switches.
   b. Is there 5Vdc excitation voltage?
   c. Is there 24Vdc display voltage?
2. Disconnect all connectors from the back panel except power.
   a. Is the voltage correct?
3. If yes reconnect one at a time and re-check for proper voltage after each cable addition.

Display adjustments and Power saver mode

4. Is the system set for Power Saver mode?
   a. Press on the scale enough to invoke Motion
   b. Did the display restore?
5. Is the front display secured?
   a. Press the enter button and look for any request for a password.
6. If the screen illumination is incorrect the display menu selection is not affected by the screen settings.
   a. Enter the configuration/tools section and select the display settings.
   b. Adjust as required observing the weight readings in the upper right hand corner.

Tests and Diagnostics

The Test and Diagnostics menus provide an expanded view of how the weight processor and scale are working. You can run several tests from either the test links on the Web Diagnostic page or the Optional Front Panel Test menu. Each test is described in its own subsection below.

You can also obtain information that a Hardy representative may ask for if you make a request to Technical Support. For example, for the last calibration, you can see the type of calibration and when it was done. You can also check the graduation size, operator ID, and other configuration information, and you can learn the serial number, model number, firmware revision number.

Diagnostic testing from the Optional Front Panel

From the Configuration menu, use the down arrow to select Diagnostics and press Enter to open the Menu.

This menu lists the tests you can run.
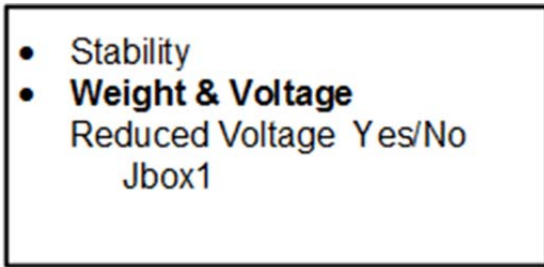
Use the down arrow to select the option.

NOTES   *The values entered in the Diagnostics Menu are for illustration purposes only. Your values will vary.*

To download the latest firmware version, see the HI 6600/Downloads page at:
http://www.hardysolutions.com/products/weighing-instruments/weight-processors/product/461/hi-6600-series

Parameters

Parameters are the first listed hyper- link at the base of the Diagnostics page. Click that link to display the Parameters page. Note the scroll bar on the right of the list.

The steps below explain how you can duplicate the configuration of one HI 6610 or HI 6600 to use in configuring another HI 6610 or HI 6600 for sending a copy of your parameters to hardysupport@hardysolutions.com

To copy the parameters:

1) Right click in the parameter list.

2) Click Select All.

3) Right click again.

4) Click Copy.

To paste the parameter configuration into the instrument you want to configure, or into a text file for storage:

1) Enter the IP address of that instrument into a Web browser to display its Home page.

2) Select Operation, then Diagnostics, then Parameters, as described above.

3) Right click in the Parameter list.

4) Click Select All.

5) Right click again in the Parameter List.

6) Click on Paste to replace the existing or default parameter settings with the parameters settings of the instrument you copied. Only the past setting from a text file will work---you can not paste from a word processing program.

7) Click the Save button. You now have an exact duplicate of the pre-configured instrument.

If you need to make any modifications to the parameter settings go to Chapter 4, Configuration, for more instructions.
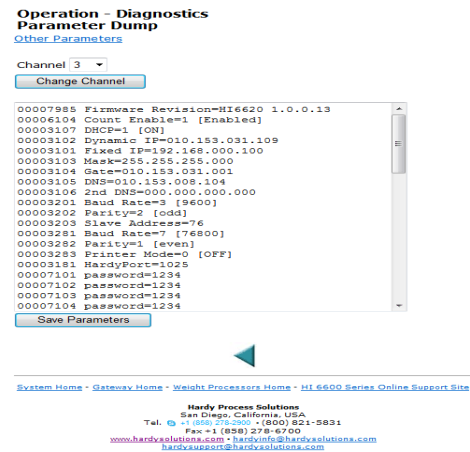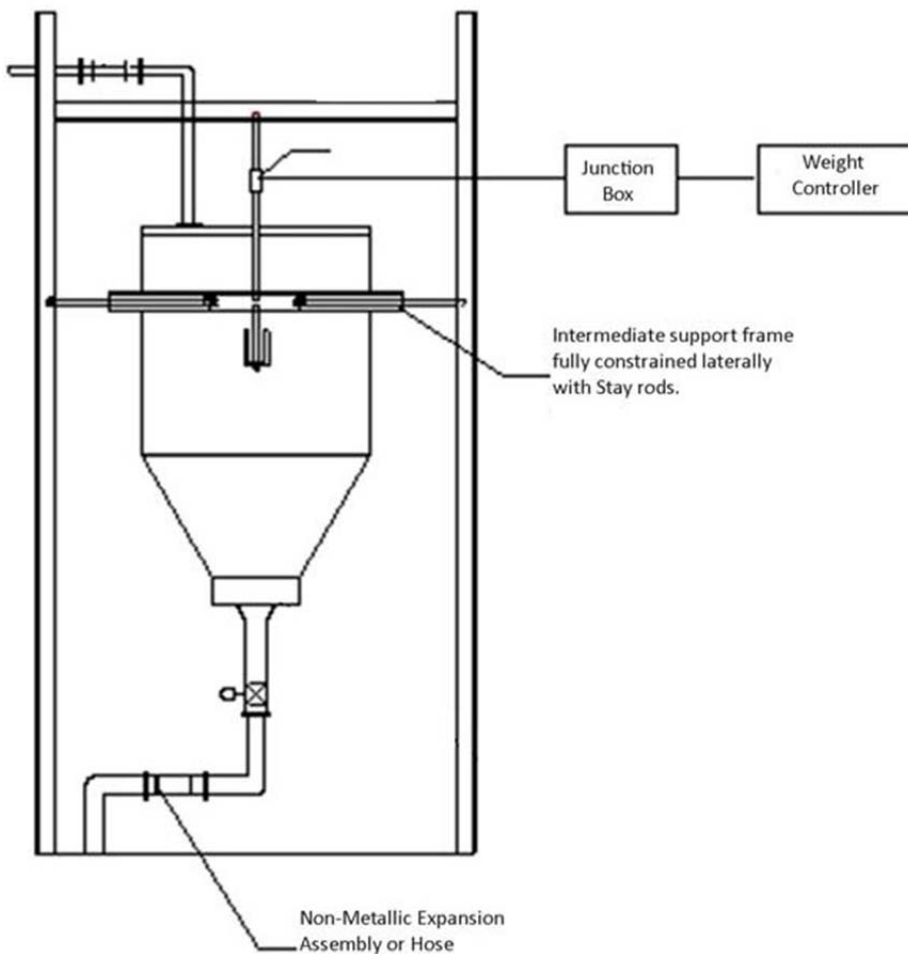
System and Load Cell Tests

Overview of Typical Load Cell System

The typical system consists of one or more load cells/points, a summing junction box, and an HI 6600 Weight Processor.

Load sensor - Used to measure pressure, weight, or torque, the sensor is a strain gauge- based force transducer that generates an electrical signal proportional to the load applied. This can be done using either tension or compression type load sensors. When the HI 6600 sends the load cell a 5-volt DC excitation signal that powers the load cell, the force transducer generates a millivolt output proportional to the load (0-10mv DC for 2mv/V load cells/ points or 0-15mv DC for 3mv/V load sensor).

Weight Processor - This is part of the HI 6600 that, among other functions, powers the load cell(s)/point(s), receives the millivolt signal output from the load cell(s)/point(s), and digitizes, interprets, communicates and displays the results.

Junction Box

Weight Controller

Intermediate support frame fully constrained laterally with Stay rods.

Non-Metallic Expansion Assembly or Hose

INTEGRATED TECHNICIAN

INTEGRATED TECHNICIAN® (IT) is an optional diagnostics utility that enables the operator to rapidly troubleshoot individual load cells. The option requires an HI 215IT or HI 6010IT Summing Box (shown above) that provides distinct inputs for each load cell.

Without the HI 215IT or HI 6010 Summing Box, it is difficult to isolate the signals from different load cells. If any load cell fails, the test will output a FAIL response without identifying the problem load cell. For numerical values, the system will return an average of all the load cell responses and, in some cases, will return values that cannot be used.

The HI 215IT or HI 6010 Summing Box with the IT firmware can provide the HI 6600 both average numerical values and values specific to each load cell, including PASS/FAIL values for each load cell, as shown below.

Integrated technician requires a Hardy IT JBOX

Jbox1Sensors 4 ▼

Sensor	weight	RTZ	mV/V	raw variation	raw result	waversaver variation	waversaver result
1	0.0 lb	Pass	0.0204	6.49	Pass	9.43	Pass
2	0.0 lb	Pass	0.0323	1.22	Pass	283.37	Fail
3	0.0 lb	Pass	0.0347	3.01	Pass	12.29	Pass
4	0.0 lb	Pass	0.0351	5.14	Pass	4.01	Pass
REF			0.4982	0.22	Pass	443161.84	Fail

[Do IT test]

To view this screen on your system, see Diagnostics The number of load sensor(s) is based on the connections in the IT junction box. Check the installation sequence in the box to determine which load sensor is number 1, 2 and so on. You can use the IT functions from either the Optional Front Panel or Web interface. If you do not have the optional IT junction box, some of the options described below will not appear on either interface.
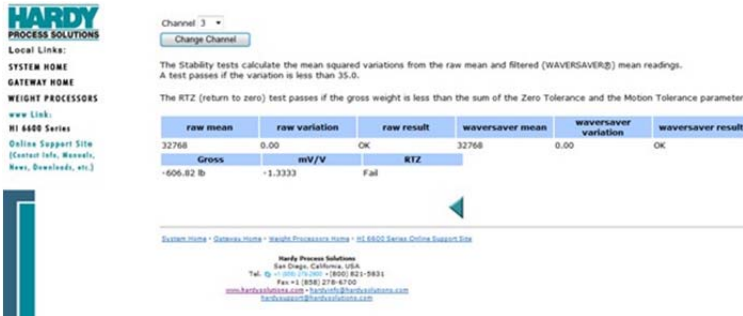
Stability Test

The Stability test lets you check the A/D Raw count and filtered. With the IT option, it tests and reports for each load cell. The test sends the load cell data to the analog-to-digital converter and calculates the mean squared variation from the average reading, using 100 samples. The test passes if the mean squared variation is less than 5.0.

If the weighing system passes the stability test, the results show OK and the variation and mean results are posted. FAIL indicates that the Mean Squared Variation is greater than 5.0 so the system is considered unstable. In that case, see the Troubleshooting Flow Charts Section.

WARNING - **DO NOT PERFORM THE STABILITY TEST DURING PRODUCTION. THE TEST ACTIVITIES CAN CAUSE INCORRECT READINGS.**

AVERTISSEMENT – Ne pas effectuer le test de stabilité lors de la production. Ces tests peuvent résulter à des lectures incorrectes.

Running the Stability Test from the Web Interface

A Stability Test column on the IT test results display (see picture above) shows PASS or FAIL for each load sensor. We obtained the data by running the IT test, as described above.

Stability test is in the Diagnostics menu. Select the Stability Test hyperlink and wait a few seconds.

The results will not be specific to each load sensor, as in the IT test. They will display an average reading and PASS/FAIL for the system as a whole. If equipped with an IT summing junction box there will be a selection to run the Weight and voltage test. That test will display the individual load cell and loop back test results.

Running the Stability Test from the Optional Front Panel

1) From the Diagnostic menu, select Stability Test with use the down arrow and press Enter. The HI 6600 runs the test and shows the results.

2) To see the AD/Raw Count and the A/D Filtered select them from the menu.

3) Press Exit to return to the Test Menu.

```
Stability:  Gross = 0.9lb
            RAW         Waversaver
Mean        32918       32993
Variation   0.17        0.00
Results     OK          OK
mV/V        0.0184
RTZ         Pass
```

Weight and Voltage Tests

The Weight and Voltage tests are used to diagnose a weighing system and, if certain types of problems are indicated, determine their source. It provides the total scale input to the instrument such as mV, mV/V and Weight in the units selected (i.e. lbs, kg, oz, g).

Weight and Voltage Test from the Web interface

Since the IT Web page shows all the weight and voltage values at once, it is the preferred method for troubleshooting. Click Integrated Technician to open the Diagnostics - Integrated Technician page.

To view individual load sensor data, click Do IT Test.

Integrated technician requires a Hardy IT JBOX

Jbox1Sensors 4 ▾

Sensor	weight	RTZ	mV/V	raw variation	raw result	waversaver variation	waversaver result
1	0.0 lb	Pass	0.0204	6.49	Pass	9.43	Pass
2	0.0 lb	Pass	0.0323	1.22	Pass	283.37	Fail
3	0.0 lb	Pass	0.0347	3.01	Pass	12.29	Pass
4	0.0 lb	Pass	0.0351	5.14	Pass	4.01	Pass
REF			0.4982	0.22	Pass	443161.84	Fail

Do IT test

These readings are snapshots and allow you to determine if the problem is in the instrument (internal) or in a load sensor(s) (external).

The specification range for the Weight Processor is 0-25 mV, so a reading between 0-25 mV is within the normal range. A reading outside this range would normally indicate that the problem is external to the system (most likely improper wiring).

If all the load sensor readings are 0.00, something is wrong between the HI 6600 and the junction or summing box box or with the summing or junction box itself. Either the cable is disconnected, or something is causing the junction box to not transmit the readings to the HI 6600.

If you do not get a reading for one or possibly two or more load sensors (Sensor 3 for example reads 0.00 or the reading is either larger or smaller than it should be) and you know that the Load Sensors are connected to the junction box, the individual load sensor cable is disconnected from the junction box or the load sensor is malfunctioning.

Running the IT test from the Optional Front Panel

The same information can be obtained from the Diagnostics menu. Select Enter to show the menu. Then select Jbox1 to run the test. To read the rest of the results, press the down arrow.

The screen shows the individual load sensors in dwell mode. Using the right+ left button, move from Sensor to Sensor. The pass/fail test requires 15-30 seconds to complete testing.

IT Dwell – Jbox1
RAW

Variation
mV/V
Weight
RTZ

```
                    Channel x (x/5)
             Waversaver  Results        OK
             OK
             0.45            0.00
             0.0219
             -0.378605
             PASS
```

Appendix A

Communications I/O Table

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I/O Tables for Communications to PLCs

The following I/O table description is common for the following communication protocol in the HI 6600 series:

- EtherNet/IP
- Profibus-DP
- Modbus-TCP
- Modbus-RTU (over 485)

For a full list of command parameters, please see Appendix B, Default Parameter IDs and Values under Communications Parameters.

	OUTPUT table	Bytes	INPUT table	Bytes
Common Header	Command	4	Command Echo	4
	Aux Comm and Information	4	Command Status	4
	Parameter ID	4	Parameter ID	4
	Parameter Value	4	Parameter Value	4
Module 1 Information	Selected WPM1 (M1)	4	M1 Status	4
	M1 reserved 1	4	M1 Net Weight	4
	M1 reserved 2	4	M1 Gross Weight	4
	M1 Parameter ID	4	M1 Parameter Value	4
Module 2 Information	Selected WPM2 (M2)	4	M2 Status	4
	M2 reserved 1	4	M2 Net Weight	4
	M2 reserved 2	4	M2 Gross Weight	4
	M2 Parameter ID	4	M2 Parameter Value	4
Module n Information	Selected WPM*n* (M*n*)	4	Mn Status	4
	Mn reserved 1	4	Mn Net Weight	4
	Mn reserved 2	4	Mn gross Weight	4
	Mn Parameter ID	4	Mn Parameter Value	4

OUTPUT Table Description

Portion of the OUTPUT table used for the Hardy Gateway Module (HGM)

The first four variables in the output table, **Command, Aux Command Information, Parameter ID**, and **Parameter Value**, are used to send commands either the Hardy Gateway Module (HGM) or to a specific Weight Processing Module, to write new parameter values, read existing parameter values, or read data values such as COUNT, or ROC, etc.

The **Command** is a 32 bit value, with the top 8 bits indicating the channel (WPM) number, the next 8 bits are reserved, and the bottom 16 bits are used for the command string as shown below.

Bits [31] to[24]	Bits [23] to [16]	Bits [15] to[0]
Channel Number	Reserved	Command

The 32-bit **Aux Command** Information is used for specific information required for special commands.
To select which parameter is being read or written set the predefined number into the Parameter ID; if the value is being read then the Parameter Value is ignored, or set to the required value if the value is being written.

Portion of the OUTPUT table used for Weigh Processing Modules (WPMs)

The remaining bytes in the output table are in multiples of 16 bytes, representing 4 variables, for each WPM in the HI6600 system.

The first variable Module Reference x is used to select which WPM, (where x = 0 to N) the output table section is targeting, the next two values Mx Reserved 1 and Mx Reserved 2 are used as padding so the user selectable read only parameters are aligned between the output and input tables.

The next value Mx **Parameter ID** is a user selectable parameter ID values which can be used to return read only values from the selected WPM. These read only values can be anything from an WPM specific measurement such as COUNT to a parameter value such as WAVERSAVER.

INPUT Table Description

Portion of the INPUT table used for the Hardy Gateway Module (HGM)

The first four variables in the input table, **Command Echo**, **Command & Gateway Status**, **Parameter ID**, **and Parameter Value**, closely match the first four variables in the output table.
The **Command Echo** is used to echo the command from the output table, to enable the PAC or PLC to ensure that the correct command has been executed; and also that command has been completed and the command status value is valid.

The response of the HGM or WPM to the generic command value or the read only parameter command value is provided in the **Command and Gateway Status** value. The bottom 16 bits are used for the **Command status**, and verifies if the command was executed with the expected result; and the top 16 bits are used for the **Gateway Status.**

Command Status	Definition
Bits[31:30]	2 bit Input table count
Bits[29:126]	14 bit Gateway status information
Bits[15:0]	Status of Command

The 16-bit value, **Gateway Status**, provides two pieces of information, the bottom 14-bits provide the current state of all the major functions within the Hardy Gateway Module (HGM) and the top 2 bits of the 16-bit value, are a cyclic "IO table count", which will increment by a count of one every time a new "input table" is generated, following a 0, 1, 2, 3 then repeat cycle. If the input table count value remains the same in two consecutive reads from the HGM then the communication or the measurement function has failed and the appropriate action needs to be taken. The bottom 14-bits reflect the status of all the major functions in the HGM and should be used in conjunction with the "measurement update count", and the individual status for each WPM, to determine the health of the HI6600 system.

The **Parameter ID**; is an echo of the value sent in the output table, while the **Parameter Value** is the value for the specified **Parameter ID**.

Portion of the INPUT table used for Weigh Processing Modules (WPMs)

A 32-bit value, **Module Status**, provides the current state of all the major functions within the selected Weight Processing Module (WPM). The top 5 bits provide the module number selected in the output table, and the next 3 bits are a simple cyclic "measurement update count", which will increment by a count of one every time a new measurement value is taken, following a 0 to 7 then repeat cycle. If this value remains the same in two consecutive reads from the WPM then the communication or the measurement function has failed and the appropriate action needs to be taken.

Bits [31:27]	Bits [26:24]	Bits [23:0]
Selected WPM	Measurement Update Count	Instrument Functional Status Bits

The bottom 24-bits reflect the status of all the major functions and should be used in conjunction with the "measurement update count" to determine the health of the WPM.

Status Word bit   0 (0x0001): ADC Error
Status Word bit   1 (0x0002): WPM channel not enabled
Status Word bit   3 (0x0008): reserved
Status Word bit   5 (0x0020): Firmware does not match board ID
Status Word bit   6 (0x0040): In motion
Status Word bit   8 (0x0100): Missing sample value
Status Word bit   9 (0x0200): reserved
Status Word bit 10 (0x0400): Failed to save to nonvolatile memory
Status Word bit 11 (0x0800): Module update in progress
Status Word bit 12 (0x1000): Failed to update module firmware
Status Word bit 13 (0x2000): Saving to nonvolatile memory
Status Word bit 14 (0x4000): IT test in progress
Status Word bit 15 (0x8000): Parameter ID not found
Status Word bits [23:16]: reserved

The **Net** and **Gross** Weight values are always provided, in the next two variables
The final value for the selected WPM is the **Parameter RD Value**, which is the read only value for the user selectable parameter ID value set in the output table. If a 0x0000 is placed in the **Parameter RDx ID** value, or the requested parameter does not exist a 0x0000 value will be returned.

Hardy Command Numbers

Here is a list of Hardy command numbers:

Command	Command
0	Read Parameter
1	Zero Cmd
2	Tare Cmd
4	Write Non-Volatile
5	Cmd (Reserved)
6	Weigh Sample Cmd
0x64 (100	Cal Low Cmd
0x65 (101	Cal High Cmd
0x66 (102	C2 Cal Cmd
0x1000 (4096	Write Integer Cmd
0x1001 (4097	Write Float Cmd

- **0: READ PARAM CMD**. To read a parameter, write a #0 to the command register (register #0), and write the parameter number in the parameter ID number in registers 2 and 3, most significant word first. The parameter value may then be read from registers 4 and 5, again most significant word first. This value may be in integer or floating point format, depending on the parameter. The status register in the reply will contain the lower 16 bits of the system status word.
    - Status word bit 0: A/D error
    - Status word bit 6 (0x40): Motion status.
    - Status word bit 15 (0x8000): Not Found - the requested parameter number does not exist

- **1: ZERO CMD**. Write a #1 to the command register to ZERO the gross weight. The status register will read 0 if this command succeeds.
    - Status Error code 1 (motion)
    - Status Error code 2 (A/D error)
    - Status Error code 3 (out of tolerance)

- **2: TARE CMD.** Write a #2 to the command register to ZERO the net weight. The status register will read 0 if this command succeeds:
    - Status Error code 1 (motion)
    - Status Error code 2 (A/D error)

- **4: WRITE NONVOL CMD**. Write a #4 to the command register to save parameters in non-volatile memory.
    - No Error Codes

- **5: CMD**: Reserved
    - No Error Codes

- **6: WEIGHT SAMPLE CMD:** Write a #6 to the command register to run the Weigh Sample command to set up the calibration of the Counts (if enabled).
    - Status Error code 1 (motion)
    - Status error code 2 (A/D error)

- **0x64 (100 decimal): CAL LOW CMD**. Write a 0x64 hex to the command register to perform the low step of a traditional calibration. The status register will read 0 if this command succeeds:
  - o Calibration_Fail 1
  - o Calibration_Fail_Motion 3
  - o Calibration_Fail_Adc_Error 4
- **0x65 (101 decimal): CAL HIGH CMD**. Write a 0x65 hex to the command register to perform the high step of a traditional calibration.
  - o Calibration_Fail 1
  - o Calibration_Fail_Motion 3
  - o Calibration_Fail_Adc_Error 4
  - o HardcalFailCounts 8: not enough counts between hard cal hi and hard cal lo
- **0x66 (102 decimal): C2 CAL CMD**. Write a 0x66 hex to the command register to perform a C2 calibration.
  - o Calibration_Fail 1
  - o Calibration_Fail_Motion 3
  - o Calibration_Fail_Adc_Error 4
  - o Calibration_Fail_Noc2 5
  - o Calibration_Fail_C2capeq 6
  - o Calibration_Fail_C2clones 7
- **0x1000 (4096 decimal): WRITE INTEGER CMD.** Set the value of an integer parameter. Write 0x1000 in the command register 0, the parameter ID number in registers 2, 3 and the desired value in registers 4, 5.
  - o No Error Codes

- **0x1001 (4097 decimal): WRITE FLOAT CMD.** Set the value of a floating point parameter. Write 0x1001 in the command register 0, the parameter ID number in registers 2, 3 and the desired float value in registers 4, 5.
  - • Failure 1
  - • TooHigh -1 : value is above legal limit
  - • TooLow -2 : value is below legal limit
  - • ErrorNotFound 0x8000 : parameter id not found

Appendix B

Default Parameter IDs and Values

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Default Parameters and Values Table

Below is a list of parameters, their ID numbers and their defaults for reference.

Menu	SubMenu	Parameter Name	Param ID	R/W	defaults (value)
Calibration	(menu items)	Loadcell Sensitivity	0x4081	r/w	4 (3.0 mV/V)
Calibration	(menu items)	Cal Motion Tolerance	0x4082	r/w	10.00
Calibration	C2Cal	Ref Weight	0x4101	r/w	0.00
Calibration	C2Cal	Gravity Correction	0x4102	r/w	1.00
Calibration	C2Cal	Num Devices	0x4103	r	n/a
Calibration	HardCal	Cal Low Weight	0x4181	r/w	0.00
Calibration	HardCal	Span Weight	0x4182	r/w	1000.00

Menu	SubMenu	Parameter Name	Param ID	R/W	defaults (value)
Communication	EthernetTCP	Enable DHCP	0x3107	r/w	0 (off)
Communication	EthernetUDP	Hardy Port	0x3181	r/w	1024
Communication	ModbusRTU	MODBUS Baud Rate	0x3201	r/w	3 (9600)
Communication	ModbusRTU	MODBUS Parity	0x3202	r/w	1 (even)
Communication	ModbusRTU	MODBUS Slave Address	0x3203	r/w	3
Communication	Scoreboard	Scorebaord Baud Rate	0x3281	r/w	3 (9600)
Communication	Scoreboard	Scoreboard Parity	0x3282	r/w	0 (none)
Communication	Scoreboard	Scoreboard Mode	0x3283	r/w	1 (Gross weight)

Menu	SubMenu	Parameter Name	Param ID	R/W	defaults (value)
Display	(menu items)	Display Mode	0x8083	r/w	0 (gross)
Display	(menu items)	Display Auto Mode	0x8084	r/w	0 (disabled)

Menu	SubMenu	Parameter Name	Param ID	R/W	defaults (value)
Filter	(menu items)	WAVERSAVER	0x2081	r/w	3 (1.0 Hz)
Filter	(menu items)	Num Averages	0x2082	r/w	10

Menu	SubMenu	Parameter Name	Param ID	R/W	defaults (value)
Language	(menu items)	Language	0x5881	r/w	1 (English)

Menu	SubMenu	Parameter Name	Param ID	R/W	defaults (value)
Operations	(menu items)	Gross Weight	0x6081	r	n/a
Operations	(menu items)	Net Weight	0x6082	r	n/a
Operations	PieceCount	Unit Count	0x6101	r	n/a
Operations	PieceCount	Unit Weight	0x6102	r/w	1.00
Operations	PieceCount	Sample Size	0x6103	r/w	1
Operations	PieceCount	Count Enable	0x6104	r/w	0 (disabled)
Operations	TareOperations	Tare Offset	0x6182	r/w	0.00
Operations	TareOperations	Tare Amount	0x6183	r/w	0.00

Menu	SubMenu	Parameter Name	Param ID	R/W	defaults (value)
Security	Display	Calibration Lock Enable	0x7106	r/w	0 (disabled)
Security	Display	Configuration Lcok Enable	0x7107	r/w	0 (disabled)
Security	Display	Display Lock Enable	0x7108	r/w	0 (disabled)
Security	Display	Keypad Lock Enable	0x7109	r/w	0 (disabled)
Security	Display	Read Only Lock Enable	0x710A	r/w	0 (disabled)

Menu	SubMenu	Parameter Name	Param ID	R/W	defaults (value)
Setup	(menu items)	Unit	0x2881	r/w	1 (lb)
Setup	(menu items)	Decimal Point	0x2882	r/w	0 (0)
Setup	(menu items)	Grads	0x2883	r/w	0 (1)
Setup	(menu items)	Zero Tolerance	0x2886	r/w	4.00
Setup	(menu items)	Motion Tolerance	0x2887	r/w	10.00
Setup	(menu items)	Scale Capacity	0x2888	r/w	1000.00
Setup	(menu items)	NumChannels	0x288C	r/w	n/a

Appendix C

Drawings & Templates

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II Diagrams

NOTE   *Full size II Diagrams are available on the Hardy Process Solutions website under products, Weight Processors, HI 6600. Select the Docs & Programs tab to locate and download the drawings you desire.*

The following pages show II diagrams for the Hardy Gateway Module and the Weight Processing module.
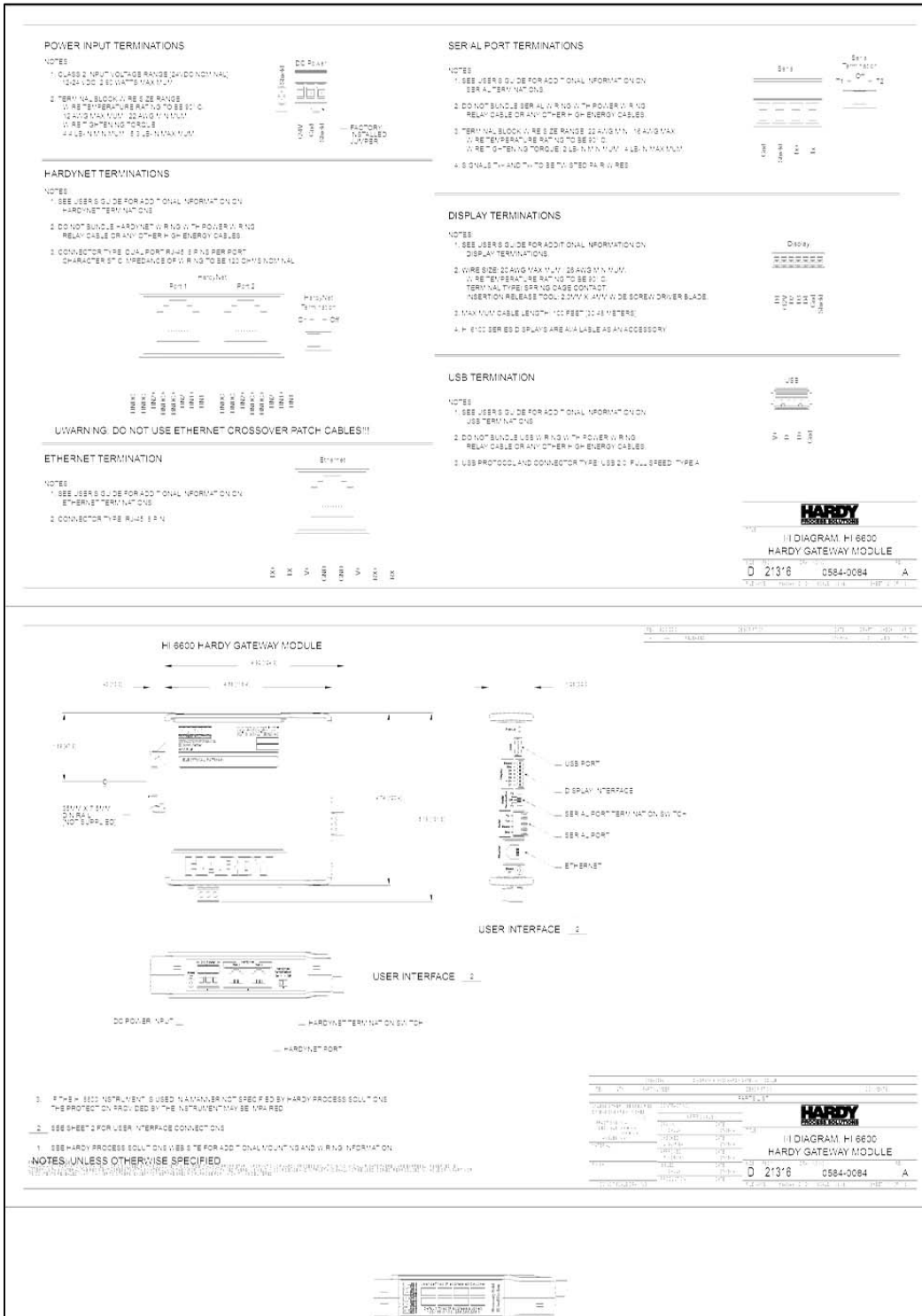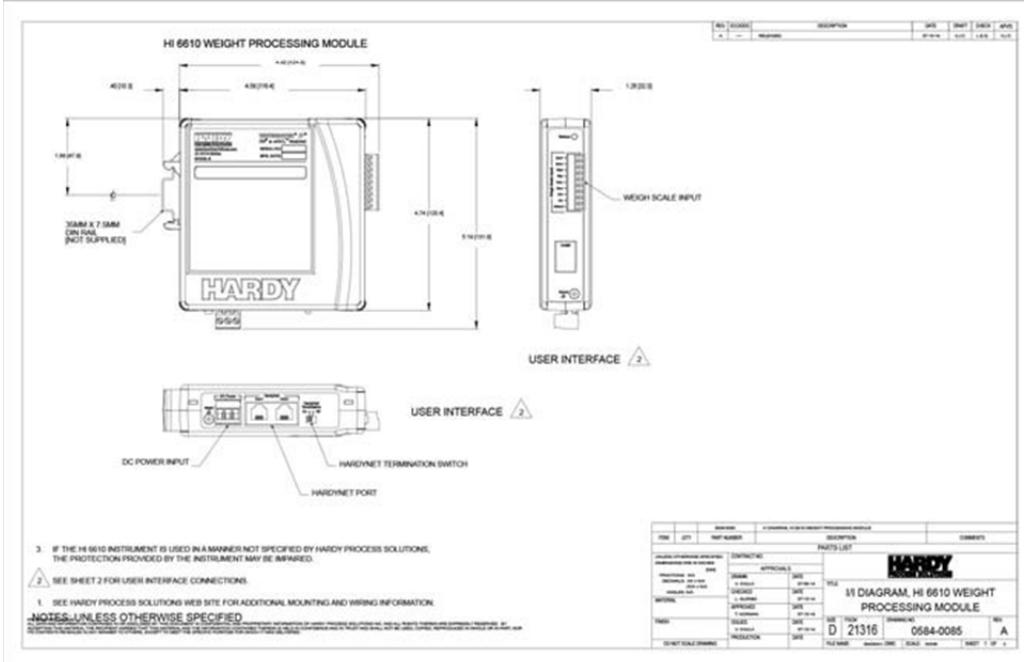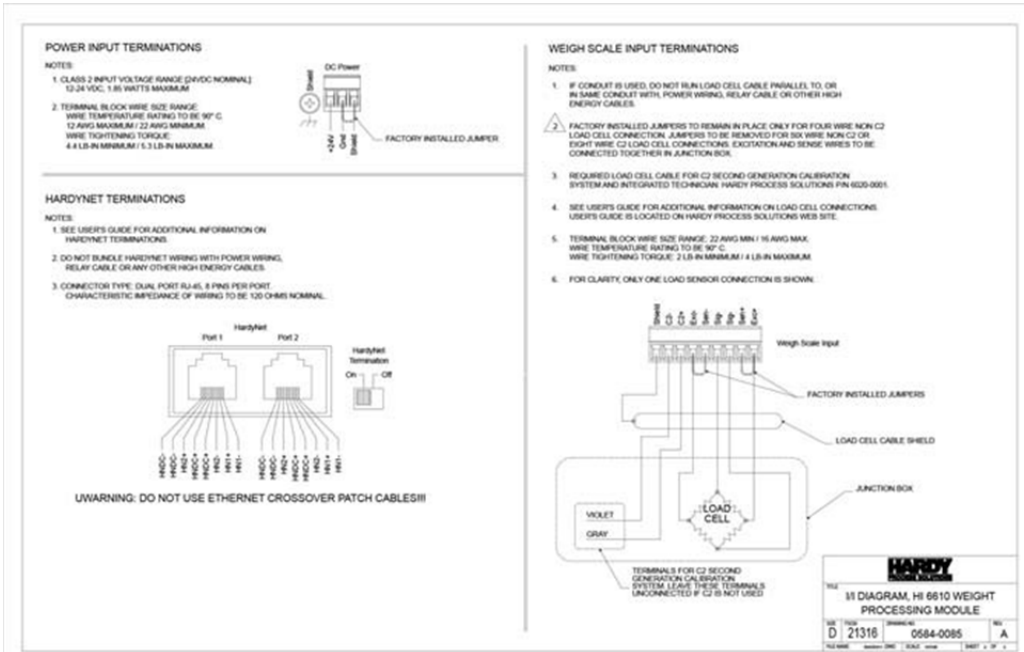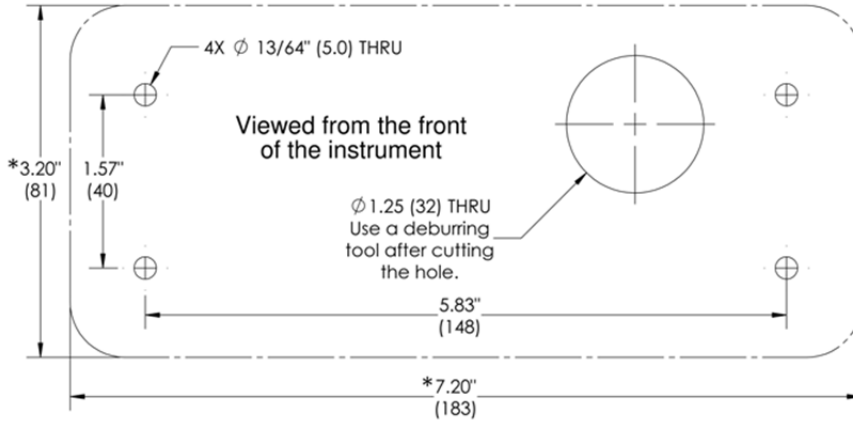
Image of HI 6600 Hardy Gateway Module II Diagram

Image of HI 6610 Weight Processing Module II Diagram

Optional HI 6110 Display Panel Mounting Template

4X Ø 13/64" (5.0) THRU

Viewed from the front
of the instrument

*3.20"
(81)

1.57"
(40)

Ø1.25 (32) THRU
Use a deburring
tool after cutting
the hole.

5.83"
(148)

*7.20"
(183)

* NOTE: Verify the dimensional accuracy of any paper template before use.
To print this template, the setting for the Page Scaling must be set to NONE.

4X Ø13/64" (5.0) THRU

Viewed from the back
of the instrument

Ø1.25" (32) THRU
Use a deburring tool
after cutting the hole.
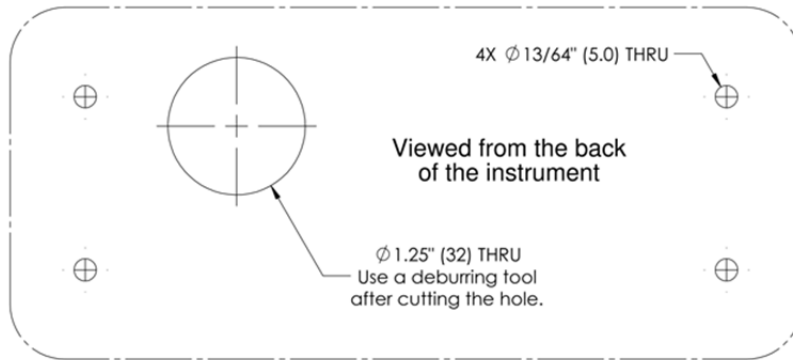
0578-0072-01 REV A

Appendix D

Spare Parts

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Spare Parts Table

| Part Reference	Description	Quantity
HI 6610 Weight Processing Module		
2140-0092-0	J1, 3-pin Power Connector	1
2140-0139-09-0	2, 9-pin Load Cell Connector	1
6032-0082-0	Cable Assy, Ethernet Patch, Cat 5E, Black (one per weight module)	1
HI 6600 Hardy Gateway Module		
2140-0092-0	J1, 3-pin Power Connector	1
2140-0139-9	J3, 9 pin Serial Connector	1
6032-0082-0	Cable Assy, Ethernet Patch, Cat 5E, Black (one per weight module)	1
Optional Display		
HI 6110	Monochrome Display	1
2140-0139-XXX	JX, 7 pin Optional Display assembly	1
0509-0536-10-0	10 ft Display Cable	1

Appendix E

Wiring Junction Boxes or Summing Cards

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Connecting to Hardy Junction Boxes or Summing Cards

To connect more than one load cell to a Hardy HI 6610 WPM module, you will need a summing card or junction box to aggregate the signals to provide a singular weight reading. While a platform, bench or floor scale has a built in summing card to perform this function, load cells need an external Summing Card or Junction Box.
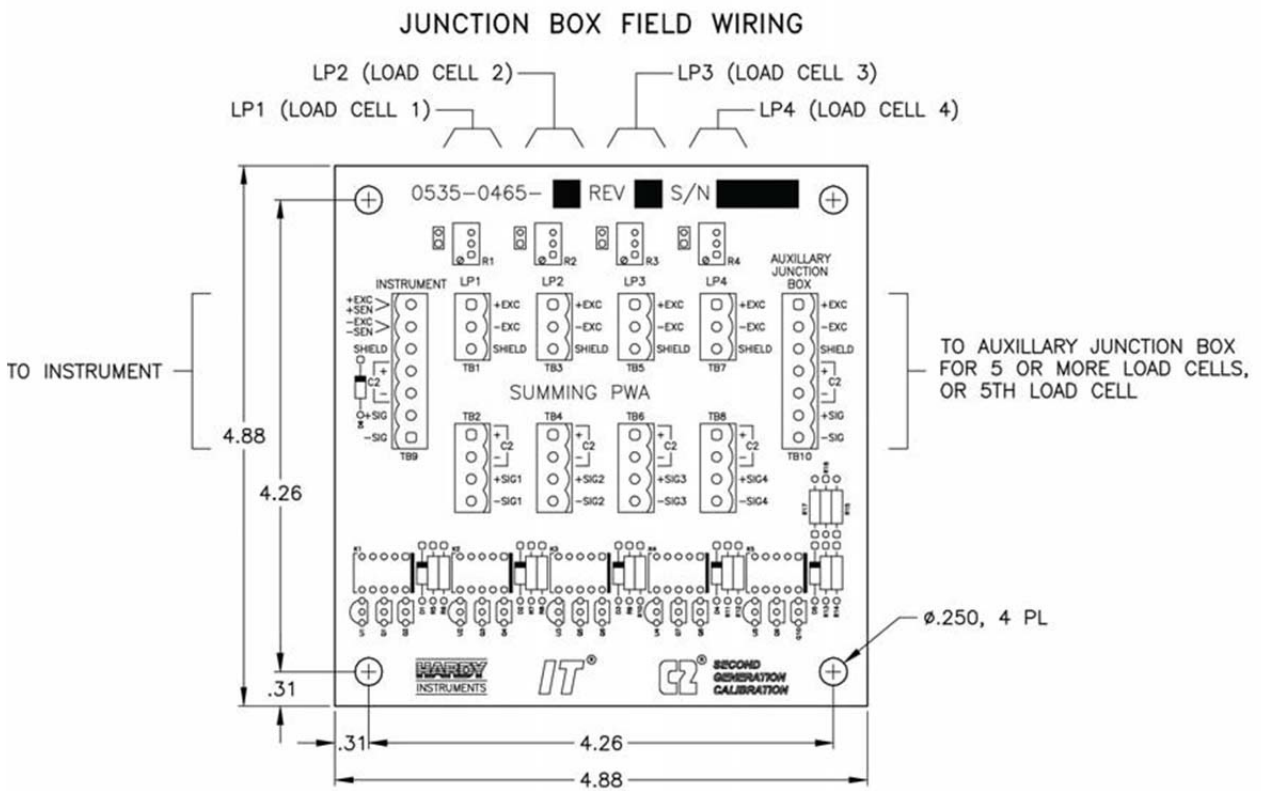

Junction Box Wiring Diagram

NOTE   *When connecting two IT Junction Boxes together to connect 8 load points, you must run an external 5 Volt DC power supply if you will run C2 cabling a long distance. You cannot use a higher voltage power supply due to over voltage damage to your Hardy controller. For more information, visit the Hardy Knowledgebase and search under external excitation voltage.*

Excitation monitor is the current draw on the excitation voltage from the weight controller. When using an external power supply the excitation monitor will not function properly. The internal excitation voltage is not being used, therefore no current draw, and the excitation monitor will improperly report a failure

HI 6010 Summing Box Diagram
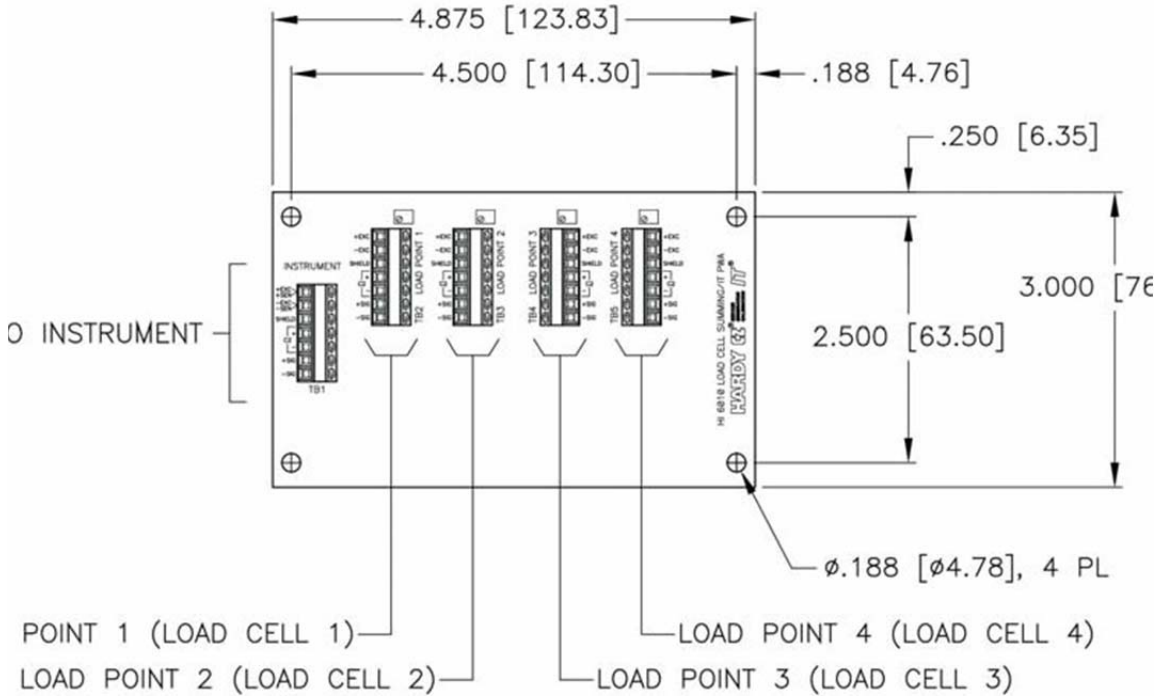
NOTE   *When connecting a Hardy Summing Box to a HI 6610 WPM you must remove the two factory installed jumpers on pins 1 & 2 and on pins 5 & 6 on the module and install C2 and sense wires. C2 wires carry the commands for Integrated Technician and the C2 calibration information.*

At Hardy, we believe that industrial weighing solutions should be EASY to engineer and operate.
We believe that simplicity delivers the LOWEST TOTAL COST to own.
That's why our solutions are EASIER to install, integrate, commission, diagnose and maintain.

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