



## Weight Processor

### HI 6500 Series

#### User's Guide

Hardy Process Solutions Document Number: 0596-0331-01 REV F



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# Chapter 1

## HI 6500 Overview & Set-Up Wizard



### General Introduction to the HI 6500 Series Weight Processor

This Manual describes installation, setup and troubleshooting procedures for the HI 6500 and HI 6500-XP Extreme Processor Series Weight Processors. Be sure to read and understand all cautions, warnings, and safety procedures in this manual to ensure safe operation and repair of this 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](mailto:hardysupport@hardysolutions.com) or [hardyinfo@hardysolutions.com](mailto:hardyinfo@hardysolutions.com)

Or visit our web site at:

<http://www.hardysolutions.com>

Our web site provides information about our products and process weighing applications. You can also update the HI 6500 User Guide. The latest revised manuals are always available FREE in the product selection pull down menu on our Web Site. Other pages on the site provide answers to questions about weighing instruments, PLC plug in modules, load points, summing boxes, process weighing or other Hardy Process Solutions products. Be sure to 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, check the Hardy WebTech on our Hardy Web Site. Most problems can be resolved by the Hardy WebTech, 365 days a year, 24 hours a day 7 days a week. You can still contact a technician by phone during our normal operating hours (6:30 AM to 5:30 PM Pacific Time) if necessary.

### HI 6500 Series Weight Processor Description

The HI 6500 series of single-channel weight processing instruments with an optional big, bright multi-channel display is suitable for PLC, PAC, DCS or PC-based control systems or stand-alone weighing applications. The primary function of the HI 6500



series is to provide stable gross or net weight in a variety of units such as oz, lb, ton, gm, kg and mt. It also provides a piece count mode.

The HI 6500 series can be used with or without a display. The display is a bright 4.3” high-contrast LCD capable of high-resolution graphics and discrete messaging. The unit can be panel mounted, DIN mounted, and remote display mounted. The thin enclosure and low power consumption allows for high density control cabinet design.

The HI 6500-XP Extreme Processor series offers higher speed, operating at 660 updates per second, which makes it ideal for filling, loss of weight and checkweighing applications. It also offers Waversaver+ adaptive filtering mechanism to provide highly stable weight readings.

### **Typical Applications**

The HI 6500 series serves a variety of industrial weighing applications found in batching, blending, filling, dispensing, inventory management, level by weight and check by weight verification.

## **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 6500 includes the following Toolbox functions.

### **C2<sup>®</sup> and eCal<sup>™</sup> Calibration**

Traditional calibration uses certified test weights. C2<sup>®</sup> (or eCAL<sup>™</sup> 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 eight load cell sensors per channel, a two junction boxes, interconnect cable, and an instrument with C2 capabilities (e.g., the HI 6500 series instrument). Each Hardy Process Solutions C2-certified load sensor outputs digital information used for calculating the calibration. When the HI 6500 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 6500 features INTEGRATED TECHNICIAN® (IT), a system diagnostics program that makes it possible to diagnose weighing system problems from the instrument's front panel or over the available networks. 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 6500, 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.

WAVERSAVER can factor out noise with frequencies as low as 0.25 Hz or as high as 7.5 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.

**WAVERSAVER® +** (HI 6500-XP and HI 6510-XP only)

WAVERSAVER+ is a superset of WAVERSAVER for the XP Extreme Processor series that uses two additional parameters, **Variation Threshold** and **Motion Threshold**, to configure an adaptive filtering algorithm, which significantly improves the stability and accuracy of the weight reading.

## Weighing System Tests

These tests are used to diagnose drifting or unstable weight reading problems. It requires a Hardy IT Junction Box for full utilization, for example the HI 215IT or the HI 6010IT. The ability to read the weight seen by the individual load sensors allows you to use this test for making cornering, leveling and load sharing adjustments to the weighing system.

INTEGRATED TECHNICIAN provides the following problem detection support:

- 1. Integrated Technician Weight and Voltage Test:** Reads the weight of each load sensor in the system to see if the load sensor might be causing the problem.
- 2. Integrated Technician Stability Test:** Disconnects the load sensors and engages an internal (in the junction box) reference signal to see if the Junction box, the cable between the instrument and the Junction Box, or the instrument is causing the problem.
- 3. Integrated Technician Return to Zero Test:** Measures and stores the mV out of each Hardy load cell during a C2 calibration when zero is used as the reference. Later when the test is run it measures and compares the voltage with zero weight out from each load cell to the stored value and indicates either a pass or fail. This test insures the integrity of the weighing system.



**NOTE**

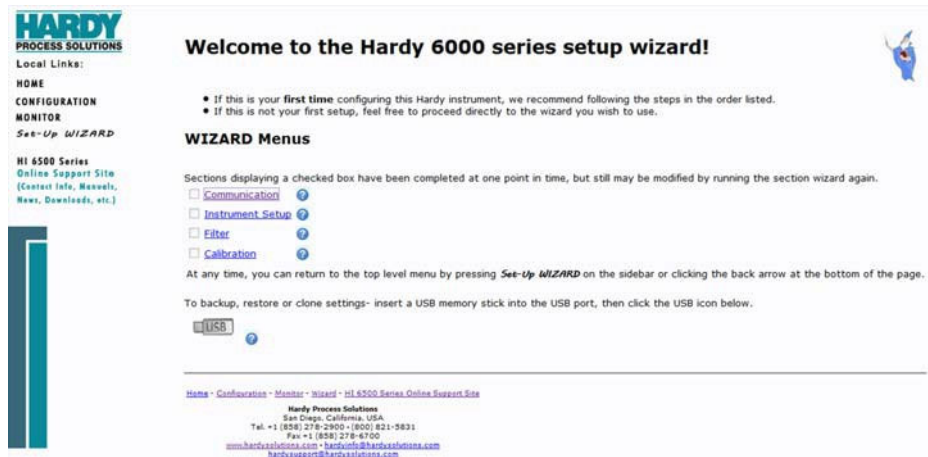
*C2, INTEGRATED TECHNICIAN and WAVERSAVER are registered trademarks of Hardy Process Solutions.*

## Using the Set-Up Wizard

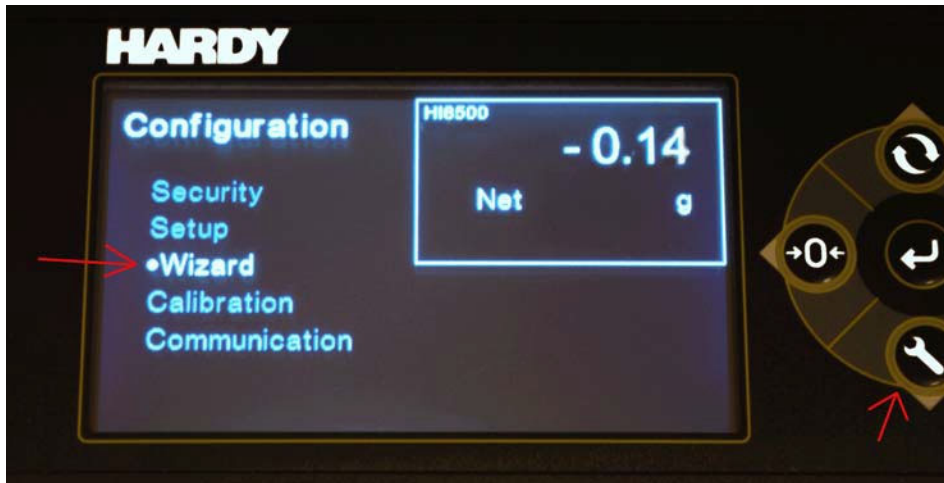
The Set-up Wizard is designed to guide you through the basic steps of setting up an HI 6500 instrument for the first time or to easily make changes to an instrument after the initial set-up is complete. The Wizard can be launched both through the Webserver and the front panel display (see illustrations below).

**NOTE**

*To set up advanced features such as instrument security settings; please refer to later chapters in this User's Guide.*



The Wizard can be launched at any the time from the Webserver by clicking the link located in the side-bar menu or from the front panel display by selecting the Wizard option located in the Configuration menu.



The front panel display will launch the Wizard automatically the first time the instrument is powered up.



To re-launch the front panel display Wizard the next time the instrument is powered up:

- Select "Later" in the initial Welcomescreen
- Or set 'Startup' found in the Wizard sub-menu to "ON"

The Wizard is segmented into logical steps of an instrument set-up process:

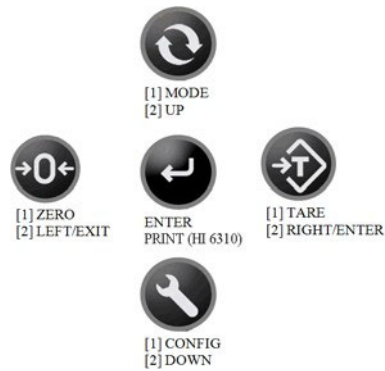
- Communication
- Setup
- Filter
- Calibration

Hardy recommends setting up each section in the order listed above. Steps within each a section may be skipped if a particular setting is not used or needed for the application (for example, Printer Communications or Operator ID).





Help text can be accessed at any time while using the Wizard by either clicking the question mark located next to the command on the Web browser or by pressing the set-up button/down arrow on the Front Panel Display.



For further explanation on the Front Panel Display keypad functions, see Chapter 5 Using the Front Panel Display Menus to Set Parameters.



# Chapter 2

## Specifications



Chapter 2 provides specifications for HI 6500 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

#### General

##### Number of Channels

- 1 Channel per unit

##### Update Rate

- **HI 6500 and HI 6510:** 110 times per second (processed weight, display, communications)
- **HI 6500-XP and HI 6510-XP:** 660 times per second (processed weight, display, communications)
- Unprocessed weight (A/D conversion) 4800 times per second

##### Resolution

- **HI 6500 and HI 6510:** Displayed - 1:10,000
- **HI 6500-XP and HI 6510-XP:** Displayed 1:30,000
- Addressable resolution - 1:999,999

##### WAVERSAVER

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

##### WAVERSAVER®+ (HI 6500-XP and HI 6510-XP Only)

- Patent pending dynamic filtering improves static weight readings by a factor of 3X

##### Averages

- 1 to 255 User-selectable in Single Increments

##### Power

- 24 VDC Nominal

- 5 Watts nominal with display
- 7 watts maximum with two IT junction boxes and 8 load cells

### **Input**

- Up to eight 350-ohm full Wheatstone bridge, strain gauge load sensor/cells (5 volt excitation) can be connected to the weigh scale input (Note: Connecting 8 load cells requires two summing cards with a J10 connector to jumper to the next board)

### **Non-linearity**

- 0.0015% of full scale

### **Common Mode Rejection**

- 110dB at or below 60 Hz

### **Common Mode Voltage Range**

- 2.5 VDC maximum (with respect to earth ground)

### **Front Panel (optional)**

- 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

### **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

### **Cable Lengths**

- 250 feet maximum of C2 authorized cable (Maximum of 8 load sensors) with two Summing Cards or IT Junction boxes with jumpers)

### **Printer Port**

- RS232

### **USB Port**

- For Parameter Saving and Backup to PC (Not available with the Swivel Mount Enclosure Option)

## **Network Connectivity**

- EtherNet/IP (-EIP models)
- Profibus-DP (-PB models)
- Ethernet UDP
- Ethernet TCP/IP (Embedded Webserver)
- Modbus RTU





# Chapter 3

## HI 6500 Installation



Chapter 3 covers unpacking, cabling, interconnecting, configuring, and installing the HI 6500 series of instruments. User and service personnel should read this chapter before installing or operating the weighing functions of the instrument.

**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**

**NOTE** *For wire and torque specifications, please review to refer to I/I Diagrams 0584-0082 (6500) and 0584-0083 (6510) on the HI 6500 page on the [www.hardysolutions.com](http://www.hardysolutions.com) website under the Docs & Downloads tab.*

**NOTE** *If you have already completed hardware installation, you may use the Setup Wizard for basic instrument parameters. Please review Chapter 1, pages 3-6. Otherwise proceed with this chapter.*

### Unpacking

- Step 1. Before signing the packing slip, inspect the packing for damage, and report damage of any kind to the carrier company.
- Step 2. Check to see that everything in the package matches the bill of lading.

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

**Hardy Process Solutions**

10075 Mesa Rim Roadive

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](mailto:hardysupport@hardysolutions.com)

Step 4. Record the model number and serial number of the HI 6500 series instrument. Store them in a convenient, secure location for reference when contacting Hardy Customer Service Department or to buy parts or firmware upgrades.

## Spare Parts List

Part Reference	Description	Quantity
HI 6110	HI 6500 Series Instrument Display (Optional)	1
0551-0653-03-0	HI 6500 Mounting Accessory Kit (optional)	1
0551-0653-04-0	HI 6510 Mounting Accessory Kit (optional)	1
0578-0072-01	Paper Mounting Template	1
0524-0034-01-0	Mounting Gasket	1
2140-0092-0	J1, 3-pin Power Connector	1
2140-0139-09-0	J2, 9-pin Load Cell Connector	1
2140-0139-06-0	J3, 6-pin Serial Port Connector	1
2140-0139-03-0	J4, 3-pin 4-20mA Connector	1
0509-0536-30-0	30 ft. Display Interface Cable	1
0509-0534-01-0	Cable Assy: Four Instruments Connector to One Display Panel	1

## Tool List

To install the HI 6500 series the following tools will be required.

- Drill with 5mm drill bit
- Jewelers screw driver (if cable assemble needs to be modified)
- 4mm nut driver with a maximum outside dimension of 8mm
- 10-50 mm Unibit (for optional display installation)

## Installing the HI 6500 Series Instrument

Before getting started, take the following precautions:

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

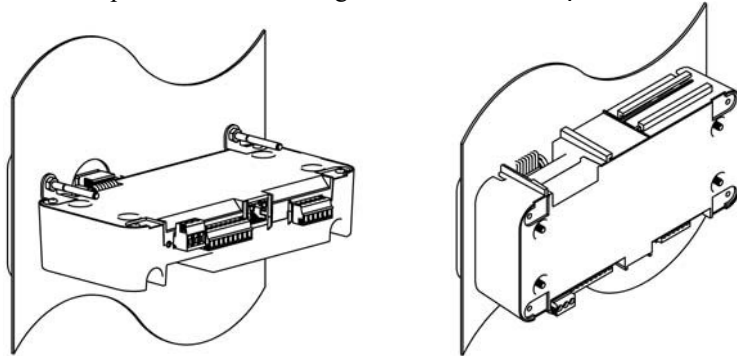
**WARNING AVERTISSEMENT – *Les décharges électrostatiques peuvent endommager les composants semi-conducteurs dans le module. NE TOUCHEZ PAS les broches du connecteur.***

- Wear an approved wrist-strap grounding device when handling the instrument.
- Touch a grounded object or surface to rid yourself of any electrostatic discharge 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.

## Installation options for the HI 6500 series instrument

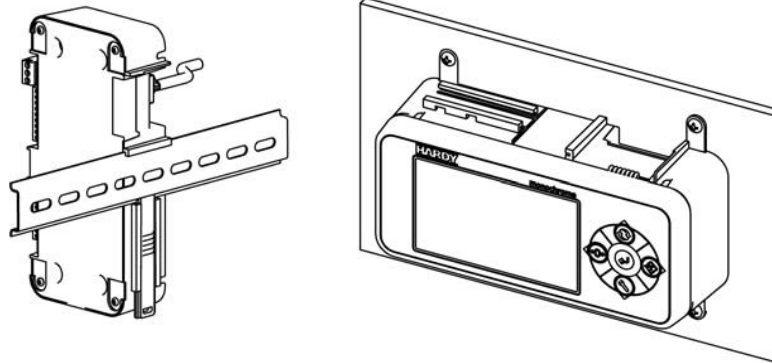
The HI 6500 series instrument can be mounted in four different configurations. There are two panel mount options, one DIN rail mount option, and a wall mount option.

Panel Mount Option 1 with mounting kit    Panel Mount Option 2



DIN Rail Mount

Wall Mount with mounting kit



**Panel Mount Option 1 and Wall Mounts require additional hardware, which is available in the Panel Mount Option 1 and Wall Mount kit sold separately (Part# 0551-0653-03-0 HI 6500 Mounting Accessory Kit or 0551-0653-04-0 HI 6510 Mounting Accessory Kit).**

The following sections provide details on how to mount the front panel display on a panel door or cover and how to install and connect the front panel to the HI 6500 series instrument for each of these four configurations.

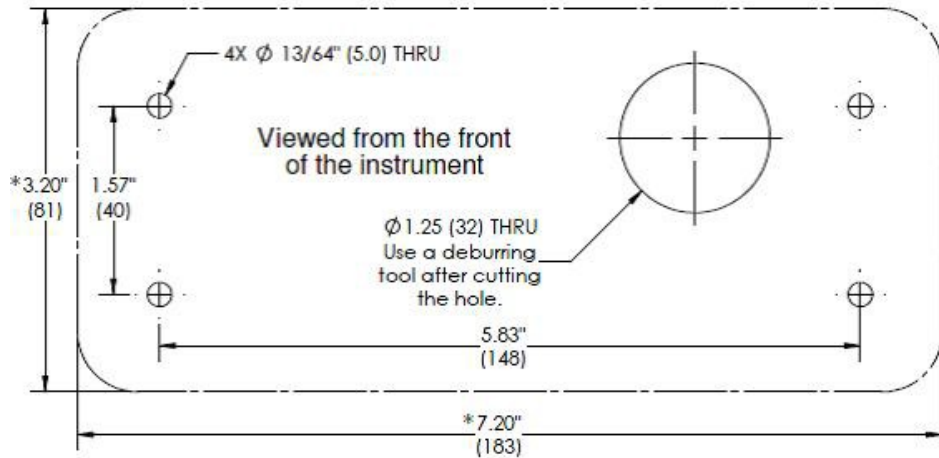
### Mounting the NEMA 4X Front Panel Display

The optional Front Panel Display is NEMA 4X rated when properly installed using the supplied gasket.



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

Step 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.



**Panel Hole Dimensions (not displayed to scale)**

A printable template is available on the Hardy website. Printers and copy machines can distort or reduce the template measurements shown above. If you are not using the plastic template included with the product, verify the dimensional accuracy of any paper template before use.

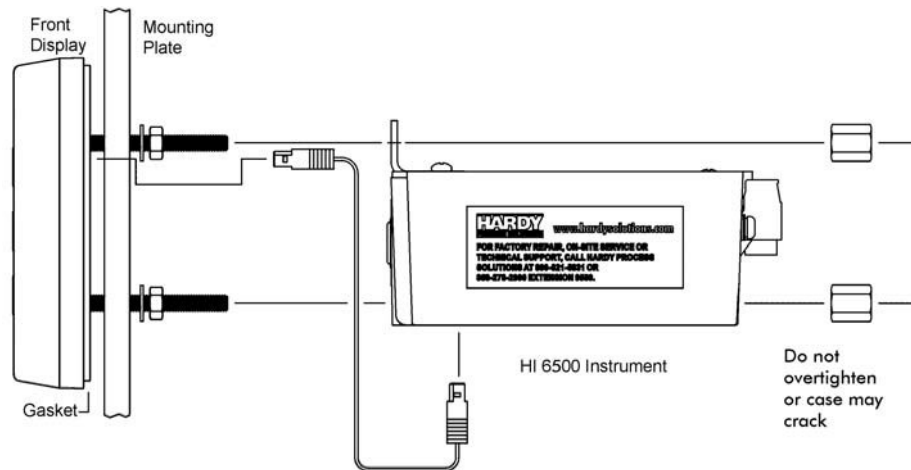
**CAUTION:**

*We recommend installing the HI 6500 in a NEMA 4, 4X or IP 55 rated enclosure or better.*

**ATTENTION**

*Nous vous recommandons d'installer le HI 6500 dans un boîtier NEMA 4, 4X ou IP 55 ou mieux.*

## Panel Mount Option 1

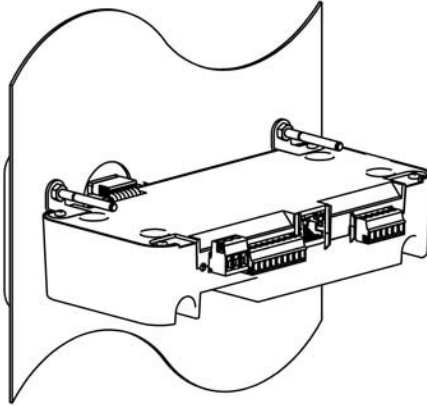


**FIG. 1 Exploded View of the Panel Mount Assembly – Option 1 with optional mounting kit**

- Step 1. Screw the Panel Mounting Brackets to the top of the enclosure
- Step 2. Connect and hand tighten the four screw rods into the front panel display
- Step 3. Push the screw rods and cable assembly through the holes in the panel.
- Step 4. Connect the front panel display cable assembly
- Step 5. Tighten the four 4mm nuts enough to completely compress the gasket for IP65
- Step 6. Position the enclosure with the connectors at the back
- Step 7. Align the screw rods with the holes in the brackets and the enclosure
- Step 8. Connect the cable assembly
- Step 9. Slide the enclosure onto the screw rods until flush with the panel
- Step 10. Install and tighten keepernuts.

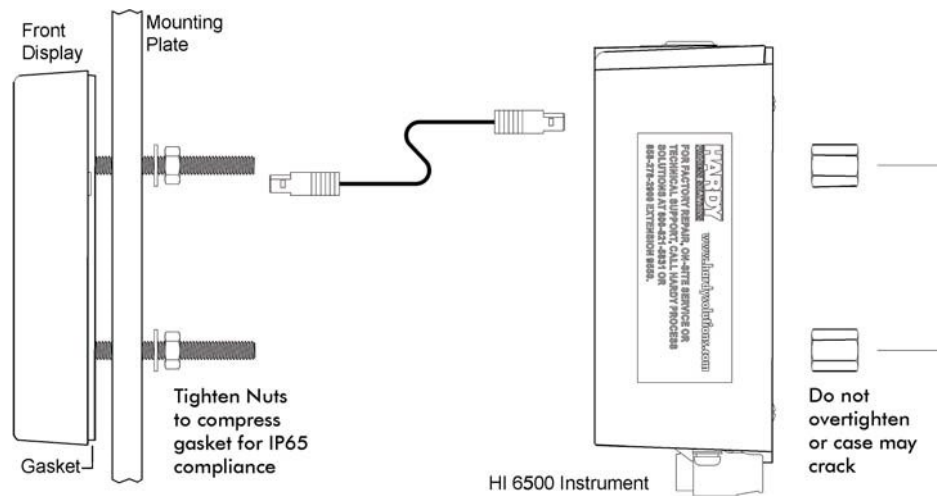
**CAUTION:** *Do not over tighten the bracket screws or the mounting nuts as this may damage the enclosure.*

**ATTENTION** *Ne pas trop serrer les écrous de montage car cela pourrait endommager l'enceinte.*



Finished Panel Mount Assembly – Option 1

### Panel Mount Option 2



Exploded View of the Panel Mount Assembly – Option 2

**NOTE**

*No brackets are needed for this installation.*

Step 1. Connect and hand tighten the four screw rods into the front panel display

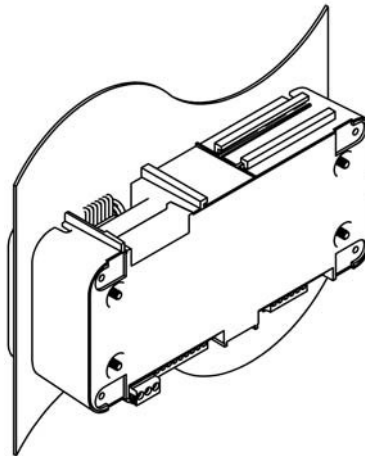
Step 2. Connect the front panel display cable assembly

Step 3. Push the screw rods and cable assembly through the holes in the panel.

- Step 4. Secure display to panel using four 4mm nuts and washers on the screw rods.
- Step 5. Tighten the four 4mm nuts enough to completely compress the gasket for IP65 compliance.
- Step 6. Position the enclosure with the connectors pointing downwards
- Step 7. Align the screw rods with the holes in the enclosure
- Step 8. Connect the cable assembly
- Step 9. Slide the enclosure onto the screw rods until flush with the panel
- Step 10. Using the 4 mm x 12 mm keeper nuts supplied, secure the enclosure screw rods

**CAUTION:** *Do not over tighten the bracket screws or the mounting nuts as this may damage the enclosure.*

**ATTENTION** *Ne pas trop serrer les écrous de montage car cela pourrait endommager l'enceinte.*



***Finished Panel Mount Assembly – Option 2***

**NOTE** *The HI 6110 front panel display is NEMA 4/4X rated when installed correctly in a panel mount configuration using the supplied plastic gasket.*

**Installing Enclosure Options**

- For the Panel Mount Wall Enclosure (PMWS---See Panel Mount Wall Enclosure Quick Start Guide)
- For the Swivel Mount Enclosure (see Appendix A)

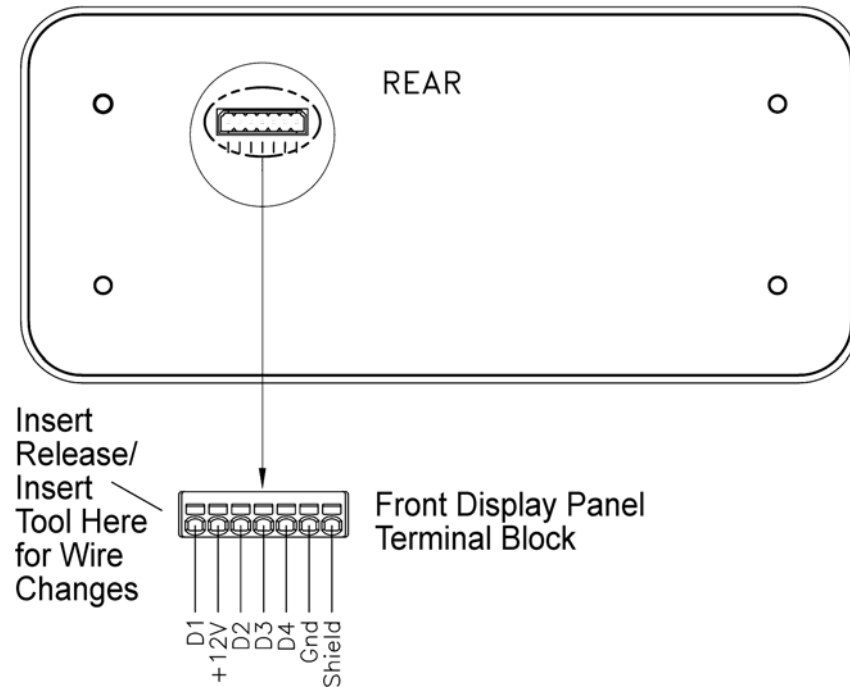
## Making Longer Display Interface Cables

If you need to install the front panel further away from the HI 6500 series than is possible with the supplied cable then, you will need to make a display cable between the panel and the instrument.

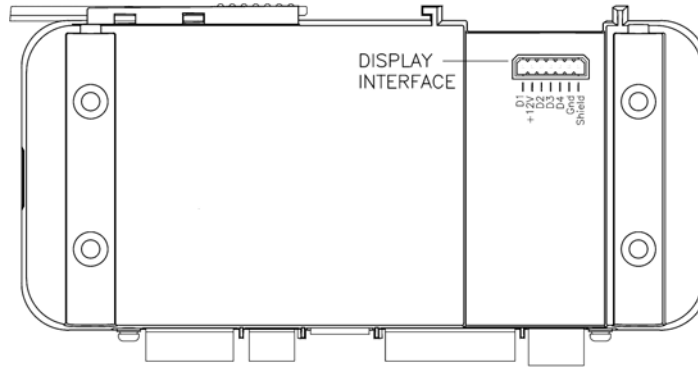
### Wiring Specifications

- Wire size: 20 AVG maximum / 26 AWG 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

### *View from the rear of the front display panel*

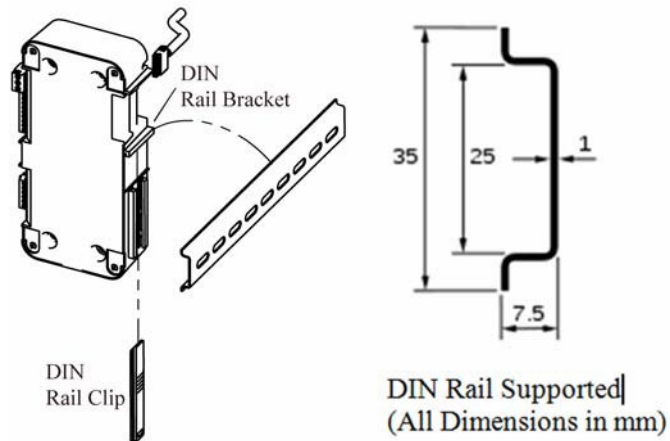


The terminal type is a spring cage type contact. There is a slot provided to use an insert/release tool. The tool is a 2.0 mm x 0.4 mm wide flat blade screw driver. Inserting the tool opens the cage contact and allows one or two bare wires to be inserted. Removing the insertion tool with bare conductor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



*View from the front of the instrument showing the display connector.*

### **DIN Rail Mount**



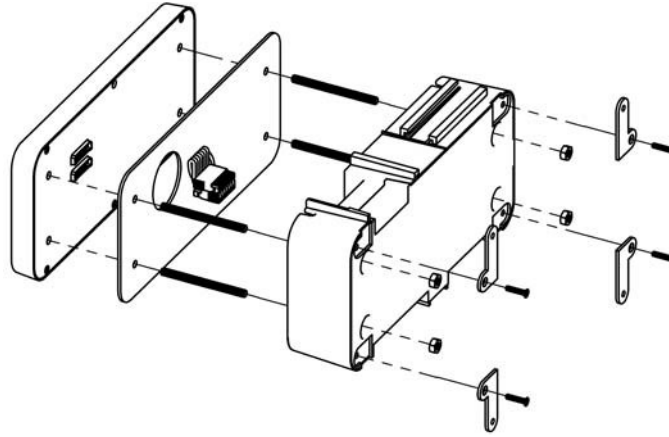
#### **Exploded View of the DIN Rail Mount Assembly**

**NOTE**

*The DIN Rail mount can be used with a remote display or operated as a Blind unit*

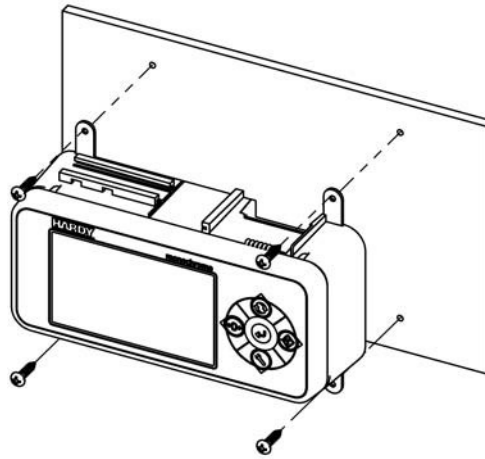
- Step 1. Pull down the DIN rail clip to expose the DIN Rail bracket. Do not fully remove the clip from the housing.
- Step 2. Hook DIN rail bracket onto the DIN rail using the groove at the top of the bracket
- Step 3. Push the DIN rail clip up until it locks in place.
- Step 4. While holding the HI 6500 series instrument, gently pull the bottom of the HI 6500 away from the DIN rail to verify that it is mounted correctly.

Step 1. Attach the mounting brackets using the supplied brackets and screws



*Exploded View of the Wall Mount Assembly – Rear View*

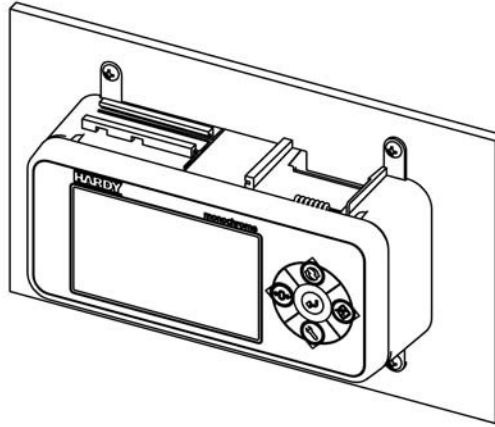
Step 2. Place the assembled wall mounted unit against the wall



Step 3. Mark the centers of the wall mounting brackets

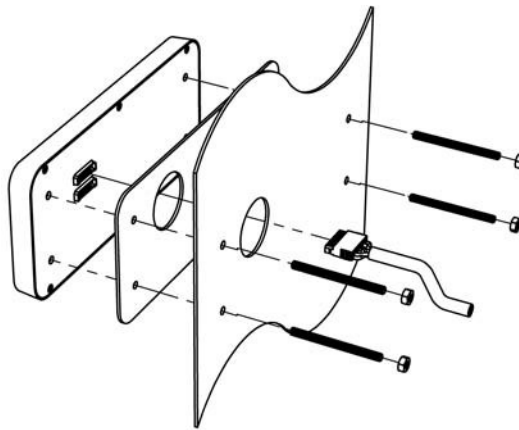
Step 4. Drill and insert the required wall plugs if attaching to brick, concrete, or plaster board.  
If attaching to wood use a pilot drill to ensure alignment.

Step 5. Position the assembled wall unit over the holes and using the appropriate screw fasten to the wall.



*Completed Wall Mount Assembly*

### **Remote Display Mount**

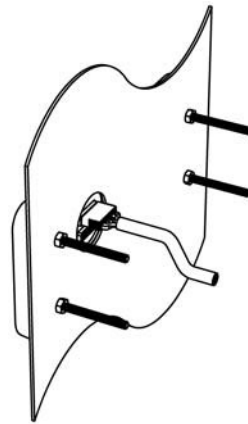


**Exploded View of the Remote Display Mount Assembly**

The display for the HI 6500 series instrument can be mounted in a remote location and the supplied cable can be modified to support the desired length of cable (not supplied).



- Step 1. Connect and hand tighten the four screw rods into the front panel display
- Step 2. Disable the cable assembly provided, and replace the original cable with the desired cable length (not provided--up to 100 ft (30.48 meters)). Build the cable assembly using the instructions above for **Making Longer Display Interface Cables** on page 13.
- Step 3. Connect the front panel to the newly assembled display cable
- Step 4. Push the screw rods and cable assembly through the holes in the gasket.
- Step 5. Slide the screw rods through the panel until flush with the surface
- Step 6. Using the washers and nuts supplied, tightened the nuts onto the screw rods. Tighten the nuts enough to completely compress the gasket for IP65 compliance
- Step 7. Connect the cable assembly to the HI 6500 series instrument



*Finished Remote Display Mount Assembly*

#### Blind Unit (No display)

The front display is not necessary for the HI 6500 series instrument to operate as a weight processor. Blind units can be fully configured using the Web browser communication.

## DC Power Input

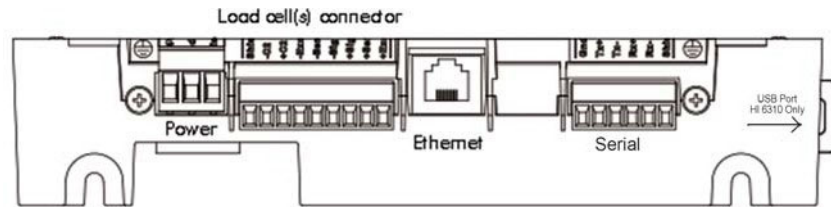
**WARNING - Do not operate with incorrect line voltage. To do so will result in property damage and/or personal injury. Make sure that the power source does not exceed 24 VDC.**

**AVERTISSEMENT – Assurez-vous que la source d'alimentation ne dépasse pas 240 V. L'utilisation d'un mauvais 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.**

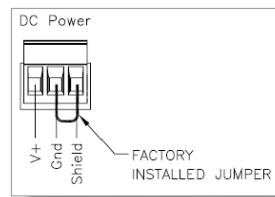
**AVERTISSEMENT – Attention à ne pas inverser le sol et fils chauds, ce qui peut entraîner des dommages à l'équipement.**

The illustration below shows the connections on the HI 6500 unit.



You must use a power-limited 24 VDC power supply (Class 2) on the DC input wiring. DC power should be supplied by a clean primary line, directly from the DC power source.

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



- Step 3. Plug the connector into the header at the rear panel.
- Step 4. Apply VDC power to the unit.

**WARNING - If the HI 6500 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 6500 est utilisé d'une façon qui n'est pas spécifiée par le fabricant, la protection fournie par l'équipement peut être altérée.**

**NOTE**

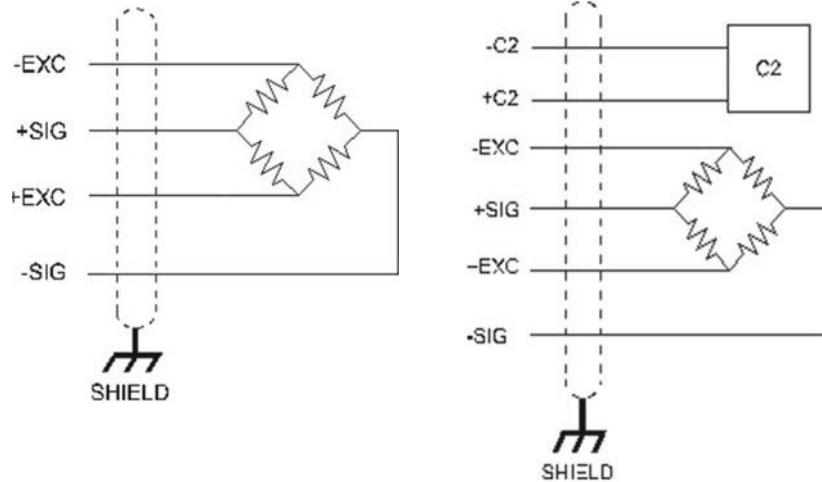
*The HI 6500 series is available in a Panel Mount Wall System Enclosure (PMWS) and a Swivel Mount Enclosure. The PMWS version features its own QuickStart Guide and the Swivel Mount Enclosure Installation Instructions are in Appendix A.*

## **Disassembly and Reassembly Notes and Cautions**

- Installation of this equipment must comply with International, National and Local Electrical and Mechanical codes.
- Make sure that any disassembly is done in a clean, well ventilated, properly controlled static-free environment.
- Always make sure that the assemblies and sub-assemblies are well supported and insulated when working on the instrument.
- Place small fasteners, connectors and electrical parts in closed containers so as not to lose parts during reassembly.
- Read the disassembly instructions before disassembly. If you find the instructions for disassembly unclear, contact the Hardy Process Solutions Technical Support Department for additional information and assistance.
- Do not disconnect any electrical plug, connector or terminal unless an identification tag is present or one is attached. Always note where the connector or plug was attached to the electrical component or wiring harness.
- Install complete hardware groups (screws, washers, lock washers, spacers, etc.) back to the original point of removal.
- Replace broken or damaged hardware immediately!
- Verify 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.

## Load Cell Wiring Diagrams

The diagrams below show how Hardy Load Sensor with C2 wiring differs from standard Load Cell (4 wire and 6 wire are similar except 6 wire adds sense wiring. C2 wiring is required when using an Integrated Technician summing junction box. The C2 wires are used for communicating IT and C2 commands.



Industry standard load cells wiring

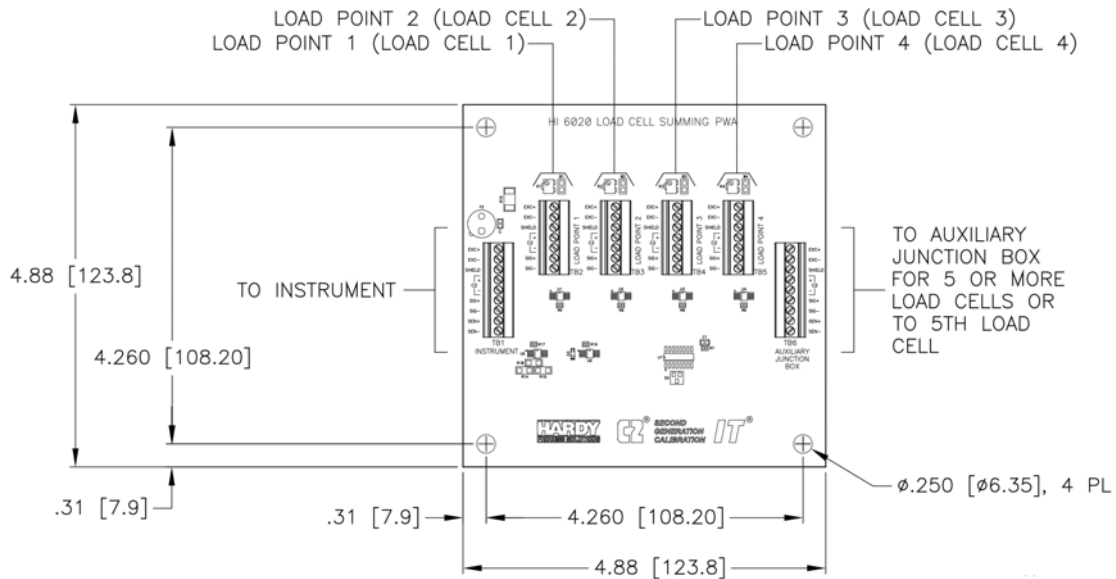
Hardy load sensor C2 wiring

The simple wiring diagram above shows how to connect a single load cell to the HI 6500 series instrument. Note: when connecting the HI 6500 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.

**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.**

## Connecting to a Hardy Junction Box or Summing Card



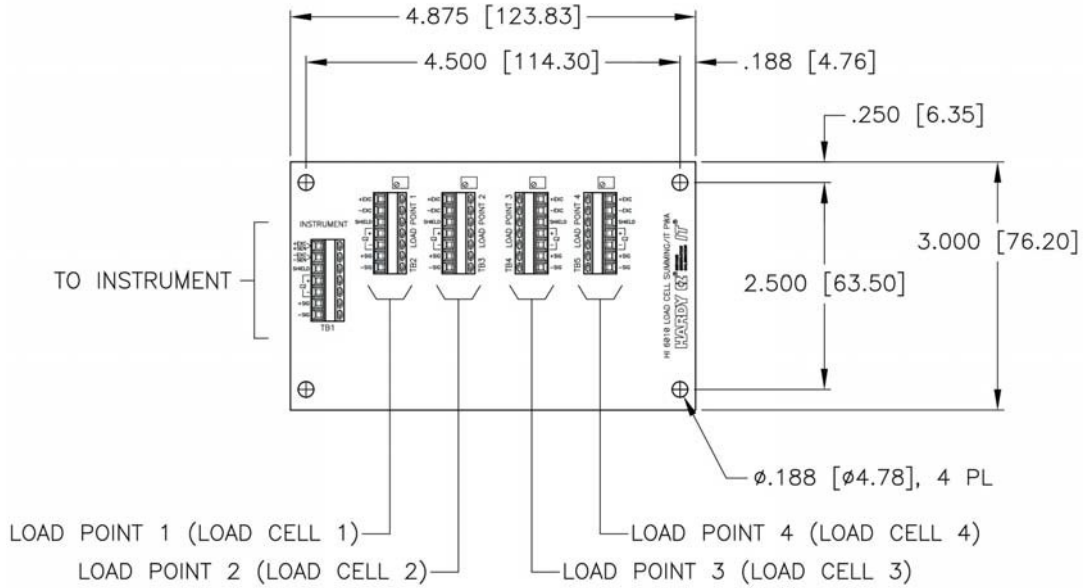
**Junction Box Wiring Diagram**

**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 Answer #1370 or search under external excitation voltage.*

*Excitation monitor is the current drawn 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. You should ignore the error bit or turn the excitation monitor off.*

## HI 6010IT SERIES LOAD CELL SUMMING CARD



**HI 6010 Summing Card Diagram**

**NOTE**

*When connecting a Hardy Summing Box to the HI 6500, 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.*

# Chapter 4

## Network Configuration



Chapter Four contains step-by-step instructions for configuring Hardy HI 6500 series instruments and related communication networks. We recommend reading these procedures because having a correct configuration is necessary to ensure trouble-free operation.

**NOTE** *For a quick set up, access the Setup Wizard communications menu. To learn more, see Chapter 1 on pages 3-6.*

This chapter also explains how to either configure the HI 6500 series instrument from its own front panel or with a PC-based Web interface connected to the HI 6500 series instrument over a standard Ethernet network. The features of the HI 6500 series instrument operate the same way in either case. You must use the Web interface to configure units that do not have a display.

Before operating the HI 6500 series 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.

**NOTE** *For Premier Integration with Rockwell PLCs, Hardy offers both AOPs and Faceplates/AOIs for the HI 6500 Series. These files are available for download on the Hardy Website under Products>Weighing Instruments>Weight Processors> HI 6500 Series> under the tab Docs & Downloads.*

### 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 Webserver in the HI 6500 series instrument allows you to easily configure every parameter of the instrument via a standard Web browser. A standard Ethernet network is required to provide the connectivity between the HI 6500 series instrument and your desktop / laptop computer.

The HI 6500 series instrument 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 6500 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 6500 series instrument to your computer:

**LAN Connection:** Connect the HI 6500 series instrument 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-6500 and your desktop or laptop computer using any standard Ethernet cable. See the *Direct Connection* section below.

## LAN Connection

To connect the HI 6500 series instrument to a LAN, you simply connect a standard Ethernet cable between the instrument and the common network hub. You will then need to determine which scheme is used on the network to assign IP addresses. Every node on the network must have a unique IP address or conflicts will result.

Contact your Network Administrator for the IP address to use for the instrument.

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 Fixed IP addresses, refer to the section *Fixed IP Configuration Using the Front Panel* below. For automatic IP assignment (DHCP), use the following steps:

### DHCP Configuration Using the Front Panel

DHCP works only if a DHCP server is installed on your network.

- Step 1. From the Configuration menu, Use the UP or DOWN button to select the communication menu, then select the Ethernet TCP/IP menu item.
- Step 2. Select the DHCP menu item and use the ENTER key to enable/disable this feature.
- Step 3. Select the DHCP IP address menu item and verify that a correct IP address has been assigned to the instrument by the network server. If an incorrect IP address has been assigned contact your system administrator; or use a Fixed IP address.
- Step 4. This is the IP address to use in your web browser to access the Web Interface. From here you can jump to the section

### NOTE

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



## Fixed IP Configuration Using the Front Panel

The HI 6500 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.

Read-only screens can display a limited number of characters per line. To see the complete IP address in DHCP, you need to do the following:

Step 1. Press the CONFIG button to enter the Configuration 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.

Step 2. Select the Fixed IP menu item.

Step 3. Starting at the right-most digit, enter the IP number using the standard format. 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 Node  
Identifier Identifier

Step 4. Press the ENTER button to save the entry.

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

Step 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.

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

This method of interconnect between an HI 6500 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.

Step 1. 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 6500 series instrument and PC with compatible IP addresses. From the Summary display, press Enter to activate the Configuration menu. Use the down arrow to select Communications and press Enter.

Step 2. Use the down arrow again to select Ethernet, and select IP to display the IP screen.



## Windows XP

- Step 1. After starting your computer, click Start and then Control Panel.
- Step 2. Click on Settings > Network Connections.
- Step 3. Right click on 'Local Area Connection' and select Properties.
- Step 4. Click on Internet Protocol (TCP/IP) and click on the Properties button to open the Internet Properties (TCP/IP) Properties dialog.
- Step 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 6500* section below.
- Step 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
- Step 7. Select OK on the TCP/IP Properties dialog box. The computer is now fully configured.
- Step 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

- Step 1. After starting your computer, click the Start button.
- Step 2. Click on Control Panel to display the Windows Control Panel.
- Step 3. Click on Network; then click Internet
- Step 4. Click on Network Sharing Center.
- Step 5. Click on Change Adapter Settings in the left-hand column.
- Step 6. Right click on Local Area Connection and select Properties.
- Step 7. Click on Internet Protocol Version 4 (TCP/IPV4)
- Step 8. Click the Properties button to open the Internet Properties (TCP/IP) Properties dialog.
- Step 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 6500* section below.
- Step 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



## I/O Tables For Communications to PLCs

The following I/O table description is common for the following communication protocols

- 1 EtherNet/IP**
- 2 Modbus-TCP**
- 3 Modbus-RTU**
- 4 Profibus-DP**

For a full list of command parameters, please see the “Default Parameter IDs and Values” on page 115 at the end of Chapter 5.

OUTPUT table		Bytes	INPUT table		Bytes
Command		4	Command Echo		4
Aux Command Information		4	Command Status		4
Parameter ID		4	Parameter ID		4
Parameter Value		4	Parameter Value		4
Reserved 1		4	Instrument Status		4
Reserved 2		4	Net Weight		4
Reserved 3		4	Gross Weight		4
Parameter RD1 ID		4	Parameter RD1 Value		4
Parameter RD2 ID		4	Parameter RD2 Value		4
Parameter RD3 ID		4	Parameter RD3 value		4
Parameter RD4 ID		4	Parameter RD4 Value		4
Parameter RD5 ID		4	Parameter RD5 Value		4
<b>Total</b>		<b>48</b>	<b>Total</b>		<b>48</b>

### OUTPUT Table Description

The first four variables in the output table, Command, Aux Command Information, Parameter ID, and Parameter Value, are used to send commands to the instrument, 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 (instrument) number if required, the next 8 bits are reserved, and the bottom 16 bits are used for the command string as shown below.

<b>[31] .....[24]</b>	<b>[23] .....[16]</b>	<b>[15] .....[0]</b>
<b>Channel Number</b>	<b>reserved</b>	<b>Command</b>

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.

The next 3 values, **Reserved1**, **Reserved2**, and **Reserved3**, are reserved, and also provide padding so the user selectable read only parameters are aligned between the output and input tables. The next 5 values **Parameter RD1 ID**, **Parameter RD2 ID**, **Parameter RD3 ID**, **Parameter RD4 ID**, and **Parameter RD5 ID** are user selectable parameter ID values which are used to return read only values from the instrument. These read only values can be anything from an instrument specific measurement such as COUNT to a parameter value such as WAVERSAVER.

### INPUT Table Description

The first four variables in the input table, **Command Echo**, **Command 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 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 instrument to the generic command value or the read only parameter command values, is provided in the **Command Status** value, and verifies if the command was executed with the expected result.

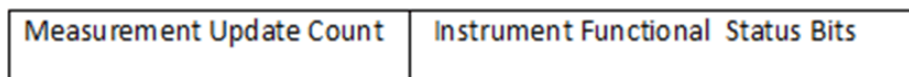
The top 8 bits are reserved for indicating if the **Parameter RDx ID** commands were executed correctly. If the bit is HIGH then either the **Parameter ID** is invalid or the value returned is invalid. When this occurs, sending the command using the **Command**, **Aux Command Information**, **Parameter ID**, and **Parameter Value** in the output table will provide the required information to debug the problem.

Command Status	Definition
Bits[31:29]	Reserved
Bit[28]	Status of Parameter RD5 command
Bit[27]	Status of Parameter RD4 command
Bit[26]	Status of Parameter RD3 command
Bit[25]	Status of Parameter RD2 command
Bit[24]	Status of Parameter RD1 command
Bits[23:16]	Reserved
Bits[15:0]	Status of Command

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**.

A 32-bit value, **Instrument Status**, provides the current state of all the major functions within the instrument. The top 8 bits are a cyclic “measurement update count”, which will increment by a count of one every time a new measurement value is taken, following a 0 to 255 then repeat cycle. If this value remains the same in two consecutive reads from the instrument then the communication or the measurement function has failed and the appropriate action needs to be taken. 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 instrument.

[31] .....[24]    [23] .....[0]



The **Net** and **Gross Weight** values are always provided.

The final five read only command values **Parameter RD1 Value**, **Parameter RD2 Value**, **Parameter RD3 Value**, **Parameter RD4 Value**, and **Parameter RD5 Value** are the read only values for the different user selectable parameter ID values 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 number	Command
0	Read Parameter
1	Zero Cmd
2	Tare Cmd
4	Write Non-Volatile Cmd
5	Print Cmd
6	Weigh Sample Cmd
0x64 (100 dec)	Cal Low Cmd
0x65 (101 dec)	Cal High Cmd
0x66 (102 dec)	C2 Cal Cmd
0x1000 (4096 dec)	Write Integer Cmd
0x1001 (4097 dec)	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)
  - During a tare or zero command: Code 0xFFFF indicates "command in progress"
- **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)
  - During a tare command: Code 0xFFFF indicates "command in progress".
- **4: WRITE NONVOL CMD.** Write a #4 to the command register to save parameters in non-volatile memory.
  - No Error Codes
- **5: PRINT CMD:** Write a #5 to the command register to send data to the Printer.
  - 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:
  - Calibration\_Fail 1
  - Calibration\_Fail\_Motion 3
  - Calibration\_Fail\_Adc\_Error 4
  - During a Cal Low Command,: Code 2 indicates "calibration in progress".
- **0x65 (101 decimal): CAL HIGH CMD.** Write a 0x65 hex to the command register to perform the high step of a traditional calibration.
  - Calibration\_Fail 1
  - Calibration\_Fail\_Motion 3
  - Calibration\_Fail\_Adc\_Error 4



- HardcalFailCounts 8: not enough counts between hard cal hi and hard cal lo
- During a Cal High Command,;Code 2 indicates "calibration in progress".
- **0x66 (102 decimal): C2 CAL CMD.** Write a 0x66 hex to the command register to perform a C2 calibration.
  - Calibration\_Fail 1
  - Calibration\_Fail\_Motion 3
  - Calibration\_Fail\_Adc\_Error 4
  - Calibration\_Fail\_Noc2 5
  - Calibration\_Fail\_C2capeq 6
  - Calibration\_Fail\_C2clones 7
  - During a C2 Cal Command: Code 2 indicates "calibration in progress".
- **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

#### Status Word Bits

- Bit 0 = A/D converter error - bad input from the load cells.
- Bit 1 = A/D converter failure - no output from the converter to the processor.
- Bit 5 = Wrong Platform - Trying to load incorrect firmware into unit.
- Bit 6 = Motion - indicates weight is in motion (changing).
- Bit 10 = EEPROM Write error - problem writing to the non volatile memory in the unit.
- Bit 14 = IT test in progress - currently running Integrated Technician test.
- Bit 15 = Not Found error - Parameter ID not found for command being run.
- Bits 28-31 = counter - The upper 4 bits are constantly incrementing. This constantly changing value can be used as confirmation of communications.

Other bits not listed here are not used at this time.



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 & Programs tab.

**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 6500 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 6500 using TCP/IP over Ethernet. The Client/Server definitions are as follows:

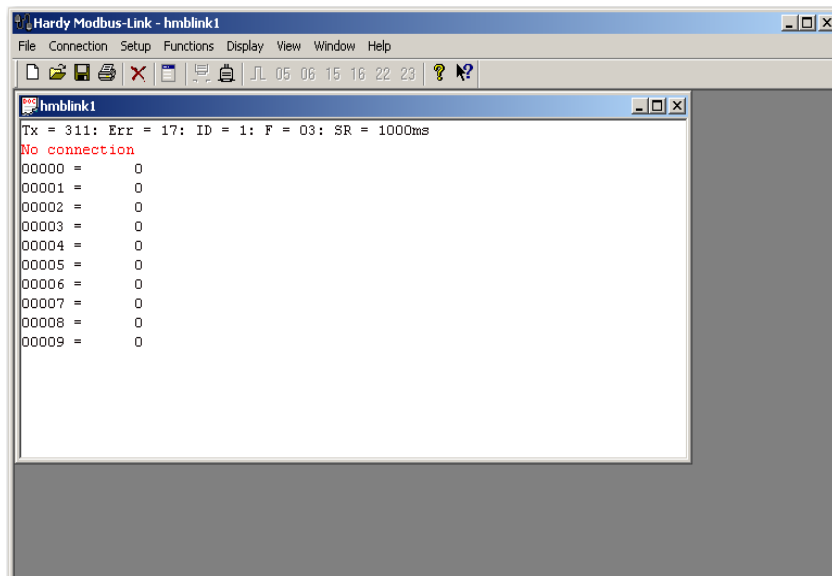
- Client - The module asking for data.
- Server - The module providing the data.

**NOTE**

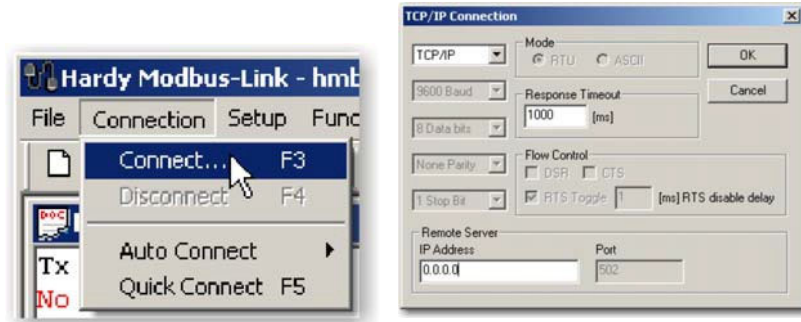
*MODBUS is positioned at level 7 of the OSI model and is accessed at a reserved system port 502 on the TCP/IP stack. It will support communication with up to 10 different hosts (sockets).*

**Configuring MODBUS**

Step 1. Click the Hardy Modbus-Link icon to open the Hardy Modbus-Link display.

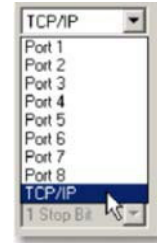


Step 2. Click Connect in the Connection pull-down menu, to display the TCP/IP Connection form.



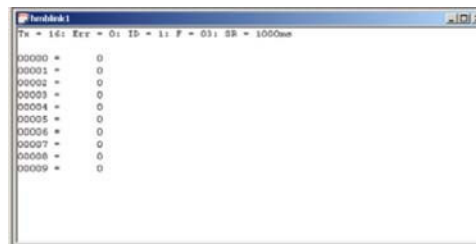
Step 3. If TCP/IP is not selected, select it from the pull-down list.

Step 4. Step 4. Type the address of the HI 6500 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.

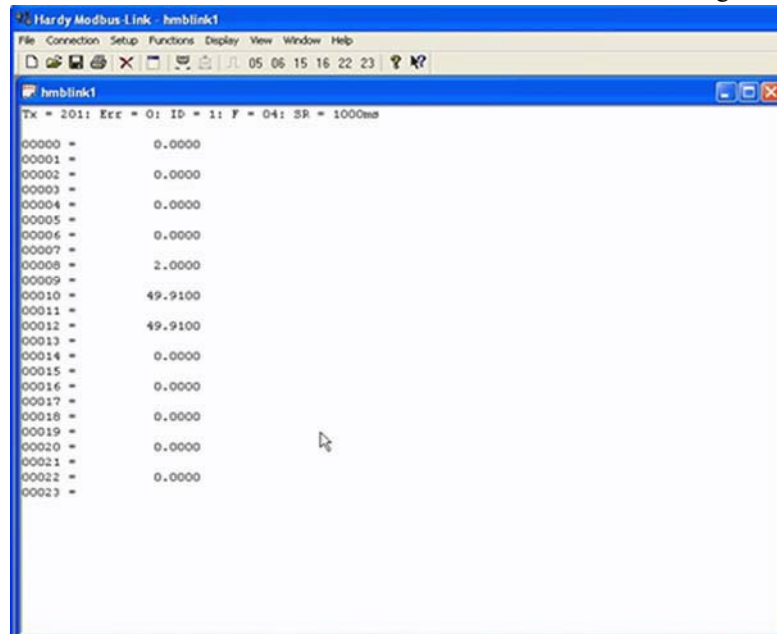
You are now connected from your PC to the HI 6500 weight processor.



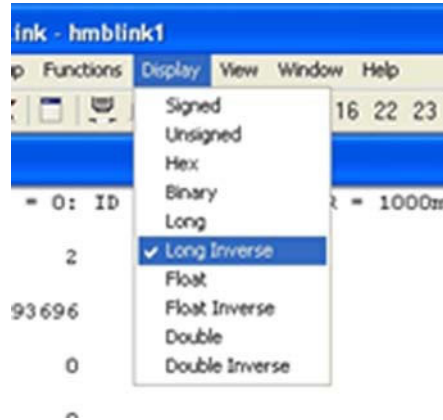
Step 5. Step 5. On the Setup pull down menu select Poll Definition and select the function 04 INPUT REGISTER and the Address 0 and Length as 24..



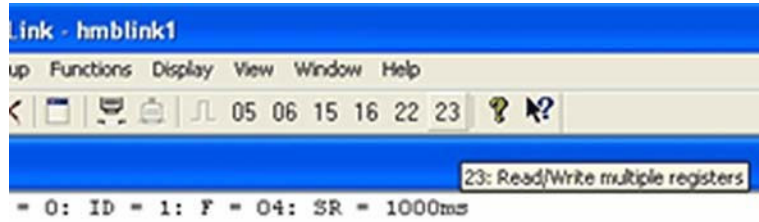
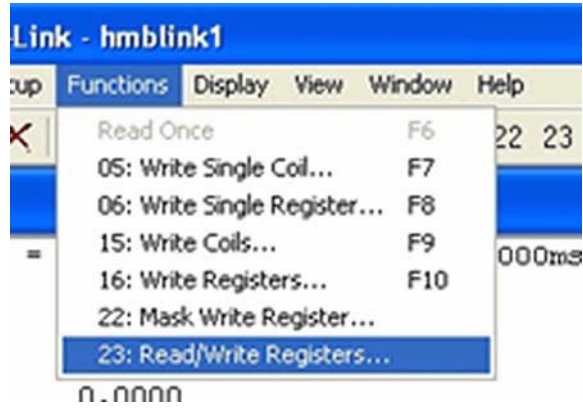
Step 6. On the Hardy Modbus-Link page. Display pull-down menu, select Float Inverse. The Weight value would be found in register 5 (net) or 6 (gross). Other registers are not float values so be aware of random numbers in other registers.



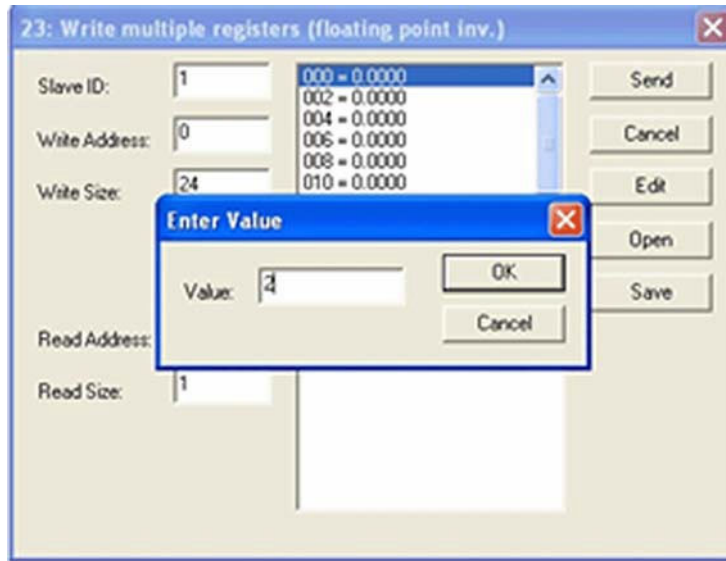
Step 7. From the DISPLAY drop down, select the Long Inverse selection. This will allow us to write an integer value into the non-float registers.



Step 8. From the FUNCTION drop down list select Read/Write registers, or click button 23 to open the Write multiple registers display.

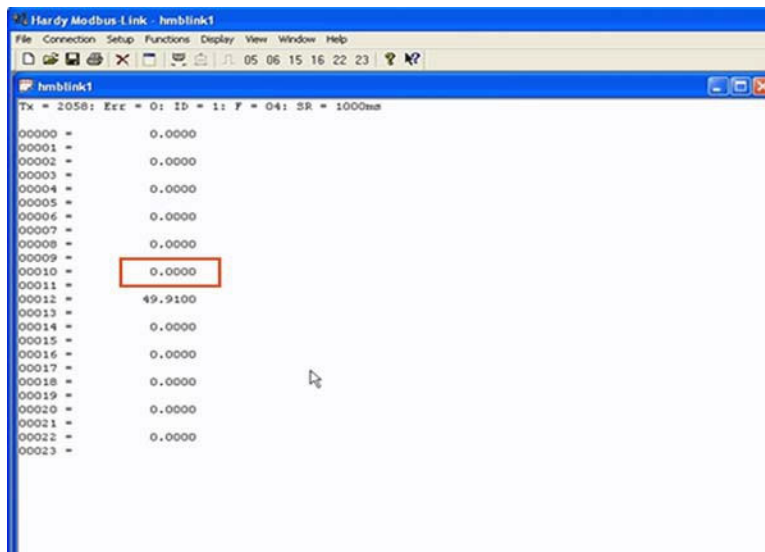


Step 9. Double click on the first register and the Enter Value box appears. Enter the new value you wish to write to this register. Our example shows writing a value of "2", which is the Tare command number.



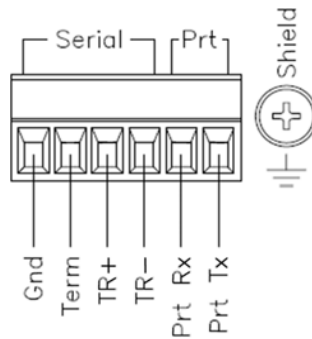
Step 10. Click on OK to accept the value and click on the Send button to send it to the HI 6500. Click OK to the Response OK message.

Step 11. Change the display back to Float Inverse and notice that our Tare command has caused the Net weight to change to zero



### Modbus Termination Parameter

This parameter is used to enable termination of the Modbus-RTU interface, either through software or manually by inserting a wire link between the TERM and GND connections on the RS-485 terminal connector



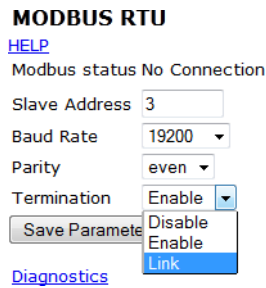
The Termination Parameter has three options, DISABLE, ENABLE and LINK.

Disable: The Modbus-RTU signal is not terminated

Enable: The Modbus-RTU signal is terminated

Link: Manual Termination.

On the **Web page**, select the Termination drop down and select the termination condition. 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.





Select Save Parameter to save the entry.

Click Home to return to the home page.

On the **HI 6500 series instrument 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 Termination value will be displayed, press the ENTER or the RIGHT button to change the parameter if the Termination needs to be modified.

## Modbus-RTU (over RS-485)

Step 1. Setup a slave address assigned to the HI 6500 series instrument from the communications menu and the Modbus-RTU submenu.. Use a unique address between 1 and 247

Step 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	DNC	TR+	TR-	PrtRX	PrtTX
Signal Ground	DO Not Connect	TX+ & Rx-	RX+	RS-232 Pins not used	Printer used

### 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 Modbus master

### Modbus Functions

The Modbus functions allowed in the HI 6500 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.

### Modbus Registers

This instrument has 64 16-bit MODBUS input registers and 64 16-bit output registers. The data in these registers is in "big endian" format, meaning that the most significant byte comes first.

- The first 6 registers (0 – 5) are used for the “command interface” in the unit.
- Registers 6 & 7 will contain the Net weight in 32 bit floating point format.
- Registers 8 & 9 will contain the Gross weight in 32 bit floating point format.

- Registers 10 and 11 will contain the status word
- Registers 12 and 13 are for the count function.

### Network Command Interface

The "network command interface" uses 6 registers (0 – 5) in and 6 registers out.

- Register 0: command (shown below)
- Register 1: status
- Registers 2, 3: Parameter number. See the diagnostics/parameters web page for a list of parameter numbers.
- Registers 4, 5: parameter value

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.
  - 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)
  - During a zero command: Code 0xFFFF indicates "command in progress".
- **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)
  - During a tare or command: Code 0xFFFF indicates "command in progress".
- **4: WRITE NONVOL CMD.** Write a #4 to the command register to save parameters in non-volatile memory.
  - No Error Codes
- **5: PRINT CMD:** Write a #5 to the command register to send data to the Printer.
  - 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:
  - Calibration\_Fail 1
  - Calibration\_Fail\_Motion 3
  - Calibration\_Fail\_Adc\_Error 4
  - During a Cal Low Command: Code 2 indicates "calibration in progress".
  
- **0x65 (101 decimal): CAL HIGH CMD.** Write a 0x65 hex to the command register to perform the high step of a traditional calibration.
  - Calibration\_Fail 1
  - Calibration\_Fail\_Motion 3
  - Calibration\_Fail\_Adc\_Error 4
  - HardcalFailCounts 8: not enough counts between hard cal hi and hard cal lo
  - During a Cal High Command: Code 2 indicates "calibration in progress".
  
- **0x66 (102 decimal): C2 CAL CMD.** Write a 0x66 hex to the command register to perform a C2 calibration.
  - Calibration\_Fail 1
  - Calibration\_Fail\_Motion 3
  - Calibration\_Fail\_Adc\_Error 4
  - Calibration\_Fail\_Noc2 5
  - Calibration\_Fail\_C2capeq 6
  - Calibration\_Fail\_C2clones 7
  - During a C2 Cal Command: Code 2 indicates "calibration in progress".
  
- **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



- Run the Modbus Function code #4 (read multiple registers). This will allow the user to read the status of the command in data register #1.

If you wish to then read back the value you have written:

- Enter the command #0 into data register #0.
- Run the Modbus Function code #16 (write multiple registers), or Function code #6 (write single register) insuring the correct data location is being set.
- Run the Modbus Function code #4 (read multiple registers).

Read the value for the span parameter in data registers #4 & 5. This value will be in floating point format.

## 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.

Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
Ground	No connection	TX+/RX+	TX-/RX-	No connection	+5V

### 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 6500 or HI 6510 is a slave device. All data communication exchanges between a master and the HI 6500 or 6510 originate from the master device. Each HI 6500 or HI 6510 is assigned to one master and only that master may write output data to that HI 6500 or HI 6510. 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,” earlier in this chapter for an understanding of the data and format for the Profibus communications.

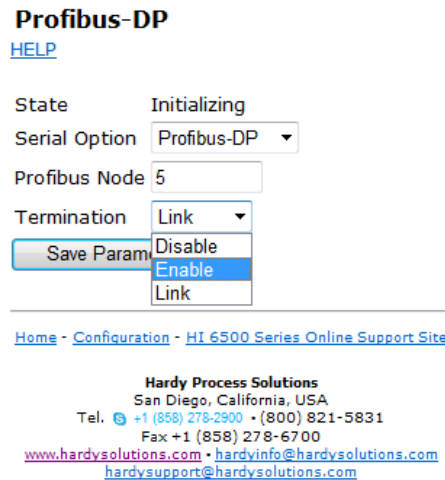
For a full list of command parameters, please see the "Default Parameter IDs and Values" at the end of Chapter 5.

**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

Step 1. Step 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 6500 OR HI 6510 Node address. Range: 1-125 (default 5) Our example uses the default address #5.



**NOTE**

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

Step 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.

Step 3. Click Save Parameters to save the entry.

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

Step 5. Click Home to return to the Home Page.

### **Initialization Process**

To be able to add an HI 6500 OR HI 6510 to a Profibus-DP network, you need a PC or a PLC and software such as Siemens Step 7™, Simatic Manager or equivalent, that allows the Profibus-DP PLC and the HI 6500 or HI 6510 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 6500 or HI 6510 is connected to the network.

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

Step 1. Navigate from the products section to the HI 6500 web page.

Step 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:

Step 1. Connect the HI 6500 Series Instrument to the Profibus DP network and verify the address. (See the Installation Section for Installation and Cabling Instructions.)

Step 2. Step 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.

Step 3. Step 3. Install the \*.gsd file.

### **Pre-Initialization Procedures**

Step 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.)

Step 2. Select the Node address for the HI 6500 or HI 6510, as shown above. This can be done before or after Initialization.

Step 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.**

Step 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.

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

### **Configuring Profibus from the Front Panel**

Step 1. Press the Configuration key

Step 2. Down arrow to Communications; press enter.

Step 3. Select Profibus-DP; press enter.

Step 4. Select Termination; press enter

Step 5. Up or down arrow to make termination selection. Press enter to select.

Step 6. Down arrow to select Serial Option;

Step 7. Press enter to toggle between Profibus-DP and Modbus. Select Profibus-DP and press enter.

Step 8. Down arrow to Node.

Step 9. Press enter to make changes to the Node. Use the arrow keys to enter node number and press enter to accept.

Step 10. Press exit key until display returns to the Summary Display.

### **Initialization Procedures on the PLC**

#### **NOTE**

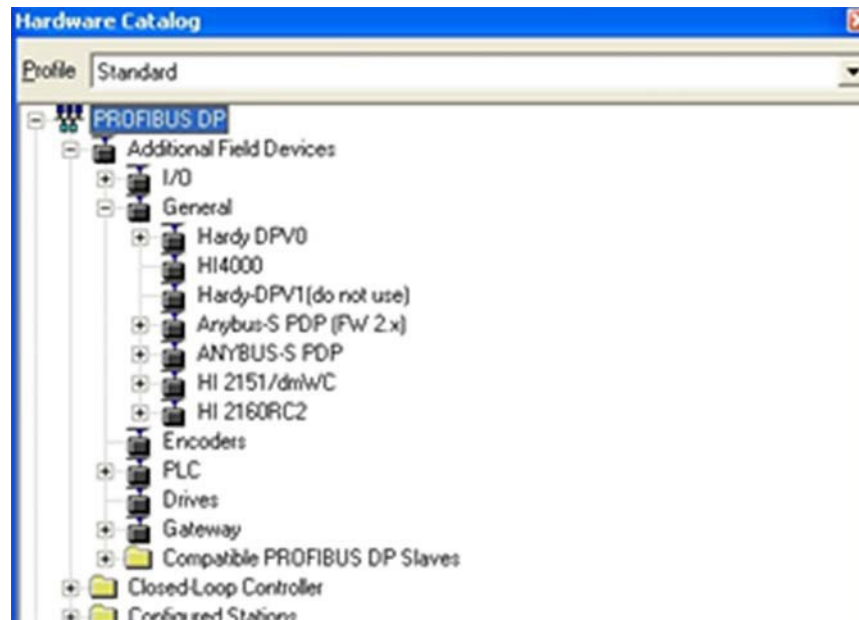
*The examples come from the Siemens Step 7™, Simatic Manager Software. Your software will vary from these procedures. Step 7™ is a trademark of the Siemens Corporation.*

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



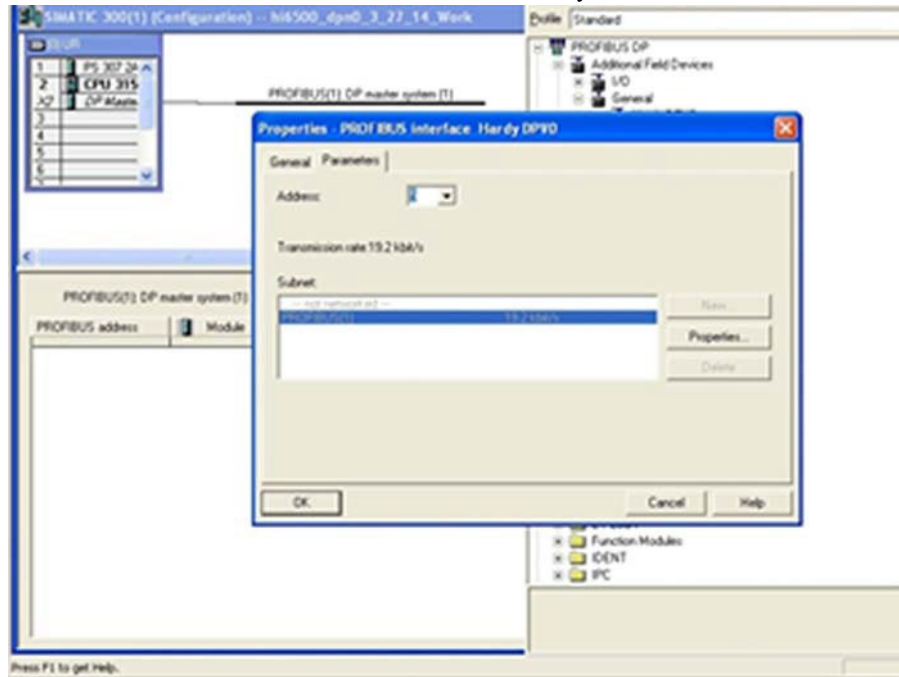
Step 2. Click on the “+” to expand the Additional Field Devices Folder.

Step 3. Click + to expand the General Folder.



Step 4. Highlight the CPU you selected in the UR dialog box.

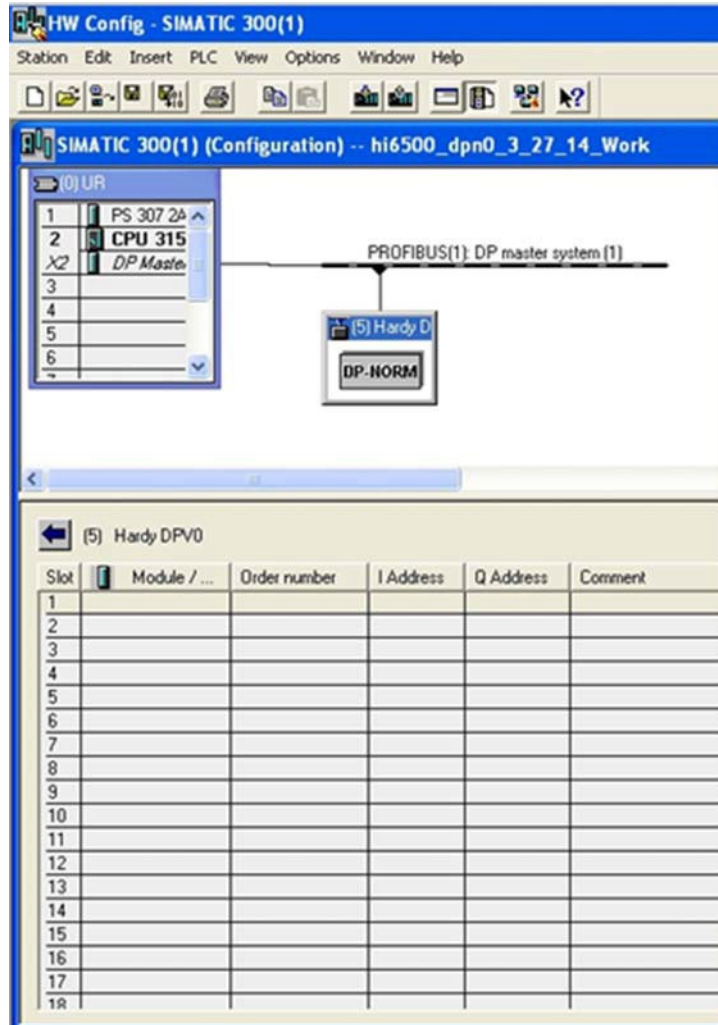
Step 5. Double Click on “HI6000” or drag and drop the “HI6000” folder to the Profibus-DP Network. This opens the HI 6000 PDP Parameters dialog box where you can set the address of the instrument, if necessary.



Step 6. Click OK to set the Node Address.

Step 7. The HI 6500 Series module appears in the Profibus Network.

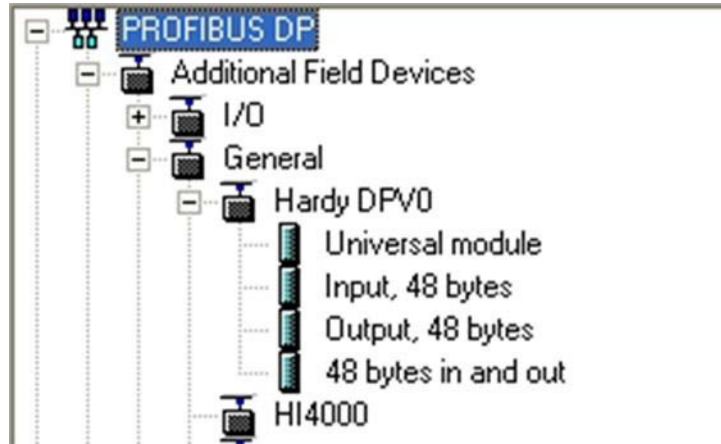
Step 8. Click in the module properties at slot 1. In the catalog, expand the module properties and make selection for "48 bytes in and out".



Step 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**

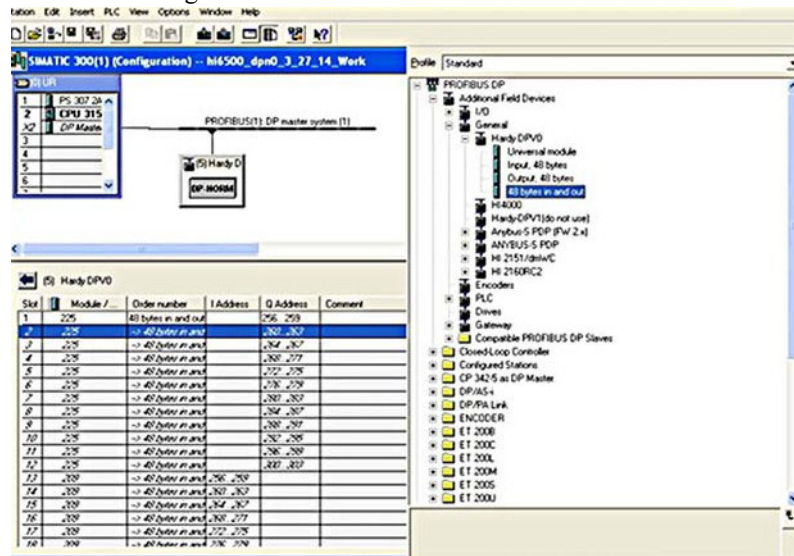
The HI 6500 or HI 6510 Series Input and Output Sizes are expressed in 32 bit words. 12 words input and 12 words output.



Step 10. Click the Download Icon to download the configuration to the PLC and open the Select Destination Module dialog box.

Step 11. 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.

Step 12. When the download is complete the HW Config dialog box should look something like this.



Step 13. Initialization is Complete

## Printer (over RS-232)

The HI 6500 series can transmit Gross, Net, Count, Tare values to a serial printer over RS-232. The printer Baud rate is user selectable at 600, 1200, 2400, 4800, 9600, or 19200 (default is 9600).

The RS-232 printer pinout is:

GND	DNC	TR+	TR-	PrtRX	PrtTX
Signal Ground	DO Not Connect	RS485 Pins Not Used		Printer RX	Printer TX

A sample wiring connection from the HI 6500 seri3esto the printer port is shown above. The printer parameters can be configured through the web interface or the display panel.

Step 1. Set the baud rate for the RS232 printer, default is 9600.

Step 2. Set the parity bit, default is EVEN

Step 3. Select what values to transmit over the serial interface to the printer using the printer mode, default is disabled.

- a. Gross Weight
- b. Net Weight
- c. Tare Weight
- d. Unit Count
- e. All – Gross, Net, Tare, and Count (if Count enabled) values
- f. OFF, Printer disabled.

## USB Memory Stick

The HI 6500 series provides an interface to an external USB memory stick that allows HI 6500 parameters to be saved, restored, or copied to another instrument.

**NOTE** *The HI 6500 series does not include a USB memory stick port when used in a Swivel Mount Enclosure. See Appendix A for further information.*

**NOTE** *Any USB stick used with the HI 6500 port can have a capacity no greater than 8 GB. If it is larger than that, the documents and parameter settings will not save correctly.*

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

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

On the **Web page**: Configuration; communications; USB; save/restore.



# Communications Parameters for the HI 6510 Only

## Analog 4-20mA

Available on the HI6510 and HI 6510-XP only

The analog 4-20mA output is directly proportional to the programmed gross, net, or count range; by setting the low value equal to 4mA and the high value equal to 20mA. These values can be set from either the front panel or the web interface.

The 4-20mA parameters can be configured through the web interface or the display panel.

**NOTE**

*The resolution of the Analog output is 16-bit monotonicity over temperature. Linearity is  $\pm 0.03\%$  of full scale input.*

From the front display: select the configuration menu then UP or DOWN to communications, enter; UP or DOWN to 4-20mA, enter; UP or DOWN to setting you want for Source; enter the value for 4mA; enter the value for 20mA or mA output (read only). Press enter to select and UP or DOWN arrows to enter value. From the Website, select the Communications Menu and then

Step 1. Select the source for the 4 to 20mA output, default is gross

- a. Gross.
- b. Net
- c. Count
- d. Manual

Step 2. Set the 4mA value

Step 3. Set the 20mA value

Step 4. Save Parameters

[HELP](#)

Weight Source	Gross	▼
Value 4mA	<input type="text" value="0.00"/>	
Value 20mA	<input type="text" value="1050.00"/>	
mA Output	<input type="text" value="4.000"/>	

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[Home](#) - [Configuration](#) - [HI 6300 Series Online Support Site](#)

**Hardy Process Solutions**  
San Diego, California, USA  
Tel. +1 (858) 278-2900 • (800) 821-5831  
Fax +1 (858) 278-6700

**NOTE**

Setting the weigh source to manual allows the A output setting to be set to a fixed output. This is used to test the circuit level to the host. If not operating in manual mode, this would should the current mA output level.



# Chapter 5

## Instrument Configuration



### Using the Home Page to set Parameters

**NOTE**

*If you have already completed hardware installation, you may use the Setup Wizard for basic instrument parameters. Please review Chapter 1, pages 3-6. Otherwise proceed with this chapter.*

Enter your HI 6500 series home page by typing the IP Address you used to set up the instrument (see Chapter 4 for information on setting the IP Address) accessing the instrument via a direct connection on a PC.

From the Home Page, click Configuration to open the Configuration page. Select Instrument Setup to open the Instrument Setup page.



The HI 6500 series instrument Configuration process sets up the instrument to operate as a scale. This includes configuring, units of measure, motion tolerance and other instrument parameters required for your process.

## Using the Front Panel Display Menus to Set Parameters

### NOTE

*If you have already completed hardware installation, you may use the Setup Wizard for basic instrument parameters. Please review Chapter 1, pages 3-6. Otherwise proceed with this chapter.*



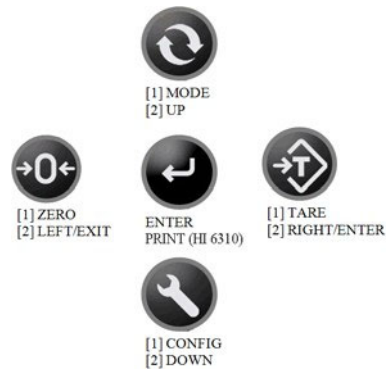
### Front Panel Display

The Front Panel Display is a 480 x 272 LCD graphical display. The Summary screen displays the current weight in the selected mode (Gross, Net or Count) and the selected engineering units (oz, lb, t (ton), g, kg, mt (Metric Ton)).

### NOTE

*In the event of a major electrostatic discharge, the display may freeze or go blank. To reset the display without resetting power, please hold the Up Arrow down for 15 seconds to reboot the display driver.*

## The Five Button Command Cluster



### TARE Command Button

When the TARE button is pressed the NET weight value is set to zero.

The TARE button also has the alternative function of moving the cursor RIGHT in the navigation when using the display for menu navigation.

### ZERO Command Button

When the ZERO button is pressed the GROSS weight value is set to zero.

The ZERO button also has the alternative function of moving the cursor LEFT in the navigation when using the display for menu navigation.

### MODE Command Button

The MODE button toggles the weight displayed between GROSS, NET, & Count.

- Count is included if this mode is enabled

The MODE button also moves the cursor UP in the navigation when using the display for menu navigation.

### CONFIG (Configuration) Command Button

The CONFIG button minimizes the displayed weight value and provides a submenu structure on the screen which is navigated by the button cluster.

The CONFIG button also moves the cursor DOWN in the navigation when using the display for menu navigation.

### The ENTER Button

Press ENTER button to display the Menus and Sub-Menus or to enter the configured values or selected items from a pick list into non-volatile memory.

- The ENTER button also acts as a PRINT key, when the print mode is enabled. The second level menu functions are selected when the CONFIG button is pressed. While the unit is in the second level menu the function for each button is changed to UP, DOWN, LEFT, or RIGHT to allow the user to navigate, select, and/or enter values for different parameters to configure the instrument.

To move UP or DOWN a list of submenu items the UP or DOWN buttons are used. To select the submenu item either the ENTER or RIGHT button can be used. When the ENTER or RIGHT button is pressed the menu structure transitions to a lower level in the menu hierarchy. This lower level may have an additional submenu list to select from or it may require the user to enter a value.

### Using the Mode, Zero, and Tare buttons

The HI 6500 series instrument weight processor display shows the weight in Gross or Net mode. Use the **MODE** button to change from displaying Gross weights to displaying Net weights.

To Tare the Scale, press the **TARE** button. If the Tare is successful, you will get a message: “Tare OK.” If the Tare is unsuccessful, you will get a message “Tare Failed.” Check the Motion Tolerance parameter. Chapter 4 provides configuration instructions for the Motion Tolerance Parameter.

To Zero the Scale, press the **ZERO** button. If the Zero is successful you will get a message: “Zero OK.” If the Zero is unsuccessful, you will get a “Zero Failed” message. Check the Zero Tolerance parameter. Instructions for setting the Zero Tolerance parameter value is provided in Chapter 4.

### The CONFIG Menu Structure



To configure and setup the HI 6500 series instrument press the CONFIG button. To enable you to continue to monitor the weighing process, the display for the the weight, mode, and zero symbol are reduced in size and placed in the top right hand corner.

A submenu list is provided on the left hand side, with the current item that you have selected highlighted and identified by the ♦ symbol.

The numeric or alphanumeric value for the selected item is displayed in the area shown as ---- **Value** ---- in the above illustration, along with help text for the item selected.

If more than five item are in the submenu list, use the UP/DOWN button to scroll through the submenu list. To select the item from the submenu list press the RIGHT or ENTER key.

### Entering Numeric and Alphanumeric Values

At the lowest level of the menu hierarchy, you may need to enter a numeric value (which could represent a tolerance), or an Ethernet IP address or an alphanumeric value (such as those used for entering a user ID or a security password).

When a parameter value is selected, either the current value is displayed or a 0 (zero) is displayed. In either case, a flashing underscore is generated under the least significant digital or character.

The LEFT and RIGHT buttons move the cursor left and right within the numeric value or character set. In the following three number examples the cursor starts under the 300 value, the LEFT button moves the cursor under the 2000 value in example 2, and in example 3 the RIGHT button moves the cursor under the 40 value.

Example 1:      12345.01

Example 2:      12345.01

Example 3:      12345.01

The UP and DOWN arrows are used to change the displayed digit.

0→1→2→3→4→5→6→7→8→9→.→ →0

The UP button increments from 0 through 9, then the decimal point, space, and back to 0, while the DOWN button decrements from 9 through 0, then the space, decimal point and back to 9.

Example 4:      12345.01

Example 5:      02345.01

Example 6:      \_2345.01

In example 4, the LEFT button is used to select the 10000 value, in example 5 the DOWN button is used to decrement the value to 0. In example 6, then the value is removed to change the original value from 12345.10 to the new value of 2345.01

Once the correct value has been entered, the ENTER button is pressed to accept the value and the left button will return the user to the next higher level in the menu hierarchy.

When a menu item, such as user ID or password enables the use of alphanumeric characters, the process is similar to entering a numeric value with additional characters available when you use the UP/DOWN buttons as shown below.

0→1→.....→9→a→b→.....→z→0

In this example a 4 character security code is entered, and in place of the value being display, four entry boxes are displayed as in example 7.

Example 7:     □ □ □ □

Example 8:     a 0 z 9

As in the numeric example, the UP button increments from 0 through 9, then the alphabet letters a through z, then back to 0, while the DOWN button decrements from 9 through 0, then the alphabet letters z through a, and back to 9.

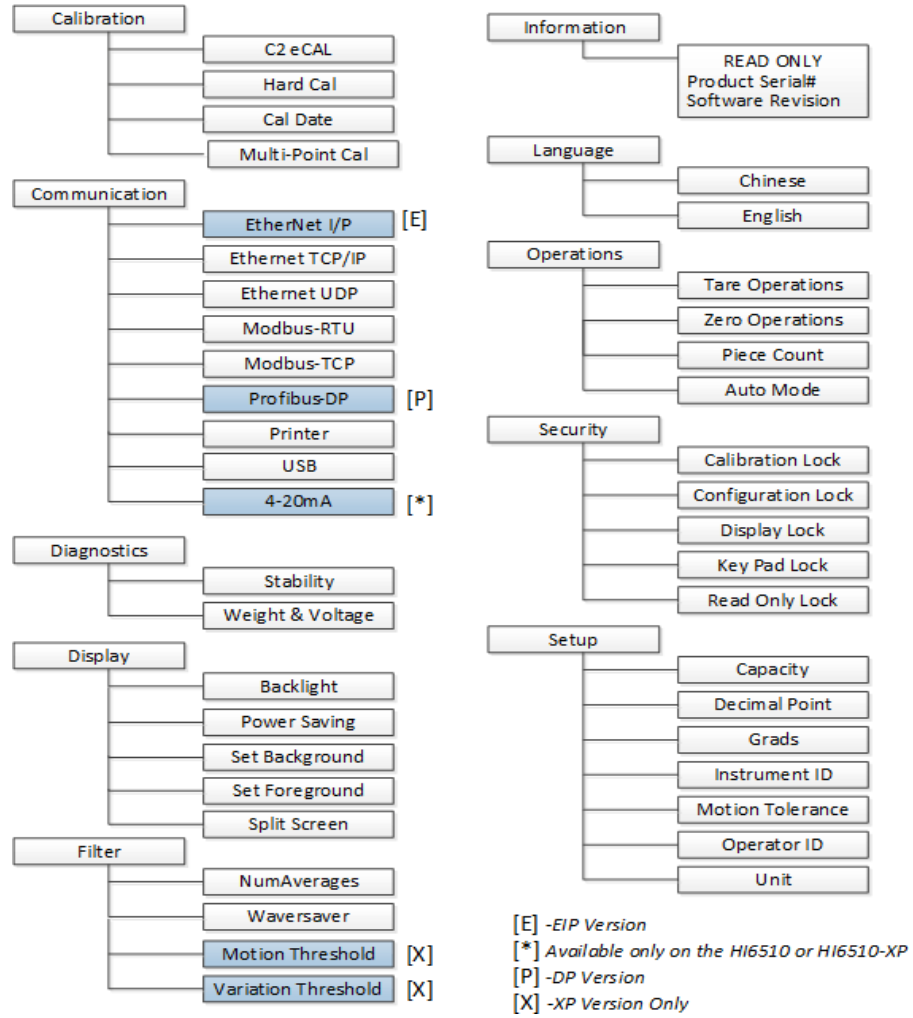
Once the last alphanumeric digit has been entered as shown in example 8, pressing the ENTER button will unlock the keypad if the code entered matches the code in memory.

## Commands and Parameters

The instrument commands and parameters are grouped into 10 categories:

- Calibration = Cal
- Communication = Comm
- Diagnostics = Diag
- Display (only active for units with a front panel display) = Display
- Filter = Filter
- Information = Info
- Language = Language
- Operations = Op
- Security = Security
- Setup = Setup

These 10 categories are further broken down into sets of commands and parameters as shown in the following figure.



## Calibration Menu

- C2 (or eCAL in China)
  - o Sensitivity
  - o Gravity
  - o Ref Wt
  - o Do C2 Calibration
  - o Cal Tol
  - o Num Dev
  
- Hard Cal
  - o Cal Tol
  - o Sensitivity
  - o Cal Lo Wt
  - o Do Cal Lo
  - o Span Wt
  - o Do Cal Hi
  
- Cal Date
- Multi-Point Calibration

## C2 (eCal) Commands and Parameters

### 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:

$$\text{Base Motion value} = (\text{Total Load Cell Capacity} \times 0.0003)$$

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



On the **Web page**, enter the value in the text box provided.

[HELP](#)

Last Calibration: Jan 22, 2013 Cal Type: TRAD

Loadcell Sensitivity

Cal Motion Tolerance

On the **HI 6500 series instrument display**, select the calibration menu and use the UP or DOWN button to select the C2 submenu, then select the Cal Tolerance (Calibration Tolerance) menu item. The current value will be displayed, press the ENTER or the RIGHT button if this value needs to be modified.

### Do C2 (eCAL) Command

When this command is selected the C2 eCAL calibration process is run using the Cal Tolerance, Gravity Correction, Ref Weight, and Sensitivity parameter settings.

#### NOTE

*Ensure the Sensitivity, Gravity and Reference weight are all set prior to running C2 cal command.*

On the **HI 6500 series instrument display**, select the calibration menu and use the UP or DOWN button to select the C2 (eCAL) submenu, then select C2 Cal. The instrument will perform the calculation.

On the **Web page**, left click on the Do C2 (eCAL) button

### Method 1: C2 eCal

cal date	<input type="text" value="Jan"/>	<input type="text" value="22"/>	<input type="text" value="2013"/>
Num Devices	<input type="text" value="1"/>		
Ref Weight	<input type="text" value="0.00"/>		
Gravity Correction	<input type="text" value="1.001500"/>		
<input type="button" value="Do C2 Calibration"/>			

### Multi-Point Calibration

For details on Multi-Point Calibration, see page 123.

### Gravity Parameter

Gravity Correction compensates for an object weighing less at the equator than at the North or South Pole.

Before modifying this value, please read the C2 calibration procedure described in Chapter 6.

On the **Web page**, select the calibration menu and left click inside the Gravity text field and enter the desired Gravity value (see table in Chapter 6).

On the **HI 6500 series instrument display**, select the calibration menu and use the UP or DOWN button to select the DOC2 eCAL submenu, then select the Gravity menu item. The current value will be displayed, press the ENTER or the RIGHT button if this value needs to be modified.

### NumDevices Parameter

The NumDevices is a read only parameter that indicates the number of C2 eCAL load cells that are connected to the HI 6500. This value is automatically calculated when Hardy C2 eCAL load cell(s) are detected during a C2 eCAL Calibration.

On the **Web page**, select the calibration menu and the number of C2 eCAL load cells detected will be shown in the NumDevices text field.

On the **HI 6500 series instrument display**, select the calibration menu and use the UP or DOWN button to select the C2 eCAL submenu, use the IP or DOWN button to select the NumDevices menu item and the number of C2 eCAL load cells detected will be shown on the display.

#### Method 1: C2 eCal

cal date	Jan ▾	22	2013
Num Devices	<input type="text" value="1"/>		
Ref Weight	<input type="text" value="0.00"/>		
Gravity Correction	<input type="text" value="1.001500"/>		
<input type="button" value="Do C2 Calibration"/>			

### 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.

On the **Web page**, select the calibration menu and left click inside the RefWeight text field and enter the desired reference weight value.

On the **HI 6500 series instrument display**, select the calibration menu and use the UP or DOWN button to select the C2 eCAL submenu, then select the Ref Weight menu item. The current value will be displayed, press the ENTER or the RIGHT button if this value needs to be modified.

### 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 6500 optimizes the processing of the analog signal from the load cell, the load sensitivity parameter should be set to match that of the load cell.

On the **Web page**, select the calibration menu and using the Sensitivity drop down list select the required sensitivity value.

[HELP](#)

Last Calibration: Jan 22, 2013 Cal Type: TRAD

Loadcell Sensitivity

Cal Motion Tolerance

On the **HI 6500 series instrument display**, select the calibration menu and use the UP or DOWN button to select the C2 eCAL submenu, then select the Sensitivity menu item. The list of sensitivity values supported will be displayed and the current value will be highlighted, if the sensitivity needs to be modified use the UP and DOWN buttons to select a new value and press the ENTER button.

### 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.

On the **Web page**, enter the value in the text box provided.

### Method 2:Calibration - Zero Cal

cal date     
Ref Weight

### Method 2:Calibration - Span

On the **HI 6500 series instrument display**, select the calibration menu and use the UP or DOWN button to select the Hard Cal submenu, then select the Cal Lo Weight menu item. The current value will be displayed, press the ENTER or the RIGHT button if this value needs to be modified.

#### 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 basemotion 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)

We recommend three graduation sizes.

RANGE: 000001 - 999999 (default 10)

On the configuration **Web page**, enter the value in the text box provided.

[HELP](#)

Last Calibration:Jan 22,2013 Cal Type:TRAD

Loadcell Sensitivity   
Cal Motion Tolerance

On the **HI 6500 series instrument display**, select the calibration menu and use the UP or DOWN button to select the Hard Cal submenu, then select the Cal Tolerance (Calibration Tolerance) menu item. The current value will be displayed, press the ENTER or the RIGHT button if this value needs to be modified.

### 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.

On the **Web page**, left click on the Do Cal Lo button

#### Method 2:Calibration - Zero Cal

cal date    Jan ▾    22    2013  
Ref Weight    0.00

On the **HI 6500 series instrument display**, select the calibration menu and use the UP or DOWN button to select the Hard Cal submenu, then select the Do Cal Lo menu item then press the ENTER button.

### 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.

On the **Web page**, left click on the Do Cal High button as shown.

#### Method 2:Calibration - Span

Span Weight    10000.00

On the **HI 6500 series instrument display**, select the calibration menu and use the UP or DOWN button to select the Hard Cal submenu, then select the Do Cal Hi menu item then press the ENTER button.

### 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.

On the **Web page**, select the calibration menu and left click inside the Span Weight text field and enter the load cell sensitivity value.

#### Method 2: Calibration - Span

Span Weight

On the **HI 6500 series instrument display**, select the calibration menu and use the UP or DOWN button to select the Hard Cal submenu, then select the Span weight menu item. The current Span Weight value will be displayed, press the ENTER or the RIGHT button if this value needs to be modified.

### Cal Date Parameter

The Cal Date parameter is used to record the date when the last calibration was completed on the HI 6500 series instrument. The format is

mm/dd/yyyy

On the **Web page**, select the calibration menu and left click inside the Cal Date text field and enter the date the calibration was completed.

cal date

On the **HI 6500 series instrument display**, select the calibration menu and use the UP or DOWN button to select the Cal Date submenu. The last Cal Date value will be displayed, press the ENTER or the RIGHT button if this date needs to be modified.

### Multi-Point Calibration

For details on Multi-Point Calibration, see page 123.

## Communication Menu

The following parameters are used to setup instrument communication

- EtherNet/IP
- Ethernet TCP/IP
  - DHCP
  - Fixed IP
  - Dynamic IP
  - Mask Address
  - Gateway Address
  - DNS Server
- Ethernet UDP
  - Hardy Port
- Modbus TCP
- Modbus-RTU
  - Slave Address
  - Baud Rate
  - Parity
  - Termination
- Profibus-DP
  - State
  - Node Address
  - Termination
- Printer
  - Baud Rate
- Parity
- USB
  - Restore
  - Save

### HI 6510 Only

- Analog 4-20mA

- o Weight Source
- o Value 4mA
- o Value 20mA
- o mA Output

---

**Communication**

[Ethernet TCP/IP, UDP](#)  
[MODBUS RTU](#)  
[MODBUS TCP](#)  
[Printer](#)  
[USB](#)  
[4 to 20 mA current output](#)  
[Profibus-DP](#)

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### **EtherNet/IP Commands and Parameters**

The HI 6500 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.

[HELP](#)

EIP State Connected

[Diagnostics](#)

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The EtherNet/IP Diagnostics Screen The EIP diagnostic screen may help with troubleshooting connection problems with the HI 6500 series units.



```

EIP State Connected
TCP in 2
TCP out 2
UDP in 0
UDP out 0
UDP IO in 95005
UDP IO out 92286
PCCC in 0
PCCC out 0

```

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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 setup this connection, and these packets show up in the TCP counters.

Finally, there are some older PLCs like the 1746 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 TCP/IP Commands and Parameters

### Enable DHCP Parameter

The **Enable DHCP** parameter enables the network to automatically assign an IP address when DHCP is enabled in the HI 6500. 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 **Web page**, select the communication menu. Then select Ethernet TCP/IP, UDP and select either Enable or Disable from the list next to the DHCP parameter.

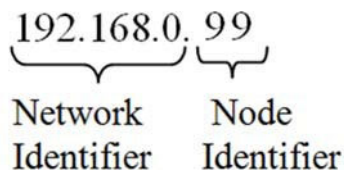
On the **HI 6500 series instrument display**, select the communication menu and use the UP or DOWN button to select the Ethernet TCP/IP submenu, then select the DHCP menu item. The current state of the DHCP value will be displayed, press the ENTER if this value needs to be modified. When modifying this parameter, the ENTER button toggles the parameter between two states Enabled and Disabled, and pressing the LEFT button sets the state for the Enable 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
<input type="button" value="Save Parameters"/>	

### Fixed IP Parameter

The HI 6500 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 injury, property damage and/or interrupted network services, your network administrator should provide this address.



On the **Web page**, select the communication menu and the Ethernet TCP/IP submenu and left click inside the Fixed IP text field and enter the IP address.

On the **HI 6500 series instrument display**, select the communication menu and use the UP or DOWN button to select the Ethernet TCP/IP submenu, then select the Fixed IP menu item. The current IP address for the Fixed IP value will be displayed, press the ENTER or the RIGHT button if this value needs to be modified.

#### **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**, select the communication menu and the Ethernet TCP/IP submenu, and left click inside the Mask Address text field and enter the mask address.

On the **HI 6500 series instrument display**, select the communication menu and use the UP or DOWN button to select the Ethernet TCP/IP submenu, then select the Mask Address menu item. The current Mask Address value will be displayed, press the ENTER or the RIGHT button if the Mask Address needs to be modified.

#### **Gateway Address Parameter**

The Gateway Address parameter, is required when the HI 6500 series instrument needs to communicate to a remote host.

On the **Web page**, select the communication menu and the Ethernet TCP/IP submenu, and left click inside the Gateway Address text field and enter the Gateway address.

On the **HI 6500 series instrument display**, select the communication menu and use the UP or DOWN button to select the Ethernet TCP/IP submenu, then select the Gateway Address menu item. The current Gateway Address value will be displayed, press the ENTER or the RIGHT button if the Gateway Address needs to be modified.

### DNS Server Parameter

The DNS Server parameter provides the host name when the HI 6500 series instrument is communicating with a remote host.

On the **Web page**, select the communication menu and the Ethernet TCP/IP submenu, and left click inside the DNS Server text field and enter the domain name of the DNS Server.

On the **HI 6500 series instrument display**, select the communication menu and use the UP or DOWN button to select the Ethernet TCP/IP submenu, then select the DNS Server menu item. The current DNS server domain name will be displayed, press the ENTER or the RIGHT button if the DNS Server domain name needs to be modified.

### Ethernet UDP Parameters

Ethernet UDP enables the HI 6500 series instrument to send messages, datagrams, to other hosts on the IP network.

Ethernet UDP Command Parameters							
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 Parameter

The Hardy Port parameter 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 **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 6500 series instrument 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 Commands and Parameters

The HI 6500 instrument 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](#)

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The Modbus TCP and Modbus RTU Diagnostics screen may help with troubleshooting connection problems with the HI 6500 series units.

The Modbus Diagnostics parameters count the number of frames received by the Hardy 6500 unit 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 No Connection

Valid Frames

Error Frames

Received Frames

---

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## 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 6500 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 6500 series instrument.

[HELP](#)

Slave Address	<input type="text" value="3"/>
Baud Rate	<input type="text" value="9600"/>
Parity	<input type="text" value="even"/>
<input type="button" value="Save Parameters"/>	
Valid Frames	<input type="text" value="0"/>
Error Frames	<input type="text" value="0"/>
Received Frames	<input type="text" value="0"/>

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On the **HI 6500 series instrument 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.

[HELP](#)

Slave Address	<input type="text" value="3"/>
Baud Rate	<input type="text" value="9600"/>
Parity	<input type="text" value="even"/>
<input type="button" value="Save Parameters"/>	
Valid Frames	<input type="text" value="0"/>
Error Frames	<input type="text" value="0"/>
Received Frames	<input type="text" value="0"/>

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On the **HI 6500 series instrument 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.

The screenshot shows a web configuration interface for the HI 6500 series instrument. At the top left, there is a blue link labeled "HELP". Below it, there are several input fields and a button. The "Slave Address" field contains the value "3". The "Baud Rate" field is a dropdown menu currently set to "9600". The "Parity" field is a dropdown menu currently set to "even". Below these fields is a blue button labeled "Save Parameters". Underneath the button, there are three more input fields: "Valid Frames" with the value "0", "Error Frames" with the value "0", and "Received Frames" with the value "0". At the bottom of the page, there is a navigation bar with the text "Home - Configuration - HI 6300 Series Online Support Site".

On the **HI 6500 series instrument 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.

### Termination Parameter

The Termination Parameter has three options, DISABLE, ENABLE and LINK.

- Step 1. On the **Web page**, select the Termination drop down and select the termination condition. 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.
- Step 2. Select Save Parameter to save the entry.
- Step 3. Click Home to return to the home page.

## MODBUS RTU

[HELP](#)

Modbus status No Connection

Slave Address

Baud Rate

Parity

Termination

[Diagnostics](#)

## Profibus-DP Commands and Parameters

### Profibus-DP

[HELP](#)

State

Serial Option

Profibus Node

Termination

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## Serial Option

### Profibus-DP

[HELP](#)

State Initializing

Serial Option Profibus-DP ▾

Profibus Node Profibus-DP  
Modbus-RTU

Termination Link ▾

Save Parameters

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## Termination

### Profibus-DP

[HELP](#)

State Initializing

Serial Option Profibus-DP ▾

Profibus Node 5

Termination Link ▾

Save Parameters Disable  
Enable  
Link

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## Printer Command Parameters

### RS-232 printer configuration.

The Printer Mode selects what will be transmitted to the serial printer over the RS-232 interface

- Gross Weight (default)
- Net Weight
- Tare Weight
- Unit Count
- All – Gross, Net, Tare, and Count
- (if Count enabled) values
- OFF, Printer disabled.

If the Count Mode is not enabled, the option to select count is disabled, and if the “All” option is selected, the Unit Count value is not printed.

Selecting the “OFF”, Printer Mode option disables the print function.

If any other option is selected when the display is at the summary page level, pressing the ENTER key is sending the selected weight values over the serial interface to the printer.

#### NOTE

*When in the split screen mode, to initiate a print the user needs to:*

1. *Use the left/right, up/down arrows to select the unit to print from.*
2. *Press Enter to go to the units summary page level.*
3. *Press the configuration key to select*
  - a. *Exit to go back to split screen display*
  - b. *Configuration to enter the configuration menu*
  - c. *Print to send the data to the printer.*

**On the Web page**, select the communication menu and using the Printer Mode down list select the required weight value(s) to send to the printer.

**On the HI 6500 series instrument display**, select the communication menu and use the UP or DOWN button to select the Printer submenu, then select the Printer Mode menu item. The list of options available will be displayed and the current printer Mode will be highlighted, if the printer Mode needs to be modified use the UP and DOWN buttons to select a new option and press the ENTER button.

### Baud Rate Parameter

No specific baud rate is specified for printer, the BaudRate parameter is used to set the baud rate for the printer connected to the instrument, typically 9,600 or 19,200.

**On the Web page**, select the communication menu, and left click inside the BaudRate text field and enter the BaudRate.

**On the HI 6500 series instrument display**, select the communication menu and use the UP or DOWN button to select the Printer 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 Bit Parameter

The Parity Bit parameter has three options, EVEN, ODD, or OFF.

**On the Web page**, select the communication menu, and then select the Printer submenu, and left click inside the Parity field and select between EVEN, ODD, or OFF using the drop down menu..

**On the HI 6500 series instrument display**, select the communication menu and use the UP or DOWN button to select the Printer submenu, then select the Parity menu item. The current Parity value will be displayed, press the ENTER or the RIGHT button if the Parity needs to be modified.

### USB Memory Stick Parameters

The HI6500 provides an interface to an external USB memory stick that allows parameters to be saved, restored or transferred to another instrument.

### Restore Command

This command replaces the existing HI6500 series parameters by the parameters stored on a USB memory stick.

You can create a "Restore.txt" file on the USB drive that when present in the HI 6500 directory, upon powerup, the unit will perform a restore function using this file and overwriting the affected parameters in the unit.

You can also create a safety "restore.txt" file by using a Params.txt file created when doing a "SAVE" function to the USB drive and copying/renaming it to Restore.txt. This will enable you to modify this Restore file by making any required changes or deleting parameters or changing parameter values in the file. Any changed values will overwrite parameters in the unit.

**On the Web page**, go the communication menu and left click on the Restore button.



**On the HI 6500 series instrument 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 6500 parameters to a USB memory stick.

**On the Web page**, go the communication menu and left click on the Save button.

**On the HI 6500 series instrument 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.

## 4-20 mA Communications Commands and Parameters

### Available on the HI6510 only

The analog 4-20mA output is directly proportional to the programmed gross, net, or count range; by setting the low value equal to 4mA and the high value equal to 20mA. These values can be set from either the front panel or the web interface.

### Weight Source Parameter

The weight source allows the 4-20mA output to be proportional to the gross weight, the net weight, a count, or can be set to a known mA value

**On the Web page**, select the communication menu and using the weight source down list select the required source for the 4 to 20mA output.

[HELP](#)

Weight Source	Gross ▾
Value 4mA	0.00
Value 20mA	1050.00
mA Output	4.000

---

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**On the HI 6510 series instrument display**, select the communication menu and use the UP or DOWN button to select the 4-20mA submenu, then select the weight source menu item. The list of sources available will be displayed and the current value will be highlighted, if the source needs to be modified use the UP and DOWN buttons to select a new value and press the ENTER button.

### Value 4mA Parameter

Sets the minimum value that will produce a 4mA output value

**On the Web page**, select the communication menu and left click inside the Value4mA text field and enter the value.

**On the HI 6510 series instrument display**, select the communication menu and use the UP or DOWN button to select the 4-20mA submenu, then select the Value4mA menu item. The current value will be displayed, press the ENTER or the RIGHT button if this value needs to be modified.

### Value 20mA Parameter

Sets the high value that will produce a 20mA output.

**On the Web page**, select the communication menu and left click inside the Value20mA text field and enter the value.

**On the HI 6510 series instrument display**, select the communication menu and use the UP or DOWN button to select the 4-20mA submenu, then select the Value20mA menu item. The current value will be displayed, press the ENTER or the RIGHT button if this value needs to be modified.

### mA Output Parameter

Sets a fixed mA output level when the weight source selected is manual. If any weight source other than manual is selected, this is a read only value showing what the current output level is in real time for the weight source selected.

**On the Web page**, select the communication menu and left click inside the mA Output text field and enter the desired mA value.

**On the HI 6510 series instrument display**, select the communication menu and use the UP or DOWN button to select the 4-20mA submenu, then select the Value20mA menu item. The current value will be displayed, press the ENTER or the RIGHT button if this value needs to be modified.

### NOTE

*The analog output is not isolated. A 4-20mA isolator may be required for stable readings depending on ground conditions.*

**WARNING - THE HI 6510 ANALOG 4 TO 20mA IS AN OUTPUT SOURCE. DO NOT CONNECT THE 4 TO 20mA OUTPUT TO ANOTHER INTERNAL OR EXTERNAL ANALOG SOURCE. TO DO SO MAY RESULT IN PROPERTY DAMAGE AND/OR PERSONAL INJURY.**

**AVERTISSEMENT – Le HI 6510 analogiques 4 à 20 mA est une source de sortie. Ne pas brancher la sortie 4 à 20 mA à l'autre Source analogique interne ou externe. Pour ce faire peut entraîner des dommages matériels et / ou corporels.**

## Diagnostics Parameter Menu

Diagnostics is covered extensively in Troubleshooting (Chapter 9).

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

See the Chapter 9 for further information on Diagnostics.

## Display Parameter Menu

The following sets of parameters are only active from the display panel when the display panel is attached to the instrument. They are not enabled on the Web Page.

- Backlight
- Power Saving
- Set Background
- Set Foreground
- Split Screen
  - o Display Mode
  - o Discover (Command)
  - o Num Display
  - o Display Order

### Backlight Parameter

The Backlight parameter sets the display panel brightness level in 16 equal steps shown as a progress bar on the instrument.

On the **HI 6500 series instrument display**, select the display menu and use the UP or DOWN button to select the Backlight submenu. The current Backlight level will be displayed, press the ENTER button if the value needs to be modified, and use the LEFT or RIGHT buttons to set the required backlight level. Press the ENTER button to set and save the backlight value.

### Power Saving Parameters

To conserve power the display can be automatically dimmed towards a blank screen. While the weight value is not in motion for the programmed Wait Time, the text is dimmed in 2 steps towards the blank level for the display. If the weight value is in motion, or the ENTER button is pressed on the display, the value returns immediately to the preset background and foreground levels.

### Auto Enable Parameter

The Auto Enable parameter is used to turn ON or OFF the power saving mode.

On the **HI 6500 series instrument display**, select the display menu and use the UP or DOWN button to select the Power Saving submenu, then select the Auto Enable menu item. The current state, ON or OFF, will be displayed. Press the ENTER button if the state needs to be modified. When modifying this parameter, ENTER toggles the parameter between the two states ON and OFF, and pressing the ENTER button sets the state for the Auto Enable parameter.



### Wait Time Parameter

The Wait Time parameter is the amount of time the instrument waits before entering power saving mode. The time unit for the Wait Time parameter is in integer multiples of minutes. The Wait Time can be set between 0 and 480 minutes (8 hours).

On the **HI 6500 series instrument display**, select the communication menu and use the UP or DOWN button to select the Power Saving submenu, then select the Wait Time submenu. The current Wait Time value will be displayed, press the ENTER or the RIGHT button if the value needs to be modified.

### Set Background Parameter

The Set Background parameter sets the monochrome level of the display background, the non-text areas of the display, in 32 equal steps, shown as a progress bar.

The Set Background value can be any value between 0 (Black) and 31 (White) as shown in the parameter dump.

On the **HI 6500 series instrument display**, select the display menu and use the UP or DOWN button to select the Set Background submenu. The current background level will be displayed, press the ENTER button if the level needs to be modified, and use the LEFT or RIGHT buttons to set the required background level. Press the ENTER button to set and save the background value.

### Set Foreground Parameter

The Set Foreground parameter sets the monochrome level of the display foreground, in other words the text areas of the display, in 32 equal steps shown as a progress bar.

The Set Foreground value can be any value between 0 (Black) and 31 (White) as shown in the parameter dump.

On the **HI 6500 series instrument display**, select the display menu and use the UP or DOWN button to select the Set Foreground submenu. The current foreground value will be displayed, press the ENTER button if the value needs to be modified, and use the LEFT or RIGHT buttons to set the required foreground level. Press the ENTER button to set and save the foreground value.

### Split Screen Parameters and Commands

The HI 6500 Series supports a split screen summary page mode in addition to the single screen summary page mode available on the HI 6500.

The split screen modes provides up to four summary pages on the display at the same time.



When the split screen mode is enabled the HI 6500 series automatically detects up to four HI 6500 instruments connected to the same display. To avoid confusion the instrument 15 character instrument ID is display in each screen segment, and the sequence the instruments are displayed can be modified under user control.



## Display Order Parameter

The display order provides the user the ability to set the sequence the instruments are displayed on the screen.

Instrument A	Instrument B
Instrument C	Instrument D

**On the Web page**, this option not configurable via the web interface

**On the HI 6500 instrument display**, select the display menu and use the UP or DOWN button to select the Split Screen submenu, then select the Display Order menu item. The current instrument sequence is displayed:

**Instrument A**

**Instrument B**

**Instrument C**

**Instrument D**

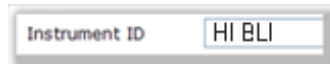
Use the UP or DOWN buttons to select the instrument to change and press ENTER to “pick up” the instrument, then use the UP or DOWN buttons to move the instrument UP or DOWN in the sequence list. Once the instrument is in the correct position in the instrument sequence then press ENTER to “set down” the instrument and establish the new instrument sequence. This process can be repeated until the instruments are in the required order.

## Instrument ID Parameter

The Instrument ID parameter provides unique identification for the HI 6500 series instrument.

RANGE: 19 Characters (default BLINST)

**On the Web page**, enter a name to identify the instrument in the Instrument ID text field. We used “HI BLI.” In this example.



**On the HI 6500 series instrument display**, select the Setup menu and use the UP or DOWN button to select the Instrument ID menu item. The current Instrument ID will be displayed, press the ENTER or the RIGHT button if this identifier needs to be modified and use the UP, DOWN, LEFT, and RIGHT buttons to input a new identifier, then press the ENTER button to save and exit this menu.

## Mode Parameter

The mode parameter selects between the single unit mode and multiple unit mode. If you have multiple units hooked up to the display and disable split screen mode, you will get data from only one of the units.

**On the Web page**, this parameter is not configurable via the web interface.

**On the HI 6500 series instrument display**, select the display menu and use the UP or DOWN button to select the Split Screen submenu, then select the Mode menu. The current mode will be displayed, press the ENTER or the RIGHT button if the mode needs to be modified.

## Num Display Parameter

The Num Display parameter sets the number of displays to be shown in the split screen mode. If a number less than four is selected, any display segments above the Num Display value will be blanked (set to the background color)

**On the Web page**, this parameter is not configurable via the web interface.

**On the HI 6500 series instrument display**, select the display menu and use the UP or DOWN button to select the Split Screen submenu, then select the Num Display menu item. The current Num Display value will be displayed, press the ENTER or the RIGHT button if this value needs to be modified.

## Discover Command

This command starts the automatic HI 6500 series instrument network discovery of up to four instruments. Once discovered, the instruments would be available for display in the split screen mode.

**On the Web page**, this parameter is not configurable via the web interface.

**On the HI 6500 series instrument display**, select the Display menu and use the UP or DOWN button to select the Split Screen submenu, then select the Discover menu item then press the ENTER button.

## Filter Parameter Menu

There are two parameters in the Filter menu

- NumAverages (Number of Averages)
- WAVERSAVER

Only the HI 6500-XP and the HI 6510-XP units have additional options for WAVERSAVER+, Motion Threshold and Variation Threshold.

## 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 6500 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:1-255 (default 10)

On the **Web page**, select the Filter menu selection and enter the value for the number of readings to factor into the average. Our example (for illustration only) has set 10 for Number of Averages. Yours will vary depending on your application.

WAVERSAVER® 1.0 Hz ▾  
Num Averages 10  
Save Parameters

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On the **HI 6500 series instrument display**, select the Filter menu and use the UP or DOWN button to select the NumAverages menu item. The current value will be displayed, press the ENTER or the RIGHT button if this value needs to be modified.

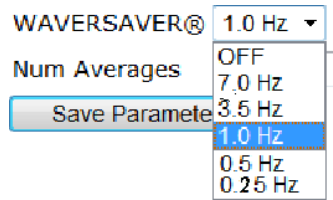
#### WAVERSAVER® Parameter

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**, from the pull-down list, select the FILTER menu and then select the value for WAVERSAVER.



On the **HI 6500 series instrument display**, select the FILTER menu and use the UP or DOWN button to select WAVERSAVER menu item. The current value will be displayed. If the WAVERSAVER selection needs to be modified, press the ENTER key, then use the UP and DOWN buttons to select a new value and press the ENTER button to set and save the new WAVERSAVER setting.

### **WAVERSAVER+ Options: Variation Threshold and Motion Threshold (HI 6500-XP and HI 6510-XP only)**

WAVERSAVER+ is a superset of WAVERSAVER that uses two entirely new parameters, Variation Threshold and Motion Threshold. These two parameters add a patent-pending adaptive filtering algorithm to the WAVERSAVER output that provides stability to weight readings of up to 1:30,000.

On the **web page**: configure WAVERSAVER+ by first setting the WAVERSAVER and Numaverages parameters to establish the speed and required accuracy for dynamic weighing. Set the Variation Threshold 0.0 and observe the peak to peak variation of the weight value. Then set the variation threshold parameter to be 1.5 times larger than the observed weight variation. Set the Motion Threshold to 1/3 of the observed peak to peak weight variation.

For example, if the observed weight change is 6, set the Variation Threshold should be set to 9 (1.5X) and the Motion Threshold parameter set to 2 (1/3X). Note that the weight changes will settle to a 2 increment level.

Weight changes smaller than 1:30,000 will need considerations for environmental protections from air movement forces and additional WAVERSAVER and NumAverages settings.

The default factory setting is 0.0; which turns WAVERSAVER+ OFF

**Filter**

[HELP](#)

WAVERSAVER®

Num Averages

WAVERSAVER+ Settings [?](#)

Variation Threshold

Motion Threshold

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On the **HI 6500-XP series instrument display**, select the FILTER menu and use the UP or DOWN button to select WAVERSAVER+ menu items. The current value will be displayed. If the WAVERSAVER+ selection needs to be modified, press the ENTER key, then use the UP and DOWN buttons to select a new value and press the ENTER button to set and save the new WAVERSAVER+ setting.

### Information Page

The information page merely displays the firmware versions and description of the HI 6500 series instrument.

Information	
Firmware Revision	HI6500 1.0.0.00
Product Serial	E0-03-70-51-F0-E0-41-30
DSP version	8
Boot version	4
Display Version	1.11
Display Serial	58-22-60-51-90-A0-41-30
Display Boot Revision	3

On the **HI 6500 series instrument display**, the information displays on two screens. From the first page, pressing the right arrow progresses to the second screen and pressing the left arrow will exit.

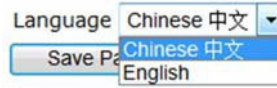
### Language Parameter Menu

There are 2 possible language selections. The factory default is English:

- Chinese
- English (default)

The Language selected for the front panel **HI 6500 series instrument display** menu is independent of the language setting for the **Web Page**.

To change the Language on the **Web Page**, select English or Chinese from the Drop Down Menu and click on Save Parameter.



From the **HI 6500 series instrument display**, select the Language menu, press Enter and use the UP or DOWN arrow to select your language of choice and press Enter. This will change the language used on the front panel display.

**NOTE**

*If you have multiple HI 6500 units attached to the display, it will change the language for all the units connected to the display, and not just the one you made the change on.*

## Operations Parameter Menu

The following parameters are used to setup the 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 Enable
  - o Weigh Sample

### Tare Operations Commands and Parameters

#### Tare Amount Parameter

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.

**NOTE**

*On the Webpage, the value will appear on the Operations web page under Tare Operations. Tare may also be accessed on the Monitor Page.*



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

**Operation**  
HELP

**Weight Input**

Item	Value
Gross	51863.0 g
Net	51847.0 g
Piece Count	12962
StatusWordA/D Conversion Error*	00000001
Periodic	<input checked="" type="checkbox"/>

Count Enable: Enabled

Unit Weight: 4.00000

Save Parameters

Sample Size: 2

Weigh Sample

Zero Tolerance: 464.0

Zeroed Amount: 0.0

Tare offset: 0.0

Tare amount: 16.0

Save Parameters

Auto mode: Enabled

display mode: Count

Save Parameters

Tare

Zero

Reload Page

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On the **HI 6500 series instrument display**, select the Operations menu and use the UP or DOWN button to select the Tare Operations submenu, then select the Tare Amount menu item. The current value will be displayed, press the ENTER or the RIGHT button if this value needs to be modified.

### Tare Offset Parameter

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)

On the **Web page**, under the Operation menu enter the value in the editable text box provided next to Tare Offset.

On the **HI 6500 series instrument display**, select the Operations menu and use the UP or DOWN button to select the Tare Operations submenu, then select the Tare Offset menu item. The current value will be displayed, press the ENTER or the RIGHT button if this value needs to be modified.



### Tare Command

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**, left click on the Tare button located in the Operations page.

**NOTE**

*The Tare operation will fail if the scale is in motion.*

On the **HI 6500 series instrument display**, select the calibration menu and use the UP or DOWN button to select the Tare Operations submenu, then select the Tare menu item and press the ENTER button to execute this command.

### Zero Operations Commands and Parameters

#### Zero Tolerance Parameter

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)

On the **Web page**, select the Operations menu and enter the value in the text box provided. Our example, for illustration only, sets the Zero Tolerance to 10.0

The screenshot shows a configuration interface with the following elements:

- Zero Tolerance:
- Zeroed Amount:
- Tare offset:
- Tare amount:
- Save Parameters:
- Tare:
- Zero:

On the **HI 6500 series instrument display**, select the Operations menu and use the UP or DOWN button to select the Zero Operations submenu, then select the Zero Tolerance menu item. The current value will be displayed, press the ENTER or the RIGHT button if this value needs to be modified.

#### Zero Amount Parameter

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

On the **Web page**, the value will appear on the Operations web page.

Zeroed Amount

On the **HI 6500 series instrument display**, select the Operations menu and use the UP or DOWN button to select the Zero Operations submenu, then select the Zero Amount menu item. The current value will be displayed.

### Zero Command

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 goes to 0.00 if the Gross weight is being displayed.

On the **Web page**, select the Operations menu and left click on the Zero button



On the **HI 6500 series instrument display**, select the Operations menu and use the UP or DOWN button to select the Zero Operations submenu, then select the Zero menu item and press the ENTER button to execute this command.

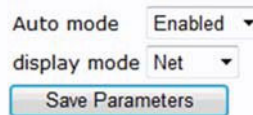
### NOTE

*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.

On the **Web page**, select the Operations menu and left click to pull down the



Enabled/Disabled command to select Auto mode. Next select display mode Gross or Net. Then click on the Save Parameters button.

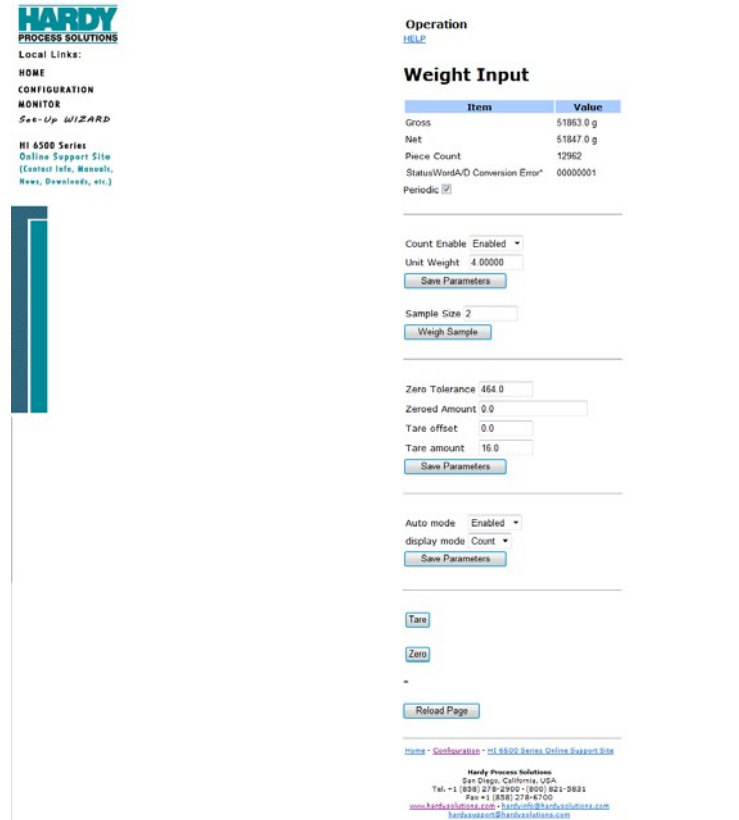
On the **HI 6500 series instrument display**, select the Operations menu and use the UP or DOWN button to Enable or Disable Automode. For display mode, select Gross or Net. Press the ENTER button to execute this command.

### Count Operations Parameters and Commands

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

**On the HI 6500 series instrument display**, select the Operations menu and use the UP or DOWN button to select the Piece Count submenu. Select Count Enable to allow the option of running the instrument in count mode.

Piece Count can be displayed on the main screen by pressing the MODE button and cycling through to the count mode: GROSS > NET > COUNT >



**Determining Piece Count:**

**If the weight of an individual piece is known:**

Select Unit Weigh by pressing ENTER and input the single unit weight value using the UP, DOWN, RIGHT and LEFT arrows.

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

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

**To weigh the items:** Place the items to be counted onto the scale and then press enter while Weigh Sample is selected. The instrument will then count the items on the scale.

**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 larger number of pieces when the weight of individual pieces varies.***

On the **Web page**: first select Count Enabled, and then either enter the weight of a unit in the unit weight field, or use the weigh sample field entering the correct number of pieces in the Sample size field as shown above. Then click on the weigh sample field.

## Security Parameter Menu

A detailed description of the security features is provided in Chapter 8.

- Calibration Lock
  - Calibration Lock
  - Calibration Password
- Configuration Lock
  - Configuration Lock
  - Password
- Display Lock
  - Display Lock
  - Display Password
- Keypad Lock
  - Keypad Lock
  - Keypad Password
- Read Only Lock
  - Read Only Lock
  - Read Only Password

**NOTE**

***The security parameters can be accessed via the 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 security menu allows the user to lock out different levels of the menu hierarchy. The user-configurable security settings only limit access through the front panel to ensure the consistency of the instrument setup and weighing process. Parameter configuration through the network is unaffected by these security settings.

The factory default for the security menu is to disable all lock modes and to preset each of the security passwords to 1234. Below is another example where each password in the security menu is different.

cal lock enabled	OFF ▾	password	1111
config lock enabled	OFF ▾	password	2222
display lock enabled	OFF ▾	password	3333
keypad lock enabled	OFF ▾	password	4444
read only lock enabled	OFF ▾	password	5555
<input type="button" value="Save Parameters"/>			

[Home](#) - [Configuration](#) - [HI 6300 Series Online Support Site](#)

## The Calibration Lock Parameters

### Calibration Lock Parameter

When the Calibration Lock is enabled, the ability to run calibration through the front panel is disabled unless the correct calibration password is entered by the operator. If the Calibration lock is disabled, then calibration through the front panel is enabled.

On the **Web page**, on the security web page, select the Calibration Lock parameter, change the password or leave it at the default password and then select either Enable or Disable from the drop down list.

On the **HI 6500 series instrument display**, select the security menu and use the UP or DOWN button to select the Calibration Lock submenu, select the Calibration Lock submenu, press enter. You will be prompted for the current password. Enter the correct password to access the menu. Select the Lock menu selection, then select the Calibration Lock parameter. The current state, Enabled or Disabled, will be displayed. To change the state of this parameter, press the ENTER button.

### Calibration Password Parameter

The Calibration Password is a four digit alphanumeric character sequence. If the sequence is not entered correctly through the front panel display the menu leaves the Calibration Lock submenu unchanged.

On the **Web page**, select the security menu. The Calibration Password will be displayed on the security web page. To change the Calibration Password, left click inside the text field and enter a new 4 character alphanumeric password or leave it at the default password. The current state, Enabled or Disabled, will be displayed. To change the state of this parameter, change the value on the drop down menu.

On the **HI 6500 series instrument display**, select the Security menu and use the UP or DOWN button to select the Calibration Lock submenu. To change the current password, arrow down to the password menu item and press enter. Now using the arrow keys to enter the new password. Press enter to accept. Press left arrow key to exit the menu. To

change the current password press the ENTER or RIGHT button and enter the current password, then simply enter the new password and press the ENTER button to save and exit this submenu; and return to the top level security menu.

## The Configuration Lock Parameters

### Configuration Lock Parameter

When the Configuration Lock is enabled, the ability to enter the configuration menu structure is disabled. If the Configuration Lock is disabled, all parameters except the security parameters can be read through the front panel. The ability to modify these parameters however is controlled by the calibration, read only, and keypad lock parameters. This will stop the use of the keypad, but will not stop the ability to change a parameter if the correct password is used.

On the **Web page**, on the security web page, select the Configuration Lock parameter, then select either Enable or Disable from the drop down list.

On the **HI 6500 series instrument display**, select the security menu and use the UP or DOWN button to select the Configuration Lock submenu enter the 4 character alphanumeric configuration password, then select the Configuration Lock parameter. To ENABLE the Configuration Lock parameter, press the ENTER button.

### Configuration Password Parameter

The Configuration Password is a four alphanumeric character sequence. If the password sequence is not entered correctly through the front panel display the menu leaves the Configuration Lock submenu.

On the **Web page**, select the security menu, the Configuration Password will be displayed on the security web page. To change the Configuration Password, left click inside the text field and enter the new 4 character alphanumeric password.

On the **HI 6500 series instrument display**, select the Security menu and use the UP or DOWN button to select the Configuration Lock submenu. Enter the current password to enter the submenu. To change the current password, arrow to "password" menu selection, enter and use the arrow keys to enter a new password, To change the current password press the ENTER or RIGHT button and enter the current password, then simply use the arrow keys to enter the new password and press the ENTER button to save and exit this submenu; and return to the top level security menu.

## The Display Lock Parameters

### Display Lock Parameter

The Display Lock disables and blanks the 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.

**NOTE**

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

On the **Web page**, on the security web page, select the Display Lock parameter, then select either Enable or Disable from the drop down list.

**On the HI 6500 series instrument display**, select the security menu and use the UP or DOWN button to select the Display Lock submenu, enter the password and then select the Display Lock parameter. To ENABLE the Display Lock parameter, press the ENTER button.

**Display Password Parameter**

The Display Password is a four alphanumeric character sequence. If the sequence is not entered correctly through the front panel display the menu leaves the Display Lock submenu.

On the **Web page**, select the security menu, the Display Password will be shown on the security web page. To change the Display Password, left click inside the text field and enter the new four character alphanumeric password.

On the **HI 6500 series instrument display**, select the Security menu and use the UP or DOWN button to select the Display Lock submenu. To change the current password press the ENTER or RIGHT button and enter the current password, then simply enter the new password and press the ENTER button. Press the ENTER button to save and exit this submenu and return to the top level security menu.

**The Keypad Lock Parameters****Keypad Lock Parameter**

The Keypad Lock disables the front panel keypad. If the ENTER button is pressed, a password dialog box is shown on the screen. If the correct password is entered the Keypad is unlocked. If the ENTER button is pressed again the Keypad Lock parameter is reset to its original locked state.

On the **Web page**, on the security web page, select the Keypad Lock parameter, then select either Enable or Disable from the drop down list.

On the **HI 6500 series instrument display**, select the security menu and use the UP or DOWN button to select the keypad lock submenu. Enter the password and then press the ENTER button. Select ENABLE and press the ENTER button to save and exit this submenu.

## Keypad Password Parameter

The Keypad Password is a four alphanumeric character sequence. If the sequence is not entered correctly the menu leaves the Keypad Lock submenu.

On the **Web page**, select the security menu, the Keypad Password will be displayed on the security web page, to change the Keypad Password left click inside the text field and enter a new 4 character alphanumeric password and press enter.

On the **HI 6500 series instrument display**, select the security menu and use the UP or DOWN button to select the keypad Password submenu. Enter the password and then press the ENTER button. Select ENABLE and press the ENTER button to save and exit this submenu.

## The Read Only Lock Parameters

### Read Only Lock Parameter

The Read Only Lock enables the operator to view all the parameters but not modify their values or state. There are two exceptions to this;

- 1 It is possible to enter the calibration submenu, but the operator must enter the Calibration Password if the Calibration Lock is ENABLED.
- 2 The security parameters can only be changed if the operator knows the required security password.

On the **Web page**, on the security web page, select the Read Only Lock parameter, then select either Enable or Disable from the drop down list.

On the **HI 6500 series instrument display**, select the security menu and use the UP or DOWN button to select the read only submenu. Select Read Only and then press the ENTER button. Select ENABLE and press the ENTER button to save and exit this submenu.

To change the state of this parameter, press the ENTER button. Pressing the ENTER button selects the new state for the Read Only Lock parameter.

### Read Only Password Parameter

The Read Only Password is a four alphanumeric character sequence. If the sequence is not entered correctly the menu leaves the Read Only Lock submenu.

On the **Web page**, select the security menu, the Read Only Password will be displayed on the security web page, to change the Read Only Password left click inside the text field and enter the new 4 character alphanumeric password.



On the **HI 6500 series instrument display**, select the Security menu and use the UP or DOWN button to select the Read Only submenu. Enter the password and then change the current password press the UP or DOWN button and enter the current password then arrow to "password" and enter and use the arrow keys to enter new password and press the ENTER button to save and exit this submenu; and return to the top level security menu.

## Setup Parameter Menu

The Setup Menu consists of the following parameters:

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

### 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**, enter the capacity in the text box provided

Scale Capacity

On the **HI 6500 series instrument display**, select the Setup menu and use the UP or DOWN button to select the Capacity item. The current value will be displayed, press the ENTER or the RIGHT button if this value needs to be modified.

### Decimal Point Parameter

Use the Decimal Point Parameter to set the resolution you want for the instrument. 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**, from the Decimal Point pull-down list, select the decimal position for this instrument.

[HELP](#)

Unit

Operator ID

Instrument ID

Decimal Point

Grads

Motion Tolerance

Scale Capacity

On the **HI 6500 series instrument display**, select the Setup menu and use the UP or DOWN button to select the Decimal Point menu item. The list of decimal point values supported will be displayed and the current value will be highlighted, if the decimal point needs to be modified use the UP and DOWN buttons to select a new value and press the ENTER button.

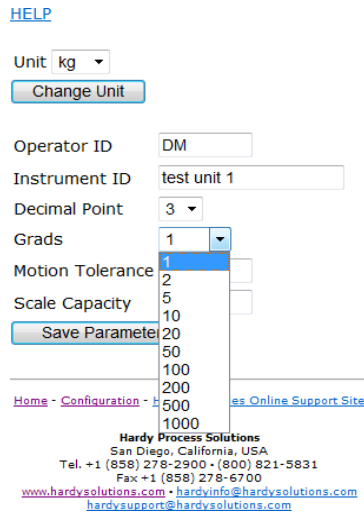
### Graduation Size Parameter

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**, from the Grads pull-down menu, select a Graduation Size Parameter for this instrument.



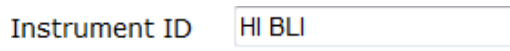
On the **HI 6500 series instrument display**, select the Setup menu and use the UP or DOWN button to select the Grads menu item. The list of graduation sizes supported will be displayed and the current value will be highlighted. If the graduation size needs to be modified, use the UP and DOWN buttons to select a new value and then press ENTER.

**Instrument ID Parameter**

The Instrument ID parameter provides unique identification for the HI 6500 series instrument.

RANGE: 19 Characters (default BLINST)

On the **Web page**, enter a name to identify the instrument in the Instrument ID text field. We used “HI BLI.” In this example.



**On the HI 6500 series instrument display**, select the Setup menu and use the UP or DOWN button to select the Instrument ID menu item. The current Instrument ID will be displayed, press the ENTER or the RIGHT button if this identifier needs to be modified and use the UP, DOWN, LEFT, and RIGHT buttons to input a new identifier, then press the ENTER button to save and exit this menu.

**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**, enter the value in the text box provided.

Motion Tolerance

On the **HI 6500 series instrument display**, select the Setup menu and use the UP or DOWN button to select the Motion Tolerance item. The current value will be displayed, press the ENTER or the RIGHT button if this value needs to be modified.

### 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**, type a name that identifies the operator of this instrument in Operator ID text field.

Operator ID

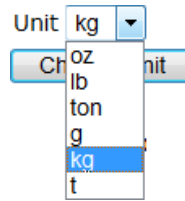
On the **HI 6500 series instrument display**, select the Setup menu and use the UP or DOWN button to select the Operator ID menu item. The current Operator ID will be displayed, press the ENTER or the RIGHT button if this identifier needs to be modified and use the UP, DOWN, LEFT, and RIGHT buttons to input a new identifier, then press the ENTER button to save and exit this menu.

### 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 **Webform**, from the Units pull-down list, select the desired weight units to use; then click Change Unit to set the units value. Our example shows pounds (kg).



On the **HI 6500 series instrument display**, select the Setup menu and use the UP or DOWN button to select the Units menu item. The list of weight measurement units supported will be displayed and the current unit will be highlighted, if the unit needs to be modified use the UP and DOWN buttons to select a new value and press the ENTER button.

## Default Parameter IDs and Values

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 (same as ref weight)	0x4101	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	COM4_20	mA Output	0x3381	r/w	
Communication	COM4_20	Weight Source	0x3382	r/w	0 (off)
Communication	COM4_20	Value 4mA	0x3383	r/w	0
Communication	COM4_20	Value 20mA	0x3384	r/w	5000
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	Printer	Printer Baud Rate	0x3281	r/w	3 (9600)
Communication	Printer	Printer Parity	0x3282	r/w	0 (none)
Communication	Printer	Printer Mode	0x3283	r/w	1 (Gross weight)

Menu	SubMenu	Parameter Name	Param ID	Read/Write	defaults (value / code)
Diagnostics	(features)	Status Word	0x4801	r	n/a
Menu	SubMenu	Parameter Name	Param ID	Read/Write	defaults (value / code)
Display	(menu items)	Display Background	0x8081	r/w	0
Display	(menu items)	Display Foreground	0x8082	r/w	31
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	Read/Write	defaults (value / code)
Filter	(menu items)	WAVERSAVER	0x2081	r/w	3 (1.0 Hz)
Filter	(menu items)	Num Averages	0x2082	r/w	10
Filter (XP only)	(menu items)	Motion Threshold	0x2101	r/w	0.0
Filter (XP only)	(menu items)	Variation Threshold	0x2102	r/w	0.0
Menu	SubMenu	Parameter Name	Param ID	Read/Write	defaults (value / code)
Information	Controller	Firmware Revision	0x7985	r	n/a
Menu	SubMenu	Parameter Name	Param ID	Read/Write	defaults (value / code)
Language	(menu items)	Language	0x5881	r/w	1 (English)
Menu	SubMenu	Parameter Name	Param ID	Read/Write	defaults (value / code)
Operations	(command)	Tare Command	0x6781	w	n/a
Operations	(command)	Zero Command	0x6782	w	n/a
Operations	(command)	Weigh Sample	0x6783	w	n/a
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	Read/Write	defaults (value / code)
Security	Display	Calibration Lock Password	0x7101	r/w	1234
Security	Display	Configuration Lock Password	0x7102	r/w	1234
Security	Display	Display Lock Password	0x7103	r/w	1234
Security	Display	Keypad Lock Password	0x7104	r/w	1234
Security	Display	Read Only Password	0x7105	r/w	1234
Security	Display	Calibration Lock Enable	0x7106	r/w	0 (disabled)
Security	Display	Configuration Lock 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	Read/Write	defaults (value / code)
Setup	(menu items)	Operator ID	0x2884	r/w	OPID
Setup	(menu items)	Instrument ID	0x2885	r/w	HARDY
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

# Chapter 6

## Calibration



Chapter 6 describes C2, eCAL and traditional calibration procedures. For the Weight Processor to give precise readings, it 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 6500 series instrument.

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.

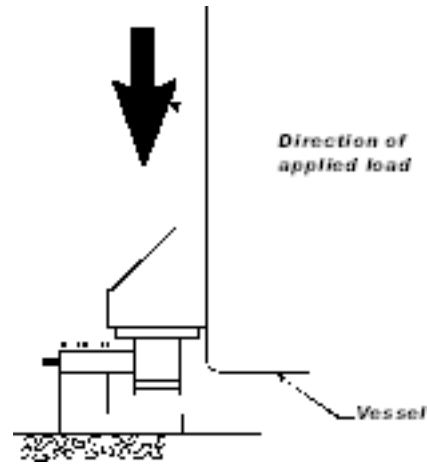
Check for binding on the Load Cell or other parts of the weighing system.

**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 vertical will have an affect on the scales ability to repeat and provide accurate weight readings.



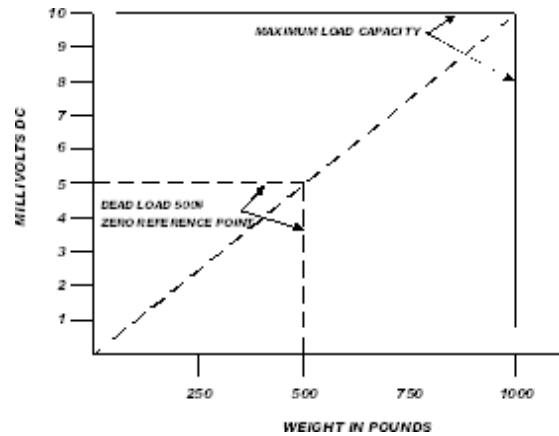
## Electrical Check Procedures

### Load Cell/Point Input/Output Measurements

The HI 6500 series 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 10mVDC 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 10mVDC 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.

The operating range for the scale in this example is 5-10 mVDC with a 500 pound weight range. Note that 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 or eCAL, Electronic Calibration, calibrates a scale system electronically without using certified test weights. It can use up to 2 junction boxes with up to 4 load cells per junction box, interconnect cable and an instrument with C2 capabilities, such as the HI 6500 series instrument. Digital information within a Hardy C2 or eCAL-certified load sensor details its unique performance characteristics. The HI 6500 series instrument reads the performance characteristics of each load sensor and detects the number of load sensors in the system.

Before running C2 eCAL calibration, run all of the pre-calibration procedures. Make sure you have configured the HI 6500 series instrument. This includes setting the units, decimal point, NumAverages etc. For instructions please see the Chapter on Instrument Configuration.

### **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	0.998653
Nicosia	1.00093	New York	1.000433	Washington DC	1.000601
Jakarta	1.002631	Oslo	0.998726	Wellington NZ	0.998399
Frankfurt	0.999579	Ottawa	1.000007	Zurich	0.999821

## C2 and eCAL Calibration from the Web Page

From the Home Page, click Configuration to display the Configuration menu; then click Calibration to open the Calibration page.

### Method 1: C2 eCal

cal date	Jan ▾	22	2013
Num Devices	<input type="text" value="1"/>		
Ref Weight	<input type="text" value="0.00"/>		
Gravity Correction	<input type="text" value="1.001500"/>		
<input type="button" value="Do C2 Calibration"/>			

- Step 1. Check to make sure the number of load cells displayed on the webpage corresponds correctly to the inputs on the instrument.
- Step 2. In the “RefWeight” text field, enter the reference weight for your application.
- Step 3. An empty scale will use a 0.00 reference weight setting.
- Step 4. (Optional) If you want to 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
- Step 5. Click the “Do C2 Calibration” button
- Step 6. 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.

Cal completed OK  
[Return to calibration page](#)

However, if no load points are connected to the HI 6500 series the following message appears. Check the cable and connectors of the load point(s) and re-calibrate.

- Step 7. This message appears if no load points are connected to the HI 6500. Check the cable and connectors of the load point(s) and re-calibrate.

Cal failed: A to D converter error

Step 8. This message appears if no C2 load points are connected to the HI 6500. Either do a traditional calibration or connect C2 load sensors to the instrument.

### C2 Cal Failed: no C2 sensors found

Step 9. Click Back to return to the Calibration page.

### **C2 Calibration from the Front Panel**

The example settings below are for illustrations only. Your setting requirements may vary significantly.

Step 1. From the Configuration menu, use the UP or DOWN button to select Calibration, and press the ENTER button to display the Calibration menu. Select C2 (eCal), and press the ENTER button to display the C2 Calibration Menu items.

Step 2. Use the UP or DOWN arrow to select the NumDevices menu item. The read-only NumDevices value provides the number of C2 (or eCal) load cells on the system detected by the HI 6500 series instrument. Verify that the displayed number matches the actual number installed. If not, 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

Step 3. When you finish updating the value press Enter to save the Reference Weight and return to the C2 eCal menu. Use the UP or DOWN button to select the Reference Weight. The current reference weight will show. Press the ENTER or RIGHT button if modifications to this value need to be made.

Step 4. Select Gravity Correction to display the value and press the ENTER button if the value needs to be modified.

Step 5. Use the UP or DOWN button to select Do C2 eCAL and press the ENTER button to perform the C2 eCAL calibration..

Step 6. A "CalCompletedOK" briefly appears on the screen indicating the C2 calibration was successful.

- A "Cal Failed" message briefly appears with the error number if the C2 Calibration was not successful. Chapter 9, Troubleshooting lists corrective actions.

## 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.

Step 1. 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.

Step 2. Check to see if the weight reading changes on the display 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 cells.

Step 3. If the display changes in the proper direction, remove the weight and proceed to calibrate the Weight Processor.

### Hard Calibration from the Web page

Step 1. Hard Calibration requires a zero point and the physical placement of test weights on the scale. To set the Zero Value, if all “live load” weight is removed from the Scale, the Zero Value should be 0.00. If any product weight is on the scale when setting this value, the reference weight must be equal to the amount of load on the scale.

#### Method 2: Calibration - Zero Cal

cal date	Jan ▾	22	2013
Ref Weight	0.00		
<input type="button" value="Do Cal Low"/>			

Step 2. 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.

Step 3. Click in the Ref Weight text field and enter the reference weight you want to use.

Step 4. Click the Do Cal Lo button to do the hard Cal Zero operation. A “Cal Completed OK” message appears briefly if the calibration 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.

Step 5. To set the Span Weight, place certified test weights on the scale.

Step 6. In the Span Weight text field, enter the amount of test weight that was placed on the scale.

### **Method 2: Calibration - Span**

Span Weight

Step 7. Click the Do Cal Hi button. A “Cal Completed OK” message appears briefly if the calibration was successful.

Step 8. An Error message appears if the calibration was not successful. See the error list in the Troubleshooting chapter, for help in correcting errors.

Step 9. The scale is now calibrated.

### **Hard Calibration from the Front Panel**

Step 1. From the Configuration menu, use the down arrow to select Calibration, and then press Enter to display the Calibration menu. Select the Hard Cal menu item and press the ENTER button to open the menu.

Step 2. Use the UP or DOWN button to select the Ref Weight value then press the ENTER to set the reference weight equal to the weight on the scale. Normally, you would remove all weight "live load" from the scale to obtain a Ref Weight of 0.0. Wait 12 seconds or more for the reading to stabilize. Press the ENTER button to save the value and return to calibration menu.

Step 3. Use the DOWN button to select " Do Cal Lo, and press the ENTER button to set the low calibration point. A "Cal Completed OK" message appears briefly if the calibration was successful.

Step 4. An Error appears if the calibration was not successful. See the Troubleshooting chapter, for help with errors.

Step 5. Press the DOWN button to select Span Weight, the current span weight will be displayed. Press the ENTER button to modify the Span Weight value.

Step 6. To set the Span Weight, place a certified test weight, equal to the span weight entered in step 5, on the scale. This value is the amount of test weight that you will apply, typically 80-100% of the expected maximum product loading on the load cells.

Step 7. Use the DOWN button to select Do Cal Hi, then press the ENTER button to set the Cal High point and complete the calibration sequence. A "Cal Completed OK" message appears briefly if the calibration is successful. An Error number appears if the calibration fails. See the Error list in the Troubleshooting chapter for help with error correction

## Multi-Point Calibration

Multi-Point Calibration, (also called midpoint correction) is simply a calibration with 3-5 points.

Standard two point calibration assumes linearity (a straight line). However, calibration to just 2 end points may not accommodate for non-linearity (a curved line) that may happen in the middle of the load curve.

Multi-Point calibration lets users calibrate at three, four or five values on the curve. A multi-point calibration means, in comparison to a two point calibration, that you can calibrate non-linearity significantly more accurately

To achieve the best possible accuracy, the multi-point calibration should cover the entire range of the desired measurement values (from zero to the highest possible value).

To access Multi-Point Calibration from the web browser, click on the Multi-Point Calibration link at the bottom of the Calibration page.

**HARDY**  
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Local Links:  
HOME  
CONFIGURATION  
MONITOR  
See-Up WIZARD

HI 6500 Series  
Online Support Site  
(Contact Info, Manuals,  
News, Downloads, etc.)

**Calibration**  
[HELP](#)

Last Calibration: Oct 21, 2014 Cal Type: C2  
Loadcell Sensitivity 2.0 m/VV  
Cal Motion Tolerance 5000  
Calibration Date Oct 21 2014

**C2 eCal**

Num Devices 1  
Ref Weight 20  
Gravity Correction 0.999653

**Traditional Calibration**

Cal Low Weight 0

Span Weight 25

[Multi-Point Calibration](#)



Local Links:

[HOME](#)

[CONFIGURATION](#)

[MONITOR](#)

[Set-Up WIZARD](#)

[HI 6500 Series](#)

[Online Support Site](#)

(Contact Info, Manuals,  
News, Downloads, etc.)



## Multi-Point Calibration

[HELP](#)

Last Calibration: Oct 21, 2014 Cal Type: C2

Loadcell Sensitivity

Cal Motion Tolerance

Calibration Date

Number of Cal Points

### Cal point 1

Cal Point Weight

### Cal point 2

Cal Point Weight

### Cal point 3

Cal Point Weight

### Cal point 4

Cal Point Weight

### Cal point 5

Cal Point Weight

First, select the number of Cal Points necessary to accommodate for non-linearity that can not be mechanically corrected in the system.

Users that have previously performed a Calibration or set the span weight value using traditional or C2 calibration, will see that value populated as the highest number of Cal Points selected.

Perform each calibration step by step from Cal Point 1 to the next point where you have set your Span Weight (e.g. Cal Point 2 then Cal Point 3) until you reach your last selected point

The system will be calibrated with multiple points, providing the most accurate method for a non-linear calibration.

## NOTE

*Multi-Point Calibration operates virtually identically through the Front Panel Display and may be accessed using this method as well.*



# Chapter 7

## Operation



Chapter 7 contains step-by-step instructions for operating the Hardy HI 6500 series instrument. The procedures include complete instructions for operating the instrument from the front panel and from the Web page. Operating procedures primarily include Taring and/or Zeroing the instrument. We highly recommend reading the set-up and operating procedures before operating the instrument. Being familiar with the operating procedures insures that the instrument will provide trouble free service.

### Getting Started

Before operating a Hardy HI 6500 series Weight Processor, check to make sure the following procedures have been performed:

- Power and Load Point cables properly installed.
- Communication cables properly installed.
- Setting of instrument parameters is complete.
- Calibration performed.

### 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 web page and choosing Gross, Net or Count from the drop-down menu or by sending the DISPLAY MODE command over communications.

## Zero Operation

In GROSS mode, remove all weight from the scale and wait until the scale has settled.



[1] ZERO  
[2] LEFT/EXIT

*A scale in motion will show the symbol “~” in the lower right hand corner of the screen to indicate the scale has not settled. A scale that will not settle may have the Motion Tolerance parameter established during SETUP adjusted too small for the environment.*

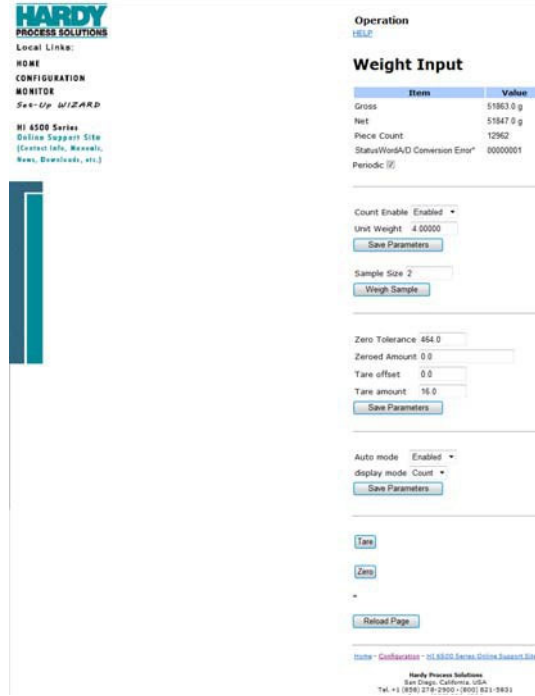
Press the ZERO button, a message “ZEROOK” will briefly be displayed and the scale will show **000.00**, indicating the ZERO command was successful.

If “ZERO FAILED” is displayed, the Zero command was unsuccessful. Check the Zero Tolerance parameter established in Set Up to determine if the zero amount has exceeded the maximum cumulative value that can be zero'd off the scale.

### NOTE

*The amount of weight zeroed off each time is cumulative. The zero command will fail if the current gross weight plus any previously zeroed amount exceeds the zero tolerance established in the SET UP parameters.*

The ZERO command can also be initiated from the Operations webpage by left clicking the ZERO button as shown in the screen shot from an HI 6500 below.



**NOTE** The ZERO function can also be performed on the MONITOR page using the web browser.

## Tare Operation

In NET mode, pressing the Tare button will zero out the scale.



- [1] TARE
- [2] RIGHT/ENTER

Press the Tare button briefly and 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**

A scale in motion will show the symbol “ ~ ” in the lower right hand corner of the screen to indicate the scale has not settled.

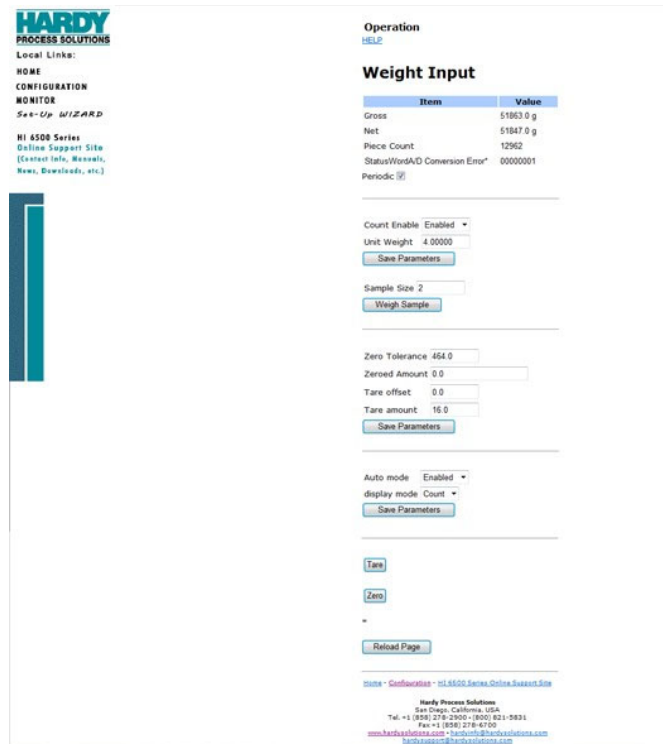
The TARE command can also be initiated from the web page by left clicking the TARE button.

A Tare Value can be set two ways:

- 1 Place an object (such as a container) onto the scale, press the TARE button either on the front panel display or in the webpage. The Tare weight has now been set as the weight of the object on the scale.
- 2 In SET UP, navigate to the Operations section, choose the Tare parameter and select the Tare Weight option. Manually input the Tare value and press the Enter key. The Tare value has now been set as the weight of the object.
- 3 The Tare Value can be viewed by navigating to the Operations menu, choosing the Tare parameter and selecting the Tare Value option.

**NOTE**

The TARE function can also be performed in the MONITOR menu in the web browser.



### Auto Mode Tracking – Disabled (Default)

1. The displayed weight mode will remain unchanged when TARE or ZERO is pressed.
2. To change the displayed weight mode, press the MODE button from the front panel display
3. or send the DISPLAY MODE command over communications.
4. The ZERO command functions in both NET or GROSS mode at any time.

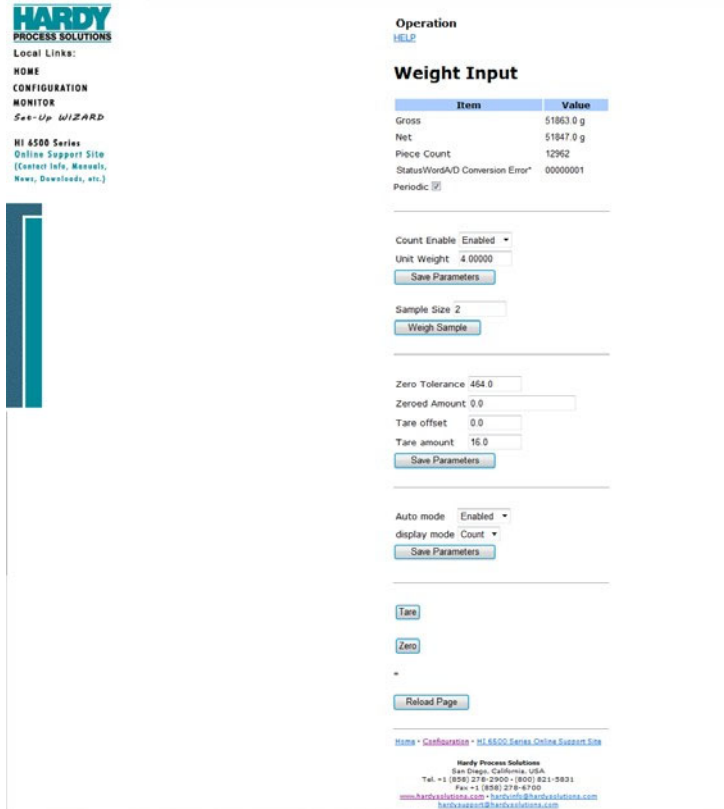
### Auto Mode Tracking – Enabled

- Step 1. The displayed weight mode will automatically change to NET when TARE is pressed on the front panel display or when a TARE command is sent over communications.
5. The displayed weight mode may also be changed at any time by pressing the MODE button on the front panel display or by sending the DISPLAY MODE command over communications.
  6. Sending the **TARE AMOUNT=0.0000** command will remove the TARE weight from memory and cause the displayed weight mode to automatically switch to display the GROSS weight. (AUTO MODE TRACKING DOES NOT FUNCTION WHILE IN COUNT MODE)
  7. The ZERO button only functions on the front panel display when the instrument is in GROSS mode.
    - a. If an operator presses ZERO button while in NET mode, the display will message the user “ZERO FAIL - CHANGE TO GROSS MODE TO USE ZERO SCALE”
  6. The ZERO command functions in both NET and GROSS modes when sent over communications.

If the instrument is in NET mode when the ZERO command is sent over communications, the display will automatically switch to showing GROSS mode after the ZERO command is sent.

### Count Operations

**On the HI6500 series instrument display**, select the Operations menu and use the UP or DOWN button to select the Piece Count submenu. Select Count Enable to allow the option of running the instrument in count mode. Piece Count can be displayed on the main screen by pressing the MODE button and cycling through to the count mode: GROSS > NET > COUNT >



### Determining Piece Count:

If the weight of an individual piece is known:

Select Unit Weigh by pressing ENTER and input the unit weight value using the up, down, right and left arrows.

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

Place the sample or samples onto the scale and then press enter while Weigh Sample is selected. The instrument will record that weigh value of the sample size. If more than one piece was used during Weigh Sample, input the Sample Size using the arrow keys.

#### NOTE:

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

*Hint: It is better to take the Weight Sample of a larger number of pieces when the weight of individual pieces varies.*

On the **Web page**: first select Count Enabled, and then either enter the weight of a unit in the unit weight field, or use the weigh sample field entering the correct number of pieces in the Sample size field as shown above. Then click on the weigh sample field.

## The Monitor Page

The Monitor page is available on the Web Server only and is designed to allow users to monitor weight readings and to perform Zero and Tare operations all on the same page.

Users who perform routine weighing operations in a repetitive fashion may want to use this centralized page for monitoring operations.

The Monitor page is accessed by selecting the Monitor on the menu on the left side.

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MONITOR  
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HI 6500 Series  
Online Support Site  
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**Monitor**

Gross	20 lb
Net	20 lb
Live Weight Reading	

Tare

Zero

Reload Page

Home - Configuration - Monitor - Wizard - 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](http://www.hardysolutions.com) • [hardyinfo@hardysolutions.com](mailto:hardyinfo@hardysolutions.com)  
[hardysupport@hardysolutions.com](mailto:hardysupport@hardysolutions.com)

## Split Screen Mode

### NOTE

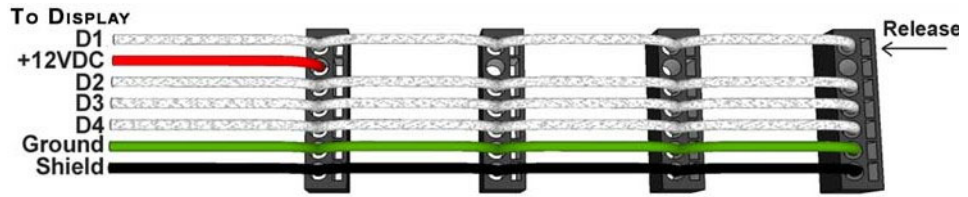
*Before using HI6110 display in split-screen mode, confirm that all instruments connected have the same firmware revision.*

### Before wiring and mounting instruments to be displayed on split screen

Be sure to update the firmware in the Display and each instrument to the latest version to ensure all menus are up to date. The display must only be connected to a single instrument to upload new firmware.

### Wiring the Units to the Display Panel

Hardy provides a pre-made cable (Part Number: 0509-0534-01-0) for quick installation. Or instruments can be wired together and connected to a display panel using the following diagram and specifications.



*A sample wiring diagram for wiring four HI 6500 instruments to one HI 6110 Panel*

### **Making Longer Display Interface Cables**

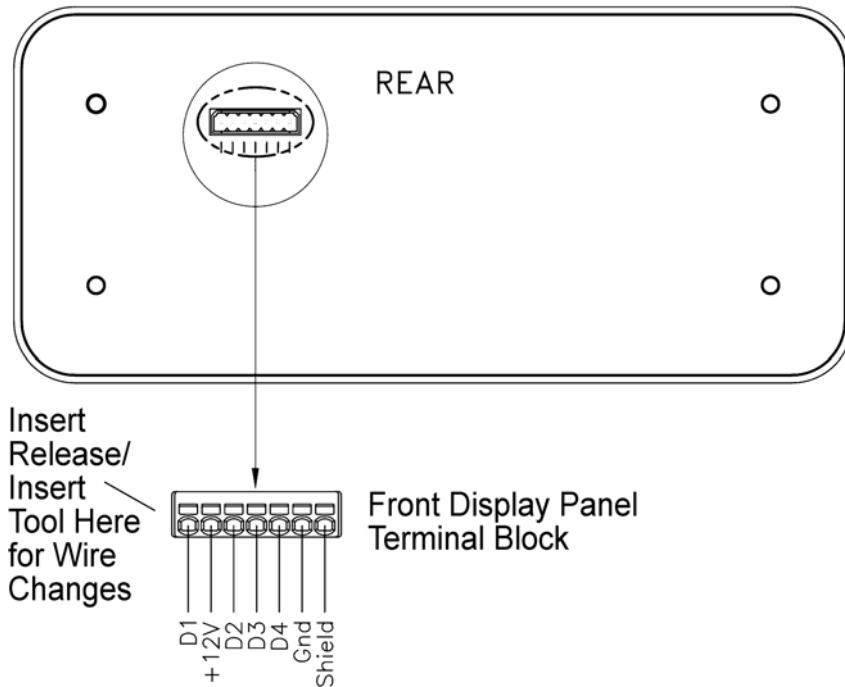
If you need to install the front panel further away from the HI 6500 series instruments than is possible with the supplied cable then, you will need to make a display cable between the panel and the first instrument. in the series of up to four connected units.

#### Wiring Specifications

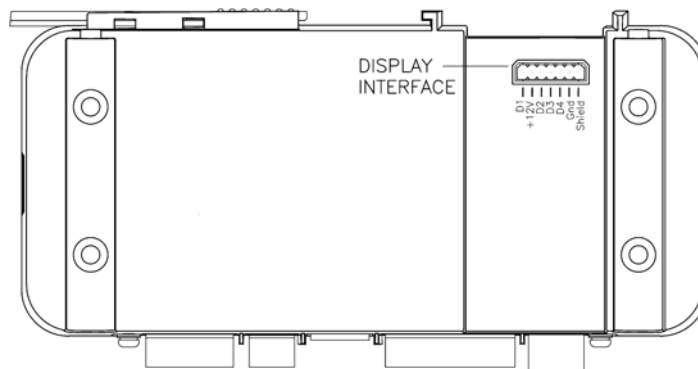
- Wire size: 20 AVG maximum / 26AWG minimum
- Maximum cable length: 100 ft. (30.48 meters)
- Use three twisted pairs with a drain wires
- Pair wires +12 and GND, D1 and D2, D3 and D4



*View from the rear of the front display panel*



The terminal type is 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 tool opens the cage contact and allows one or two bare wires to be inserted. Removing the insertion tool with bare conductor inserted will lock the connection.



*View from the front of the instrument showing the display connector.*

### Once Instruments are Wired and In Place

Connect the display to the port on the instrument. If the Split Screen Display Mode is not enabled, the user will be connected to a single unit.

Enter the Display->Split Screen menu to enable the Split Screen Display Mode. Here you can send a Discover command and the display will find all compatible instruments on the RS-485 Display Network. The product serial codes for each instrument will be listed as they are found. Once the discovery process has completed the menu will switch to the Display Order interface and attempt to connect to each discovered instrument. As instruments connect their Instrument IDs will be displayed next to their product serial codes.

### Reordering Units

When a Discovery completes or when Display Order is selected in the Display->Split Screen menu, the Display Order interface will open. The order which instruments are listed determines their locations on the Split Screen Summary Page. Instruments are displayed left to right, top to bottom.

From the front panel display, use the UP and DOWN buttons to select unit to move to another location. Press enter to select the unit. Use UP and DOWN button to move it to the desired location. Once in the desired position, press Enter do complete the move. Repeat with any other unit you wish to move in the display.

1	2
3	4

### Hiding Units by Changing the Number of Units to Display

The NumDisplay parameter sets the number of instruments to display on the Split Screen Summary Page. Sections higher than the number of instruments to display are left blank and cannot be selected from the Split Screen Summary Page.

# Chapter 8

## Security



Chapter 8 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 front panel to ensure the consistency of the instrument setup and weighing process. Parameter configuration through the network is unaffected by these security settings.

### 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 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.

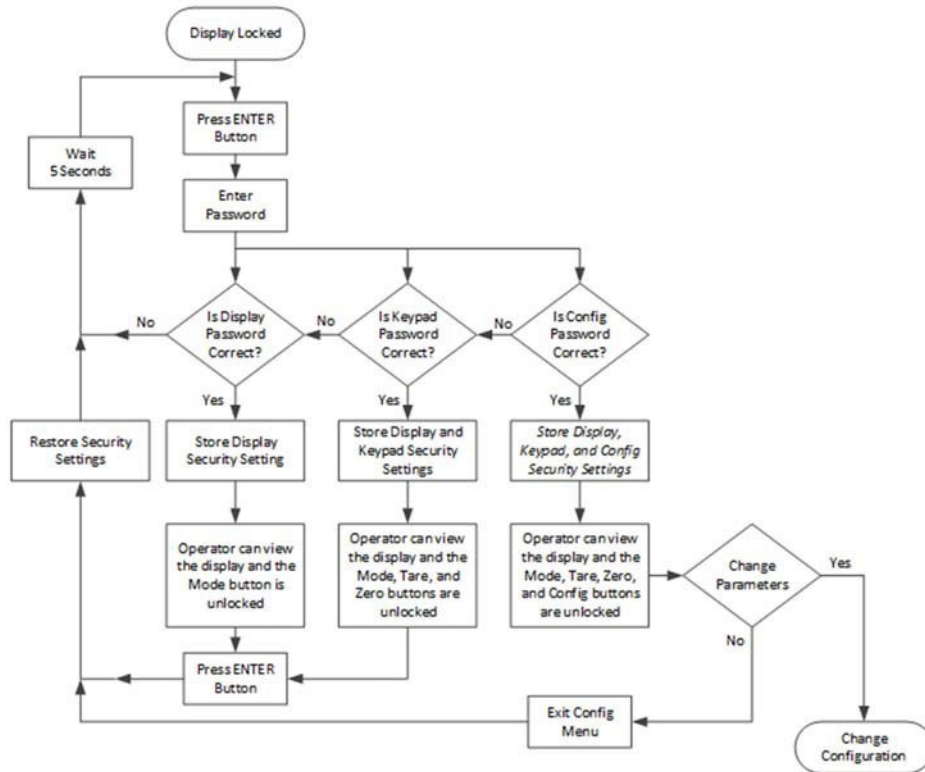
## The Display Lock

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 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.

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 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 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 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.

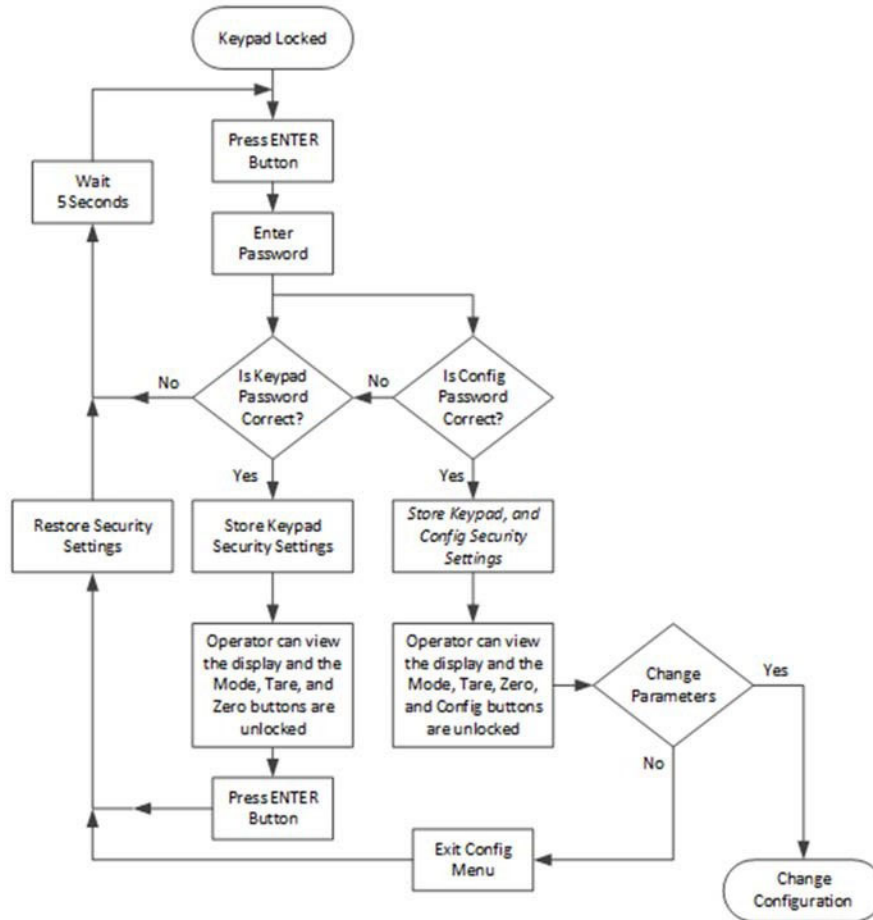
## The Keypad Lock

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.

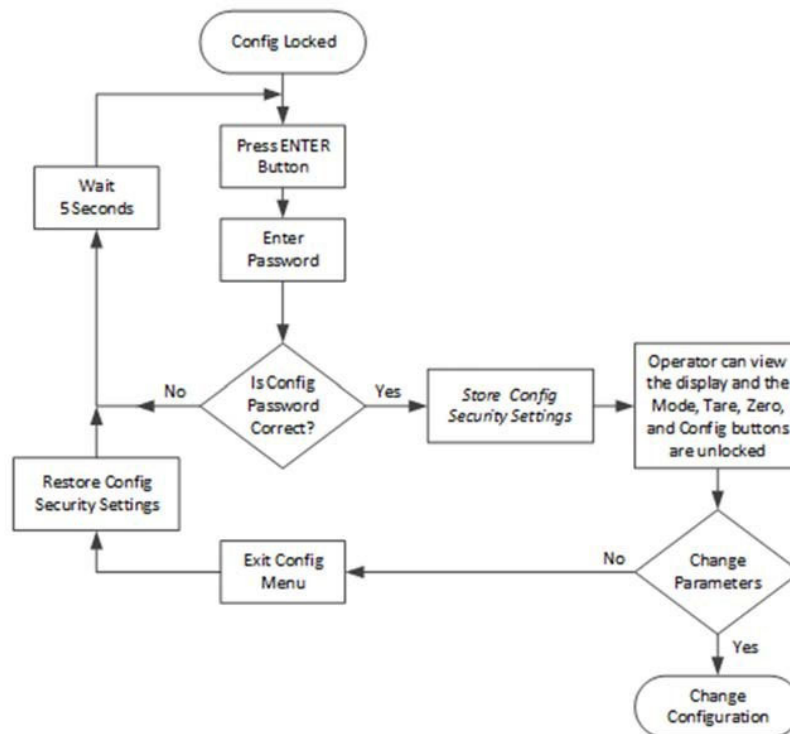
## The Configuration Lock

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.

**1 Configuration Password:**

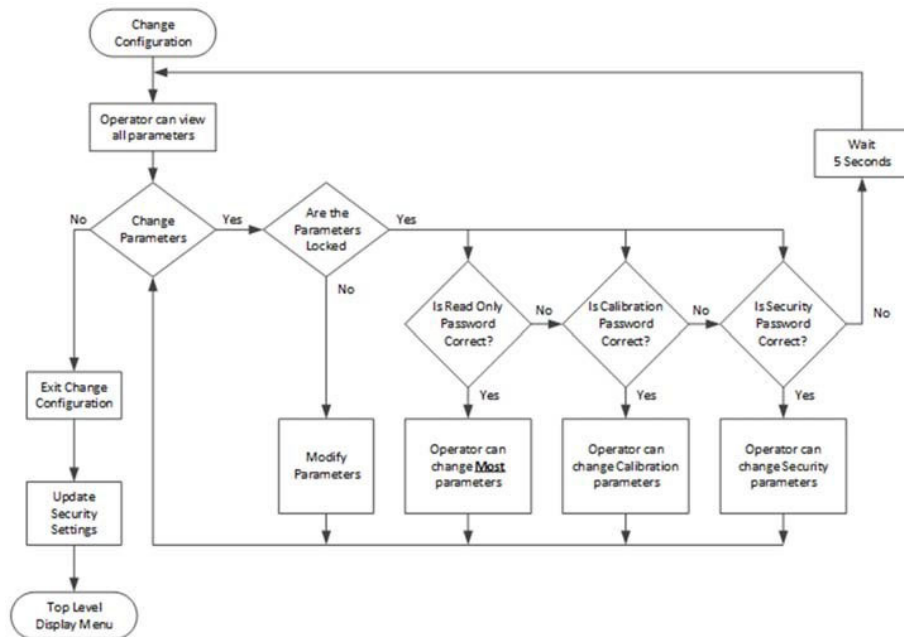
- The current configuration lock setting is saved.
- The CONFIG button is also enabled allowing the operator to open the configuration menus.
- When the operator exits the configuration menu, if no changes to the configuration lock or password parameters were made the configuration lock is set to its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

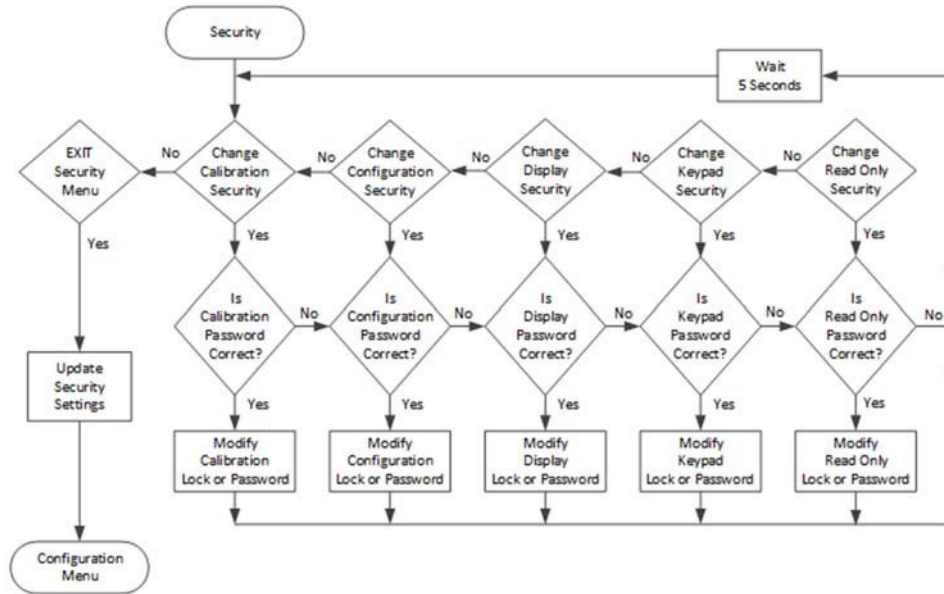
**Figure 4: Parameters Lock Flow Chart**



## 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 digitalphanumeric 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 9

## Troubleshooting



Chapter 9 provides procedures for troubleshooting the electrical, mechanical and firmware elements of the HI 6500 series instrument and for using Hardy's Integrated Technician (IT®) software utility to isolate problems. Flow charts provide troubleshooting procedures for the ontrroller, 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.

### Disassembly and Reassembly 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 seem to be the problem.

If you are in doubt as to how to resolve a problem or if you need assistance, review Hardy Process Solutions Web-tech at <http://www.hardysolutions.com>. Web-tech 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 WebTech Knowledge base. 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:

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

## 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.

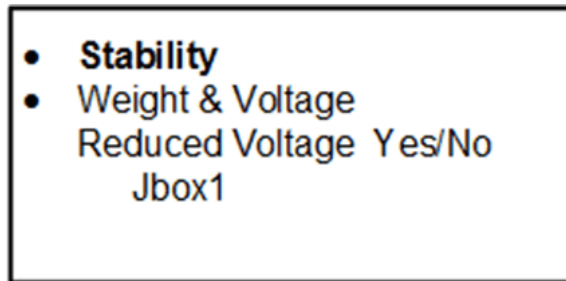
## Trouble Shooting Using Integrated Technician (IT<sup>®</sup>)

The front panel display for the HI 6500 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 one J-boxes and 4 channels.

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.



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<sup>©</sup> Test section.

- **Stability**
- **Weight & Voltage**  
Reduced Voltage Yes/No  
Jbox1

### NOTE

*INTEGRATED TECHNICIAN<sup>®</sup> (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 6500 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 Junction Box and 4 channels. From the front display, select Jbox 1.

From the Diagnostics menu, select Integrated Technician.

**HARDY**  
PROCESS SOLUTIONS

Local Links:  
HOME  
CONFIGURATION  
MONITOR  
Set-Up WIZARD

HI 6500 Series  
Online Support Site  
(Contact Info, Manuals,  
News, Downloads, etc.)

**Diagnostics**

Diagnostic and troubleshooting information is contained in the operations manual and online at [hardysolutions.com](http://hardysolutions.com)>support>online support and WebTech Knowledge base.

StatusWord 36000000

<a href="#">Parameters</a>	<a href="#">Stability Test</a>	<a href="#">C2</a>
<a href="#">Integrated Technician</a>	<a href="#">Power</a>	<a href="#">Modbus RTU</a>
<a href="#">Modbus TCP</a>	<a href="#">Ethernet/IP</a>	<a href="#">Ping</a>
<a href="#">Display Diagnostics</a>		

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[hardysupport@hardysolutions.com](mailto:hardysupport@hardysolutions.com)

**Sensor Number** Indicates which sensor is under test. Using the up or down arrow selects the target sensor to be tested. Then select the number of load cells to test, and press Do IT Test. The Dwell test for pass or fail take 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

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

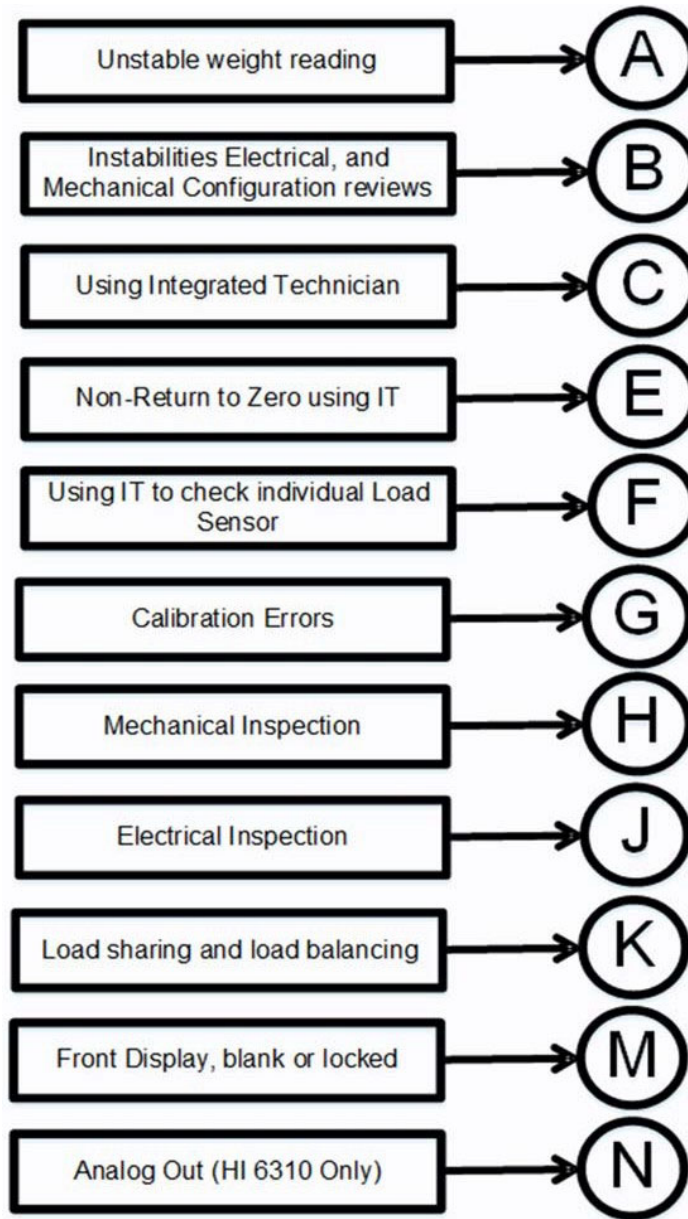
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[hardysupport@hardysolutions.com](mailto:hardysupport@hardysolutions.com)

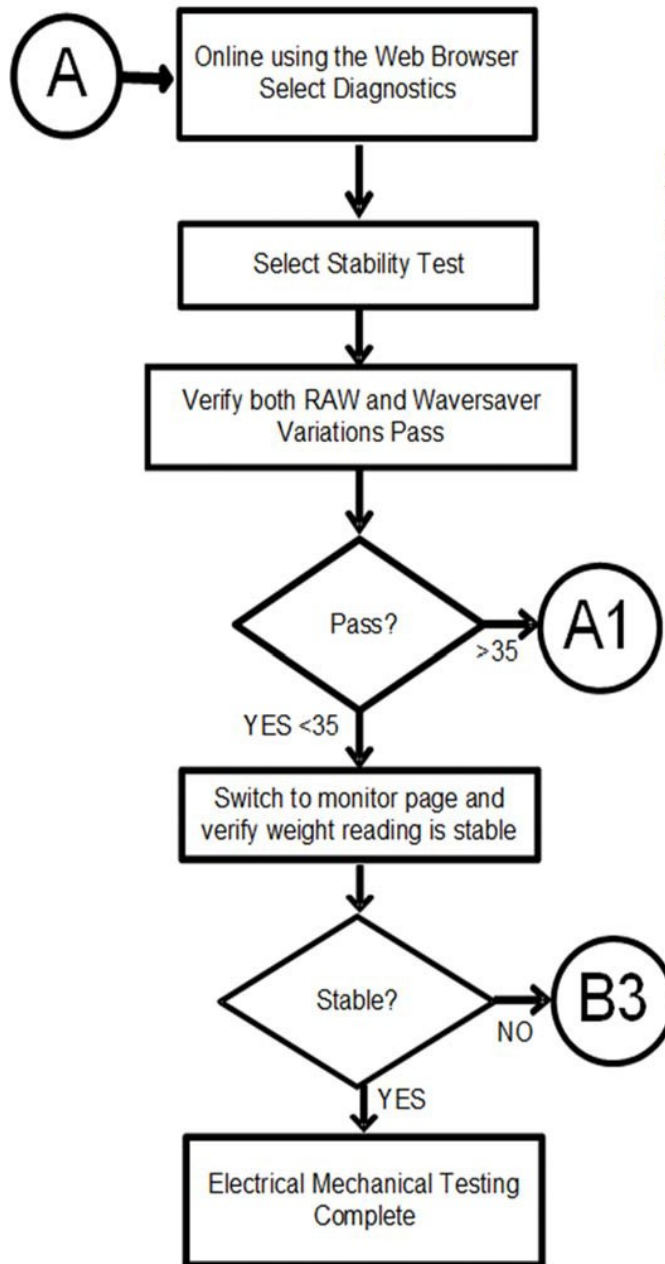
**NOTE**

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

## General Troubleshooting Flow Chart Index

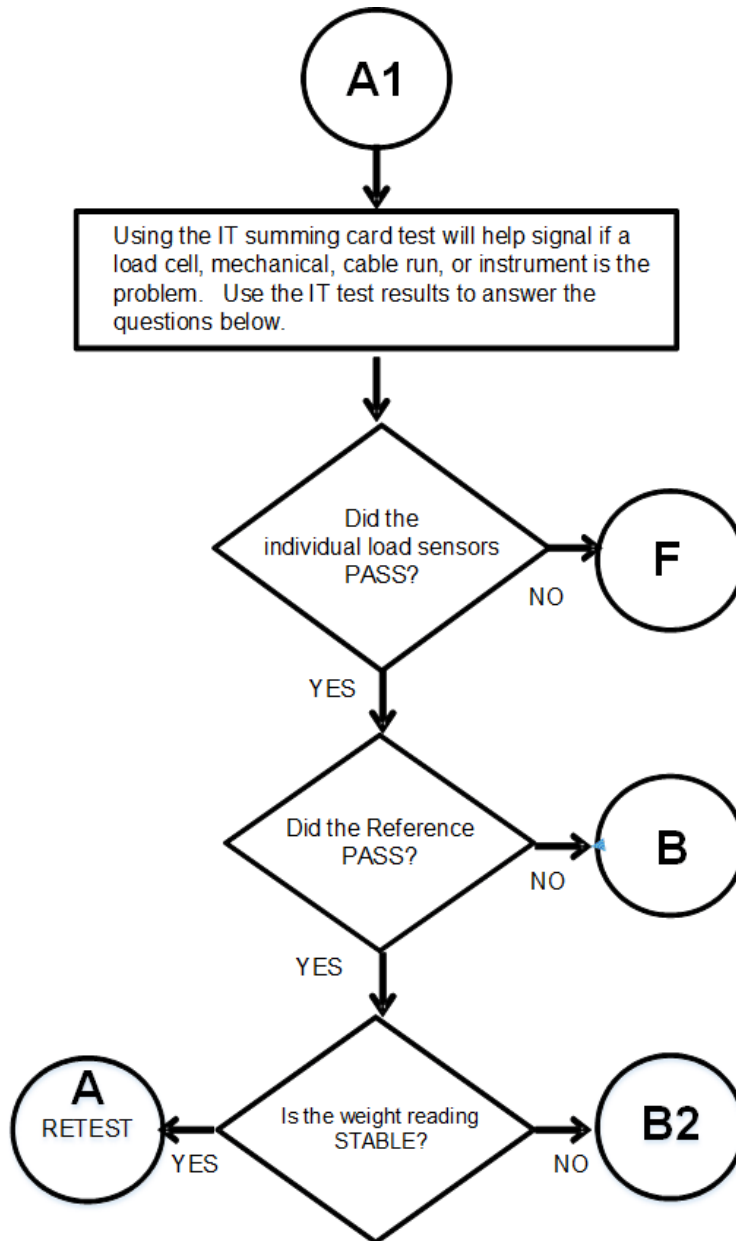


## A - Guideline Instability: Electrical and Mechanical review.

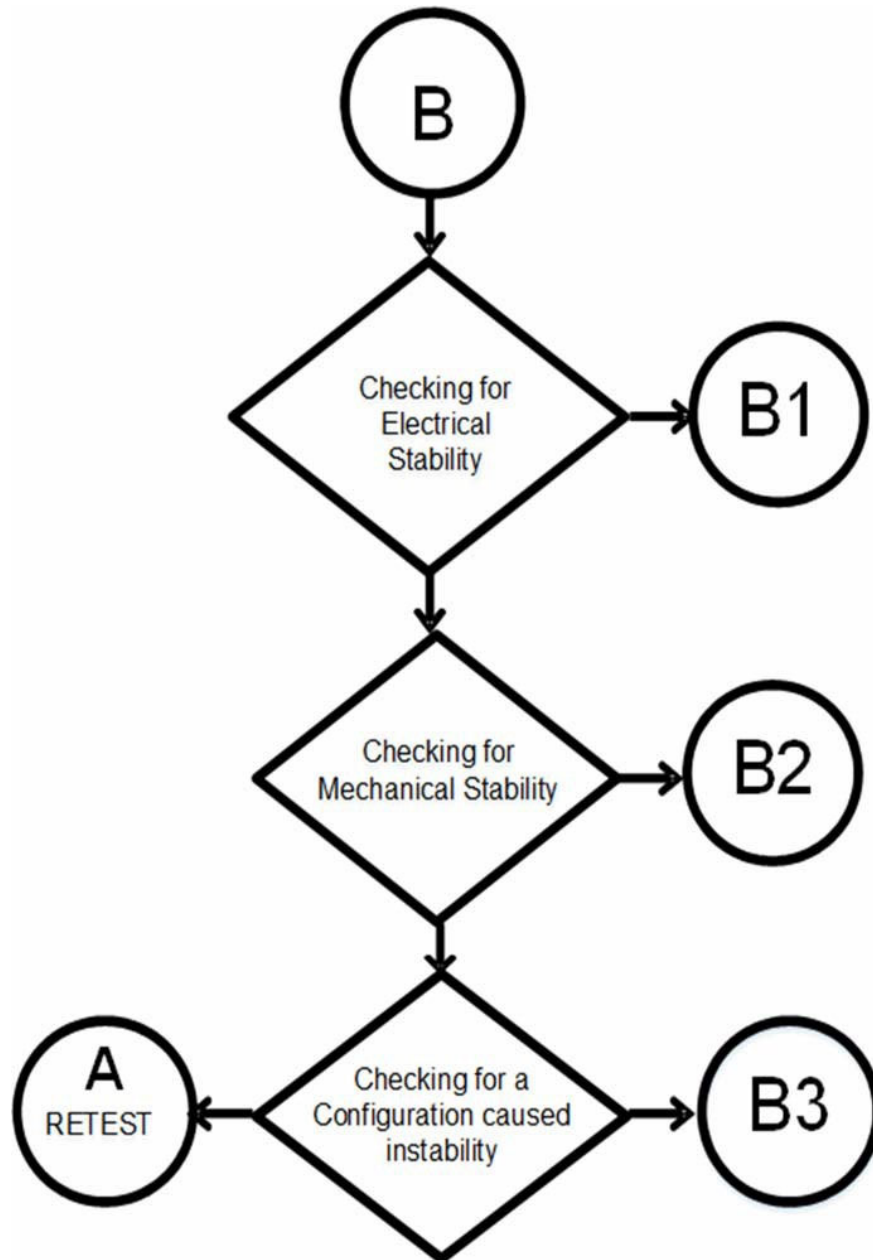


This test is Pass or Fail.  
The raw and filtered signal standard deviation is compared over the last 100 updates. The mean deviation must be less than 35 counts to pass. Tests internal and external signal levels for excessive signal variations.

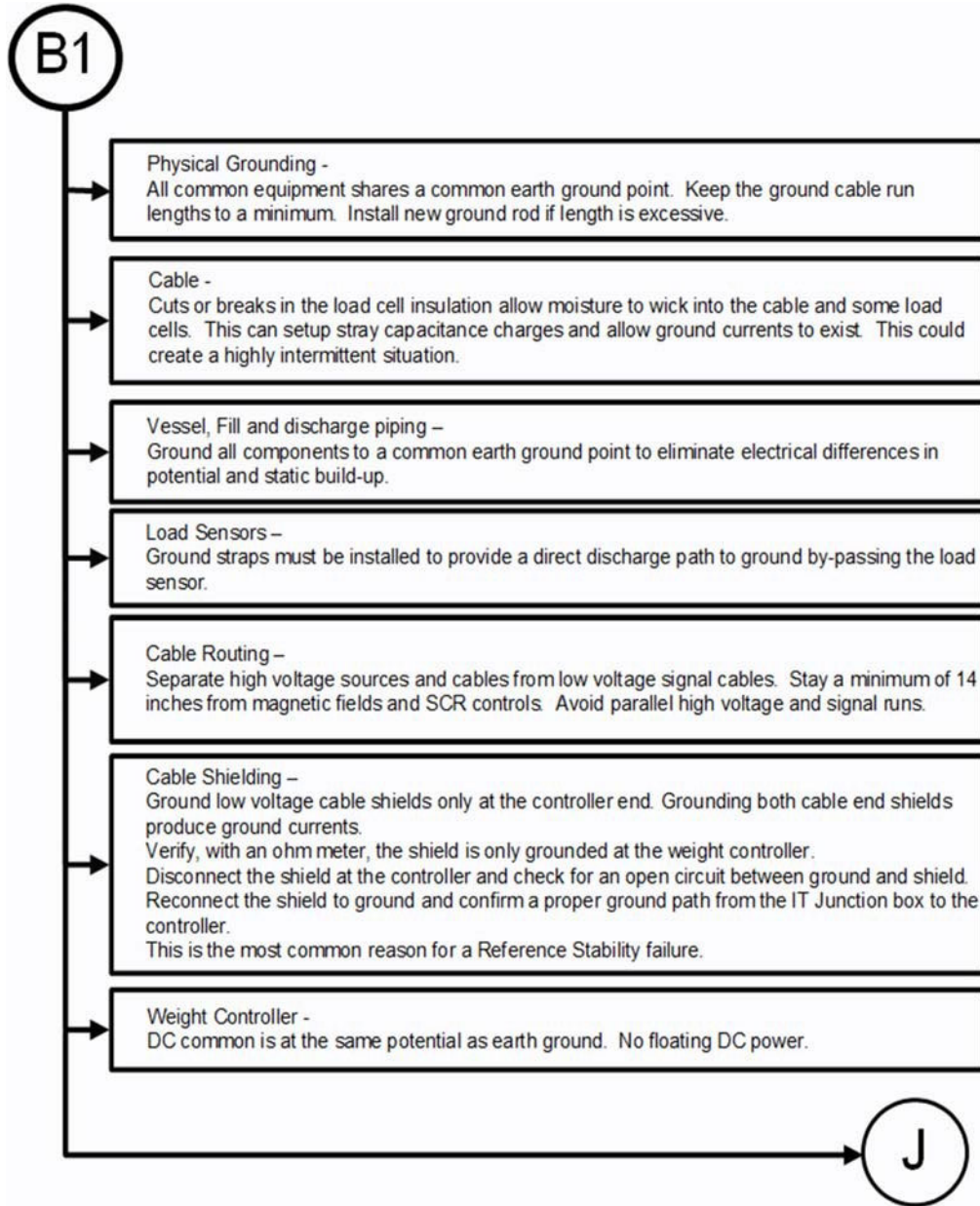
## A1. Checking for Unstable Components in a Weighing System



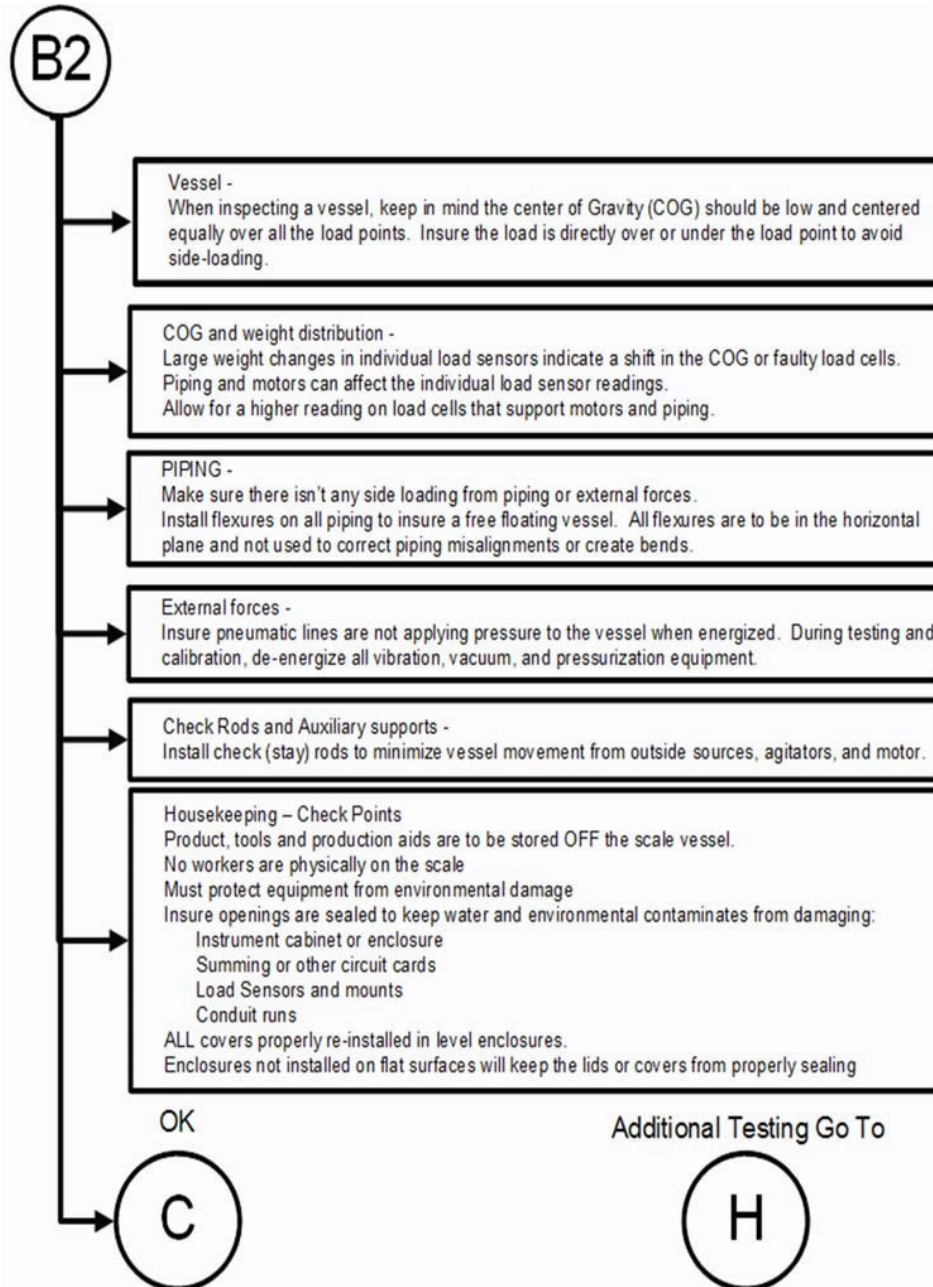
## B. Guidelines for Electrical, Mechanical or Configuration Issues



# B1 - Guidelines to Verify Electrical Installation

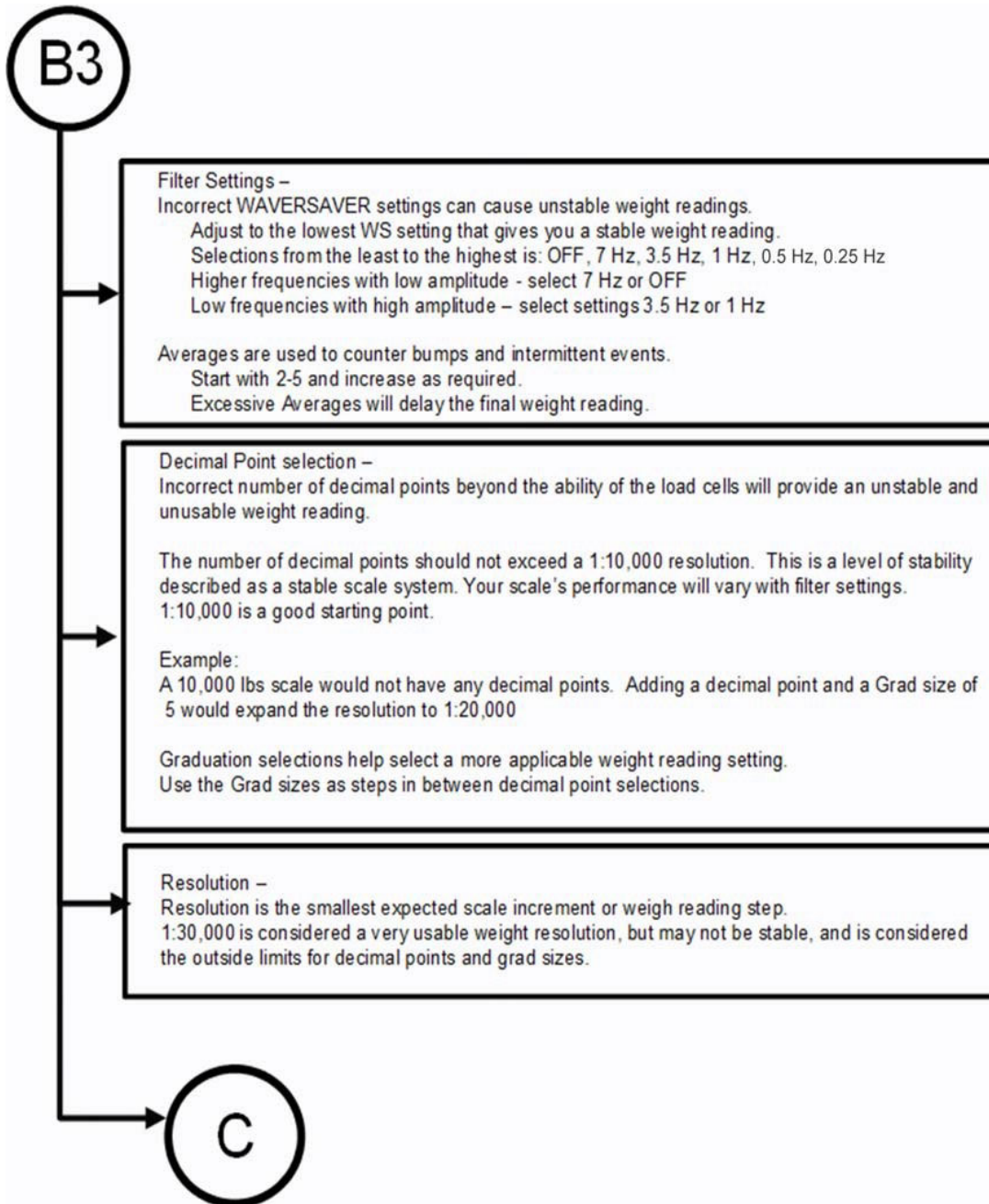


## B2 - Guidelines to Verify Mechanical Installation

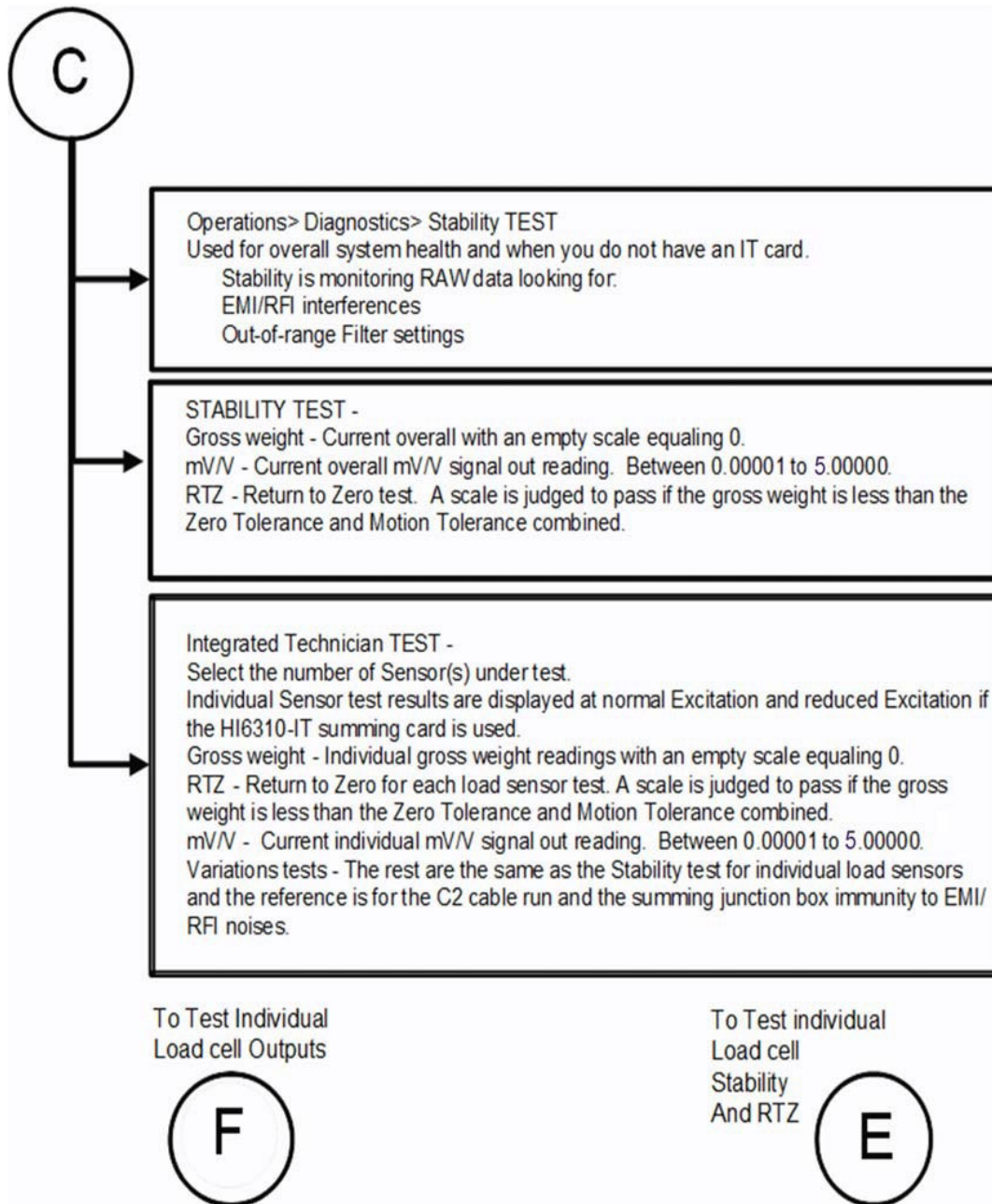




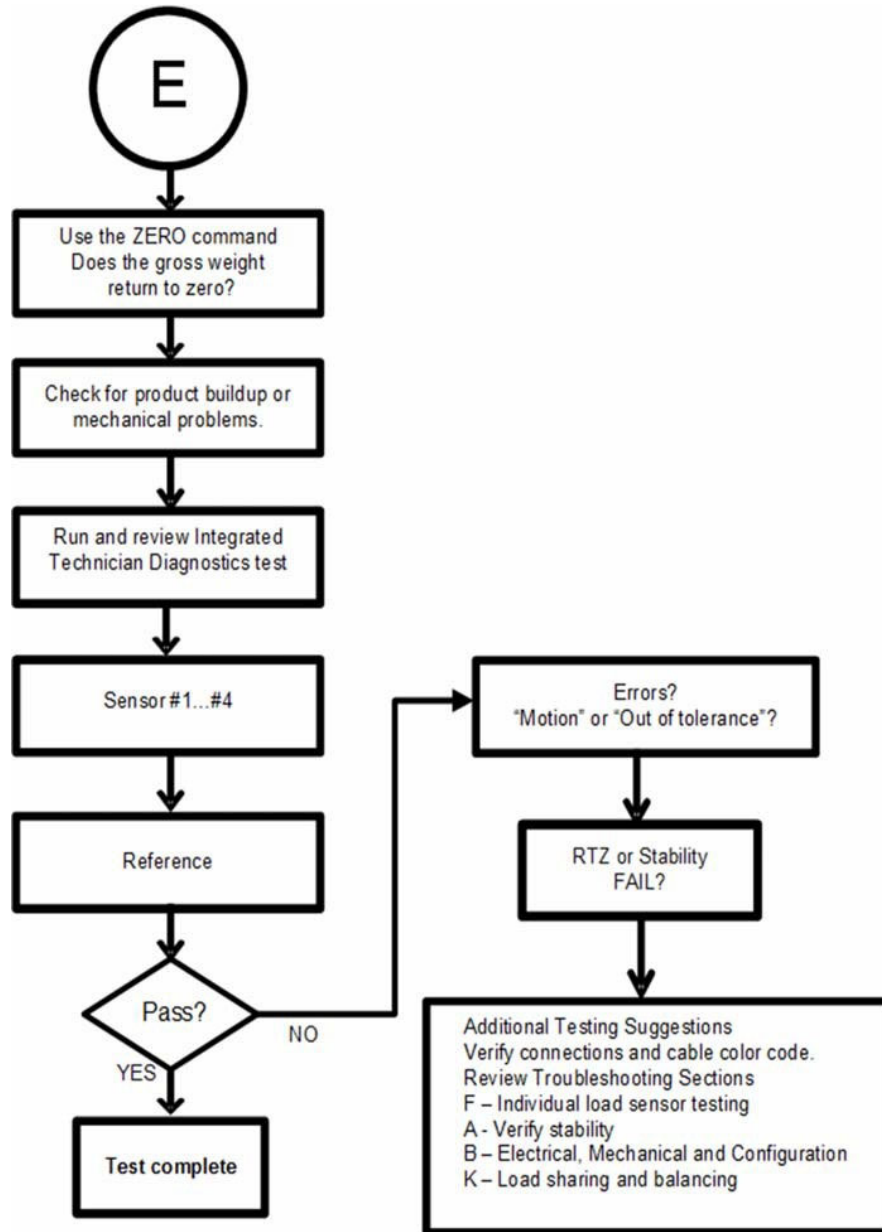
## B3 - Guidelines to Verify Configuration/Filter Settings to Improve Stability



## C - Integrated Technician and Stability Test Overview



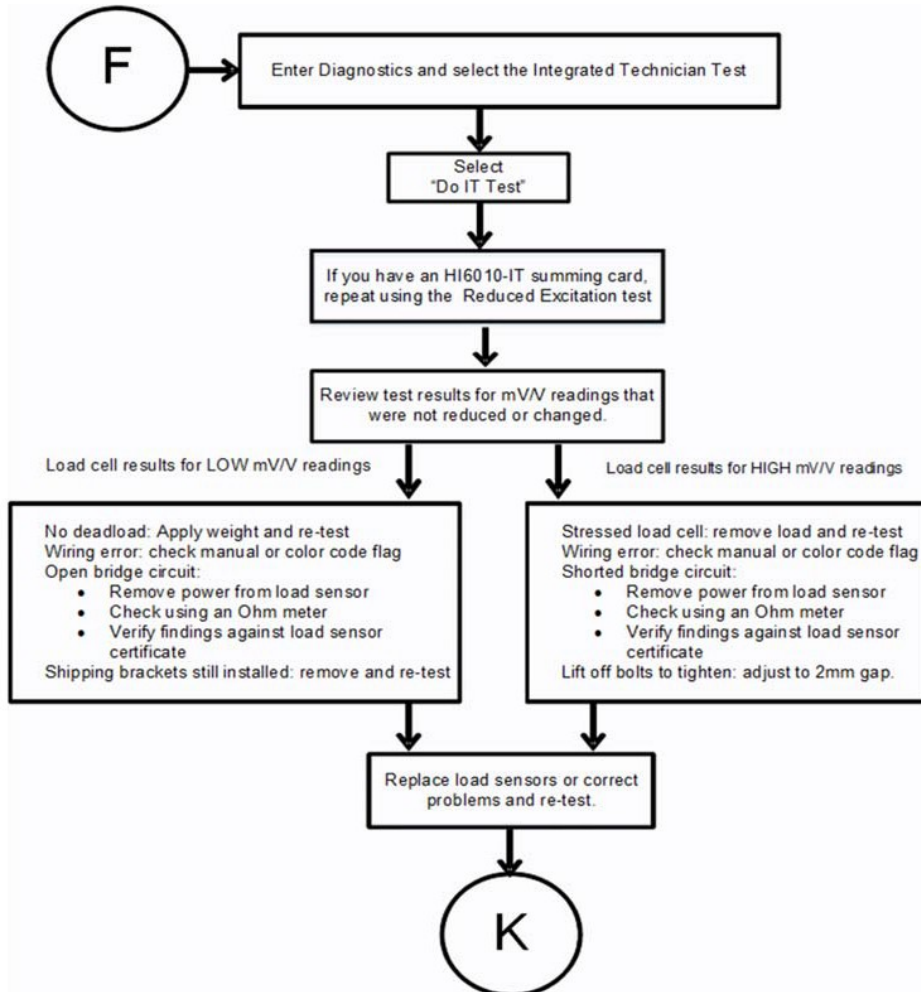
## E Testing for Non-Return to Zero (System with IT Summing Card.)



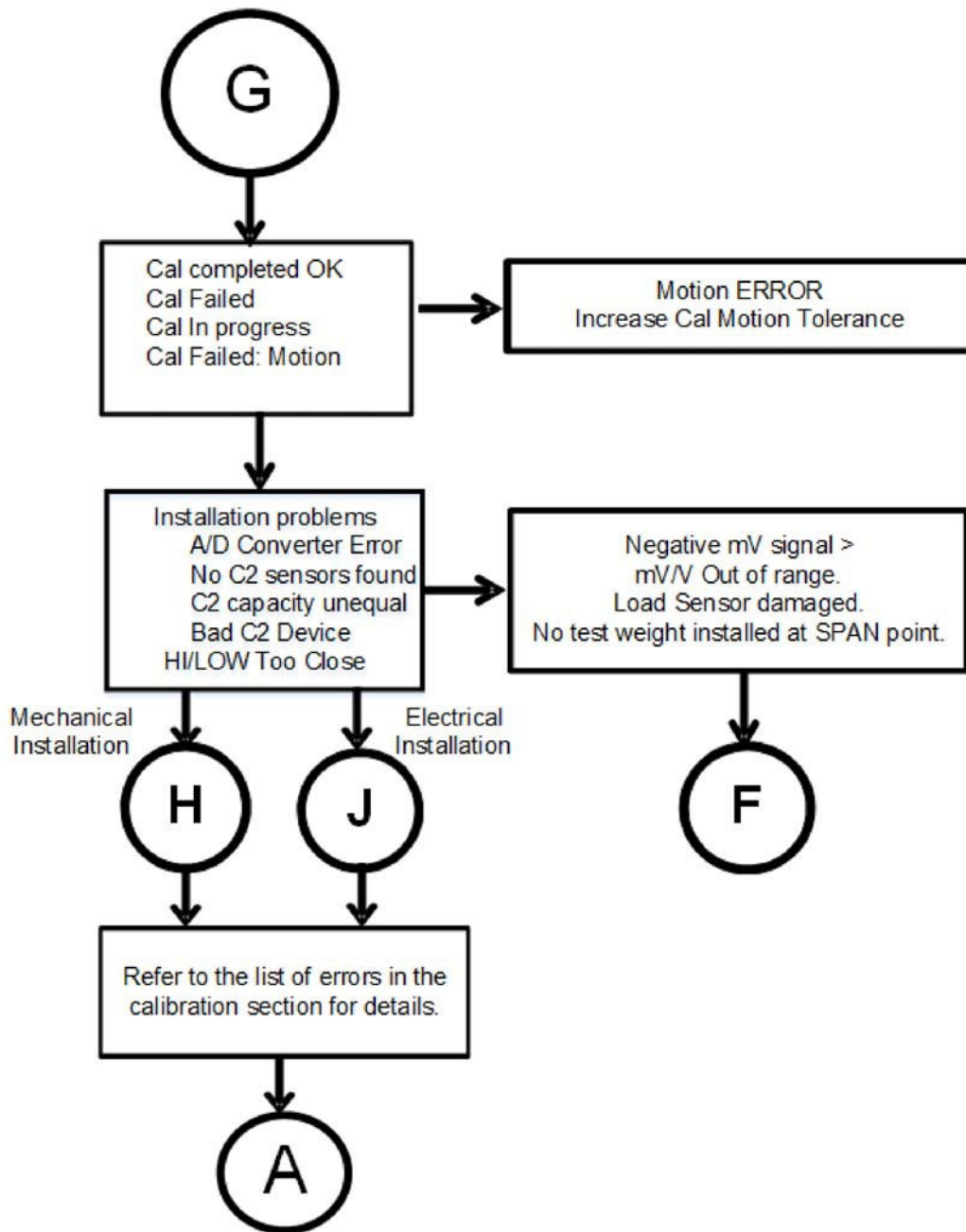
## F. Verify Individual Load Sensor Millivolt Output readings

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.

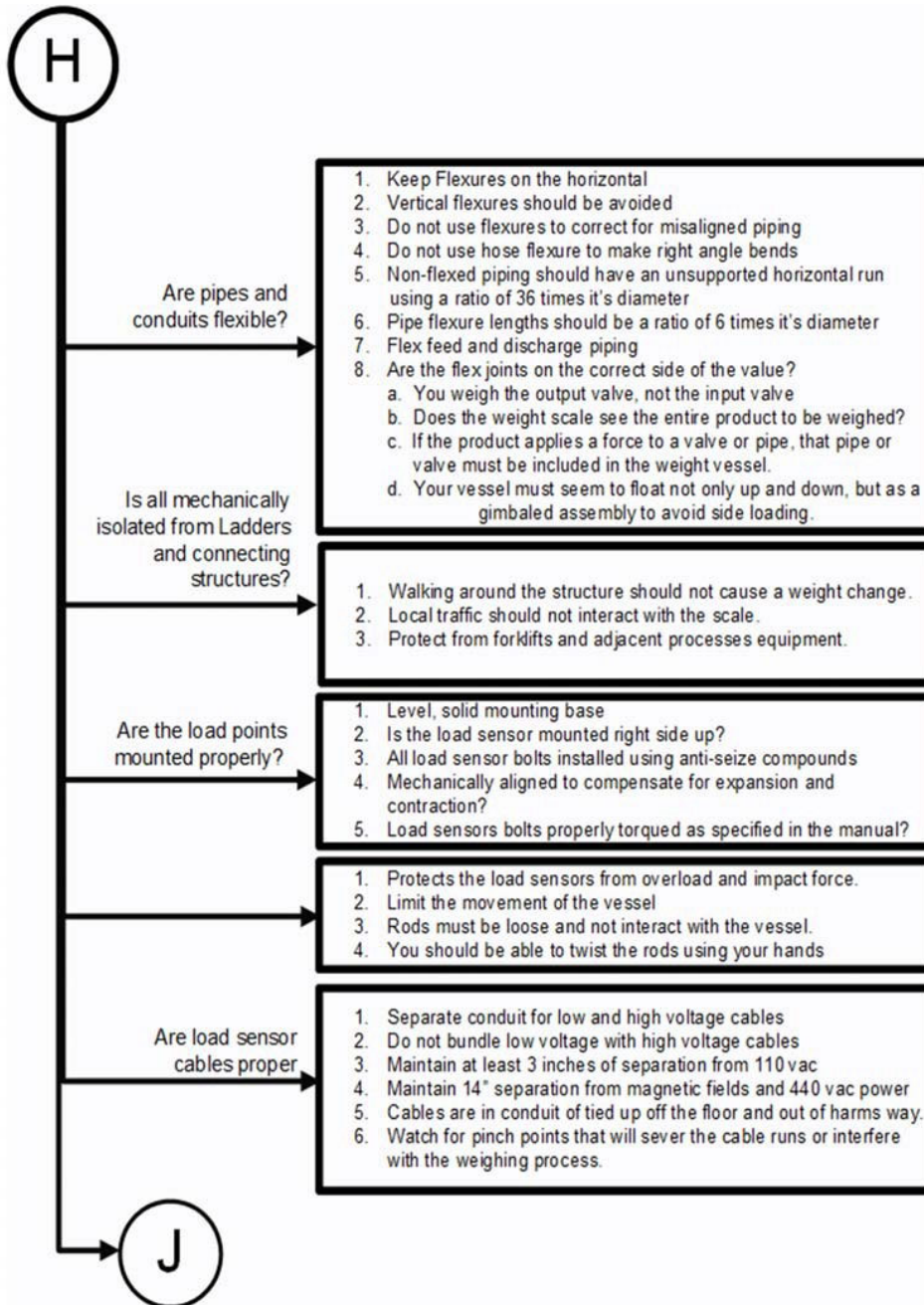
Example: A 3mV/V Load sensor produces approximately 3.0000 mV/V at rated load. If the scale capacity is 1,000 lbs with 100 lbs of deadload, when empty the load point mV/V reading should measure 0.3000 mV/V. This number can be converted to mV by multiplying the mV/V results by 5. (5V excitation)



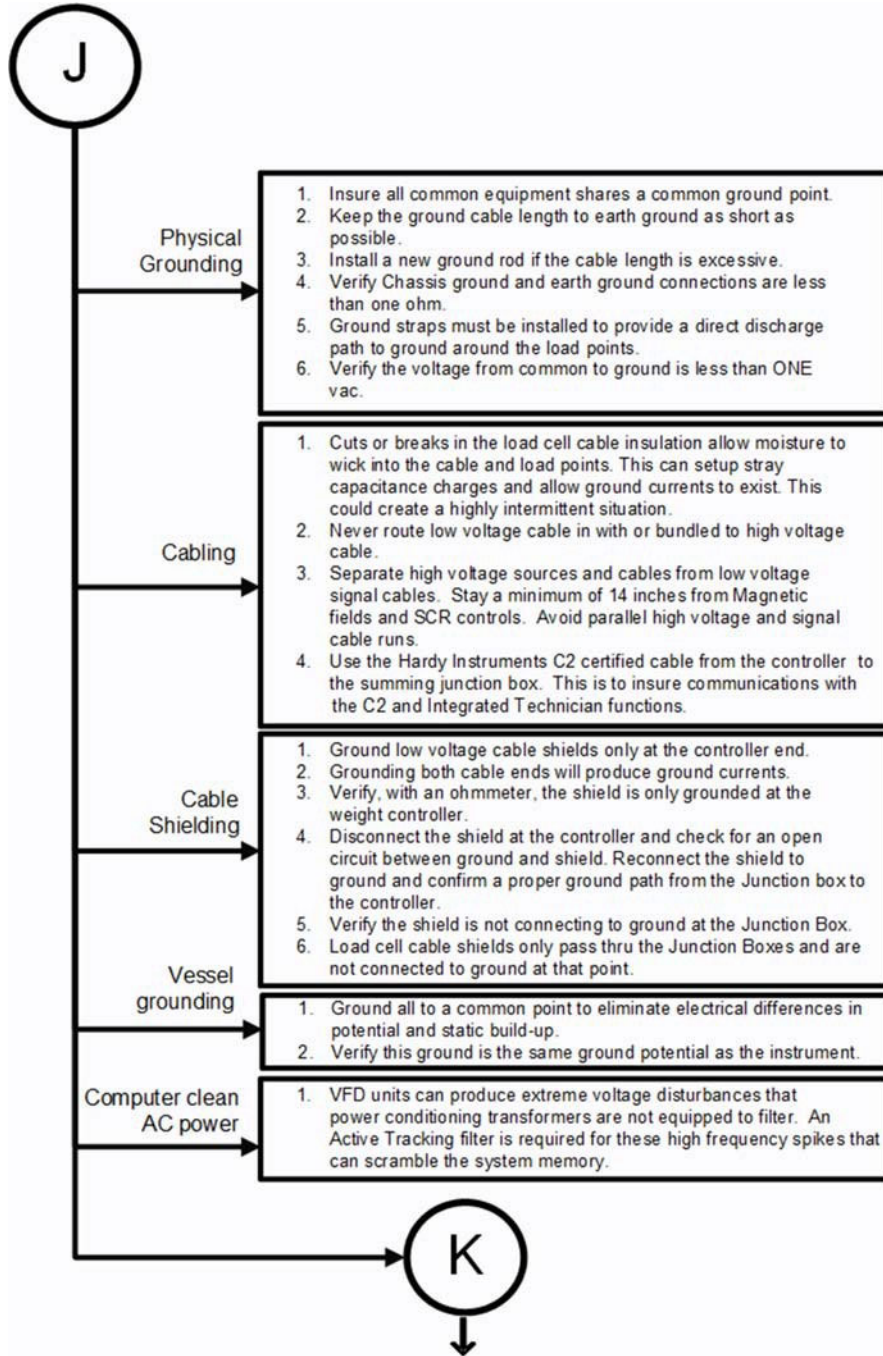
## G- Calibration Errors When Performing the Calibration



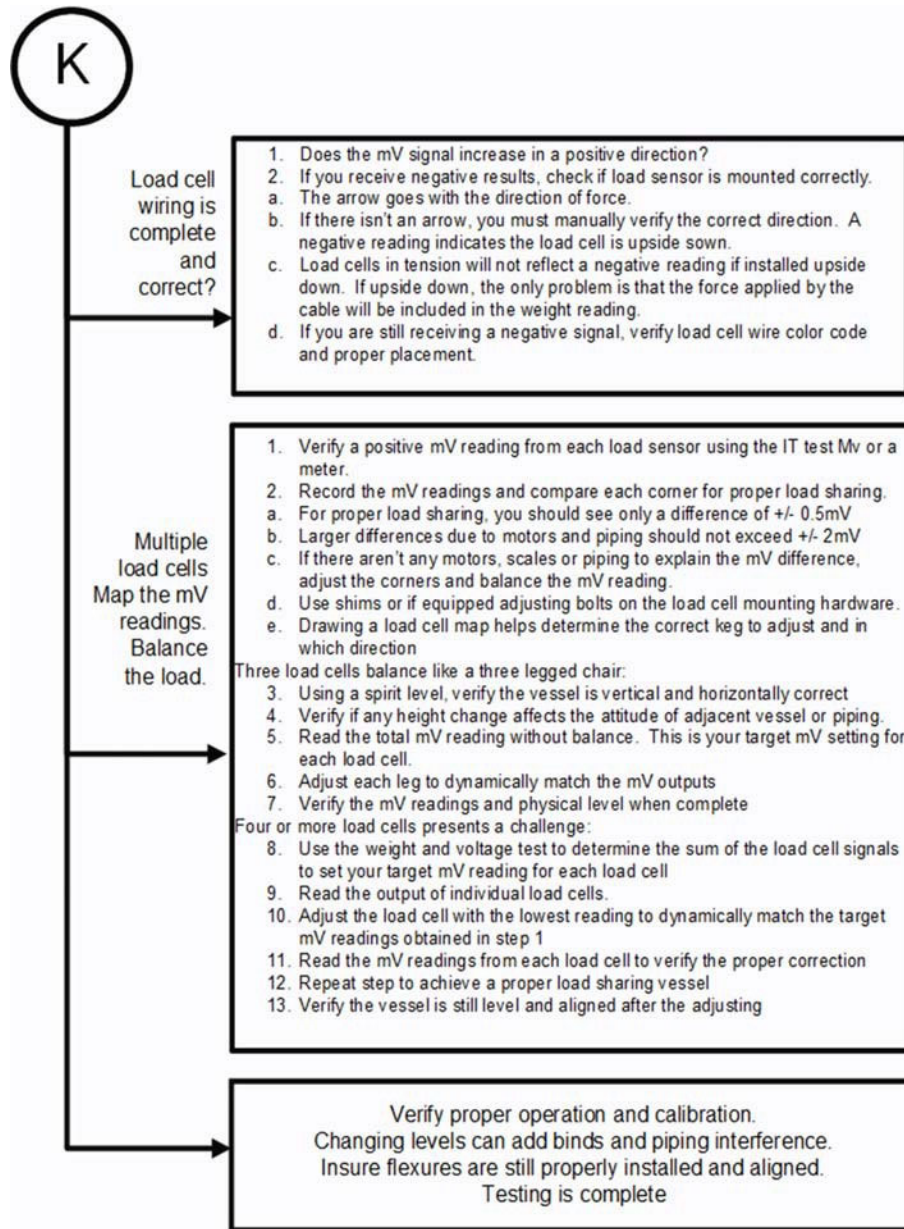
## H. Mechanical Installation



## J- Electrical Inspection

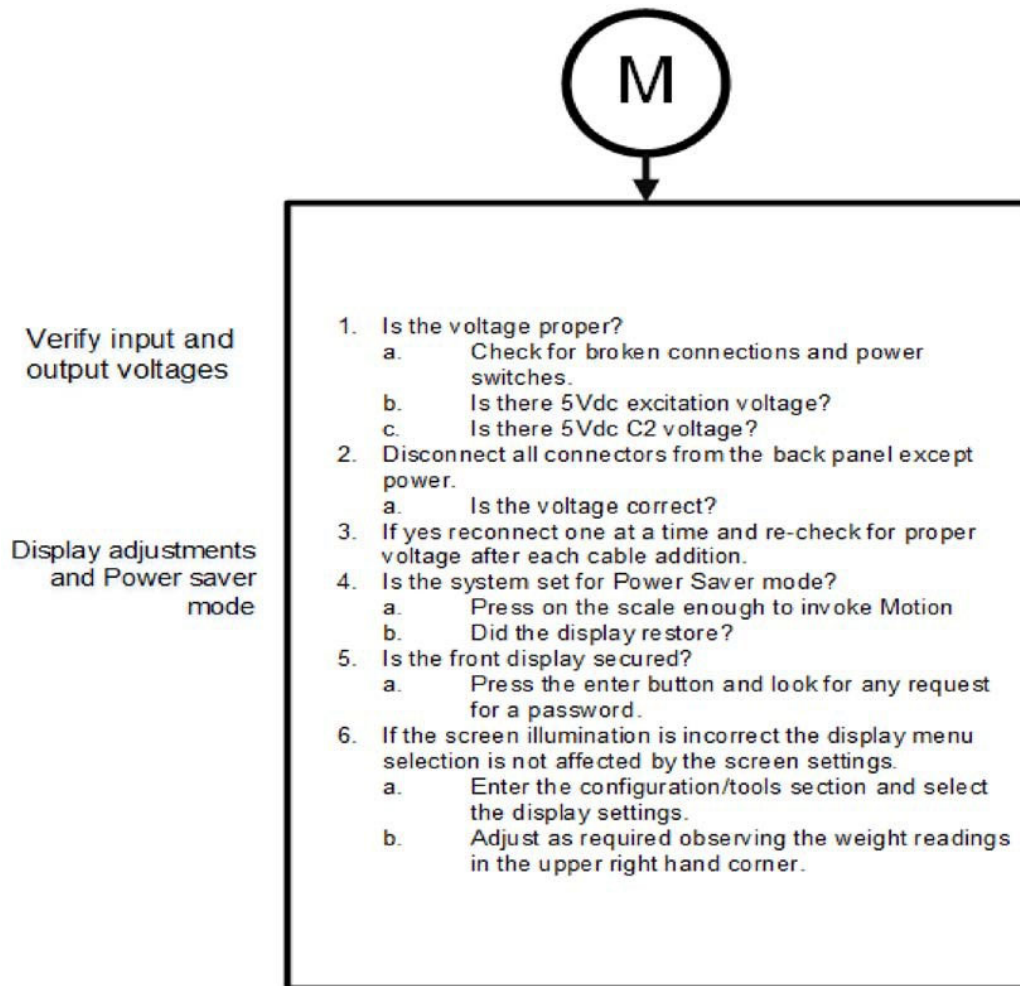


## K - Installation CheckPoints

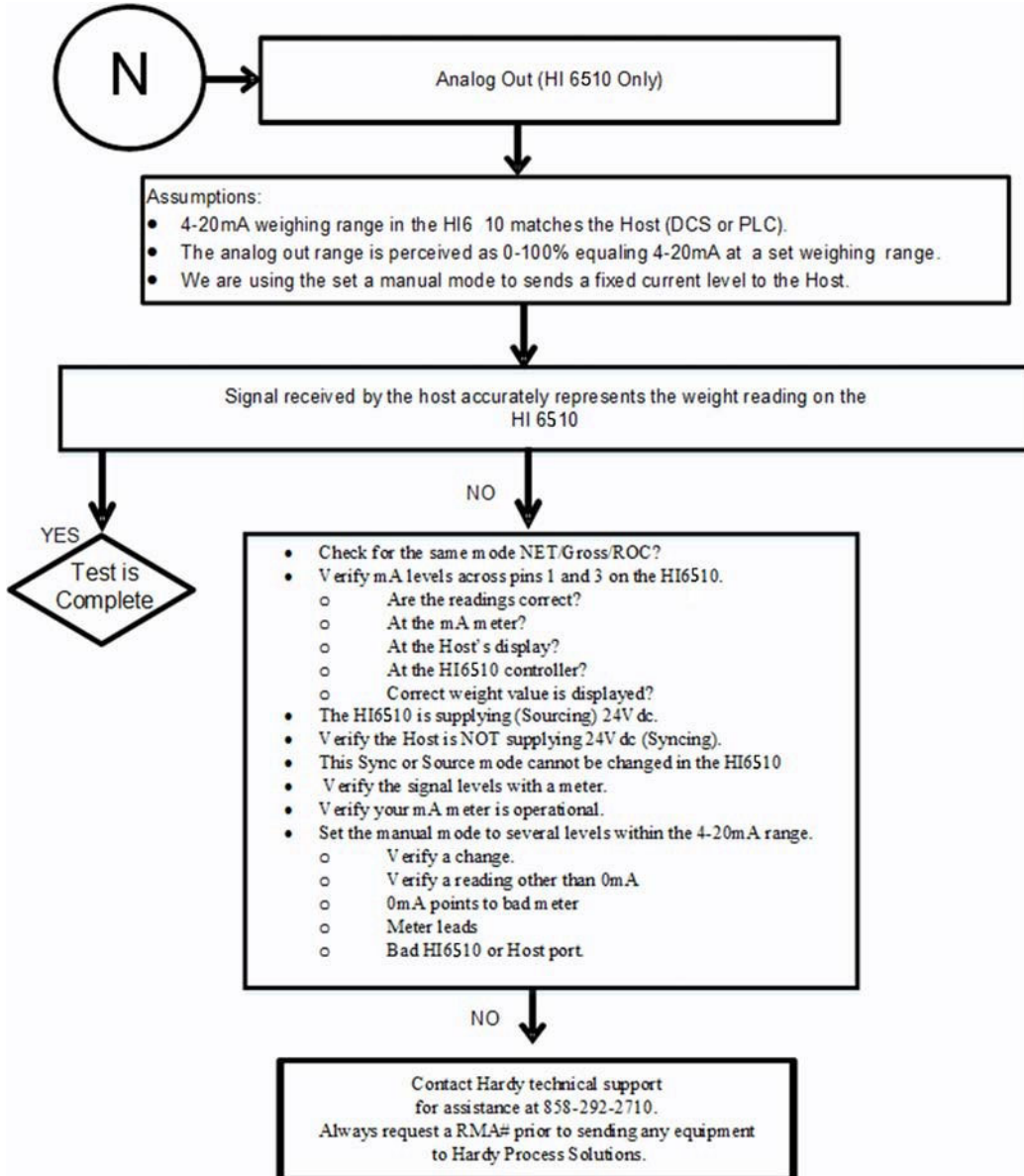




## M. Weight Processor's Front Display is Blank or Locked



## N. Analog Out (HI 6510 Only)



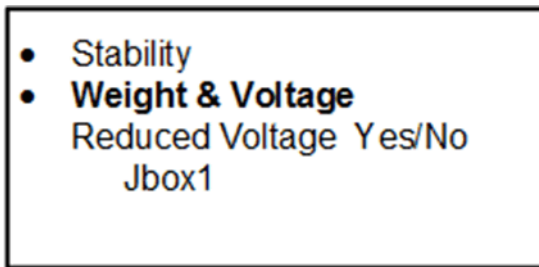
## Tests and Diagnostics

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 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 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 6500/Downloads page at:  
<http://www.hardysolutions.com/products/weighing-instruments/weight-processors/product/461/hi-6500-series>*

## Parameters

Parameters is 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 6500 to use in configuring another HI 6500 for sending a copy of your parameters to [hardysupport@hardysolutions.com](mailto:hardysupport@hardysolutions.com)

To copy the parameters:

- Step 1. Right click in the parameter list.
- Step 2. Click Select All.
- Step 3. Right click again.
- Step 4. Click Copy.

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

- Step 1. Enter the IP address of that instrument into a Web browser to display its Home page.
- Step 2. Select Operation, then Diagnostics, then Parameters, as described above.
- Step 3. Right click in the Parameter list.
- Step 4. Click Select All.
- Step 5. Right click again in the Parameter List.
- Step 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.
- Step 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 5, Configuration, for more instructions.

### Operation - Diagnostics Parameter Dump

[Other Parameters](#)

```
00000283 Firmware Revision=HI6500 1.0.0.0
00000001 Unit=4 [kg]
00000003 Grads=0 [1]
00000002 Decimal Point=2 [2]
0000000F Scale Capacity=1.00
00000004 Operator ID=DM
00000005 Instrument ID=Hardy1
00000006 WAVERSAVER=3 [1.0 Hz]
00000007 Num Averages=50
00000008 Zero Tolerance=0.40
00000009 Loadcell Sensitivity=0 [1.0 mV/V]
0000000D Motion Tolerance=0.05
0001000D Cal Motion Tolerance=0.03
00000201 Span Weight=10000.00
00000202 Ref Weight=0.00
00000203 Cal low counts=8618425
00000204 Cal high counts=8999232
00000205 Cal Span Factor=5.294424681779E-06
00000206 Zero counts=8618425
00000207 Cal Zero counts=8618425
```

Save

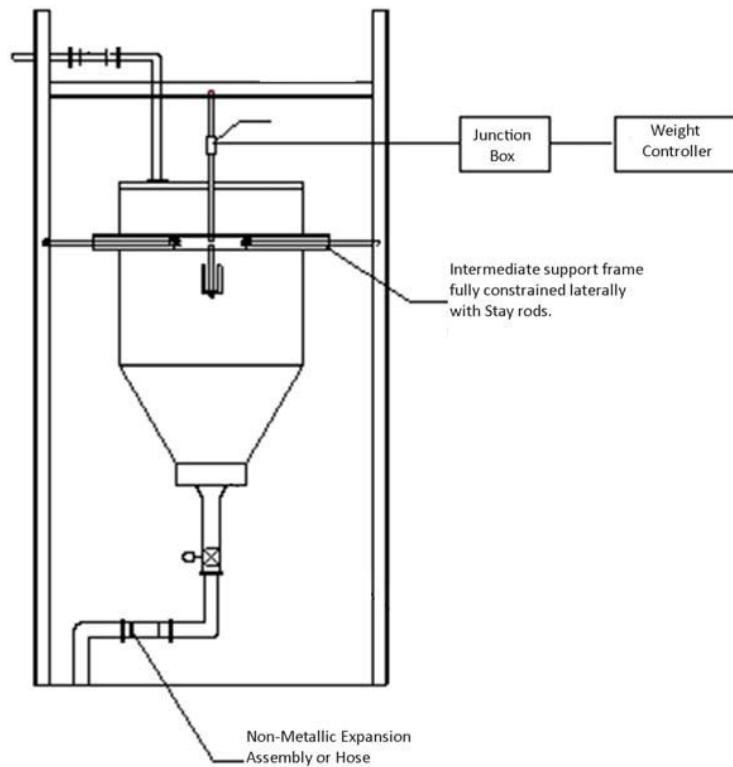
# System and Load Cell Tests

## Overview of Typical Load Cell System

The typical system consists of one or more load cells/points, a summing junction box, and an HI 6500 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 6500 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 6500 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.



## INTEGRATED TECHNICIAN

INTEGRATED TECHNICIAN<sup>®</sup> (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 6500 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 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

The Stability tests calculate the mean squared variations from the raw mean and filtered (WAVERSAVER®) mean readings. A test passes if the variation is less than 35.0.

The RTZ (return to zero) test passes if the gross weight is less than the sum of the Zero Tolerance and the Motion Tolerance parameters.

raw mean	raw variation	raw result	waversaver mean	waversaver variation	waversaver result
32930	0.03	OK	33010	0.00	OK
Gross	mV/V	RTZ			
-0.2 lb	0.0197	Pass			

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[hardysupport@hardysolutions.com](mailto:hardysupport@hardysolutions.com)

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 front panel

Step 1. From the Diagnostic menu, select Stability Test with use the down arrow and press Enter. The HI 6500 runs the test and shows the results.

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

Step 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

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 0-25mV, so a reading between 0-25mV 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 6500 and the junction or summing 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 6500.

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 front panel

The same information can be obtained from the Diagnostics menu. Select Enter to show the menu. Then select Jbox 1 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	Channel x (x/5)	
	RAW	Waversaver
Results	OK	OK
Variation	0.45	0.00
mV/V	0.0219	
Weight	-0.378605	
RTZ	PASS	

### Integrated Technician Test for the HI 6500 Over Communications

Integrated Technician testing and testing data over communications, is a simple matter of running the provided tests. There are two different tests: the normal Integrated Technician test and the Reduced Voltage Integrated Technician test. The latter requires the new HI 6020IT summing card.

#### NOTE

*The HI 6500 can use either one or two HI 6020 IT summing cards, with up to 8 load cells.*

Once the test has been run, the unit will store the data collected during the test. This data includes:

- The number of load cells specified for each junction box
- Weight readings for each load cell and the junction box ref weight.
- MV/V for each load cell and the junction box ref weight.

- Raw variation for each load cell and the junction box ref weight.
- WEVERSAVER® variation for each load cell and the junction box ref weight.
- Raw variation results (pass/fail) for each load cell and junction box ref weight.
- WEVERSAVER® variation results (pass/fail) for each load cell and junction box ref weight.
- The Return to Zero (RTZ) results (pass/fail) for each load cell and ref weight as well as the combined reading.

To run the test users need to know the parameter ID (a 32 bit hex value) for the two commands, Do IT Cmd and Do IT Reduced (voltage) Cmd.

These parameter IDs are:

0x3197 Do IT Test Cmd

0x3198 Do IT Reduced Cmd

To run the test, the user would set these parameters to a value of 1. Once the Test has been run, the user can read each parameter ID they wish for the return value of that parameter. The data will remain in the unit until the next time the IT test is run, which then would overwrite the previous data with new data.

The parameter IDs are:

- 0x3197 Do IT Test Cmd
- 0x3198 Do IT Reduced Cmd

**NOTE**

*The number of sensors reported is from a list and will show 1 less than the user's input for the number of sensors for the selected jbox.*

0x498DJBOX 1 NUMBER SENSORS

0x498EJBOX 2 NUMBER SENSORS

0x4990 WEIGHT CHAN0

0x4991 WEIGHT CHAN1

0x4992 WEIGHT CHAN2

0x4993 WEIGHT CHAN3

0x4998 WEIGHT JBOX REF1

0x4994 WEIGHT CHAN4

0x4995 WEIGHT CHAN5

0x4996 WEIGHT CHAN6

0x4997 WEIGHT CHAN7

0x4999 WEIGHT JBOX REF2

0x49A0MV/V CHAN0

0x49A1MV/V CHAN1  
0x49A2MV/V CHAN2  
0x49A3MV/V CHAN3  
0x49A8MV/V JBOX REF1  
0x49A4MV/V CHAN4  
0x49A5MV/V CHAN5  
0x49A6MV/V CHAN6  
0x49A7MV/V CHAN7  
0x49A9MV/V JBOX REF2  
0x49B0RAW VARIATION CHAN0  
0x49B1RAW VARIATION CHAN1  
0x49B2RAW VARIATION CHAN2  
0x49B3RAW VARIATION CHAN3  
0x49B8RAW VARIATION JBOX REF1  
0x49B4RAW VARIATION CHAN4  
0x49B5RAW VARIATION CHAN5  
0x49B6RAW VARIATION CHAN6  
0x49B7RAW VARIATION CHAN7  
0x49B9RAW VARIATION JBOX REF2  
0x49C0WAVERSAVER® VARIATION CHAN0  
0x49C1WAVERSAVER® VARIATION CHAN1  
0x49C2WAVERSAVER® VARIATION CHAN2  
0x49C3WAVERSAVER® VARIATION CHAN3  
0x49C8WAVERSAVER® VARIATION JBOX REF1  
0x49C4WAVERSAVER® VARIATION CHAN4  
0x49C5WAVERSAVER® VARIATION CHAN5  
0x49C6WAVERSAVER® VARIATION CHAN6  
0x49C7WAVERSAVER® VARIATION CHAN7  
0x49C9WAVERSAVER® VARIATION JBOX REF2  
0x49D0RAW VARIATION RESULT CHAN0  
0x49D1 RAW VARIATION RESULT CHAN1  
0x49D2 RAW VARIATION RESULT CHAN2

0x49D3 RAW VARIATION RESULT CHAN3  
0x49D8 RAW VARIATION RESULT JBOX REF1  
0x49D4 RAW VARIATION RESULT CHAN4  
0x49D5 RAW VARIATION RESULT CHAN5  
0x49D6 RAW VARIATION RESULT CHAN6  
0x49D7 RAW VARIATION RESULT CHAN7  
0x49D9 RAW VARIATION RESULT JBOX REF2  
0x49E0 WAVERSAVER® VARIATION RESULT CHAN0  
0x49E1 WAVERSAVER® VARIATION RESULT CHAN1  
0x49E2 WAVERSAVER® VARIATION RESULT CHAN2  
0x49E3 WAVERSAVER® VARIATION RESULT CHAN3  
0x49E8 WAVERSAVER® VARIATION RESULT JBOX REF1  
0x49E4 WAVERSAVER® VARIATION RESULT CHAN4  
0x49E5 WAVERSAVER® VARIATION RESULT CHAN5  
0x49E6 WAVERSAVER® VARIATION RESULT CHAN6  
0x49E7 WAVERSAVER® VARIATION RESULT CHAN7  
0x49E9 WAVERSAVER® VARIATION RESULT JBOX REF2  
0x49F0 RTZ CHAN0  
0x49F1 RTZ CHAN1  
0x49F2 RTZ CHAN2  
0x49F3 RTZ CHAN3  
0x49F8 RTZ JBOX REF1  
0x49F4 RTZ CHAN4  
0x49F5 RTZ CHAN5  
0x49F6 RTZ CHAN6  
0x49F7 RTZ CHAN7  
0x49F9 RTZ JBOX REF2  
0x498CRTZ COMBINED

# Appendix A

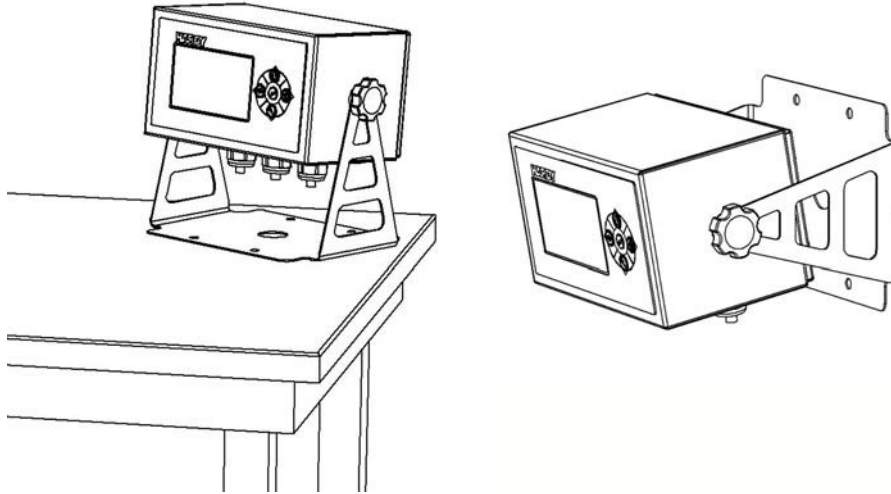
## Installation of Swivel Mount Enclosures



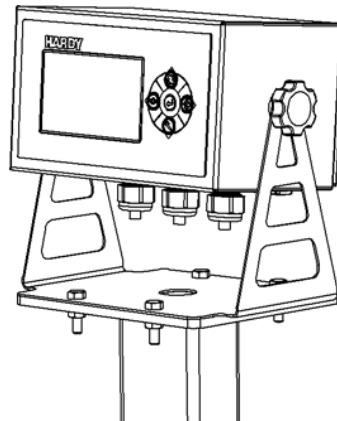
### Mounting Location

The swivel mount enclosure is designed to accommodate a wide range of installation requirements for 6300 and 6500 instruments, including mounting horizontal and vertical surfaces. It is also ideal for mounting on top of an instrument column or pedestal.

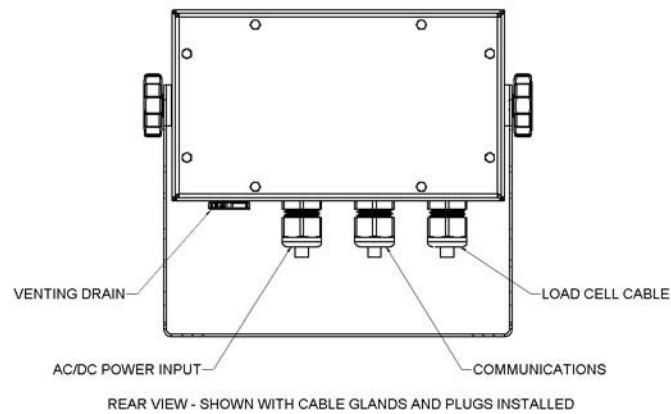
#### Table Mounted and Wall Mounted



Mounted On an Instrument Pedestal for a Bench or Floor Scale



## Swivel Mount Enclosure Rear View



## Installation of Cable Glands

Remove the back cover by loosening the 8 screws on the back of the unit. Set them aside in a safe place for re-installation after completing the wiring and assembly.

### Cable Glands Assembly

Three cable glands and one breather vent are shipped with the enclosure. Both the glands and the vent have an integrated seal to meet IP66 ingress requirements. To install, simply insert glands and vent into the pre-cut holes found on the bottom of the enclosure and secure with included backing nuts (see Figure A) by firmly tightening (torque: 40-45 in-lbs).

Also included are cable gland sealing plugs to be used in the event that communication cabling is not required. To seal a cable gland with a gland seal plug, simply insert to the midpoint of the plug and firmly tighten the gland until plug material compresses.

Figure A1: Installing the Cable Glands

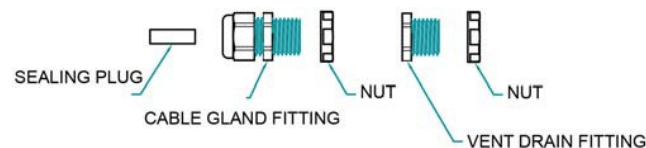
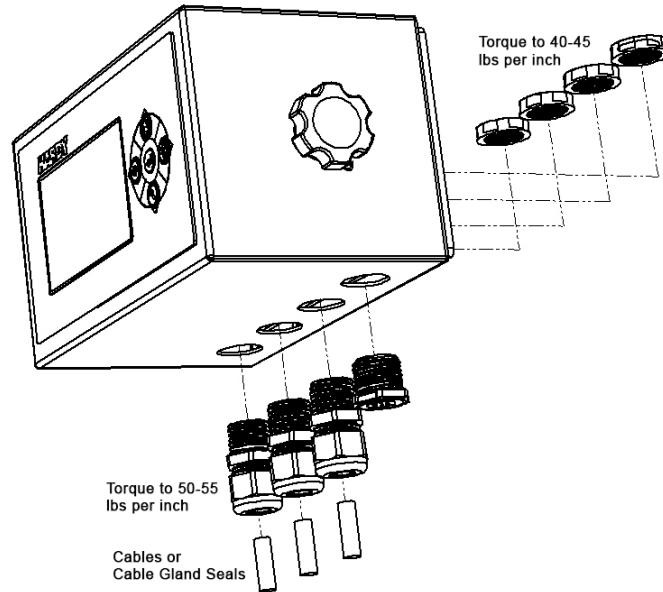


Figure A2: Exploded View Showing Cable Gland Assembly



## Wiring

Install wiring through the glands following the recommend sequence shown in Figure A. Wiring must be round and have an outside diameter between 0.17" to 0.45" (4.3mm to 11.4mm) in order to achieve a proper seal. Before tightening glands around wiring (gland seal nut torque: 50-55 in-lbs), check to be sure there is enough length of wire left inside the enclosure to reach termination points found on the instrument. Terminate wires with proper connectors, connect terminations to instrument.

**NOTE**

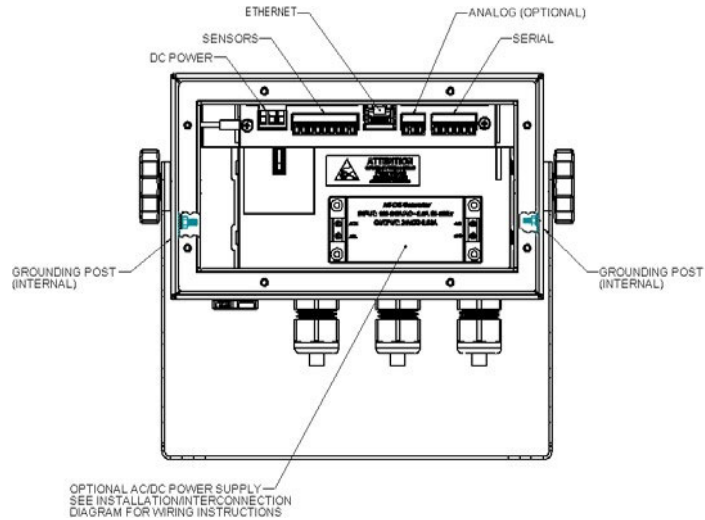
*An AC-DC power module is optional. When wiring for AC power, the ground wire must be connected to ground post using a terminal ring connector. An AC 120 volt power cord is included when ordering an AC power supply. If your installation requires 240 volt, a power cord must be sourced to meet the plug configuration and requirements of the local installation.*

**NOTE**

*IMPORTANT: Refer to I/I diagram for recommended wire gage, wire temperature rating and tightening specifications.*

**NOTE**

**Figure B: Rear Wiring Diagram for Swivel Mount Enclosure**



The AC-DC power module shown in Figure B is optional. When wiring for AC power, ground wire must be connected to the left side grounding post using the terminal ring connector supplied with the AC power cord (see Figure B).

## Assembly

Power is supplied by either directly connecting to the DC Power connector or connecting AC power to the optional AC-DC power supply. (See I/I Diagram for further detail.)

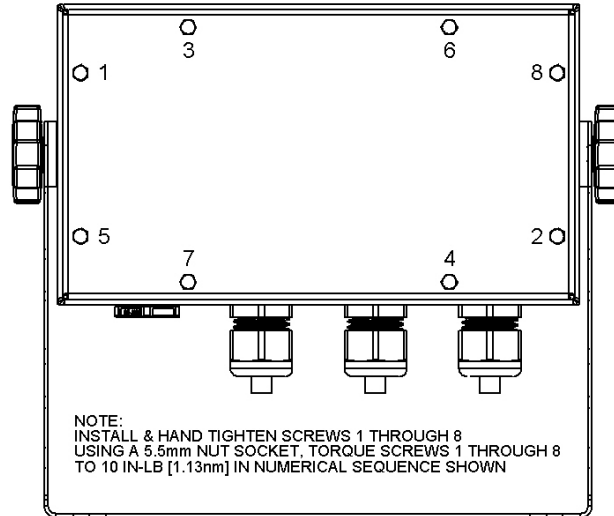
Before sealing the back of unit, it is recommend to power up the instrument to test that all connections have been properly made. Also check for proper alignment of gasket onto the back panel by making sure that the pre-cut holes in the gasket are aligned with the screw holes of the back panel.

**NOTE**

*The USB port is not accessible for an instrument mounted in a Swivel Mount Enclosure.*



**Figure C: Proper Installation of Screws in Back Panel**



Install back panel squarely over gasket on the back of the enclosure and loosely insert screws into all locations 1 thru 8 (see Figure C). Once screws are located in holes 1 through 8, tighten each screw in numerical order shown to 10 in-lbs.

**CAUTION:**

It is important to closely follow tightening instructions to achieve a proper seal. Assembly of the screws in any other order could cause the gasket material to tear, resulting in loss of ingress protection.

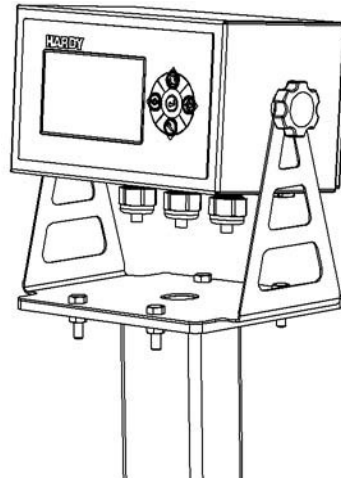
**ATTENTION**

Il est important de suivre de près les instructions de serrage pour obtenir une bonne étanchéité. Assemblée dans un autre ordre pourrait entraîner le matériau de joint à déchirer, entraînant une perte de protection contre la pénétration.

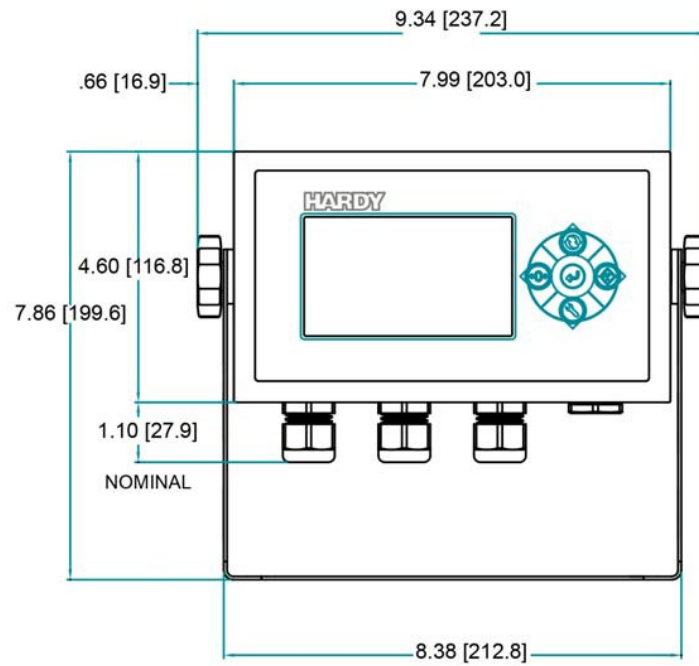
Finish assembly and mounting per the diagram below.

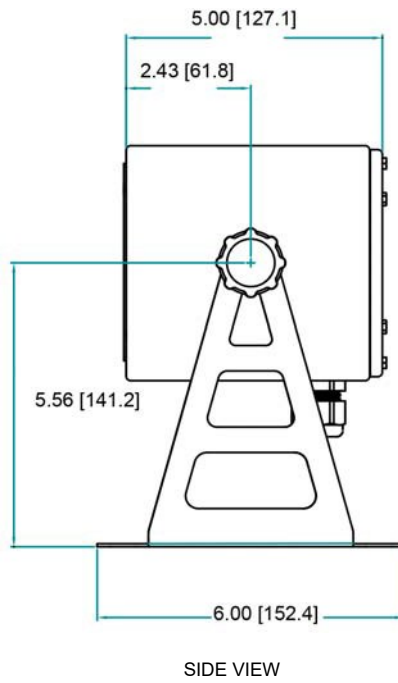
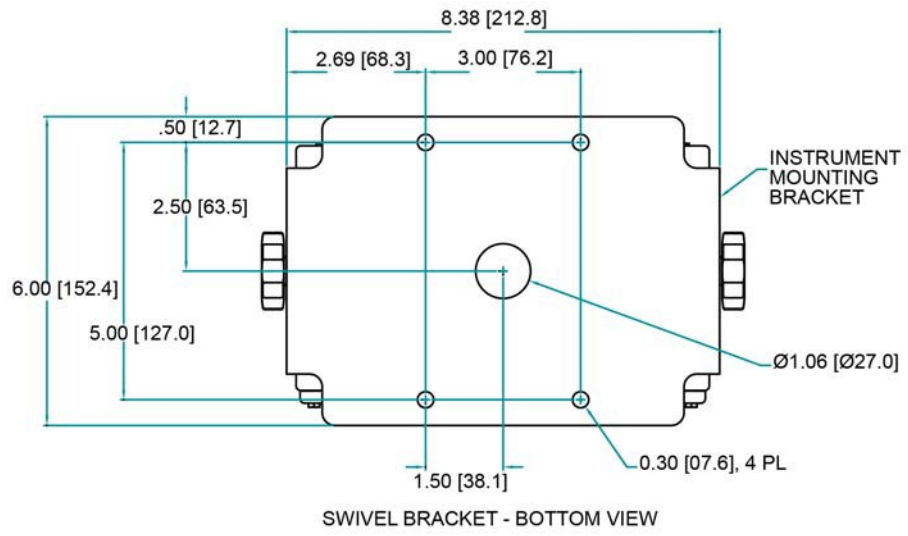
- 1** Position enclosure between mounting stand.
- 2** Insert rubber washer between enclosure and stand.
- 3** Insert thumb screws and loosely tighten.
- 4** Adjust the front display viewing angle.
- 5** Firmly tighten thumb screws.

Figure E: The Assembled Swivel Mount Enclosure on an Indicator Stand



## Dimensions







# Appendix B

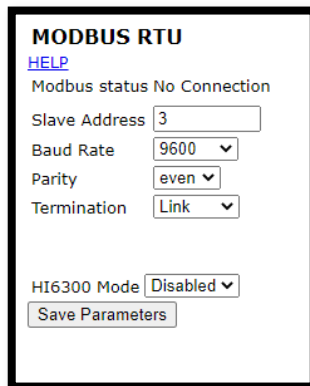
## HI6300 Emulation Mode



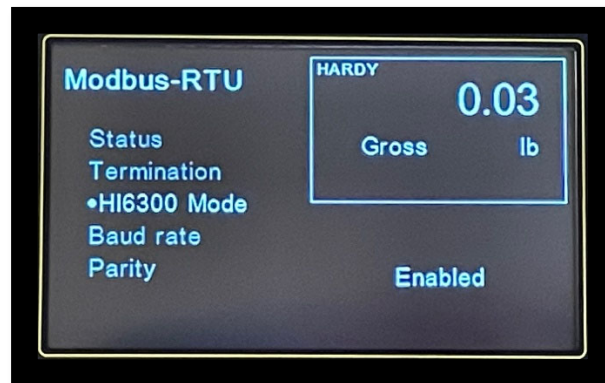
### Overview

The HI6300 Emulation Mode is designed to allow HI6500 and HI6510 instruments to be reverse compatible with HI6300 and HI6310 instruments. Using the HI6300 Emulation Mode enables HI6500/HI6510 instrumentation to replicate the **Modbus I/O** tables of HI6300/HI6310 instruments. In addition, when using **Ethernet TCP/UDP**, the HI6300 Emulation mode also changes the Command IDs the HI6500/HI6510 instrumentation to replicate Command IDs of the HI6300/HI6310 instrumentation.

- 1) Enabling the HI6300 Emulation Mode.
  - a) Using the Web browser or the front panel display, navigate to Configuration > Communication > and select either **Modbus RTU** or **Ethernet TCP/IP, UDP**.



Web browser



Front panel display

- b) Using the Web browser, use the pull-down menu to either Enable or Disable the feature, click Save Parameter when finished. Using the front panel display, use the arrows keys to select HI6300 Mode and the enter key to cycle between Enable and Disable; use the back arrow to navigate away from the selection to save.

Note: Enabling the HI6300 Mode in one location will enable the mode for both **Modbus RTU** or **Ethernet TCP/IP, UDP**.

2) With the HI6300 Mode *Enabled*, the Modbus RTU I/O tables will change as follows:

HI6300 Mode <i>DISABLED</i>		HI6300 Mode <i>ENABLED</i>	
6500 Input Table	Bytes	6300 Input Table	Bytes
Command Echo	4	command	2
Command Status	4	Parameter ID	4
Parameter ID	4	parameter value	4
Parameter Value	4	Net Weight	4
Instrument Status	4	Gross Weight	4
<b>Net Weight</b>	4		
<b>Gross Weight</b>	4		
Parameter RD1 Value	4		
Parameter RD2 Value	4		
Parameter RD3 Value	4		
Parameter RD4 Value	4		
Parameter RD5 Value	4		

Modbus RTU Input Table

HI6300 Mode **DISABLED**

6500 Output Table	Bytes
Command	4
Aux Command Informa	4
Parameter ID	4
Parameter Value	4
Reserved1	4
Reserved2	4
Reserved3	4
Parameter RD1 ID	4
Parameter RD2 ID	4
Parameter RD3 ID	4
Parameter RD4 ID	4
Parameter RD5 ID	

HI6300 Mode **ENABLED**

6300 Output Table	Bytes
command	2
status	2
Parameter number	4
parameter value	4

Modbus RTU Output Table

- 3) With the HI6300 Mode **Enabled**, the Ethernet TCP/UDP parameter IDs will change as follows:

HI6300 Mode **DISABLED**

HI6500 Parameter ID/CMD	
Display Mode	0x8083
Net Weight	0x6082
Gross Weight	0x6081
Tare Command	0x6781

HI6300 Mode **ENABLED**

HI6300 Parameter ID/CMD	
Display Mode	40103
Net Weight	91
Gross Weight	90
Tare Command	0x07FF

- 4) Refer to HI6300 Series manual located in the legacy section of the Hardy website for additional details.





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